JET COMMERCIAL LLC

INJURY AND ILLNESS PREVENTION PROGRAM

FOR THE STATE OF SOUTH CAROLINA

PRINT DATE: FEBRUARY 22, 2021

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SCOPE

In South Carolina, the state's Occupational Safety and Health Plan (SCOSH) is operated by the South Carolina Department of Labor, Licensing, and Regulation (SCDLLR). SCOSH exercises jurisdiction over all private and public sector workplaces within the state, with the exception of: private sector maritime activities; employment on military bases; Savannah River and Three Rivers Solid Waste Authority private sector employment; federal government workers; and the U.S. Postal Service (USPS).

The information in this foreword provides general requirements for all industries, including information regarding worker protection and complaint procedures.

STATE REGULATIONS

The South Carolina Occupational Safety and Health Act requires employers to comply with safety and health standards adopted by the state's DLLR. To assure compliance with the rules, DLLR safety and health inspectors conduct periodic inspections.

Most of the South Carolina safety and health regulations are aligned with federal OSHA's code of regulations (29 CFR 1910 and 1926). The state has defined specific regulations governing spray finishing, the definition of a "competent person" with regard to excavation work, respirator use when working in "immediately dangerous to life or health" (IDLH) atmospheres, and the use of powered industrial trucks for lifting personnel.

Details of the state requirements can be found in the South Carolina Code of Laws – Title 41: Labor and Employment, Chapter 15: Occupational Health and Safety.

The remainder of this foreword contains reporting and other regulatory information that is specific to North Carolina.

The chapters that follow this foreword contain information that is aligned, at a minimum, to OSHA standards. If an applicable OSHA standard does not exist, or is superseded by another regulatory agency or state-specific requirement, the most stringent standard available will be provided.

LABOR LAW POSTERS

In addition to the required federal posters, all employers are required to post the S.C. OSHA poster at the jobsite. Employers with 11 or more employees must record on-the-job injuries and illnesses on the OSHA 300 form.

REPORTING

The following sections provide information for reporting unsafe workplaces, job-related incidents, and filing for workers' compensation. Although South Carolina operates its own OSHA program, unsafe workplace complaints and injury/fatality reports can always be filed with the federal OSHA offices, which will direct the information to the proper South Carolina office.

INCIDENT & ACCIDENT REPORTING

All JET Commercial LLC employees will report all work-related injuries, illnesses, or “near-miss” events to their supervisor as soon as possible. OSHA defines an incident as a near miss or an event resulting in property damage, and an accident as an event resulting in injury or death.

Employers must report any work-related amputation, loss of an eye, or in-patient hospitalization of any employee, within 24 hours of the incident, and all fatalities as soon as possible, and within eight hours of occurrence or notification.

The state and federal contact information for reporting is listed below:

South Carolina OSHA

P.O. Box 11329

Columbia, S.C.

General Information

Phone: 803-896-7665

Fax: 803-896-7670

Accident Reporting

803-896-7672 (24-hour service)

(Fatalities and catastrophes must be reported to the Office of S.C. OSHA within eight hours of death)

Employee Complaints

(To make a complaint regarding workplace safety and health)

Phone: 803-896-7825

Fax: 803-896-7670

Federal OSHA Offices:

Regional Office

61 Forsyth Street, SW

Room 6T50

Atlanta, Georgia 30303

Phone: 678-237-0400

Fax: 678-237-0447

Columbia Area Office

Strom Thurmond Federal Building

1835 Assembly Street, Room 1472

Columbia, South Carolina 29201-2453

Phone: 803-765-5904

Fax: 803-765-5591

UNSAFE WORKPLACE

Any employee who believes there is a safety or health violation in the workplace should notify his/her supervisor immediately. If the employer does not correct the condition, the employee may file a complaint by completing a Notice of Safety or Health Hazards form and submitting it to S.C. OSHA. This form is available online at the S.C. OSHA website, and can be faxed or mailed to the S.C. OSHA number/address listed above. A copy of this form is also attached to the end of this foreword.

Safety and health complaints are divided into several categories:

Imminent Danger Complaint

Any complaint, whether formal or informal, that is determined to be an imminent danger will be investigated within 24 hours. An imminent danger is any condition or practice that could reasonably be expected to cause death or serious physical harm.

Formal Complaint

Subarticle V, Section 71-508 of the Rules and Regulations defines the requirements for a formal complaint. The complaint must:

- Be submitted in writing (either on a DOSH-C-7 form or in a letter)
- Allege that a violation of the South Carolina Occupational Safety and Health Act exists in the workplace
- Explain the details of the condition that exists. The complaint doesn’t need to reference a specific standard; it need only specify a condition or practice that is hazardous, and if uncommon, why it is hazardous
- Be signed by one or more employees or their representatives

In order to submit a formal complaint, the complainant must be a present employee of the employer whose establishment is being complained about. A complaint by a former employee is not considered a formal complaint unless the former employee alleges discrimination for exercising his or her rights under the Act.

A formal complaint may also be submitted by:

- Any authorized representative of the employee bargaining unit, such as certified or recognized labor organizations
- An attorney acting for an employee
- A member of the employee's family, who is purporting to act as a representative of the employee, will be presumed to be the employees' representative unless the Compliance Officer/Industrial Hygienist has specific information that the complaint was submitted without the employees knowledge

Informal Complaints

A complaint that does not meet the formal requirements of S.C. Rules and Regulations will be considered informal and no inspection will be conducted.

Upon receipt of a written informal complaint, the complainant will be provided a written explanation stating:

- Why the complaint does not meet the formality requirements
- That no inspection can be made
- That a letter will be sent to the employer requesting voluntary correction of the hazard. A copy of the letter to the employer will be included with the letter to the complainant.

If the complaint does not contain sufficient information to determine whether it is formal or informal, the complainant will be contacted for additional information.

If the employer provides an inadequate response or fails to respond, an inspection may be scheduled at the Compliance Manager's discretion.

When action taken by the employer is disputed by the complainant, the Compliance Manager may at his/her discretion schedule an inspection.

Oral Complaints

If an oral complaint appears to meet the requirements for a formal complaint, except for the written requirement, the complainant will be advised to file a written complaint as prescribed by law.

- A complainant's identity will remain confidential, if requested
- Protection against discrimination is provided by law under Section 41-15-510
- No inspection can be conducted until the written complaint has been received by S.C. OSHA. The complaint must be returned within 15 calendar days
- If an oral complainant is not an employee or employee representative, the complainant must be informed why no action can be taken on the complaint

DISCRIMINATION

An employee who believes that he or she has been discharged or otherwise discriminated against in violation of Section 41 15 510 may file a complaint, within 30 days of the violation, with the director of the Department of Labor, Licensing and Regulation alleging the discrimination. Contact the S.C. DLLR for more information.

WORKERS' COMPENSATION

If a South Carolina employee is injured on the job, they should:

- Notify their employer at once. Employees can't receive benefits unless their employer knows they are injured. Injuries must be reported within 90 days of the occurrence. Although employees must report the injury within 90 days, they have up to two years to file a claim for benefits
- Tell the doctor that the employer sends them to that they are covered by Workers' Comp
- Notify the Workers' Comp. provider below or the S.C. Workers' Comp. Commission at 803-737-5700 if they experience undue delays or problems with their claim

Employees may file a claim personally if their employer does not report the accident, denies the employee's injury by accident, or if the employee believes they did not receive all of their benefits. To file a claim, employees must submit a Form 50 or Form 52 to the Commission. These forms can be completed online at the Workers' Compensation Commission website: http://www.wcc.sc.gov/Pages/FAQ%20Employees.aspx. Copies of these forms are also attached to the end of this foreword, and can be mailed to the address below.

S.C. Workers' Compensation Commission

1333 Main Street

Columbia, S.C. 29201

(803) 737-5700

www.wcc.sc.gov

When filing a claim on a Form 50 or Form 52, mark box 13a, which states, "I am filing a claim. I am not requesting a hearing at this time."

In case of accidental injury or death to an employee, the injured employee, or someone acting on his or her behalf, must give immediate notice to the employer or general authorized agent. Failure to give such immediate notice may be the cause of serious delay in the payment of compensation to the injured employee, or his or her dependents, and may result in failure to receive any compensation benefits under the law.

TRAINING

The South Carolina Department of Labor, Licensing and Regulation requires employers to train their employees before they engage in any tasks or activities that may endanger their health or safety. Employers must ensure that their employees are competent before beginning work, or the employees must work under the supervision of a competent worker.

In order to establish the presence and degree of onsite safety hazards, employers should perform a job hazard analysis (JHA) that mitigates and handles the hazards. The analysis will include the following:

- The tasks to be performed
- The equipment to be used and/or operated
- The work environment and atmosphere
- The health and safety risks inherent to the work

An onsite competent professional, or trainers from an approved third-party source, may conduct training.

The training system must include methods that, at a minimum:

- Determine the level of competence required by workers who perform hazardous tasks, and furthermore evaluate the competence of workers who presently perform such tasks
- Ensure employees who are not competent to complete a hazardous task are reassigned or trained appropriately
- Ensure that training takes place when workers experience changes in equipment, processes, or their environment, and that the training includes updated content that reflects the workplace changes

ATTACHMENTS

- South Carolina Notice of Safety or Health Hazards
- South Carolina Employers' First Report of Injury – Form 12A
- South Carolina Workers' Compensation – Form 50
- South Carolina Workers' Compensation – Form 52

NOTE: These forms are also available online, either as downloadable or fillable forms, at the websites listed below.

- http://www.scosha.llronline.com/index.asp?file=complaint.htm#
- http://www.wcc.sc.gov/welcomeandoverview/forms/Pages/default.aspx

INSTRUCTIONS FOR COMPLETING OSHA SAFETY/HEALTH COMPLAINT FORM

1. Complaint Number: Leave blank

2. Employer Name: Company name

3. Site Location (Street, City, State, and Zip): Physical address

4. Mailing Address: If different from physical address

5. Management Official: Name of management person and title

6. Telephone Number: Company telephone number

7. Type of Business: What product is made? What work is being done?

8. Hazard Description: What is the safety and health hazard?

9. Hazard Location: Where in the facility is the hazard located?

10. Has condition been brought to the attention of your employer or a different government agency? (Please check blocks that apply).

11. Please indicate your desire to reveal your name, or not to reveal your name, to the employer.

12. What is your current status with the company: employee, former employee, relative of employee, representative (lawyer, doctor, union, etc.)

13. Complainant Name: Your name

14. Telephone Number: A number where you can be reached

15. Address: Your current mailing address

16. Signature: Please sign the complaint form.

17. Date: Please date the form when you sign it.

18. Representative of Employee: Complete this if you are an attorney or union representative.

Notice of Alleged Safety or Health Hazards

South Carolina Department of Labor, Licensing & Regulation
Division of Occupational Safety and Health

MOD	Date	1. Complaint Number

2. Employer Name

3. Site Location (Street, City, State, ZIP)

4. Mailing Address (If different) (Street, City, State, ZIP):

5. Management Official	6. Telephone Number

7. Type of Business

8. Hazard Description: Describe briefly the hazard(s) which you believe exist: include the appropriate number of employees exposed to or threatened by each hazard.

9. Hazard Location: Specify the particular building or worksite where the alleged violation exists.

10. Has this condition been brought to the attention of (Mark " X" in all that apply)

☐ Employer ☐ Other Government Agency (specify)_____

11. Please indicate your desire:

☐ Do not reveal my name to the Employer ☐ My name may be revealed to the Employer

12. The Undersigned (Mark " X" in one box)

☐ Employee ☐ (Not used)

☐ Representative of Employees ☐ Other (specify)_____

Believes that a violation of an Occupational Safety or Health standard exists which is a job safety or health hazard at the establishment named on this form.

13. Complainant Name (Type or print name)	14. Telephone Number

15. Address (Street, City, State, Zip)

16. Signature	17. Date

18. If you are an authorized representative of employees affected by this complaint, please state the name of the organization that you represent and your title.

Organization Name: Your Title:

South Carolina Workers' Compensation Commission
1333 Main Street, Suite 500
P.O. BOX 1715
Columbia, SC 29202-1715
803-737-5722

EMPLOYER'S INSTRUCTIONS

DO NOT ENTER DATA IN SHADED FIELDS

DATES:
Enter all dates in MM/DD/YYYY format.

INDUSTRY CODE:
This is the code which represents the nature of the employer's business, which is contained in the Standard Industrial Classification Manual or the North American Industry Classification System, published by the Federal Office of Management and Budget.

CARRIER:
The licensed business entity issuing a contract of insurance and assuming financial responsibility on behalf of the employer of the claimant.

CLAIMS ADMINISTRATOR:
Enter the name of the carrier, third party administrator, state fund, or self-insured responsible for administering the claim.

AGENT NAME & CODE NUMBER:
Enter the name of your insurance agent and his/her code number if known. This information can be found on your insurance policy.

OCCUPATION/JOB TITLE:
This is the primary occupation of the claimant at the time of the accident or exposure.

EMPLOYMENT STATUS:
Indicate the employee's work status. The valid choices are:
Full-Time On Strike Unknown Volunteer
Part-Time Disabled Apprenticeship Full-Time Seasonal
Not Employed Retired Apprenticeship Part-Time Piece Worker

DATE DISABILITY BEGAN:
The first day on which the claimant originally lost time from work due to the occupation injury or disease or as otherwise designated by statute.

CONTACT NAME/PHONE NUMBER:
Enter the name of the individual at the employer's premises to be contacted for additional information.

TYPE OF INJURY/ILLNESS:
Briefly describe the nature of the injury or illness, (e.g. Lacerations to the forearm).

PART OF BODY AFFECTED:
Indicate the part of body affected by the injury/illness, (e.g. Right forearm, lower back).

DEPARTMENT OR LOCATION WHERE ACCIDENT OR ILLNESS EXPOSURE OCCURRED:
(e.g. Maintenance Department or Client's office at 452 Monroe St., Washington, DC 26210)

If the accident or illness exposure did not occur on the employer's premises, enter address or location. Be specific.

South Carolina Workers' Compensation Commission
1333 Main Street, Suite 500
P.O. BOX 1715
Columbia, SC 29202-1715
803-737-5722

EMPLOYER'S INSTRUCTIONS – cont'd

ALL EQUIPMENT, MATERIAL OR CHEMICALS EMPLOYEE WAS USING WHEN ACCIDENT OR ILLNESS EXPOSURE OCCURRED:

(e.g. Acetylene cutting torch, metal plate)

List all of the equipment, materials, and/or chemicals the employee was using, applying, handling or operating when the injury or illness occurred. Be specific, for example: decorator's scaffolding, electric sander, paintbrush, and paint.

Enter "NA" for not applicable if no equipment, materials, or chemicals were being used. NOTE: The items listed do not have to be directly involved in the employee's injury or illness.

SPECIFIC ACTIVITY THE EMPLOYEE WAS ENGAGED IN WHEN THE ACCIDENT OR ILLNESS EXPOSURE OCCURRED:

(e.g. Cutting metal plate for flooring)

Describe the specific activity the employee was engaged in when the accident or illness exposure occurred, such as sanding ceiling woodwork in preparation for painting.

WORK PROCESS THE EMPLOYEE WAS ENGAGED IN WHEN ACCIDENT OR ILLNESS EXPOSURE OCCURRED:

Describe the work process the employee was engaged in when the accident or illness exposure occurred, such as building maintenance. Enter "NA" for not applicable if employee was not engaged in a work process (e.g. walking along a hallway).

HOW INJURY OR ILLNESS/ABNORMAL HEALTH CONDITION OCCURRED. DESCRIBE THE SEQUENCE OF EVENTS AND INCLUDE ANY OBJECTS OR SUBSTANCES THAT DIRECTLY INJURED THE EMPLOYEE OR MADE THE EMPLOYEE ILL:

(Worker stepped back to inspect work and slipped on some scrap metal. As worker fell, worker brushed against the hot metal.)

Describe how the injury or illness/abnormal health condition occurred. Include the sequence of events and name any objects or substance that directly injured the employee or made the employee ill. For example: Worker stepped to the edge of the scaffolding to inspect work, lost balance and fell six feet to the floor. The worker's right wrist was broken in the fall.

DATE RETURN(ED) TO WORK:

Enter the date following to most recent disability period on which the employee returned to work.

S.C. WORKERS' COMPENSATION COMMISSION – FIRST REPORT OF INJURY OR ILLNESS

EMPLOYER (NAME & ADDRESS INCL ZIP)	CARRIER/ADMINISTRATOR CLAIM NUMBER	OSHA LOG NUMBER	REPORT PURPOSE CODE
	JURISDICTION	JURISDICTION CLAIM NUMBER	
	INSURED REPORT NUMBER		
	EMPLOYER'S LOCATION ADDRESS (IF DIFFERENT)		LOCATION #
INDUSTRY CODE / EMPLOYER FEIN			PHONE #

CARRIER/CLAIMS ADMINISTRATOR

CARRIER (NAME, ADDRESS, & PHONE #)	POLICY PERIOD TO CHECK IF APPROPRIATE ☐ SELF INSURANCE	CLAIMS ADMINISTRATOR (NAME, ADDRESS & PHONE NO)
CARRIER FEIN	POLICY/SELF-INSURED NUMBER	ADMINISTRATOR FEIN
AGENT NAME & CODE NUMBER		

EMPLOYEE/WAGE

NAME (LAST, FIRST, MIDDLE)	DATE OF BIRTH	SOCIAL SECURITY NUMBER	DATE HIRED	STATE OF HIRE
ADDRESS (INCL ZIP)	SEX ☐ Male ☐ Female ☐ Unknown	MARITAL STATUS ☐ Unmarried/Single/Divorced ☐ Married ☐ Separated ☐ Unknow	OCCUPATION/JOB TITLE EMPLOYMENT STATUS NCCI CLASS CODE	
PHONE	# OF DEPENDENTS			
RATE PER: ☐ DAY ☐ MONTH ☐ WEEK ☐ OTHER	DAYS WORKED/WEEK	FULL PAY FOR DAY OF INJURY? ☐ YES ☐ NO DID SALARY CONTINUE? ☐ YES ☐ NO		

OCCURRENCE/TREATMENT

TIME EMPLOYEE BEGAN WORK ☐ AM ☐ PM	DATE OF INJURY/ILLNESS	TIME OF OCCURRENCE ☐ AM ☐ PM (☐) CANNOT BE DETERMINED	LAST WORK DATE	DATE EMPLOYER NOTIFIED DATE DISABILITY BEGAN
CONTACT NAME/PHONE NUMBER	TYPE OF INJURY/ILLNESS			PART OF BODY AFFECTED
DID INJURY/ILLNESS/EXPOSURE OCCUR ON EMPLOYER'S PREMISES? ☐ YES ☐ NO	TYPE OF INJURY/ILLNESS CODE			PART OF BODY AFFECTED CODE

DEPARTMENT OR LOCATION WHERE ACCIDENT OR ILLNESS EXPOSURE OCCURRED	ALL EQUIPMENT, MATERIALS, OR CHEMICALS EMPLOYEE WAS USING WHEN ACCIDENT OR ILLNESS EXPOSURE OCCURRED
SPECIFIC ACTIVITY THE EMPLOYEE WAS ENGAGED IN WHEN THE ACCIDENT OR ILLNESS EXPOSURE OCCURRED	WORK PROCESS THE EMPLOYEE WAS ENGAGED IN WHEN ACCIDENT OR ILLNESS EXPOSURE OCCURRED

HOW INJURY OR ILLNESS/ABNORMAL HEALTH CONDITION OCCURRED. DESCRIBE THE SEQUENCE OF EVENTS AND INCLUDE ANY OBJECTS OR SUBSTANCES THAT DIRECTLY INJURED THE EMPLOYEE OR MADE THE EMPLOYEE ILL	CAUSE OF INJURY CODE

DATE RETURN(ED) TO WORK	IF FATAL, GIVE DATE OF DEATH	WERE SAFEGUARDS OR SAFETY EQUIPMENT PROVIDED? ☐ YES ☐ NO WERE THEY USED? ☐ YES ☐ NO

PHYSICIAN/HEALTH CARE PROVIDER (NAME & ADDRESS)	HOSPITAL OR OFF SITE TREATMENT (NAME & ADDRESS)	INITIAL TREATMENT
		0 ☐ No Medical Treatment
		1 ☐ MINOR BY EMPLOYER
		2 ☐ MINOR CLINIC/HOSP
		3 ☐ EMERGENCY CARE
		4 ☐ HOSPITALIZED > 24 HOURS
		5 ☐ FUTURE MAJOR MEDICAL/ LOST TIME ANTICIPATED

OTHER

WITNESSES (NAME & PHONE #)			
DATE ADMINISTRATOR NOTIFIED	DATE PREPARED	PREPARER'S NAME & TITLE	PHONE NUMBER

WCC FORM 12A
REV. DATE 04/06

SEE INSTRUCTIONS FOR IMPORTANT INFORMATION

South Carolina Workers' Compensation Commission
1333 Main Street, Suite 500 • Post Office Box 1715
Columbia, South Carolina 29202-1715
(803) 737-5675 www.wcc.sc.gov

WCC File #: _____
Carrier File #: _____
Carrier Code #: _____
Employer FEIN #: _____

Claimant's Name: _____ SSN: _____ Employer's Name: _____

Address: _____ Address: _____

City: _____ State: _____ Zip: _____ City: _____ State: _____ Zip: _____

Home Phone: _____ Work Phone: _____ Insurance Carrier: _____

Preparer's Name: _____ Law Firm: _____ Preparer's Phone #: _____

A claim for workers' compensation benefits is made based on the following grounds: **Date of Injury or Illness:** _____

☐ Injury ☐ Illness ☐ Repetitive Trauma ☐ Occupational Disease ☐ Physical Brain Injury ☐ Concurrent Jurisdiction

1. The claimant sustained an injury to _____ (Part(s) of Body Injured) on _____ (Month/Day/Year) in _____ county, state of _____. Body part(s) affected are: _____
2. Briefly describe how the accident occurred. _____
3. Both the claimant and the employer were subject to the South Carolina Workers' Compensation Act at the time of injury.
4. The relationship of employer and employee existed at the time of injury.
5. At the time of the injury the claimant was performing services arising out of and in the course of employment.
6. Notice of the accidental injury was given to the Employer on _____ (Month/Day/Year) in the following manner: _____

☐ 7. Due to injury, the claimant is in need of (check one):
☐ (a) medical examination and treatment for: _____
☐ (b) additional medical examination and treatment for: _____

☐ 8. Due to injury, the claimant requests temporary total disability benefits because of lost compensable time from work and wages for the period of:

☐ 9. Due to the injury, the Claimant has permanent disability of the following nature and extent (check one):
☐ (1) General Disability: ☐ Total ☐ Partial ☐ (2) Specific Disability: ☐ Total ☐ Partial ☐ (3) Wage Loss

☐ 9a. ☐ A determination of permanent disability is premature at this time.

☐ 10. Due to the injury, the Claimant has a serious bodily disfigurement consisting of:

10a. At the time of the injury, the Claimant was paid weekly wages of $_____, and demands accounting of days worked and wages earned as provided by law.

10b. Give names and addresses of all employers for whom the Claimant has worked since the date of the accident:

11. Further grounds or unusual aspects of claim:

11a. List names and addresses of all physicians or other medical specialists who have seen or treated the Claimant as a result of the accident:

11b. To the best of your knowledge, did you have any prior permanent disability?
If yes, describe:

12. Appropriate benefits as provided in the Act for the above grounds and other relief as the Workers' Compensation Commission may direct as just and proper.

☐ 13a. **I am filing a claim. I am not requesting a hearing at this time.** 14. Estimated time needed for hearing: _____

☐ 13b. **I am requesting a hearing. A $25 fee is required.**

☐ **Mediation**
- ☐ a. Mediation is requested to be ordered pursuant to Reg. 67-1801 B.
- ☐ b. Mediation is required pursuant to Reg. 67-1802.
- ☐ c. Mediation is requested by consent of the Parties pursuant to Reg. 67-1803.
- ☐ d. Mediation has been conducted by a duly qualified mediator and resulted in an impasse.

Questions regarding mediation may be submitted to **mediation@wcc.sc.gov.**

I certify I have served this document pursuant to Reg. 67-211 by delivering a copy to _____ address _____ on the _____ day of _____ 20____, by ☐ first class postage ☐ certified mail ☐ personal service.

I verify the contents of this form are accurate and true to the best of my knowledge.

Preparer's Signature _____ Title _____ Email _____ Date _____

Questions about the use of this form should be directed to the Claims Department at 803.737.5723. Refer to Regulations 67-204 through 67-211 and Regulations 67-601 through 67-615 as well as Reg. 67-1801.

South Carolina Workers' Compensation Commission
1333 Main Street, Suite 500 • Post Office Box 1715
Columbia, South Carolina 29202-1715
(803) 737-5723 www.wcc.sc.gov

WCC File #: _____
Carrier File #: _____
Carrier Code #: _____
Employer FEIN #: _____

Claimant's Name: _____ SSN: _____ Employer's Name: _____

Address: _____ Address: _____

City: _____ State: _____ Zip: _____ City: _____ State: _____ Zip: _____

Home Phone: _____ Work Phone: _____ Insurance Carrier: _____

Preparer's Name: _____ Law Firm: _____ Preparer's Phone #: _____

A claim for workers' compensation death benefits is made based on the following grounds:

The Claimant is _____ (relationship to employee) of _____ (employee's name)

1. The employee sustained an accidental injury to the _____ (Part of Body Hurt) on _____ (m/d/yyyy) in _____ County, State of _____.
2. Both the employee and the employer were subject to the South Carolina Workers' Compensation Act at the time of injury.
3. The relationship of employer and employee existed at the time of injury.
4. At the time of the injury the employee was performing services arising out of and in the course of employment.
5. Notice of the accidental injury was given to the employer on _____ (m/d/yyyy) in the following manner:

_____

☐ 6. Due to injury, the employee received medical examination and treatment which remains unpaid by the employer.

☐ 7. Due to injury, the employee lost compensable time from work and wages for the periods of:

_____

☐ 8. The employee died on _____ (m/d/yyyy) as a result of the accidental injury, and death compensation is claimed.

9. At the time of the injury, the employee was paid weekly wages of $_____. The claimant demands an accounting of days worked and wages earned as provided by law.

10. Further grounds of claim:

_____

11. Appropriate benefits as provided in the Act for the above grounds and other relief as the Workers' Compensation Commission may direct as just and proper.

☐ 12a. **I am filing a claim. I am not requesting a hearing at this time.**

☐ 12b. **I am requesting a hearing. A $25 fee is required.**

☐ **Mediation**

- ☐ a. Mediation is requested to be ordered pursuant to Reg. 67-1801 B.
- ☐ b. Mediation is required pursuant to Reg. 67-1802.
- ☐ c. Mediation is requested by consent of the Parties pursuant to Reg. 67-1803.
- ☐ d. Mediation has been conducted by a duly qualified mediator and resulted in an impasse.

Questions regarding mediation may be submitted to **mediation@wcc.sc.gov**.

I certify I have served this document pursuant to Reg. 67-211 by delivering a copy to_____
address_____ on the _____day of _____20____,
by ☐ first class postage ☐ certified mail ☐ personal service.

I verify the contents of this form are accurate and true to the best of my knowledge.

Preparer's Signature _____ Title _____ Email _____ Date _____

Questions about the use of this form should be directed to the Judicial Department at 803.757.5675 or **judicial@wcc.sc.gov** or **mediation@wcc.sc.gov**. Refer to Regulations 67-205 through 67-211, 67-216, Regulations 67-601 through 67-615 and; Regulations 67-901 through 67-905 well as Reg. 67-1801.

POLICY

The safety and health of employees is the first consideration in operating any business. Without question, it is the responsibility of every employee at all levels in the hierarchy.

JET Commercial LLC will comply with all laws and prevent workplace injuries and illnesses. To do this, we must be aware of conditions that can result in injury or illness in every work area. No employees will be required to work at a job they know is unsafe or unhealthy. Companywide cooperation in detecting hazards and controlling them is a condition of employment. Employees will inform their supervisor immediately of any hazardous situation beyond their ability or authority to correct.

Preventing workplace injuries and illnesses takes precedence over operating productivity when necessary. To the greatest degree possible, management will provide safeguards for personal safety and health, in keeping with the highest standards.

We strive to maintain an occupational injury and illness prevention program (IIPP) that conforms to industry best practices for organizations of this type. To be successful, such a program must embody proper attitudes toward injury and illness prevention on the part of both supervisors and employees. It also requires cooperation in all safety and health matters, not only between supervisor and employee, but also among coworkers.

Our objective is an (IIPP) that reduces the number of work place incidences to an absolute minimum, not merely in keeping with, but surpassing the best experience of operations similar to ours. Our goal is zero accidents and injuries.

Safety and Health Program Components

Our (IIPP) includes the following:

- Communicating with employees about safety issues and workplace hazards through a range of avenues including a safety training program and meetings to exchange ideas about workplace safety and health among employees
- Providing and maintaining mechanical, physical and administrative safeguards to control risks presented by workplace hazards to the maximum possible extent
- Conducting a program of safety and health inspections to find and eliminate unsafe working conditions or practices, to control health hazards, and to comply with safety and health regulations and standards
- Providing necessary personal protective equipment (PPE) and instructions for proper use and care
- Developing and enforcing safety and health rules and requiring employees to cooperate with these rules as a condition of employment
- Investigating promptly and thoroughly every accident, safety incident, and near miss to determine root causes and make appropriate changes to remedy those causes
- Creating a culture of safety that encourages employees to identify workplace hazards, recommend changes to reduce the risks they pose and work for a safer workplace
- Periodic review of all elements of our IIPP to maintain its accuracy

We recognize the responsibilities for occupational safety and health are shared: JET Commercial LLC will see that all employees are properly instructed and supervised in safe operation of machinery, tools, equipment, processes, and practices while at work.

JET Commercial LLC accepts responsibility for the leadership, effectiveness and improvement of the injury and illness prevention program and for providing the required safeguards to ensure safe work conditions.

Supervisors are responsible for encouraging proper attitudes toward safety and health and for ensuring that workers perform operations with the utmost regard for the safety and health of all personnel.

Employees are responsible for wholehearted, genuine implementation of all aspects of the (IIPP), including compliance with all rules and regulations, and for continuously following best safety and health practices while performing their duties.

Requirements in multiple chapters may apply to the same job, and some health and safety procedures will be addressed at different levels of focus. Where a circumstance is addressed by different requirements throughout this manual, then all requirements apply and when a conflict occurs, the more specific one must be followed.

PROGRAM GOALS

The goal of JET Commercial LLC is to continue operating a profitable business while protecting employees from injuries or illness. This can be achieved by delegating responsibility and accountability to all involved in this company's operation.

- Responsibility: Having to answer for activities and results
- Accountability: The actions taken by management to ensure the performance of responsibilities

To reach our goal of a safe workplace, everyone needs to take responsibility and be accountable.

Owner Name	Owner Signature	Date

Our designated safety professional is responsible for the implementation and enforcement of safety rules.

FOLLOWING SAFETY RULES

JET Commercial LLC employees will follow all Safety and Health Program rules, provide first aid up to their level of training and promptly report unsafe conditions or practices that can't be immediately remedied to a supervisor. Not following safety policies and procedures can affect co-workers and the public, and may result in disciplinary action up to and including termination.

If employees are unsure of the safe method to do a job, they must STOP and ask a supervisor.

Employees have the authority to stop work to address a hazard.

DISCIPLINARY ACTION

Employees will be disciplined for infractions of safety rules and unsafe work practices that are observed, not just those that result in an injury. Care will be taken to ensure discipline does not discriminate. Consistency in the enforcement of safety rules will be exercised at all times. While safety rules will be enforced rigorously, no one will be punished for reporting unsafe work practices or for reporting illness or injury. In any disciplinary action, discipline is given to the employee only for violation of safe work policy, not because they were injured or filed a workers' compensation claim.

Discipline for safety violations will be administered in a manner consistent with JET Commercial LLC's system of progressive discipline.

As in all disciplinary actions, each situation is to be carefully evaluated and investigated. The steps taken in the disciplinary process, up to and including termination, will depend on the severity of the violation, employee history and overall consideration for the well-being of the company, its employees and its customers.

Each department or supervisor may have additional safety rules and policies specific to operations. In following these rules, employees are expected to exercise sound judgment and work in a manner to ensure the safety of themselves and coworkers.

SAFETY INCENTIVE PROGRAMS

Although strict adherence to safety policies and procedures is required of all employees, JET Commercial LLC may periodically provide recognition of safety-conscious employees and acknowledge safety-conscious work habits through a safety incentive program. Safety incentive programs must not discourage reporting of injuries and illnesses.

TRAINING AND SAFETY COMMUNICATION

OSHA requires employers to train employees in the safe methods of performing their job. JET Commercial LLC is committed to instructing all employees in safe, healthy work practices. Awareness of potential hazards and knowledge of how to control them is critical to maintaining a safe, healthy work environment and preventing injuries. JET Commercial LLC will provide training to each employee on general safety issues and safety procedures specific to that employee's work assignment.

Training provides the following benefits:

- Makes employees aware of job hazards
- Teaches employees to perform jobs safely
- Promotes two-way communication
- Fulfills legal requirements
- Encourages safety suggestions
- Creates additional interest in the safety program

JET Commercial LLC will only use training material appropriate in content and vocabulary to the educational level, literacy and language of employees, and will offer retraining as needed to ensure safe practices.

Training Program

Actual demonstration of proper task performance will be used whenever possible to instruct new workers. Workers must provide evidence of topic mastery before training is complete. Trainers will rely on the following safe training techniques: tell them how, show them how, have them tell you how, and have them show you how.

Training topics will reflect the hazards of the workplace and may include the following: employee's safety responsibilities; general safety rules; IIPP contents; safe job procedures; mandatory and optional PPE.

New Employees

Every new employee will be given instruction by their supervisor or appropriate member of management in the general safety requirements of their job. New employees will not begin a job until they have demonstrated or otherwise confirmed awareness of safe practices for their tasks and general workplace safety rules and guidelines. A copy of the general safety rules will be provided to each new employee, and each new employee will be given access to any element of the safety program that pertains to the work he or she will be expected to do.

Documentation of Training

All employee safety training will be documented. Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

Retraining

Employees observed performing unsafe acts or not following safe work procedures will be retrained by their supervisor or an appropriate safety trainer. A safety contact report may be completed by the supervisor to document the training. If multiple employees are involved, additional safety meetings will be held.

SAFETY COMMUNICATION

JET Commercial LLC will advise employees of changes relating to the safety program. Employee safety communication procedures are designed to develop and maintain employee involvement and interest in workplace safety and health. These activities help ensure effective communication between management and employees on safety-related issues and nurture a culture of safety.

The following are some of the safety communication methods that may be used:

- Frequent accident prevention instructions and periodic practice drills
- Distribution of articles, memos, payroll stuffers and other communication concerning workplace safety and health
- Regular safety meetings with employees that encourage participation and open, two-way communication
- Employee bulletin boards or other displays discussing safety issues, accidents, and general safety suggestions
- New employee safety orientation and training

Safety Suggestion Program

JET Commercial LLC encourages all employees to become involved in the development and implementation of the safety and health program. Management will request opinions and comments from workers at all levels and respond to them respectfully and appropriately.

All employee-initiated safety related suggestions will be channeled to the appropriate authority by supervisors, either verbally or in writing. Unresolved issues may be relayed to Macy Weaver, the safety coordinator.

JET Commercial LLC will not discriminate against any employee that raises a safety concern, files a complaint, causes a regulatory action to be brought, or testifies against the employer. There will be a system where employees may share safety or health concerns anonymously.

Rules

The following rules are a selection of safety practices to help prevent work-related injury and illness. It is not comprehensive; employees are expected to adhere to any safe work practice necessary to complete their job safely.

Drug- and Alcohol-Impaired Workers

JET Commercial LLC encourages employees to discuss personal and interpersonal problems with their supervisor. Supervisors will handle all such contacts with appropriate confidentiality and refer employees who may benefit from outside assistance to appropriate resources.

No employee may work while fatigue, illness, prescription drugs or over-the-counter drugs impair his or her ability or alertness.

No one known to be under the influence of alcohol or drugs will be allowed on the job while in that condition.

Notify a supervisor of any coworker demonstrating signs of impairment that may present a safety or health hazard.

GENERAL SAFETY

- Take time to do every job safely
- Refrain from horseplay, scuffling, pranks, and similar acts that may have an adverse influence on the safety and well-being of employees
- Walk - don't run - in the workplace
- Smoke, eat and store personal items only in designated areas. Smoking is not allowed in any indoor place of employment
- Maintain awareness of potential hazards when walking about the workplace
- Use tools only for their intended purpose, and always use the right tool for the job
- Listen to instructions. If you don't understand them, ask before starting work
- Inspect all safeguards before beginning work. Ensure proper functioning of protective devices and report any known deficiencies immediately
- Only operate equipment you can have been trained on
- Refrain from handling or tampering with equipment, machinery or lines outside the scope of your duties
- Report all injuries to the appropriate supervisor so arrangements can be made for medical or first-aid treatment and appropriate reporting may be completed
- Ensure clothing and footwear is appropriate to the hazards of the job. If you are unsure, ask your supervisor
- Wear approved protective equipment in work areas that demand such equipment
- Heed signs, posters, hazard bulletins, and tags posted on company premises
- Only enter hazardous areas after they are made safe to enter

JET Commercial LLC strictly prohibits possession of firearms, weapons, illegal drugs or alcoholic beverages on JET Commercial LLC property, customer property or other locations while on the job.

Housekeeping

- Keep all exits, fire doors, aisles, and areas around fire extinguishers, first aid kits, emergency equipment, electrical panels, and traffic lanes clear
- Keep tools, materials or other objects off the floor to prevent trips and falls. Remove waste from the work area promptly
- Keep work areas clean and free of debris, electrical cords, and other hazards; immediately clean spilled liquids
- Keep stairways, passageways, exits, and sidewalks clean and clear of obstructions
- Bend or cap sharp wires or protruding nails must be bent or capped
- Place tools and equipment so they will not fall from elevated areas
- Only use approved cleaning agents

Fire Prevention

- Firefighting equipment will be inspected on a regular basis
- Discharged, damaged or missing equipment must be reported immediately to a supervisor. Tampering with fire equipment is prohibited
- Take precautions to prevent fires, particularly from oily waste, rags, gasoline, flammable liquids, acetylene torches, improperly installed electrical equipment and trash
- Access to fire extinguishers must be kept clear at all times. Make note of the location of firefighting equipment in your work area
- In case of fire, employees will consider the safety of themselves and other individuals before saving property
- Never use gasoline or flammable solvents to clean
- Smoking is prohibited within 20 feet of flammable substances

Lifting and Material Handling

- Think before lifting
- Find a better way. If at all possible, use mechanical help from a pushcart or hand truck
- If the load is heavy or awkward to lift alone, get help. Team lifting cuts the load in half and reduces likelihood of injury
- Break the load down into smaller lifts if possible. It is better to make two or more light trips than one heavy trip
- If possible, bring the load up between the knees and waist before lifting
- Do not lift on slippery surfaces
- Test the load before doing the lift; determine how heavy it is by giving it a shove
- Ensure a good handhold on the load before attempting to lift
- Keep the load close. Walk as closely as possible to the load
- Do not jerk the load or speed up. Lift the load in a smooth and controlled manner
- Do not lift in an awkward position or twist while lifting (especially with a heavy load). Turn and take a step
- Avoid long forward reaches and bending your back. Use a step stool or platform if necessary
- Make sure you have plenty of room to lift and to set down the object
- If you are lifting an object above your head, get a ladder or step stool

Personal Protective Equipment (PPE)

- Use the correct PPE for any job assignment that requires it. If you do not know, ask
- PPE will be maintained in good condition and cleaned regularly
- PPE will be stored properly when not in use to protect it from damage
- Damaged or broken PPE must be returned for replacement
- PPE may not hamper or restrict freedom of movement due to improper fit
- Eye protection must be worn when working with hazardous materials or chemicals

Ladder Safety

- Keep portable stairways, ladders, and step stools in good condition and use them only in a safe manner
- Inspect the ladder before using it. If it is broken, remove it from service
- Use the proper ladder for the job
- Do not use “A” frame self-supporting ladders as straight ladders
- Make sure the ladder is tall enough to reach the work area
- Do not use metal ladders for electrical work
- Avoid temporary ladders. Always use a commercially made ladder of the proper length and strength for the work being performed
- Keep ladder rungs must be kept free of grease, oil, mud, or other slippery substances
- Do not place ladders in passageways, doorways, or any location where they might be hit or jarred, unless protected by barricades or guards
- Place ladders only on hard, level surfaces. Make sure ladder feet are not placed on sandy, slippery or sloping surfaces. Clean or sweep the area where the ladder feet will be and make sure the rubber feet are in good shape
- Arrange work so you can face the ladder and use both hands while climbing. Do not carry tools or equipment in your hands while climbing. If tools or equipment cannot be safely stored on your person, as with a belt or vest, climb the ladder, and then hoist them with a line or hoisting device
- Secure portable ladders in place and at a pitch so the leveling indicator is in alignment or the distance from the wall to the base of the ladder is at least 1’ away from the wall for every 4’ of ladder height
- Tie-off straight ladders at the top of the ladder to prevent slipping
- Be aware of objects below you; move or cover sharp objects in case you fall
- Do not stand on or work from the second rung from the top or above
- Do not reach too far from the ladder, and keep your center of gravity as close to the center of the ladder as possible
- Ensure extension ladders extend at least 36" above the level being accessed
- On all ladders, do not step on cross bracing not intended to be used for climbing
- Do not use a ladder as a brace, workbench or for any other purpose than climbing

Electrical Safety

- Only trained, qualified, and authorized employees may work on or repair electrical equipment
- Report exposed wires and damaged electrical equipment or wires immediately
- Extension and temporary power cords must be appropriate to the task and grounded, and only used only as a last resort. Frayed or defective cords will not be used
- Never overload an outlet or circuit. Use approved power strips and extension cords in accordance with company policy and best safety practices
- All energized equipment and installations will be de-energized before work. If the equipment or installation must be energized, special precautions will be taken to protect against the hazards of electric shock

- All equipment will be locked out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Do not attempt to operate any switch, valve, or other energy-isolating device bearing a lock
- Safety grounds will always be used where there is a danger of shock from back feeding or other hazards
- Suitable attire and personal protective equipment (PPE) must be worn at all times while working on electrical equipment
- Always exercise caution when energizing electrical equipment or installations. Take steps to protect against arc flash and exploding equipment in the event of a fault
- All power tools will be grounded or double insulated. Tools with defective cords or wiring will not be used
- Don't wear metal jewelry around energized circuits
- Suitable temporary barriers or barricades will be installed when access to opened enclosures containing exposed energized equipment is not under the control of an authorized person
- Enclosures or tight-fitting covers must protect electrical installations from accidental contact.
- Metal measuring tapes, fish tapes, ropes or other metal devices are prohibited where they may contact energized parts of equipment or circuits

Company Vehicles

- Only authorized employees are permitted to operate JET Commercial LLC vehicles
- Company vehicles are to be used for JET Commercial LLC business only. Personal, off duty and family use is prohibited
- Drive defensively and obey all traffic and highway laws
- Always wear a seat belt, whether driver or passenger
- Report accidents to a supervisor as soon as possible, and obtain a police report
- Lock vehicles and remove keys from unattended vehicles
- Inspect the vehicle before operation and report any defects or operating problems to the appropriate supervisor so repairs can be made
- Smoking is prohibited while inside the vehicle and during vehicle refueling
- If your driver's license is revoked or expired, immediately notify your supervisor and do not drive. If you receive a moving violation or any citation that may affect your eligibility to drive a company vehicle, inform your supervisor immediately

Hazardous Materials and Chemicals

- Ask a supervisor about any unfamiliar material, chemical or substance
- Read GHS warning labels and pay close attention to the pictographs and signs
- Read the Safety Data Sheets (SDS) before using any chemicals. SDS contain a wealth of safety information and are available to employees at their request
- Hazardous materials will be handled in accordance with the SDS and label. If protective equipment is required, use it
- Store all hazardous materials in suitable containers that are properly labeled
- Use chemicals that produce fumes or vapors only in well-ventilated areas

- Wear eye protection when working with hazardous materials or chemicals
- Mixing of chemicals is prohibited at all times, unless required by the label. Before you mix, review all SDS
- Practice appropriate hygiene after handling hazardous substances and follow special instructions from authorized sources. Wash hands thoroughly after handling chemicals and before eating or smoking, even if wearing protective gloves. Never use solvents for hand cleaning
- Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body must be provided within the work area for immediate emergency use
- Air under Pressure (Compressed Air)
- Air pressure at the discharge end of a portable air blow gun or portable air hose must be less than 30 pounds per square inch gauge when dead-ended
- When air under pressure is used to remove chips and dust, a chip guard, such as a fixed or removable shield, safely located, will be provided to protect an employee in an adjacent area
- The employee using air under pressure will be provided with and use appropriate PPE to the extent necessary to protect against hazards created by the operation
- Air under pressure, used in a manner that could cause injury, must not be used for cleaning clothes while being worn
- Air under pressure must not be directly applied to any part of the body. This could cause a serious or fatal injury (embolism) if air penetrates the skin/enters the body
- Air under pressure must not be used to move flammable dust in an area containing open flames or spark-producing equipment
- Air under pressure must not be used to remove toxic dusts in an employee environment
- Polyvinyl chloride (PVC) piping must not be used for the transportation and distribution of compressed air or other compressed gases in an above-ground installation
- An employee must be protected by guards or location when pressure tests are being performed on materials or equipment where rupture or failure would create a hazard

Accident Prevention Signage and Tags

An employer must provide, install and maintain signs and tags where an employee might be, or would likely be, injured or harmed if not alerted to an existing or potential hazard.

Signage must be unobscured, displayed in a well-lit area, and legible from a distance that provides sufficient time or warning for an employee to take appropriate action.

Similarly, accident prevention tags will be used as a temporary means of warning an employee of an existing hazard on certain items, such as defective tools or equipment. Don’t use tags in place of accident prevention signs or consider them a complete warning. Tags must be attached to prevent accidental disengagement, and they must be large enough to attract attention to the hazard. Use “Do Not Start,” “Out of Order,” and “Out of Service” tags in appropriate situations.

Sanitation

Potable water must be provided and placed in locations readily accessible to all employees. The water must be suitably cool and available continuously in sufficient amounts to keep all workers hydrated, taking into account the air temperature, humidity and nature of the work performed. The water will be dispensed in sanitary single-use drinking cups, or by fountains. Common drinking cups are prohibited.

Portable containers used to dispense drinking water must be tightly covered, regularly cleaned and refilled at least daily. Containers must have a tap, and water must not be dipped from containers. The containers must be clearly marked as to the nature of their contents, made of a material that maintains water quality, and not used for any other purpose.

Potable drinking water, as well as toilet and hand-washing facilities, must be maintained in accordance with appropriate public health sanitation practices.

Outlets for non-potable water, such as water for industrial or firefighting purposes only, will be identified by signs that clearly indicate the water is unsafe and is not to be used for drinking, washing or cooking purposes. There will be no cross-connection, open or potential, between a system that furnishes potable water and a system that furnishes non-potable water.

Employers must provide onsite general washing facilities (one per 20 employees) for construction projects, must keep them in sanitary condition, and must provide suitable cleaning agents/single-use towels for the removal of hazardous and other substances.

Toilet facilities must be adequately ventilated, readily accessible, and maintained in a clean and sanitary condition. Mobile crews may be provided transportation to nearby toilet facilities.

Every enclosed workplace must be constructed, equipped, and maintained, as reasonably practicable, to prevent the entrance and presence of rodents, insects, and other vermin. A continuing and effective extermination program must be instituted where their presence is detected.

Color Coding

- Green is used for general safety or accident-prevention signs; yellow is the basic color for designating caution on signage, and for marking physical hazards—solid yellow, yellow and black stripes, or yellow with a suitable contrasting background may be used interchangeably; red is used to indicate a warning/danger on signage, and to indicate “stop” when used with buttons
- A stop bar, stop button, electrical switch, or other mechanical device for the emergency stopping of machinery, excluding cables, will be red in color
- A safety can will be red in color

FORMS AND ATTACHMENTS

Please find the following document on the next page:

- General Safety Rules Receipt and Attestation

This form may be reproduced freely by JET Commercial LLC for the purposes of implementing and maintaining a safety and health program.

GENERAL SAFETY RULES RECEIPT AND ATTESTATION

This is to certify that I have received a copy of the general safety rules.

- I have read these instructions, understand them and will comply with them while working for JET Commercial LLC.
- I understand that failure to follow the company injury and illness prevention program may result in disciplinary action and possible termination of my employment with this company.
- I understand that I am to report any injury to my supervisor and report all safety hazards as soon as safely possible.
- I further understand that I have the following safety rights:
  - I am not required to work in any area I feel is not safe.
  - I am entitled to receive information about all hazards I am exposed to while working.
  - I am entitled to see a copy of the company safety and health manual.
  - I will not be discriminated against for reporting safety concerns.

Employee Name	Signature	Date
Supervisor Name	Signature	Date

cc: Employee File

SCOPE

This chapter is based on OSHA interpretations of the following training regulations to be applicable to the global training policy.

- 1910.134(k) Respiratory Protection; Training and Information
- 1910.147(c) The Control of Hazardous Information; General
- 1910.1030(g) Bloodborne Pathogens; Communication of Hazards to Employees
- 1910.1200(h) Hazard Communication; Employee Information and Training
- 1926.21 Construction; Safety Training and Education

Where unique training requirements particular to specific regulations are needed, they will be addressed in that chapter.

POLICY

JET Commercial LLC will freely provide training necessary for employees to perform assigned work in a safe and healthful manner.

Training will be tailored to encourage and assist understanding for all employee education and literacy levels in the languages they receive other job instruction.

EMPLOYER RESPONSIBILITIES

- Provide training to employees:
  - Free of charge
  - During regular working hours
  - In a language and at a competence level that employees can understand
- Train employees in routine and emergency response procedures
- Ensure that, where necessary, only competent/qualified personnel will deliver the training
- Maintain records of employee training for the duration of their employment, or as required by specific regulations
- Provide additional and/or refresher training as required or requested

EMPLOYEE RESPONSIBILITIES

- Attend and participate in all company required training
- Follow all company procedures and safe work practices
- Not perform any work that they have not been trained to safely complete
- Request additional training as needed

GENERAL TRAINING REQUIREMENTS

Employees must know how to identify the health and safety issues at their worksite, analyze the causes, and bring about healthier and safer workplaces for themselves and their co-workers.

Particular standards of training requirements common to most workplaces include:

- Emergency response and evacuation procedures
- Fire protection and prevention
- First Aid (if required)
- Hazardous Communication, as necessary
- Personal Protective Equipment (PPE)

Emergency Action Plan

Employees designated in the emergency evacuation plan to assist in evacuation, will be trained how to safely and orderly help evacuate other employees

Additional educational considerations include:

- Reviewing the plan with each designated employee when:
- The plan is developed
- An employee is first assigned to a job
- The employee's emergency action plan responsibilities change
- The plan is changed
- Providing the written plan for review when an employee asks to see it.

Fire Prevention Plan

Employees will be informed of the fire hazards they are exposed to at the worksite, and the parts of the fire prevention plan they need to know to protect themselves.

The written plan will be available for review when an employee asks to see it.

First Aid

The company will have the appropriate number of people available for employees to talk to and give advice on health and safety matters relevant to that worksite hazards.

At worksites that are too far from a clinic or hospital identified as able to handle likely safety and health hazards and injuries at that worksite, there will be an appropriate number of people adequately trained provide first aid.

Hazard Communication Standard

Written programs maintained at each worksite will describe how employees will be provided effective information and training on hazardous chemicals they might encounter in their work area:

- At the time of initial assignment
- When a new physical or health hazard is introduced

This training will cover at least:

- How to detect the presence or release (e.g. spills) of hazardous chemicals in that work area
- Physical and health hazards of chemicals in the work area (i.e. either the specific chemicals, or broader categories of hazards like: flammable or cancer causing)

- How employees are to protect themselves from exposure, such as specific safe work procedures
- Details of the written program, particularly the labels and Safety Data Sheets (SDS) of specific chemicals at the worksite, and how to get and use needed hazard information

Personal Protective Equipment (PPE)

Before beginning work that requires PPE, employees will be trained in at least:

- What PPE is needed and when it is necessary
- The protective limitations of the PPE
- How to put on, take off, adjust, and wear the assigned PPE
- How to properly care for and maintain the PPE
- Knowing and recognizing the assigned PPE's useful life, and how to properly dispose it when necessary

Retraining will occur when the employee shows that they don't understand or have the skill required to correctly use the PPE in the way they've been trained.

Training records will show that the employee as demonstrated they understand the training and how to correctly use the PPE how they've been trained.

REFRESHER TRAINING

JET Commercial LLC will provide refresher training to employees when:

- There are periodic intervals required by the regulation
- Changes in the workplace render previous training obsolete
- Changes in the types of equipment or materials being used render previous training obsolete
- Inadequacies in an affected employee's knowledge or use of safe practices indicate that the employee has not retained the requisite understanding or skill
- Periodic evaluations show inadequacy in training or results in new safe work procedures

The Company will verify that each affected employee has received and understood the required training through a written certification that contains the name of each employee trained, the date(s) of training, and that identifies the subject of the certification.

SUPPLEMENTAL TRAINING

Company training in each subject will be developed according to the intent of each regulation; covering all elements listed in prescriptive regulations (e.g. respiratory protection training), and focusing on the desired outcome in performance regulations (e.g. confined spaces training.)

In addition to the common training listed above, JET Commercial LLC will provide affected employees with job specific training based on their responsibilities. This training can include, but is not limited to:

- Lockout/Tagout
- Confined spaces
- Hand and power tool use

- Fall protection
- Equipment/machinery operation
- Scaffold work
- Welding and hot work
- Respiratory protection

TRAINING RECORDS

JET Commercial LLC will maintain records of all employee training for the length of their employment, or for the time required by specific OSHA regulations. These records will include:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

All training records will be provided when an employee or their representative, or another authorized person asks for it.

FORMS AND ATTACHMENTS

On the following page, please find a generic training record sheet. This form may be reproduced for the purposes of implementing and maintaining a safety and health program.

(TOPIC NAME) _____ TRAINING RECORD SHEET

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name:	**Signature:**

POLICY

JET Commercial LLC is committed to providing a safe, healthy workplace by eliminating or controlling all workplace hazards. A Job Hazard Analysis (JHA) systematically investigates a job process, equipment, and the workplace environment to identify hazards and reduce risk. Macy Weaver is responsible for ensuring facilities and workplaces are inspected regularly for hazards, and will do so with support and assistance from employees.

EMPLOYER RESPONSIBILITIES

JET Commercial LLC is responsible for:

- Ensuring that safety inspections of the facility occur on regular basis
- Training personnel in how to perform a job hazard analysis
- Responding quickly to eliminate workplace hazards
- Ensuring all equipment is kept in good repair
- Ensuring employees follow safe job procedures
- Reviewing job hazard analysis whenever there is a significant change to any element of the job or there has been an injury or illness

EMPLOYEE RESPONSIBILITIES

All employees are expected to:

- Assist in job hazard analyses
- Follow safe job procedures
- Report hazards to a supervisor immediately

TRAINING

JET Commercial LLC will ensure every manager, supervisor and safety team member participates in a JHA training program. This training will be provided at no cost to the employee during working hours.

The Company will use only training material appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Components

Macy Weaver will verify that all employees have been trained in the following minimum elements:

- Importance of involving employees in job safety analyses
- How to review safety records to identify areas that present hazards
- How to analyze a job to determine the level of risk it presents
- How to prioritize job hazard analysis and hazard control activities

- Basic steps of a job hazard analysis, including: breaking the job into steps, analyzing risks, and determining controls
- How much detail to include when listing the steps of a job for a JHA
- What kinds of workplace hazards might exist and what types of risk they pose
- H Process of hazard controls and advantages of certain types of controls
- How to review a job hazard analysis and how to write a safe job procedure
- When to reanalyze a job for hazards

The person conducting the training will be knowledgeable in the subject matter of the training program as it relates to the workplace.

All employees will be trained in basic hazard identification and will be trained in their jobs according to safe job procedures, as directed by the job safety analysis.

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions and attached documents
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions
- Attendance and attestation forms of all persons trained

Employee training records will be retained for the length of their employment.

EMPLOYEE INVOLVEMENT

No one knows how to do a job better than the person currently doing that job does. Employees who are included in a JHA) provide valuable insight and knowledge into work procedures that is valuable in identifying hazards and controlling them. This insight can help prevent potentially dangerous oversights.

Further, soliciting employee input demonstrates that management values everyone's involvement in creating a safer workplace and provides an opportunity for employees' active involvement in the JHA process.

Preliminary Review

Reviewing the worksite's accident history with employees draws attention to failures in hazard controls and deficiencies in work processes, which in turn suggests opportunities for safety program growth. A thorough review of recorded accidents, illnesses and near misses points to jobs, processes and tasks that require closer examination. It also indicates the immediate actions necessary to control all existing risks.

A discussion with employees about hazards they already know to exist also provides an opportunity to discuss ideas to control them.

If there is a hazard that poses an immediate danger, do not wait until after the JHA is complete to establish controls. Problems need to be corrected quickly. This demonstrates a commitment to safety and permits more time and thought for more complicated work safety issues.

Prioritize Hazardous Jobs

Understanding the risk posed by a job requires consideration of two main factors: the likely severity or impact of the injury or illness caused by a hazard and the likelihood injury or illness will actually occur (see Table 1). It is important, when assessing the overall risk of a job to determine the number of people exposed to a hazard who could be affected by an incident. Hazards that affect the whole worksite present much more risk than hazards that affect only one worker.

Jobs that present unacceptable risk need to take priority. Place priority on jobs:

- With exceptionally high injury or illness rates
- Where there already have been close calls
- Where violations of standards already have occurred
- With potential to cause serious harm

Severity

Factors that increase risk because they increase the severity of an injury or illness often rely on chance. However, certain job elements and behaviors intensify the severity of possible incidents:

- Using high-powered machinery and heavy equipment
- Working at elevation
- Working around hazardous chemicals
- Moving heavy or cumbersome loads
- Working around or with electrically energized equipment
- Working in a confined space

Probability

Factors that increase risk because they increase the likelihood of an injury or illness include the number of employees exposed to a hazard, frequency of exposure, duration of exposure, proximity to “point of danger”, unreasonable workload, working under stress, and environment.

TABLE 1: RISK ASSESSMENT MATRIX

		Probability of Harm		
		Not Likely	**Likely**	**Very Likely**
Severity of Harm	**Serious Harm**	Moderate Risk	High Risk	Very High Risk
	Significant Harm	Low Risk	Moderate Risk	High Risk
	Minor or no harm	Low Risk	Low Risk	Moderate Risk

Analysis

When analyzing a job's hazards and determining how best to control them, it's important to identify all significant hazards accurately, and understand each within the context of the entire job.

Break Job into Steps

Every job requires several steps. Each has its share of hazards that puts workers at risk.

To complete a job hazard analysis, first there must be a clear understanding of the steps required to complete the job. The observer will watch the worker perform the job and list the steps the worker takes to complete it.

When breaking a job into its individual steps, it's important to balance between too much and too little detail. Too much detail will make the analysis needlessly long, and too little will not cover the basic steps.

Each step is one action. Some actions may not be observable, and some steps may involve specifically not doing things.

The observation stage of the JHA shouldn't focus on either the employee's performance, or individual unsafe acts, it should focus on the task itself. All phases of the analysis benefit from employee insight and feedback, and extensive employee involvement is strongly encouraged.

OSHA recommends video recording or photographing the worker performing the job, having them explain each step, and why they did it that way. These visual records can be handy references when doing a more detailed assessment of the work.

When all the steps are documented, the observer will review them with the employee to ensure nothing is missed.

Identify Hazards

The JHA requires answers to the following:

- What can go wrong?
- What are the consequences?
- How could the hazard arise?
- What are the other contributing factors?
- How likely is it that the hazard will result in an incident?

A good description of a possible hazard scenario will reveal the answers to those questions by describing the hazard in terms of the environment in which it occurs, the trigger that would precipitate an incident, how a worker faces exposure to the hazard, and the worst-case consequences.

Again, workers provide excellent insight into the hazards they work with as well as suggestions for how to control risks presented by hazards where they work.

The JHA will not only include actual hazards, but also potential hazards that could arise while performing the job:

- Is there danger of striking against, being struck by or otherwise making harmful contact with an object?
- Can the worker be caught in, by, or between objects?
- Is there potential for a slip or trip?
- Can the employee fall from one level to another or even on the same level?
- Can pushing, pulling, lifting, lowering, bending or twisting cause strain?
- Is the work environment hazardous to safety or health?
- Are there concentrations of toxic gas, vapor, fumes or dust?
- Are there potential exposures to heat, cold, noise or ionizing radiation?
- Are there flammable, explosive or electrical hazards?

Please see the table of Workplace Hazards at the end of this chapter for reference.

A list of hazards must accompany each step of the job. This provides a framework pointing to controls already in place and controls needed to prevent hazards from causing injuries or illnesses.

Control

Though awareness and thoughtfulness are excellent ways to reduce risk in the workplace, it is not enough simply to identify workplace hazards. Hazards in the workplace that are identified must be controlled if possible to minimize their risk. The JHA provides a systematic way to approach hazards and their controls. To control a hazard, it is important to remember two very basic principles. First, either eliminate the hazard itself or control worker exposure to the hazard. Second, eliminating a hazard is more effective than controlling exposure to a hazard.

These two principles shape a hierarchy of hazard control strategies (see Figure 1). When considering how to address the hazards in each step of a given job, controls at the top of the hierarchy need to be considered before controls toward the bottom of the hierarchy. The more reliable and less likely a hazard control can be circumvented, the better.

A good hazard control plan often includes a mixture of different things, such as the following:

- Priority given to high-risk hazards
- Inexpensive, easy improvements and temporary solutions until more reliable controls are in place
- Long-term solutions to risks most likely to cause accidents or ill health
- Long-term solutions to risks with the worst potential consequences
- Arrangements for training workers on the main risks that remain and how they are to be controlled
- Regular checks to make sure the control measures stay in place, and clear responsibilities. Who will lead on what action, and by when?

Controlling the Hazard

The most effective strategy is to "engineer the hazard out" by using control methods that physically remove or change a hazardous machine, work environment condition or other hazard. If, during the JHA, you discover a hazard that can be engineered out, do it. Turn the dangerous step into a safe step that doesn’t require safety precautions.

Elimination

If there are hazards that can be removed from the worksite, do this first. Good housekeeping procedures keep many hazards under control. Removing redundant or unnecessary equipment, materials or processes also rids the workplace of any risks associated with them.

Substitution

There may be alternative chemicals, machines or processes to accomplish the job but pose fewer hazards to workers. Explore ways to incorporate these alternatives into the job.

Isolation and Other Engineering Approaches

Creating a boundary between a hazard and workers can reduce risk almost as effectively as removing the hazard from the workplace altogether. Limit access to hazards with enclosures, machine guards and physical barriers that reduce the likelihood of exposure to a hazard before turning to controls that rely on a person.

Redesigning equipment and installing new guards (within manufacturer specifications) can remove or redirect hazards away from workers to prevent exposure.

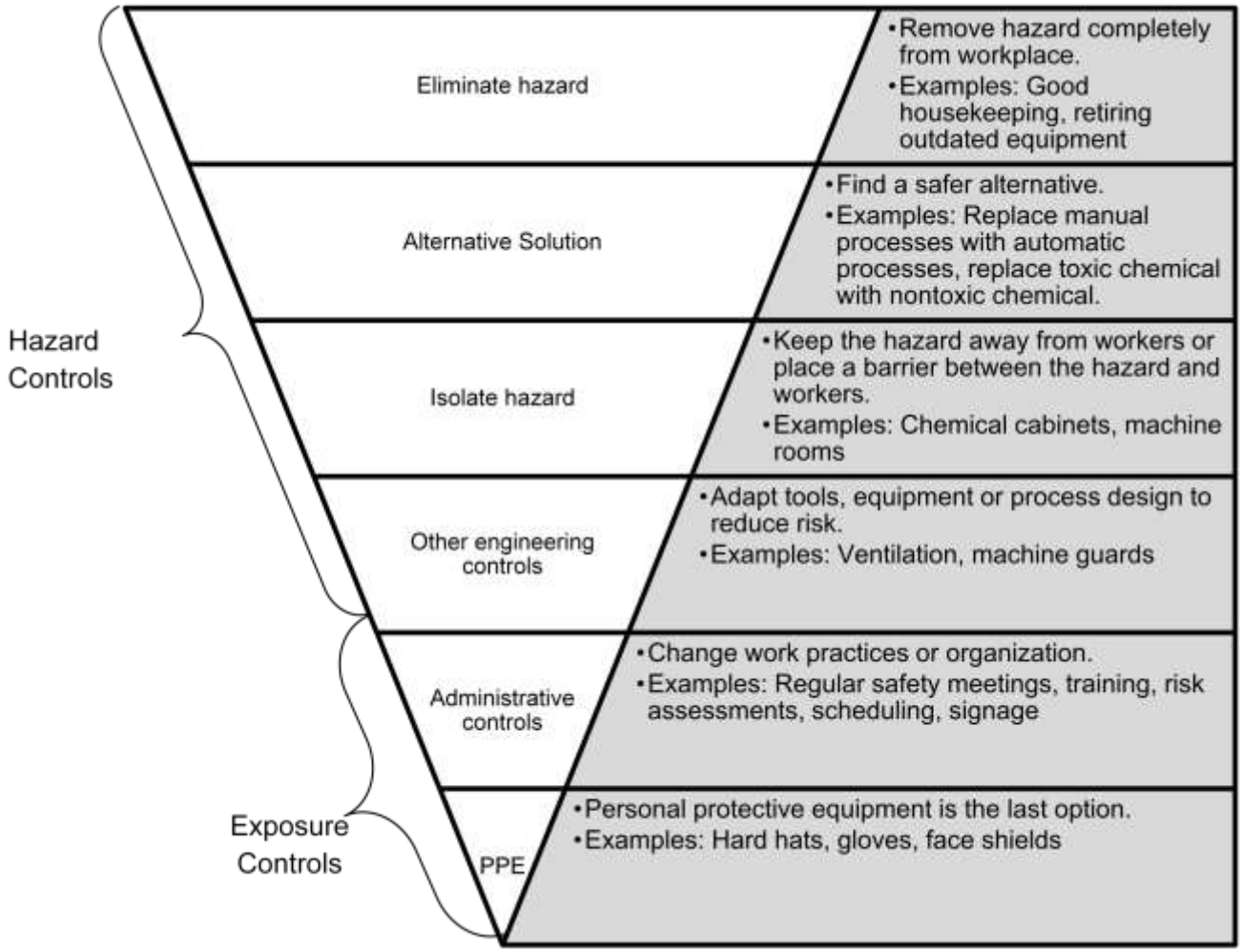
Controlling Exposure

Some jobs and processes demand a level of exposure to some workplace hazards. If this is the case, controlling risk means controlling or eliminating the exposure and the negative effects of exposure.

Administrative or Management Controls

Administrative hazard controls are far-reaching and varied when implemented. These controls rely on appropriate human behavior, which is why they are lower on the hazard control hierarchy than engineering controls. Administrative controls include:

- Policies, procedures and practices to reduce exposure
- Modifying work schedules to reduce exposure
- Monitoring the use of hazardous
- Alarms, signs and warnings
- The buddy system
- Training



Personal Protective Equipment

Personal protective equipment (PPE) is the least effective way to control hazards, but is necessary for some hazardous jobs. The following are examples of when PPE is acceptable:

- When engineering controls are not feasible or do not totally eliminate the hazard
- While engineering controls are being developed;
- When safe work practices do not provide sufficient additional protection
- During emergencies when engineering controls may not be feasible

PPE needs to be chosen carefully to address the hazard, and fitted to the person using it.

Document and Evaluate

By the end of the JHA, there will be a document that clearly outlines the steps to perform the job, the hazards encountered in each step, and appropriate controls that need to be in place to reduce the risk posed by those hazards. This will paint a picture of a process that considers safety from the start to end of the job.

However, unsafe habits have a way of introducing themselves into a process as workers find their "own way" of performing tasks — ways that may not take into account the safety measures identified in the JHA. Further, there may be risks that were not identified or were left insufficiently controlled that may only become evident after the JHA is complete. Monitoring and periodic reviews help ensure the JHA remains current to prevent accidents and injuries.

Document the Safe Job Procedure

Once the analysis is complete, communicate the results to all workers who are, or will be, performing that job. The side-by-side format used in JHA worksheets is not an ideal one for instructional purposes. Use a narrative-style communication format to create a safe job procedure that is easy to understand:

Write in step-by-step format. Each step needs its own paragraph that describes the step as one action.

Point out the hazard: If the step involves exposure to a hazard, point out the hazard in the step. Include the possible injury or illness that could result from unprotected exposure to the hazard.

Identify safety precautions: If the step involves exposure to a hazard, also point out the safety precautions to stay safe and healthy.

Paint a 'word picture': Write the procedure in a way that someone unfamiliar with the task could perform it safely. The safe job procedure can serve as a training document as well as a safety document. Avoid jargon and technical terms so new employees can easily understand the process.

Write in the second person, present tense. Treat the safe job procedure as a set of instructions. Tell the person who is doing the job exactly how to do it.

Write clearly. While it is important to be concise, it is more important to be clear and accurate. Keep sentences short. Clear writing helps make sure all workers can understand the instructions and follow them. If employees speak a language other than English, translate the job procedure into the language they speak so there is as little confusion as possible.

Monitor and Review

Periodically reviewing your JHA ensures it is current and continues to prevent workplace accidents and injuries. Even if the job does not change, unnoticed hazards may become apparent. It is particularly important to review job hazard analyses if an illness or injury occurs.

Based on the circumstances, the job procedure may need to change to prevent similar incidents in the future. If an employee's failure to follow proper job procedures results in a "close call or near miss," discuss the situation with all employees who perform the job and remind them of proper procedures. Any time you revise a job hazard analysis, it is important to train all employees affected by the changes in the new job, procedures or protective measures.

Hazard identification, and risk assessment and control are ongoing processes. Make sure to undertake a hazard identification and risk control analysis whenever there is a change to the workplace, including when work systems, tools, machinery or equipment change, or when the existing process is otherwise potentially out of date or no longer valid.

FORMS AND ATTACHMENTS

On the following pages, please find the following documents:

- Workplace Hazards
- Job Hazard Analysis Worksheet
- Safe Job Procedure Form
- Job Hazard Analysis Training Documentation

WORKPLACE HAZARDS (PAGE 1 OF 2)

Hazard		Description
Slips/Trips/Falls		Conditions that result in falls (impacts) from height or walking surfaces (such as slippery floors, poor housekeeping, uneven walking surfaces, exposed ledges, etc.)
Mechanical	Failure	Self-explanatory; typically occurs when devices exceed designed capacity or are inadequately maintained.
	Caught-in/ Caught-on/Crush	Skin, muscle or body part exposed to crushing, caught-between, cutting, tearing, shearing items or equipment.
Impact	Struck By	Accelerated mass that strikes the body causing injury or death. (Examples are falling objects and projectiles.)
	Struck Against	Injury to a body part due to coming into contact with a surface in where the action was initiated by the person. (An example is when a screwdriver slips.)
Chemical	Toxic	A chemical that exposes a person by absorption through the skin, inhalation, or through the blood stream that causes illness, disease, or death. The amount of chemical exposure is critical in determining hazardous effects. Check Safety Data Sheets (SDS), and/or OSHA 1910.1200 for chemical hazard information.
	Flammable	A chemical that, when exposed to a heat ignition source, results in combustion. Typically, the lower a chemical's flash point and boiling point, the more flammable the chemical. Check SDS for flammability information.
	Corrosive	A chemical that, when it comes into contact with skin, metal, or other materials, causes damage. Acids and bases are examples of corrosives.
Explosion	Chemical Reaction	Self-explanatory.
	Pressurization	Sudden and violent release of a large amount of powder blast/gas/energy due to ignition or a significant pressure difference such as rupture in a boiler or compressed gas cylinder.
Temperature Extreme		Temperatures that result in heat stress, exhaustion, or metabolic slow down such as hypothermia or hyperthermia.

WORKPLACE HAZARDS (PAGE 2 OF 2)

Electrical	Shock/Short Circuit	Contact with exposed conductors or a device that is incorrectly or inadvertently grounded, such as when a metal ladder comes into contact with power lines. 60Hz alternating current (common house current) is very dangerous because it can stop the heart.
	Fire	Use of electrical power that results in electrical overheating or arcing to the point of combustion or ignition of flammables, or electrical component damage.
	Static / ESD	The moving or rubbing of wool, nylon, other synthetic fibers, and even flowing liquids can generate static electricity. This creates an excess or deficiency of electrons on the surface of material that discharges (spark) to the ground resulting in the ignition of flammables or damage to electronics.
	Loss of Power	Safety-critical equipment failure due to a loss of power.
Ergonomics	Strain	Damage of tissue due to overexertion (strains and sprains), work positioning or repetitive motion.
	Human Error	A system design, procedure or equipment that is likely to cause error. (A switch goes up to turn something off).
	Vibration	Vibration that can cause damage to nerve endings, or material fatigue that results in a safety-critical failure.
Radiation	Ionizing	Alpha, Beta, Gamma X-rays and neutral particles that cause injury (tissue damage) by ionization of cellular components.
	Non-Ionizing	Ultraviolet, visible light, infrared, and microwaves that cause injury to tissue by thermal or photochemical means.
Noise		Noise levels that result in hearing damage (an 8-hour time-weighted average greater than 85 decibels) or inability to communicate safety-critical information.
Visibility		Lack of lighting or obstructed vision that results in an error or other hazard.
Weather Phenomena		Self-explanatory.

JOB HAZARD ANALYSIS WORKSHEET (PAGE 1 OF 2)

Department/Project:		Job/Activity:	
Date:		Created By:	
Step	Hazard(s)		Controls
1)			
2)			
3)			
4)			
5)			
6)			
7)			

JOB HAZARD ANALYSIS WORKSHEET (PAGE 2 OF 2)

Step
8)
9)
10)
11)
12)
Required Training:
Required Personal Protective Equipment:
Special Inspection Requirements:
Please attach any diagrams, flowcharts, or photographs that may be helpful in hazard assessment.

SAFE JOB PROCEDURE

DO NOT undertake this job unless a supervisor has instructed you in the safe use of all equipment and appropriate safety precautions for work processes associated with the job. Any employee who undertakes this job must have explicit supervisor permission to do so.						
Job Performed						
Potential Hazards						
Personal Protective Equipment						
						
Hand Protection	Respiratory Protection	Eye Protection	Face Protection	Special Footwear	Hearing Protection	Special Clothing
Other (Specify)						
Safe Work Procedures (attach additional sheets if necessary)						
Pre-Operation						
Operation						
Post-Operation						
Competent Personnel These individuals are permitted to perform the job and supervise others learning to do this job						
Name		Title		Contact		
Name		Title		Contact		

JOB HAZARDS TRAINING

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name:	**Signature:**

POLICY

JET Commercial LLC has implemented this policy for the protection of our employees during emergencies in the workplace. Macy Weaver will supervise the Emergency Action Plan.

The Company will have a written Emergency Action Plan (EAP). The EAP will be posted in the workplace and remain available to employees for review, along with the names and job titles of every person in the chain of command during emergencies.

EMPLOYER RESPONSIBILITIES

It is the responsibility of JET Commercial LLC to:

- Ensure adequate workplace safeguards against hazards, including appropriate exit routes, fire alarms, and fire protection systems
- Ensure development and implementation of the EAP
- Ensure training of employees in accordance with this policy

EMPLOYEE RESPONSIBILITIES

Every employee is expected to:

- Report fires or other emergencies
- Follow the EAP

TRAINING

JET Commercial LLC will ensure every employee is provided training on emergency planning. This training will be provided at no cost to the employee and held during their working hours.

Training will be provided:

- At the time of assignment
- When the employee's responsibilities under the Plan change
- When any element of the Plan is changed
- At least annually thereafter, annual training for all employees will be provided within one year of their previous training

The Company will provide additional training when tasks or procedures are added or changed that may affect the employee’s work. It is acceptable for additional training to be limited to addressing only the changes or additions to the employees’ exposure.

JET Commercial LLC will use only training material that is appropriate in content and vocabulary to the educational level, literacy, and language of employees.

Training Components

Macy Weaver will ensure all employees are informed and trained in the following minimum elements for the Emergency Action Plan and Fire Protection Program:

- Fire hazards at the worksite
- Means of controlling or removing fire hazards at the worksite
- Procedures for reporting a fire or other emergency
- Procedures for emergency evacuation for all areas of work, including type of evacuation and exit route assignments
- Safe assembly areas designated for all work areas in the event of evacuation
- Procedures to be followed by employees who are requested to remain to operate critical plant operations before they evacuate, if applicable
- Procedures to account for all employees after evacuation
- Procedures to be followed by employees performing rescue or medical duties
- The members in the chain of command who may be contacted by employees for information about the plans or for an explanation of their duties under the plans
- Proper operation of fire extinguishers provided by the company if the EAP allows employees to fight incipient stage fires rather than evacuate
- The hazards involved in incipient stage firefighting. Employees are instructed to ensure the local emergency response service (Fire Department) is notified before attempting to extinguish any fire, and that if a fire is not immediately extinguished, or the fire recurs to evacuate immediately

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

Emergency Action Plan

JET Commercial LLC is committed to providing a safe workplace and ensuring procedures are in place to protect employees in the event of any emergency. Accordingly, JET Commercial LLC will ensure there is an Emergency Action Plan, written and available to employees, that includes:

- Procedures for reporting a fire or other emergency
- Procedures for emergency evacuation, including type of evacuation and exit route assignments
- Procedures to account for all employees after evacuation

- Procedures to be followed by employees performing rescue/medical duties and operating critical plant operations
- The name or job title of every employee from whom other employees can find out more about the plan

Employee Involvement

The continued development and thorough implementation of the EAP is a company-wide effort that demands concerted effort of management and all employees. Accordingly, employees will be involved in every step of the EAP from planning to training to implementation in an emergency.

Macy Weaver, or an approved designate, will review the EAP with all employees to verify they understand procedures to be followed in an emergency.

Employees will report or remedy workplace hazards and unsafe work practices as soon as they may do so safely.

Possible Workplace Emergencies

In the planning and implementation of the company's EAP, employees will consider the range of emergencies that may require response and develop contingencies that respond to the unique workplace impact of these emergencies.

Weather

Weather-related events include hurricanes, tornadoes, blizzards, floods and severe storms. Supervisors must communicate unexpected schedule changes because of severe weather to employees as quickly as possible. Such events may result in a loss of power or communication and may limit the ability of first-responders to respond quickly.

Medical

Medical emergencies are the most likely workplace emergency. Response time is critical to a positive outcome during a severe medical emergency. Onsite medical first responders will know first aid and CPR, but no employee will perform first aid beyond their training or capability. If first aid trained, personnel are not available, stop any bleeding with firm pressure (avoiding contact with body fluid) and in case of choking, clear the air passages. In the event of a medical emergency, it is imperative to call 911 promptly.

Threat of Violence

Threats of violence can come through a range of modes of communication, directed at a single employee, a group of employees or the entire workplace. Every threat is serious. If you receive or are aware of a threat of violence, contact a supervisor immediately, if you are able to do so safely. Please see the chapter on "Workplace Violence Prevention" for more information about how to prevent and respond to threats of violence and violence in the workplace.

Fire

The fire prevention plan requires involvement of all employees to prevent fire emergencies. Response to a fire emergency depends on whether your workplace has decided to allow all employees or some employees to fight incipient-stage fires. Supervisors may have to serve as evacuation wardens, and if the emergency action plan demands it, an employee may need to shut down critical operations before evacuation. A quick, orderly evacuation accompanied by a call to 911 is the acceptable response to an out-of-control fire.

Explosion

If there are flammable substances at your worksite, take extra care during planning to address the hazards they present. Explosions do not offer any warnings, and often, panic presents the biggest obstacle to safety in the wake of such a disaster. Further, explosions often accompany fires, adding complexity to fire response planning.

Earthquake

When an earthquake strikes, the greatest risks come from above, collapsing ceilings and falling objects can severely injured workers. If the workplace is in an earthquake-prone location, consider earthquake drills and make sure you and your coworkers know to protect their head and neck under sturdy furniture or against an inside wall. A severe earthquake will occupy emergency workers, and onsite rescue and triage may be a task that falls into the hands of supervisors or members of the safety committee, if applicable. No employee should perform first aid or attempt rescue beyond training or capacity to do so safely.

CHAIN OF COMMAND

During an emergency, it's critical that employees understand the chain of command in the emergency action plan. In addition to the chain of command, it's also important to recognize that the authority of local emergency response officials, like members of the fire department, supersedes the authority of any JET Commercial LLC employee.

Emergency Scene Commander

Unless precluded by unforeseen contingencies, Macy Weaver will act as the scene commander in the event of a workplace emergency. JET Commercial LLC will determine whether an emergency exists, oversee procedures during an emergency, and notify and coordinate with outside emergency services.

Emergency Scene Coordinators

The emergency action plan requires the worksite to have enough people trained to assist in the evacuation of employees and assist the safety coordinator/emergency scene commander. The number of scene responders depends on the number of employees, the size and complexity of the worksite and the hazards posed by likely emergencies.

Table 3 provides a good guideline when considering how many coordinators will be necessary to implement the EAP. Scene coordinators should know CPR and first aid and would benefit from additional safety training, including workplace violence response. Their duties in an emergency include, but are not limited to the following:

- Checking for employees who may be unable to evacuate
- Knowing who may need assistance during evacuation and how to assist them
- Coordinating emergency activities
- Using their knowledge of workplace, escape routes and hazards to perform a swift, safe evacuation
- Verifying all employees are in designated safe areas following an evacuation

TABLE 3

Number of Emergency Scene Responders for Typical Workplaces		
Employees in Workplace	**Emergency Scene Commander**	**Emergency Scene Coordinator**
11-19	1	1
20-49		1-2
50-99		2-5
100-249		5-12
250+		12+

Emergency Reporting Procedures

Employees must report emergencies as quickly as they may do so safely. Emergencies may be reported through manual pull stations or other alarm systems. If the EAP requires employees to call Macy Weaver or other assigned staff, those numbers will be posted at every phone. Major emergencies demand an immediate call to 911 to prevent damage, injury or death. After the report of an emergency, the alarm system will notify employees about the emergency.

WORKPLACE EVACUATION

The EAP will include a floor diagram with arrows to designate exit route assignments based on location within the building. There need be secondary routes and exits whenever possible. It is important every employee knows the building's exit routes and keeps them free of obstacles and debris at all times. For more information about exit routes, please see the floor diagram and consult "Exit Routes" in this chapter.

Evacuation Assistance

Scene coordinators or other assigned personnel will act as evacuation wardens to ensure employees move from danger to safety during an emergency. An employee designated to assist in evacuations will need to know which employees need extra assistance and be trained and prepared to offer this assistance. Further, any visitors on premises may need assistance during evacuations. It is useful to implement a system to account for visitors, like a sign-in sheet, to promote facility security and account for everyone in case of an emergency.

Services During Evacuation

Workplaces with equipment and processes that take time to shut down or with systems that may pose a hazard if not shut down may include, as part of the EAP, a partial evacuation procedure. The roles of those performing critical operations during evacuation must be clear, and anyone left behind must be able to recognize when to abandon the task and evacuate. The same goes for workplaces that plan for employees to fight incipient-stage fires.

Accounting for Employees

The emergency action plan requires JET Commercial LLC to account for employees after an evacuation. Employees will gather in an established assembly area (or areas) after an evacuation. After the evacuation is complete, Macy Weaver or an approved designate, will perform a headcount and note the names and last known whereabouts of anyone missing. Accuracy in accounting for employees during an evacuation is vital to prevent a dangerous search-and-rescue operation if one is not needed. Procedures need to include a way to account for visitors, customers and suppliers who are onsite as well.

Sheltering in Place

Not every emergency requires evacuation. Certain contaminants and disasters present greater hazards outside than inside. If an emergency does not require evacuation, it may demand employers instead “shelter-in-place.” Macy Weaver will determine the extent of evacuation, and whether employees need to shelter in place. Sheltering in place means taking refuge in an interior room with no or few windows until the emergency has passed. In many cases, local authorities will issue advice to shelter-in-place via TV or radio. In case of chemical release, special precautions to protect against toxic atmospheres may be necessary. Including shelter-in-place preparations in the EAP demands a means of alerting employees in distinguishable ways and additional training on shelter-in-place procedures.

First Aid and Rescue

JET Commercial LLC will ensure that local fire, police and other emergency medical personnel are available and trained to provide assistance. In the absence of those resources, at least one person on staff will be trained to render first aid. An amount and dispersal of first aid supplies appropriate to the size of the facility, number of employees and hazards present will remain readily available. First aid supplies will be added or replaced as frequently as necessary to ensure availability. Facilities for rinsing or drenching eyes or body will be provided as hazards demand. First Aid kits will include or will be accompanied by appropriate personal protective equipment for anticipated hazards, including exposure to blood borne pathogens for personnel while performing first aid. More information is available in the chapters titled “Medical Services and First Aid” and “Bloodborne Pathogens.”

Critical Information

As part of the personnel file, there will be a record of emergency contact information for employees, in case an employee is unable to contact someone for themselves. The confidential record should include physician information and any other medical information the employee shares for use in case of an emergency.

Multi-Employer Workplaces

If the company shares a building or worksite with other employers, consider working with them to develop a building-wide emergency plan. If a building-wide plan is not feasible, take all necessary steps to ensure the EAP does not conflict with the plans of other employers in the building.

PERSONAL PROTECTIVE EQUIPMENT

During some emergencies, it is necessary for an employee to encounter hazards that require personal protective equipment. A medical emergency involving blood, for instance, will call for gloves as indicated in the bloodborne pathogen exposure control plan. Training, preparation and procedures will include consideration for any necessary PPE.

EXIT ROUTES

During an emergency, swift evacuation can ensure the safety and well-being of employees. In an emergency that requires employees to evacuate, JET Commercial LLC will adhere to all applicable regulations to ensure safe exit routes remain available to employees in case fire or other emergency demands evacuation of the workplace.

Basic Requirements

An exit route must be established and separated by fire resistant materials as quickly as possible during construction, and a safe means of egress must be maintained during renovation and demolition.

If the route connects three or fewer floor levels, construction materials separating the exit from other parts of the workplace must have a one-hour of fire resistance rating. (More stories call for a two-hour resistance rating.) An opening to an exit will only have self-closing, laboratory-tested fire doors as necessary to allow passage of individuals through the established route.

Enclosure and protection of openings for means of passage must occur as soon as possible after exterior walls/windows are in place.

Adequate Exit Routes

JET Commercial LLC will ensure sufficient exit routes for the workplace. While a single exit route is permissible in small workplaces with possible safe evacuation, two exit routes, located as far as practical from each other helps employees evacuate safely if one exit route is blocked. There will be enough exit routes to ensure safe evacuation of all employees.

Consult local codes to ensure safe means of passage in any construction. Exit stairways and means of egress in multi-level buildings must be provided immediately after floor decking is installed. In new multi-level buildings, one of the exit stairs may be obstructed for construction, but do not obstruct exit stairs for more than two contiguous floor levels.

Exit Discharge

Exits must discharge outside or to a space with access to the outside that is large enough to accommodate the number of people taking that route. For stairs that continue past the evacuation level, there will be indication of proper direction to discharge area.

Unlocked, Side-Hinged

Under no circumstances will an exit door be locked from the inside. Nothing can restrict the use of an exit door or any means of egress established in the fire protection plan in an emergency.

All exit doors will be side-hinged, with doors that swing out in the direction of exit travel, and rooms designed to hold more than 50 people or in a high-hazard area.

Capacity and Size Requirements

Exit routes must be able to handle the maximum occupant load for that floor. The capacity may not decrease as the route approaches the exit discharge.

The ceiling of an exit route must be at least seven feet six inches high. Any projection from the ceiling must not reach a point less than six feet eight inches from the floor.

An exit access must be at least 28 inches wide at all points. Where there is only one exit access leading to an exit or exit discharge, the width of the exit and exit discharge must be at least equal to the width of the exit access. The width of an exit route must be sufficient to accommodate the maximum permitted occupant load of each floor served by the exit route.

Objects that project into the exit route must not reduce the width of the exit route to less than the minimum width requirements for exit routes.

Outdoor Exit Routes

An outdoor exit route must be protected by guardrails if a fall hazard is present; covered or protected from slipping hazards; reasonably straight, smooth, solid and level; and free of dead ends longer than 20ft.

Minimize Dangers

Exit routes will be unobstructed and clear of hazardous materials or flammable furnishings. An exit route that goes toward a high hazard area requires barriers or partitions to provide a suitable shield from the hazard for workers.

Lighting and Marking

Exit routes must be adequately lit, clearly visible and marked by a sign reading “EXIT.” Decorations and signs must not obstruct or obscure the visibility of the exit door. If a doorway could be mistaken for an exit, it must be marked “Not an Exit” or a sign that identifies its use. If the direction to the exit is not apparent, signs must be posted to indicate the direction for evacuation.

Exit signs must be lighted and comply with the NFPA requirements.

Construction, Repairs, Alterations

Employees may not occupy any workplace during construction, repairs or alterations unless all exit routes and required safety standards are maintained. The Company will ensure removal of or appropriately minimize hazards beyond normal conditions during construction activities.

FORMS

On the following pages, please find the Emergency Action Plan form, which may be reproduced freely by the Company JET Commercial LLC for the purposes of implementing and maintaining a safety and health program.

EMERGENCY ACTION PLANS (PAGE 1 OF 4)

Company Name				Job Location			
Street		City		State		ZIP	
Prepared By		Title			Phone		
Signature					Date		

Purpose
This plan is for the safety and well-being of company employees. It identifies necessary management and employee actions during fires and other emergencies. Education and training are provided so that all employees know and understand the Emergency Action Plan.

Location of Plan	
The Emergency Action Plan can be found at the station or office of	
Upon request, an OSHA representative may obtain a copy of the plan from	

Exit Routes
Draw a diagram of jobsite or facility exit routes in space below. Locate meeting place or “Roll-Call” area on diagram

EMERGENCY ACTION PLANS (PAGE 2 OF 4)

Accounting for Employees			
After exiting jobsite or facility, all employees are to assemble for “Roll-Call” at this location Note location on exit route diagram			
The following are responsible for ensuring that employees comply with this requirement			
Name		Title	
Name		Title	

Critical Operations	
To minimize damage from the emergency, the following personnel are responsible for shutting down the listed critical operations	
Personnel Names	Critical Operations
As soon as shutdowns are completed, the employees who performed critical operations must take the nearest exit route in accordance with general emergency procedures.	

Rescue and Medical Duties		
The following personnel are certified and trained in both CPR and general first aid		
Name	Title	Phone Number

EMERGENCY ACTION PLANS (PAGE 3 OF 4)

Reporting Emergencies		
The following personnel have the duty of contacting public responders to come to the emergency scene. The personnel are listed in descending order of availability		
Name	Title	Phone Number

Alarm Systems and Notification of Emergencies	
In the event of a workplace or facility emergency, employees will be notified as follows	

Types of Evacuation	
OSHA requires this Company to have an established system of types of evacuation to follow for different emergency circumstances. The following listing represents Company policy for various emergency situations	
PARTIAL EVACUATION: Code Yellow – 3 rings or horn blasts RESPONDERS (trained extinguisher personnel and trained rescue and medical personnel)	
FULL EVACUATION: Code Red – 4 rings or horn blasts: RESPONDERS (n/a)	
NOTE: If there is more than one evacuation type, the alarm signal for each must be distinctive.	
Other (describe)	

EMERGENCY ACTION PLANS (PAGE 4 OF 4)

Public Emergency Response Information	
911 emergency services DO / DO NOT cover the area this Emergency Action Plan covers. (circle one)	
Local Police Department	
Local Fire Department	
Local Ambulance/EMS	
Local Hospital	

Further Information	
For further information or explanation about any duties under this Plan, contact	
Name	Title

This Emergency Action Plan is authorized and approved by (Name and Title)		
Name (print)	Signature	Title

POLICY

Safety incidents indicate the failure of safety control systems and demand changes to prevent future harm. In order to implement necessary changes and prevent future harm, JET Commercial LLC will investigate accidents and near misses to identify causes and make safety recommendations.

The primary purpose of workplace accident investigations performed by JET Commercial LLC is to find facts to guide future actions, not to find fault or assign blame.

Fatalities must be reported to OSHA within eight hours. Serious accidents where an employee is admitted to a hospital for treatment or observation because of injuries suffered from a workplace accident must be reported to OSHA within 24 hours.

If an employee with an occupational injury or illness receives a medical emergency procedure, Macy Weaver or designate will document the incident on OSHA's Form 301, "Injury and Illness Incident Report," and record the injury or illness on OSHA's Form 300, "Log of Work Related Injuries and Illnesses." See "29 CFR 1904.7 — Recordkeeping Forms and Recording Criteria" for more information.

EMPLOYER RESPONSIBILITIES

It is the responsibility of JET Commercial LLC to:

- Provide accident investigation training
- Require that every accident is investigated to find and remedy the root causes
- Respond promptly to any recommendation following an accident
- Take corrective actions to prevent the recurrence of an accident
- Avoid blaming individuals in incident investigations for safety purposes
- Report to the appropriate authority, as required by law, any fatality, injury or work-related illness
- Share with employees the findings of accident investigations
- Review these accident investigation procedures and this policy annually and revise as necessary

EMPLOYEE RESPONSIBILITIES

Every JET Commercial LLC employee is expected to:

- Immediately report any work-related accident, injury, or near miss
- Actively cooperate with investigators during accident investigations
- Participate in recommending changes to processes, systems, and the workplace, and in helping to implement changes as necessary to prevent future accidents

TRAINING

JET Commercial LLC will ensure all employees are provided training on their role in the accident investigation process. This training will be provided at no cost to the employee during working hours.

JET Commercial LLC will use only training material that is appropriate in content and vocabulary to the educational level, literacy, and language of employees.

Training Components

Macy Weaver will ensure that all employees at JET Commercial LLC are informed and trained in the following minimum elements for accident investigation:

- What an accident is and why accidents occur
- What a near-miss is
- How to report an accident
- A general overview of the accident investigation process
- Why accident investigations are important, and the purpose of them
- Different levels of causes for accidents

Managers and supervisors will complete training in the following minimum elements for accident investigation:

- Learning the legal requirements of accident reporting
- Securing an accident scene
- Planning an accident investigation
- Collecting information from an accident scene
- Conducting interviews as part of an accident investigation
- Photographing and sketching an accident
- Creating a timeline of an accident
- Learning root-cause analysis techniques
- Compiling accident investigation reports
- Recommending change to prevent accidents

Training Records

The company will retain training records for three years from the date on which the training occurred.

The following information must be included:

- Dates of the training
- Contents or a summary of the training
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training

PROCEDURE

It is easy to think of an accident simply as a single event that results in injury or illness to an employee, or in property damage. In reality, an accident is the culmination of a series of events. Accidents are the end of an unplanned, unintended and undesired process. They are complex, and in some industries exceedingly rare, often with several events that can be identified as causes.

It is also easy to think of accidents as being the result of poor chance or fate. However, a competent person can examine workplace conditions, behaviors, and underlying systems to predict what kind of accidents will occur. There is certainly an element of chance in every incident. However, most accidents can be prevented by eliminating and controlling workplace hazards.

A serious accident may result in disability, severe property damage or even death; a minor accident may only cause an inconvenience; near misses may not harm anyone or anything. However, nearly all accidents and near misses point to failures in safety systems that demand a closer look to prevent more harm in the future.

Investigations

An accident investigation may have different purposes, including:

- Identifying and describing the actual course of events
- Identifying the direct and root causes / contributing factors of the accident
- Identifying risk-reducing measures to prevent future, comparable accidents
- Investigating and evaluating the basis for potential criminal prosecution
- Fulfilling legal requirements or processing workers' compensation claims
- Evaluating the question of guilt in order to assess the liability for compensation

Police, insurance investigators and safety regulators may investigate an accident for other reasons, but JET Commercial LLC accident investigations emphasize finding the root causes of the accident to prevent future accidents from happening again.

Investigators are interested in not only individual harmful events, but also the events, systems, and processes that led to the accident. Accident investigations need to determine exactly what happened, but more importantly, must look for deeper causes — the how and why.

Incidents that don't involve injury or property damage will still be investigated to determine which hazards need to be corrected. The same principles apply to a quick inquiry of a minor incident, and to the more formal investigation of a serious event.

Procedures for Accident Investigations

The best time to develop accident investigation procedures is before the accident occurs.

The plan will include procedures that determine:

- Who to notify when an accident occurs
- Who may notify outside agencies (fire, police, etc.)
- Who will conduct investigations

- Who will maintain recordkeeping documents
- What training is required for accident investigators
- Who receives and acts on investigation reports
- Timetables for conducting hazard correction

At JET Commercial LLC, pre-accident investigation planning is a team effort between supervisors and Macy Weaver. Nevertheless, there are some key steps to help ensure an accident investigation will accomplish its goal of preventing future incidents. See Figure 1 for an outline of the general steps of an accident investigation.

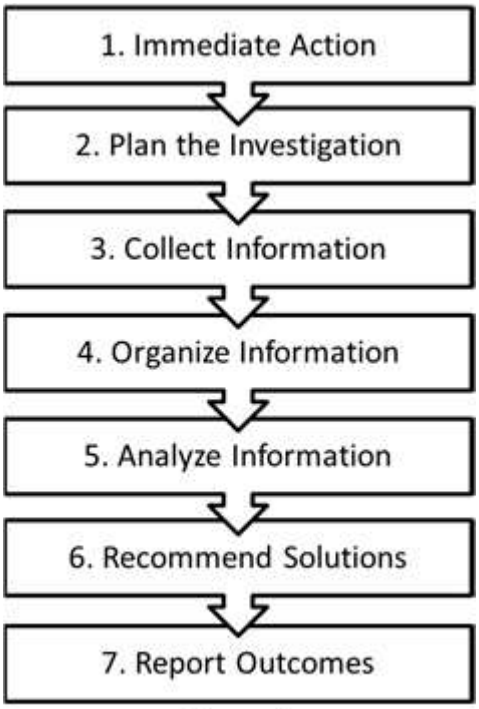


Figure 1

IMMEDIATE ACTION

Secure Accident Scene

The first action to take at an accident scene is to prevent further injuries and make the area safe. Administer first aid (or ensure it is administered) or summon appropriate emergency responders as necessary.

Sometimes, an investigation can begin while the victim is being assisted by emergency responders. However, the priority is always taking care of the victim, and usually investigations don't begin until emergency response is completed. Material evidence will most likely not be in its original location, but effective interviews can shed light on the scene at the time of the accident.

At this point, gathering as much pertinent information as possible for later analysis takes priority over determining the cause of the accident, but the top priority must always be the safety and well-being of workers and the public.

Preliminary Investigation

It is important to start the investigation as soon as possible. Significant elapsed time between the accident and the investigation can lead to a deterioration of evidence and undermine the accuracy of the investigation.

Material Evidence

There is a temptation to clean up the accident scene immediately so people can get back to work, but an effective procedure will protect material evidence for the investigation.

It is important to secure the scene of an accident quickly and effectively. Tape, rope, cones, or even personnel, can secure the accident scene.

Plan Investigation

Most investigation planning should happen well in advance of an accident. However, some details of the investigation can only be seen after the fact. The nature of the accident will determine the extent of the investigation, the resources that will be needed, what types of investigative processes will be required, who will need to be interviewed, etc.

Build Team

Ideally, someone experienced in accident causation and investigative techniques will conduct accident investigations. An investigator who is also fully knowledgeable of the work processes, procedures, peoples, and general work environment of a particular situation will be able to shed some light on the causes of the accident.

In most cases, the supervisor will help investigate, together with the safety coordinator and/or whoever is in charge of worksite inspections.

Other members of the team can include:

- Employees with knowledge of the work
- A union representative, if applicable
- Employees with experience in investigations
- An impartial expert from outside the company

It's important the team represent a variety of expert perspectives on workplace safety and the job being performed when the accident happened. However, everyone on the team needs to be trained in appropriate investigative techniques and not be involved in any disciplinary proceedings that might emerge out of the incident, if possible.

It is important to keep the safety-related aspect of the investigation separate from any possible disciplinary action. Accident investigations will always focus on identifying safety failures and remedying them promptly.

COLLECT INFORMATION

The next step is to gather useful information about what directly and indirectly contributed to the accident. When collecting information to understand an incident or accident, consider all possible sources.

Photograph and Video

Photographs and video recording can help in the preparation of a report, as well as in analyzing conditions at the site of the incident. Take photographic evidence as soon as safely possible.

Following are some techniques useful in taking photographs at incident scenes:

- Photograph the overall area before moving to detail the precise incident site
- Take photos from different perspectives and angles—close-up and from a distance
- Use witnesses to help you decide what to shoot, and note their comments

- Record what photos you take in a log that includes details like when the shot was taken, by whom, where, what the shot contains, identifying number on a sketch of the area, and a brief description of what the photograph is trying to identify
- Keep the photos in a safe place along with notes, evidence, and sketches from the accident investigation
- Narrate video with details like those above

Sketch Scene

Sketches complement information in photos or video, indicating distances among elements of the accident scene. It is important to be as precise as possible when making sketches.

Following are some things to remember:

- Make sketches large and clear
- Include basic facts (date, time, location, identity of objects, victims, etc.)
- Define spatial relationships with identifiable points of reference and compass directions
- Include important measurements, and note key concepts
- Indicate what has been included in photographs
- Mark where people were standing

Eventually, a precise diagram can reflect the information in a sketch, but it is important to get as much information as possible immediately after the accident.

Interview Witnesses

Interviewing witnesses is the easiest way to gain an understanding of how the accident occurred, and the conditions that led to it. Witnesses include people who saw the incident, such as any injured people, and others whose behavior, actions and/or inactions— either intentionally or unintentionally—contributed to the incident. This can include supervisors and trainers, maintenance personnel, and anyone else tied to the investigation.

When interviewing, it is important to remember emotions can run high in the wake of an accident, especially a catastrophic one. The accident investigation is a cooperative effort to create a safer workplace by gathering and understanding information. Keep an open mind and listen with a calm, relaxed, unhurried demeanor.

- Use a voice recorder only with permission; if possible, offer a copy of the recorded conversation, or a transcription, to the interviewee
- Express to the individual that the information given is important, but put the person at ease. Explain the purpose of the interview and your role. Express sincere concern regarding the accident and your desire to prevent a similar occurrence
- Interview witnesses separately, and ensure witnesses can discuss the incident with you in relative privacy where possible. Don’t promise confidentiality though
- Take the witness to the scene if they are comfortable. If you can’t conduct a private interview at the location, find an office or meeting room that the interviewee considers a "neutral" location

- Allow witnesses to have a support person present, but ensure the support person is not directly linked to the incident and is not a witness. If there is a collective bargaining agreement, and a worker requests union representation, do not continue the interview until representation has been secured
- Direct an eyewitness to "explain what happened" in their own words. If you don't ask them to explain, you may be left with a simple "Yes" or No" response, which is not as helpful. Open-ended questions elicit much more information than closed-ended questions. "Why" questions can put an interviewee on guard. Look for facts and observations; ignore speculation
- Take notes casually, but with care. Allow the interviewee to review notes of the interview to ensure accuracy and help bring details to mind. Give the interviewee a copy of the notes you take to help reduce any thought that you're trying to conceal information
- Repeat the facts and sequence of events back to the person to avoid misunderstanding, and to establish the correct version of events
- Request interviewees to offer their own suggestions as to how the incident could have been avoided
- Conclude interviews by thanking interviewees for their contribution. Ask them to contact you if they think of anything else. If possible, tell witnesses personally of the outcome of the investigation before it becomes public knowledge

Consult Records

When searching for information, investigations will continue after evaluating the scene of the accident, collecting physical evidence and interviewing the people involved. Documents related to the incident can provide incredible insight into the causes of an accident; especially root causes.

Some examples of useful documents include:

- Technical data sheets
- Inspection reports
- Company policies
- Maintenance reports
- Past accident reports
- Job hazard analyses and safe-work procedures
- Training records and reports
- Work schedules
- Injury and illness logs
- Any other document that may shed light on the safety-related systems in place where the accident took place

Determining the causes of the accident based on available information may be difficult because events must be analyzed not only to identify direct causes for the accident, but also related root causes. "Surface" causes can be obvious. However, it may take a great deal of additional time to unearth weaknesses in management systems, or other root causes that contributed to the conditions and practices associated with the accident.

ORGANIZE AND ANALYZE THE FACTS

Develop Sequence of Events

When all of the evidence is collected, and all the interviews are complete, a timeline of the accident should emerge. Each event on the timeline describes an actor and an action. The actor effects change through action or inaction. Actors do not have to be personnel. Equipment or processes can affect the system to precipitate an accident.

When developing the sequence of events, do not hesitate to stretch the timeline further back as deeper causes begin to emerge. Accidents often result from long-term oversights and failures that have taken some time to have a negative impact.

If gaps in the timeline are apparent, they need to be filled in. If re-interviewing witnesses or investigating the evidence fails to fill the gaps, develop an “educated guess” supported by the rest of the timeline and available evidence.

The sequence of events must describe what happened in such a way that someone unfamiliar can understand what likely happened.

Determine the Causes

When the timeline is established, the next step is to determine the causes of the accident. The key question for an investigator to establish cause is “Why?” Why did an unsafe condition emerge in the workplace? Why did the worker end up exposed to the unsafe condition? Determining the root causes of an accident requires asking “Why?” over and again.

Implement Solutions

Although an accident investigation can be a reactive safety process, it typically ends in recommendations for effective control strategies and system improvements that will help prevent similar accidents in the future.

WRITE THE REPORT

An accident or incident investigation aims to create systemic change and ensure everyday safeguards remain in place to reduce risk and promote safety in the workplace. However, the information uncovered in the investigation, and recommendations that come from the investigation, need to be available to people with authority. A report that includes the pertinent information about the causes of an incident, as well as concrete recommendations, helps the investigation to positively affect the safety culture of JET Commercial LLC.

Please see the “Accident/Incident Report” at the end of this chapter for an example template for an incident report.

Background: This section of the report covers the basic information about the accident: when and where the accident occurred, who was involved, etc.

Description: The description of the incident is a timeline of the incident, a step-by-step narrative of what occurred. The incident and the findings of the investigation will determine how far before and after the incident itself, the narrative should stretch. Include enough information to give a person who was not there a clear understanding of the accident. Be specific. Include a diagram of the event.

Findings: Report results of the root-cause analysis with complete thoughts, not short notes. Remember to describe both hazardous conditions and unsafe actions. Findings need to include direct and indirect surface causes. Findings must also clearly outline the root causes of the accident and frame recommendations. Remember, the point of the investigation is not to assign blame. Findings will describe unsafe actions of individuals, but any lack of hazard controls, or deficient safety systems, at the organizational level is what the report aims to remedy.

Recommendations: Recommendations can only be as effective as the findings on which they are based. In the report, recommendations need to be specific and help those in authority take the first steps to implement the recommendations. Include who will be responsible to implement the recommendations, a timeline, and estimated cost—if that can be determined.

Summary: Review the causes of the accident and the corrective steps that are recommended.

Review and Follow-up: This can be included as part of the recommendations. Necessary changes require a system of accountability. Suggesting a specific timeframe and identifying individuals with appropriate authority to enact recommendations will drive the needed changes. Incorporating accident follow-up and accountability is a useful way to build widespread accountability for the types of safety system changes workplace accidents often demand.

Attachments: Be sure to include with the report the notes from interviews, as well as photographs and any other pertinent information and evidence from the investigation.

REPORTING ACCIDENTS

JET Commercial LLC will investigate all lost-time injuries. Any fatality, or the hospitalization of three or more employees, must be reported to OSHA within eight hours.

Effective January 1, 2015 any accidents resulting in hospitalization, amputation, and eye loss must be reported within 24 hours (amputations do not include avulsions, enucleations, deglovings, scalpings, severed ears, or broken/chipped teeth.)

Employees will report all accidents and near-miss incidents that result in personal injury, property damage, chemical spills or other emergencies to the assigned supervisor at the time of the event. In addition, emergency medical services, the fire department, and hazmat services will be immediately summoned as needed.

NOTE: Effective Jan. 1, 2017, OSHA will require certain employers to electronically submit injury and illness data that they are already required to record on their onsite Injury and Illness forms.

The new reporting requirements will be phased in over two years:

Establishments with 250 or more employees in industries covered by the recordkeeping regulation must submit information from their 2016 Form 300A by July 1, 2017. These same employers will be required to submit information from all 2017 forms (300A, 300 and 301) by July 1, 2018. Beginning in 2019 and every year thereafter, the information must be submitted by March 2.

Establishments with 20-249 employees in certain high-risk industries must submit information from their 2016 Form 300A by July 1, 2017, and their 2017 Form 300A by July 1, 2018. Beginning in 2019 and every year thereafter, the information must be submitted by March 2.

For a complete list of industries that fall into the “high risk” category, please refer to the compliance section of the following OSHA web location: osha.gov/recordkeeping/finalrule/index.html

OSHA's Form 300, 300A and 301

Unless a company is in a low-hazard industry (see list at right) or employs 10 or fewer individuals, all recordable injuries and illnesses must be recorded appropriately. See 1904.7 — Recordkeeping Forms and Recording Criteria.

If an employee with an occupational injury or illness receives a medical emergency procedure, Macy Weaver or designate will document the incident on OSHA’s Form 301 “Injury and Illness Incident Report” and record the injury or illness on OSHA’s Form 300 “Log of Work Related Injuries and Illnesses.” within seven (7) calendar days of receiving information that a recordable injury or illness has occurred.

Yearly, OSHA’s form 300A “Summary of Work-Related Injuries and Illnesses,” will be completed based on the information in form 300 and posted between February 1 and April 30 of the year following the year covered by the form.

FORMS AND ATTACHMENTS

Please find the documents listed below on the following pages:

- Accident/Incident Report
- Accident Investigation Training Documentation

These forms may be reproduced freely by JET Commercial LLC for the purpose of implementing and maintaining a safety and health program.

OSHA reporting forms and work-related injury and illness logs are available at:

http://www.osha.gov/recordkeeping/new-osha300form1-1-04.pdf

ACCIDENT/INCIDENT REPORT FORM (PAGE 1 OF 3)

Date of Accident	Time	Day of Week	Shift	Department
		☐ S ☐ M ☐ T ☐ W ☐ T ☐ F ☐ S	☐ 1 ☐ 2 ☐ 3	

Injured Person

Name				Address	
Age		Phone			
Job Title		Supervisor Name			
Length of Employment at Company		Length of Employment at Job			
Employment Classification	☐ Full Time ☐ Part Time ☐ Contract ☐ Temporary				

Nature of Injury	☐ Bruising	☐ Dislocation	☐ Other (specify)	Injured Body Part
☐ Strain/Sprain	☐ Scratch/Abrasion	☐ Internal		
☐ Fracture	☐ Amputation	☐ Foreign Body	Remarks	
☐ Laceration/Cut	☐ Burn/Scald	☐ Chemical Reaction		

Treatment	Name and Address of Treating Physician or Facility
☐ First Aid	
☐ Emergency Room	
☐ Doctor's Office	
☐ Hospitalization	

Damaged Property

Property, Equipment, or Material Damaged	Describe Damage
Object or Substance Inflicting Damage	

ACCIDENT/INCIDENT REPORT FORM (PAGE 2 OF 3)

Incident Description	
Describe what happened (attach photographs or diagrams if necessary)	
Make sketches or illustrations to help describe incident	

ACCIDENT/INCIDENT REPORT FORM (PAGE 3 OF 3)

Root Cause Analysis (check all that apply)		
Unsafe Acts	Unsafe Conditions	Management Deficiencies
☐ Improper work technique ☐ Safety rule violation ☐ Improper PPE or PPE not used ☐ Operating without authority ☐ Failure to warn or secure ☐ Operating at improper speeds ☐ Bypassing safety devices ☐ Guards not used ☐ Improper loading or placement ☐ Improper lifting ☐ Servicing machinery in motion ☐ Horseplay ☐ Drug or alcohol use ☐ Unnecessary haste ☐ Unsafe act of others ☐ Other:	☐ Poor workstation design/layout ☐ Congested work area ☐ Hazardous substances ☐ Fire or explosion hazard ☐ Inadequate ventilation ☐ Improper material storage ☐ Improper tool or equipment ☐ Insufficient knowledge of job ☐ Slippery conditions ☐ Poor housekeeping ☐ Excessive noise ☐ Inadequate hazard guards ☐ Defective tools/equipment ☐ Insufficient lighting ☐ Inadequate fall protection ☐ Other:	☐ Lack of written policies and procedures ☐ Safety rules not enforced ☐ Hazards not identified ☐ PPE unavailable ☐ Insufficient worker training ☐ Insufficient supervisor training ☐ Improper maintenance ☐ Inadequate supervision ☐ Inadequate job planning ☐ Inadequate hiring practices ☐ Inadequate workplace inspection ☐ Inadequate equipment ☐ Unsafe design or construction ☐ Unrealistic scheduling ☐ Poor process design ☐ Other:

Accident/Incident Analysis	
Using the root-cause analysis list, explain the cause(s) of the incident in as much detail as possible. Attach a sheet if there is not enough room.	
How bad could the accident have been?	☐ Very Serious ☐ Serious ☐ Minor
What is the chance of the accident happening again?	☐ Frequent ☐ Occasional ☐ Rare

ACCIDENT/INCIDENT REPORT FORM

Recommendations and Follow Up			
Describe actions that will be taken to prevent recurrence (attach another sheet if necessary)	Deadline	By Whom	Complete

Summary

Investigation Team		
Name	Signature	Position

POLICY

JET Commercial LLC is committed to the safety and health of our employees and to ensuring prompt medical attention for any injury that occurs at work.

Part of that commitment includes having readily available medical personnel. Where there is no medical facility close to the worksite, Macy Weaver and other personnel as needed will be trained to provide first aid. First-aid kits are located at: each truck

JET Commercial LLC will provide, at no cost, medical services for employee evaluations, employment requirements and special conditions of work.

EMPLOYER RESPONSIBILITIES

It is the responsibility of JET Commercial LLC to:

- Verify that all employees receive training that explains the first-aid response plan
- Determine who must be trained to render first aid and ensure every employee expected to render first aid will be trained in appropriate practices and techniques, including response to site-specific hazards
- Check that the first-aid response plan, amount of first-aid-trained personnel, first-aid equipment and all other hazard controls protect against the workplace hazards as determined in job hazard analyses and worksite inspections
- Check that first-aid kits remain fully stocked and any emergency response equipment is in good repair
- Respond to recommendations and concerns from JET Commercial LLC employees

EMPLOYEE RESPONSIBILITIES

All employees are expected to:

- Follow the first-aid policy and the first-aid response plan
- Understand the hazards presented by “Good Samaritan” first aid response

TRAINING

JET Commercial LLC will ensure every employee receives training that covers the JET Commercial LLC first-aid response plan. All personnel expected to render first aid will be certified by an approved first-aid training organization. All training for workplace safety will be provided at no cost to the employee during working hours.

JET Commercial LLC will provide training:

- At the time of assignment to tasks where occupational exposure may take place.
- At least annually thereafter, annual training will be provided within one year of previous training.

JET Commercial LLC will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Components

The training program for medical services and first aid will contain at a minimum the following elements:

- Location and contents of workplace first-aid kits
- “Good Samaritan” hazards and bloodborne pathogens
- Self-care and incident reporting

The person conducting the training will be knowledgeable in the subject matter of the training program as it relates to the workplace.

Any JET Commercial LLC employee who is expected to render first aid as part of his or her job duties, will receive additional training from an external organization (e.g. American Heart Association, American Red Cross, and the National Safety Council) including, but not limited to:

- Recommended first-aid practices, especially those that may be necessary for hazards specific to the JET Commercial LLC workplace
- Bloodborne pathogen exposure control
- Cardiopulmonary resuscitation incorporating use of automated external defibrillators (if present at worksite)

If a third-party first aid training provider is unable to provide first aid training specific to hazards at JET Commercial LLC, first aid responders require supplementary training over the appropriate response to injuries that may result from worksite-specific hazards.

Potential First Aid Training Elements

OSHA suggests a number of elements to include when planning first-aid training programs.

Teaching Methods

Training programs will incorporate the following principles:

- Basing the curriculum on a consensus of scientific evidence where available
- Having trainees develop “hands-on” skills through the use of mannequins and partner practice
- Having appropriate first-aid supplies and equipment available
- Exposing trainees to acute injury and illness settings as well as to the appropriate response through the use of visual aids
- Including a course information resource for reference both during and after training
- Allowing enough time for emphasis on commonly occurring situations
- Emphasizing skills training and confidence-building over classroom lectures
- Emphasizing quick response to first-aid situations

First Aid Training Elements

The training program will include instruction in repositioning ill/injured victims to prevent further injury.

Preparing to Respond to a Health Emergency

The training program will include instruction or discussion in the following:

- Prevention as a strategy in reducing fatalities, illnesses and injuries
- Interacting with the local EMS system
- Maintaining a current list of emergency telephone numbers (police, fire, ambulance, poison control) accessible to all employees
- Understanding the legal aspects of providing first-aid care, including Good Samaritan legislation, consent, abandonment, negligence, assault and battery, State laws and regulations
- Understanding the effects of stress, fear of infection, panic; how they interfere with performance; and what to do to overcome these barriers to action
- The importance of universal precautions and body substance isolation to provide protection from bloodborne pathogens and other potentially infectious materials
- Learning about personal protective equipment — gloves, eye protection, masks, and respiratory barrier devices
- Appropriate management and disposal of blood-contaminated sharps and surfaces; and awareness of OSHA's Bloodborne Pathogens standard 29 CFR 1910.1030

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

JET Commercial LLC will maintain employee-training records for the length of their employment.

First aid training courses provided to JET Commercial LLC employees will include instruction in general and workplace hazard-specific knowledge and skills.

First-aid trained employees will repeat training periodically to maintain and update knowledge and skills.

First Aid Response Planning

Macy Weaver, working with management, will determine a first-aid response plan appropriate to the worksite.

The first-aid response plan can be incorporated into the emergency action plan and will:

- Fit the work location, type of work and environmental conditions
- Identify the police, fire and emergency medical services available, and determine their estimated response times to the worksite
- Verify they are trained to handle the types of emergencies that can be expected
- Verify that their contact numbers are posted at the work site
- Describe the type of first-aid training employees receive, if applicable
- Identify the location(s) of first-aid supplies and/or first-aid station
- Identify the contents of first-aid kits
- Describe how first-aid supplies, kits and equipment will be inspected and maintained
- List all first-aid trained employees

Sharing First Aid Response Plan Information

First-aid policies and procedures are most effective when they are in writing. Whether in writing or not, the first-aid response plan needs to be communicated in such a way that every worker, can understand and follow the plan.

IMPLEMENTATION

Hazard Assessment

A job hazard analysis (see chapter on “Job Hazard Analysis”) will define the extent and nature of first-aid training for a given job and determine the first-aid supplies that need to be available.

First Aid Kits

First-aid supplies will remain available in adequate quantities and be readily accessible at each truck.

Macy Weaver or a designated person will determine the types and quantities of kits and additional first-aid equipment and supplies required at the work site to accommodate larger operations or multiple operations.

Responding to Medical Emergencies

A wide variety of medical emergencies can occur in the workplace; however, they can be divided into two categories, life threatening and non-life threatening. It’s important for JET Commercial LLC first aid providers to be trained to deal with situations as they arise, and to be able to recognize the severity of the emergency. Medical emergencies can include, but are not limited to:

- Chest pain
- Impalements
- Electrocution
- Breathing problems
- Hypoglycemia in diabetics taking insulin
- Pregnancy complications
- Reduced level of consciousness
- Stroke
- Crushing
- Severe bleeding
- Anaphylactic reaction
- Seizures
- Abdominal injury

Assessing the Scene and the Victim(s)

The top priorities of first aid providers when responding to a medical emergency are”

- Assessing the scene for safety, number of injured, and nature of the event
- Assessing the toxic potential of the environment and the need for respiratory protection
- Establishing the presence of a confined space and the need for respiratory protection and specialized training to perform a rescue
- Prioritizing care when there are several injured
- Assessing each victim for responsiveness, airway patency (blockage), breathing, circulation, and medical alert tags
- Taking a victim’s history at the scene, including determining the mechanism of injury
- Performing a logical head-to-toe check for injuries
- Continuous monitoring of the victim
- Early activation of EMS
- Safely moving and rescuing victims

RESPONDING TO LIFE-THREATENING EMERGENCIES

First aid training will be designed for the specific worksite and include first-aid instruction for the management of the following:

Breathing Problems

The training program will be designed or adapted for the specific worksite and may include first-aid instruction in the following:

- Establishing responsiveness
- Establishing and maintaining an open and clear airway
- Performing rescue breathing
- Treating airway obstruction in a conscious victim
- Recognizing asphyxiation and the danger of entering a confined space without appropriate respiratory protection

Additional training is required if first-aid personnel will assist in the rescue from the confined space.

Poisoning

- Ingested poisons: alkali, acid, and systemic poisons. Role of the Poison Control Center (1-800-222-1222)
- Inhaled poisons: carbon monoxide; hydrogen sulfide; smoke; and other chemical fumes, vapors, and gases. Assessing the toxic potential of the environment and the need for respirators
- Knowledge of the chemicals at the worksite and of first aid and treatment for inhalation or ingestion
- Effects of alcohol and illicit drugs so that the first-aid provider can recognize the physiologic and behavioral effects of these substances

Physical Injuries

JET Commercial LLC first aid providers will be able to:

- Recognize the signs and symptoms of shock and provide first aid for shock due to illness or injury
- Assess and treat a victim who has an unexplained change in level of consciousness or sudden illness
- Control bleeding with direct pressure

Sudden Cardiac Arrest

Cardiopulmonary Resuscitation

OSHA standards require training in cardiopulmonary resuscitation (CPR) in some employment situations where sudden cardiac arrest from asphyxiation, electrocution or exertion may occur: permit-required confined spaces; logging operations; electric power generation, transmission, and distribution; dive teams; and power transmission and distribution construction. However, sudden cardiac arrest is a potential risk at all worksites and those trained in first aid benefit greatly from learning CPR regardless of work hazards.

Automated External Defibrillators

JET Commercial LLC will determine the need for an automated external defibrillator (AED) program as part of the first-aid response plan. Training will reflect whether an AED is included.

If an AED is available at the worksite, CPR training will incorporate AED training.

Corrosive Materials, Strong Irritants or Toxic Chemicals

If a job hazard analysis determines hazards from corrosive materials, strong irritants or toxic chemicals, the JET Commercial LLC first-aid plan will include appropriate hazard controls. These controls include eye irrigation equipment, eyewash stations and emergency showers.

Even worksites without high-risk levels from corrosives, irritants and toxic chemicals may find eye-irrigation equipment and eyewash equipment appropriate to address workplace hazards. Be aware that some state requirements and specific chemical safety procedures require such equipment on worksites. Where such requirements exist, JET Commercial LLC will adhere to applicable workplace safety and health regulations, and industry best practices.

At construction jobsites, employers must provide a sanitary washing facility for every 20 employees. At jobsites where employees work with paint, coatings, or any substance that may be harmful, the facilities must include suitable cleaning agents/towels for the removal of hazardous and other substances.

Bloodborne Pathogens

If an employee is designated to render first aid as part of his or her job duties, or if they may otherwise be exposed to the hazard of bloodborne pathogens, the employee must meet the requirements of 29 CFR 1910.1030, Bloodborne Pathogens, and must be trained accordingly. Additional requirements may also apply. Please see the chapter on “Bloodborne Pathogens” for more information.

Employees who have not received first-aid training need to understand the hazards presented by delivering first aid to a coworker. While JET Commercial LLC discourages the administration of first aid by any employee who has not been trained in first aid, “Good Samaritan” first-aid delivery is a possibility if necessary.

RESPONDING TO NON-LIFE-THREATENING EMERGENCIES

First aid training will be designed for the specific worksite and include first-aid instruction for the management of the following:

Wounds

- Assessment and first aid for wounds including abrasions, cuts, lacerations, punctures, avulsions, amputations and crush injuries
- Principles of wound care, including infection precautions
- Principles of body substance isolation, universal precautions and use of personal protective equipment

Burns

- Assessing the severity of a burn
- Recognizing whether a burn is thermal, electrical, or chemical and the appropriate first aid
- Reviewing corrosive chemicals at a specific worksite, along with appropriate first aid

Temperature Extremes

- Exposure to cold, including frostbite and hypothermia
- Exposure to heat, including heat cramps, heat exhaustion and heat stroke

Musculoskeletal Injuries

- Fractures
- Sprains, strains, contusions and cramps
- Head, neck, back and spinal injuries
- Appropriate handling of amputated body parts

Eye Injuries

- First aid for eye injuries
- First aid for chemical burns

Mouth and Teeth Injuries

- Oral injuries; lip and tongue injuries; broken and missing teeth
- The importance of preventing aspiration of blood and/or teeth

Bites and Stings

- Human and animal bites
- Bites and stings from insects; instruction in first-aid treatment of anaphylactic shock

RECORD KEEPING

All safety and health incidents and near misses will be documented and investigated according to the policy on “Accident Investigation.” This includes prompt notification to OSHA of fatalities and may include other reporting requirements.

PROGRAM REVIEW

Macy Weaver will review the first-aid response plan and all elements at least annually to ensure all elements sufficiently address the safety needs of JET Commercial LLC and its employees. Recommended first-aid techniques and knowledge change over time, and JET Commercial LLC policy will reflect those changes.

FORMS AND ATTACHMENTS

On the following page, please find a First-Aid Response Plan form that you can use to create your companies plan

FIRST AID RESPONSE PLAN FORM (PAGE 1 OF 2)

Company		Date	
This plan was written for (site or location this plan covers)			
The following person/position is responsible for managing our first-aid response plan			
The emergency medical service to be called			
Summon the emergency medical service by doing the following (in most cases, it will be to call 911 or some other phone number, but a direct alarm or some other method may be the preferred way)			
Emergency phone numbers are posted at the following location(s)			
Other means to summon aid are at the following location			
When employees need first aid they must do the following			
Employees on site who are first-aid trained			

FIRST AID RESPONSE PLAN FORM (PAGE 2 OF 2)

First-aid kits (or a first aid station) are located at	
The following person/position is responsible for inspecting the first-aid kits	
The Company's Designated Medical Provider is	

Person Preparing Plan	Signature	Date
Supervisor's Name	Signature	Date

POLICY

JET Commercial LLC is committed to the safety and health of our employees and to preventing the spread of bloodborne pathogens. Therefore, JET Commercial LLC adheres to the following bloodborne pathogen policy and Exposure Control Plan (ECP).

Bloodborne pathogens are diseases caused by microorganisms that live in the bloodstream and are spread through blood and other body fluids. Bloodborne pathogens include the human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV). HIV compromises the body's immune functions and can lead to acquired immunodeficiency syndrome. While the virus does not live out of the body for long, it can enter the bloodstream through cuts, abrasions, small tears in mucous membranes, etc. Hepatitis affects the health of the liver.

Bloodborne pathogens can be transmitted through any bodily fluid, and employees must take care when they are near, or are exposed to, possible contaminants, in order to prevent the spread of bloodborne infections.

If employees, such as those designated as responsible for first aid and medical assistance, or those doing work in certain medical or sanitation facilities, are exposed to bloodborne pathogens, will use universal precautions that requires them to treat all human blood and certain human body fluids as if they were known to be infectious. This includes the use of appropriate gloves, mask and/or gowns.

EMPLOYER RESPONSIBILITIES

It is the responsibility of JET Commercial LLC to:

- Enact and enforce an exposure control plan to prevent occupational exposure to potentially infectious materials
- Identify employees who may reasonably be anticipated to come into contact with blood and other potentially infectious materials
- Provide for post-exposure evaluation and follow-up if an employee is exposed to potentially infectious materials
- Verify employees receive appropriate bloodborne pathogens training
- Check that there's an adequate supply of Personal Protective Equipment

EMPLOYEE RESPONSIBILITIES

Every employee is expected to:

- Offer input on ECP as appropriate, including identification, evaluation, and selection of new control methods
- Follow all elements of the bloodborne pathogens policy and training
- Notify a supervisor if they encounter any problems or concerns related to this policy

TRAINING

JET Commercial LLC will ensure every employee who may reasonably anticipate coming into occupational exposure to potentially infectious materials, participate in a bloodborne pathogen training program. This training will be provided at no cost to the employee during working hours.

Training will be provided:

- At the time of assignment to/prior to working on tasks where occupational exposure may take place
- At least annually thereafter

JET Commercial LLC will provide additional training when tasks or procedures are added or changed that affect the employee's occupational exposure. It is acceptable for additional training to be limited to addressing only the changes or additions to the employees' exposure.

The Company will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Components

The training program will contain, at a minimum, the following elements:

- A general explanation of bloodborne diseases
- An explanation of the modes of transmission of bloodborne pathogens
- An explanation of the methods for recognizing tasks and other activities that could cause exposure to blood and other potentially infectious materials
- An explanation of methods to prevent or reduce exposure, including engineering controls, work practices, and personal protective equipment
- Information on the types, proper use, location, handling, decontamination and disposal of PPE
- Information on the hepatitis B vaccine, the benefits of being vaccinated and that the vaccine and vaccination will be offered free of charge to employees who face occupational exposure
- Information on the actions to take and persons to contact in an emergency involving blood or other potentially infectious materials
- An explanation of the procedures to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available
- Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident
- An explanation of the applicable signs, labels, and/or color coding

The training will be conducted by a person knowledgeable in the subject matter.

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

PROCEDURES

Exposure Determination

It is crucial to determine what jobs expose an employee to blood and other potentially infectious material, as well as how that exposure might occur. Accordingly, management will determine which job classifications can reasonably expect occupational exposure to potentially infectious material.

The following will be determined and documented:

- Job classifications in which all employees have occupational exposure
- Job classifications in which some employees have occupational exposure
- Tasks and procedures in which occupational exposure occurs

Further, input from non-managerial employees exposed to contaminated sharps and infectious material is vital to the success of this exposure control plan, and every employee is encouraged to offer suggestions that will help the effectiveness of the exposure control plan.

Methods of Compliance

Employees will take universal precautions to prevent contact with potentially infectious material. If an employee can't easily determine the nature of a body fluid, he or she must treat it as infectious.

Engineering and Work Practice Controls

As part of this exposure control plan, JET Commercial LLC will seek methods by which to eliminate occupational exposure to the greatest extent possible. This plan encourages work task changes to reduce exposure, as well as for isolating or removing materials that might pose a hazard. The exposure control plan requires the Company to examine regularly, and maintain or replace, engineering controls to ensure their effectiveness.

Handwashing

- JET Commercial LLC will provide readily accessible handwashing facilities to every employee. If providing handwashing facilities is not feasible, the Company will provide antiseptic towelettes or an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels.
- For construction projects, employers must provide onsite general washing facilities (one per 20 employees), keep them in sanitary condition and provide suitable cleaning agents/towels for the removal of hazardous and other substances.
- In addition to basic workplace hygiene requirements, employees will wash their hands as soon as possible after removing gloves or other PPE.
- If an employee's skin or mucous membrane were exposed to potentially infectious materials, the employee will immediately wash their skin with soap and water or flush their mucous membranes with water.

Sharps

- Employees will handle and dispose of contaminated sharps in a way that prevents unnecessary exposure to hazards. Employees will not bend, recap or remove contaminated sharps unless no alternative is feasible and the employee can accomplish any bending, recapping or needle removal using a mechanical device or one-handed technique.
- As soon as possible after use, contaminated reusable sharps will be placed in a container that is puncture resistant, labeled or color-coded appropriately, leak-proof on the sides and bottom, constructed in a manner that does not require employees to reach into it to use it.

Other Engineering and Work-Practice Controls

- Employees may not eat, drink, smoke, apply cosmetics or handle contact lenses where occupational exposure may occur.
- No food or drink is to be stored where potentially infectious materials are present.
- Employees may not use their mouths to pipette or suction potentially infectious materials.
- Containers used to store or transport potentially infectious materials must be closable, prevent leaks and be appropriately labeled or color-coded. They should also be puncture resistant, if necessary.
- Employees will examine any equipment that may be contaminated before servicing or shipping, and will decontaminate it as necessary and feasible. If decontamination is impossible, the employee will attach a label to the equipment, and inform all appropriate personnel of the contamination to ensure they take proper precautions.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Where the possibility of occupational exposure exists, JET Commercial LLC will provide personal protective equipment appropriate to the hazards and the work being performed. Appropriate personal protective equipment is impermeable to blood or other potentially infectious material under normal conditions and durations of use
- PPE will be provided free to employees and available in appropriate sizes, and provisions will be made for employees who are allergic to gloves normally provided
- An employee may decline using appropriate PPE under “rare and extraordinary circumstances” when PPE use might prevent the delivery of health care or public safety services. These exceptions will be investigated and documented to prevent future occurrences
- PPE will be removed as soon as feasible before leaving the general work area. After removal, the employee will place contaminated PPE in an appropriate area or container to be stored, washed, decontaminated or disposed of

Gloves

Employees must wear gloves if they anticipate hand contact with potentially infectious materials. Do not reuse single-use gloves, and replace as quickly as possible if torn, punctured or otherwise compromised.

Masks, Eye Protection, and Face Shields

Employees will wear masks, together with proper eye-protection devices whenever splashes, spray, spatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose or mouth contamination can be reasonably anticipated.

Gowns, Aprons, etc.

Employees will wear appropriate protective clothing like gowns or clinic jackets when appropriate; the type of protective clothing is determined by the nature of exposure, and will be sufficient to protect against occupational exposure.

HOUSEKEEPING

- Employees will keep the workplace clean and sanitary. JET Commercial LLC will implement a written schedule for cleaning and decontamination based on the demands of the site
- Employees will use an appropriate disinfectant to clean and decontaminate contaminated or potentially contaminated work surfaces after any spill of infectious materials, and at the end of the work shift. JET Commercial LLC will replace protective surface coverings as soon as possible if they are contaminated. Bins, cans, pails or other receptacles that may become contaminated must be inspected and decontaminated regularly, in addition to being decontaminated as soon as feasible after visible contamination. Employees must not pick up, by hand, any broken glassware that may be contaminated. Use a brush/dustpan or tongs

LAUNDRY

Employees will handle any contaminated laundry as little as possible. They must put such laundry into a color-coded or labeled container at the site where it was used. Place wet laundry in a leak-proof container. Employees handling contaminated laundry must use appropriate PPE. Employees must never take or wear contaminated clothing outside of the work site.

HEPATITIS B VACCINATION

JET Commercial LLC will make available the hepatitis B vaccination series at no cost to any employee who faces occupational exposure. If not vaccinated, employees will be informed of the opportunity to be vaccinated within 24 hours of an exposure incident.

An employee occupationally exposed to potentially infectious material may decline the hepatitis B vaccine, but must sign a declination statement to be kept on file. Anyone who declines vaccination may request and receive the vaccination later at no cost.

Medical records relating to employees' hepatitis B vaccination status and post-exposure evaluation and follow-up must be kept for 30 years plus the duration of employment.

If an exposure incident occurs, the employee must contact Macy Weaver (or designate), immediately.

In Case of Exposure

A licensed health care professional will conduct a confidential medical evaluation and follow-up, and will provide a medical opinion on diagnosis/course of action, as soon as possible following an exposure incident. After administering initial first aid (cleaning the wound, flushing the eyes or other mucous membranes, etc.), follow the procedure below:

1. Document the routes of exposure and how the exposure occurred.

2. Identify and document the source individual (unless the employer can establish that identification is infeasible or prohibited by state or local law).

3. Obtain consent, and arrange to have the source individual tested as soon as possible, to determine HIV, HCV and HBV infectivity, document and notify the employee's health care provider of the source individual's test results. If the source individual is known to be HIV, HCV and/or HBV positive, new testing is not necessary.

4. Provide the exposed employee with the source individual's test results and with information about applicable disclosure laws and regulations concerning the identity and infectious status of the source individual (e.g., laws protecting confidentiality).

5. After obtaining consent, collect the exposed employee's blood as soon as feasible after an exposure incident, and test the blood for HBV and HIV serological status. This will establish a baseline for periodic testing over the next six months. Depending upon the circumstances of the exposure, post-exposure prophylaxis may be recommended to reduce the risk of infection from HIV or HBV.

6. If the employee does not give consent for HIV serological testing during collection of blood for baseline testing, preserve the baseline blood sample for at least 90 days; if the exposed employee elects to have the baseline sample tested during this waiting period, perform testing as soon as feasible.

Administrative Responsibilities Following Exposure

The Company will ensure that the health care professional responsible for post-exposure evaluation and follow-up receives the following:

- A copy of OSHA's bloodborne pathogens standard
- A description of the employee's job duties relevant to the exposure incident
- Route(s) of exposure
- Circumstances of exposure
- Results of the source individual's blood test if possible
- Relevant employee medical records, including vaccination status
- The Company will provide the employee with a copy of the evaluating healthcare professional's written opinion within 15 days of the completion of the evaluation

Counseling

The Company will make post-exposure counseling available to employees following an exposure incident. Counseling should include Centers for Disease Control and Prevention (CDC) recommendations for prevention and transmission of bloodborne infections including HIV, HBV and HCV. Counseling must be made available regardless of the employee's decision to accept serological testing.

RECORDKEEPING

Medical Records

The Company will maintain a confidential medical record for every employee with occupational exposure that will include at least the following:

- Name and social security number of the employee
- Copy of the employee's HBV status (with dates of all Hep B vaccinations)
- Copy of all post-exposure documentation and healthcare professional's written opinion
- Copy of the information provided to the healthcare professional

Figure 1

Do not share or report this record unless the employee provides written consent

Sharps Injury/Exposure Incident Log

A Sharps Injury Log is a record of each exposure incident involving a sharp. The purpose of the Sharps Injury Log is to generate a record of exposure incidents that will include enough information about the cause of the incidents to allow the company to analyze them and take preventive action.

The Sharps Injury Log must include:

- The date and time of the sharps-related exposure incident
- The type and brand of the sharp involved in the incident
- A description of the incident including:
  - The job classification of the exposed employee
  - The department or work area where the incident occurred
  - The procedure being performed
  - How the incident occurred
  - The body part injured
  - For sharps with engineered sharps injury protection (ESIP), if the safety mechanism was activated
  - If the incident occurred before action, during activation or after activation of the mechanism. For sharps without ESIP, the employee's opinion if ESIP could have prevented the injury

Sharps injuries/exposures must be recorded on the log within 14 working days of when the incident was reported to the employer. The Sharps Injury Log must be maintained for five years from the date of the occurrence of the exposure incident.

HAZARD COMMUNICATION

Label containers of regulated biological waste, any container used to store or transport potentially infectious material, as well as contaminated equipment, to prevent exposure. Labels for such containers will include the legend depicted in Figure 1.

All such labels will be fluorescent orange or orange-red and be attached on, or as close as feasible to, the container.

REVIEW AND UPDATE OF EXPOSURE CONTROL PLAN (ECP)

Management will review this ECP and update it at least annually, and whenever necessary, to reflect new or changed tasks and procedures that affect occupational exposure.

Reviews and updates will:

- Reflect changes in technology that eliminate or reduce exposure to bloodborne pathogens
- Document the annual consideration and implementation of effective medical, and commercially available, devices and services designed to eliminate or minimize occupational exposure

The Company will seek the input of non-managerial employees to identify, evaluate and select controls to reduce occupational exposure. This input will be documented as part of this ECP.

FORMS AND ATTACHMENTS

Please find the following documents on the pages below:

- Exposure Control Plan Documentation
- Declination Statement
- Exposure Incident Report
- Evaluating Physician’s Written Opinion
- Sharps Injury Log

These forms may be reproduced freely for the purposes of implementing and maintaining a safety and health program.

EXPOSURE CONTROL PLAN DOCUMENTATION FORM

Exposure Determination	
Jobs in which all employees have occupational exposure to potentially infectious materials	Task or procedure where exposure occurs
Jobs in which some employees have occupational exposure to potentially infectious materials	Task or procedure where exposure occurs
Engineering Controls and Work Practice Controls	
The following types of PPE are available in the following locations	
Personal Protective Equipment	Location

HEPATITIS B DECLINATION STATEMENT FORM

DECLINATION STATEMENT			
I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself. However, I decline Hepatitis vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.			
Employee Signature		Date	

DECLINATION STATEMENT			
I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself. However, I decline Hepatitis vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.			
Employee Signature		Date	

DECLINATION STATEMENT			
I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself. However, I decline Hepatitis vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.			
Employee Signature		Date	

EXPOSURE INCIDENT REPORT FORM (PAGE 1 OF 2)

(Routes and Circumstances of Exposure Incident) – Please Print					
Employee's Name				Date	
Date of Birth			SS#		
Telephone	Business		Home		
Job Title					
Date of Exposure		Time of Exposure		☐ AM ☐ PM	
Hepatitis B Vaccination Status					
Location of Incident					
Describe job duties you were performing when the exposure incident occurred					
Describe the circumstances under which the exposure incident occurred (What happened that resulted in the incident?)					
What body fluid(s) were you exposed to?					

EXPOSURE INCIDENT REPORT FORM (PAGE 2 OF 2)

What was the route of exposure? (e.g., mucosal contact, contact with non-intact skin, percutaneous)			
Describe any personal protective equipment in use at time of exposure incident			
Did PPE fail?	☐ Yes ☐ No	If yes, how?	
Identification of source individual(s) (names)			
Other pertinent information			

EVALUATING PHYSICIAN'S WRITTEN OPINION FORM

To the Evaluating Physician:

This employee may have suffered an exposure incident to a Bloodborne Pathogen. In accordance with OSHA standards, covering post-exposure evaluation and follow up, the following documents are provided for you:

- A copy of OSHA regulations covering Occupational Exposure to Bloodborne Pathogens
- A description of the exposed employee's duties as they relate to the exposure incident
- Documentation of the routes of exposure and circumstances under which exposure occurred
- Results of the source individual's blood testing, if available
- All medical records relevant to this employee's appropriate treatment, including vaccination status

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After you have determined whether there are contra-indications to vaccination of this employee with Hepatitis B vaccine, please state in the space below if:

Vaccine was indicated	Vaccine was received
(All other findings are to remain confidential and are not to be included on this page)	
Please return this sheet to this employee	
Thank you for your evaluation of this employee.	

Physician's name (printed)	Physician's signature	Date

SHARPS INJURY LOG

Facility/Location				Year	
Address					
City		State		ZIP	

Date	Time	Type, Brand, Model of Sharp Device	Department / Work Area	Description of How Incident Occurred

(Retain at least 5 years)

POLICY

JET Commercial LLC encourages a safe and healthy work environment. Verbal or physical intimidation, harassment, threats of violence, or any violent act are expressly forbidden. A person who makes threats of violence, exhibits threatening behavior, or engages in violent acts on company property will be removed from the premises as quickly as safety permits and will be kept off premises pending the outcome of an investigation.

The company is committed to preventing acts of violence and intimidation. The company has adopted a system of controls to prevent workplace violence, mitigate the harm caused by it, and otherwise address violence and harassment in the workplace.

Macy Weaver is responsible for implementing and enforcing this policy and will do so with the assistance of management, the safety committee members, and all employees.

RESPONSIBILITIES

Preventing workplace violence is a cooperative effort between JET Commercial LLC and its employees.

Employer Responsibilities

- Ensure managers remain committed to preventing aggression and violence;
- Document plan to control aggressive or violent behavior in the workplace;
- Evaluate reports of workplace violence at least yearly to determine necessary changes to violence prevention policy;
- Ensure job hazard analyses include workplace violence hazards;
- Exhibit commitment to the safety and health of workers and customers;
- Ensure employees understand and fulfill obligations under the violence prevention program;
- Establish a program to address medical and psychological repercussions of workplace violence; and
- Support and implement appropriate recommendations of the Safety Committee.
- Enforce prohibition on sexual harassment.

Safety Committee Responsibilities

- Help create policy, evaluate risks, and develop procedures to respond to hostile acts;
- Assist in or lead training for workplace violence prevention; and
- Participate in job hazard analyses that identify potential for workplace violence.

Employee Responsibilities

JET Commercial LLC employees are expected to:

- Contribute to developing procedures to address concerns over safety and security;
- Understand and comply with the workplace violence prevention program, and safety and security measures;
- Report violent incidents promptly and accurately;
- Refrain from hostile and violent acts;
- Participate in safety and health committees or teams that receive reports of violent incidents or security problems, make facility inspections and respond with recommendations for corrective strategies; and
- Participate actively in training programs and share on-the-job experiences that cover techniques to recognize escalating agitation, aggressive behavior, or criminal intent.

TRAINING

The company will provide training to employees regarding their roles in workplace violence prevention. This training will come at no cost to the employee during working hours.

The company will use only training material that is appropriate in content and vocabulary to the educational level, literacy and language of employees.

Training Components

JET Commercial LLC will ensure that every employee is trained in the following elements:

- The workplace violence prevention policy
- Risk factors that cause or contribute to assaults
- Early recognition of escalating behavior or recognition of warning signs or situations that may lead to assaults
- Ways to prevent or diffuse volatile situations, manage anger and appropriately
- A standard response action plan for violent situations, including the availability of assistance, response to alarm systems and communication procedures
- Ways to deal with hostile people in the workplace
- Relaxation, stress management and anger control
- Basic self-protection measures

- The location and operation of safety devices such as alarm systems, along with the required maintenance schedules and procedures
- Ways to protect oneself and coworkers, including use of the “buddy system”
- Policies and procedures for reporting and recordkeeping
- Information on multicultural diversity to increase staff sensitivity to racial and ethnic issues and differences
- Policies and procedures for obtaining medical care, counseling, workers’ compensation or legal assistance after a violent episode or injury
- The sexual harassment policy

Managers and Supervisors will be trained in:

- The company’s Workplace Violence Prevention Program
- Communication skills
- Recognition of aggressive behavior
- Dealing with employee layoffs, job terminations, and discipline; how to assess violence potential of individuals; and take appropriate measures
- Violence prevention, the company’s security and response procedures
- Addressing problems and conflict promptly

Any employee engaged in a task that faces a high risk of workplace violence (e.g. working alone, especially late at night) will be trained for workplace safety practices specific to the worksite that reduce the risk of workplace violence.

Where JET Commercial LLC operations require security personnel, such personnel will receive training specific to the worksite, including the psychological components of handling aggressive and abusive customers, types of disorders and ways to handle aggression and defuse hostile situations.

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be maintained for 3 years from the date the training occurred.

POLICY

Workplace Violence

Workplace violence includes violence or the threat of violence against workers. It can occur at or outside the workplace and can range from threats and verbal abuse to physical assaults and homicide. For this policy, workplace violence also includes aggressive behavior, workplace harassment, bullying, and intimidation.

JET Commercial LLC permits no workplace violence. No negative action will be taken against an employee for reporting any hazardous situation, and appropriate confidentiality considerations will be taken in every instance of such a report.

High-Risk Occupations

Workplace violence is a hazard at any worksite for every worker. Some workers, however, are at significantly increased risk, including workers who:

- Exchange money with the public
- Deliver passengers, goods, or services
- Work alone or in small groups, during late night or early morning hours, in high-crime areas, or in community settings and homes with extensive contact with the public

Any employee who faces an increased risk of workplace violence, will be informed of the increased risk, and trained in appropriate practices based on a job hazard analysis of the job. Please see “Workplace Risk Factors” later in this chapter.

Types of Workplace Violence

Type I Criminal Intent: The perpetrator has no legitimate relationship to the business or its employees and is usually committing a crime in conjunction with the violence. These crimes can include robbery, shoplifting, trespassing, and terrorism

Type II Customer Client: The perpetrator has a legitimate relationship with the business and becomes violent while being served by the business. This category includes customers, clients, patients, students, inmates, and any other group for which the business provides services

Type III Worker on Worker: The perpetrator is an employee or past employee of the business who attacks or threatens another employee(s) or past employee(s) in the workplace

Type IV Personal Relationship: The perpetrator usually does not have a relationship with the business but has a personal relationship with the intended victim. This category includes victims of domestic violence assaulted or threatened while at work.

Horseplay

Horseplay includes playing tricks on coworkers; distracting coworkers; wrestling; showing off; playing punching, kicking, or slapping games; and otherwise drawing focus away from the task to engage in a playful way that disregards safety precautions. Horseplay creates unnecessary hazards in the workplace and presents needless distractions. While horseplay is not necessarily violent, it can have a harmful impact on the safety of JET Commercial LLC employees, and is therefore forbidden and will be treated as a workplace violence issue for the sake of JET Commercial LLC's safety and health program.

PROGRAM PLANNING

Planning Principles

As with any element of the company's safety and health program, workplace violence prevention requires site-specific and job-specific planning.

JET Commercial LLC will work with management, the safety committee, and appropriate employees to evaluate the ability of JET Commercial LLC to prevent workplace violence and handle incidents involving violence to enfor0ce effective protections from workplace violence.

Plans to prevent workplace violence should be evaluated regularly, and will be evaluated when changes are made that impact the risk of workplace violence and when a workplace incident involving violence occurs.

Job Hazard Analyses

Workplace violence risks will be considered in every job hazard analysis performed at the company. If a job or task presents hazards, steps will be taken to control those hazards as soon as safely possible to prevent injury. (See the chapter on "Job Hazard Analysis" in this manual for more information).

Other Planning Considerations

As part of the organization-wide violence prevention program, the company may conduct a screening survey to get employee ideas on the potential for violent incidents and to identify opportunities for improved security measures. These surveys may be repeated as part of the periodic review of this policy.

Independent reviewers such as safety and health professionals, security consultants or law enforcement professionals can provide expert opinions on workplace safety and provide a fresh perspective on preventing workplace violence.

HAZARDS

Violent behavior, like any safety and health risk factor, occurs within a context. Controlling workplace violence hazards first requires identifying them.

Warning Signs of Violence

There is no way to predict all acts of violence; however, the FBI suggests the following indicators of escalating violence risk in an individual:

- Increasing belligerence;
- Ominous, specific threats;
- Hypersensitivity to criticism;
- Recent acquisition/fascination with weapons;
- Apparent obsession with another person;
- Preoccupation with violent themes;
- Interest in recently publicized violent events;
- Outbursts of anger;
- Extreme disorganization;
- Noticeable changes in behavior; and
- Homicidal/suicidal comments or threats

Workplace Risk Factors

A variety of workplace factors can contribute to violence risk as well, including the following:

- Understaffing;
- Frustrations arising from poorly defined job tasks and responsibilities;
- Downsizing or reorganization;
- Labor disputes and poor labor-management relations;
- Inadequate security or a poorly trained, poorly motivated security force;
- A lack of employee counseling;
- Poor management styles (for example, arbitrary or unexplained orders; over-monitoring; corrections or reprimands in front of other employees, inconsistent discipline); and
- A high injury rate or frequent grievances may be clues to problem situations in a workplace.

Research indicates that in addition to management oversights, certain job elements increase risk and may indicate the need for greater care when performing job hazard analysis and violence prevention planning.

These factors include the following:

- Contact with the public
- Exchange of money
- Delivery of passengers, goods, or services
- Having a mobile workplace
- Working with unstable or volatile people
- Working alone or in small numbers
- Working late at night or during early morning hours
- Working in high-crime areas
- Guarding valuable property
- Working in community-based settings

CONTROLS

JET Commercial LLC will identify and implement effective controls to protect workers against violence hazards. These controls will be determined based on the work, the environment, and the organizational context of the work. Controls may include a variety of engineering and administrative approaches to control the hazards associated with violence in the workplace.

Please see the section on “Control” in the chapter covering “Job Hazard Analysis”.

Engineering

- Develop emergency signaling, alarms and monitoring systems.
- Increase visibility, especially in high-risk areas. Use cameras and curved mirrors in hallways, and ensure good lighting in the workplace and in parking lots.
- Restrict movement of the public and employees with appropriate barriers and card- or key-controlled access.
- Design public areas to minimize assault risk:
- Provide staff restrooms and emergency exits.
- Install enclosed stations, deep service counters, or bullet resistant and shatterproof glass enclosures in reception areas if appropriate.
- Arrange furniture and other objects with safety in mind. Be mindful of objects or furniture that can easily be turned into weapons

Administrative and Work Practice Controls

- Demonstrate concern for workers’ emotional and physical health and safety, communicating that violence is not permitted
- Design staffing patterns to prevent personnel from working alone and to minimize waiting time for customers
- Provide security escorts to the parking lots at night if appropriate
- Develop a system for alerting security personnel or management to threats of violence and recording incidents to determine need for additional controls
- Encourage employees to use the “buddy system” when personal safety threatened
- Limit the amount of accessible cash and valuables in the workplace
- Consider an employee assistance program to help employees handle their personal problems that may affect job performance and workplace safety
- Consider potential for violence in human resources operations. Areas where appropriate procedures and policies to prevent violence should be in place include the following:
    - Pre-employment screening
    - Employee assistance
    - Employment transition or outplacement services during layoffs
    - Substance abuse prevention programs
    - Detailed post-termination security protocol

RESPONSE

JET Commercial LLC understands violence can best be prevented through appropriate workplace security measures and caring for the people who work for our company through communication, adequate training, and a system for reporting and following up on incidents. However, regardless of the level of hazard control, JET Commercial LLC may experience a safety incident involving violence. Response to violence in the workplace will depend on the nature of the incident, but will focus on reducing the negative impacts of the incident and discovering ways to prevent similar incidents in the future.

Workplace violence will be considered during the development of the Emergency Action Plan. Please see the chapter entitled “Fire Prevention and Emergency Action Plans” for more information.

NOTIFICATION

Employees will notify a supervisor as soon as safely possible if an incident involving violence occurs. However, if there is an immediate danger of harm and the situation demands the presence of emergency responders, an employee should contact the appropriate authorities or see that a supervisor contacts them. Employees should report any criminal act immediately to police if safely possible and keep a line of communication with the authorities until police arrive.

Management will handle all reports of violence and threats of violence in a manner that respects the sensitive nature of such reports and maintains confidentiality.

It is a good idea for every worksite to have a means to alert others to an emerging incident. Such means include alarms, codes, and signals. These alerts need to be in place, and shared, before an incident occurs to ensure their effectiveness.

DE-ESCALATION STRATEGIES

DO	DON'T
Be calm. Move and speak slowly, quietly, and confidently. Encourage the person to talk; listen closely and patiently. Maintain a relaxed, attentive posture. Position yourself at an angle. Arrange yourself so your access to emergency exits is not blocked. Acknowledge the person's feelings. Ask for small, specific favors such as asking the person to move outside. Use delaying tactics to give the person time to calm down, such as offering a drink of water. Point out choices, break big problems into smaller ones. Avoid sudden movements and maintain a 3-6 foot distance. If necessary, call the police when safe. A fitness-for-duty evaluation may be appropriate for employees exhibiting dysfunctional behaviors. Potential victims will be informed of any threat made to them and permitted access to legal assistance and psychological counseling as warranted.	Make sudden movements. Speak rapidly, raise your volume or use an accusatory tone. Reject all demands. Make physical contact, jab your finger at the other person or use long periods of eye contact. Pose in challenging stances — directly opposite someone, hands on hips or with arms crossed. Challenge, threaten or dare the individual. Belittle the other person. Criticize or act impatient. Attempt to bargain with a threatening individual. Try to make the situation seem less serious than it is. Make false statements or promises you cannot keep. Try to impart a lot of technical or complicated information when emotions are high. Take sides or agree with distortions. Invade individual's personal space.

INCIDENT RESPONSE TEAM

Macy Weaver and the safety committee, as part of hazard control planning may determine the need for an incident response team responsible for violence response. Training for this team should include identifying hazard escalation, techniques for de-escalating conflict and other appropriate incident response.

EVACUATION AND SHELTER IN PLACE

All employees will be made aware of appropriate evacuation and “Shelter-In-Place” procedures and follow them as necessary in response to a violent workplace incident. Training and preparation may include drills and simulations for a violent incident.

POST-INCIDENT RESPONSE

In the event of workplace violence, JET Commercial LLC will ensure victims and witnesses are provided appropriate treatment, regardless of the severity of the incident. In addition to physical injuries, victims of workplace violence may suffer other consequences such as the following:

- Psychological trauma;
- Fear of returning to work;
- Changes to relationships;
- Feelings of guilt, powerlessness and incompetence; and
- Fear of criticism by supervisors.

Further, to address opportunities to remedy oversights in the violence prevention program, any incident that demands managerial response under this violence prevention program will be followed by an incident investigation.

Please see the chapter on “Accident Investigation” for more information.

RECORDKEEPING AND PROGRAM EVALUATION

The company will record and communicate injuries and illnesses to workers according to applicable regulations.

This policy will be reviewed, and these reviews documented, at least once a year or under the following circumstances:

- Following a workplace violence incident or report;
- Change in management;
- Change of contact person;
- To make needed changes or improvements to the policy; and
- To identify new training or refresher training needs.

SEXUAL HARASSMENT

It is JET Commercial LLC’s policy that sexual discrimination, unwelcome sexual advances, requests for sexual favors, and any other conduct of a sexual nature is strictly prohibited.

Requiring coworkers, subordinate employees, or prospective employees to submit to conduct of this nature, explicitly or implicitly, as a term or condition of employment, or used as a basis for any employment decisions is forbidden.

Any behavior that has the purpose or effect of unreasonably interfering with an individual's work performance, or creating an intimidating, hostile, or offensive work environment is banned.

Sexual harassment can occur in a variety of circumstances:

- The victim as well as the harasser may be a woman or a man. The victim does not have to be of the opposite sex.
- The harasser can be the victim's supervisor, an agent of the employer, a supervisor in another area, a co-worker, or a non-employee.
- The victim does not have to be the person harassed but could be anyone affected by the offensive conduct.
- Sexual harassment may occur without economic injury to or discharge of the victim.
- The harasser's conduct must be unwelcome.

Prevention is the best tool to eliminate sexual harassment in the workplace. The company has designated appropriate managers (rather than a direct supervisor) and other alternative routes by which an employee can issue formal complaints of sexual harassment. If possible, any victimized employee should attempt to resolve a sexual harassment issue informally by directly informing the harasser that the conduct is unwelcome and must stop. If informal resolution is unsuccessful, the victim should use the formal complaint form and submit it to an appropriate supervisor.

The company will take immediate appropriate action when an employee files a complaint.

The company recognizes that the question of whether a particular course of conduct constitutes sexual harassment requires a factual determination. The company also recognizes that false accusations of sexual harassment can have serious effects on innocent persons. If an investigation results in a finding that a person who has accused another of sexual harassment has maliciously or recklessly made false accusations, the accuser will be subject to appropriate sanctions, including discharge.

When investigating allegations of sexual harassment, the company will look at the whole record, the circumstances, and the context in which the alleged incidents occurred. The company will make a determination on the allegations from available facts on a case-by-case basis. Outside avenues of resolution are available to employees who feel their rights have not been protected. The company does not tolerate any sexual harassment.

ACTIVE SHOOTING EVENT

Introduction

While preventing workplace violence altogether through a system of controls is the best way to prevent injury from an attack, any workplace may find itself at the hands of a person determined to cause harm through violence. Spree shootings and mass killings are rare, but an active shooter event may be unavoidable. Preparation and awareness, however, can help you stay safe and keep coworkers safe as well.

Safety experts and emergency response professionals urge workers to be prepared with a simple plan of action should a violent perpetrator attack. Depending on the circumstances, you should either run, hide, or fight.

Run

The best response to a shooting attack in the workplace is to get out of there as quickly and safely as possible. Put as much distance between you and the shooter as you can and encourage others to do likewise, if you can do so safely. If a coworker is hesitant to join you in your escape, do not risk your life to wait for them or convince them to follow you.

Focus on getting yourself and others out of harm's way. Don't worry about saving your work. Don't worry about gathering your things. Gather your senses and save your life instead. Stay behind cover and low to the ground as you move quickly and quietly to the nearest safe exit. Once away from the scene, do what you can to keep others from harm and call 9-1-1 as soon as you can.

Hide

Unfortunately, it is not always possible to get away from the scene of an active shooter event. If the threat of harm is keeping you from escaping the shooter, it is best to hide. Again, speed and silence are central to safely surviving a shooting spree situation. Try to find a spot that is out of the shooter's view that can protect you from bullets fired your way. Try to ensure your hiding spot doesn't close off options for escape or movement.

When you find a place to hide, try to secure it the best you can by locking doors and, if you can do so without drawing attention to your location, turn out lights and move heavy things to block entry. Silence personal electronic devices to keep them from giving away your location, and try to remain as calm as possible.

Fight

Engaging with the attacker is never the preferred means to handle an active shooter, and should only be a last resort option. However, it is not always possible to hide or run away when your life is at risk.

Never try to reason or start a dialogue with a person who is shooting a weapon at people.

If your life is in danger and you must fight, commit to taking the shooter down however possible. Look for a readily available item that you can use as an improvised weapon, and don't hesitate to use it with aggression to subdue the rampaging shooter. If you find yourself in a position where you must fight an active shooter, you cannot hesitate to use violent force against him and continue using it until he or she is incapacitated.

Conclusion

Workplace shooting events are rare, but dangerous and unpredictable. Awareness and preparedness can mean the difference between life and death. Keep calm and remember Run, Hide, Fight.

FORMS & ATTACHMENTS

Please find the below documents on the following pages:

- Assault/Threat Report
- Sexual Harassment Complaint Form

ASSAULT/THREAT REPORT FORM (PAGE 1 OF 3)

(Attach additional sheets as necessary)

Employee Information			
Name		Telephone	
Address		Employee Classification	
Manager's Name		Telephone	

Employee Information			
Name of Assailant		Is he/she an employee?	☐ Yes ☐ No
Date of Incident		Location of Incident	
This Incident Occured	☐ Over the phone ☐ In person ☐ Over the internet ☐ Other (please explain)		

Were there any witnesses?	☐ Yes ☐ No	(Please provide relevant information below and attach statements)

Witnesses			
Name		Telephone	
Address		Witness Roll (e.g. employee, customer)	
Name		Telephone	
Address		Witness Roll (e.g. employee, customer)	

Threat Information	
As closely as possible, what were the exact words used?	
Was the assailant in a position to carry out the threat immediately?	
How serious do you believe the threat was and why?	

ASSAULT/THREAT REPORT FORM (PAGE 2 OF 3)

(Attach additional sheets as necessary)

Assault Information	
What (if anything) happened to set off the assault?	
Did the assailant say anything during the assault? What?	
How did the assailant attack? (e.g. punching, kicking, knife, words)	
What injuries, if any, did you sustain? Did injuries require medical treatment?	
What ended the assault?	
How did you leave the site of the assault?	

ASSAULT/THREAT REPORT FORM (PAGE 3 OF 3)

(Attach additional sheets as necessary)

Employee Actions					
What actions did you take later? (e.g. worker's comp claim, medical treatment, sick leave)					
Do you request JET Commercial LLC action at this time related to the assault? What? (If none, please specify "None.")					
Law Enforcement Information (attach police report when possible)					
Law Enforcement Agency Contacted					
Name of Official		Date Contacted		Telephone	
Was a written report completed?	☐ Yes ☐ No	Indicate any action promised			
Manager Actions					
Directions given to employee					
Manager Recommendation	☐ Prosecution ☐ Restraining Order ☐ Letter to Threatener ☐ Other (please specify)				
Legal Counsel Actions					

SEXUAL HARASSMENT COMPLAINT FORM (PAGE 1 OF 2)

Please write legibly and fill out form completely. Attach additional sheets if necessary. Submit completed form to appropriate manager.

Complainant		Alleged Harasser	
Department		Department	
Job Title		Job Title	
Mailing Address		Other relevant information about Alleged Harasser	
Home Phone			
Work Phone			
Details of Incident			
What exactly occurred or was said?			
When did it occur, and is it ongoing?			
Where did it occur?			
How often did it occur?			
How did it affect you?			
What response did you make when the incident(s) occurred or afterwards, and how did you react?			
Has your job been affected in any way?			
Was anyone present when the alleged harassment occurred? List any third-party witnesses			

SEXUAL HARASSMENT COMPLAINT FORM (PAGE 2 OF 2)

Please write legibly and fill out form completely. Attach additional sheets if necessary. Submit completed form to appropriate manager.

Are there any persons who have relevant information?	
Did you tell anyone about it?	
Did anyone see you immediately after episodes of alleged harassment?	
Did the person who harassed you harass anyone else?	
Do you know whether anyone complained about harassment by that person?	
Are there any notes, physical evidence or other documentation regarding the incident(s)?	
Do you know of any other relevant information?	
How would you like to see the situation resolved?	
I am aware that false accusations of sexual harassment can have serious effects on innocent persons. I further understand that if it is determined, after investigation, that I have maliciously or recklessly made false accusations, I will be subject to appropriate sanctions, including discharge.	

Complainant's printed name	Complainant's signature	Date
Received by	Signature	Date

POLICY

JET Commercial LLC has implemented this policy for the protection of our employees against the fire and other emergencies in the workplace. Macy Weaver will supervise the Fire Protection Program.

JET Commercial LLC will have a written Fire Protection Program (FPP). The FPP will be posted in the workplace and remain available to employees for review along with the names and job titles of every person in the chain of command during emergencies.

EMPLOYER RESPONSIBILITIES

It is the responsibility of JET Commercial LLC to:

- Ensure adequate workplace safeguards against hazards, including appropriate exit routes, fire alarms, and fire protection systems
- Ensure development and implementation of FPP and EAP
- Ensure training of employees in accordance with this policy

EMPLOYEE RESPONSIBILITIES

Every JET Commercial LLC employee is expected to:

- Report a fire or other emergency
- Follow fire prevention plan and emergency action plan
- Report any suspected problem with fire control systems to their supervisor
- Assist in fire hazard assessment

TRAINING

JET Commercial LLC will ensure every employee is provided training on fire protection and emergency planning. This training will be provided at no cost to the employee and held during their working hours.

Training will be provided:

- At the time of assignment
- At least annually thereafter

JET Commercial LLC will provide additional training when tasks or procedures are added or change, that may affect the employee's work. It is acceptable for additional training to be limited to addressing only the changes or additions to the employees' exposure.

JET Commercial LLC will use only training material that is appropriate in content and vocabulary to the educational level, literacy, and language of employees.

Training Components

JET Commercial LLC is committed to informing employees about all fire hazards with which they may come into contact. Macy Weaver or a designate will review the FPP with all employees and inform them of any fire hazards a new assignment might present.

Macy Weaver will verify all employees at JET Commercial LLC are informed and trained in the following minimum elements for the Emergency Action Plan and Fire Protection Program:

- Fire hazards at the worksite
- Means of controlling or removing fire hazards at the worksite
- Procedures for reporting a fire or other emergency
- Procedures for emergency evacuation for all areas of work, including type of evacuation and exit route assignments
- Safe assembly areas designated for all work areas in the event of evacuation
- Procedures to be followed by employees who are requested to remain to operate critical plant operations before they evacuate, if applicable
- Procedures to account for all employees after evacuation
- Procedures employees are to follow when performing rescue or medical duties
- The members in the chain of command that employees can contact for information about the plans or for an explanation of their duties under the plans
- Proper operation of fire extinguishers provided by the company if the EAP allows employees to fight incipient stage fires rather than evacuate
- The hazards involved in incipient stage firefighting. Employees are instructed to ensure the local emergency response service (Fire Department) is notified before attempting to extinguish any fire, and that if a fire is not immediately extinguished, or the fire recurs to evacuate immediately
- Where employees have been provided portable fire extinguishers, JET Commercial LLC will provide training on the general principles of fire extinguisher use and the hazards involved with incipient-stage firefighting. This training will occur upon hire and repeated annually

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

FIRE PREVENTION PLAN

JET Commercial LLC is committed to protecting its employees in the event of a fire emergency. Accordingly, JET Commercial LLC will ensure there is a Fire Protection Program written and available to employees as required by OSHA regulations.

This plan will include the following:

- A list of all major fire hazards, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard
- Procedures to control accumulations of flammable and combustible waste materials
- Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials
- The name or job title of employees responsible for maintaining equipment to prevent or control sources of ignition or fires; and the name or job title of employees responsible for the control of fuel source hazards

Determining Fire Hazards

Figure 1

A fire is essentially the rapid oxidation of a chemical. It requires heat, oxygen and fuel in the right proportion. Different types of fuel react in different ways and require different levels of heat and oxygen to ignite; however, once the chemical reaction begins, fire provides a source of heat for continued ignition until one of the essential aspects of combustion — fuel, heat or oxygen — is removed and the reactions end. See figure 1.

Macy Weaver or designee will perform an area-by-area assessment of fire hazards and record them by location on the “Major Fire Hazards” list. The assessment will ascertain and document whether the hazard is a fuel or ignition source, control systems in place to protect against fire, and the name or job title of the individual who is responsible for removing or minimizing the listed hazard.

The goal is to systematically eliminate fire hazards wherever possible; ensure a means to prevent a fire if the hazard cannot be removed; inform employees about fire hazards in their workspace; and identify the party responsible for controlling any given fire hazard. Fire hazard identification plays a central role in the FPP, and all employees are expected to contribute their efforts to identify and mitigate fire hazards in the workplace.

Employees will familiarize themselves with the safety data sheet of any hazardous chemicals with which they work and know proper handling and storage procedures to reduce hazards. Flammable and combustible material will be stored and staged in amounts as small as possible for operations and away from sources of ignition. It is important for employees to monitor the workplace for changes that might pose additional fire hazards.

FIRE PROTECTION EQUIPMENT AND SAFEGUARDS

Local Fire Alarm Systems

An alarm system to alert employees and the local fire department will provide a distinctive signal in case of fire or other emergency. The alarm needs to be audible above ambient noise levels and/or seen over ambient light levels.

Inspection, Maintenance and Testing

JET Commercial LLC will provide for the frequent testing of all alarm systems and make sure they remain in operating condition. A local, unsupervised fire alarm system must be tested by a qualified, trained, and authorized employee or an outside service not less than once a week to insure operability by the activation of not less than 1 box, not using the same box in consecutive tests, and replacing power supplies as necessary.

Tests for systems that are capable of being supervised will occur at least annually.

Portable Fire Extinguishers

Any portable fire extinguisher provided will:

- Be fully charged and operable
- Be kept in a conspicuous place when not in use
- Not use carbon tetrachloride, chlorobromomethane, or other toxic vaporizing extinguishing agents
- Not be operated by inverting the extinguisher to rupture a cartridge or initiate an uncontrollable pressure-generating chemical reaction to expel the extinguishing agent
- Be protected from freezing (if subject to freezing)

Fire extinguishers are composed of a variety of materials depending on the type of fire they are designed to eliminate. All extinguishers will contain contents under high pressure:

Not all fire extinguishers are manufactured exactly alike. Variations may include operating instructions or distance the user should stand from the fire when dispersing contents. See the required cylinder labeling for specific information.

Each 3,000 square feet of protected buildings during construction requires a fire extinguisher rated at least 2A, spaced within 100 feet of any point of the protected area. In multi-story construction, each floor needs its own extinguisher rated at least 2A, adjacent to the stairwell

JET Commercial LLC will provide a fire extinguisher rated not less than 10B within 50 feet of anywhere there is more than 5 gallons of flammable or combustible liquids being used on the jobsite (aside from vehicle fuel tanks)

Inspection, Maintenance and Testing

JET Commercial LLC is responsible for the inspection, maintenance and testing of all portable fire extinguishers in the workplace. Maintenance checks of portable fire extinguishing equipment will occur at least annually. The dates of fire extinguisher checks will be recorded; the record of these checks will be retained for at least a year after the last check or the life of the shell (whichever is less). An individual trained to perform hydrostatic testing will test each portable fire extinguisher with suitable equipment. Such testing is also called for when portable fire extinguishers show new evidence of corrosion or mechanical wear.

Each extinguisher in the workplace will be accompanied by a record securely fixed to the extinguisher that indicates:

- Name of the person or agency who performed the last test, and the test date
- Signature of the person who performed the test
- Serial number or other identifier of the fire extinguisher that was tested

Alternatives to Portable Fire Extinguishers

During construction activities, a 55-gallon drum with two fire pails may substitute for a fire extinguisher with a 2A rating.

A ½-inch diameter garden-type hose no longer than 100 feet, can substitute for the same as long as it can discharge at least 5 gallons per minute and the stream ranges at least 30 feet horizontally.

Further, 100 feet or fewer of 1½-inch hose with a nozzle capable of discharging water at 25 gallons or more per minute may be substituted, if the hose line can reach all points in the area. (Make sure the hose connections are compatible with local firefighting equipment.)

Other Fire Protection Systems

JET Commercial LLC will meet or exceed all legal requirements for any fire protection system in the workplace and keep in good working order all safeguards designed to protect employees during emergencies, including fire retardant paints and solutions. Any other fire protection systems in use will also meet applicable regulatory requirements and may include the following:

- Temperature limit switches
- Fixed extinguishing systems
- Fire detection systems
- Standpipe and hose systems
- Flashback arresters
- Automatic sprinkler systems
- Fire brigades

During demolition activities involving combustible materials, charged hose lines that are supplied by hydrants, water tank trucks with pumps, or equivalent, must be available.

WATER SUPPLY

A water supply adequate for the operation of firefighting equipment must be available as soon as there is an accumulation of combustible materials. Underground water mains must be made available as soon as practicable where they are to be provided.

SPRINKLERS

If there will be an automatic sprinkler fire protection system, install, and place it in service as soon as permitted following completion of each story.

Ensure that sprinklers are spaced to provide a maximum protection area per sprinkler, a minimum of interference to the discharge pattern by building or structural members or building contents and suitable sensitivity to possible fire hazards.

Maintain a 36” clearance between the top of stored material and sprinkler heads.

A stock of extra sprinklers must be on hand or readily available for each temperature rating and type so that the system can be returned to readiness as soon as possible.

An automatic sprinkler system having 20 or more sprinklers must have at least one automatic water supply capable of providing design water flow for at least 30 minutes.

During demolition or alterations, keep automatic sprinkler installations in service as long as reasonable. Only authorized personnel may operate sprinkler control valves. Expedite sprinkler system modifications made to permit alterations or additional demolition so that the automatic protection may be returned to service as quickly as possible. Check sprinkler control valves daily at close of work to ensure service.

No one may occupy a portion of a structure (except as permitted under law) that must be protected by automatic sprinklers until the sprinkler system is operable and has been approved.

STANDPIPES

If standpipes are required, or exist in structures being altered, they must be brought up as soon as applicable laws permit and will be maintained as construction progresses in such a manner that they are always ready for fire protection use. Standpipes will be provided with Siamese fire department connections on the outside of the structure, at the street level, and conspicuously marked. Local codes may specify lighting or painting requirements. There must be at least one standard hose outlet at each floor.

During demolition, maintain a standpipe as long as possible in operable condition for firefighting use. Do not demolish the standpipe further than one floor below the floor being demolished.

FIRE PROTECTION

Controlling fire hazards (e.g. accumulations of flammable and combustible materials) and ensuring safe storage of building materials is a priority of the highest order for JET Commercial LLC and its employees. Controlling fuel sources demands all workers maintain a tidy work area and dispose of refuse in the appropriate receptacle; it also calls for due consideration of piles and stacks or materials at the worksite. Controlling means of ignition requires following appropriate safety guidelines especially around electricity, open flame, or any work that may produce arc, sparks, excessive heat, etc.

No Smoking, No Open Flame

Smoking is prohibited at the jobsite at all times. Signs will be posted according to local requirements alerting employees and the public to this prohibition. Open fires may not be ignited or maintained at the worksite. Only approved heaters may be used in designated locations in such a way to prevent fires.

Ignition Hazards

Electrical wiring onsite must be installed safely by qualified personnel and in compliance with applicable regulations. If equipment is powered by an internal combustion engine, make sure it is located so that the exhausts are well away from combustible materials. If the exhausts are piped outside, verify there is a 6 in. clearance between piping and combustible materials. If portable battery powered lighting equipment is used near flammable gases or liquids, make sure it's approved for hazardous locations.

During the cleaning or ventilation of tanks and vessels that contain hazardous concentrations of flammable gases or vapors nozzles, lines, or hoses for air, inert gas, or steam must be bonded to the tank or vessel shell and neither attached nor detached in hazardous concentrations of flammable gases or vapors.

All debris and refuse must be disposed of promptly (at the end of each shift or more frequently as required), especially if it is combustible. If material is to be disposed of by burning onsite, make sure that method has been approved, and complies with all relevant safety controls. All materials susceptible to spontaneous ignition (oily rags) will be stored in an approved disposal container.

Hotwork must be completed according to appropriate guidelines, and appropriate fire watch must be established and maintained to ensure safety of any operation that presents a fire hazard.

TEMPORARY BUILDINGS

- No temporary building may adversely affect a means of exit
- Temporary buildings erected within another building must be of noncombustible construction or of combustible construction with a fire resistance rating of at least 1 hour
- Temporary buildings, not inside another building and not used for the storage, handling, or use of flammable or combustible liquids, flammable gases, explosives, or blasting agents, or similar hazardous occupancies, must be located at least 10 feet from another building or structure
- Groups of temporary buildings, not exceeding 2,000 square feet in size total, will be considered a single temporary building

OPEN YARD STORAGE

Combustible materials must not be piled higher than 20 feet and must be piled in a stable manner.

Where driveways go between or around combustible storage piles, they must be at least 15 feet wide and free of any obstruction. A driveway grid formed by such driveways may not exceed 50ft. by 150ft.

Make sure the storage area is clean and any plant life is controlled to prevent additional fire hazards. Piles of combustible material must be organized, orderly and 10 feet or more from buildings. Ensure appropriate fire extinguishers (at least 2A) are easily accessible.

INDOOR STORAGE

Make sure materials stored indoors do not block exits or impede exit in any way and are piled to maintain a 36” clearance between the top of the stored material and sprinkler heads.

Maintain safe clearance between material piles and lights or heating elements. Also, provide a barricade or ensure at least 24” around the path of travel to fire doors. Never store material within 36” of a fire door.

ACCESS FOR FIREFIGHTING

Vehicle access to a construction, remodel or demolition site must be maintained at all times within 100 feet (consult local codes) of available fire department connections. Temporary vehicle access must be maintained until permanent access is established. Such roads may need to be inspected by local authorities to comply with local laws. Horizontal and vertical clearance for such access routes must be sufficient for emergency vehicle approach and meet applicable local codes.

FLAMMABLE LIQUIDS

Flammable liquids must be stored and handled in approved containers and tanks. Handling and use of flammable liquid materials in quantities of 5 gallons or less requires approved safety cans or DOT-approved containers. Flammable liquids that are hard to pour may be stored, handled and used in quantities of one gallon or less in their original container.

Ensure flammable or combustible liquids are kept clear of areas used for exits or safe passage of people.

This section applies to the handling, storage and use of flammable liquids with a flashpoint below 140°F but not to:

- Bulk transportation of flammable and combustible liquids
- Storage, handling and use of fuel oil tanks and containers connected with oil burning equipment

NOTE: With the adoption of the Globally Harmonized Standards (GHS) by OSHA, liquids capable of being ignited are divided into four categories based on their flash points.

Category 1	**Category 2**	**Category 3**	**Category 4**
Flash Point < 72ºF Boiling point ≤ 95ºF	Flash Point < 72ºF Boiling point > 95ºF	Flash Point ≥ 72ºF Boiling point ≤ 140ºF	Flash Point > 140ºF Boiling point ≤ 200ºF
Extremely flammable	Highly flammable	Flammable	Combustible

INDOOR STORAGE

Outside of an approved storage cabinet, limit storage of flammable or combustible liquids to 25 gallons. An approved storage cabinet must adhere to the following specifications:

- The bottom, sides, and top will be constructed of an exterior grade of plywood at least 1 in. thick, which will not break down or delaminate under standard fire test conditions

- All joints must be rabbeted and fastened in two directions with flathead wood screws
- When more than one door is used, there will be a rabbeted overlap of not less than 1 inch
- Steel hinges will be mounted in such a manner as to not lose their holding capacity due to loosening or burning out of the screws when subjected to fire
- These cabinets will be painted inside and out with fire retardant paint
- Approved metal storage cabinets are acceptable
- Cabinets must be labeled in conspicuous lettering, “Flammable-Keep Fire Away”

Any one storage cabinet is limited to 60 gallons of flammable liquids, and 120 gallons of combustible liquids. Any one storage area is limited to three storage cabinets. Higher quantities must be stored inside a storage room.

INDOOR STORAGE ROOMS

Storage rooms inside must be sufficiently fire-resistive for their use and comply with test specifications outlined in “Standard Methods of Fire Test of Building Construction and Material, NFPA 251-1969” and table 2.

Fire Protection Provided*	Fire Resistance	Maximum size	Total allowable quantities gals. / sq.ft. / floor area
Yes	2 hrs.	500 sq.ft.	10
No	2 hrs.	500 sq.ft.	4
Yes	1 hr.	150 sq.ft.	5
No	1 hr.	150 sq.ft.	2

Automatic extinguishing systems will be designed and installed to meet the following requirements:

- Openings to other rooms or buildings require noncombustible liquid-tight raised sills or ramps at least 4 inches in height, or the floor in the storage area must be at least 4 inches below the surrounding floor
- Openings will be equipped with approved self-closing fire doors
- The room will be liquid-tight where the walls join the floor
- A permissible alternate to the sill or ramp is an open-grated trench, inside of the room, which drains to a safe location
- Where other portions of the building or other buildings are exposed, windows will be protected as set forth in the Standard for Fire Doors and Windows, NFPA No. 80-1970, for Class E or F openings
- Wood of at least 1-inch nominal thickness may be used for shelving, racks, dunnage, scuff boards, floor overlay, and similar installations
- Materials that will react with water and create a fire hazard may not be stored in the same room with flammable or combustible liquids
- Wiring and equipment in such rooms must be approved for Class I, Division 1, Hazardous Locations as outlined in CFR 1926.449

- Every storage room must have one clear three-foot wide aisle
- Containers over 30 gallons capacity cannot be stacked on top of each other

Each indoor storage room must be equipped with either a gravity or a mechanical exhausting system that meets the following specifications:

- It must start no more than 12 inches above the floor
- It must be designed to provide a complete change of air within the room at least 6 times per hour
- If a mechanical exhausting system is used, it must be controlled by a switch located outside of the door
- Ventilating equipment and any lighting fixtures must not be operated by the same switch
- An electric pilot light will be installed next to the switch if flammable liquids are dispensed within the room
- Where gravity ventilation is provided, the fresh air intake, as well as the exhausting outlet from the room, must be on the exterior of the building where the room is located

Limit the quantity of flammable or combustible liquids near any spraying operations to the minimum required for operations. This must not exceed a supply for 1 day or one shift. Bulk storage of portable containers of flammable or combustible liquids will be in a separate, constructed building detached from other important buildings or cut off in a standard manner.

STORAGE OUTSIDE BUILDINGS

Flammable and combustible liquids in excess of the amount permitted in inside storage rooms will be stored outside of buildings.

Limit groupings of containers (not more than 60 gallons each) to 1,100 gallons in any one pile or area. Piles or groups must be separated by a 5-foot clearance and placed 20 feet or further away from a building.

Within 200 feet of such piles, ensure a 12-foot-wide access for fire control approach.

The area reserved for storing flammable and combustible liquids must be graded to divert spills away from building. Alternatively, the area may be surrounded by a curb or dike at least 12 inches high if provisions are made for draining off accumulations of ground or rain water, or spills of the stored liquids. Drains must terminate at a safe location and be accessible to operation under fire conditions.

OUTDOOR PORTABLE TANK STORAGE

- Portable tanks must be at least 20 feet from any building
- Two or more portable tanks, grouped together, having a combined capacity in excess of 2,200 gallons, must be separated by a 5-foot-clear area
- Individual portable tanks exceeding 1,100 gallons must be separated by a 5-foot-clear area
- There must be a 12-foot-wide access way within 200 feet of each portable tank, to permit approach of fire control equipment
- Storage areas will be kept free of weeds, debris, and other combustible material not necessary to the storage

- Portable tanks, not exceeding 660 gallons, must have emergency venting and other devices, as required by chapters III and IV of NFPA 30, The Flammable and Combustible Liquids Code
- Portable tanks, in excess of 660 gallons, must have emergency venting and other devices, as required by chapters II and III of “The Flammable and Combustible Liquids Code, NFPA 30”

FIRE CONTROL FOR FLAMMABLE LIQUIDS

- At least one portable fire extinguisher, with a rating of at least 20-B units (capable of extinguishing a twenty square foot fire), must be located outside of, but not more than 10 feet from, the door opening into any room used for storage of more than 60 gallons of flammable or combustible liquids
- At least one portable fire extinguisher having a rating of at least 20-B units must be located not less than 25 feet, nor more than 75 feet, from any flammable liquid storage area located outside
- When sprinklers are provided, they will be installed in accordance with the current “Standard for the Installation of Sprinkler Systems, NFPA 13”
- At least one portable fire extinguisher having a rating of not less than 20-B:C units will be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable or combustible liquids

DISPENSING LIQUIDS

- Areas where combustible liquids are transferred more than 5 gallons at a time must be separated from other activity by 25ft. or construction with a fire resistance rating of 1 hour. Drainage in such areas to control spills is required as is ventilation sufficient to maintain flammable vapor concentrations below 10 percent of the lower flammable limit
- Flammable liquid transfer between two containers requires the containers to be electrically bonded
- Draw or transfer flammable or combustible liquids from vessels, containers, or tanks within a building or outside only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container, or portable tanks, by gravity or pump, through an approved self-closing valve. Transferring by means of air pressure on the container or portable tanks is prohibited
- Protect dispensing units against collision damage
- Dispensing devices and nozzles for flammable liquids must be of an approved type

HANDLING LIQUIDS AT POINT OF FINAL USE

- Keep Flammable liquids in closed containers when not in use
- Dispose of leakage or spillage of flammable or combustible liquids promptly and safely
- Flammable liquids may be used only where there are no open flames or other sources of ignition within 50 feet of the operation, unless conditions warrant greater clearance

SERVICE AND REFUELING AREAS

- Flammable or combustible liquids must be stored in approved closed containers, in tanks located underground, or in above-ground portable tanks
- Tank trucks must comply with the requirements covered in the latest edition of the Standard for Tank Vehicles for Flammable and Combustible Liquids, NFPA No. 385
- Only approved types of dispensing hoses may be used
- The dispensing nozzle will be an approved automatic-closing type without a latch-open device
- Do not abandon underground tanks
- Provide clearly identified and easily accessible switch(es) at a location remote from dispensing devices to shut off the power to all dispensing devices in the event of an emergency
- Heating equipment of an approved type may be installed in the lubrication or service area where there is no dispensing or transferring of flammable liquids, provided the bottom of the heating unit is at least 18 inches above the floor and is protected from physical damage
- Heating equipment installed in lubrication or service areas, where flammable liquids are dispensed, must be of an approved type for garages, and will be installed at least 8 feet above the floor
- No smoking or open flames will be permitted in the areas used for fueling, servicing fuel systems for internal combustion engines, receiving or dispensing of flammable or combustible liquids
- Post conspicuous and legible signs prohibiting smoking
- Shut off motors of equipment being fueled during the fueling operation; and provide each service or fueling area with at least one fire extinguisher having a rating of not less than 20B:C located so that an extinguisher will be within 75 feet of each pump, dispenser, underground fill pipe opening, and lubrication or service area.

FORMS AND ATTACHMENTS

Please find on the following page the Major Fire Hazards Form, which may be reproduced freely by JET Commercial LLC for the purposes of implementing and maintaining a safety and health program.

MAJOR FIRE HAZARDS FORM

Major Fire Hazards Form													
Location	Fire Hazard	Fuel source hazard	Ignition source hazard	Handling, storage, and/or maintenance procedures and other relevant protections (include PPE)	Name or job title of responsible party								
Example													
Site Gate	cigarette butts at gate	Yes	Yes	Ensure all materials have been completely extinguished and properly disposed of. Fire extinguisher is inside office.	Housekeeping: Employees, Custodian Fire extinguisher: Macy Weaver								

POLICY

JET Commercial LLC will manage or eliminate hazards in the workplace to the greatest extent possible with engineering controls and work practice controls. However, if such controls fail to provide employees sufficient protection, Macy Weaver or designate will provide employees with personal protective equipment (PPE) and ensure proper use thereof. PPE minimizes exposure to a range of hazards. All protective devices must meet the following minimum requirements:

- Provide adequate protection against the hazards for which they are designed
- Be of safe design and construction for the work to be performed
- Be reasonably comfortable when worn under the designated condition
- Fit snugly and not unduly interfere with the movements of the wearer
- Be durable
- Be capable of being disinfected
- Easily cleaned
- Be distinctly marked to facilitate identification of the manufacturer

HAZARD ASSESSMENT

As explained in the chapter on Job Hazard Analysis, hazard assessment is the backbone of the JET Commercial LLC safety and health program. Recognizing and documenting hazards is the first step to protecting employees from them. An initial walk-through to develop a list of potential hazards will be followed by a review of records and an analysis of the facility layout to determine what controls would best protect workers. If engineering and administrative controls are unable to protect employees from hazards they face, Macy Weaver and management will determine what PPE is necessary.

JET Commercial LLC job hazard analysis is an ongoing process. Weekly inspections and periodic reassessments will look for changes that may affect occupational hazards for workers and will determine if PPE remains viable (in terms of condition, age and appropriateness) to protect a worker from hazards on the job.

JET Commercial LLC must certify and document the required workplace hazard assessment in a way that identifies the following:

- Workplace evaluated
- Person certifying the evaluation has been performed
- Date of the hazard assessment
- Document as a certification of hazard assessment

EMPLOYER RESPONSIBILITIES

It is the responsibility of JET Commercial LLC to:

- Identify in the hazard assessment where PPE is appropriate and what type is necessary
- Identify and provide properly fitting PPE for employees
- Inform employees how and when to use identified PPE
- Enforce PPE use
- Train employees in the use and care of PPE
- Ensure employees maintain PPE
- Replace worn or damaged PPE
- Ensure employee provided PPE is adequate
- Periodically review, update and evaluate the effectiveness of the PPE program

EMPLOYEE RESPONSIBILITIES

JET Commercial LLC employees are expected to attend PPE training sessions provided by management

JET Commercial LLC requires employees use personal protective equipment (PPE) appropriate to the hazards of their job. This equipment may include protection for the following: eyes, face, feet, hands, head and body.

Employees required to use such equipment will be trained in all aspects of its use, maintenance and applicability.

The following list of PPE is available to employees and will be used as required: hard hat, reflective or safety vests, eye protection, steel-toed shoes, gloves, hearing protection, harnesses and other as required per job site.

- Use, and properly wear, all PPE provided by the employer
- Properly care for, clean, and maintain all PPE
- Inform a supervisor of the need to repair or replace PPE

TRAINING

JET Commercial LLC will ensure every employee is provided training on personal protective equipment. This training will be provided at no cost to the employee during working hours.

JET Commercial LLC will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Components

JET Commercial LLC will ensure training for every employee in the following minimum elements:

- When PPE is necessary
- What specific PPE is necessary
- How to properly put on, take off, adjust and wear PPE

- Limitations of PPE
- Proper care, maintenance, useful life and disposal of the PPE

Affected employees must demonstrate an understanding of all training and the ability to use PPE properly before they will be permitted to perform work requiring PPE.

JET Commercial LLC will provide retraining for any affected employee who is unable to demonstrate the understanding or skills to use PPE properly. Circumstances that require retraining include, but are not limited to the following:

- When there have been changes in the workplace that have rendered previous training obsolete
- When there have been changes to PPE used that render previous training obsolete
- When an employee demonstrates or expresses inadequacies in understanding or skill needed to use assigned PPE properly

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

PPE SELECTION

JET Commercial LLC will select only PPE of safe design and construction and will work with employees to ensure PPE remains clean and reliable. In selecting PPE used to control hazards in the workplace, JET Commercial LLC will consider comfortable fit, providing sizes appropriate to the affected employees, and ensure any PPE used will be compatible to provide sufficient protection. Comfort and ease of use is an important consideration because workers are more likely to wear comfortable PPE.

All PPE at JET Commercial LLC, including any employee-owned PPE, will meet at least the minimum standards and requirements to provide sufficient protection for workers. Following are the standards referenced by OSHA for select groups of PPE:

- Eye and Face: ANSI Z87.1
- Head: ANSI Z89.1
- Foot: ANSI Z41.1

However, alternative protective equipment is acceptable if JET Commercial LLC demonstrates it is at least as effective as equipment constructed according to the above standards.

NON-PROVIDED PPE

JET Commercial LLC will provide all PPE and replacement PPE at no cost to employees except for the following:

- Non-specialty safety-toe protective footwear, non-specialty prescription eyewear, provided they may be worn away from work
- Shoes or boots with metatarsal protection if JET Commercial LLC provides separate metatarsal guards
- Logging boots
- Everyday clothing
- Clothing worn only for protection from weather
- Replacement PPE the employee has intentionally damaged or lost
- Where the employee provides his or her own adequate PPE

WORK CLOTHING

JET Commercial LLC requires employees to wear clothing appropriate to the work and conditions. Examples of this stipulation include clothing that provides protection against high temperature hazards that can cause burns, and not wearing loose clothing like ties or loose fitting clothing near moving machinery. Employees will not wearing jewelry that might contact or electric circuitry.

Also any clothing contaminated with a hazardous material (e.g. flammable liquids, toxic substances, irritants or oxidizers) must be removed immediately and properly cleaned before it can be worn again.

EYE AND FACE PROTECTION

JET Commercial LLC will ensure adequate protection against the following:

- Flying particles
- Molten metal
- Liquid chemicals
- Acids or caustic liquids
- Chemical gases or vapors
- Potentially infected material
- Potentially harmful light radiation

When there is a hazard from flying particles, eye protection will provide side protection, or JET Commercial LLC will provide effected employees with detachable side protectors.

- Employees will ensure that face and eye protectors are used by only the person to whom the items are issued.
- Eye and face PPE must have the manufacturer's identification distinctly marked.

Prescription Lenses

Everyday glasses will not provide sufficient protection against the types of hazards that require eye protection. Employees who wear prescription lenses to correct their vision must wear either eye protection that incorporates their prescription or that can be worn over glasses without compromising the glasses' ability to correct the wearer's vision.

If JET Commercial LLC requires more than one worker to wear the same piece of eyewear, employees must disinfect the protective eyewear after each use.

Types of Eye Protection

Safety Spectacles: These protective eyeglasses have safety frames constructed of metal or plastic and impact-resistant lenses. Side shields are available on some models.

Goggles: These tight-fitting eye protectors completely cover the eyes, eye sockets and the facial area immediately surrounding the eyes and provide protection from impact, dust and splashes. Some goggles will fit over corrective lenses.

Welding Shields: Constructed of vulcanized fiber or fiberglass and fitted with a filtered lens, welding shields protect eyes from burns caused by infrared or intense radiant light; they also protect both the eyes and face from flying sparks, metal spatter, and slag chips produced during welding, brazing, soldering and cutting operations. OSHA requires filter lenses to have a shade number appropriate to protect against the specific hazards of the work being performed in order to protect against harmful light radiation.

Laser Safety Goggles: These specialty goggles protect against intense concentrations of light produced by lasers. The type of laser safety goggles an employer chooses will depend upon the equipment and operating conditions in the workplace.

Face Shields: These transparent sheets of plastic extend from the eyebrows to below the chin and across the entire width of the employee's head. Some are polarized for glare protection. Face shields protect against nuisance dusts, potential splashes or sprays of hazardous liquids, and smaller particles, but will not provide adequate protection against larger impact hazards. Face shields must be worn over the top of basic eye protection devices such as goggles or safety spectacles.

Typical uses for face shields include, but are not limited to, the following situations: woodworking operations where chips and particles fly; metal machining that causes flying particles; buffing, polishing, wire brushing, and grinding; operations that cause flying particles or objects; spot welding; and handling of hot or corrosive materials.

Laser Operations

Laser light radiation can be extremely dangerous to the unprotected eye, and direct or reflected beams can cause permanent eye damage.

Laser retinal burns can be painless, so it is essential that all personnel in or around laser operations wear appropriate eye protection.

Laser safety goggles must protect for the specific wavelength of the laser and must be of sufficient optical density for the energy involved. Safety goggles intended for use with laser beams must be labeled with the laser wavelengths for which they provide protection, the optical density of those wavelengths and the visible light transmission.

TABLE1 - LASER SAFETY GLASS

Intensity, CW maximum power density (watts/cm²)	Attenuation	
	Optical density (O.D.)	Attenuation factor
10^{-2}	5	105
10-1	6	106
1.0	7	107
10.0	8	108

Laser safety goggles must protect for the specific wavelength of the laser and must be of sufficient optical density for the energy involved. Safety goggles intended for use with laser beams must be labeled with the laser wavelengths for which they provide protection, the optical density of those wavelengths and the visible light transmission.

When a face shield is used in atmospheres or working areas requiring special conditions of non-conductivity or non-sparking, the equipment and materials used must meet those requirements. A face shield must be identified as a “non-conductive face shield” or “non-sparking face shield.”

Welding Operations

The intense light associated with welding operations can cause serious and sometimes permanent eye damage if operators do not wear proper eye protection. The intensity of light or radiant energy produced by welding, cutting or brazing operations varies according to a number of factors including the task producing the light, the electrode size and the arc current. Table 2 shows the minimum protective shades for a variety of welding, cutting and brazing operations in general industry and in the shipbuilding industry.

Helmets or hand shields must be used during all arc welding or arc cutting operations, excluding submerged arc welding. Helpers or attendants must be provided with proper eye protection. A hand shield must be constructed of materials similar to those used for a helmet, in a like manner, to protect the body from direct radiant energy.

TABLE 2 -- FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

Operations	Electrode Size 1/32 in.	Arc Current	Minimum (*) Protective Shade
Shielded metal arc welding	Less than 3	Less than 60	7
	3-5	60-160	8
	5-8	160-250	10
	More than 8	250-550	11
Gas metal arc welding and flux cored arc welding		Less than 60	7
		60-160	10
		160-250	10
		250-500	10
Gas tungsten arc welding		Less than 50	8
		50-150	8
		150-500	10
Air carbon arc cutting	(Light)	Less than 500	10
	(Heavy)	500-1000	11
Plasma arc welding		Less than 20	6
		20-100	8
		100-400	10
		400-800	11
Plasma arc cutting	(light)(**)	Less than 300	8
	(medium)(**)	300-400	9
	(heavy)(**)	400-800	10
Torch brazing			3
Torch soldering			2
Carbon arc welding			14

FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

Operations		Plate Thickness – inches	Plate Thickness – mm	Minimum (*) Protective Shade
Gas Welding	Light	Under ⅛	Under 3.2	4
	Medium	⅛ to ½	3.2 to 12.7	5
	Heavy	Over ½	Over 12.7	6
Oxygen Cutting	Light	Under 1	Under 25	3
	Medium	1 to 6	25-150	4
	Heavy	Over 6	Over 150	5
Footnote (*) As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade, which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation. Footnote (**) These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the workpiece.				

HEAD PROTECTION

JET Commercial LLC will protect employees from potential head injuries by providing proper head protection and accessories, and ensuring that employees wear these items to protect themselves from injury. Hard hats and helmets can protect employees from impact and penetration hazards, as well as from electrical shock and burn hazards.

JET Commercial LLC will ensure employees wear head protection if any of the following apply:

- Objects might fall from above and strike them on the head;
- They might bump their heads against fixed objects, such as exposed pipes or beams
- There is a possibility of accidental head contact with electrical hazards or any other harmful contacts or exposures
- There is a risk of injury from any of the following:
  - Electric shock
  - Hair entanglement
  - Chemicals
  - Temperature extremes

Some examples of occupations where employees will be required to wear head protection include construction workers, carpenters, electricians, linemen, plumbers and pipefitters, timber and log cutters, welders, among many others. Whenever there's a danger of objects falling from above, such as working below others who are using tools or working under a conveyor belt, head protection must be worn. Hard hats must be worn with the bill forward to protect employees properly.

In general, protective helmets or hard hats should do the following:

- Resist penetration by objects
- Absorb the shock of a blow
- Be water-resistant and slow burning
- Have clear instructions explaining proper adjustment and replacement of the suspension and headband, which must be replaced if slack, twisted, worn out, sweat-soaked, etc.

Hard hats must have a hard outer shell and a shock-absorbing lining that incorporates a headband and straps that suspend the shell from 1 to 1¼ inches (2.54 cm to 3.18 cm) away from the head. This type of design provides shock absorption during an impact and ventilation during normal wear.

A metallic head device must not be furnished by an employer or used by an employee for head protection, except where it has been determined that the use of other types of protective helmets or safety hats or caps is impractical, such as where chemical reaction will cause the deterioration of other types of head protection.

Types of Hard Hats/Helmets

JET Commercial LLC will select protective headgear that meets ANSI standard requirements and will ensure employees wear hard hats/helmets to provide appropriate protection against potential workplace hazards. Hardhat selection must consider all hazards on the worksite, including electrical hazards. This can be done through a comprehensive hazard analysis and an awareness of the different types of protective headgear available.

Hard hats are divided into three industrial classes:

- **Class G** (formerly Class A) hard hats (General) provide impact and penetration resistance along with limited voltage protection (up to 2,200 volts)
- **Class E** (formerly class B) hard hats (Electrical) provide the highest level of protection against electrical hazards, with high-voltage shock and burn protection (up to 20,000 volts). They also provide protection from impact and penetration hazards by flying/falling objects
- **Class C** hardhats (Conductive) provide lightweight comfort and impact protection but offer no protection from electrical hazards

In addition, hard hats/helmets that protect against impacts are classified as either:

- **Type I** – Helmets that are intended to reduce the force of impact resulting from a blow only to the top of the head
- **Type II** – Helmets that are intended to reduce the force of impact resulting from a blow to the top or sides of the head

Another class of protective headgear on the market is called a “bump hat,” designed for use in areas with low head clearance. They are recommended for areas where protection is needed from head bumps and lacerations. These are not designed to protect against falling or flying objects and are not ANSI approved. It is essential to check the type of hardhat employees are using to ensure that the equipment provides appropriate protection. Each hat will have a label inside the shell that lists the manufacturer, the ANSI designation and the class of the hat.

Size and Care Considerations

Head protection that is too large or too small is inappropriate for use, even if it meets all other requirements. Protective headgear must fit appropriately on the body and for the head size of each individual. Most protective headgear comes in a variety of sizes with adjustable headbands to ensure a proper fit (many adjust in ⅛-inch increments). A proper fit allows sufficient clearance between the shell and the suspension system for ventilation and distribution of an impact. The hat must not bind, slip, fall off or irritate the skin.

Some protective headgear allows for the use of various accessories to help employees deal with changing environmental conditions, such as slots for earmuffs, safety glasses, face shields and mounted lights. Optional rims may provide additional protection from the sun and some hats have channels that guide rainwater away from the face. Protective headgear accessories must not compromise the safety elements of the equipment.

Periodic cleaning and inspection will extend the useful life of protective headgear. A daily inspection of the hardhat shell, suspension system, and other accessories for holes, cracks, tears or other damage that might compromise the protective value of the hat is essential. Paints, paint thinners and some cleaning agents can weaken shells of hard hats and may eliminate electrical resistance. Consult the helmet manufacturer for information on the effects of paint and cleaning materials on their hard hats. Never drill holes, paint, or apply labels to protective headgear as this may reduce the integrity of the protection. Do not store protective headgear in direct sunlight, such as on the rear window shelf of a car, since sunlight and heat can damage them.

Hardhats with any of the following defects must be removed from service and replaced:

- Perforation, cracking, or deformity of the brim or shell
- Indication of exposure of the brim or shell to heat, chemicals or ultraviolet light and other radiation (in addition to a loss of surface gloss, such signs include chalking or flaking)

Always replace a hardhat if it sustains an impact, even if damage isn't noticeable. Suspension systems are available as replacement parts, and must be replaced if damaged or excessive wear is noticed. It's not necessary to replace the entire hard hat when deterioration or tears of the suspension systems are noticed.

Hoods

A hood must be made of materials that combine all of the following:

- Have mechanical strength and lightness of weight to a high degree
- Be non-irritating to the skin when subjected to perspiration
- Be capable of withstanding frequent cleaning and disinfection
- Materials used in the manufacture of hoods must be suitable to withstand the hazards to which the user may be exposed
- A hood must be designed to provide adequate ventilation for the wearer

A protective helmet must be used in conjunction with a hood where there is a head injury hazard and the hood must be designed to accommodate helmets.

Accessories

Faceshield Protection: Faceshield devices can be attached to the helmet without changing the helmet strength and electrical protection. A metal faceshield bracket system can be used on a Class G helmet; however, if a Class E helmet is to be used in an area where Class E protection is required, a type of bracket and shield system that won't conduct electricity (has a dielectric rating) must be used.

Earmuffs: The required degree of hearing protection will be considered prior to selecting earmuff attachments. If earmuffs are to be attached to helmets, metal attachments are acceptable for Class G helmets. Attachments with a dielectric rating must be used for Class E helmets.

Sweat Bands: If sweatbands are necessary, they must not interfere with the effectiveness of the helmet headband system. Some sweatband devices are made to fit on the headband. For electrical work, metal components must not be used to attach sweatbands to helmets.

Winter Liners: There are many varieties of winter liners. One type fits over the hardhat assembly. It must be flame retardant and elasticized to give the user a snug, warm fit. Other styles fit under the helmet. If the liner is to be used with a Class E helmet, it must have a dielectric rating. Regardless of the warmth characteristics, the liner and helmet combination must be compatible. The liner and helmet must fit properly to give the employee proper impact and penetration protection.

Chin Straps: When wind or other conditions present the possibility of the hard hat being accidentally removed from the head, chinstraps can be used. If chinstraps are used, they must be the type that fastens to the shell of the hard hat. If the chinstraps fasten to the headband and suspension system, the shell may blow off and strike another employee.

Hair Enclosures: Employees must wear a hat, cap or net if there's a danger of hair entanglement in moving machinery or equipment, or where there's a risk of exposure to an ignition source. Hair enclosures must completely enclose all loose hair; be adjustable to accommodate all head sizes; be designed to be reasonably comfortable to the wearer.

FOOT AND LEG PROTECTION

Employees who are exposed to possible foot or leg injuries from falling or rolling objects or from crushing or penetrating materials must wear protective footwear. In addition, employees whose work involves exposure to hot substances or corrosive or poisonous materials must have protective gear to cover exposed body parts, including legs and feet. If an employee's feet may be exposed to electrical hazards, nonconductive footwear must be worn. On the other hand, workplace exposure to static electricity may necessitate the use of conductive footwear.

An employer must ensure that employees wear protective footwear when working in areas where any of the following occur:

- Employees' feet are exposed to electrical hazards
- There is a danger of foot injuries due to falling or rolling objects, such as barrels or tools
- There is a danger of sharp objects, such as nails or spikes, piercing the soles of shoes
- There is exposure to molten metal that might splash on feet or legs
- There is possible exposure to chemical spills

Employees must also wear proper footwear (including protective footwear when necessary) when working on or around hot, wet, or slippery surfaces.

Foot and leg protection choices include the following:

- Leggings or high boots made of a suitable material (e.g. leather, rubber) for workers exposed to dangerous chemical spill and heat hazards such as molten metal or welding sparks
- When an employee uses a chain saw, he must wear chaps or leg protectors, made from material designed to resists cuts, covering from at least upper thigh to mid-calf
- Metatarsal guards protect the instep area from impact and compression. Made of aluminum, steel, fiber, or plastic, these guards may be strapped to the outside of shoes. Footwear designed to newer versions of ANSI Z41 and the ASTM standards require metatarsal protection to be built into the footwear
- Toe guards fit over the toes of regular shoes to protect the toes from impact and compression hazards. They may be made of steel, aluminum, or plastic

An employer who chooses to provide employees with toe guards must demonstrate that they are as protective as an incorporated toebox used in safety-toe footwear.

- Combination foot and shin guards protect the lower legs and feet, and may be used in combination with toe guards when greater protection is needed
- Safety shoes have impact-resistant toes and heat-resistant soles that protect the feet against hot work surfaces common in roofing, paving and hot metal industries. The metal insoles of some safety shoes protect against puncture wounds. Safety shoes may also be designed to be electrically conductive to prevent the buildup of static electricity in areas with the potential for explosive atmospheres or nonconductive to protect workers from workplace electrical hazards
- If a hazard is created from a process, environment, chemical, or mechanical irritant that could cause an injury or impairment to the feet by absorption or physical contact, other than from impact, the employer must provide any of the following to the employee:
  - Boots
  - Overshoes
  - Rubbers
  - Wooden-soled shoes
  - An equivalent of the above

Special Purpose Shoes

Electrically conductive shoes provide protection against the buildup of static electricity. Employees working in explosive and hazardous locations such as explosives manufacturing facilities or grain elevators must wear conductive shoes to reduce the risk of static electricity buildup on the body that could produce a spark and cause an explosion or fire.

Don’t use foot powder when wearing protective conductive footwear because it provides insulation, reducing the conductive ability of the shoes. Don’t wear silk, wool and nylon socks that can produce static electricity with conductive footwear. Conductive shoes must be removed when the task requiring their use is completed.

Employees exposed to electrical hazards must never wear conductive shoes. Electrical hazard, safety-toe shoes are non-conductive, and will prevent the wearers' feet from completing an electrical circuit to ground. These shoes can protect against open circuits of up to 600 volts in dry conditions, and should be used with other insulating equipment and additional precautions to reduce the risk of a worker becoming a path for hazardous electrical energy.

The insulating protection of electrical hazard, safety-toe shoes may be compromised if the shoes become wet, the soles are worn through, metal particles become embedded in the sole or heel, or workers touch conductive grounded items. Note: Nonconductive footwear must not be used in explosive or hazardous locations.

Foundry shoes insulate the feet from the extreme heat of molten metal. They keep hot metal from lodging in shoe eyelets, tongues or other shoe parts. These snug-fitting leather or leather-substitute shoes have leather or rubber soles and rubber heels. All foundry shoes must have built-in safety toes.

Care of Protective Footwear

As with all protective equipment, safety footwear must be inspected prior to each use. Shoes and leggings need to be checked for wear and tear at reasonable intervals. This includes looking for cracks or holes, separation of materials, broken buckles or laces. Check the soles of shoes for pieces of metal or other embedded items that could present electrical or tripping hazards. Employees will follow the manufacturers' recommendations for cleaning and maintenance of protective footwear.

HAND AND ARM PROTECTION

If a workplace hazard assessment reveals employees face potential injury to hands and arms that cannot be eliminated through engineering and work practice controls, JET Commercial LLC will ensure employees wear appropriate protection. Potential hazards that require protection include skin absorption of harmful substances, chemical or thermal burns, electrical dangers, bruises, abrasions, cuts, punctures, fractures, amputations and harmful temperature extremes.

Protective equipment includes gloves, finger guards, and arm coverings. In addition, items such as machine guards and barriers are examples of engineering controls that may eliminate hazards to the hands and arms.

Types of Protective Gloves

There are many types of gloves available today to protect against a wide variety of hazards. The nature of the hazard and the operation involved will affect the selection of gloves. The variety of potential occupational hand injuries makes selecting the right pair of gloves challenging. No gloves can provide protection against all potential hand hazards. Employees must use gloves specifically designed for the hazards and tasks found in their workplace. Gloves designed for one function may not protect against a different function even though they may appear to be an appropriate protective device.

The following are examples of some factors that may influence the selection of protective gloves for a workplace:

- Type of chemicals handled (toxic properties of the chemical(s))
- Chemical concentration and temperature (the higher the concentration and temperature, the shorter the breakthrough time)
- Nature of contact (total immersion, continual contact, splash, etc)
- Duration of contact
- Area requiring protection (hand only, forearm, arm)
- Degree of dexterity (fine motor work)
- Grip requirements (dry, wet, oily)
- Thermal protection
- Size and comfort
- Abrasion/cut resistance requirements
- Other job hazards (such as biological, electrical, and radiation hazards)

Gloves are made from a wide variety of materials and are designed for many types of workplace hazards. In general, gloves fall into four groups:

- Gloves made of leather, synthetic fibers, or metal mesh
- Fabric and coated fabric gloves
- Chemical protective gloves
- Insulating rubber gloves (See 29 CFR 1910.137, Electrical Protective Equipment, for detailed requirements on the selection, use and care of insulating rubber gloves)

Leather, Canvas or Metal Mesh Gloves

- Sturdy gloves made from metal mesh, leather or canvas provide protection against cuts and burns. Leather or canvas gloves also protect against sustained heat
- Leather gloves protect against sparks, moderate heat, blows, chips and rough objects. These gloves can be used for tasks such as welding
- Aluminized gloves provide radiant heat protection by reflection and insulate/reduce heat conduction with a liner or insert. Employees working with molten materials would benefit from this type of glove
- Aramid fiber gloves such as Kevlar, protect against heat, are cut- and abrasion-resistant and wear well. Employees working in jobs such as firefighting, automotive work, metal fabrication, glass and ceramic handling would benefit from this type of glove
- Synthetic gloves of various materials offer protection against heat and cold, are cut- and abrasion-resistant and may withstand some diluted acids. These materials do not stand up against alkalis and solvents
- Metal mesh hand, wrist, arm and finger protective wear protects against knife cuts; however, it offers very little, if any, protection against punctures. Plastic dots can be adhered to the metal mesh to facilitate gripping

Fabric and Coated Fabric Gloves

Fabric and coated fabric gloves are made of cotton or other fabric to provide varying degrees of protection.

- Fabric gloves protect against dirt, slivers, chafing and abrasions. They do not provide sufficient protection for use with rough, sharp or heavy materials. Adding a plastic coating will strengthen some fabric gloves
- Coated fabric gloves normally are made from cotton flannel with napping on one side. By coating the un-napped side with plastic, fabric gloves are transformed into general-purpose hand protection offering slip-resistant qualities. These gloves are used for tasks ranging from handling bricks and wire to chemical laboratory containers. When selecting gloves to protect against chemical exposure hazards, always check with the manufacturer or review the manufacturer's product literature to determine the gloves' effectiveness against specific workplace chemicals and conditions

Chemical- and Liquid-Resistant Gloves

Chemical-resistant gloves are made with different kinds of rubber: natural, butyl, neoprene, nitrile and fluorocarbon (viton); or various kinds of plastic: polyvinyl chloride (PVC), polyvinyl alcohol and polyethylene. These materials can be blended or laminated for better performance. As a general rule, the thicker the glove material, the greater the chemical resistance but thick gloves may impair grip and dexterity, having a negative impact on safety

Some examples of chemical-resistant gloves include:

- Butyl gloves are made of a synthetic rubber and protect against a wide variety of chemicals, such as peroxide, rocket fuels, highly corrosive acids (nitric acid, sulfuric acid, hydrofluoric acid and red-fuming nitric acid), strong bases, alcohols, aldehydes, ketones, esters and nitro-compounds. Butyl gloves also resist oxidation, ozone corrosion and abrasion, and remain flexible at low temperatures. Butyl rubber does not perform well with aliphatic and aromatic hydrocarbons and halogenated solvents
- Natural (latex) rubber gloves are comfortable to wear, which makes them a popular general-purpose glove. They feature outstanding tensile strength, elasticity and temperature resistance. In addition to resisting abrasions caused by grinding and polishing, these gloves protect workers' hands from most water solutions of acids, alkalis, salts and ketones. Latex gloves have caused allergic reactions in some individuals and may not be appropriate for all employees. Hypoallergenic gloves, glove liners and powderless gloves are possible alternatives for workers who are allergic to latex gloves
- Neoprene gloves are made of synthetic rubber and offer good pliability, finger dexterity, high density, and tear resistance. They protect against hydraulic fluids, gasoline, alcohols, organic acids and alkalis. They generally have chemical and wear resistance properties superior to those made of natural rubber

- Nitrile gloves are made of a copolymer and provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene. Although intended for jobs requiring dexterity and sensitivity, nitrile gloves stand up to heavy use even after prolonged exposure to substances that cause other gloves to deteriorate. They offer protection when working with oils, greases, acids, caustics, and alcohols but are generally not recommended for use with strong oxidizing agents, aromatic solvents, ketones, and acetates

Care of Protective Gloves

Protective gloves will be inspected before each use to ensure they are not torn, punctured or made ineffective in any way. A visual inspection will help detect cuts or tears but a more thorough inspection by filling the gloves with water and tightly rolling the cuff towards the fingers will help reveal any pinhole leaks. Gloves that are discolored or stiff may also indicate deficiencies caused by excessive use or degradation from chemical exposure. Interiors of gloves must be kept free of corrosive or irritating contaminants.

Any gloves with impaired protective ability must be discarded and replaced. Reuse of chemical-resistant gloves must be evaluated carefully, taking into consideration the absorptive qualities of the gloves. A decision to reuse chemically exposed gloves should take into consideration the toxicity of the chemicals involved and factors such as duration of exposure, storage and temperature. All gloves must be sanitized and clean before reissue.

BODY PROTECTION

Employees who face possible bodily injury of any kind that cannot be eliminated through engineering, work practice or administrative controls must wear appropriate body protection while performing their jobs. In addition to radiation, the following are workplace hazards that could cause bodily injury, and require protection:

- Temperature extremes
- Hot splashes from molten metals and other hot liquids
- Potential impacts from tools, machinery, and materials
- Hazardous chemicals
- Wetness

There are many varieties of protective clothing available for specific hazards. Employers are required to ensure that their employees wear personal protective equipment only for the parts of the body exposed to possible injury. Examples of body protection include laboratory coats, coveralls, vests, jackets, aprons, surgical gowns and full body suits.

If a hazard assessment indicates a need for full body protection against toxic substances or harmful physical agents, the clothing must be carefully inspected before each use, it must fit each worker properly and it must function properly and for the purpose for which it is intended.

Protective clothing comes in a variety of materials, each effective against particular hazards, such as:

- Paper-like fiber, which is used for disposable suits provide protection against dust and splashes
- Treated wool and cotton, which adapts well to changing temperatures, is comfortable and fire-resistant, and protects against dust, abrasions and rough, irritating surfaces

- Duck, which is a closely woven cotton fabric that protects against cuts and bruises when handling heavy, sharp, or rough materials
- Leather, which is often used to protect against dry heat and flames
- Rubber, rubberized fabrics, neoprene and plastics, which protect against certain chemicals and physical hazards
- When chemical or physical hazards are present, check with the clothing manufacturer to ensure that the material selected will provide protection against the specific hazard

HEARING PROTECTION

Determining the need to provide hearing protection for employees can be challenging. Employee exposure to excessive noise depends upon a number of factors, including:

- The loudness of the noise as measured in decibels (dB)
- The duration of each employee's exposure to the noise
- Whether employees move between work areas with different noise levels
- Whether noise is generated from one or multiple sources

Generally, the louder the noise, the shorter the exposure time before hearing protection is required. For instance, employees may be exposed to a noise level of 85 dB for 8 hours per day (unless they experience a Standard Threshold Shift) before hearing protection is required. At a noise level of 85 dB the Company is required to implement a hearing protection program that includes monitoring, employee audiometric testing and training on the use of hearing protection. If employees are exposed to a noise level of 115 dB, hearing protection is required and the exposure time can't exceed 15 minutes. For more information on the requirements for a comprehensive hearing conservation program, see the chapter on hearing protection.

If engineering and work practice controls do not lower employee exposure to workplace noise to acceptable levels, employees must wear appropriate hearing protection. It is important to understand that hearing protectors reduce only the amount of noise that gets through to the ears. The amount of this reduction is referred to as attenuation, which differs according to the type of hearing protection used and how well it fits. Hearing protectors worn by employees must reduce an employee's noise exposure to within the acceptable limits.

Types of hearing protection include the following:

- Single-use earplugs are made of waxed cotton, foam, silicone rubber or fiberglass wool. They are self-forming and, when properly inserted, they work as well as most molded earplugs
- Pre-formed or molded earplugs must be individually fitted by a professional and can be disposable or reusable. Reusable plugs must be cleaned after each use
- Earmuffs require a perfect seal around the ear. Glasses, facial hair, long hair, or facial movements such as chewing may reduce the protective value of earmuffs

Safety Belts, Lifelines, And Lanyards

The only acceptable use of lifelines, safety belts and lanyards is to safeguard employees. If a lifeline, safety belt or lanyard is subjected to in-service loading; it must be removed from service and discarded.

- Lifelines must be secured above the point of operation to an anchorage or structural member capable of supporting a minimum dead weight of 5,400 pounds
- If a lifeline is subject to cutting or abrasion, as may be the case on rock scaling operations, it must be at least ⅞-inch wire core manila rope. Otherwise, it may be a ¾-inch manila or equivalent, with a nominal breaking strength of at least 5,400 pounds
- Safety belt lanyards will be at least ½-inch nylon and provide for a fall that does not exceed 6 feet. They must also have a nominal breaking strength of 5,400 pounds
- Hardware on safety belts and lanyards in use must be drop forged or pressed steel or cadmium plated according to federal specifications. The surface must be smooth and free of sharp edges
- Safety belt and lanyard hardware, except rivets, must withstand a tensile loading of 4,000 pounds without cracking, breaking, or taking a permanent deformation

For more information, see the “Fall Protection” chapter.

OTHER PPE

High Visibility Apparel

High visibility apparel must be used by workers involved in traffic control, such as flaggers or law enforcement officers, or for employees who work on the roadways, such as sanitation, utility or construction workers and emergency responders. The apparel must be high visibility orange, yellow, yellow-green or a fluorescent version so that it contrasts with the surrounding area. Reflective material visible from all sides for 1,000 feet must be worn during dark hours.

Flotation Vests

Employees working over or near water, where the danger of drowning exists, will be provided with approved life jackets or buoyant work vests. These vests are available as flotation pads inside high visibility international orange nylon shells or as vinyl coated flotation pads of international orange. The flotation vests must be U.S. Coast Guard approved.

Additionally, in any other workplace where employees work over or near water, or use boats, approved life jackets, buoyant work vests or other flotation devices must be provided. All buoyant work vests and life preservers will be checked for defects before and after each use.

Welding and High Heat

Coveralls, jackets, pants and aprons are available for operations involving high heat or molten metal splashes. Leather is the traditional protective material for many welding operations. Where there is exposure to radiant heat as well as molten metal splashes, aluminized garments may be used. They reflect up to 95 percent of the radiant heat. Flame-resistant cotton coveralls designed for comfort and protection are sometimes preferred. Whatever the type of clothing used for welding operations, it must not have external pockets or cuffs. Fabrics of silica, ceramic and fiberglass eliminate the need for asbestos and are now available for welding operations. Protective clothing with asbestos will not be used.

FORMS AND ATTACHMENTS

Please find on the following pages the PPE Hazard Assessment Certification Form, which may be reproduced freely by JET Commercial LLC for the purposes of implementing and maintaining a safety and health program.

PPE HAZARD ASSESSMENT CERTIFICATION FORM (PAGE 1 OF 5)

Workplace		Conducted By	
Address		Date	
Area(s)		Job or Task	

Eyes

Work activities, such as	Work-related exposure to	Can hazard be eliminated without the use of PPE?
☐ abrasive blasting ☐ chopping ☐ cutting ☐ drilling ☐ hammering ☐ other: ☐ punch press operations ☐ sanding ☐ sawing ☐ grinding ☐ chipping	☐ airborne dust ☐ dirt ☐ UV ☐ flying particles/ objects ☐ blood splashes ☐ hazardous liquid chemicals and mists ☐ chemical splashes ☐ molten metal splashes ☐ glare/ high intensity lights ☐ laser operations ☐ intense light ☐ hot sparks ☐ other:	☐ Yes ☐ No **If No, use:** ☐ Safety glasses ☐ Safety goggles ☐ Dust-tight goggles ☐ Impact goggles ☐ Welding helmet/shield ☐ Chemical goggles ☐ Chemical splash goggles ☐ Laser goggles ☐ Shading/ Filter (# ___) ☐ Welding shield ☐ Other: **With:** ☐ Side shields ☐ Face shield ☐ Shaded ☐ Prescription

Face

Work activities, such as	Work-related exposure to	Can hazard be eliminated without the use of PPE?
☐ cleaning ☐ cooking ☐ siphoning ☐ painting ☐ dip tank operations ☐ pouring ☐ other: ☐ foundry work ☐ welding ☐ mixing ☐ pouring molten metal ☐ working outdoors	☐ hazardous liquid chemicals ☐ extreme heat ☐ extreme cold ☐ potential irritants ☐ other:	☐ Yes ☐ No **If No, use:** ☐ Face shield ☐ Shading/ filter (#____) ☐ Welding shield ☐ other:

PPE HAZARD ASSESSMENT CERTIFICATION FORM (PAGE 2 OF 5)

Head			
Work activities, such as		Work-related exposure to	Can hazard be eliminated without the use of PPE?
☐ building maintenance ☐ confined space operations ☐ electrical wiring ☐ walking/ working under catwalks ☐ walking/ working on catwalks	☐ walking/ working under conveyor belts ☐ working with/ around conveyor belts ☐ walking/ working under crane loads ☐ utility work ☐ other:	☐ beams ☐ pipes ☐ exposed electrical wiring or components ☐ falling objects ☐ fixed object ☐ machine parts ☐ other:	☐ Yes ☐ No **If No, use:** ☐ Protective Helmet ☐ Type G (low voltage) ☐ Type E (high voltage) ☐ Type C ☐ Bump cap (not ANSI-approved) ☐ Hair net or soft cap ☐ other:
Hand/Arms			
Work activities, such as		Work-related exposure to	Can hazard be eliminated without the use of PPE?
☐ baking ☐ cooking ☐ grinding ☐ welding ☐ working with glass ☐ using computers ☐ using knives ☐ dental and health care services	☐ garbage disposal ☐ computer work ☐ material handling ☐ sanding ☐ sawing ☐ hammering ☐ using power tools ☐ working outdoors ☐ other:	☐ blood ☐ irritating chemicals ☐ tools or materials that could scrape, bruise, or cut ☐ extreme heat ☐ extreme cold ☐ animal bites ☐ electric shock ☐ vibration ☐ musculoskeletal disorders ☐ sharps injury ☐ other:	☐ Yes ☐ No **If No, use:** ☐ Gloves ☐ Chemical resistance ☐ Liquid/leak resistance ☐ Temperature resistance ☐ Abrasion/cut resistance ☐ Slip resistance ☐ Latex or nitrile ☐ Anti-vibration ☐ Protective sleeves ☐ Ergonomic equipment _____ ☐ Other:

PPE HAZARD ASSESSMENT CERTIFICATION FORM (PAGE 3 OF 5)

Feet/Legs					
Work activities, such as		Work-related exposure to		Can hazard be eliminated without the use of PPE?	
☐ building maintenance ☐ construction ☐ demolition ☐ food processing ☐ foundry work ☐ working outdoors	☐ logging ☐ plumbing ☐ trenching ☐ use of highly flammable materials ☐ welding ☐ other:	☐ explosive atmospheres ☐ explosives ☐ exposed electrical wiring or components ☐ heavy equipment ☐ slippery surfaces ☐ impact from objects ☐ pinch points ☐ slippery/wet surface	☐ crushing ☐ sharps injury ☐ blood ☐ chemical splash ☐ chemical penetration ☐ extreme heat/cold ☐ fall ☐ other:	☐ Yes **If No, use:** ☐ Safety shoes or boots ☐ Toe protection ☐ Electrical protection ☐ Puncture resistance ☐ Anti-slip soles	☐ No ☐ Leggings or chaps ☐ Foot-Leg guards ☐ Metatarsal protection ☐ Heat/Cold protection ☐ Chemical resistance ☐ Other:
Body/Skin					
Work activities, such as		Work-related exposure to		Can hazard be eliminated without the use of PPE?	
☐ baking or frying ☐ battery charging ☐ dip tank operations ☐ fiberglass installation ☐ sawing ☐ other:		☐ chemical splashes ☐ extreme heat ☐ extreme cold	☐ sharp or rough edges ☐ irritating chemicals ☐ blood ☐ other:	☐ Yes **If No, use:** ☐ Vest ☐ Coveralls ☐ Raingear ☐ Apron	☐ No ☐ Welding leathers ☐ Abrasions/ cut resistance ☐ Other:

PPE HAZARD ASSESSMENT CERTIFICATION FORM (PAGE 4 OF 5)

Body/Whole			
Work activities, such as	Work-related exposure to		Can hazard be eliminated without the use of PPE?
☐ building maintenance ☐ construction ☐ logging ☐ computer work ☐ working outdoors ☐ utility work ☐ other:	☐ working from heights of 10 feet or more ☐ impact from flying objects ☐ impact from moving vehicles ☐ sharps injury ☐ blood ☐ electrical/ static discharge ☐ hot metal ☐ sparks	☐ musculo-skeletal disorders ☐ chemicals ☐ extreme heat/cold ☐ elevated walking/working surface ☐ working near water ☐ injury from slip/trip/fall ☐ other:	☐ Yes ☐ No **If No, use:** ☐ Fall arrest/restraint ☐ Traffic vest ☐ Static coats/overalls ☐ Flame resistant jacket/pants ☐ Insulated jacket ☐ Cut-resistant sleeves/ wristlets ☐ Hoists/lift ☐ Ergonomic equipment _____ ☐ Other: **With:** ☐ Hood ☐ Full sleeves
Lungs/Respiratory			
Work activities, such as	Work-related exposure to		Can hazard be eliminated without the use of PPE?
☐ cleaning ☐ mixing ☐ painting ☐ fiberglass installation ☐ compressed air or gas operations ☐ confined space work ☐ floor installation ☐ ceiling repair ☐ working outdoors ☐ pouring ☐ sawing ☐ other:	☐ dust or particulate ☐ toxic gas/vapor ☐ chemical irritants (acids) ☐ welding fume ☐ asbestos ☐ pesticides	☐ organic vapors ☐ oxygen deficient environment ☐ paint spray extreme heat/ cold ☐ other:	☐ Yes ☐ No **If No, use:** ☐ Dust mask ☐ Disposable particulate respirator ☐ Replaceable filter particulate w/cartridge ☐ PAPR (air recycle) ☐ PPSA (air supply) **With:** ☐ Face shield ☐ Acid/gas crtg ☐ Organic crtg ☐ Pesticide crtg ☐ Spray paint crtg ☐ Half-faced ☐ Full-faced ☐ Hooded

PPE HAZARD ASSESSMENT CERTIFICATION FORM (PAGE 5 OF 5)

Ears/Hearing		
Work activities, such as	Work-related exposure to	Can hazard be eliminated without the use of PPE?
☐ generator ☐ ventilation fans ☐ motors ☐ sanding ☐ pneumatic equipment ☐ punch or brake presses ☐ use of conveyers ☐ grinding ☐ machining ☐ routers ☐ sawing ☐ sparks ☐ other:	☐ loud noises ☐ loud work environment ☐ noisy machines/tools ☐ punch or brake presses ☐ other:	☐ Yes ☐ No **If No, use:** ☐ Ear muffs ☐ Ear plugs ☐ Leather welding hood
Additional Notes		

POLICY

JET Commercial LLC is committed to the safety and health of its employees. To identify and control hazards presented by products that contain materials, chemicals or components that may cause injury or illness in the workplace, JET Commercial LLC has in place a Hazard Communication Program (HCP) to provide information to employees about any hazardous materials to which they are exposed.

If JET Commercial LLC employees are exposed to any hazardous chemical, JET Commercial LLC designates Macy Weaver to ensure a written HCP is created, communicated to all employees, and maintained according to all applicable regulations, standards and industry best practices.

All aspects of this policy and the JET Commercial LLC Hazard Communication Program are subject to annual review by Macy Weaver to verify the effectiveness of the policy, to guarantee a safe working environment for JET Commercial LLC employees, and to reflect any regulatory changes to which the policy must respond.

OSHA has adopted the United Nation's Globally Harmonized System (GHS) of Classification and Labeling of Chemicals into its Hazard Communication standard, this includes:

- Safety Data Sheets (SDS) and their new format instead of Material Safety Data Sheets (MSDS)
- The requirements and formats for the new primary and secondary labels
- Employee Training requirements so workers understand the risks to safety and health that hazardous materials pose at their worksite, and being able to read and understand the new SDS sheets and labels."

The Hazard Communication Program (HCP) describes how JET Commercial LLC will meet all applicable requirements regarding identifying hazardous chemicals, labeling under the GHS guidelines, providing availability of safety data sheets (SDS), and employee information and training.

The HCP also will include the following:

- A list of chemicals (SDS) in inventory known to present a hazard to JET Commercial LLC employees
- Methods JET Commercial LLC will use to inform employees of hazards presented by non-routine tasks
- Methods JET Commercial LLC will use to inform employees of hazards associated with chemicals contained in unlabeled pipes in their work areas

EMPLOYER RESPONSIBILITIES

- It is the responsibility of JET Commercial LLC (through Macy Weaver) to:
- Establish a Hazard Communication Program if employees work with or around any potentially hazardous material
- Ensure that proper safeguards are in place to ensure the safety of personnel working with or around hazardous chemicals
- Maintain a list of hazardous chemicals that exist in the workplace as well as in formation on the hazards they present (SDS), and ensure that every employee can readily access them
- Ensure all hazardous chemicals in the workplace are labeled and have a complete safety data sheet on file
- Ensure all employees are trained on the Hazard Communication Program (HCP)
- Provide support for the implementation of HCP
- Review the HCP at least annually to evaluate the effectiveness of the program
- Report the use of known carcinogens to the state OSHA division as required.

EMPLOYEE RESPONSIBILITIES

Every JET Commercial LLC employee is expected to:

- Follow safety policy and adhere to all precautions and safety requirements when working with or around hazardous chemicals
- Understand the hazards of the chemicals in the workplace by reviewing SDS before using any hazardous chemical
- Understand how to lessen or prevent exposure to hazardous chemicals through safe work practices and use of personal protective equipment
- Understand emergency procedures in the event of exposure to these chemicals
- Verify the proper labeling of chemicals at the worksite, and the presence of SDS for each
- Report any deficiencies in hazard communication as soon as safely possible to his or her supervisor
- Attend and participate actively in safety trainings

TRAINING

JET Commercial LLC will provide training covering all aspects of the Hazard Communication Program. JET Commercial LLC will provide training on hazardous chemicals in their employee's work area at the time of assignment and whenever a new hazard is introduced to their work area.

All employees who may be exposed to hazardous chemicals under normal operating conditions while performing their job duties in their assigned work areas must receive training. JET Commercial LLC may design training or use training designed to cover categories of hazards or specific chemicals.

The HCP will be made available upon request to any employee (or their designated representatives) and any regulatory official with the authority to demand it.

Training Components

Macy Weaver will ensure that all employees at JET Commercial LLC are informed and trained in the following minimum elements for hazard communication:

- The requirements of regulatory bodies, industry standards and best safety practices regarding specific chemicals
- Operations in the employee's work area that involve hazardous chemicals
- Physical, health, simple asphyxiation, combustible dust, and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area
- Reading and understanding hazardous chemical labeling, including pictograms, signal words, hazard statements, and precautionary statements
- The availability and location of the written HCP, list of hazardous chemicals, and SDS
- How to detect the presence or release of a hazardous chemical in the work area
- The classified and unclassified hazards of chemicals in the work area
    - The Globally Harmonized System of Classification (GHS) determines if a substance or mixture meets their criteria for a hazardous substance, meaning harmful to the environment or to humans. OSHA has adopted the GHS classification of chemicals. Those substances that are identified as hazardous are referred to as Classified. Substances that have not yet been classified are referred to as 'Hazards Not Otherwise Classified' (HNOC) or Unclassified.
- Measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented for employee protection
- The details of the HCP, including an explanation of all labels and SDS, how employees can obtain and use the appropriate hazard information. Training must include the order of information on the SDS and how to obtain and use the hazard information

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

JET Commercial LLC will retain employee training records for the length of their employment.

HAZARD DETERMINATION AND COMMUNICATION

JET Commercial LLC will rely on the evaluation of the chemical manufacturer or importer of any hazardous chemicals at the worksite to provide the identifying labels and safety data information required for the HCP.

Container Warning Labels

The purpose of a container warning label is to warn employees about the container's contents and to refer employees to an appropriate SDS for more information about the chemical's physical and health hazards. Manufacturers, importers and distributors must ensure that each hazardous chemical product sold to you has a label that includes the chemical's identity, a hazard warning, and a name and address for additional information about the product. If you use hazardous chemicals at your workplace, you must ensure that each hazardous chemical container has a legible label, in English that identifies the chemical and warns of its hazards.

Original Containers

Original containers of hazardous chemicals from a manufacturer, importer or distributor must have warning labels. Do not remove or deface them.

The GHS does not specify a label format or layout, but requires the inclusion of several elements. All hazardous material containers at JET Commercial LLC will be labeled, tagged or marked with the following:

1. **Product Identifier**. The product identifier must match the identifier on the safety data sheet and include the chemical identity of the substance or ingredients in a mixture that contribute to the product's hazards.

2. **Pictograms**. Pictograms are combinations of graphical elements that convey information about the product's hazards. GHS hazard pictograms are a black symbol on a white field within a red diamond.

3. **Signal Word**. Signal words indicate the severity of the product's hazard. "Danger" indicates severe hazards while "Warning" indicates less sever hazards.

4. **Hazard Statements**. Hazard statements are assigned based on the nature of the product's hazards.

5. **Precautionary Statements**. Precautionary statements inform the reader about how to prevent or minimize the negative effects of storing or handling the product unsafely. They fall into four categories: prevention, response, storage and disposal.

6. **Supplier Identification**. The supplier identification includes the name, address and telephone number that can be used to locate or communicate with the manufacturer or supplier.

Other Elements: GHS permits competent authorities to require or allow additional information and specify where it must be presented on the product label as long as it does not impede, contradict or confuse the standard information. Examples include transport pictograms, precautionary pictograms, first-aid recommendations, universal product codes, general usage information, etc.

Secondary/Portable Containers

Secondary containers are used to hold material transferred from the manufacturers' original container. These must be labelled if:

- It's not used within the work shift by the individual who makes the transfer
- The worker who made the transfer leaves the work area
- The container is moved to another work area and is no longer in the possession of the person who filled the container

JET Commercial LLC will verify that workplace labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. If JET Commercial LLC has employees who speak other languages, the company may add the information in their language to the material presented, as long as the information is presented in English as well.

Labels for secondary containers must include:

- The identity of the chemical and appropriate hazard warnings must be shown on the label.
- The hazard warning that provides users with an immediate understanding of the primary health and/or physical hazard(s) of the chemical through the use of words, pictures, symbols, or any combination of these elements
- The name and address of the manufacturer, importer or other responsible party

The hazard label message must be legible, permanently displayed and written in English

Portable containers are intended for immediate use of a chemical by the person who makes the transfer. Labels on portable containers are not required if the worker who made the transfer uses all of the contents during the work shift, or the chemical is return to a labelled primary or secondary container at the end of the shift, or when work is completed.

For unclassified hazards, the label requires supplementary information, a description of the unclassified hazards and appropriate precautionary measures to take for safe handling and use.

- Alternatively, hazardous material containers at JET Commercial LLC can be marked with the product identifier and words, pictures, symbols, or combination thereof, to provide at least general information regarding the hazards of the chemicals. Labeling is done in conjunction with other information immediately available to employees under the HCP to provide employees with the specific information regarding the physical and health hazards of the hazardous chemical
- Instead of labelling individual containers, the JET Commercial LLC HCP may rely on signs, placards, process sheets, batch tickets, operating procedures or similar written materials, as long as the alternative method provides workers with the same information. See the signage provisions of the National Fire Protection Association contained in NFPA 704 – Standard System for the Identification of the Hazards of Materials for Emergency Response
- A container for a hazardous substance into which the substance has been transferred for immediate use does not have to be labeled. Labels are necessary, however, for any container that is stored
- No employee will remove or deface labels or other forms of warnings
- JET Commercial LLC will check that labels are legible in English, but may present the chemical's hazard information in another language, as long as it's also present in English

- Don't use any container that's contained a hazardous substance unless the it's been thoroughly cleaned to remove all traces of any hazardous substance, except where the container is refilled with the same substance
- Verify that every container is correctly labeled with regard to its contents

SAFETY DATA SHEETS

JET Commercial LLC will continuously compile and keep at the workplace a list of all known hazardous chemicals that are present

The GHS does not specify a specific format or layout for the data sheet, but requires the inclusion of several elements, which will include the following section numbers and headings, and the information about the chemical associated with each:

- Section 1, Identification
- Section 2, Hazard(s) identification
- Section 3, Composition/information on ingredients
- Section 4, First-aid measures
- Section 5, Fire-fighting measures
- Section 6, Accidental release measures
- Section 7, Handling and storage
- Section 8, Exposure controls/personal protection
- Section 9, Physical and chemical properties
- Section 10, Stability and reactivity
- Section 11, Toxicological information
- Section 12, Ecological information
- Section 13, Disposal considerations
- Section 14, Transport information
- Section 15, Regulatory information
- Section 16, Other information, including date of preparation or last revision.

EMERGENCY PLANNING

Facilities that maintain Extremely Hazardous Substances (EHS) on-site in quantities greater than corresponding threshold planning quantities must cooperate in emergency plan preparation with local/state governments. Local governments are required to prepare chemical emergency response plans, and to review plans at least annually. State governments are required to oversee and coordinate local planning efforts.

For a complete list of related requirements, see the Emergency Planning and Community Right-to-Know Act (EPCRA), passed by Congress in 1986. This section, and the two that follow, contain the major provisions of the EPCRA.

REPORTING

Facilities must immediately report to state and local officials accidental releases of EHS chemicals and "hazardous substances" in quantities greater than corresponding Reportable Quantities (RQs) defined under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Information about accidental chemical releases must also be available to the public.

The EPA requires facilities that manufacture, use, or store 500 pounds or the Threshold Planning Quantity (whichever is less), of an extremely hazardous substance (EHS), report to state and local officials, and to local fire departments, inventories of all on-site chemicals for which safety data sheets exist. Facilities that manufacture, use or store 10,000 pounds of any hazardous chemical must also follow the same reporting procedures (gasoline and diesel fuel are the only hazardous chemicals to have higher threshold levels).

Facilities, as applicable, must complete and submit a toxic chemical release inventory form (Form R) annually. Form R must be submitted for each of the over 600 TRI chemicals that are manufactured or otherwise used above the applicable threshold quantities.

COMMUNITY RIGHT TO KNOW

In addition to providing employees with information regarding the hazards of chemicals in the workplace, employers must also, upon request, inform members of the public about the health and environmental hazards posed by stored or released chemicals. The public is also entitled to know the approximate quantities of chemicals stored or released at a given workplace. If an employer denies a reasonable request, the requesting party may then file an application for information with the state agency that has jurisdiction, or federal OSHA.

HAZARD CONTROL

Employers must protect workers against the potential negative health effects of exposure to hazardous substances by ensuring employees use respirators and appropriate equipment if they are, or may be, exposed to substances at levels above permissible exposure limits (PELs).

Permissible Exposure Limits (PELs)

Approximately 500 PELs have been established by OSHA as part of 29 CFR 1910.1000. See tables Z-1 and Z-2 for the current levels, and check to see if their state OSHA (if applicable) has more stringent standards for specific hazardous substances.

Multi-Employer Workplaces

If hazardous chemicals present risk to employees of another employer, JET Commercial LLC will ensure the HCP includes the methods to do the following for the other employers on the site:

- Provide onsite access to SDS for each hazardous chemical to which their employees may be exposed
- Inform them of any precautionary measures that need to be taken for worker protection during normal operating conditions and foreseeable emergencies
- Inform them of the labeling system used in the workplace

Multiple Workplaces

If employees must travel between workplaces during a shift, JET Commercial LLC may keep the HCP at only the primary workplace facility.

Non-Routine Tasks

Before employees begin work on hazardous non-routine tasks, the appropriate supervisor will give affected employees information about hazardous chemicals to which the employee may be exposed during such activity. This information will include the following:

- Specific chemical hazards
- Protective/safety measures employees can take
- Measures JET Commercial LLC has taken to reduce the hazards

Hazardous Chemicals in Unlabeled Pipes

If there are hazards associated with chemicals in the piping system in the work area, a supervisor must inform employees working around the pipes and provide information about the chemical and its hazards. Labels to relay this information are good practice for workplaces that transport potentially hazardous chemicals through pipes, and may be required by other regulations.

Standards for labeling pipes in the workplace can be found in ANSI A13.1.

FORMS AND ATTACHMENTS

Please find on the following pages the below documents, which may be reproduced freely by JET Commercial LLC for the purposes of implementing and maintaining a safety and health program.

- Hazardous Chemical labels
- Hazardous Chemicals List

HAZARDOUS CHEMICAL LABEL

HAZARDOUS CHEMICAL	**HAZARDOUS CHEMICAL**
NAME OF CHEMICAL:	**NAME OF CHEMICAL:**
Physical Hazards:	Physical Hazards:
Health Hazards, Target Organs, or Systems:	Health Hazards, Target Organs, or Systems:
Optional Information, such as Personal Protective Equipment or Safe Handling:	Optional Information, such as Personal Protective Equipment or Safe Handling:
HAZARDOUS CHEMICAL	**HAZARDOUS CHEMICAL**
NAME OF CHEMICAL:	**NAME OF CHEMICAL:**
Physical Hazards:	Physical Hazards:
Health Hazards, Target Organs, or Systems:	Health Hazards, Target Organs, or Systems:
Optional Information, such as Personal Protective Equipment or Safe Handling:	Optional Information, such as Personal Protective Equipment or Safe Handling:

HAZARDOUS CHEMICALS LIST

The following list identifies all hazardous chemicals used at this workplace. Detailed information about the physical and health effects of each chemical is included in a safety data sheet; the identity of each chemical on the list matches the identity of the chemical on its safety data sheet. Safety data sheets are readily available to employees in their work areas.

Product or Brand Name	Manufacturer	Hazardous Ingredient

POLICY

JET Commercial LLC has established this electrical safety policy to protect all employees from the hazards of working with and around electricity. This policy is intended for employees who may be exposed to electrical hazards on the job. Employees who are qualified and assigned the duties of performing electrical work need to refer to the “Electrical Work” chapter of this manual for additional information. Qualified workers (electrical trade workers) require additional training and or certification.

Many workers in manufacturing and construction deal with potential electrical hazards when working with power equipment and tools, but office personnel and others can also be exposed to these hazards. For that reason, all employees must be trained on electrical hazards and how to avoid them.

EMPLOYER RESPONSIBILITY

JET Commercial LLC is responsible for providing:

- All tools and equipment will meet the required safety standards
- Approved PPE to employees as needed
- A written electrical safety program and training on the program

EMPLOYEE RESPONSIBILITIES

All JET Commercial LLC employees are expected to:

- Follow safe work practices and adhere to all precautions and safety requirements when working with or around electrical equipment or circuits
- Understand how to reduce or prevent exposure to electrical hazards through safe work practices and use of PPE
- Use only hand tools, electric tools, extension cords and other equipment that are in good repair
- De-energize electric power circuits and/or equipment before working near, inspecting or making repairs
- Understand emergency procedures in the event of an electrical accident
- Report any potential electrical hazards as soon as safely possible to their supervisor
- Attend and participate actively in safety trainings
- Exercise good judgment when working near energized lines (including underground and overhead lines). Comply with OSHA regulations and the current National Electric Code, NFPA 70

HAZARDS

Electrical Shock

An electrical shock is received when electrical current passes through the body. Current will pass through the body in a variety of situations. Whenever two wires are at different voltages, current will pass between them if they are connected. Your body can connect the wires if you touch both of them at the same time. Current will pass through your body.

The severity of injury from electrical shock depends on the amount of electrical current and the length of time the current passes through the body. For example, 100 milliamps of electricity going through the body for just 2 seconds is enough to cause death. The amount of internal current a person can withstand and still be able to control the muscles of the arm and hand can be less than 10 milliamps

The table below shows what usually happens for a range of currents (lasting one second) at typical household voltages. Longer exposure times increase the danger to the shock victim. For example, a current of 100 mA applied for 3 seconds is as dangerous as a current of 900 mA applied for 0.03 seconds. The muscle structure of the person also makes a difference. People with less muscle tissue are typically affected at lower current levels. Even low voltages can be extremely dangerous because the degree of injury depends not only on the amount of current but also on the length of time the body is in contact with the circuit.

LOW VOLTAGE DOES NOT MEAN LOW HAZARD!

Effects of Electrical Current* on the Body	
Current	**Reaction**
1 milliamp	Just a faint tingle
5 milliamps	Slight shock felt. Disturbing, but not painful. Most people can “let go.” However, strong involuntary movements can cause injuries.
6–25 milliamps (women)† 9–30 milliamps (men)	Painful shock. Muscular control is lost. This is the range where “freezing currents” start. It may not be possible to “let go.”
50–150 milliamps	Extremely painful shock, respiratory arrest (breathing stops), severe muscle contractions. Flexor muscles may cause holding on; extensor muscles may cause intense pushing away. Death is possible.
1,000–4,300 milliamps (1–4.3 amps)	Ventricular fibrillation (heart pumping action not rhythmic) occurs. Muscles contract; nerve damage occurs. Death is likely.
10,000 milliamps (10 amps)	Cardiac arrest and severe burns occur. Death is probable.
15,000 milliamps (15 amps)	Lowest over-current at which a typical fuse or circuit breaker opens a circuit!
*Effects are for voltages less than about 600 volts. Higher voltages also cause severe burns. †Differences in muscle and fat content affect the severity of shock.	

Electrical Burns

The most common shock-related, nonfatal injury is a burn. Electrical burns can result when a person touches electrical wiring or equipment that’s being used or maintained improperly. Typically, such burns occur on the hands. Electrical burns are one of the most serious injuries you can receive. They need to be given immediate attention. Additionally, clothing may catch fire and a thermal burn may result from the heat of the fire.

Electrical Fires

Electricity is one of the most common causes of fires and thermal burns in homes and workplaces. Defective or misused electrical equipment is a major cause of electrical fires. If there is a small electrical fire, be sure to use only a Class C or multipurpose (ABC) fire extinguisher, or you might make the problem worse.

All fire extinguishers are marked with letter(s) that tell you the kinds of fires they can put out. Some extinguishers contain symbols, too.

Thermal burns may result if an explosion occurs when electricity ignites an explosive mixture of material in the air. This ignition can result from the buildup of combustible vapors, gasses or dusts. Occupational Safety and Health Administration (OSHA) standards, the NEC, and other safety standards give precise safety requirements for the operation of electrical systems and equipment in such dangerous areas. Ignition can also be caused by overheated conductors or equipment, or by normal arcing at switch contacts or in circuit breakers.

PREVENTING ELECTRICAL ACCIDENTS

To prevent electrical accidents, JET Commercial LLC will take the following steps:

- Establish safe practices and procedures for working around electrical control cabinets without getting hurt
- Make sure all employees know the importance of de-energizing electrical sources before performing repairs

Note: only qualified personnel can perform work on circuits, including testing

PERSONAL PROTECTIVE EQUIPMENT

Employees who are not working directly on energized parts, equipment or circuits may still be required to wear PPE to prevent the risk of electrical injury. This equipment must meet OSHA/ANSI requirements and be appropriate for the parts of the body that need protection and the work performed. When working near electrical circuits, or on equipment that could become energized, employees must:

- Wear electrically protective gloves
- Wear insulated shoes
- Use only insulated tools

FIRST AID FOR ELECTRICAL INJURIES

If a co-worker is shocked or burned by electricity, the following actions need to be taken:

- Shut off the electrical current if the victim is still in contact with the energized circuit
- Have someone else call for help
- If you can’t shut off the power quickly, pry the victim from the circuit with something that doesn’t conduct electricity such as dry wood. Don’t touch the victim yourself if he or she is still in contact with an electrical circuit!

- Don’t leave the victim unless there’s no other option. Stay with the victim while Emergency Medical Services (EMS) is contacted. The caller should come back to you afterwards to verify that the call was made

Once you know that electrical current is no longer flowing through the victim, call out to the victim to see if he or she is conscious. If the victim is conscious, tell them not to move. It’s possible for a shock victim to be seriously injured and not realize it. Quickly examine the victim for signs of major bleeding. If there’s heavy bleeding, place a cloth over the wound and apply pressure. If the wound is in an arm or leg, gently elevate the injured area while keeping pressure on the wound. Keep the victim warm and talk to them until help arrives.

If the victim is unconscious, check for signs of breathing. While you do this, move the victim as little as possible. If the victim isn’t breathing, someone trained should begin CPR.

You also need to know the location of:

- Electricity shut-offs (“kill switches”)
- First-aid supplies
- A telephone so you can find them quickly in an emergency

CREATE A SAFE WORK ENVIRONMENT

A safe work environment is created by controlling contact with electrical voltages and the currents they can cause. Electrical currents need to be controlled so they don’t pass through the body. In addition to preventing shocks, a safe work environment reduces the chance of fires, burns and falls.

You need to guard against contact with electrical voltages and control electrical currents in order to create a safe work environment.

A safe work environment isn’t enough to control all electrical hazards. You must also work safely. Safe work practices help you control your risk of injury or death from workplace hazards. If you are working on electrical circuits or with electrical tools and equipment, you need to use safe work practices.

Before you begin a task, ask yourself:

- What could go wrong?
- Do I have the knowledge, tools and experience to do this work safely?

All workers need to be very familiar with the safety procedures for their jobs. You must know how to use specific controls that help keep you safe. You must also use good judgment and common sense.

ELEMENTS OF ELECTRICAL SAFETY

JET Commercial LLC employees will use the three-stage approach to safety: recognize, evaluate and control hazards. To be safe, you must think about your job and plan for hazards. To avoid injury or death, you must understand and recognize hazards. You need to evaluate the situation you are in and assess your risks. You need to control hazards by creating a safe work environment, by using safe work practices, and by reporting hazards to a supervisor. If you do not recognize, evaluate and control hazards, you may be injured or killed by the electricity itself, electrical fires or falls.

Recognize Hazards

The first part of the safety model is recognizing the hazards around you. Only then, can you avoid or control the hazards. It is best to discuss and plan hazard recognition tasks with your co-workers. Sometimes others see hazards that we overlook.

Knowing where to look helps you to recognize hazards.

- Inadequate wiring is dangerous
- Exposed electrical parts are dangerous
- Overhead power-lines are dangerous
- Wires with bad insulation can give you a shock
- Electrical systems and tools that are not grounded or double insulated are dangerous
- Damaged power tools and equipment are electrical hazards
- Using the wrong PPE is dangerous
- Using the wrong tool is dangerous
- Ladders that conduct electricity are dangerous
- Electrical hazards can be made worse if the worker, location or equipment is wet
- Overloaded circuits are dangerous

Hazard Indicators

- Tripped circuit breakers and blown fuses show that too much current is flowing in a circuit. This condition could be due to several factors, such as malfunctioning equipment or a short between conductors. You need to determine the cause in order to control the hazard
- An electrical tool, appliance, wire or connection that feels warm may indicate too much current in the circuit or equipment. A qualified person must evaluate the situation
- An extension cord that feels warm can indicate there's too much current for the wire size of the cord. Unplug the cord and notify your supervisor or a qualified person
- A cable, fuse box or junction box that feels warm may indicate too much current in the circuits
- A burning odor may indicate overheated insulation
- Worn, frayed or damaged insulation around any wire or other conductor is an electrical hazard because the conductors could be exposed. Contact with an exposed wire could cause a shock. Damaged insulation can cause a short, leading to arcing or a fire. Inspect all insulation for scrapes and breaks. You need to evaluate the seriousness of any damage you find and decide how to deal with the hazard
- A GFCI that trips indicates there is current leakage from the circuit. Have a qualified person inspect the circuit

Any of these conditions, or "clues," tell you something important, there is a risk of fire and electrical shock. The equipment or tools involved must be avoided. You can find yourself in a situation where you need to decide if these clues are present. A supervisor needs to be called if there are signs of overload and you're not sure of the degree of risk. Ask for help whenever you're not sure what should be done.

Evaluate Hazards

After you recognize a hazard, your next step is to evaluate your risk from the hazard. Obviously, exposed wires are a hazard. If the exposed wires are 15 feet off the ground, your risk is low. However, if you are going to be working on a roof near those same wires, your risk is high. The risk of shock is greater if you will be carrying metal conduit that could touch the exposed wires. You must constantly evaluate your risk.

Combinations of hazards increase your risk. Improper grounding and a damaged tool greatly increase your risk. Wet conditions combined with other hazards also increase your risk. You'll need to make decisions about the nature of hazards in order to evaluate your risk.

Control Hazards

Once electrical hazards have been recognized and evaluated, they must be controlled.

In order to control hazards, you must first create a safe work environment, and then work in a safe manner. Generally, it is best to remove the hazards altogether and create an environment that is truly safe. When OSHA regulations and the NEC are followed, safe work environments are created.

However, you never know when materials or equipment might fail. Prepare yourself for the unexpected by using safe work practices. Use as many safeguards as possible. If one fails, another may protect you from injury or death.

Controlling electrical hazards (as well as other hazards) reduces the risk of injury or death.

HAZARD TYPES

Wiring Hazards

An electrical hazard exists when the wire is too small a gauge for the current it will carry. Normally, the circuit breaker in a circuit is matched to the wire size. However, in older wiring, branch lines to permanent ceiling light fixtures could be wired with a smaller gauge than the supply cable.

For example, let's say a light fixture is replaced with another device that uses more current. The current capacity (ampacity) of the branch wire could be exceeded. When a wire is too small for the current it is supposed to carry, the wire will heat up. The heated wire could cause a fire.

When you use an extension cord, the size of the wire you are placing into the circuit may be too small for the equipment. The circuit breaker could be the right size for the circuit but not right for the smaller-gauge extension cord. A tool plugged into the extension cord may use more current than the cord can handle without tripping the circuit breaker. The wire will overheat and could cause a fire.

The kind of metal used as a conductor can cause an electrical hazard. Special care needs to be taken with aluminum wire. Since it is more brittle than copper, aluminum wire can crack and break more easily. Connections with aluminum wire can become loose and oxidize if not made properly, creating heat or arcing. You need to recognize that inadequate wiring is a hazard.

Exposed Electrical Parts Hazards

Electrical hazards exist when wires or other electrical parts are exposed. Wires and parts can be exposed if a cover is removed from a wiring or breaker box. The overhead wires coming into a home may be exposed. Electrical terminals in motors, appliances and electronic equipment may be exposed. Older equipment may have exposed electrical parts. If you contact exposed live electrical parts, you will be shocked. You need to recognize that an exposed electrical component is a hazard.

Overhead Power-Line Hazards

Most people don't realize that overhead power-lines aren't normally insulated. More than half of all electrocutions are caused by direct worker contact with energized power-lines.

When dump trucks, cranes, work platforms or other conductive materials (such as pipes and ladders) contact overhead wires, the equipment operator or other workers can be killed. If you do not maintain required clearance distances from power-lines, you can be shocked and killed. Never store materials and equipment under or near overhead power-lines. You need to recognize that overhead power-lines are a hazard.

Defective Insulation Hazards

Insulation that is defective or inadequate is an electrical hazard. Usually, a plastic or rubber covering insulates wires. Insulation prevents conductors from coming in contact with each other. Insulation also prevents conductors from coming in contact with people.

Extension cords may have damaged insulation. Sometimes the insulation inside an electrical tool or appliance is damaged. When insulation is damaged, exposed metal parts may become energized if a live wire inside touches them.

Electric hand tools that are old, damaged or misused may have damaged insulation inside. If you touch damaged power tools or other equipment, you will receive a shock. You are more likely to receive a shock if the tool is not grounded or double insulated. (Double-insulated tools have two insulation barriers and no exposed metal parts.) You need to recognize that defective insulation is a hazard.

Improper Grounding Hazards

When an electrical system is not grounded properly, a hazard exists. The most common OSHA electrical violation is improper grounding of equipment and circuitry. The metal parts of an electrical wiring system that we touch (switch plates, ceiling light fixtures, conduit, etc.) must be grounded and at 0 volts. If the system is not grounded properly, these parts may become energized. Metal parts of motors, appliances or electronics that are plugged into improperly grounded circuits may be electrified. When a circuit is not grounded properly, a hazard exists because unwanted voltage cannot be safely eliminated. If there is no safe path to ground for fault currents, exposed metal parts in damaged appliances can become energized.

Extension cords may not provide a continuous path to ground because of a broken ground wire or plug. If you touch a defective electrical device that's not grounded or grounded improperly, you will be shocked. You need to recognize that an improperly grounded electrical system is a hazard.

Electrical systems are often grounded to metal water pipes that serve as a continuous path to ground. If plumbing is used as a path to ground for fault current, all pipes must be made of conductive material (a type of metal). Many electrocutions and fires occur because (during renovation or repair) parts of metal plumbing are replaced with plastic pipe, which does not conduct electricity. In these cases, the path to ground is interrupted by nonconductive material.

A ground fault circuit interrupter, or GFCI, is an inexpensive lifesaver. GFCIs detect any difference in current between the two circuit wires (the black wires and white wires). This difference in current can occur when electrical equipment isn't working correctly, causing leakage current. If leakage current is detected in a GFCI-protected circuit, the GFCI switches off the current, protecting you from a dangerous shock. GFCIs are set at about 5 mA and are designed to protect workers from electrocution. GFCIs are able to detect the loss of current resulting from leakage through a person who is beginning to be shocked.

GFCIs are different from circuit breakers because they detect leakage currents rather than overloads. Circuits with missing, damaged or improperly wired GFCIs may allow you to be shocked. You need to recognize that a circuit improperly protected by a GFCI is a hazard.

Overload Hazards

Overloads in an electrical system are hazardous because they can produce heat or arcing. Wires and other components in an electrical system or circuit have a maximum amount of current they can carry safely. If too many devices are plugged into a circuit, the electrical current will heat the wires to a very high temperature. If anyone tool uses too much current, the wires will heat up. The temperature of the wires can be high enough to cause a fire. If their insulation melts, arcing may occur. Arcing can cause a fire in the area where the overload exists, even inside a wall.

In order to prevent too much current in a circuit, a circuit breaker or fuse is placed in the circuit. If there is too much current in the circuit, the breaker "trips" and opens like a switch. If an overloaded circuit is equipped with a fuse, an internal part of the fuse melts, opening the circuit. Both breakers and fuses do the same thing: open the circuit to shut off the electrical current.

If the breakers or fuses are too big for the wires they are supposed to protect, an overload in the circuit will not be detected and the current will not be shut off. Overloading leads to overheating of circuit components and may cause a fire. You need to recognize that a circuit with improper overcurrent protection devices—or one with no overcurrent protection devices at all—is a hazard.

Overcurrent protection devices are built into the wiring of some electric motors, tools and electronic devices. For example, if a tool draws too much current or if it overheats, the current will be shut off from within the device itself. Damaged tools can overheat and cause a fire. You need to recognize that a damaged tool is a hazard.

Wet Conditions Hazards

Working in wet conditions is hazardous because you may become an easy path for electrical current. If you touch a live wire or other electrical component—and you are well grounded because you are standing in even a small puddle of water—you will receive a shock.

Damaged insulation, equipment or tools can expose you to live electrical parts. A damaged tool may not be grounded properly, so the housing of the tool may be energized, causing you to receive a shock. Improperly grounded metal switch plates and ceiling lights are especially hazardous in wet conditions. If you touch a live electrical component with an uninsulated hand tool, you are more likely to receive a shock when standing in water.

Remember: you don't have to be standing in water to be electrocuted. Wet clothing, high humidity and perspiration also increase your chances of being electrocuted. You need to recognize that all wet conditions are hazards.

HAZARD CONTROL

Lock-Out and Tag-Out Circuits and Equipment

Don't work on equipment unless it's been locked and tagged out. Only qualified and trained persons are allowed to perform lockout/tagout procedures.

OSHA requires companies to have adequate machine-specific procedures for lockout/tagout. These will be written procedures that are on site and readily available to employees. Provide training on lock-out/tag-out to both authorized and affected employees. Interlocks may not be used as lockout or as equivalent lockout protection.

For more information on lock-out/tag-out procedures, see the "Controlling Hazardous Energy" chapter (if included) of this manual.

Control Inadequate Wiring Hazards

Electrical hazards result from using the wrong size or type of wire. You must control such hazards to create a safe work environment. You must choose the right size wire for current expected in a circuit. The wire must be able to handle the current safely. The wire's insulation must be appropriate for the voltage and tough enough for the environment. Connections need to be reliable and protected.

MAXIMUM CURRENT DIFFERENT WIRE SIZES CAN SAFELY CONDUCT

Gauge Amperage	12 AWG (stranded)	12 AWG (solid)	10 AW G	8 AW G	6 AW G	2 AW G	1/0 AW G
	25 amps	25 amps	30 amps	40 amps	55 amps	95 amps	125 amps

Control Hazards of Fixed Wiring

The wiring methods and size of conductors used in a system depend on several factors:

- Intended use of the circuit system
- Building materials
- Size and distribution of electrical load
- Location of equipment (such as underground burial)
- Environmental conditions (such as dampness)

- Presence of corrosives
- Temperature extremes

Fixed, permanent wiring is better than extension cords, which can be misused and damaged more easily. NEC requirements for fixed wiring must always be followed.

Control Hazards of Flexible Wiring

Electrical cords supplement fixed wiring by providing the flexibility required for maintenance, portability, isolation from vibration, and emergency and temporary power needs. Flexible wiring can be used for extension cords or power supply cords. Power supply cords can be removable or permanently attached to the appliance. **DO NOT** use flexible wiring in situations where frequent inspection would be difficult, where damage would be likely, or where long-term electrical supply is needed. Flexible cords cannot be used as a substitute for the fixed wiring of a structure.

Flexible cords must not be

- Run through holes in walls, ceilings, or floors
- Run through doorways, windows, or similar openings (unless physically protected)
- Attached to building surfaces (except with a tension take-up device within 6 feet of the supply end)
- Hidden in walls, ceilings, or floors
- Hidden in conduit or other raceways

Use the Right Extension Cord

The size of wire in an extension cord must be compatible with the amount of current the cord will be expected to carry. The amount of current depends on the equipment plugged into the extension cord. Current ratings (how much current a device needs to operate) are often printed on the nameplate. If a power rating is given, it is necessary to divide the power rating in watts by the voltage to find the current rating. For example, a 1,000-watt heater plugged into a 120-volt circuit will need almost 10 amps of current. Let’s look at another example: A 1- horsepower electric motor uses electrical energy at the rate of almost 750 watts, so it will need a minimum of about 7 amps of current on a 120-volt circuit. However, electric motors need additional current as they startup or if they stall, requiring up to 200% of the nameplate current rating. Therefore, the motor would need 14 amps.

Add to find the total current needed to operate all the appliances supplied by the cord. Choose a wire size that can handle the total current.

AMERICAN WIRE GAUGE (AWG)

Wire Size	Handles Up To
#10 AW G	30 amps
#12 AW G	25 amps
#14 AW G	18 amps
#16 AW G	13 amps
Remember: The larger the gauge number, the smaller the wire!	

The length of the extension cord also needs to be considered when selecting the wire size. Voltage drops over the length of a cord. If a cord is too long, the voltage drop can be enough to damage equipment. Many electric motors only operate safely in a narrow range of voltages and will not work properly at voltages different from the voltage listed on the nameplate. Even though light bulbs operate (somewhat dimmer) at lowered voltages, do not assume electric motors will work correctly at less-than-required voltages. In addition, when electric motors start or operate under load, they require more current. The larger the size of the wire, the longer a cord can be without causing a voltage drop that could damage tools and equipment.

The grounding path for extension cords must be kept intact to keep you safe.

A typical extension cord grounding system has four components:

1. A third wire in the cord, called a ground wire
2. A three-prong plug with a grounding prong on one end of the cord
3. A three-wire, grounding-type receptacle at the other end of the cord
4. A properly grounded outlet

Control Hazards to Exposed Live Electrical Parts

Isolate Energized Components

Electrical hazards exist when wires or other electrical parts are exposed. These hazards need to be controlled to create a safe work environment. Isolation of energized electrical parts makes them inaccessible unless tools and special effort are used. Isolation can be accomplished by placing the energized parts at least 8 feet high and out of reach, or by guarding. Guarding is a type of isolation that uses various structures—like cabinets, boxes, screens, barriers, covers and partitions—to close-off live electrical parts.

Take the following precautions to prevent injuries from contact with live parts:

- Immediately report exposed live parts to a supervisor
- Unless qualified, don’t attempt to correct the condition yourself without supervision
- Provide guards or barriers if live parts cannot be enclosed completely

- Use covers, screens, or partitions for guarding that require tools to remove them
- Replace covers that have been removed from panels, motors, or fuse boxes
- Even when live parts are elevated to the required height (8 feet), use caution when using objects (like metal rods or pipes) that can contact these parts
- Close unused conduit openings in boxes so that foreign objects (pencils, metal chips, conductive debris, etc.) cannot get inside and damage the circuit

Control Hazards of Exposure to Live Electrical Wires

Use Proper Insulation

Insulation is made of material that does not conduct electricity (usually plastic, rubber, or fiber). Insulation covers wires and prevents conductors from coming in contact with each other or any other conductor. If conductors make contact, a short circuit is created.

In a short circuit, current passes through the shorting material without passing through a load in the circuit, and the wire becomes overheated. Insulation keeps wires and other conductors from touching, which prevents electrical short circuits. Insulation prevents live wires from touching people and animals, thus protecting them from electrical shock.

Insulation helps protect wires from physical damage and conditions in the environment. Insulation is used on almost all wires, except some ground wires and some high-voltage transmission lines. Insulation is used internally in tools, switches, plugs, and other electrical and electronic devices.

Special insulation is used on wires and cables that are used in harsh environments. Wires and cables that are buried in soil must have an outer covering of insulation that is flame-retardant and resistant to moisture, fungus and corrosion.

In all situations, you must be careful not to damage insulation while installing it. Do not allow staples or other supports to damage the insulation. Bends in a cable must have an inside radius of at least 5 times the diameter of the cable so that insulation at a bend is not damaged. Extension cords come with insulation in a variety of types and colors. The insulation of extension cords is especially important.

Since extension cords often receive rough handling, the insulation can be damaged. Extension cords might be used in wet places, so adequate insulation is necessary to prevent shocks. Because extension cords are often used near combustible materials (such as wood shavings and sawdust) a short in an extension cord could easily cause arcing and a fire.

Insulation on individual wires is often color-coded. In general, insulated wires used as equipment grounding conductors are either continuous green or green with yellow stripes. The grounded conductors that complete a circuit are generally covered with continuous white or gray insulation. The ungrounded conductors, or “hot” wires, may be any color other than green, white or gray. They are usually black or red.

Conductor and Cable Markings

Conductors and cables must be marked by the manufacturer to show the following:

- Maximum voltage capacity
- AWG size
- Insulation-type letter
- Manufacturer's name or trademark

Control Shock Hazards

When an electrical system is not grounded properly, a hazard exists. This is because the parts of an electrical wiring system that a person normally touches may be energized, or live, relative to ground. Parts like switch plates, wiring boxes, conduit, cabinets and lights need to be at 0 volts relative to ground. If the system is grounded improperly, these parts may be energized. The metal housings of equipment plugged into an outlet need to be grounded through the plug.

Grounding is connecting an electrical system to the earth with a wire. Excess or stray current travels through this wire to a grounding device (commonly called a "ground") deep in the earth. Grounding prevents unwanted voltage on electrical components. Metal plumbing is often used as a ground. When plumbing is used as a grounding conductor, it must also be connected to a grounding device such as a conductive rod. (Rods used for grounding must be driven at least 8 feet into the earth.

Sometimes an electrical system will receive a higher voltage than it is designed to handle. These high voltages may come from a lightning strike, line surge, or contact with a higher voltage line. Sometimes a defect occurs in a device that allows exposed metal parts to become energized. Grounding will help protect the person working on a system, the system itself, and others using tools or operating equipment connected to the system. The extra current produced by the excess voltage travels relatively safely to the earth.

Grounding creates a path for currents produced by unintended voltages on exposed parts. These currents follow the grounding path, rather than passing through the body of someone who touches the energized equipment. However, if a grounding rod takes a direct hit from a lightning strike and is buried in sandy soil, the rod must be examined to make sure it will still function properly. The heat from a lightning strike can cause the sand to turn into glass, which is an insulator. A grounding rod must be in contact with damp soil to be effective.

Leakage current occurs when an electrical current escapes from its intended path. Leakages are sometimes low-current faults that can occur in all electrical equipment because of dirt, wear, damage or moisture. A good grounding system must be able to carry off this leakage current. A ground fault occurs when current passes through the housing of an electrical device to ground. Proper grounding protects against ground faults. Ground faults are usually caused by misuse of a tool or damage to its insulation. This damage allows a bare conductor to touch metal parts or the tool housing.

When you ground a tool or electrical system, you create a low-resistance path to the earth (known as a ground connection). When done properly, this path has sufficient current-carrying capacity to eliminate voltages that may cause a dangerous shock. Grounding does not guarantee that you will not be shocked, injured or killed from defective equipment. However, it greatly reduces the possibility.

EQUIPMENT GROUNDING REQUIREMENTS

Equipment needs to be grounded under any of these circumstances:

- The equipment is within 8 feet vertically and 5 feet horizontally of the floor or walking surface
- The equipment is within 8 feet vertically and 5 feet horizontally of grounded metal objects, you could touch
- The equipment is located in a wet or damp area and is not isolated
- The equipment is connected to a power supply by cord and plug and is not double- insulated

Use of GFCIs

The use of GFCIs has lowered the number of electrocutions dramatically. A GFCI is a fast- acting switch that detects any difference in current between two circuit conductors. If either conductor comes in contact—either directly or through part of your body—with a ground (a situation known as a ground fault), the GFCI opens the circuit in a fraction of a second. If a current as small as 4 to 6 mA does not pass through both wires properly, but instead leaks to the ground, the GFCI is tripped. The current is shut off.

There is a more sensitive kind of GFCI called an isolation GFCI. If a circuit has an isolation GFCI, the ground fault current passes through an electronic sensing circuit in the GFCI. The electronic sensing circuit has enough resistance to limit current to as little as 2 mA, which is too low to cause a dangerous shock.

GFCIs are usually in the form of a duplex receptacle. They are also available in portable and plug-in designs and as circuit breakers that protect an entire branch circuit. GFCIs can operate on both two- and three-wire ground systems. For a GFCI to work properly, the neutral conductor (white wire) must:

- Be continuous
- Have low resistance
- Have sufficient current-carrying capacity

GFCIs help protect you from electrical shock by continuously monitoring the circuit. However, a GFCI does not protect a person from line-to-line hazards such as touching two “hot” wires (240 volts) at the same time or touching a “hot” and neutral wire at the same time. Also, be aware that instantaneous currents can be high when a GFCI is tripped. A shock may still be felt. Your reaction to the shock could cause injury, perhaps from falling.

Test GFCIs regularly by pressing the “test” button. If the circuit does not turn off, the GFCI is faulty and must be replaced.

The NEC requires that GFCIs be used in these high-risk situations:

- Electricity is used near water
- The user of electrical equipment is grounded (by touching grounded material)
- Circuits are providing power to portable tools or outdoor receptacles
- Temporary wiring or extension cords are used

Specifically, GFCIs must be installed in bathrooms, garages, outdoor areas, crawl spaces, unfinished basements, kitchens, and near wet bars.

Bond Components to Assure Grounding Path

In order to assure a continuous, reliable electrical path to ground, a bonding jumper wire is used to make sure electrical parts are connected. Some physical connections, like metal conduit coming into a box, might not make a good electrical connection because of paint or possible corrosion. To make a good electrical connection, a bonding jumper needs to be installed.

A metal cold water pipe that is part of a path to ground may need bonding jumpers around plastic anti-vibration devices, plastic water meters or sections of plastic pipe. A bonding jumper is made of conductive material and is tightly connected to metal pipes with screws or clamps to bypass the plastic and assure a continuous grounding path. Bonding jumpers are necessary because plastic doesn't conduct electricity and will interrupt the path to ground.

Additionally, interior metal plumbing must be bonded to the ground for electrical service equipment in order to keep all grounds at the same potential (0 volts). Even metal air ducts need to be bonded to electrical service equipment.

Control Overload Current Hazards

When a current exceeds the current rating of equipment or wiring, a hazard exists. The wiring in the circuit, equipment or tool cannot handle the current without heating up or even melting.

Not only will the wiring or tool be damaged, but the high temperature of the conductor can also cause a fire. To prevent this from happening, an overcurrent protection device (circuit breaker or fuse) is used in a circuit. These devices open a circuit automatically if they detect current in excess of the current rating of equipment or wiring. This excess current can be caused by an overload, short circuit or high-level ground fault.

Overcurrent protection devices are designed to protect equipment and structures from fire. They do not protect you from electrical shock! Overcurrent protection devices stop the flow of current in a circuit when the amperage is too high for the circuit. A circuit breaker or fuse will not stop the relatively small amount of current that can cause injury or death. Death can result from 20 mA (.020 amps) through the chest. A typical residential circuit breaker or fuse will not shut off the circuit until a current of more than 20 amps is reached!

However, overcurrent protection devices are not allowed in areas where they could be exposed to physical damage or in hazardous environments. Overcurrent protection devices can heat up and occasionally arc or spark, which could cause a fire or an explosion in certain areas. Hazardous environments are places that contain flammable or explosive materials such as flammable gasses or vapors (Class I Hazardous Environments), finely pulverized flammable dusts (Class II Hazardous Environments), or fibers or metal filings that can catch fire easily (Class III Hazardous Environments). Hazardous environments may be found in aircraft hangars, gas stations, storage plants for flammable liquids, grain silos and mills where cotton fibers may be suspended in the air. Special electrical systems are required in hazardous environments.

If an overcurrent protection device opens a circuit, there may be a problem along the circuit. (In the case of circuit breakers, frequent tripping may also indicate that the breaker is defective.) When a circuit breaker trips or a fuse blows, the cause must be found.

A circuit breaker is one kind of overcurrent protection device. It is a type of automatic switch located in a circuit. A circuit breaker trips when too much current passes through it. Don't use a circuit breaker to turn power on or off in a circuit, unless it's designed for this purpose and marked "SWD" (stands for "switching device").

A fuse is another type of overcurrent protection device. A fuse contains a metal conductor that has a relatively low melting point. When too much current passes through the metal in the fuse, it heats up within a fraction of a second and melts, opening the circuit. After an overload is found and corrected, a blown fuse must be replaced with a new one of appropriate amperage.

Avoid Wet Working Conditions and Other Dangers

Remember that any hazard becomes much more dangerous in damp or wet conditions. To be on the safe side, assume there is dampness in any work location, even if you do not see water. Even sweat can create a damp condition!

Avoid Overhead Power Lines

Be very careful not to contact overhead power lines or other exposed wires. More than half of all electrocutions are caused by contact with overhead lines. When working in an elevated position near overhead lines, avoid locations where you (and any conductive object you hold) could contact an unguarded or uninsulated line. Stay at least 10 feet away from high-voltage transmission lines.

Vehicle operators must also pay attention to overhead wiring. Dump trucks, front-end loaders and cranes can lift and make contact with overhead lines. If you contact equipment that is touching live wires, you will be shocked and may be killed. If you are in the vehicle, stay inside. Always be aware of what is going on around you.

USE PROPER WIRING AND CONNECTORS

- Avoid overloads — Don't overload circuits
- Test GFCIs — Test GFCIs monthly using the "test" button
- Check switches and insulation — Tools and other equipment must operate properly
- Make sure that switches and insulating parts are in good condition
- Use three-prong plugs — Never use a three-prong grounding plug with the third prong broken off

When using tools that require a third-wire ground; use only three-wire extension cords with three-prong grounding plugs and three-hole electrical outlets. Never remove the grounding prong from a plug! You could be shocked or expose someone else to a hazard. If you see a cord without a grounding prong in the plug, remove the cord from service immediately.

Use extension cords properly — If an extension cord must be used, choose one with sufficient ampacity for the tool being used. An undersized cord can overheat and cause a drop in voltage and tool power. Check the tool manufacturer's recommendations for the required wire gauge and cord length. Make sure the insulation is intact. To reduce the risk of damage to a cord's insulation, use cords with insulation marked "S" (hard service) rather than cords marked "SJ" (junior hard service). Make sure the grounding prong is intact. In damp locations, make sure wires and connectors are waterproof and approved for such locations. Do not create a tripping hazard.

Check power cords and extensions — Electrical cords must be inspected regularly using the following procedure:

- Remove the cord from the electrical power source before inspecting
- Make sure the grounding prong is present in the plug
- Make sure the plug and receptacle are not damaged
- Wipe the cord clean with a diluted detergent and examine for cuts, breaks, abrasions, and defects in the insulation

Coil or hang the cord for storage. Do not use any other methods. Coiling or hanging is the best way to avoid tight kinks, cuts and scrapes that can damage insulation or conductors.

Test electrical cords regularly for ground continuity using a continuity tester as follows:

- Connect one lead of the tester to the ground prong at one end of the cord
- Connect the second lead to the ground wire hole at the other end of the cord
- If the tester lights up or beeps (depending on design), the cord's ground wire is okay. If not, the cord is damaged and must not be used
- Don't pull on cords, always disconnect a cord by the plug
- Use correct connectors — Use electrical plugs and receptacles that are right for your current and voltage needs. Connectors are designed for specific currents and voltages so that only matching plugs and receptacles will fit together. This safeguard prevents a piece of equipment, a cord and a power source with different voltage and current requirements from being plugged together. Standard configurations for plugs and receptacles have been established by the National Electric Manufacturers Association (NEMA)
- Use locking connectors — Use locking-type attachment plugs, receptacles, and other connectors to prevent them from becoming unplugged

USE AND MAINTAIN TOOLS PROPERLY

Your tools are at the heart of your craft. Tools help you do your job with a high degree of quality. Tools can do something else, too. They can cause injury or even death! You must use the right tools for the job. Proper maintenance of tools and other equipment is very important. Inadequate maintenance can cause equipment to deteriorate, creating dangerous conditions.

Inspect tools before using them — Check for cracked casings, dents, missing or broken parts and contamination (oil, moisture, dirt, corrosion). Damaged tools must be removed from service and properly tagged. Don't use these tools until they are repaired and tested.

Use the right tool correctly — Use tools correctly and for their intended purposes. Follow the safety instructions and operating procedures recommended by the manufacturer. When working on a circuit, use approved tools with insulated handles. **However, do not use these tools to work on energized circuits. Always shut off and de-energize circuits before beginning work on them.**

Protect your tools — Keep tools and cords away from heat, oil and sharp objects. These hazards can damage insulation. If a tool or cord heats up, stop using it! Report the condition to a supervisor immediately. If equipment has been repaired, make sure that it has been tested and certified as safe before using it. Never carry a tool by the cord. Disconnect cords by pulling the plug—not the cord!

Use double-insulated tools — Portable electrical tools are classified by the number of insulation barriers between the electrical conductors in the tool and the worker. The NEC permits the use of portable tools only if they have been approved by Underwriter's Laboratories (UL Listed). Equipment that has two insulation barriers and no exposed metal parts is called double insulated.

When used properly, double-insulated tools provide reliable shock protection without the need for a third ground wire. Power tools with metal housings or only one layer of effective insulation must have a third ground wire and three-prong plug.

Use multiple safe practices — Remember, A circuit may not be wired correctly. Wires may contact other "hot" circuits. Someone else may do something to place you in danger. Take all possible precautions.

ATTACHMENTS

The following pages contain a Safe Electrical Practices Checklist that can be reproduced and used by JET Commercial LLC and its employees to ensure any electrically related work is performed safely.

"SAFE ELECTRICAL WORK PRACTICES" CHECKLIST (PAGE 1 OF 2)

- ☐ Are all employees required to report (as soon as practical) any obvious hazard to life or property observed in connection with electrical equipment or lines?
- ☐ Are employees instructed to make preliminary inspections and/or appropriate tests to determine what conditions exist before starting work on electrical equipment or lines?
- ☐ When electrical equipment or lines are to be serviced, maintained, or adjusted, are necessary switches opened, locked out and tagged?
- ☐ Are portable hand-held electrical tools and equipment grounded or are they of the double-insulated type?
- ☐ Do extension cords have a grounding conductor? Are multiple plug adaptors prohibited?
- ☐ Are ground-fault circuit interrupters installed on each temporary 15, 20, or 30 ampere, 125-volt AC circuit at locations where construction, demolition, modifications, alterations or excavations are being performed? OR…
- ☐ Do you have an assured equipment-grounding conductor program in place?
- ☐ Are all temporary circuits protected by suitable disconnecting switches or plug connectors at the junction with permanent wiring?
- ☐ Is exposed wiring and cords with frayed or deteriorated insulation repaired or replaced promptly?
- ☐ Are flexible cords and cables free of splices or taps?
- ☐ Are clamps or other securing means provided on flexible cords or cables at plugs, receptacles, tools, equipment, and are the cord jackets securely held in place?
- ☐ Are all cords, cable and raceway connections intact and secure?
- ☐ In wet or damp locations, are electrical tools and equipment appropriate for the use or locations (or otherwise protected)?
- ☐ Are electrical power lines and cables located (overhead, underground, underfloor, other side of walls) before digging, drilling, or similar work begins?
- ☐ Is the use of metal measuring tapes, ropes, hand lines or similar devices with metallic thread woven into the fabric prohibited where these could come into contact with energized parts of equipment or circuit conductors?
- ☐ Is the use of metal ladders prohibited in areas where the ladder or the person using the ladder could be exposed to energized parts of equipment, fixtures or circuit conductors?
- ☐ Are all disconnecting switches and circuit breakers labeled to indicate their use or equipment served?
- ☐ Are disconnecting means always opened before fuses are replaced?
- ☐ Are all energized parts of electrical circuits and equipment guarded against accidental contact by approved cabinets or enclosures?
- ☐ Is sufficient access and working space provided and maintained around all electrical equipment to permit ready and safe operations and maintenance?
- ☐ Are all unused openings (including conduit knockouts) of electrical enclosures and fittings closed with appropriate covers, plugs or plates?
- ☐ Are electrical enclosures such as switches, receptacles and junction boxes provided with tight-fitting covers or plates?

"SAFE ELECTRICAL WORK PRACTICES" CHECKLIST (PAGE 1 OF 2)

- ☐ Are employees prohibited from working alone on energized lines or equipment more than 600 volts?
- ☐ Are employees forbidden (unless properly qualified/certified) from working closer than 10 feet from high-voltage (more than 750 volts) lines?
- ☐ Have all underground utilities been located prior to any excavation work?
- ☐ Is all digging within 4 feet of power lines done by hand?
- ☐ Are power lines de-energized? Has the utility company been consulted before digging?
- ☐ Has the power company been notified if work is to be done near overhead lines?
- ☐ Are live parts of electrical circuits de-energized before an employee works on or near them?
- ☐ Are all exposed energized parts in the temporary power supply protected from possible contact?
- ☐ Are all power-supply circuit disconnects marked according to their functions?
- ☐ Is splicing allowed on extension cords only if they are larger than size 12 and the splicing retains insulation protection equal to the original extension cord?
- ☐ Are all plug connections used with the voltage for which they were designed?
- ☐ Do you always ensure that flexible cords are not immersed in water or exposed to damage from vehicles?
- ☐ Are all junction boxes used in a wet environment waterproof?
- ☐ Are you using a GFCI, or has an AEGCP been established?

POLICY

This policy has been developed to protect our employees from the hazards associated with using abrasive grinding machines and wheels, and will comply with OSHA regulations 1910.215 and 1926.303.

HAZARDS

Grinding wheels are made up of individual particles that are bonded together to form a wheel. The hazard with abrasive wheels is that, if not properly mounted and used, the wheel can explode, sending sections of the wheel flying out at high speeds. The pieces of the wheel can strike the machine operator causing death or serious injury. Another hazard associated with abrasive wheel machinery is the rotating motion of the spindle end, nut, and flange projections. To protect employees against these hazards, the company has adopted the following policy.

To avoid injury from contact with these mechanical parts, the side of the wheel must be covered to enclose these parts (some exceptions are allowed and are listed in the “Usage – Guarding and Other Safety Precautions” section that follows.)

RESPONSIBILITIES

Preventing harm from abrasive wheels and grinders is a cooperative effort between this company and its employees.

EMPLOYEE RESPONSIBILITIES

Employees are expected to:

- Adhere to the recommended safe grinder usage guidelines
- Report potential hazards, including defective equipment, to a supervisor immediately
- Complete a grinder training program
- Report accidents to the supervisor immediately
- Wear proper personal protective equipment

TRAINING

All employees will complete a hand and power tool-training program prior to beginning their work assignment. Training must cover the grades, types, and markings of wheels; the use, hazards, speed controls, storage, handling, inspection, testing, dressing, and adjustments of wheels; and the functions of associated components such as flanges, blotters, bushes, locking nuts, etc. This training will be re-administered a minimum of once every year, and when employees are observed to be not following company safety policies or industry standards.

Training Records

Training records will be retained for all employees for the length of their employment and will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

SAFE PRACTICES

To protect the machine operator, as well as other employees in the area, machine safeguarding will be used. A good rule to remember is any machine part, function, or process that could cause injury must be safeguarded. Machine safeguarding can be done by using controls or by eliminating the hazard.

Three basic areas of machines require safeguarding:

1. At the point of operation – This is the point where work is performed on the material, such as grinding, gutting, or boring

2. At the power transmission apparatus – This consists of all components of the mechanical system that transmit energy to any part of the machine, performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears

3. Other moving parts – This involves all parts of the machine that move while the machine is working. These can include reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine

Usage and Safety Precautions

Most grinding accidents are caused by improper wheel selection or usage. This company requires that employees follow these requirements when using abrasive wheels and grinders:

- Make sure the grinder is grounded and has its own on/off switches
- After mounting an abrasive wheel, run the machine with the guard in place or in an enclosure at operating speed for at least one minute before applying work. During this time, employees must not stand in front of or in line with the wheel
- Only use abrasive wheels on machines that have safety guards capable of containing all fragments in the event of the wheel bursting. The strength of the guard fastenings must exceed the strength of the guards. All wheel breakage incidents will be investigated to determine the cause, correct employee procedural deficiencies, and to prevent a recurrence

Guards must be used according to the manufacturer's instructions, and are required to be in place before starting the wheel, with the following exceptions:

- Wheels used for internal work while within the work being ground
- Mounted wheels, used in portable operations, 2 inches and smaller in diameter
- Type 16, 17, 18, 18r, and 19 cones, plugs, and threaded hole pot balls where the work provides a suitable measure of protection to the operator
- Metal diamond lapidary blades used within a coolant deflector, with speeds not more than 3,500 sfpm

Ensure that abrasive wheel safety guards cover the spindle end, nut, and flange projections except when:

- The object being ground provides a suitable measure of protection to the operator in the event that the wheel should break
- The work entirely covers the side of the wheel
- Machines are designed as portable saws

For offhand grinding machines (i.e., machines that require the operator to stand directly in front of them), adjustable work rests made of rigid construction must be used to support the work. The work rests must be kept adjusted closely to the wheel with a maximum opening of ⅛ inch to prevent the work from being jammed between the wheel and the rest, which could cause the wheel to break. Because the grinding wheel will likely decrease in size each time that you use it, it may be necessary to adjust the work rest after each use to ensure that the distance does not exceed ⅛ inch.

The safety guards for bench and floor stands, and for cylindrical grinders, must not expose the grinding wheel periphery more than 65 degrees above the horizontal plane of the wheel spindle. For example, if you have a six-inch grinding wheel, only a 5.1-inch section of the outside edge of the wheel may be exposed. A safety guard must enclose the remaining portion of the wheel. The exposed portion of the wheel must be above the horizontal plane, or top half of the wheel.

The protecting part of the abrasive wheel safety guard (tongue guard) must be adjusted so that the distance between the wheel and the adjustable tongue is less than ¼ inch. Because the grinding wheel will likely decrease in size each time that you use it, it may be necessary to check and/or adjust the tongue guard after each use to ensure that the distance does not exceed ¼ inch.

Side grinding will be performed only on an abrasive wheel that is designed for that purpose. A wheel designed for grinding on the outside edge must not be used for side grinding. This does not prohibit wheel use for applications such as shoulder form, and contour grinding where it's recognized that a limited amount of grinding with the side of the wheel is performed with a wheel that is designed for periphery grinding.

Before mounting a new wheel, check the spindle speed of the machine to see that it doesn't exceed the maximum operating speed of the wheel. All grinders must have their maximum spindle speeds marked on them.

Before mounting a grinding wheel, closely inspect and ring test it to make sure there's no damage.

Pedestal grinders are generally top heavy, and must be secured. As a rule, if your machine has holes in its base, anchor it. Note that you may secure your grinder to either the floor or a large dimension base plate.

Fabricated Guards

Fabricated guards for abrasive wheels must be made of steel and meet the standards in the following table. Column A also applies to cast guards. Column B applies where bolts hold an adjustable tongue. Any means of fastening will be considered satisfactory if, when assembled, it has strength at least equal to the members being joined.

TABLE 8
DIMENSIONAL REQUIREMENTS FOR CONSTRUCTION OF FABRICATED GUARDS
MAXIMUM WHEEL SPEED 10,000 SFPM

	A	B	C	D	E	F	G	H
Diameter of Wheel	Length of Tongue	Diameter of Bolts Medium Carbon Quenched & Tempered	Size of Angle Supports Tongue and Rest	Diameter of Rivets for Supports	Diameter of End Connecting Bolts	Thickness of Tongue	Maximum Space Between New Wheel and Guard at Periphery	Maximum Inside Width of Guard
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
Under 12	3 1/2	9/16	1 1/2 x 1 1/2 x 5/16	4 ea. @ 1/2	1/2	1/4	1 1/2	1 1/2 wider than wheel
16	5	5/8	2 x 2 x 5/16	4 ea. @ 5/8	9/16	5/16	1 1/2	2 wider than wheel
24	6	3/4	2 x 2 x 1/2	6 ea. @ 5/8	5/8	1/2	1 1/2	2 wider than wheel
30	7	11/16	2 1/2 x 2 1/2 x 1/2	6 ea. @ 11/16	11/16	1/2	1 1/2	2 wider than wheel

NOTE: Column D assumes low carbon steel (38,000 PSI tensile) rivets. Two rivets per bar 12 and 16" diameter. For rivets per bar 24 and 30" diameter.

Flanges – General Requirements

An abrasive wheel must be mounted between flanges, except as noted below, which must not be less than ⅓ the diameter of the abrasive wheel.

Exceptions: mounted wheel; portable cup, plug, and cone wheels with threaded inserts or studs; abrasive disc of the inserted nut, inserted washer, and projecting stud type; plate-mounted wheel; cylinder, cup, or segmented wheel mounted in a chuck; depressed-center wheel; internal wheel less than two inches in diameter; straight and flaring cup wheel for terrazzo use; cutting off wheel (see more info on cutting-off wheels just below); masonry and concrete saws.

A straight cutting-off wheel must be mounted between relieved flanges that are not less than ¼ the wheel diameter. A depressed center cutting-off wheel more than 16 inches in diameter must be mounted between flat unrelieved flanges and not less than ¼ the wheel diameter.

A masonry saw using a reinforced resinoid and steel-centered wheel may use 4-inch diameter flanges for wheels through 20 inches in diameter.

Concrete saws using a steel-centered wheel 20 inches and larger may use flanges measuring 1/6 the wheel diameter.

Flange Construction

When a wheel is mounted between flanges, the flange must be designed to transmit the driving torque from the spindle to the abrasive wheel.

A flange must be made of steel, cast iron, or materials of equal strength and rigidity so that when tightened, the radial width of the bearing surface of contact on the abrasive wheel is maintained.

Two flanges, between which an abrasive wheel is mounted, except when a special adaptor is used on a depressed-center wheel, must have the same dimensions and bearing surface.

Mounting Depressed Center Wheels

A depressed center wheel, except as prescribed above for a straight cutting-off wheel, must be mounted with specially designed adaptors.

The back flange must extend beyond the central hub or raised portion and contact the wheel to counteract the side pressure on the wheel in use.

The adaptor nut, which is less than the minimum ⅓ diameter of the wheel, must fit into the depressed side to prevent interference in side grinding and drive the wheel by its clamping force against the depressed portion of the back flange.

Adaptors affixed by the depressed center wheel manufacturer must not be reused.

SPEED PROVISIONS

Abrasive wheels must not be run in excess of the maximum permissible speed as recommended by the manufacturer. It is a legal requirement to clearly show minimum and maximum speeds on all power-driven machines, marked in rpm, for all wheels more than 55 mm in diameter. For smaller wheels, this information should be displayed on or adjacent to where the wheel is operated. This information must be available at all times.

A grinding machine with a vari-speed control must have the speed adjustment supervised by an authorized and trained employee.

Before mounting a wheel on a vari-speed grinder, an employee must adjust the speed of a machine to not more than the rated speed of the wheel.

Spindle Speeds

The spindle speed must be permanently marked on a grinding machine and maintained in a legible manner. The spindle speed must not exceed the rated speed of the grinding wheel. The wheel spindle speed on a single-speed grinding machine must be checked with a tachometer when a change is made that could affect the spindle speed.

The wheel spindle speed on an air-driven grinder must be checked with a tachometer as follows:

- After maintenance or repair
- When in use, with such checks being performed as often as necessary to assure that wheel overspeed will not occur

The wheel spindle speed of a vari-speed grinding machine must be checked with a tachometer as follows:

- When in use, with such checks being performed as often as necessary to assure that wheel overspeed will not occur
- After any change that could affect the spindle speed
- When a new wheel is mounted

Wheel Speeds

An abrasive wheel or its package must show the maximum operating speed as revolutions per minute. The use of a package for this marking must be limited to those shapes that make marking unfeasible.

An abrasive wheel must not be run at a speed greater than the rated speed on the wheel. The revolutions per minute may be increased as the wheel diameter decreases if the original surface-feet-per-minute speed is not exceeded. Wheel speed must be computed from the free-running speed of the machine spindle.

The company will purchase and use only abrasive wheels that have been speed tested by the manufacturer, with the following exceptions:

- A wheel that is less than 6 inches in diameter
- A diamond or cubic boron nitrate wheel that is bonded by metal or organic substances
- A segmental disc wheel and disc wheel
- A ball grinding wheel
- A regulating wheel for centerless grinders
- A mounted wheel
- A segment

Special Speeds

Wheels that are used on special applications at speeds higher than those listed in Table 21 below must be marked for high-speed application and the specific conditions of use. The marked maximum speed of the wheel must not be exceeded.

The machine and its components, such as the spindle, bearings, guards, flanges, and rated horsepower, must permit the entire unit to operate safely at the special speed.

An employer must assure that the machine is operated with safety guards as prescribed in this document, and that the machine and guards are maintained in good condition for continued safety.

TABLE 21
STANDARD MAXIMUM SPEEDS IN SURFACE FEET PER MINUTE

Classification Number	Types of Wheels (See Section 1 for Definitions)	Inorganic Bonds		Organic Bonds			
		Low Strength	Medium Strength	High Strength	Low Strength	Medium Strength	High Strength
		OPERATING SPEED SHALL NOT EXCEED:					
		SFPM	SFPM	SFPM	SFPM	SFPM	SFPM
1	Type 1 – Straight Wheels – except classifications 6, 7, 9, 10, 11, 12 and 13 below	5,500	6,000	6,500	6,500	8,000	9,500
	Type 4* – Taper Side Wheels						
	Types 5, 7, 20, 21, 22, 23, 24, 25, 26 Recessed, Dovetailed and/or relieved wheels. (Except Classification 7 below)						
	Type 12 – Dish Wheels						
	Type 13 – Saucer Wheels						
	Types 16, 17, 18, 19 – Cones and Plugs						
2	Type 2 – Cylinder Wheels including plate mounted, inserted nut and projecting stud – Segments	5,000	5,500	6,000	5,000	6,000	7,000
3	Cup Shape Tool Grinding Wheels (For Fixed Base Machines) Type 6 – Straight Side Cups Type 11 – Flaring Cups	4,500	5,000	6,000	6,000	7,500	8,500

SANDING MACHINES

Feed rolls of self-feed sanding machines must be protected with a semi-cylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard must be constructed of not less than 18-gauge sheet metal or stronger material, preferably metal, and must be firmly secured to the frame carrying the rolls to remain in adjustment for any thickness of stock. The bottom of the guard should come down to within 3/8-inch of a plane formed by the bottom or contact face of the feed roll where it touches the stock.

Drum Sanding Machines

A drum sanding machine must have an exhaust hood or other guard if an exhaust system is not required, arranged to enclose the revolving drum, except for that portion of the drum above the table.

Disk Sanding Machines

A disk-sanding machine must have the exhaust hood, or other guard if an exhaust system is not required, arranged to enclose the revolving disk, except for that portion of the disk above the table. The distance between the disk and the table edge must not be more than ¼ inch.

Belt Sanding Machines

Belt sanders must have all pulleys enclosed, including sides and periphery, except the working end of an edge sander. An exhaust hood may be part of the guard.

The edges of the unused run of the belt must be guarded. These guards must effectively prevent the hands or fingers of the operator from coming in contact with the nip points.

CHOOSING THE CORRECT TYPE OF WHEEL

There are a myriad of abrasive wheel manufacturers and a seemingly endless variety of wheel types with different characteristics. There is a system of marking of abrasive wheels that specifies the type and nature of the abrasive material, grain size, grade and structure, as well as the nature of the bond. It's important to understand the marking system when selecting a wheel for a particular job.

As a rule, soft-grade wheels are most suitable for use on hard materials, and hard-grade wheels on soft materials. Coarse grains are for the rapid removal of material, and fine grains are for polishing.

The use of an unsuitable wheel may result in the wheel face becoming loaded as the pores become clogged by the material being removed. If the wheel is too hard or too fine, it may become glazed or polished. Both situations will reduce the efficiency of the wheel.

Only reinforced resin-bonded wheels should be used with portable grinding machines. Diamond blades can be used on hand-held machines at speeds up to 100 m/s if the machine is designed for this speed and the marked maximum permissible operating speed of the blade is not exceeded. Diamond blades are directional and must be mounted so that they rotate in the direction marked on the blade.

Multiple Wheel Mounting

When mounting more than one abrasive wheel between a pair of flanges, the wheels must be cemented together and separated by spacers having low compressibility, such as soft copper or brass, or the wheels must be specially manufactured for mounting without cement or the use of the prescribed spacers. The spacers must be equal in diameter to the flanges and have equal bearing surfaces.

MAINTENANCE AND INSPECTION

It is essential that an inspection of the equipment be carried out before and after use, every time.

In addition, every three months, all abrasive wheels will be the subject of an inspection and service by an appointed person with duties for abrasive-wheel maintenance.

The inspection and service will include:

- Checking the rotation direction
- Checking the mounting of the wheel
- Lubricating the moving parts
- General visual inspection of the equipment for damage or defects

Flanges with a worn, warped, sprung, or damaged bearing surface must be repaired or replaced.

An out-of-truth (crooked) abrasive wheel must be trued (straightened) by a trained employee. A wheel that cannot be trued must not be used.

STORAGE AND HANDLING

Follow the guidelines below when handling or storing an abrasive wheel:

- The wheel must be stored flat
- Store it in a rack, bin, box, or drawer in a manner to prevent damage
- Labels should be retained and kept in good condition
- Do not drop, bump, or roll the wheel
- Do not subject it to:
  - High humidity
  - Water or other liquids
  - Freezing temperatures or any temperature low enough to cause condensation on the wheel when moving it from storage to an area of higher temperature

PERSONAL PROTECTIVE EQUIPMENT

When an abrasive wheel is being used, there is an obvious risk of eye injuries caused by abrasive particles or hot sparks being thrown off. Therefore, it is essential that either goggles or a face shields or visors be worn during operation of the wheel.

Where dust cannot be adequately controlled by ventilation or suppression, an appropriate facemask should be worn.

Hearing defenders should be worn where noise exceeds the action levels set out in the Noise at Work Regulations.

FORMS AND ATTACHMENTS

The following section contains a standard checklist for Abrasive Wheel Equipment Grinders. The checklist references the applicable OSHA regulations for the inspection item, if additional information is needed.

CHECKLIST FOR ABRASIVE WHEEL EQUIPMENT GRINDERS

Description	Yes	No*
Do side guards cover the spindle, nut, and flange, and 75% of the wheel diameter?	☐	☐
Is the work rest used and kept adjusted to within ⅛-inch of the wheel?	☐	☐
Is the adjustable tongue guard on the top side of the grinder used and kept to within ¼-inch of the wheel?	☐	☐
Is the maximum RPM rating of each abrasive wheel compatible with the RPM rating of the grinder motor?	☐	☐
Before new abrasive wheels are mounted and used, are they visually inspected and ring tested?	☐	☐
Is cleanliness maintained around grinders?	☐	☐
Are dust collectors and powered exhausts provided on grinders used in operations that produce large amounts of dust?	☐	☐
Are goggles or face shields always worn when grinding?	☐	☐
Are bench and pedestal grinders permanently mounted?	☐	☐
Is each electrically operated grinder effectively grounded?	☐	☐
Are fixed or permanently mounted grinders connected to their electrical supply system with metallic conduit or another permanent method?	☐	☐
Does each grinder have an individual on and off control switch?	☐	☐

* A mark in the “No” column indicates a need for corrective action.

SCOPE

This chapter defines the procedures and safe practices to be followed by qualified persons when performing electrical work. This includes working near high voltages, on live circuits, and anywhere arc flash hazards may be present.

This policy will comply with the requirements of OSHA regulations 1926 Subpart K, 1910 Subpart S, NFPA 70E, and all applicable state or local regulations relating to construction or general industry electrical work.

This information does not include our Lockout/Tagout policy, which is contained in a separate chapter.

POLICY

This company has adopted this policy for the prevention of employee exposure to electrical hazards.

DEFINITIONS

Qualified Person: A qualified person is someone who has demonstrated the skills and knowledge of the construction and operation of electrical equipment and installations and has received safety training to identify and avoid the hazards involved.

Unqualified Person: An unqualified person is someone who has not been trained on the hazards and safe practices of working on or near energized electrical circuits or equipment.

EMPLOYER RESPONSIBILITIES

- Ensuring that safety inspections of the facility occur on regular basis
- Ensuring that only qualified personnel perform work on high-voltage circuits, live circuits and anywhere there is a risk of an arc flash incident
- Training personnel in how to perform a job hazard analysis
- Responding quickly to eliminate workplace hazards
- Ensuring all equipment is kept in good repair
- Ensuring employees follow safe job procedures
- Reviewing job hazard analysis whenever there is a significant change to any element of the job or when there has been an injury or illness

SUPERVISOR RESPONSIBILITIES

- Establishing and maintaining safe and healthful working conditions
- Familiar with the electric safety and health hazards that their employees are exposed to, how to recognize them, the potential effects these hazards have on the employees, and rules, procedures and work practices for controlling exposure to those hazards
- Setting good examples, instructing their employees, making sure they fully understand and follow safe procedures

EMPLOYEE RESPONSIBILITIES

- No employee is expected to undertake a job until he/she has received instructions on how to do it properly and safely and is authorized to perform the job

- No employees should undertake a job that appears to be unsafe
- Mechanical safeguards must always be in place and kept in place
- Employees are to report to a superior or designated individual all unsafe conditions encountered during work
- PPE must be used when and where required, and properly maintained

SAFE PRACTICES

De-Energized Electrical Equipment

Conductors and parts of electrical equipment that have been de-energized but not locked out will be treated as energized.

While any employee is exposed to fixed electric equipment or circuits, the energized parts will be de-energized, locked out and tagged.

Electrical Low Voltage

Low-Voltage Electrical Safety applies to all electrical installations and electrical equipment operating or intended to operate on systems of 600 volts, nominal, or less and to all work performed directly on or in proximity to such electrical installations, equipment or systems in all places of employment. Only qualified personnel are authorized to perform work, service or maintenance on electrical parts or systems.

All employees will treat the electrical equipment as energized until tested or otherwise proven to be de-energized.

LOCKOUT/TAGOUT PROCEDURES

Employees are responsible for following host employer's Lockout Tagout (LOTO) procedures. While any employee is exposed to contact with parts of fixed electric equipment or circuits that have been de-energized, the circuits energizing the parts will be locked out and/or tagged.

Employees will be responsible for the following before working on energized electrical equipment or systems unless the equipment is physically removed from the wiring system:

- Notifying all involved personnel
- Locking the disconnecting means in the "open" position with the use of lockable devices, such as padlocks, combination locks, or disconnecting of the conductor(s), or other positive methods or procedures which will effectively prevent unexpected or inadvertent energizing of a designated circuit, equipment, or appliance

Employees will not remove LOTO locks or tags, or energize electrical equipment or systems.

Safety Precautions:

Whenever there is access to opened enclosures containing exposed energized equipment that is not under the control of an authorized or certified person, suitable temporary barriers or barricades will be installed. These can be any one of the following:

- Barricades may be of a single placard, vertical type, a double placard, horizontal type
- A solid orange, plastic cone designed to be moved or rearranged quickly

- Barricades may be equipped with flashers for use at night and are often used with temporary signs which give specific directions to be followed
- Caution, Warning, or Danger Barricade Tape

Employees will have an authorized person remove temporary barriers and reinstall permanent barriers or covers.

Conductive Equipment

When working on or near exposed energized conductors or parts of equipment conductive measuring tapes, ropes, or similar measuring devices will not be used. Conductive fish tapes will not be used in raceways entering enclosures containing exposed energized parts unless such parts are isolated by suitable barriers.

ELECTRICAL HIGH VOLTAGE

All work locations will be safely accessible whenever work is to be performed.

All employees will inspect each safety device, tool or piece of equipment each time it is used and only use those items that are found to be in good condition. The company will require the use of all safety devices and safeguards where applicable.

Only qualified employees will work on energized conductors or equipment connected to energized high-voltage systems. Except for the following:

- Replacing fuses
- Operating switches
- Operations that don’t require the employee to contact energized high-voltage conductors or energized parts of equipment
- Clearing “trouble” or in emergencies involving hazard to life or property
- No employees will be assigned to work alone in the following situations:
- Employees in training, who are qualified by experience and training, will be permitted to work on energized conductors or equipment connected to high-voltage systems while under the supervision or instruction of a qualified electrical worker
- During the time work is being done on any exposed conductors or exposed parts of equipment connected to high-voltage systems, a qualified electrical worker, or an employee in training, will be in close proximity at each work location to:
    - Act primarily as an observer for the purpose of preventing an accident
    - Render immediate assistance in the event of an accident

The observer will not be required in connection with work on overhead trolley distribution circuits not exceeding 1,500 volts D.C. where there is no conductor of opposite polarity less than four feet (4ft) there from, or where such work is performed from suitable tower platforms or other similar structures.

Employees will not be permitted to approach or take any conductive object without an approved insulating handle closer to energized parts. To provide clearance distances as specified in Cal/OSHA table 2940.2-1: NOTE: These distances are the air, bare-hand and live-line tool distances.

ILLUMINATION

Illumination will be provided as needed to perform the work safely. This can be done by using any one of the following: droplights, floodlights, flashlights, etc.

Employees may not enter spaces containing exposed energized parts without illumination that enables employees to work safely.

PERSONAL SAFETY AND PROTECTIVE EQUIPMENT

Insulating equipment will be provided and designed for the voltage levels to be encountered.

The company will be responsible for the periodic visual and electrical re-testing of all insulating gloves, sleeves and blankets. The following maximum re-testing intervals according to the listed American Society for Testing and Materials (ASTM) standards:

- In–Service Care of Insulating Gloves and Sleeves ASTM F 496-97: six (6) Months
- In–Service Care of Insulating Blankets ASTM F 479-95: twelve (12) Months
- In–Service Care of Line Hose and Covers ASTM F 478-92: When to be found damaged or defective

All gloves, sleeves and blankets will be marked to indicate compliance with the re-test schedule and will be marked with either the date tested or the date of the next scheduled test.

All insulating equipment found to be defective or damaged will be immediately removed from service.

Test equipment (multi-meters, electrical leads, proximity testers) will be rated for the circuits and equipment on which they will be used. To check they are working properly, test equipment will be checked against a known voltage source to verify it's working properly, before and after determining a part is de-energized. In addition, a second method that includes listening to the transformer, checking lights and trying to operate the equipment will be used to confirm de-energization.

Calibration and Testing of equipment and tools will be performed according to the following schedule:

- Analog equipment – six months
- Digital equipment – 12 months
- Torque wrenches – 12 months
- Insulated tools – 24 months

Safety grounds will be checked before each use and installed with hot sticks while wearing PPE.

Shock protective tools and equipment will be inspected before every use and after each incident that could cause damage, looking for damage to the insulation that prevents it from working correctly, or could add to the risk. Electrical and safety equipment will meet the ANSI and ASTM standards.

OVERHEAD POWER LINES

Protective measures will be provided before starting work under or near overhead lines, such as de-energizing and grounding the power lines.

Vehicles or mechanical equipment that can be elevated near energized lines will always keep a 10 ft. clearance.

A qualified person working near energized overhead lines may not approach or take a conductive object without an approved insulating handle closer than five feet. An unqualified worker may not approach an energized overhead line or take a conductive object within 10 feet for voltages 50kV or below. For voltages over 50kV, the distance is 10 feet, plus 4 inches for every 10kV over 50kV.

WARNING SIGNS

Warning signs will be placed in areas where equipment is working around or near overhead power lines. The warning signs will be posted and maintained in plain view of the operator and driver on each of the following that may be in use: crane, derrick, power shovel, drilling rig, hay loader, hay stacker, pile driver or similar apparatus.

A durable warning sign legible at twelve feet (12ft) reading “Unlawful to Operate This Equipment within Ten Feet (10ft) Of High-Voltage Lines of 50,000 Volts or Less.”

CONFINED SPACES

When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized parts, the Company will provide, and the employee will use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts

PORTABLE LADDERS

Portable ladders will have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized parts.

CONDUCTIVE APPAREL

Conductive articles of jewelry and clothing (such a watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) may not be worn if they might contact exposed energized parts. However, such articles may be worn if they are rendered nonconductive by covering, wrapping or other insulating means.

ENERGIZING EQUIPMENT

Opened enclosures and exposed energized equipment not under the control of an authorized person will have suitable temporary barriers installed by an authorized person. After the work is completed, the authorized person is responsible for removing temporary protective equipment and reinstalling all permanent barriers and equipment.

COMMUNICATING HAZARDS

The company will communicate to the host employer of unique hazards found or created and the steps taken to correct the hazards.

ENERGIZED WORK PERMITS

Only qualified employees can work on energized equipment. An energized work permit will be completed before starting any work on energized equipment including an explanation why the equipment can’t be de-energized, signed by a qualified person. Work that doesn’t require an energized work permit is: voltage or current testing, electrical troubleshooting, infrared thermography, and visual inspections where the plane of the cover will not be breached.

The energized work permit will include documentation of a job briefing before the job, where the employee in charge will discuss with affected workers the relevant hazards, work procedures, special precautions, energy source controls, PPE requirements and other information on the permit.

ARC FLASH AND SHOCK BOUNDARIES

Established shock and arc flash limited and restricted approach boundaries will be observed for uncovered and energized electrical equipment. Qualified persons can cross these boundaries to perform tasks such as testing, troubleshooting and voltage measuring if they follow the correct safety procedures, while unqualified persons must remain outside the boundaries.

The limited approach shock boundary requires workers to be trained according the Training section and be qualified to do the job to enter and carry out work like: testing, troubleshooting, and measure voltage.

The restricted approach shock boundary requires qualified workers entering the boundary to:

- Have a documented plan approved by management
- Use appropriate PPE
- Keep as much of the body out of the restricted space, using only protected body parts
- Verify they are properly insulated from live parts and conductive objects before taking a conductive object into the boundary

A hazard evaluation will be performed prior to work being done within the Limited Approach Boundary, in order to determine the safe practices to be employed. The Hazard Analysis should contain event severity, frequency, probability, and avoidance to determine the level of safe practices employed.

The first option for working on energized electrical equipment will be to shut it off, de-energize it, lock it out and verify it is locked out. All equipment will be treated as it is energized until it’s proven de-energized. This means wearing the appropriate PPE while verifying the equipment.

TRAINING

Only qualified individuals are authorized to perform work, service, or maintain energized electrical parts or systems. Training and documentation is required for qualified individuals. Employees not qualified will be trained in electrically related safety practices necessary for their safety. All employees will be able to identify and understand electrical energy hazards.

Qualified persons (those permitted to work on or near exposed energized parts) will be trained in, and familiar with, the following at a minimum:

- Distinguishing exposed live parts from other parts of electric equipment
- The specific task they are going to perform and the safe work practices that related to their job assignment
- Determining the nominal voltage of exposed live parts
- The clearance distances and the corresponding voltages they will be exposed to
- The proper use of special precautionary techniques to prevent electric shock and injuries from direct or indirect contact when working near or on energized electrical equipment, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment (e.g., panels or equipment supplied from more than one source)

- Performing job related electrical tasks according to NFPA 70E, including the approach distances
- Determining the risk level of the hazard, job planning, and PPE needed to safely perform the task
- Personnel exposed to the presence of 50 volts or more will have formal documented electrical training in both the job related electrical tasks and electrical safety awareness
- Tasks that are performed less often than once per year will require retraining before the performance of the work practices involved
- An employee who is undergoing on-the-job training for the purpose of obtaining the skills and knowledge necessary to be considered a qualified person, and who in the course of such training demonstrates an ability to perform specific duties safely at his or her level of training, and who is under the direct supervision of a qualified person will be considered to be a qualified person for the performance of those specific tasks
- Documentation of qualifications will include records of academic courses, experience, on the job training, safety courses and task related certification. The employer will document that each employee has received the required training. This documentation will be made when the employee demonstrates proficiency in the work practices involved and will be maintained for the duration of the employee's employment. The documentation will contain the content of the training, each employee's name and dates of training.
- The Company requires retraining at least every three years and when workplace changes necessitate safety-related work practices that are different from what the employee normally uses. Different work practices may be new technology, types of equipment, or changes in procedures.

SCOPE

This chapter provides information on the requirements and safe practices for workers engaged in construction, general industry, and remodeling as well as those performing building maintenance or housekeeping in building that may contain asbestos. These practices will comply with OSHA asbestos standards 1910.1001 and/or 1926.1101 as applicable. These regulations define the exposure limits and guidelines for exposure monitoring, medical surveillance, recordkeeping, regulated areas and communication of hazards. It does not address employees engaged in automotive brake or clutch work, which are covered in a separate chapter.

POLICY

This company has implemented an asbestos safety policy to limit any potential asbestos exposure by its employees. Asbestos exposure can lead to diseases including lung cancer. In order to prevent such illnesses to employees, this company will adhere to all applicable regulations concerning asbestos safety.

EMPLOYER RESPONSIBILITIES

It is the responsibility of this company to:

- Ensure employees are trained in procedures to avoid asbestos-related illnesses
- Ensure no employee is exposed to an airborne concentration of asbestos in excess of the Excursion Limit (EL) of 0.1 fiber per cubic centimeter of air (0.1 f/cc) as averaged over an 8-hour day
- Ensure no employee is exposed to an airborne concentration of asbestos in excess of the 1.0 fibers per cubic centimeter of air (1 f/cc) as averaged over a sampling period of 30 minutes.
- Assess asbestos operations for potential to generate airborne fibers
- Measure employee exposure if exposure may surpass the Permissible Exposure Limit (PEL)
- Institute a medical surveillance program for all employees exposed to airborne concentrations of asbestos at or above the PEL and/or EL
- Keep an accurate record of exposure measurements
- Set apart areas where concentrations of asbestos exceed PEL and/or EL for authorized personnel only
- Ensure appropriate communication regarding presence of asbestos hazards to prevent exposure
- Use appropriate control methods to reduce employee exposure to asbestos at or below permissible limits
- Ensure employees have access to personal protective equipment that will sufficiently reduce their exposure to asbestos
- Keep employees away from lunchroom facilities when they are protective work clothes that might be contaminated
- Provide all other protections against asbestos exposure as required by regulations, laws and industry best practices

Any employer or contractor engaging in asbestos-related work that disturbs more than 100 square feet of asbestos-containing material (greater than 0.1 percent asbestos by weight) during the course of work, at a single worksite, may be required to register with their state OSHA division or local agency with jurisdiction. Obtain all required permits and licenses before beginning work.

In addition, any employer or contractor who plans to engage in an asbestos-related work project may need to notify their state OSHA division or agency with jurisdiction as much as 10 days, and at least 24 hours, before beginning work (including site preparations, demolition, etc.), regardless of the amount of asbestos-containing material to be disturbed. Check with your state and local agencies.

EMPLOYEE RESPONSIBILITIES

All company employees will follow this and all other safety policies and follow the instructions of supervisors to avoid exposure to asbestos:

- Never eat, drink, chew tobacco or gum, or apply cosmetics in regulated areas
- Actively participate in training efforts
- Use, store and clean any personal protective equipment appropriately

HAZARDS

Asbestos fibers can enter the body through the inhalation of airborne particles, or by ingestion, and can become embedded in the tissues of the respiratory or digestive systems. Years of exposure to asbestos can cause numerous disabling or fatal diseases. Among these diseases are asbestosis, an emphysema-like condition; lung cancer; mesothelioma, a cancerous tumor that spreads rapidly in the cells of membranes covering the lungs and body organs; and gastrointestinal cancer.

PROTECTIVE EQUIPMENT

This company will provide all necessary PPE for employees working where there is a risk of exposure to asbestos.

Respiratory Protection

Respirators must be selected, provided, and used in the following circumstances:

- While feasible engineering and work practice controls are being installed or implemented
- During maintenance and repair activities, or other activities where engineering and work practice controls are not feasible
- In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the PEL and/or EL
- In emergencies

Where respiratory protection is required, the employer must develop a respiratory protection program. All respirators will be NIOSH approved. The company will also provide a powered, air-purifying respirator in lieu of any negative-pressure respirator when the employee chooses it and when the respirator provides adequate protection.

Employees who use a filter respirator must use a high-efficiency filter and must change filters whenever an increase in breathing resistance is detected. Employees who wear respirators must be allowed to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

An employee must not be assigned to tasks requiring the use of respirators if a physician determines that the employee is unable to function normally wearing a respirator or that the employee's safety and health or that of others would be affected by the employee's use of a respirator. In this case, the employer must assign the employee to another job or give the employee the opportunity to transfer to a different job that does not require the use of a respirator. The job must be with the same employer, in the same geographical area, and with the same seniority, status, and rate of pay, if such a position is available.

The employer must ensure that a respirator issued to an employee fits properly and exhibits minimum facepiece leakage. Employers also must perform quantitative or qualitative fit tests, whichever are appropriate, at the time of initial fitting and at least every year for each employee wearing tight-fitting respirators.

For additional information on fit tests, see the "Respiratory Protection" chapter of this manual.

Protective Clothing

The company will provide any employee exposed to airborne concentrations of asbestos that exceed the PEL and/or EL, protective clothing, such as coveralls or similar full-body clothing, head coverings, gloves and foot coverings. In addition, wherever the possibility of eye irritation exists, face shields, vented goggles or other appropriate protective equipment must be provided and worn.

Employees will remove asbestos-contaminated work clothing in changing rooms, placed, and stored in closed, labeled containers that prevent dispersion of the asbestos into the ambient environment. Protective clothing and equipment must be cleaned, laundered, repaired, or replaced to maintain effectiveness.

The company must provide clean protective clothing and equipment at least weekly to each affected employee. The Company will inform any person who launders or cleans asbestos-contaminated clothing or equipment of the potentially harmful effects of exposure to asbestos.

In addition, the Company must be certain that the person doing the cleaning or laundering is knowledgeable on how to prevent the release of airborne fibers in excess of the permissible exposure limits. For example, asbestos must never be removed from protective clothing by means of blowing or shaking.

Contaminated clothing and equipment taken out of change rooms or the workplace for cleaning, maintenance, or disposal must be transported in sealed impermeable bags or other closed impermeable containers and labeled appropriately.

PROCEDURES

Permissible Exposure Limits

Time-Weighted Average (TWA): The employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air (0.1 f/cc) as averaged over an 8-hour day.

Excursion Limit (EL): The Company will ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over a sampling period of 30 minutes.

OSHA has adopted the term “excursion limit” to refer to the short-term permissible exposure limit to be consistent with the terminology used by the American Conference of Governmental Industrial Hygienists (ACGIH).

Exposure Monitoring

Except for brake and clutch repair where a “preferred” control method is used, employers having a workplace or operation covered by this standard must assess all asbestos operations for their potential to generate airborne fibers.

Where exposure may exceed the PEL, employee exposure measurements must be made from breathing zone air samples representing the 8-hour TWA and 30-minute EL.

Initial monitoring also must be performed for all employees who may be, exposed to airborne concentrations of asbestos at or above the PEL and/or EL unless the collected data shows that no asbestos will be released in airborne concentrations at or above the PEL and/or EL when materials are being processed, used, or handled.

If initial monitoring indicates that exposures are above the PEL and/or EL, periodic monitoring must be conducted at intervals no greater than every six months. If either initial or periodic monitoring statistically indicates that employee exposures are below the PEL and/or EL, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

The company must reinitiate monitoring whenever there has been a change in the production, process, control equipment, personnel, or work practices that may result in new or additional exposures to asbestos above the PEL and/or EL.

Affected employees and their representatives must be allowed to observe monitoring and must be notified in writing, either individually or by posting results in an accessible location, within 15 working days after the receipt of the monitoring results.

This written notification must contain the corrective action the employer is taking to reduce employee exposure to asbestos on or below the PEL and/or EL wherever monitoring results indicate that the PEL and/or EL has been exceeded. If monitoring is being observed in a regulated area, the observer must be provided proper protective clothing and equipment.

TABLE 1 ASBESTOS-CONTAINING MATERIALS FOUND IN BUILDINGS

Subdivision	Generic Name	Asbestos (%)	Dates of Use	Binder/Sizing
Surfacing material	sprayed-or troweled-on	1–95	1935–1970	Sodium silicate, Portland cement, organic binders
Preformed thermal insulating products	batts, blocks, and pipe covering 85% magnesia calcium silicate	15 6–8	1926–1949 1949–1971	magnesium carbonate calcium silicate
Textiles	cloth blankets (fire) felts: blue stripe red stripe green stripe sheets cord/rope/yarn tubing tape/strip curtains (theater, welding)	100 90–95 80 90 95 50–95 80–100 80–85 90 60–65	1910–present 1920–present 1920–present 1920–present 1920–present 1920–present 1920–present 1920–present 1920–present 1945–present	none cotton/wool cotton cotton cotton cotton/wool cotton/wool cotton/wool cotton/wool cotton
Cementitious concrete-like products	extrusion panels: corrugated flat flexible flexible perforated laminated (outer surface) roof tiles clapboard and shingles: clapboard siding shingles roofing shingles pipe	 8 20–45 40–50 30–50 30–50 35–50 20–30 12–15 12–14 20–32 20–15	 1965–1977 1930–present 1930–present 1930–present 1930–present 1930–present 1930–present 1944–1945 unknown–present unknown–present 1935–present	 Portland cement Portland cement Portland cement Portland cement Portland cement Portland cement Portland cement Portland cement Portland cement Portland cement Portland cement
Paper products	corrugated: high temperature moderate temperature indented millboard	 90 35–70 98 80–85	 1935–present 1910–present 1935–present 1925–present	 sodium silicate starch cotton and organic binder starch, lime, clay
Roofing felts	smooth surface mineral surface shingles pipeline	10–15 10–15 1 10	1910–present 1910–present 1971–1974 1920–present	Asphalt Asphalt Asphalt Asphalt

Medical Surveillance

The employer must institute a medical surveillance program for all employees who are or will be exposed to airborne concentrations of asbestos at or above the PEL and/or EL. All medical examinations and procedures must be performed by or under the supervision of a licensed physician. Such exams must occur at a reasonable time and place and must be provided at no cost to the employee.

At a minimum, such examinations must include a medical and work history, a complete physical examination with emphasis on the respiratory system, the cardiovascular system and the digestive tract, a chest X-ray, pulmonary function tests; respiratory disease standardized questionnaire, and any additional tests deemed appropriate by the examining physician. These examinations must be made available annually. Chest X-ray must be conducted in accordance with Table below.

Years since first exposure	Age of Employee		
	15 to 35	35 to 45	45+
0 to 10	Every 5 years	Every 5 years	Every 5 years
10+	Every 5 years	Every 2 years	Every 1 year

Recordkeeping

Employers must keep accurate records of all exposure measurements taken to monitor employee exposure to asbestos, and those employees subject to medical surveillance. These records must be kept for 30 years. Medical surveillance must be maintained for the duration of employment plus 30 years.

In addition, the employer must maintain all employee training records for one year beyond the last date of employment by the employee.

All records must be made available to authorized OSHA personnel, affected employees, former employees, and designated representatives. When the employer ceases to do business and there is no successor to receive the records for the prescribed period, the employer must notify the director of NIOSH at least 90 days prior to the disposal of records.

In addition, if handling, using, or processing any products made from or containing asbestos are exempted, the employer must establish and maintain accurate records of objective data that exempt these products. These records must be kept for the duration of the employer’s reliance upon the data.

Building and facility owners also are required to maintain records about the presence, location, and quantity of asbestos-containing material and presumed asbestos-containing material in the building or facility. These records must be kept for the duration of ownership and must be transferred to the successive owners.

Companies that perform asbestos removal must keep a record of each asbestos project performed and make the record available to local or state agencies with jurisdiction, or federal OSHA, at any reasonable time.

These records must be kept for at least six years, and include:

- The name, address, and license number of the person who supervised the asbestos project
- The name and address of each employee or agent who worked on the project
- The location and a description of the project and the amount of asbestos material that was removed
- The start and completion dates of each instance of removal or encapsulation
- A summary of the procedures that were used to comply with these provisions
- The name and address of each asbestos disposal site where the asbestos-containing waste was deposited
- A receipt from the asbestos disposal site indicating the amount of asbestos and disposal date
- Copies of air sampling results or initial negative assessment
- Safety data sheets for all solvents used on the asbestos project

Regulated Areas

The employer must establish and set apart a regulated area wherever airborne concentrations of asbestos and/or presumed asbestos-containing material exceed the PEL and/or EL. Only authorized personnel may enter regulated areas. All people entering a regulated area must be supplied with and are required to use an appropriate respirator.

No smoking, eating, drinking, chewing tobacco or gum, or applying cosmetics is permitted in regulated areas.

Warning signs must be provided and displayed at each regulated area and must be posted at all approaches to regulated areas. Where necessary, signs must bear pictures or graphics, or be written in appropriate language so that all employees understand them. These signs must bear the following information:

In addition, warning labels must be affixed to all asbestos products (raw materials, mixtures, scrap) and to all containers of asbestos products, including waste containers that may be in the workplace. The labels must comply with the requirements of 29 CFR 1910.1200(j) of OSHA's Hazard Communication Standard and must include the following information:

Labels or safety data sheets (SDS) are not required when:

- Asbestos fibers have been modified by a bonding agent, coating, binder, or other material
- The manufacturer can demonstrate that during handling, storing, disposing, processing, or transporting no airborne concentrations of fibers of asbestos exceeding the exposure limits will be released
- If asbestos is present in a product in a concentration of less than 1 percent

Communication of Hazards

Building / Facility Owners Duties

The communication of asbestos hazards is vital. Employees engaged in housekeeping activities in public and commercial buildings with installed asbestos-containing materials may be exposed to asbestos fibers. Building owners are often the only and/or best source of information concerning the presence of previously installed asbestos-containing building materials. The standard requires building owners and employers of potentially exposed employees to institute the following practices:

- In buildings built before 1980, treat thermal system insulation, sprayed-on, and troweled-on surfacing materials as asbestos-containing materials, unless properly analyzed and found not to contain more than 1 percent asbestos
- Train employees who may come in contact with asbestos-containing materials to deal safely with them
- Treat asphalt and vinyl flooring materials installed before 1980 as asbestos-containing, unless properly analyzed and found to contain no more than 1 percent asbestos

METHODS OF COMPLIANCE

Control Methods

To the extent feasible, engineering and work practice controls must be used to reduce and maintain employee exposure at or below the PEL and/or EL. The standard, therefore, requires the employer to institute the following measures:

- Design, construct, install, and maintain local exhaust ventilation and dust collection systems according to the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2
- Provide a local exhaust ventilation system for all hand-operated and power-operated tools such as saws, abrasive wheels, and drills that produce or release fibers of asbestos
- Handle, mix, apply, remove, cut, score or work asbestos in a wet state to prevent employee exposure

- Do not remove cement, mortar, coating, grout, plaster, or similar materials containing asbestos from bags, cartons or other containers that are being shipped without wetting, enclosing or ventilating them
- Do not sand floors containing asbestos
- Do not use compressed air to remove asbestos or materials containing asbestos unless the compressed air is used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air
- Where engineering and work practice controls have been instituted but are insufficient to reduce exposure to the required level, the employer must supplement them by using respiratory protection. Where the PEL and/or EL is exceeded, the employer must establish and implement a written program to reduce employee exposure to or below the PEL and to or below the EL by means of engineering and work practice controls and by the use of respirators where required and permitted

Written plans for the program must be available upon request to OSHA personnel, and employees and their representatives. These plans must be reviewed and updated, as necessary, to reflect significant changes in the compliance program.

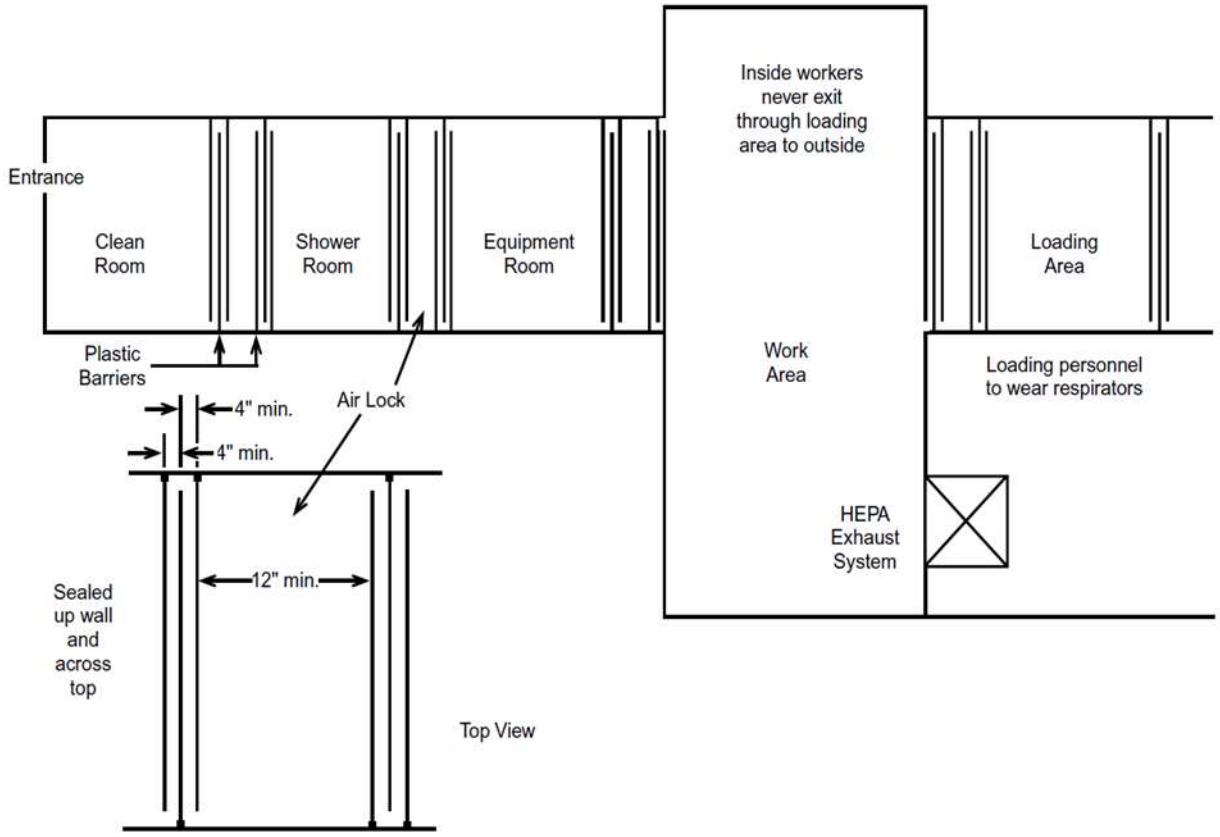
The rotation of employees in and out of exposure areas cannot be used as a means of compliance with the PEL and/or the EL.

Hygiene Facilities and Practices

Employees who are required to work in regulated areas must be provided with clean change rooms, shower facilities, and lunchrooms. Change rooms must have two separate lockers or storage facilities — one for contaminated clothing, the other for street clothing. They must be far enough apart to prevent accidental contamination of the employee's street clothes. Employees must shower at the end of the shift and cannot leave the workplace wearing any clothing or equipment worn during the work shift. Lunchroom facilities must have a positive-pressure filtered air supply and must be readily accessible to employees. See Figure 1.

The employer must ensure that employees do not enter lunchroom facilities with protective work clothing or equipment unless surface asbestos fibers have been removed by vacuuming or some other method that removes dust without causing the asbestos to become airborne. The employer also must ensure that employees wash their hands prior to eating, drinking, or smoking. Smoking is prohibited in regulated areas.

FIGURE 1: DECONTAMINATION AREA ARRANGEMENT



Housekeeping

All surfaces must be maintained as free as possible of accumulations of waste containing asbestos or asbestos dust. The preferred methods of cleanup are wet cleaning and/or vacuuming with HEPA-filtered vacuuming equipment. Compressed air alone may not be used to clean surfaces contaminated by asbestos at any time (any asbestos that is disturbed must be collected and removed efficiently). Whichever cleanup method is chosen, the equipment must be used and emptied in a manner that minimizes the reentry of asbestos into the workplace.

The employer also must ensure that all spills and sudden releases of asbestos-containing materials are immediately cleaned up, that sanding asbestos-containing floors is prohibited, and that low abrasion pads at speeds lower than 300 rpm and wet methods are used. If the floor has sufficient finish, brushing or dry buffing is permissible. If workers are required to buff or wax asbestos-containing resilient floors, building and facility owners, must identify the installed material and inform employees and employers of employees doing such housekeeping work.

Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing consigned for disposal must be collected and disposed of in sealed, labeled, impermeable bags or other closed, labeled impermeable containers.

TRAINING

This company will develop a training program for all employees who are exposed to airborne concentrations of asbestos at or above the PEL and/or EL. Training must be provided prior to or at the time of initial assignment and at least yearly thereafter. The training program must inform employees about ways in which they can safeguard their health.

In addition, employers must provide an awareness training course for employees who do housekeeping operations in facilities where asbestos-containing materials or presumed asbestos-containing materials are present.

The elements of the course must include the health effects of asbestos; locations; signs of damage and deterioration of asbestos-containing materials and presumed asbestos-containing materials; the proper response to fiber release episodes; and where the housekeeping requirements are found in the standard. This training must be held annually and conducted so that all employees understand it. In addition, all training materials must be available to the employees at no cost.

Training Components

The safety coordinator will ensure that all employees are trained in the following minimum elements:

- How employees can safeguard their health from asbestos exposure
- Health effects of asbestos
- Locations where exposure to asbestos may present a hazard
- Signs of damage and deterioration of asbestos-containing materials
- Proper response to fiber release episodes
- Where to find OSHA housekeeping requirement standards (and how to follow them)

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

CERTIFICATION

Any person who contracts to provide consulting activities relating to asbestos-containing construction material greater than 100 square feet must notify the state OSHA division or regulatory board in order to register/certify.

FORMS AND ATTACHMENTS

On the following page, please find the Asbestos Training Record Sheet.

This form may be reproduced for the purposes of implementing and maintaining a safety and health program.

ASBESTOS TRAINING RECORD SHEET

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

SCOPE

Behavior-based safety (BBS) is an approach that instills not only correct job safety procedures but also a safety conscious attitude and behaviors that positively affect the entire Company. This chapter discusses the aspects of our Company's BBS program and defines the required actions. It's important to understand the BBS program applies to all levels of the Company, and that its focus is on changing the behaviors and attitudes of all employees. An effective BBS program is an ongoing process that is intended to improve safety, employee's attitudes toward safety and the Company's profitability,

POLICY

This Company has adopted this Behavior-Based Safety program for the prevention of occupational injuries and illness to employees.

The elements of our program consist of:

- Common Goals-Employee and Managerial commitment to the process
- Creating a systematic, ongoing process that defines a set of behaviors that reduce the risk of work-related injury, derived from safety assessments
- Training personnel in the Observation Process
- Observation and data collection on the frequency of critical safety practice violations
- Feedback and reinforcement to encourage and support positive safety practices
- Action Plan-Team meetings to decide on how to proceed, based on the data
- Review and monitoring the progress of the Action Plan on a regular basis

OBSERVATION

A critical element in our Behavior-based Safety (BBS) program depends on site observation. Site observation includes direct and open communication with the employees involved. The observer will:

- Meet with the worker at the site and introduce himself and the job being done. Observe and monitor the worker, noting his safe behaviors
- Monitor the At-risk behaviors performed by the worker

Observation Process Training

Training in the Observation Process will be established and implemented to the proper personnel. These individuals will be experienced employees of the Company. Training will consist of either classroom or on the job training.

Elements of the Training Program include:

- Who is to be trained
- Ensuring employees know the basic elements of the BBS Program
- Ensuring that all employees involved in the process are trained in the classroom or on the job

The types of training that will be provided are:

- Management training- to ensure the common goals and process of the program are being met.

- New employee training- effectively communicating the program to all employees
- Refresher training- to be done as needed or when changes are made to the policy or procedure of the program

This training will include:

- Program objectives and incident report reviews
- How to conduct the site observations
- The observer's knowledge of the job procedures they observe
- Knowledge of the correct work and safety procedures involved. How to complete the observation form
- How to determine and analyze at-risk behaviors
- Feedback training and role play (mentoring and coaching) - Employees should be aware they may be observed at any time
- This training process will be documented in order to keep on record those qualified to observe onsite behaviors and effectively implement the program's elements

Feedback

Communication is a crucial element in a successful BBS Program. To effectively accomplish this, feedback is of key importance.

The observer will start by commending the safe behavior the worker was doing during his work. These observations may result in recognition and/or reward for the worker based on the Company's established criteria.

You then want to explain, one by one, the at-risk behaviors the worker was doing. Then the observer asks the worker why he was putting himself at risk. For example, if the worker is welding a piece of metal and the sparks are flying in the workers direction. The observer would then ask the worker why he was not wearing protective clothing, like flame-retardant apron.

At this time, the observer and worker will discuss the at-risk behaviors until the worker agrees to try the suggested recommendation made by the observer. The worker might be aware of his at- risk behavior or maybe not. The worker may be doing the at-risk behavior for long time without hurting himself.

The observer's job here is to highlight this behavior, then explain the associated negative consequences with this behavior. The above discussion and agreement is the individual feedback that helps the worker to change his behavior. This feedback is considered as a form of reward since:

- The worker got commendable comments on his safe behavior
- The worker understood his at-risk behavior without being reprimanded at site or reported to his superiors for further penalties

Key elements for the observer to remember during the feedback process are:

- Reviewing the observation with the employee
- Start with positive comments on behavior and procedure

- Reinforce these behaviors
- Describe and discuss the unsafe portions observed
- Determine the reasons for the unsafe actions with open-ended questions to the worker.
- Re-emphasize that there are no negative consequences at this stage, so long as the observer and worker agree on the change of behavior

Data Collection

At the end of the observation, the Observer will:

- Fill out an Observation Form with the safe and at-risk behaviors he noticed. Record the date, time, and location of the observations
- Note the workers comments and reasons for the at-risk behavior
- Record recommended safe behavior

NOTE: The worker's name, or identification number, are not noted on the Observation Form. These Company forms will be used by our Company to summarize the observation process.

Recording this interaction is important for later detailed analysis by the committee in charge of the program.

Data gathering and the Observation Form will be gathered and entered into an electronic database. Reports will be generated for the committee to analyze and recommend practical solutions. These reports highlight trends of at-risk behaviors and in which location they are taking place.

Data collection and trend analysis allow our Company to compile the information taken from the observation and feedback phase of the program and transfer it to useful data, which will be implemented in the Action Plan.

Elements of the Action Plan

In order to address unsafe behaviors Our Company will construct its Action Plan based on Observation Reports, trend analysis and recommendations from the Observers and employees. The Safety Coordinator is responsible for the procedures of the Action Plan.

Action planning will include:

- Holding regularly scheduled meetings to discuss and analyze BBS report findings
- Evaluating unsafe behaviors
- Designating responsible parties and time frames to complete the Action Plan
- Ensuring support of management

The committee will produce a set of recommendations to correct workers' behavior.

Recommendations may be as simple as providing Personal Protective Equipment (PPE) to workers in certain location or increase work force in another location. Some of the recommendations may require site modification or costly machinery. Such recommendations are sent to top management for necessary approvals.

The committee's responsibility is to ensure that:

- The recommendations will change the at-risk behaviors at the targeted location
- The recommendations will eliminate hazards and risks caused by hardware or wrong design

Follow Up

Any Action Plans set out by Our Company at the direction of The Safety Coordinator will be completed in a time frame agreed upon by the entire committee.

Regularly scheduled meetings will be held to:

- Assign responsibility for the completion of the Action Plan
- Ensure that the guidelines of the Action Plan are being carried out
- To document the Action Plan and its progress

ATTACHMENTS

- Training Form
- Observation Form
- Employee Training Acknowledgement Form

(TOPIC NAME)_____ TRAINING FORM

Company Name	
Date of Training	
Trainer's Name	
Trainee	☐ Initial Training ☐ Refresher Training

Work Type / Job	**Trained / Not Trained**	
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

I, _____, understand that my training in the above listed jobs qualifies me to observe employees while doing their job(s), conduct feedback with employee(s) and implement the established goals of the Behavior-based Safety Program. I have also displayed the required knowledge in the following areas:

- Knowing the BBS Program objectives How to conduct observations Knowledge of the jobs being observed
- The correct safety procedures of these jobs
- Filling out the Observation Form
- How to identify At-risk behaviors

Signature: _____ Date: _____

OBSERVATION FORM

Observer Name		Date	
Job Observed			

Job Step	Procedure Comments	
1)	Positive Behaviors	At-Risk Behaviors
Recommendations		
2)	Positive Behaviors	At-Risk Behaviors
Recommendations		
3)	Positive Behaviors	At-Risk Behaviors
Recommendations		
4)	Positive Behaviors	At-Risk Behaviors
Recommendations		

Observer's Signature	Date

EMPLOYEE TRAINING ACKNOWLEDGEMENT FORM

I, _____, have read or been informed of the Behavior-based Safety Program and its elements.

- ☐ I am aware of the company's Safe Work procedures including the Company Code of Safe Practices.
- ☐ I understand I may be observed in my job performance or assigned tasks by a designated Observer and this person will inform me that I am being observed.
- ☐ I understand that the Observer will communicate to me the positive and at-risk behaviors I may display on completion of his/her observation.
- ☐ I agree to do my utmost to implement any of the observers' recommendations they make in order to improve my performance and safety.
- ☐ I understand my cooperation and communication is key to the success of the Behavior-Based Program.
- ☐ I understand that the observations of my job performance will not include my name or any identifying mark and is used only for statistical information in the program.
- ☐ I agree to follow the procedures of any Action Plan as set out by the Company.

Employee Signature	Date

SCOPE

This chapter contains the requirements and safe practices to be followed to prevent illness or injury from exposure to cold weather. These practices will comply with the OSHA General Duty clause and any state or local regulations. They will also follow the recommendations provided by OSHA's Cold Stress guide and quick reference card.

POLICY

All work operations involving exposure to low temperatures have the potential for inducing cold stress. This policy has been developed to address these issues. All employees will receive training relating to the causes and effects of, the personal and environmental factors that may lead to, and prevention measures to fight cold stress.

EMPLOYER RESPONSIBILITIES

It is the responsibility of this Company to:

- Provide employees with information on signs and prevention of cold stress
- Provide reliable means of preventing cold stress and other related health hazards

EMPLOYEE RESPONSIBILITIES

Employees working in cold environments, where illness or injury is a risk, are expected to:

- Wear appropriate clothing
- Make sure to protect ears, face, hands, and feet
- Move into warm locations during work breaks; limit the amount of time outside on extremely cold days
- Carry cold weather gear, such as extra socks, gloves, hats, jacket, blankets, a change of clothes, and a thermos of hot liquid
- Include a thermometer and chemical hot packs in your first aid kit
- Avoid touching cold metal surfaces with bare skin
- Monitor your physical condition and that of your co-workers

SAFE PRACTICES

Employees who work in cold environments, or are exposed to extreme cold, are at risk of cold stress. Extremely cold or wet weather is a dangerous situation that can cause occupational illness and injuries such as hypothermia, frostbite, and trench foot. When the body is unable to warm itself, serious cold-related illnesses, and injuries may occur, and permanent tissue damage and death may result.

An individual gains body heat from food and muscular activity and loses it through convection, conduction, radiation, and sweating to maintain a constant body temperature. When a person's body temperature drops even a few degrees below its normal temperature of 98.6° F, the blood vessels constrict, decreasing peripheral blood flow to reduce heat loss from the surface of the skin. Shivering generates heat by increasing the body's metabolic rate.

Risk Factors

The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds, dampness, and cold water. One of the gravest dangers of winter weather is wind chill. The wind chill is based on the rate of heat loss from exposed skin by combined effects of wind and cold. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. Below is a wind chill chart from the National Weather Service.

WIND CHILL CHART

Wind Speed	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Temperature (°F)

Frostbite Times: 30 minutes 10 minutes 5 minutes

To work safely, these challenges have to be counterbalanced by proper insulation, such as layered protective clothing, physical activity and by controlling exposure; e.g., work/rest schedule.

Air Temperature: Air temperature is measured by an ordinary thermometer in degrees Fahrenheit (°F) or degrees Celsius (°C).

Wind Speed: Various types of commercially available anemometers are used to measure wind speed or air movement.

Wind speed is usually measured in km/h or mph. The following is a suggested guide for estimating wind speeds if accurate information is not available:

- 5 mph (8 km/h): light flag moves
- 10 mph (16 km/h): light flag fully extended

- 15 mph (24 km/h): raises newspaper sheet
- 20 mph (32 km/h): causes blowing and drifting snow

Humidity: Water conducts heat away from the body 25 times faster than dry air.

Physical Activity: The production of body heat by physical activity is difficult to measure. However, tables are available in literature, which shows metabolic rates for a variety of activities. Metabolic heat production is measured in kilocalories (kcal) per hour. One kilocalorie is the amount of heat needed to raise the temperature of one kilogram of water by 24° F.

Diet: Workers have increased energy requirements when working in the cold. Consider adding additional wholesome foods to the diet, such as pasta, potatoes, rice, dairy products, nuts, meat, herring, and salmon. Light snacks and warm fluids should be taken during rest breaks. Alcohol must not be consumed when working in the cold. Alcohol produces a deceptive feeling of warmth but may contribute to dehydration and impair judgment.

Work/rest Schedule: Regular rest breaks in a heated area are recommended for anyone working in the cold. The frequency of breaks depends on the air temperature and wind speed, as well as the degree of physical activity.

Protective Clothing: To be protected from the cold, workers should dress in layers.

- The inner layers should trap moisture and wick it away from the body; the middle layers provide insulation; the outer layers protect against the wind and weather
- As work activity and environmental conditions change, workers should be able to easily add or remove layers

Wind Chill

At any temperature, you feel colder as the wind speed increases. The combined effect of cold air and wind speed is expressed as equivalent chill temperature (ECT) or simply wind chill temperature in degrees Fahrenheit or Celsius.

- It is essentially the air temperature that would feel the same on exposed human flesh as the given combination of air temperature and wind speed
- It can be used as a general guideline for deciding clothing requirements and the possible health effects of cold
- In some parts of the United States, the term wind chill factor is used. This is a measurement of a heat loss rate caused by exposure to wind and it is expressed as the rate of energy loss per unit area of exposed skin per second (e.g., joules/ [second-metre^2] or watts/metre^2, W/m^2)
- Cold Stress Prevention Controlling Cold Stress Environmental Measures
- Temperature and wind conditions should be known; e.g., weather report on the radio, current weather office information
- Steps should be taken to protect workers from wind (or indoors from drafts or forced air from air handling units). The combination of low temperatures and even moderate winds can quickly create dangerous working conditions
- Ensure that heated rest areas, such as a truck cab, tent, or hut, are available

Equipment Design

For work below the freezing point, metal handles and bars should be covered by thermal insulating material. In addition, machines and tools should be designed so that they can be operated without a person having to remove mittens or gloves.

Here are some examples of engineering controls to reduce cold exposure:

- Isolate the worker from the environment, where possible
- Use local heating for the body and especially bare hands (when fine work is required)
- This may include the use of warm air jets, radiant heaters, or contact warming plates
- Provide structures to block air or reduce air velocities at the work location
- Provide heated metal tools and handles or cover them with thermal insulating materials
- Use machine controls and tools designed so that workers do not have to remove mittens or gloves to use them

Work Practices

A schedule of regular rest breaks should be established to allow workers to warm up. These breaks should be not less than 10 minutes in length and should be taken in a heated area.

- Heated warming shelters; e.g., tents, cabins, rest rooms, should be provided
- When entering the heated shelter, outer and middle clothing layers (as necessary) should be removed to prevent overheating and to allow dampness to evaporate. A change of dry clothing may be necessary since returning to cold work while damp or sweaty may result in rapid chilling
- Warm fluids should be consumed at the work site to provide energy and warmth and to replace fluids lost during work
- Recognize the symptoms of cold stress. The onset of severe shivering, the feeling of excessive fatigue, drowsiness, irritability, or euphoria indicate the need to immediately return to the shelter

The following additional precautions apply at colder temperatures:

- Workers should be under constant protective observation by a buddy or supervisor
- Work rate should not be high enough to cause sweating. If heavy work must be performed, rest periods in heated shelters and the opportunity to change into dry clothing should be provided
- New employees should not be required to work full-time in the cold during the first days of employment until they become accustomed to the working conditions and required protective clothing
- Weight and bulkiness of clothing should be included in estimating required work performance
- Work should be arranged to minimize periods of standing or sitting still
- Workers should be appropriately trained
- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker

- Train the workforce about cold-induced illnesses and injuries
- Select proper clothing for cold, wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. (Tight clothing, however, can reduce blood circulation to the extremities.) Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene). Be aware that some clothing may restrict movement resulting in a hazardous situation
- Protect the ears, face, hands, and feet in extremely cold or wet weather. Boots should be waterproof and insulated
- Carry extra socks, gloves, hats, jacket, blankets, a change of clothes, and a thermos of hot liquid
- Include chemical hot packs in your first aid kit
- Avoid touching cold metal surfaces with bare skin
- Take frequent short breaks in warm dry shelters to allow the body to warm up
- Perform work during the warmest part of the day
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm
- Use the buddy system (work in pairs)
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea or hot chocolate) or alcohol
- Eat warm, high-calorie foods like hot pasta dishes

Dressing for the Cold

Clothes must be layered to manage moisture and keep dry. Insulating layers trap air for warmth, and outer layers protect workers from wind and weather.

To remain comfortable as weather and work conditions change, clothing layers should be added or removed, or ventilation openings in clothing opened or closed.

Every effort must be made to avoid sweating and becoming damp. Clothing selections are normally made based on staying warm while inactive. Consider the work to be performed and weather conditions, and then have workers dress so layers can be shed and still remain comfortably warm. If clothing layers do become damp and remain that way, workers should be prepared to replace them before becoming chilled and hypothermic. If a worker is sweating, then his or her clothing is probably too warm for the conditions and tasks being performed.

Hand Wear

- Mittens keep hands warmer than gloves since fingers are together. With gloves, fingers are separated and lose heat from one another
- Have workers wear thin liners under gloves or mittens. Liners need not be removed when removing the gloves
- Removable glove and mitten liners can be replaced and dried when they become damp
- New mitten styles, including three-finger lobster claws that keep fingers warm yet offer good dexterity are available
- Windproof over mitts offer additional hand protection, without adding significant bulk

Headwear

- Avoid cotton; use synthetic fabrics or wool instead
- Workers must use an appropriate hard hat liner to reduce heat loss
- Select a hat appropriate for the weather conditions and activity level. Consider thickness, extent of head coverage (e.g., open-faced, full balaclava, ear coverage), need for Wind protection, effect on vision and hearing, and ability to fit into or over protective headwear, if required
- A facemask and eye protection may sometimes be necessary

Footwear

- Warm, insulated safety footwear is essential. Boots should have thick soles for insulation while standing in snow or on cold concrete. Footwear selection should be based on the work being performed, the surfaces on which the worker will work and the weather conditions to which the worker will normally be exposed. Tight-fitting boots reduce circulation and can make feet feel cold
- Footwear should be sized so that it will accommodate an extra layer(s) of socks
- A synthetic sock liner, worn beneath a synthetic blend or wool outer sock, wicks moisture away from the skin, keeping feet drier and warmer

COLD-ENVIRONMENT CONDITIONS AND FIRST AID MEASURES

Hypothermia

Symptoms of hypothermia can vary depending on how long you have been exposed to the cold temperatures. They include:

Early	Late
Fatigue	No shivering
Confusion and disorientation	Blue skin
Shivering	Dilated pupils
Loss of coordination	Slowed pulse and breathing
	Loss of consciousness

Treating hypothermia

- Alert the supervisor and request medical assistance.
- Move the victim into a warm room or shelter.
- Remove their wet clothing.
- Warm the center of their body first-chest, neck, head, and groin using an electric blanket, if available; or use skin-to-skin contact under loose, dry layers of blankets, clothing, towels, or sheets.

- Warm beverages may help increase the body temperature, but do not give alcoholic beverages. Do not try to give beverages to an unconscious person.
- After their body temperature has increased, keep the victim dry, and wrapped in a warm blanket, including the head and neck.
- If victim has no pulse, begin cardiopulmonary resuscitation (CPR).

Cold Water Immersion

Cold water immersion creates a specific condition known as immersion hypothermia. It develops much more quickly than standard hypothermia because water conducts heat away from the body 25 times faster than air. Typically, people in temperate climates don't consider themselves at risk from hypothermia in the water, but hypothermia can occur in any water temperature below 70° F. Survival times can be lengthened by wearing proper clothing (wool and synthetics and not cotton), using a personal flotation device (PFD, life vest, immersion suit, dry suit), and having a means of both signaling rescuers (strobe lights, personal locator beacon, whistles, flares, waterproof radio) and having a means of being retrieved from the water. Below you will find links with information about cold water survival and cold-water rescue.

Frostbite

Frostbite is an injury to the body that is caused by freezing. Frostbite causes a loss of feeling and color in the affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite can permanently damage body tissues, and severe cases can lead to amputation. In extremely cold temperatures, the risk of frostbite is increased in workers with reduced blood circulation and among workers who are not dressed properly.

Symptoms of frostbite include:

- Reduced blood flow to hands and feet
- Numbness
- Tingling or stinging
- Aching
- Bluish or pale, waxy skin

Workers suffering from frostbite should:

- Get into a warm room as soon as possible
- Unless absolutely necessary, do not walk on frostbitten feet or toes-this increases the damage
- Immerse the affected area in warm-not hot- water (the temperature should be comfortable to the touch for unaffected parts of the body)
- Warm the affected area using body heat; for example, the heat of an armpit can be used to warm frostbitten fingers
- Do not rub or massage the frostbitten area; doing so may cause more damage
- Do not use a heating pad, heat lamp, or the heat of a stove, fireplace, or radiator for warming. Affected areas are numb and can be easily burned

Trench Foot

Trench foot, also known as immersion foot, is an injury of the feet resulting from prolonged exposure to wet and cold conditions. Trench foot can occur at temperatures as high as 60 degrees F if the feet are constantly wet. Injury occurs because wet feet lose heat 25-times faster than dry feet. Therefore, to prevent heat loss, the body constricts blood vessels to shut down circulation in the feet. Skin tissue begins to die because of lack of oxygen and nutrients and due to the buildup of toxic products.

Symptoms of trench foot include:

- Reddening of the skin
- Numbness
- Leg cramps
- Swelling
- Tingling pain

Workers suffering from trench foot should:

- Remove shoes/boots and wet socks
- Dry their feet
- Avoid walking on feet, as this may cause tissue damage
- Gangrene (the foot may turn dark purple
- Bleeding under the skin blue, or gray)
- Blisters or ulcer

Chilblains

Chilblains are caused by the repeated exposure of skin to temperatures just above freezing to as high as 60 degrees F. The cold exposure causes damage to the capillary beds (groups of small blood vessels) in the skin. This damage is permanent and the redness and itching will return with additional exposure. The redness and itching typically occurs on cheeks, ears, fingers, and toes.

Symptoms of chilblains include:	**Workers suffering from chilblains should:**
Itching	Avoid scratching
Inflammation	Slowly warm the skin
Possible blistering	Keep blisters and ulcers clean and covered
Redness	Use corticosteroid creams to relieve itching and swelling
Possible ulceration in severe cases	

TRAINING

We will ensure every employee is provided training on all equipment, procedures, and processes to protect from cold stress. This training will be provided at no cost to the employee during working hours.

Training will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Components

The safety coordinator will ensure that every employee will be trained in the following minimum elements:

- proper clothing and equipment
- safe work practices
- guidelines for eating and drinking
- risk factors that increase the health effects of cold exposure
- how to recognize signs and symptoms of frostbite
- how to recognize signs and symptoms of hypothermia
- Appropriate first aid treatment, including rewarming procedures

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

SCOPE

This chapter provides information on the safe practices for working with compressed gas cylinders. Our safe practices will comply with the requirements of OSHA regulations 1910.101 and/or 1926.350 whichever is applicable.

POLICY

Compressed gas cylinders can be extremely hazardous when misused or abused. Compressed gas cylinders can present a variety of hazards due to their pressure and/or content. Because of the hazards posed by compressed gas cylinders in the workplace, employees must adhere to industry best practices and safety regulations applicable to the transportation, use, and storage of compressed gas cylinders.

EMPLOYER RESPONSIBILITIES

This company will:

- Train employees on compressed gas cylinder safety
- Procure and track pressurized gas cylinders to minimize quantity onsite
- Document procedures on safe pressurized cylinder handling and storage
- Train emergency response personnel to handle an emergency
- Label and identify every cylinder
- Ensure each cylinder has the hydrostatic test label
- Document procedures to dispose of cylinder and have them refilled
- Secure gas cylinders

EMPLOYEE RESPONSIBILITIES

Employees are expected to:

- Use appropriate PPE as needed
- Transport, store, and use compressed gas cylinders according to best safety practices
- Report any unexpected hazard that cannot safely be remedied immediately

SAFE PRACTICES

Depending on the particular gas, there is a potential for simultaneous exposure to both mechanical and chemical hazards. Gases used may be:

- Flammable or combustible
- Corrosive
- Explosive
- Poisonous
- Inert
- Acidic
- Reactive
- A combination of hazards

Without proper use and care, compressed gas cylinders can explode, killing workers and destroying equipment. Cylinders can become flying projectiles when cylinder valves are damaged or broken off. Regulators can become bullets that tear through workers if safety precautions are not taken.

- When the gas is flammable, flash points lower than room temperature compounded by high rates of diffusion present a danger of fire or explosion
- Additional hazards of reactivity and toxicity of the gas, as well as asphyxiation, can be caused by high concentrations of even "harmless" gases such as nitrogen
- Since the gases are contained in heavy, highly pressurized metal containers, the large amount of potential energy resulting from compression of the gas makes the cylinder a potential rocket or fragmentation bomb
- Careful procedures are necessary for handling the various compressed gases, the cylinders containing the compressed gases, regulators, or valves used to control gas glow, and the piping used to confine gases during flow
- Always use safety glasses (preferably with a face shield) when handling and using compressed gases, especially when connecting and disconnecting compressed gas regulators and lines

Careful procedures are necessary for handling the various compressed gases, cylinders, regulators or valves used to control gas flow, and the piping used to confine gases during flow.

Identifying Contents of Compressed Gas Cylinders

The contents of any compressed gas cylinder must be clearly identified. Gas identification should be stenciled or stamped on the cylinder or a label. Commercially available three-part tag systems may be used for identification and inventory.

No compressed gas cylinder should be accepted for use that does not legibly identify its contents by name. If the labeling on a cylinder becomes unclear, the cylinder should be marked “contents unknown” and returned to the supplier.

Do not rely on the color of the cylinder for identification, always read the label. Color-coding is not reliable because cylinder colors may vary with supplier. Also, never rely on labels on caps because they are interchangeable.

All gas lines leading from a compressed gas supply should be clearly labeled to identify the gas and the area served. The labels should be coded to distinguish hazardous gases such as flammable, toxic, or corrosive substances. Signs should be posted in areas where flammable compressed gases are stored or used, identifying the substance and appropriate precautions.

Transporting Gas Cylinders

- Never drag, slide, or roll a cylinder; use a cylinder cart or basket
- Always have the protective cap covering the valve when transporting the cylinder
- Never transport the cylinder with the regulator in place
- Make sure the cylinder is secured to the cart before moving it
- Do not drop cylinders or strike them against each other or against other surfaces violently
- Do not use valve covers to lift cylinders; they could be damaged and become unattached. If the cylinder is dropped on a hard surface, it can cause an explosion

Storage of Gas Cylinders

- Gas cylinders must be secured at all times to prevent tipping
- Use appropriate material, such as chain, plastic coated wire cable, commercial straps, etc., to secure cylinders
- Gas cylinders cannot be stored in public hallways or other unprotected areas
- Cylinders must be segregated in hazard classes while in storage. Oxidizers (oxygen) must be separated from flammable gases, and empty cylinders must be isolated from filled cylinders
- The proper storage for oxygen cylinders requires a minimum of 20 feet to be maintained between flammable gas cylinders and oxygen cylinders or the storage area be separated, at a minimum, by a firewall five (5) feet high with a fire rating of 30 minutes
- Store out of direct sunlight and away from sources of heat and ignition; temperatures must not exceed 125° F
- Acetylene cylinders must never be stored on their sides
- Always place valve protectors on gas cylinders when the cylinders are not connected for use
- Cylinders must be protected from damage. Do not store cylinders near elevators or gangways, or in locations where heavy-moving objects may strike or fall on them
- Cylinders must be stored where they are protected from the ground to prevent rusting
- Cylinders should be protected against tampering by unauthorized individuals
- Storage areas must be well-ventilated, cool, dry, and free from corrosive materials

Use of Compressed Gas Cylinders

Before first use:

- Make sure the cylinder is equipped with the correct regulator
- Inspect the regulator and cylinder valves for grease, oil, dirt, and solvent. Never use grease or oil to lubricate regulators or cylinder valves because they can cause an explosion
- The cylinder should be placed so that the valve handle at the top is easily accessible
- When using toxic or irritating gas, the valve should only be opened while the cylinder is in a working fume hood
- Only use wrenches or tools that are provided by the cylinder supplier to open or close a valve. Pliers should never be used to open a cylinder valve. Some regulators require washers; this should be checked before the regulator is fitted
- Refer to the Safety Data Sheet for the gas being used for information regarding use and toxicity
- Fire extinguishing equipment should be readily available when combustible materials can be exposed to welding or cutting operations using compressed cylinder gases

During use:

- Only properly trained personal should handle compressed gas cylinders
- Back off the pressure adjusting screw of the regulator to release spring force before opening the cylinder valve
- Open the valve slowly and only with the proper regulator in place. Stand with the cylinder between yourself and the regulator (cylinder valve outlet facing away) when opening the cylinder valve

- Acetylene or other flammable gas cylinder valves should not be opened more than ½ turns of the spindle, and preferably no more than ¾ of a turn. This reduces the risk of explosion and allows the cylinder valve to be closed quickly cutting off the gas flow
- Never heat a cylinder to raise the pressure of the gas (this can defeat the safety mechanisms built in by the supplier)
- Keep the cylinder clear of all electrical circuits, flame, and sparks
- Never leave the valve open when equipment is not in use, even when empty; air and moisture may diffuse through an open valve causing contamination and corrosion within the cylinder
- Do not refill a cylinder; mixing of residual gases in a confined area may cause a dangerous reaction
- Never use copper fittings or tubing on acetylene tanks – an explosion may result
- Never use compressed gas to dust off clothing; this could cause injury to the eyes or body and create a fire hazard. Clothing can become saturated and burst into flames if touched off by an ignition source such as a spark or cigarette
- Never leave pressure in a regulator when it is not in use
- Valve protection caps should remain in place until ready to withdraw gas or connect to a manifold
- Cylinder discharge lines should be equipped with approved check valves to prevent inadvertent contamination of cylinders connected to a closed system
- Do not force connections that do not fit
- Close the cylinder valve and release all pressure before removing the regulator
- Do not smoke when oxygen or fuel gases are present. Smoking can cause a fire or explosion
- Do not use acetylene at operating pressures above 15 psig
- Purge fuel and oxygen hoses individually before lighting up a torch tip
- Follow the equipment manufacturer’s operating instructions at all times
- If an outlet valve becomes clogged with ice, thaw it with warm water (if the gas is not water reactive), applied only to the valve
- Use the cylinder valve for turning gas off, not the regulator
- Workers should wear safety glasses and face shields when handling and using compressed gases, especially when connecting and disconnecting regulators and lines
- Never use oxygen as a substitute as a “compressed air” to run pneumatic tools, in oil heating burners, to start internal combustion engines, to blow out pipelines, or to create pressure for ventilation
- Oxygen cylinder valves should be opened all of the way during use

Housekeeping Procedures

The following are housekeeping items to remember when working with all compressed gas cylinders:

When you're unsure about the proper handling of a compressed gas cylinder or its content, consult the manufacturer or supplier. Information about the gas is available from the safety coordinator, or on the Safety Data Sheet (SDS), kept in the Right-to-Know folder in your work area. It contains the material's identity; hazardous ingredients; and the name, address, and phone number of the manufacturer. The person handling the cylinder and connections is responsible for checking the identity of the gas by reading the label or other markings on the cylinder before using it. If the content is not clearly marked, do not use it.

Return it to the supplier as soon as possible. If a foreign substance enters a cylinder or the valves are damaged, notify the owner or manufacturer. Be prepared to provide details about the incident and serial number of the cylinder involved.

Keep oily substances away from cylinders, valves, coupling hoses, and other apparatus. Valves on empty cylinders should be kept closed at all times. Keep valve protection caps in place when cylinders are moved or not in use. Screw the protection cap all the way down.

Close cylinder valves when the job is finished.

When transporting compressed gas cylinders outside your work area:

- Make sure the valves are closed
- Remove the regulators
- Make sure the protection cap is in place
- Secure the cylinder on a cylinder cart

NEVER use compressed gases to dust off clothing or skin, as this may cause serious injury to the eyes and/or body in the form of an air embolism in the bloodstream, which can lead to heart failure. Compressed air used for cleaning purposes must be reduced to less than 30 psi, compressors must be visually inspected, and the safety valves must be tested. Compressed air used for cleaning is only permitted with effective chip guarding and personal protective equipment to protect the operator and other employees from the hazards of the release of compressed air and flying debris.

Cylinder Leaks

- If the cylinder contains a **flammable, inert, or oxidizing gas**, remove it to an isolated area, away from possible ignition sources. Allow it to remain isolated until the gas has discharged, making certain that appropriate warnings have been posted
- If the gas is a **corrosive**, remove the cylinder to an isolated, well-ventilated area. The stream of leaking gas should be directed into an appropriate neutralizing material
- For toxic material, the cylinder should be removed to an isolated, well-ventilated area but only if this is possible while maintaining personal safety. It may be necessary to evacuate the facility
- If the leak is at the junction of the cylinder valve and cylinder, do not try to repair it. Contact the supplier and ask for response instructions
- **Never** use a flame to detect a gas leak. Use soapy water

Empty Cylinders

- Do not completely empty the cylinder; always leave some residual pressure
- If the cylinder is empty, replace the cap and remove it to the empty cylinder storage area
- Label all empty cylinders with tags so that everyone will know their status. Empty cylinders can be marked with “MT” and date with chalk
- Handle empty cylinders as carefully as full ones; residual pressure can be dangerous
- Never refill a cylinder. This requires specialized equipment and techniques
- Never mix gases in a cylinder. The next person who draws from it may unknowingly cause an explosion

Piping, Hoses and Connections

Piping

- Polyvinyl chloride (PVC) plastic pipes cannot be used for transporting compressed gases aboveground unless they are completely enclosed in a conduit or casing of sufficient strength to provide protection from external damage and deterioration. The heat generated from compressed air can weaken the PVC pipe and create an explosion hazard. When PVC piping explodes, plastic shrapnel pieces can be thrown in all direction and injure workers or damage equipment
- Do not use copper piping for acetylene
- Do not use cast iron pipe for chlorine
- Distribution lines and their outlets need to be clearly labeled
- Inspect piping systems on a regular basis
- Pay attention to fittings as well as possible cracks that may have developed

Hoses and Connections

- Examine hoses regularly for leaks and set up an inspection schedule
- Do not use unnecessarily long hoses
- Keep hoses free from kinks and away from high traffic areas
- Repair leaks promptly and properly
- Store hoses in a cool place and protect them from hot objects and sparks
- Do not use a single hose having more than one gas passage

Engineering Controls

Listed below are some engineering controls that can be used in some cases to control the risk of compressed gas use:

- **Emergency Shutoff Switch** – can be used at a remote location to cause pneumatic valves to shut, stopping gas flow. Switches should be non-electric so that arcs or sparks are not created around flammable gases
- **Gas Cabinets** – hazardous gas cylinders should be housed in a gas cylinder cabinet. These cabinets can be equipped with sprinkler protection and ventilation

- **Flow Restrictors** – can be used to limit hazardous gas flow to just over maximum flow needed, must be installed immediately downstream of each hazardous gas cylinder
- **Emergency Eyewash** – must be present in areas were corrosive materials or gas is used

SPECIAL PRECAUTIONS

Flammable Gas

- Cylinders of flammable gas must be stored away from flammable liquids, combustible materials, oxidizers, open flames, sparks and other sources of heat or ignition. Maintain a distance of at least 20-feet from these materials unless separated by a noncombustible wall, not less than 5-feet high, having a fire-resistance rating of ½-hour
- All lines and equipment associated with flammable gas systems must be grounded and bonded
- Flash arrestors are designed to prevent a flashback, should it occur, in a line containing a flammable gas
- Portable fire extinguishers should be available in the area of use and storage
- Use spark-proof tools when working with flammable gas
- Do not leave “flow” experiments unattended
- Do not use acetylene at operating pressures over 15 psig
- Never use copper fittings or tubing on acetylene tanks

Oxidizing Gas

- Cylinders of oxygen and other oxidizers must be stored at least 20-feet from fuel-gas or other combustible materials unless separated by a noncombustible wall, not less than 5-feet high, having a fire-resistance rating of ½-hour
- All equipment used for oxidizing gases must be cleaned with oxygen-compatible materials free from oils, greases, and other contaminants
- Do not use oily hands or gloves when handling cylinders. The reaction between oxygen and hydrocarbons can be violent even when small quantities are involved

Corrosive Gas

- Avoid contact with skin and eyes
- An emergency shower and eyewash must be installed within 50 feet where corrosive materials are used
- Metals become brittle when used in corrosive gas service; check equipment and lines frequently for leaks

Inert Gases

Inert gases such as argon, carbon dioxide, helium, krypton, neon nitrogen, and xenon are simple asphyxiants that can displace oxygen in the air and can cause suffocation. When the normal amount of oxygen in the air is reduced by displacement with an inert gas, it is a potential hazard to employees. Reduced concentration of oxygen in the air causes sleepiness, fatigue, loss of physical coordination, even death.

Poisonous Gases

Storage of highly toxic or poisonous gases must be outdoors or in a separate non-combustible building without any other occupancy. Poison gases such as arsine, diorama, methyl bromide, nitric oxide, nitrogen dioxide, phosgene, and phosphine can cause potential hazards to personnel and requires special handling.

These products must never be handled except by specially trained personnel who are fully aware of the potential hazards involved and who are equipped with such special personal safety gear as is necessary in the handling of these products.

Top Safety Tips

- Cylinders must be secured
- Racks containing small cylinders must be secured by special attachments
- Storage areas must be labeled for the specific gases to be stored in those areas
- NO SMOKING signs must be posted and clearly visible
- Flammable gas cylinders and oxidizer cylinders must be separated by 20 feet or by a noncombustible barrier 5 feet high having a fire resistance rating of at least one half-hour. No ignition sources are allowed in the area
- Cylinders of all gases must be stored upright with the cylinder cap in place
- Empty and full cylinders must be segregated in the rack or otherwise clearly marked
- Cylinder storage areas must not be placed next to combustible materials or obstruct exit routes
- Storage areas must be well ventilated
- Take care in handling and storing compressed gas cylinders. If you have any questions about particular gases check the SDS, or speak to the manufacturer or senior safety officer in your area. Following safety procedures will minimize the risks involved with handling compressed gas cylinders

TRAINING

We will ensure every employee is provided training on compressed gas cylinder safety. This training will be provided at no cost to the employee during working hours.

Training will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

FORMS AND ATTACHMENTS

On the following pages, please find the Compressed Gas Cylinders Safety Training Document. This form may be reproduced for the purposes of implementing and maintaining a safety and health program.

COMPRESSED GAS CYLINDERS SAFETY TRAINING

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

SCOPE

This chapter provides information on the safe practices for the operation and use of concrete buggies. These safe practices will comply with all applicable the requirements of OSHA 1926 Subpart Q - Concrete and Masonry Construction. This chapter does not include information of general concrete operations or concrete cutting and drilling, which are covered in separate chapters.

POLICY

This Company has established the following safety policies and procedures to protect its employees from the hazards of operating concrete buggies. These safety precautions must be followed at all times to prevent injury to yourself and others.

EMPLOYER RESPONSIBILITIES

This Company will:

- Allow only trained employees to operate concrete buggies
- Inform employees of the hazards associated with operating and/or working around concrete buggies
- Provide employees with all necessary PPE

EMPLOYEE RESPONSIBILITIES

All employees are expected to:

- Follow all safe practices when using concrete buggies
- Wear and maintain all required PPE
- Report any unsafe conditions or act immediately

HAZARDS

Lethal Exhaust Gases

Engine exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause death if inhaled. Never operate a buggy in a confined area or enclosed structure that does not provide ample free flow air.

Explosive Fuel

Gasoline is flammable; vapors can cause an explosion if ignited.

- Do not start the engine near spilled fuel or combustible fluids
- Do not fill the fuel tank while the engine is running or hot
- Do not overfill tank
- Store fuel in approved containers, in well-ventilated areas and away from sparks and flames
- Never use fuel as a cleaning agent

Burns

Burn Hazards: Engine components can generate extreme heat. To prevent burns, do not touch these areas while the engine is running or immediately after operations. Never operate the engine with heat shields or heat guards removed

Rotating Parts

Never operate the buggy with covers, or guards removed. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

Accidental Starting

Always place the engine ON/OFF switch in the OFF position, and/or disconnect the spark plug lead before servicing the engine or equipment. Ground the lead to prevent sparks that could ignite a fire.

PERSONAL PROTECTIVE EQUIPMENT

This Company will provide all PPE determined to be necessary to employees, and will verify that they are capable of the proper care and use of the equipment. Required PPE can consist of, but is not limited to:

- Hardhats
- Safety shoes or boots
- Safety glasses or goggles
- Hearing protection (if needed)
- Respiratory protection when needed (e.g. NIOSH 95 Dust mask)

GENERAL SAFETY INFORMATION

- Know the rated load capacity, speed range, braking and steering characteristics, turning radius and operating clearances
- Remember that rain, snow, ice, loose gravel, soft ground, etc., can change the operating characteristics and capabilities of the concrete buggy
- Inspect the surface over which you will travel. Look for holes, drop offs and obstacles
- Look for rough spots. Look for weak spots on docks, ramps, or floor
- Look for oil spills, wet spots and slippery surfaces. Look for soft soil, deep mud and standing water. Watch for anything that might make you lose control or cause the Buggy to tip over
- When transporting the concrete buggy on a truck or trailer, know the overall height to avoid contacting overhead obstructions such as bridges, power lines, etc. Make sure all tie-downs and blocks are in place and the bucket is completely lowered and securely latched. If the Concrete buggy is to be hauled by truck, check the truck and ramp capacities
- Do not leave a concrete buggy near ovens, furnaces, or radiant heaters
- Heat could raise the pressure of the fuel and open the relief blow-off valve, so that vented gas could ignite
- The concrete buggy should be equipped with a spark arrestor/spark arresting muffler and cannot be operated in areas with flammable or explosive atmospheres

Job Planning

Inspect the surface over which you will travel. Look for holes, drop-offs and obstacles. Look for rough spots. Look for weak spots on docks, ramps or floor. Look for oil spills, wet spots and slippery surfaces. Look for soft soil, deep mud and standing water. Watch for anything that might make you lose control or cause the Buggy to tip over.

Clear away trash and debris. Pick up anything that might puncture the tires. Make sure aisles, ramps, doorways and passages are clear. Plan your work. Make sure you know where you will make your pickups, dumps and turns. Before you take a load, know where you will place it.

Check the clearances of doorways, canopies and overheads. Know exactly how much clearance you have under power and telephone cables. Also check clearances when trans- porting the Concrete buggy on a truck or trailer.

Hauling Capacities

Know the rated load capacities of your Concrete buggy and never exceed them.

Always refer to buggy's rated hauling capacity before loading. Keep in mind that Concrete buggy will normally operate on uneven, unpaved and often very bumpy or inclined surfaces. Operating conditions can reduce the amount that should be carried. Always exercise extreme caution when hauling to avoid tipping of the Concrete buggy.

WARNING: Never approach power lines with any part of the buggy unless all local, state and federal (OSHA) required safety precautions have been taken. Use extreme CAUTION when approaching high voltage power lines.

SAFE PRACTICES

Concrete buggies will be operated by trained and qualified personnel only. Failure to follow instructions may lead to serious injury or even death. Operators must always wear the appropriate PPE and clothing while operating a concrete buggy.

General Safe Practices

Never operate the buggy in any enclosed or narrow area where free flow of the air is restricted. If the airflow is restricted, it will cause serious damage to the buggy or engine and may cause injury to people.

- Always read, understand and follow procedures in the operator's manual before attempting to operate the buggy
- Stop the engine when leaving the buggy unattended
- Block the unit when leaving or when using on a slope
- Never run the engine without an air filter. Severe engine damage may occur
- Always store the buggy properly when it is not being used. The buggy should be stored in a clean, dry location out of the reach of children
- Do not operate the buggy unless all guards and safety devices are attached and in place
- Keep all inexperienced and unauthorized people away from the equipment at all times

- Do not make any unauthorized equipment modifications
- Test the engines ON/OFF and KILL switches before operating
- If the concrete buggy will be used over rough terrain, place the step plate (platform) in the upright position, and make sure that it sufficiently secure
- Do not stand on the Concrete buggy's "step plate" when working in rough terrain, walk behind the buggy
- Check the free speed control linkage located on the right handle bar. The speed control lever should work freely and return to the closed position if working correctly
- Do not start engine unless speed control linkage is working properly
- Check the buggy’s tire pressure. Make sure that the tires are inflated to the manufacturers recommended tire pressure
- Do not operate the buggy with bad or worn tires. Always replace defective tires with new ones
- Always make sure that the buggy's brakes are working properly
- Check brake linkage and adjust as required. Never operate the Concrete buggy with a defective braking system
- Never drive or tow the Concrete buggy in traffic or on public roads
- Check the hydraulic dumping mechanism of the tub and make sure that it’s working properly
- Never move the buggy with the tub in the DUMP position (vertical). When moving the buggy is required, always leave the tub in the flat (horizontal) position
- Operate the controls smoothly. Do not jerk the steering or any controls
- Avoid sudden stops, starts, turns or changes in directions
- Never attempt to work the control except from operator’s position
- Never leave the operator’s position without first setting the parking brake, and placing controls in neutral (or park)
- Do not touch, lean on or reach through the dump mechanism or allow others to do so
- Never climb on the Concrete buggy or dump mechanism
- Always keep all parts of your body in the operator's position (standing on the platform) while operating the buggy
- Never operate without the proper PPE required by the job
- Never use accessories or attachments, unless they are recommended by the manufacturer, damage to the equipment and/or injury to user may result
- When necessary, replace nameplate, operation and safety decals if they become hard to read
- Always check the machine for loosened hardware before starting
- Allow the engine to cool before adding fuel or performing service and maintenance functions
- Always refuel in a well-ventilated area, away from sparks and open flames
- Do not smoke around or near the machine. Fire or explosion could result from fuel vapors, or if fuel is spilled on a hot engine
- Do not operate the buggy in an enclosed area, the buggy's engine gives off carbon monoxide gas
- Never operate the buggy in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe bodily harm or even death
- Never use fuel as a cleaning agent

Pre-Check

- Engage the parking brake lever and attempt to rock the buggy back and forth. If the wheels turn during the rocking motion, adjust the brakes
- Place the engine's throttle control in the slow position, IDLE
- Check the speed control linkage located on the right side of the handle bar. The speed control should work freely when squeezed by hand, and return to the closed position when released

Before the Concrete buggy can be put into operational use, it is best to perform a test run to make certain that all components are functioning properly.

- Place the Concrete buggy on flat solid ground
- Set the parking brake lever
- Place the engine's throttle control in the slow position, IDLE
- Place the Concrete buggy's direction lever in the forward direction
- Slowly squeeze the speed control lever slightly for a short period to test the brake holding capacity. If the Concrete buggy moves forward, adjust the brakes as outlined in the maintenance section of this manual
- If the Concrete buggy does not move forward, release the speed control, and disengage the parking brake. If the Concrete buggy creeps forward while the parking brake is disengaged, adjust the pump control lever stop until the creeping is eliminated

Buggy Operation

Brakes

- With the engine running and parking brake released, place the direction lever in the forward direction
- Squeeze the speed control lever slightly until the Concrete buggy begins to move in a forward direction. Let the buggy travel at about 3 MPH
- With the right foot, step up and place it on the brake pedal. Gradually apply pressure to the brake pedal until the buggy comes to rest
- Try step 3 at different speeds until you are comfortable with stopping the Concrete buggy. If the brakes do not seem to stop the Concrete buggy adequately, refer to the maintenance section of this manual for brake adjustment instructions

Moving Loads

If possible, plan to load, unload and turn on flat level ground. When you travel with a load, keep the speed reasonable for the load and the terrain to be traveled. The Concrete buggy is less stable when traveling with a load.

- Avoid sharp turns at high speed
- If you cannot see where you are going, get someone to direct you
- When traveling over soft ground or wet/icy surfaces, slow down
- Travel only at speeds that permit stopping in a safe manner
- Never permit additional riders to stand on the platform or ride inside the tub

When traveling on inclines, slopes, ramps and downgrades exercise extreme caution. Always make sure you can see the dumpsite, use a signal person if you cannot see the placement point,

Be sure the landing point you intend to use can safely support the load. This may not always be true in the case of scaffolds or shallow floors. If there is any question of overloading, separate the load into two or more loads.

Use caution when placing or traveling near overhead electrical power lines. Water pipes, sprinklers, steam pipes, walkways or other potential hazards. Avoid weakened or incomplete scaffolding. Stay off structurally damaged floors, dock boards and ramps.

Tub (Bucket) Dumping

The hydraulic dump can be controlled by a hand lever or foot pedal.

- To activate the hydraulic dump, press down on the dump foot pedal or move the dump control lever forward. The tub will move to the vertical position as long as the lever is held in the forward position or pressure is continuously applied to the dump foot pedal
- To return the tub to its horizontal position, simply release the dump control lever or remove your foot from the dump pedal

Note: When dumping, keep the dump hand lever pushed forward or keep your foot pressed down on the dump foot pedal. Releasing either one (lever or pedal) will cause the dump cylinder to return to the horizontal position.

Shutdown

Follow these steps:

- Come to a full stop
- Set parking brake
- Idle engine for gradual cooling
- Shut off engine
- Cycle hydraulic controls to eliminate residual pressure
- Remove ignition key on electric start models
- Block wheels if on a slope or incline

Clean-Up

Keep work surfaces and engine compartments clean. Clean steps, pedals and floor. Remove any grease or oil. Brush away dirt or mud. During winter conditions, scrape away snow and ice. Remember, slippery surfaces can be hazardous.

- The entire Concrete buggy (tub, step stand, shroud, wheels etc.) should be cleaned after every use to prevent a buildup of concrete or other debris

Transporting Buggies

When lifting of the Concrete buggy is required, use a properly rated forklift to lift the buggy. Forklift pockets should be provided on the Concrete buggy's frame. Make sure the forklift arms are insert into the buggy's forklift pockets a minimum of 24-inches.

When transporting of the Concrete buggy is required, place the buggy on a flatbed truck or equivalent and securely tie down.

Emergencies

Always know the location of the nearest fire extinguisher and first aid kit. Know the location of the nearest telephone. Know the phone numbers of the nearest ambulance, doctor, and fire department.

EQUIPMENT MAINTENANCE

Adding Hydraulic Oil: Replace hydraulic oil after every 200 hours of operation. The hydraulic oil filter should be changed each time the hydraulic oil is changed.

- Caution must be exercised while servicing the buggy. Rotating and moving parts can cause injury if contacted
- Never lubricate components or attempt service on a running machine
- Always allow the machine a proper amount of time to cool before servicing
- Keep the machinery in proper running condition
- Service the air cleaner frequently to prevent carburetor malfunction
- The engine section of the concrete buggy requires an adequate free flow of cooling air
- Fix damage to the machine immediately and always replace broken parts
- Dispose of hazardous waste properly. Potentially hazardous waste is used motor oil, fuel and fuel filters

Machine Safety Decals: The buggy should be equipped with safety decals. Should any become un-readable; replacements can be obtained from the manufacturer.

NOTE: Buggy and Engine troubleshooting guides are provided at the end of this chapter.

TRAINING

Our Company will provide all necessary training for employees engaged in concrete buggy work. This training will include at a minimum:

- The safe practices to be followed
- The operation of the buggy type they will use
- The proper care and use of all required PPE

All employee training records will be retained for the length of their employment.

ATTACHMENTS

The following pages contain concrete buggy and engine troubleshooting guides that can be used by employees and/or maintenance personnel when making repairs.

CONCRETE BUGGY TROUBLESHOOTING

Symptom	Possible Problem	Solution
Loss of power.	Speed control cable out of adjustment?	Adjust speed control cable. Replace cable if necessary
	Hydraulic oil level low?	Check hydraulic oil level. Add oil if necessary.
	Contaminated hydraulic oil filter?	Replace hydraulic oil filter.
	Low engine RPM?	Check engine speed.
Loss of travel	Forward/Reverse lever in neutral position?	Place lever in either forward or reverse position. Check hydraulic motors.
	Parking brake partially engaged?	Release parking brake.
System operating hot	Hydraulic oil level low?	Check hydraulic oil level add hydraulic oil if necessary.
	Defective cooling fan?	Inspect cooling fan, replace if necessary.
Slow Dumping	Low engine speed?	Check engine speed. Adjust engine speed if necessary
	Dump cylinder is internally bypassing oil?	Replace dump cylinder.
System jerky when started.	Speed cable out of adjustment?	Adjust speed control cable.
	Defective drive motors?	Check drive motors, replace if necessary.
Difficult to steer.	Un-lubricated steering column?	Lubricate steering column.
Parking brake will not hold	Brake linkage out of adjustment?	Adjust parking brake linkage.
Difficulty stopping	Brakes out of adjustment?	Brake lining worn. Replace brake lining.
Engine will not start	Low on fuel or fuel tank empty?	Add fuel.
	Defective Kill Switch?	Check electrical kill switch. Replace if necessary
	Engine ON/OFF switch in OFF position?	Set engine ON/OFF switch to ON position.
	Fuel Shut-off valve CLOSED?	Open Fuel shut-off valve.

ENGINE TROUBLESHOOTING (PAGE 1 OF 2)

Symptom	Possible Cause	Solution
Difficult to start, "fuel is available, but no SPARK at spark plug".	Spark plug bridging?	Check gap, insulation or replace spark plug.
	Carbon deposit on spark plug?	Clean or replace spark plug.
	Short circuit due to deficient spark plug insulation?	Check spark plug insulation, replace if worn.
	Improper spark plug gap?	Set to proper gap.
Difficult to start, "fuel is available, and SPARK is present at the spark plug".	Console or engine ON/OFF switch is shorted?	Check switch wiring, replace switch.
	Ignition coil defective?	Replace ignition coil.
	Improper spark gap, points dirty?	Set correct spark gap and clean points.
	Condenser insulation worn or short circuiting?	Replace condenser.
	Spark plug wire broken or short circuiting?	Replace defective spark plug wiring.
Difficult to start, "fuel is available, spark is present and compression is normal"	Wrong fuel type?	Flush fuel system, and replace with correct type of fuel.
	Water or dust in fuel system?	Flush fuel system.
	Air cleaner dirty?	Clean or replace air cleaner.
Difficult to start, "fuel is available, spark is present and compression is low"	Suction/exhaust valve stuck or protruded?	Re-seat valves.
	Piston ring and/or cylinder worn?	Replace piston rings and or piston.
	Cylinder head and/or spark plug not tightened properly?	Torque cylinder head bolts and spark plug.
	Head gasket and/or spark plug gasket damaged?	Replace head and spark plug gaskets.

ENGINE TROUBLESHOOTING (PAGE 2 OF 2)

Symptom	Possible Cause	Solution
No fuel present at carburetor.	Fuel not available in fuel tank?	Fill with correct type of fuel.
	Fuel cock does not open properly?	Apply lubricant to loosen fuel cock lever, replace if necessary.
	Fuel filter clogged?	Replace fuel filter.
	Fuel tank cap breather hole clogged?	Clean or replace fuel tank cap.
	Air in fuel line?	Bleed fuel line.
"Weak in power" compression is proper and does not misfire.	Air cleaner not clean?	Clean or replace air cleaner
	Improper level in carburetor?	Check float adjustment, re- build carburetor.
	Defective Spark plug?	Clean or replace spark plug.
"Weak in power" compression is proper but misfires	Water in fuel system?	Flush fuel system, and replace with correct type of fuel.
	Dirty spark plug?	Clean or replace spark plug.
	Ignition coil defective?	Replace ignition coil.
Engine overheats.	Spark plug heat value improper?	Replace with correct type of spark plug.
	Correct type of fuel?	Replace with correct type of fuel
	Cooling fins dirty?	Clean cooling fins
Rotational speed fluctuates.	Governor adjusted correctly?	Adjust governor.
	Governor spring defective?	Replace governor spring
	Fuel flow restricted?	Check entire fuel system for leaks or clogs.
Recoil starter malfunction.	Recoil mechanism clogged with dust and dirt?	Clean recoil assembly with soap and water.
	Spring loose?	Replace spring.

SCOPE

This chapter provides the safe practices and requirements for performing the following types of concrete and asphalt work:

- Core Drilling
- Concrete Slab Cutting
- Concrete Wall Cutting
- Asphalt Cutting
- Safety Grooving and Texturing

It does not cover pouring, placing, or mixing concrete or asphalt; those topics are covered in separate chapters. Although OSHA does not have specific regulations regarding concrete and asphalt sawing and drilling, the Concrete Sawing and Drilling Association (CSDA) does provide recommended training and best practices, which will be followed by this Company whenever practical. We will also adhere to the OSHA Silica Dust exposure standard 1926.1153.

POLICY

This Company has instituted the following program to ensure its employees are aware of the safety and health risks arising from performing concrete cutting and drilling work. All employees are expected to use safe work practices when performing their jobs.

EMPLOYER RESPONSIBILITIES

This Company will:

- Verify that only trained employees are allowed to operate cutting and drilling equipment
- Keep all saws and drills in good working order
- Train all employees on the proper care and use of the required PPE
- Enforce all safe practices

EMPLOYEE RESPONSIBILITIES

All employees are expected to:

- Attend all necessary training
- Follow all Company safe practices
- Report any unsafe conditions or acts immediately

MAJOR HAZARDS AND SUGGESTED CONTROLS

This section provides general information about the major hazards associated with concrete cutting and drilling operations. Following are some examples and suggested measures for controlling exposure to the risk associated with each hazard.

Airborne Hazards

Airborne hazards affecting the health and safety of concrete cutting and drilling operators can arise in several different ways:

- From dusts created from the cutting or drilling of the concrete itself
- From exhaust gases generated by machines powered by internal combustion engines
- From work conducted in confined spaces
- From hazardous substances (chemicals or additives) used in the process

Concrete cutting and drilling can generate large quantities of dust which can include respirable silica dust. Exposure to silica dust can result in silicosis, a stiffening and scarring of the lungs. It results in shortness of breath, coughing, and chest pain. The effects are irreversible and lead to degeneration in the person's health, invariably resulting in death. The coarser rock and cement dust particulates can cause upper respiratory irritation and symptoms, such as bronchitis, if extensively exposed over long periods.

Dry methods of concrete cutting and drilling produce the highest levels of respirable dust.

Control Measures

During operations where powered tools or equipment are used to cut, grind, core, or drill concrete or masonry materials, a dust reduction system will be applied to effectively reduce airborne particulate. Exceptions include: operations where it can be shown that permissible exposure limits are not exceeded; roofing operations with tile, pavers or similar materials; and during the first 24 hours of an emergency operation.

Wherever possible, concrete cutting and drilling equipment will be fitted with collection devices to eliminate generated dust at the source.

Where dust extraction is not practical, wet methods will be used to minimize dust generation. Ensure that enough water/coolant is supplied to the operation to adequately suppress the dust.

Whenever the above controls are not practical, or fail to achieve full compliance, respiratory protection must be used. An appropriate "N" series or "P" series particulate respirator will provide adequate protection for respirable quartz concentrations.

Where it is necessary to carry out the task dry, (e.g., due to the proximity of electrical fittings or machinery) ensure that particulate respirators with adequate protection are used.

Other people in the vicinity will also be protected from any dusts created by the cutting or drilling operation. Remove slurry before it dries, otherwise the dried dust can be re-dispersed to expose unprotected workers and others on the site.

If possible, workers will change into disposable or washable work clothes at the job site, shower (where available), and change into clean clothing after leaving the site to prevent contamination of cars, homes, and other areas. Workers must not eat, drink, smoke, or apply cosmetics (including sunscreen) in areas where there is dust containing crystalline silica.

Exhaust Gases from Machinery

Exhaust gases from equipment powered by internal combustion engines, including carbon monoxide, oxides of nitrogen, and aldehydes, are all toxic. Carbon monoxide is a chemical asphyxiant, which can cause rapid loss of coordination, unconsciousness, and death. Any engine operated in, or near, a poorly ventilated area can quickly produce dangerous levels of contaminants.

Control Measures

Because of the extreme risks from hazardous exhaust gases, equipment with an internal combustion engine will NOT be used in an enclosed or poorly ventilated space. Instead, use hydraulic, electric, or pneumatic machines in poorly ventilated spaces. Attempts to use general dilution ventilation to remove exhaust gases are rarely successful because of the large amounts of contaminants produced and physical difficulties in producing and directing the flow of adequate fresh air supplies.

Do not use conventional filtering type respirators to deal with general exhaust gases. There is NO filter to protect a wearer against carbon monoxide for regular respiratory protective equipment.

Working in Confined Spaces

Any work activity undertaken in a confined space can be hazardous. Hazards include:

- Inadequate air quality caused by lack of oxygen (e.g. displacement by carbon dioxide)
- Presence of toxic constituents of the atmosphere (e.g. hydrogen sulphide, carbon monoxide)
- Presence of explosive air contaminants (e.g. methane)

Further (as noted above), for concrete cutting or drilling, the operation of an internal combustion engine equipped machine may produce additional extremely toxic gases in the confined space.

Control Measures

For concrete cutting and drilling, where entry into or on a confined space is needed, the atmosphere must first be tested to check for adequate oxygen, absence of both toxic contaminants and explosive gases or vapors. Where the atmosphere is not suitable for entry, it must be ventilated until it is shown by test to be suitable for safe entry.

Use of machinery in a confined space will be restricted to hydraulic, pneumatic, or electric machines. All machines capable of causing sparks, particularly electric machines, can provide a source of ignition in an explosive atmosphere.

Hazardous Substances Used in the Process

In some instances, chemicals or other hazardous substances may be added as aids in the cutting or drilling operations. The nature of the hazard and the risks will depend on the hazardous substance used.

Control Measures

Relevant safety and health information can be obtained from the SDS for a hazardous substance.

Noise

Noise from concrete cutting and drilling is a serious issue. An operator's hearing may be damaged by very loud noise over a relatively short period or by exposure to a lower level of loud noise over a longer period. In a normal working day, noise from concrete cutting or drilling equipment will lead to exposure to excessive noise for the operator and other nearby workers. The hearing ability of the operators and workers will therefore be at risk if no control measures are implemented.

Control Measures

- There are currently no cutting and drilling equipment available that are quiet enough as not to create excessive noise with normal daily use. Modifications in the form of engineering noise control measures at the source also offer limited noise reduction
- Operators, nearby workers, and bystanders, therefore, must protect their hearing through the wearing of personal hearing protectors. Employers providing hearing protectors must also provide training and instruction in the proper use and maintenance of such personal hearing protectors (and any other protective equipment) the employer requires the worker to wear

Manual Tasks Including Manual Handling

Awkward or static working postures and forceful exertions repeated or maintained for long periods increase the risk of injury by increasing loads on the back, other joints, and soft tissues of the body.

Holding hand held equipment (such as hand held concrete cutting saws) over extended periods increases the loads on the body and the risk of injury.

Control Measures

Possible solutions include:

- Suspending or supporting equipment in a frame to reduce the forces and the awkward and static working postures needed to position it
- Reducing the range of movement of the equipment to minimize the effort or forces needed to guide and control it
- Training workers in safe methods of work and in principles for handling the equipment

Vibration of the Whole Body and/or Hand Arm

Vibration transmitted from concrete cutting and drilling machinery and equipment can affect the body as a whole or segments of the body such as the hands and arms of the operator. The harmful effects from whole body vibration are predominantly of a musculoskeletal nature, especially in the lower spine region. Other effects include fatigue, headaches, gastrointestinal problems, and a reduction in job efficiency.

Hand-arm vibration may cause disturbances in the peripheral nerve and vascular systems of the hands resulting in Raynaud's Syndrome (also known as vibration white finger) which causes the loss of senses of touch and heat, numbness, and loss of grip strength. Other effects can include: damage to tendons, bones, and joints in the hands, wrists, arms, elbows, and shoulders and carpal tunnel syndrome.

Control Measures

Choose equipment:

- That vibrates less or does not have to be held or supported
- That is well balanced, as light as possible, and able to be held with either hand and different sized hands
- With vibration absorbing handles or with an even surface on the handles to distribute gripping force

Covering of metal handles of existing equipment with a soft, resilient rubber can also be very effective in reducing vibration exposure.

Train workers in the use of the equipment with a minimum grip force while still able to perform the work safely.

The use of gloves has minimal effect on vibration exposure. The beneficial effects of the use of gloves are that they can improve grip on the equipment and can keep hands warm and thus increase blood flow to the fingers.

Working at Heights

Working at height with any concrete cutting or drilling equipment is dangerous. Heavy equipment cannot be used safely on an unstable platform and portable equipment should not be used from a ladder.

Control Measures

Do not use ladders when operating concrete cutting and drilling equipment. All work at heights must be done from safe working platforms, such as scaffolding and elevated working platforms.

Electrical Safety

There is a risk of electrocution if extension leads, plugs, and electric powered tools are used in the presence of water. Electrocution can also be caused by inverting hand held equipment when wet cutting.

Control Measures

Equipment operators must make sure:

- Double adaptors and piggyback plugs are not used
- Electrical equipment is inspected, tested, and tagged by a competent person at regular, prescribed intervals
- Electrical equipment is immediately withdrawn from use if it is not safe to use
- Electrical equipment is connected to a GFCI
- Portable GFCI devices are tested at regular, prescribed intervals
- GFCI devices are withdrawn from use if they are not working properly

In addition, suspend cords and extension leads on stands and use waterproof connectors where water may be present. Do not use electrical equipment for inverted cutting.

Damage to Structures

Operators risk injury and the safety of others on site by cutting through stressed components in buildings and any other components that could affect the integrity of the structure.

Control Measures

If components, such as stressing tendons, must be cut, the person responsible for workplace safety must assess the risk. Advice and supervision from a structural engineer must be obtained for all cuts to structural components. The relevant person responsible for workplace safety will locate and mark the location of all components that will affect the strength of a structure if cut as part of initial planning for safety.

Damage to Services

Operators risk injury and the safety of others on the site by cutting through gas, electricity, or water services.

Control Measures

The relevant person responsible for workplace safety on site will locate and mark the location of all services during initial planning for safety. If services are to be cut through, they must be disconnected and tagged. Disconnection will be confirmed and tagged by the relevant service personnel before the work begins. At conclusion of the work, the service personnel will remove their tags.

Loss of Vacuum

Operators using a vacuum assembly to anchor a core drill stand to the surface may risk injury if the vacuum pump fills with slurry. This can cause loss of vacuum, which can result in the drill stand breaking free and rotating around the drill.

Control Measures

Use bolt down stands where practical. Ensure that the surface to be cut is sound and monitor the equipment to ensure that vacuum pressure is being maintained.

Working Alone

When working alone it may be difficult to set up equipment on site

Control Measures

A second person will be available to assist in the set up and relocating equipment on site.

PERSONAL PROTECTIVE EQUIPMENT

The company will provide all necessary personal protective equipment (PPE) to minimize exposure to a risk, the person responsible for workplace safety and health will make sure that workers are properly trained and instructed in the correct use of the equipment, BEFORE starting any concrete cutting or drilling work.

All workers are required to use the PPE provided by the company and the Company will ensure the worker is properly instructed in its use.

The following PPE will be provided, where required:

- Safety Helmets/Hardhats
- Hearing Protection
- Eye Protection
- Safety clothing such as safety boots, waterproof clothing, aprons, gloves, and reflective safety vest
- Respirators
- Gloves to improve grip and reduce force

In addition, operators working outside for long periods will be protected from harsh sunlight and/or reflected light by applying a sunscreen with a SPF rating of at least 15+. They will also wear hats, eye protection, long sleeve shirts, and long trousers.

When selecting items of PPE, they must comply with relevant standards.

Operators will not wear loose clothing and long hair will be covered or tied back. All clothing needs to be comfortable and suitable for the work and the weather conditions.

Storage and Maintenance of PPE

PPE will be stored in a clean and operational condition and in a location that is safe from interference and damage. It must be easily accessible when needed. Employees will inspect PPE regularly to determine that they are in a serviceable condition. Any PPE found to be damaged or defective will be repaired or discarded.

SAFE PRACTICES

General Cautions for Using Hand-Held Concrete Cutting Saws

- ALWAYS follow the designer's recommendations for the safe use of the saw
- ONLY use correct blade size, as recommended by the saw manufacturer. Oversized blades are dangerous
- NEVER use the saw with the guards removed
- Do NOT hold hand-held concrete cutting saws any higher than shoulder height
- Do NOT use hand-held concrete cutting saws for inverted cutting

Preparing a Safe Site

- Those people responsible for workplace safety and health must ensure that the work site is safe, based on the results of the workplace health and safety risk management process, as recorded in the Job Hazard Analysis (JHA) or similar site evaluation
- Site preparation for concrete cutting and drilling operations will include consideration of:
  - Weather/environmental conditions that can create hazards (e.g. heat, rain)
  - Access to and from the work site
  - Barricades and warning signs

- Provisions for appropriate personal protective equipment
- Specific health and safety instructions for the site
- Whether the equipment is suitable for the work, is properly maintained, and will be used according to manufacturer's recommendations
- Provision for GFCI residual current devices for electrical equipment
- Safe removal of cut pieces and cores
- A method to collect residue to prevent the surface becoming slippery and to prevent residue entering storm water drains. Residue will be disposed of according to environmental protection requirements

Setting up Safely: Using a Site Checklist

When setting up the site safely for concrete cutting and drilling activities, a safety checklist, such as the one at the end of this section, will be used to make sure that:

- Work areas and/or work platform are suitable and safe
- Locations of all services are marked/disconnected
- Exact location of the cut or drilling is clearly marked
- The blade/equipment is of correct type and in good condition
- Appropriate barricading and warning signs are erected
- The work area is adequately ventilated
- Adequate lighting is provided, where necessary
- Specific site hazards have been identified and safe systems of work are in place
- There is a method of collecting residue from the operation to prevent surfaces becoming slippery
- There is a method for safe removal or support of cut pieces or cores

Using Cutting Equipment Safely

Before cutting with road, floor, wall, and hand-held saws, the operator will check that the equipment is safe. The operator will check the general condition of the equipment before commencing each job to ensure that the cutting tool, guards, leads, and hydraulic hoses are in good order.

The operator will ensure that:

- The cutting blade is the right size and right type for the machine
- The blade is in good working condition and is free from cracks and deterioration
- The specified blade speed matches the saw drive speed
- The shaft and flanges are clean and undamaged
- The blade fits securely over the shaft
- The shaft nut is tightened against the outside flange
- The blade guard is fitted and in good working order
- The drive belt is at the correct tension
- For wet cuttings, adequate coolant/water is available
- A trolley is used to support the cutting machine for horizontal work at low level, so that operators do not have to work on their knees

- Other people on the site are not at risk
- Safe removal or support of cut pieces or cores is provided
- The equipment is protected at the power outlet with a Ground Fault Circuit Interrupter
- The area behind the cut is barricaded and warning signs are posted when cutting through floors or walls to prevent people entering that area
- Safe operating procedures are in place when hand held saws are used in confined areas
- Appropriate personal protective equipment is provided, where required

During cutting, ensure that:

- The blade guard is in the lowered position
- When starting the machine, the operator and other people stand outside the path of the blade
- If the machine stalls, the blade is raised and the outside flange and nut are checked for tightness
- Wall cuts are performed with the operator's back close to vertical and the hands do not move above shoulder height
- Where possible, cut from a standing position with the feet braced and the body balanced. In some circumstances, it may be necessary to kneel on one knee to enable cuts to be made close to the floor. In such circumstances, protection for the knee will be necessary.
- When cutting horizontally across a wall, the operator's hand is at waist height
- The length of time the operator spends in a fixed position is minimized
- The throttle lock is only used when starting the equipment. If the throttle lock is used during normal operation then the ability to cut power will be reduced
- The equipment is stopped when changing grip to move between horizontal and vertical cuts
- When pre-cutting to 6 inches and changing to a second blade, the blade is aligned with the previous cut on resumption of cutting
- The handles provided (rather than the belt guard) are used to support the equipment
- When using electrical equipment, the leads will not be cut during operation
- Any person, who is providing assistance to the operator, is located where they will not be exposed to danger from sudden saw movement, ejection of material, a dropped machine, or falling offcuts
- The saw is only used with blade rotating in the opposite direction to the cut and not used for inverted cutting
- Plenty of water or coolant is used and that the coolant/water is suppressing dust at the point of generation (airborne dust is a health hazard)
- Appropriate personal protective equipment is being worn

In situations where the power pack for a hydraulic and compressed air wall saw is not easily accessible, or the machine is not remotely controlled at the working head, a second operator must be available.

Using Hand-Held Concrete Cutting Saws

Hand-held concrete cutting saws will only be used where the use of larger, self-supporting saws is not practical. When it is necessary to use a hand-held concrete cutting saw, select one which:

- Has handholds for the operator's non-trigger hand

- Is as light weight as is practical for the type of work, to reduce manual handling risks
- Has the best type of guarding around the blade
- Is well-balanced and has hand grips that are comfortable to use (poorly balanced machines might require operators to place their hands in dangerous positions near the blades to support the machine)
- Has the least vibration when in use, so as to reduce the risk of damage to the operator's blood circulation
- Can be used both left-handed and right-handed
- For horizontal cutting, can be used left-to-right and right-to-left without having to reposition the blade or guard

The operator must be instructed in, and competent at, operating the saw safely. Where possible, the saw will be used with the operator's hands at waist height when cutting horizontally and between shoulders to knee height when cutting vertically. When necessary, provide scaffolding or supports to ensure safe use of the saw. Always check to ensure that hand-held concrete cutting saws have not been modified.

General Cautions for Using Hand-Held Concrete Cutting Saws

- ALWAYS follow the designer's recommendations for the safe use of the saw
- ONLY use correct blade size, as recommended by the saw manufacturer
- Do NOT use oversized blades
- NEVER use the saw with the guards removed
- Do NOT hold hand-held concrete cutting saws any higher than shoulder height
- Do NOT use hand-held concrete cutting saws for inverted cutting

Using Concrete Drilling Equipment Safely

Operators drilling concrete will ensure that:

- Close fitting clothing is worn to avoid entanglement
- The drill is securely fastened to the work surface
- The area below or behind the operation is barricaded to prevent people entering during drilling
- Appropriate warning signs are posted
- The drilling equipment is connected to a GFCI
- Appropriate PPE is provided and being used
- Hydraulic, air, or flexible drive units and a drill stand are used for inverted drilling
- Supply of coolant/water is adequate to suppress dust

Protecting the Public

If cutting or drilling is carried out on a road, or in a public place, the public must be protected and a safe route around the work area must be provided.

Public safety measures include:

- Complying with local government requirements for road or footpath closure

- Barricading or screening the work area to protect pedestrians and to prevent vehicle entry
- Displaying warning signs and caution lighting where necessary lighting the area but ensuring there is no glare or shadows (where flood lighting is used, ensure it is positioned so as not to blind motorists)
- Providing wheelchair access around the area

MAINTAINING CONCRETE CUTTING AND DRILLING EQUIPMENT

Maintenance can prevent equipment from deviating from the design intention in a way that is a risk to safety and health.

Equipment will be maintained according to the manufacturer's specifications for maintenance or, in the absence of such specifications, in accordance with other proven and tested procedures. Regular inspection and routine maintenance undertaken by a competent person will help to ensure safe and efficient operation of equipment.

A suggested schedule is:

- The operator will check the general condition of the equipment daily, before use
- The equipment will be inspected and maintained by a qualified person at least every month or after 50 hours of operation

Defects and Repairs

Defects to concrete cutting and drilling equipment will be reported immediately to the person responsible for equipment maintenance. Because of their day-to-day experience, operators will be regularly consulted about the performance of equipment. Their suggestions for improvements should also be encouraged.

- A qualified person will carry out repairs
- Ensure that equipment with defects that could endanger people is not used

Keeping Records

Complete records of any inspections, services or repairs carried out will be kept for all concrete cutting and drilling equipment. These records will include any faults identified in normal use. Records must be up to date and retained for the life of the equipment.

TRAINING AND INSTRUCTING OPERATORS

All operators of concrete cutting and drilling equipment must know how to work safely and be able to demonstrate competency before using this equipment.

Employers must ensure their workers are trained in safe concrete cutting and drilling work practices and procedures, and are supervised by experienced people before carrying out this unsupervised work.

Training will be conducted at least annually, and will include information and instruction on:

- Dust, fumes, and air quality

- The hazards and risks associated with the work activities, including the potential health hazards of overexposure to airborne dust generated from concrete materials, including silicosis, lung cancer, chronic obstructive lung disease (COPD) and decreased lung function
- Recognition of poorly ventilated areas and confined spaces
- Methods to control exposure to airborne dust from concrete materials, including wet cutting, local exhaust ventilation systems, and process isolation, as applicable
- Proper use and maintenance of dust reduction systems, including the safe handling and disposal of waste materials
- The importance of good personal hygiene and housekeeping practices when working in proximity to dust from concrete, including: not smoking tobacco products, cleaning up appropriately before eating, cleaning clothes appropriately, avoiding other activities that could cause exposure to airborne dusts
- Additional safe work practices and procedures, including: the safe operation of equipment, the control measures in place, safe handling procedures (including lifting and moving), the safe use of hazardous substances, fire protection, emergency and first aid procedures, electrical safety, safety in confined spaces, proper sun protection, and other training required under hazard-specific regulations
- The correct use, fit, care, and storage of tools and personal protective equipment

The operator will be monitored, as necessary or required, to ensure safe work practices and procedures are being followed.

In addition, supervisors must be trained:

- To know and understand the information outlined above in this section
- To identify tasks that may result in employee exposure to dust or other hazards and, as necessary, initiate procedures that reduce employee exposure to dust or other hazards

Employee training records will be retained for the length of their employment.

ATTACHMENTS

- Concrete Cutting and Drilling Site Safety Checklist
- Concrete Cutting and Drilling Equipment Safety Checklist

CONCRETE CUTTING AND DRILLING SITE SAFETY CHECKLIST (PAGE 1 OF 3)

Company Name:			Operator's Name		
Site Location:		Type of Job		Date	

Check the site for safety — on arrival at the site, mark the correct answer where relevant to the job. If the answer is no the situation is unsafe. Alert the office.

	Yes	No	Comment
Site Evacuation			
Checked with Client	☐	☐	
Located First Aid/Accessible	☐	☐	
Scaffolding			
Erected as Required	☐	☐	
Services Located/Marked			
Electricity	☐	☐	
Gas	☐	☐	
Other	☐	☐	
Ventilation			
Adequate	☐	☐	
Lighting			
Lighting in Place	☐	☐	
Control/Public Safety			
Barricades in Position	☐	☐	
Warning Signs Displayed	☐	☐	
Traffic Control in Place	☐	☐	
Safety Equipment			
Safety Equipment is Functional, Clean and Safe	☐	☐	

CONCRETE CUTTING AND DRILLING EQUIPMENT SAFETY CHECKLIST (PAGE 2 OF 3)

Company Name:			Operator's Name		
Site Location:		Type of Job		Date	

Check the equipment for safety — on setting up, mark the correct answer where relevant to the job and equipment. If the answer is NO the situation is unsafe. Alert your supervisor.

	Yes	No	Comment
Floor Saw			
Shaft Nut Secure Belt	☐	☐	
Belt Tensioned and Undamaged	☐	☐	
Adequate Water and Waterways Clear	☐	☐	
Flaps In Place	☐	☐	
Guards In Place	☐	☐	
Hand Held Saw			
Belts Tensioned And Undamaged	☐	☐	
Flange Locking Nut Secure	☐	☐	
Water Supply Adequate	☐	☐	
Guards In Place	☐	☐	
Wall Saw			
Tracks Securely Fastened	☐	☐	
Blade Secured	☐	☐	
Job Wedged/Securely Supported	☐	☐	
Wire Saw			
Pulleys Secure	☐	☐	
Hydraulic Pressure Correct	☐	☐	

CONCRETE CUTTING AND DRILLING EQUIPMENT SAFETY CHECKLIST (PAGE 3 OF 3)

Company Name:			Operator's Name		
Site Location:		Type of Job		Date	

Check the equipment for safety — on setting up, mark the correct answer where relevant to the job and equipment. If the answer is NO the situation is unsafe. Alert your supervisor.

	Yes	No	Comment
Drills			
Electric Switch, Plug, And Lead Safe	☐	☐	
Water Collar Operable	☐	☐	
Carriage Clamp And Shims Operable	☐	☐	
Blade And Bits			
No Undercutting Evident	☐	☐	
Blades Free Of Cracks and Deterioration	☐	☐	
Blade Is Right Size And Type For The Machine	☐	☐	
All Segments Secure	☐	☐	
Electrical Leads			
Plugs In Good Condition	☐	☐	
Outer Casing Intact Correctly Tagged	☐	☐	
GFCIs Fitted	☐	☐	

Notes	

SCOPE

This chapter provides information on the hazards of confined spaces in both Construction and General Industry work. It also covers the current OSHA regulations for both industries and the actions the Company will take to protect employees from those hazards.

POLICY

This confined space policy is designed to ensure the safety and health of employees by limiting exposure to the hazards present while performing construction or general industry work in and around confined spaces.

The OSHA construction confined space regulations do not apply to work already governed by excavation, underground work, or diving regulations.

Although the OSHA confined space regulations for General Industry (1910.146) and for construction (1926 Subpart AA) are similar, there are new components that reflect different challenges present in construction work, including higher employee turnover, changing worksites and multiple contractors (controlling and subcontractors).

DEFINITION

Confined spaces have the following attributes:

- They are enclosed spaces that are large enough to work in
- Existing (natural) ventilation is insufficient to remove dangerous air contamination, or to improve any oxygen deficiency/enrichment that may exist or develop
- They are difficult to enter and exit, and the removal of a suddenly disabled employee is difficult due to the location and/or size of the opening(s)
- They are not designed to be occupied continuously by any employee or person

For these reasons, a confined space can present life-threatening hazards that a qualified person must evaluate, and that must be controlled, before workers may enter the space.

STANDARDS AND REGULATIONS

Except where applicable state regulations specify more stringent requirements, this confined space policy will comply either the OSHA general industry or construction regulations, depending on which is applicable, and will be followed whenever and wherever the Company’s employees could be exposed to confined space hazards.

This program will be available to any employee and their representative at any time.

Working in confined spaces requires close coordination and communication between contractors, companies and employees. Written policies and procedures defining responsibilities are essential for protecting workers.

EMPLOYER RESPONSIBILITIES

This Company will create and implement the following measures to protect its and other employees both inside and outside confined spaces.

- Identify all confined spaces that employees could enter, inform all affected employees of their presence
- Involve affected employees on this policy, ensuring they are educated on the elements of confined space safety and trained in worksite specific procedures
- Document training and keep training records for all current employees
- Complete all confined space entry permits
- Keep cancelled permits until an annual review can be conducted
- Prevent unauthorized entry by using covers, posting signs or an attendant at the entrance
- Enforce safe permit space entry procedures
- Provide the necessary equipment
- Evaluate permit spaces during entry
- Provide attendants outside permit spaces during entry
- Describe how the attendant assigned to monitor multiple spaces will respond to emergencies
- Assign a role to every person in an entry, identify their duties and provide required training
- Arrange for rescue and emergency services for PRCS
- Coordinate entry operations
- Review this policy annually and following any incidents or near misses
- Provide all documents to the Secretary of Labor upon request

ENTRY SUPERVISOR RESPONSIBILITIES

For every permit-required confined space entry, the entry employer will assign an entry supervisor who has the ability to complete the following responsibilities:

- Knowing the hazards of the confined space
- Verifying the permit is completed correctly
- Ordering evacuation and cancelling or suspending the permit
- Communicating with and verifying the availability of emergency and rescue services
- Removing anyone unauthorized who tries to go into a permit space
- Assessing the permit-confined space when taking over responsibility and periodically as needed

Entry supervisors will know and understand the potential hazards of each confined space such as how entrants could be exposed, signs, symptoms and consequences. The entry supervisor will be someone who knows at least as much as the authorized entrants and attendants, and should be someone who knows even more about the space and hazards.

Before signing it, the supervisor will check the completed permit to be sure everything identified in the permit is correct: tests completed, procedures followed, and equipment in place.

The entry supervisor is responsible for deciding when there are unsafe conditions for an ongoing permit entry, terminating the entry and then cancelling or suspending the permit. A permit can be cancelled when the entry permit is completed or when a new condition not addressed in the permit occurs. The supervisor can also suspend a permit if a condition requires temporary evacuation, and the space soon returns to acceptable conditions in the permit. After reevaluating the permit space, the entry supervisor can remove the suspension but will record it on the permit.

The entry supervisor will check that needed emergency and rescue services are available; can be reached, and can themselves respond in a timely manner during the permit-required confined space entry.

When taking over responsibility of a permit space entry, the new entry supervisor will check the confined space conditions to make sure they are within safe levels and consistent with the permit. The entry supervisor is also responsible for periodically assessing the hazards and work within a confined space as often as deemed necessary according to the nature of the possible hazards and expected change of conditions.

ATTENDANT RESPONSIBILITIES

An attendant's primary responsibility is to evaluate and protect authorized entrants inside a PRCS. These responsibilities include:

- Knowing the hazards of the confined space
- Keeping track of authorized entrants
- Remaining outside permit spaces during entry and communicating with entrants
- Assessing the confined space conditions
- Ordering necessary evacuations
- Calling emergency services
- Non-entry rescues
- Keeping unauthorized entrants out
- Focusing exclusively on primary responsibility

Attendants will know and understand the potential hazards of the confined space such as, how entrants could be exposed, signs, symptoms and consequences. This includes knowing how the hazard could affect entrants' behavior.

Attendants will also continuously track authorized entrants in the permit space, and accurately document it on the permit.

An attendant must stay outside the permit space during an entry, even during emergencies regardless of whether entrants can escape, until relieved by another attendant. Once another attendant is on the scene, the attendant still can only try an entry rescue if they have the necessary equipment, are trained to do so and the entry permit allows for it.

Communication includes working with the entrant to make sure they are aware of the potential hazards of the confined space conditions, and understand when to evacuate.

The attendant is responsible for determining when a confined space is no longer safe and ordering entrants to evacuate whenever: there is a prohibited condition, the entrant is showing behavioral effects of exposure, something outside the confined space could be dangerous to entrants or if the attendant can't focus on all required responsibilities.

As soon as the attendant assesses that entrants need help to evacuate the permit space, he/she will immediately call rescue and emergency services as described in the permit and start non-entry rescue established in the permit.

When an unauthorized person approaches a confined space, the attendant will tell he/she to exit immediately. The attendant will tell the entrants and supervisor there is an unauthorized person in the permit space.

Attendants will not be assigned or allowed to do any work that takes their attention away from their focus on the confined space and the safety of people inside and outside it. This means attendants can do tasks that add to their knowledge of permit space conditions, like monitoring atmospheric conditions or passing tools to entrants from outside the space. Although this knowledge can be part of the job description, tasks that do not require continued attention away from or leaving the permit-required confined space are not included.

AUTHORIZED ENTRANTS

Authorized entrants will know and understand the potential hazards of the confined space such as how they could be exposed, signs, symptoms and consequences.

Entrants are expected to properly use all equipment, communicate with attendant and be ready to exit any permit space quickly.

Communication includes working with the attendant to share information attendant about any symptoms, warning signs or prohibited conditions.

The entrant must exit permit spaces when told to by the attendant or entry supervisor, there is an exposure warning sign or symptom, they detect a prohibited condition or an evacuation alarm is activated.

CONFINED SPACES IN CONSTRUCTION

Confined space hazards in construction work differ from those in general industry work mostly due to changing worksites and multiple contractor involvement. These differences require additional communications between employers and more stringent training.

Communicating Between Employers

The host employer will communicate all details about confined spaces at the worksite to the controlling contractor before and after entry. Where the Company has contracted with the property owner to manage it and transmit all confined space details, this Company will be considered both the controlling contractor and the host employer.

As the controlling contractor, all details about confined spaces at the worksite will be communicated with the host employer and all entry employers (i.e. subcontractors) before and after entry, ensuring that information is transferred to the different entry employers before and during entry so they don't create additional hazards for other entry employers' workers. Details will be communicated with other non-entry employers so that their workers do not create hazards or go into the confined space.

The entry employer will communicate all details about the confined space with the controlling contractor before and after entry.

A non-entry employer will communicate with the controlling contractor to determine where the confined spaces, are and the necessary steps to prevent employees from accessing them or creating hazards for other workers. Employees will be instructed not to enter the identified confined space.

IDENTIFYING CONFINED SPACES AND HAZARDS

A confined space is an area a worker can enter, but isn't designed for continuous occupancy and doesn't have an unrestricted entry or exit. A PRCS has a serious health or safety hazard, such as a hazardous atmosphere, material that can engulf a person or is in a shape that can trap or asphyxiate a person (e.g. converging or sloping walls or floor).

The Company will ensure that a competent person will identify all confined spaces an employee might work in, before the work begins, and determine which require permits. Employees and the controlling contractor will be informed directly of the location and danger in each permit space. Signs that warn of the danger and prohibit entry will be placed at permit space entrances.

As an entry employer, a competent person will re-evaluate non-permit spaces and determine if they are a permit spaces whenever there's an indication that the use or configuration has changed increasing the danger, or the original evaluation is incorrect.

Work will be scheduled as much as reasonably possible to avoid confined spaces by finishing tasks in areas before they become confined spaces.

Permit Required Confined Spaces include:

Oxygen-Deficient Atmospheres

An atmosphere with an oxygen concentration below 19.5% has insufficient oxygen for an employee and is a hazardous atmosphere. Such spaces require an approved breathing apparatus and a permit.

Flammable Atmospheres

An atmosphere is flammable, and hazardous, if any of the following conditions are true:

- Flammable gas, vapor, or mist is present in excess of 10% of its lower flammable limit (LFL)
- Airborne combustible dust is present at a concentration at or above its LFL
- Atmospheric oxygen concentration exceeds 23%

Toxic Atmospheres

An atmospheric concentration of any substance in excess of its permissible exposure limit (PEL) creates a hazardous atmosphere, as does any other atmospheric condition that is immediately dangerous to life or health.

Engulfing Potential

Any liquid or flowable solid that can kill by suffocation, strangulation, constriction or crushing has engulfing potential. A confined space that contains a material that can engulf an entrant is hazardous and requires a confined-space entry permit.

Trapping or Asphyxiation Risk

If the walls of a confined space converge inwardly or the floor of a confined space slopes downward to taper to a smaller cross-section an entrant runs the risk of becoming trapped and can face an asphyxiation risk. Confined spaces with such hazards are permit spaces.

Temperature Extremes

Extremely hot or cold temperatures can present problems for workers. Confined spaces can trap heat to create a condition dangerous to the life or health of a worker entering the space.

Noise

The design and acoustic properties in a confined space can amplify noise. Excessive noise can not only damage hearing and reduce reaction time to hazards, but can also affect communication. This can cause a shouted warning to go unheard.

Slippery Surfaces

Slips and falls can occur on a slick, wet, or icy surface, causing injury or death to workers. Further, wet environments can increase the likelihood of electric shock.

Falling Objects

Many confined spaces have openings above the worker that introduce hazards from objects falling from above onto a worker below. Before any worker may enter a confined space, appropriate barriers must protect entrants from falling objects.

CONFINED SPACES WITH ONLY ATMOSPHERIC HAZARDS

The following procedures and conditions are for entering a confined space with only atmospheric hazards that can be made safe to enter through forced air ventilation during entry.

To be more specific, all physical hazards have to be eliminated or isolated through engineering controls, the forced air ventilation has to keep the space safe for entry and entrants must be able to exit safely if ventilation stops working.

If the above can be proven and documented with monitoring and inspection where the data is available to each entrant, the space can be entered without a permit, attendant, or rescue and emergency equipment once the Company certifies that:

- Entrance covers can be safely removed
- Entrance openings are immediately guarded by a railing, temporary cover or barrier that prevents accidental falls into the opening and protects entrants from foreign objects falling into the space
- The internal atmosphere is tested with a calibrated direct-reading instrument in the following order: oxygen content, flammable gases and vapors, and potential toxic air contaminants. The testing procedure is evaluated to ensure it's appropriate for the possible atmospheric hazards. This may mean identifying the possible toxic air contaminants and ensuring the gas detector can detect it, and testing at the top, middle, and bottom of the space to account for different gases' density
- Testing and continuous monitoring ensures there is no hazardous atmosphere
- Continuous forced air ventilation from a clean source directed to the lowest spot or furthest corner, so that it eliminates any hazardous atmosphere from the space while anyone is in the space
- Continuous monitoring of the atmosphere in the space with monitoring equipment that will sound an alarm notifying all entrants if a hazard exceeds the atmospheric thresholds
- Where the preferred continuous monitoring is not used because of equipment limitations, or periodic monitoring is shown to be sufficient, periodic monitoring will be done often enough to detect a hazardous atmosphere is building up and make sure entrants have time to exit
- Once a hazard is observed, everyone will immediately leave the space. The hazard source is then found, and the Company will take steps that protect employees before they enter that space again
- There is a safe way to enter and exit the space, including a personnel hoist made for that purpose, or a job hoist approved ahead of time in writing by a registered professional engineer

The written certificate must contain the date, location of the space and the signature of the person certifying the above conditions have been met. The certification must be made before anybody enters and be available to every employee entering the space. The employer will re-evaluate the space if there is a change to the space that may increase hazards or there is indication the current evaluation is incorrect.

RECLASSIFYING PERMIT REQUIRED CONFINED SPACES FOR ENTRY

Permit required confined spaces without any potential atmospheric hazard can be reclassified as non-permit required once the entry employer certifies that:

- The hazards can be eliminated or isolated without entering the space
- If the entry employer can show they have to enter the space to remove the hazard, then they can do that following the permit process

The written certificate must contain how all the hazards have been eliminated or isolated, the date, location of the space, and the signature of the person certifying the above conditions have been met. The certification must be made before anybody enters and be available to every employee entering the space. If new hazards are identified everyone must leave the space, and the entry employer will reevaluate.

ENTRY PERMIT SYSTEM

Before any employee may enter a PRCS, the employer/entry supervisor must follow the measures outlined in the “Pre-Entry” and “Additional Requirements” sections of this chapter.

The employer must also complete and sign documentation of the measures used to render the space safe for entry and maintain control over potential hazards to workers (an entry permit). The permit must be readily available to all authorized entrants or their representatives, posted at the entry. If the nature of the space prevents permit posting at the entry, the permit must remain available by an equally effective means.

The entry permit that documents compliance with this section and authorizes entry to a permit space will include a written description of:

- The location of permit space to be entered
- The purpose of the entry, including the type of work that will be done
- The time, date and authorized duration of the permit (the duration of the permit can’t exceed one shift or 12 hours; the permit may be extended for another 12-hour period pending recertification of acceptable conditions)
- The names of authorized entrants within the permit space
- The personnel, by name, currently serving as attendants
- The name and signature of the entry supervisor, and if different, the names and signatures of the qualified person responsible for securing the permit, and of the qualified person responsible for reviewing conditions prior to entry
- The hazards of the permit space to be entered
- The measures used to isolate the permit space and eliminate or control permit space hazards before entry, including all means of isolation, cleaning, purging, or inserting
- The minimum acceptable environmental conditions for entry/work in the space
    - See the NIOSH standards for the current permissible exposure/IDHL levels for the chemicals that can be found in confined spaces
- The personal protective equipment required, including respiratory protection, clothing or harnesses required for entry and rescue
    - The results of initial and periodic (at least hourly) atmospheric tests performed to ensure safe entry/work conditions, accompanied by the names of the testers, as well as when the tests were performed
    - The last calibration dates for the oxygen detector and combustible gas indicator being used
- Additional permits needed to complete the task in the confined space
    - The rescue and emergency services that can be summoned and the means of summoning those services
    - The communication procedures used by authorized entrants and attendants to maintain contact during the entry

  - Equipment to be provided for compliance with this section
  - Special work practices or procedures, or any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety
- Any additional permits, such as for hot work, that have been issued to authorize work in the permit space

AFTER ENTRY

Cancel Permit

The entry supervisor will terminate entry and cancel the permit as soon as a condition that is not allowed occurs in or near the confined space, or upon completion of operations requiring permit-space entry.

Retain Permit

Entry permits (and in particular canceled permits) will be retained for at least a year to help in the required regular evaluation of the confined space program. If entry or work presented any problems, the entrant, attendant, or supervisor will note them on the permit to facilitate necessary revisions to the permit space program.

No Entrant

If no employee or contractor will enter a permit-required confined space, effective measures must prevent anyone from entering the permit space.

SAFE PERMIT SPACE ENTRY OPERATIONS

The employer will take the following steps to check out the PRCS before entry.

Test the Air

Before entry, the air must be tested by a qualified individual to determine whether an oxygen enrichment and/or an oxygen deficiency exists, if potential flammable hazards (gases and vapors) exist, and if there is the presence or potential for toxic air contaminants—in that order. Oxygen levels must remain between 19.5% and 23%. A written record of such testing results will be made and kept at the work site during work, and for at least one year afterward. Affected employees or their representative may review and record the testing results.

Testing is not necessary if a toxic material is known to exist, and appropriate PPE is worn.

If interconnected spaces are blinded off as separate units, each space must be tested and the results recorded. In this case, the most hazardous condition that is found will determine the procedures to be followed.

If the space is part of a larger continuous system and can’t be isolated, pre-entry testing will be done, and conditions will be continuously monitored unless necessary monitoring equipment isn’t commercially available. Work in large or continuous system also requires a sufficient early-warning system continuously monitoring for engulfment hazards.

Air Contamination/Hazard Does Not Exist

If an oxygen enrichment and/or oxygen deficiency, flammable hazard, or toxic air contamination don't exist within the space, entry into and work within the space may proceed subject to the following provisions:

The air must continue to be tested and documented by a qualified individual at least hourly if continuous monitoring devices are not used, to ensure that an oxygen enrichment and/or oxygen deficiency, flammable hazard, or toxic air contamination don't occur within the space during the performance of any operation.

Air Contamination/Hazard Exists

Where the existence of an oxygen enrichment and/or oxygen deficiency, flammable hazard, or toxic air contamination is confirmed, existing ventilation must be improved by the use of additional mechanical ventilation or other appropriate means. Work may begin/resume only when air tests reveal that an oxygen enrichment and/or oxygen deficiency, flammable hazard, or toxic air contamination has been eliminated. Ventilation will continue as long as the recurrence of the hazards is possible, or appropriate PPE must be worn by all employees.

Mechanical and Electrical Devices

All fixed mechanical devices and equipment that are capable of causing injury must be placed at zero mechanical state. Electrical equipment, excluding lighting, must be locked out with a key-type padlock and the key will remain with the person working inside the confined space, in cases where locking is impossible, equipment must be properly tagged. Installations under the exclusive control of electric utilities or companies performing the same functions, on their own/leased or public properties, may be exempt.

Continuously monitor the atmosphere in the space with monitoring equipment that will sound an alarm notifying all entrants if a hazard exceeds the atmospheric thresholds.

Pre-Entry

A competent person will identify and evaluate permit space hazards before any employees enter it and establish all the following elements to ensure safe work in the area have been met, especially:

- Citing the acceptable entry conditions
- Authorized entrants can observe space testing and monitoring
- Isolating the space and its hazards
- Controlling atmospheric hazards through purging, inerting, flushing or ventilating
- Reducing the atmosphere to below 10 percent of its Lower Flammable Limit (LFL) or inerting the atmosphere so that it is entirely non-combustible and addressing the other atmospheric hazards like oxygen deficiency through PPE
- Ensuring monitoring procedures will detect atmospheric hazard level increases quickly enough for entrants to exit, in case ventilation stops working
- Having necessary barriers to protect entrants from outside hazards

- Conditions continue to allow safe entry the entire time
- The necessary PPE effectively protects every employee, and that they have the PPE before entering a hazardous atmosphere
- Conditions, like high pressure, that can make removing an entrance cover unsafe are eliminated

Prevent Dangerous Air Contamination

Before any employee enters the permit space, the space must be emptied, flushed or otherwise purged of flammable, injurious or incapacitating substances to the greatest extent possible. In short, the space must be isolated from hazards (which may require lockout/tagout).

Pumps and lines must be disconnected, blinded or blocked off by other positive means to prevent the development of dangerous air contamination, as well as oxygen enrichment and/or oxygen deficiency. The disconnection or blind should be located or performed in a manner that prevents the inadvertent reconnection of the line or removal of the blind. The closing of valves alone, or the closing of valves and locking or tagging them, is not considered effective protection. Initial cleaning must be done from outside the confined space to the extent feasible.

Exceptions: This does not apply to public utility gas distribution systems, and it does not necessarily require blocking of all laterals to sewers or storm drains.

Additional Requirements

When oxygen-consuming equipment such as salamanders, plumbers' torches, furnaces and similar equipment will be used, measures must be taken to ensure adequate combustion air and exhaust gas venting.

No sources of ignition are permitted in a confined space until procedures have been implemented to ensure that oxygen enrichments and/or oxygen deficiencies, flammable hazards, or toxic air contamination do not exist. Fans or other equipment used for removing flammable gases or vapors must not create an ignition hazard. Never take cylinders of compressed gases into a confined space, except for cylinders that are part of self-contained breathing apparatus or resuscitation equipment. When left unattended, a torch and hose must be removed from a confined space. Open-end fuel gas and oxygen hoses must be immediately removed from an enclosed space when they are disconnected from the torch or other gas-consuming device.

All electrical cords, tools and equipment must be inspected for defects before use in a confined space. In the absence of low voltage circuits and equipment or double-insulated tools, equipment must be of the heavy-duty insulation type, or ground-fault circuit interrupters must be used. Temporary lighting must be operated at 12 volts or less. However, 120-volt lights may be used if protected by a ground-fault circuit interrupter.

Efforts must be made to permit ready entry and exit to the confined space, to the greatest extent feasible. Where it’s not feasible to provide for ready exit from spaces equipped with automatic fire-suppression systems that use harmful concentrations of toxic or oxygen-displacing gases, or total foam flooding, these systems must be deactivated. Where it is not practical or safe to deactivate such systems, the use of respiratory protective equipment will apply during entry into, and work within, such confined spaces.

Measures such as posting warning signs or erecting barriers will be implemented to prevent unauthorized entry into permit spaces, and to protect entrants from falling objects and other hazards from outside of the space.

Smoking is prohibited in confined spaces or within 20 feet of a confined space opening.

Confined Space Entry

The following provisions apply to the entry into, and work within a PRCS. A confined space is considered to be permit-required if, through the steps outlined in the "Pre-Entry" subsection above, an atmosphere is found to contain, or can't be verified to be free of, an oxygen enrichment and/or oxygen deficiency, flammable hazard, or toxic air contamination.

Safe Practices

- Tanks, vessels, or other confined spaces with side and top openings must be entered from side openings when practicable. For the purposes of this requirement, side openings are those within 3½ feet of the bottom
- Appropriate, approved respiratory protective equipment must be provided and worn
- If entry into a confined space is through a top opening, an approved safety belt with an attached line must be used. The free end of the line will be secured outside the entry opening. The line must be at least ½ inch in diameter and 2,000-pounds test. The exception to this requirement is where it can be shown that a safety belt and attached line would further endanger the life of the employee
- At least one standby employee/attendant must stand by outside of, in near proximity to, and within view of the entry of the confined space ready to give assistance in case of emergency. The standby employee must maintain visual, voice or single-line communications with all individuals in the confined space and must have means available to summon assistance. At least one additional employee who may have other duties must be within sight or call of the standby employee(s)
- The standby employee(s) will have appropriate training, as well as approved respiratory protective equipment, including an independent source of breathing air available for immediate use
- The protected standby employee(s) may enter the confined space, but only in case of an emergency, and only after alerting at least one other trained rescue worker or emergency response team (fire department) of the existence of an emergency and of their intent to enter the confined space
- Entry into a confined space without an attendant is allowed only when there is no potential for engulfment or IDHL atmospheres. In that case, at least one entrant must wear a continuous monitoring device equipped with an alarm and capable of evaluating oxygen concentrations and combustible gas concentrations in the confined space. When large confined spaces are entered, a sufficient number of monitoring devices must either be worn or located in the work area to monitor the atmosphere adequately

When entry must be made through a top opening, the following requirements will also apply:

- The safety belt will be a harness type that suspends a person in an upright position
- The lifeline must be strung from the employee overhead and back down to the employee, where it must be tied to the employee's "D" ring, keeping the lifeline reasonably taut at all times
- A hoisting device or other effective means must be provided for lifting employees out of the space
- Work involving the use of a flame, arc, spark or other source of ignition is prohibited within a confined space (or any adjacent space having common walls, floor or ceiling with the confined space) that contains, or is likely to develop, oxygen enrichment or dangerous air contamination due to flammable and/or explosive substances
- When gases such as nitrogen are used to provide an inert atmosphere for preventing the ignition of flammable gases or vapors, no flame, arc, spark or other source of ignition is permitted unless the oxygen concentration is maintained at less than 20 percent of the concentration that will support combustion
- Testing of the oxygen content must be conducted with sufficient frequency to ensure conformance with this oxygen concentration
- A written record of the results of such testing must be made and kept at the work site for the duration of the work
- Only approved lighting and electrical equipment may be used in confined spaces subject to oxygen enrichment or dangerous air contamination by flammable and/or explosive substances
- Employees working in confined spaces that contain, or contained, substances corrosive to the skin or substances that can be absorbed through the skin, must be provided with, and will be required to wear, appropriate personal protective clothing or devices. Eyewashes and safety showers may also be required
- The Company requires a second employee be available to help in an emergency when an employee enters a manhole, unless the employee can safely enter for a brief period to perform inspections and housekeeping, take readings, or some other task that can safely be done

When a host employer arranges to have employees of another employer (contractor) perform work that involves a confined space entry, the host employer must:

- Inform the contractor that the workplace contains a confined space and that confined space entry is allowed only through compliance with this confined space program, as they apply to the project/contractor
- Inform the contractor of the elements, including the hazards identified and the host employer's experience with the confined space, that make the space in question a confined space
- Inform the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near the confined space where the contractor's personnel will be working
- Coordinate entry operations with the contractor, when both host employer and contractor personnel will be working in or near the confined space, so that operations of one employer won't endanger the employees of any other employer

- Debrief the contractor at the conclusion of the confined space operation regarding the confined space program followed, and any hazards confronted or created in the confined space during entry, or other, operations

In addition to complying with the confined space requirements that apply to all employers, each contractor retained to perform confined space entry operations must:

- Obtain any available information regarding confined space hazards and entry operations from the host employer
- Coordinate entry operations with the host employer, when both host employer personnel and contractor personnel will be working in or near a confined space, so that operations of one employer will not endanger the employees of any other employer
- Inform the host employer of the confined space program that the contractor will follow, and of any hazards confronted or created in the confined space, either through a debriefing or during the entry operation

EQUIPMENT

The Company will provide suitable equipment needed to safely enter, exit from and conduct rescues in confined spaces. The equipment will be properly maintained and all employees will know how to use it correctly. Equipment requirements can include:

- Adequate testing and monitoring equipment
- Ventilating equipment that makes entering possible
- Communication equipment that allows attendant to talk to entrants
- PPE that meets any other applicable requirements where engineering and administrative controls don't give enough protection
- Lighting that meets the minimum illumination requirements, that won't ignite any gas, vapor, dust or fiber present, and that enables employees to work safely and exit during emergencies
- Barriers and shields that effectively isolate the confined space
- Ladders needed to enter and exit the confined space
- Rescue and emergency equipment that is called for in the Company's emergency rescue policy

TRAINING

Employees will be trained in a vocabulary and language they understand so that they are proficient in their expected responsibilities. This training will occur:

- Before they are first assigned duties that involve confined-spaces work
- Before there is a change in their assigned duties, as applicable to confined spaces
- When there is a change in permit-space operations that warrants training
- When any new hazard on which the employee has not been trained is, or may become, introduced to a confined space
- When the employee does not follow or understand entry procedures

Assigned duties include authorized entrant, attendant, entry supervisor and emergency rescue. Employees not authorized to enter confined spaces will be trained on the hazards of the confined spaces at the worksite, and how to avoid them.

The training and determination of proficiency will be documented and kept for all current employees. This documentation will be available to all employees who ask for it, and the Secretary of Labor upon request.

Training Components

All employees will be trained in the following minimum elements:

- How to identify a confined workspace
- The need for safe, confined-space entry procedures
- Hazard recognition, including inherent or possible hazards presented by confined spaces in the workplace
- The use of respiratory protection equipment, if it is required or may be needed
- The use of atmospheric testing devices, if employees are required to use them, training will cover field checks as specified by the manufacturer, normal use and specific limitations of the equipment
- Lockout/tagout procedures
- The use of any special equipment and tools
- The roles of individuals involved in the safe entry into, and work in, confined spaces
- Emergency and rescue procedures and methods

Employees expected to perform duties as an entry supervisor, hazardous confined space entry attendant or authorized entrant will receive specific training and demonstrate the understanding, knowledge and skills necessary to participate safely in the confined space entry program, including, but not limited to the following:

- The specific hazards of all confined spaces in the workplace
- Conditions under which a confined space may or must be reclassified under the confined space entry program
- Conditions required to participate in alternate confined space entry procedures and the alternate procedures for permit space entry
- Pre-entry procedures for confined space entry
- Any equipment provided or used as part of the confined space entry program
- Plans and procedures for response or rescue in case of an emergency in a permit space and permit-space evacuation
- The contents and requirements of a confined-space entry permit
- The roles and responsibilities of each employee involved in confined space entry and operations
- The importance of atmospheric monitoring, and how to perform such monitoring
- The steps that are required following permit space entry
- The permit space program review process

Rescue Teams

- Rescue teams, if applicable, must be trained to use the equipment they may need to perform the rescue functions that are assigned to them
- At least annually, rescue teams will practice removing victims through openings and portals of the same size, configuration and accessibility as those of spaces from which an actual rescue could be required
- The attendant or at least one member of each rescue team must hold current certifications in basic first aid and CPR

Training Records

Training will be certified by recording the following:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment, and will be made available to employees and their representatives.

PRECAUTIONS FOR EMERGENCIES IN CONFINED SPACES

At least one person trained in first aid and cardiopulmonary resuscitation (CPR) must be immediately available when the use of respiratory protective equipment is required in a confined space. Standards for CPR training will follow the principles of the American Heart Association or the American Red Cross.

An effective means of communication between employees inside a confined space and a standby employee will be used when the use of respiratory protective equipment is required, and when employees inside a confined space are out of sight of the standby employee(s). All affected employees must be trained in the use of the communication system, and the system must be tested before each use.

RESCUE AND EMERGENCY SERVICES FOR PRCS

Rescue and emergency service procedures are a necessary component of the permit and include the preferred non-entry and entry rescues. The non-entry can be initiated immediately by the attendant and entry supervisor who remains outside the PRCS. Entry rescues need to be either from a designated outside source or a team of selected employees, and each has their own requirements. Unauthorized personnel must not attempt a rescue.

Any injured entrant that is exposed to a hazardous substance at the worksite will bring the associated Safety Data Sheet (SDS) and provide it to the facility where the medical treatment takes place.

Any injured entrant that is exposed to a substance with a SDS at the worksite will be given to the medical facility where he is treated.

Outside Rescue and Emergency Services

Outside rescue and emergency services will be evaluated to ensure they can respond quickly, and have both the equipment and ability to provide rescue when considering each PRCS and the identified hazards.

The Company will provide hazard information about its confined spaces and allow the service to go to the PRCS and develop rescue plans. The service selected must have the training, equipment, ability and willingness to perform rescues. The service also has to agree to tell the Company when it will be unable to perform rescues.

The time it takes the service to reach the permit space, enter and retrieve entrants will also be considered, along with the rescue requirements of other regulations. In particular, if the PRCS could have an atmosphere that is immediately dangerous to life or health (IDLH), the respiratory protection standard requires standby rescue personnel equipped with respiratory protection. A response time of 15 minutes may be determined adequate for mechanical hazards that could cause broken bones or abrasions.

Employee Rescue and Emergency Services

When selecting a team of employees to provide rescue and emergency services, they will: have the necessary equipment and PPE; be trained to be proficient as entrants and rescuers, correct PPE use, basic first aid and cardiopulmonary resuscitation (CPR); and practice attempting the type of rescue needed at least once every 12 months. At least one member of the rescue team will have current basic first aid and CPR certifications.

If a rescue operation is correctly performed in the last 12 months, then practice is not necessary.

Non-Entry Rescue and Retrieval Equipment

Authorized entrants who enter a permit space must wear a chest or full body harness with a retrieval line attached to the center of their backs near shoulder level or above their heads. Wristlets may be used if the employer can demonstrate that the use of a chest or full body harness is not feasible or creates a greater hazard.

The other end of the retrieval line must be secured outside of the permit space, either by another person holding the line, or by attaching it to a mechanical device or a fixed point. A mechanical device must be available to retrieve someone from vertical-type permit spaces deeper than five feet deep. When entry is made through a top opening, a hoisting device such as a tripod must be provided for lifting employees out of the space.

The line will be attached outside the permit space so that it can be used to pull entrants out as soon as they need to be rescued. This can either be a mechanical device like a block and tackle or winch system, or a fixed point. Vertical entrances more than five feet deep call for a mechanical device to assist rescue.

Circumstances described by OSHA that increase risk of or hamper rescue include anything that can catch onto or entangle the retrieval line like physical obstructions, airlines, electric cords and additional retrieval lines from multiple entrants. The distance entrants have to go into the space and how much they will have to move around can also affect the decision that a retrieval system is too dangerous.

Additional Management Responsibilities

Management is also required to adhere to the following requirements, as applicable to the job at hand:

- Evaluate the workplace to determine whether any spaces are permit-required confined spaces
- Inform exposed employees of the presence of permit-required confined spaces with signs or equally effective means
- Take measures to prevent employees from entering permit spaces without permit
- Develop and implement a written permit space program — available for inspection by employees or their representatives — if employees are permitted to enter permit spaces
- Reevaluate, and reclassify as necessary, a non-permit confined space when there are changes in use or configuration of that space that may increase hazards to entrants
- Abide by all applicable standards and regulations when work with a contractor involves permit space entry
- Provide and keep in good repair all equipment necessary for the written permit space program
- Evaluate permit space conditions when entry operations are concluded
- Provide at least one attendant outside of a permit space during entry operations in order to respond to an emergency
- Designate individuals with active roles in entry operations, identify their duties, and provide appropriate training
- Develop and implement all other elements of a permit space program including, but not limited to:
  - A system for preparing, issuing, using and cancelling entry permits
  - Procedures for summoning rescue and emergency services
  - Procedures for concluding entry/operations
- Review entry operations and the permit space program to ensure employees are protected from permit space hazards
- Consult with affected employees or their representatives in the development and implementation of all elements of the permit space program, and make available to them all information required for the program

POLICY REVIEW

This policy will be reviewed annually and when measures may not protect employees, such as after any incidents or near misses. Any deficiencies will be corrected before entering any additional PRCS.

Some examples of situations that may require a review are:

- An unauthorized person enters a PRCS

- A new hazard not covered by the permit is detected in a PRCS
- A new condition prohibited by the permit is detected in a PRCS
- An injury takes place during entry
- A change in the PRCS configuration or use
- An employee issues a complaint

The annual review will ensure that all cancelled permits are included in the review within one year after entry. This review will evaluate the policy's effectiveness of providing protection to all affected employees.

FORMS AND ATTACHMENTS

Evaluate the documents on the following pages along with their source material from the General Industry Regulation's appendixes, and consider using them to implement and maintain your safety program.

- Confined-Space Entry Permit
- Confined Space Entry Training Record Sheet
- Initial Evaluation of Confined Space Rescue Plans
- Evaluation of Confined Space Rescue Program
- Planning Confined Space Rescue Drills

CONFINED SPACES ENTRY PERMIT (1 OF 3)

GENERAL INFORMATION					CONTROLS AND EQUIPMENT
Permit Space Location					☐ ISOLATION ☐ Lockout/Tagout ☐ Blanking/Blinding ☐ Double Block and Bleed ☐ Line Breaking/Misalignment ☐ Other: _____ ☐ INERTING ☐ PURGE/CLEAN ☐ METHOD FOR SAFE COVER REMOVAL AND SECURING AREA ☐ ATMOSPHERIC TESTING ☐ Periodic (give interval) _____ ☐ Continuous ☐ VENTILATION ☐ Natural ☐ Continuous Forced Air ☐ Local Exhaust ☐ ENTRY EQUIPMENT ☐ Ladders ☐ Other: _____ ☐ PERSONAL PROTECTIVE EQUIPMENT ☐ Respiratory (SCBA, SAR, air purifying) ☐ Clothing ☐ Eye and Face Protection ☐ Hearing Protection ☐ RESCUE and RETRIEVAL EQUIPMENT ☐ Full Body Harness ☐ Lifeline ☐ Tripod w/Mechanical Wench ☐ Explosion-Proof Lighting ☐ NON-SPARKING TOOLS ☐ SAFE ELECTRICAL EQUIPMENT and GFCI ☐ COMMUNICATION EQUIPMENT ☐ Radio ☐ Phone ☐ Other:_____ ☐ HOT WORK PERMIT ☐ FIRE EXTINGUISHERS
Purpose of Entry					
Permit Valid For	Date		To		
	Time		To		
PERMIT SPACE HAZARDS				**Y N**	
ATMOSPHERIC	Oxygen Deficient			☐ ☐	
	Oxygen Enriched			☐ ☐	
	Explosive (Gas/Vapor)			☐ ☐	
	Explosive Dust			☐ ☐	
	Carbon Monoxide			☐ ☐	
	Hydrogen Sulfide			☐ ☐	
	Other Toxic Vapors			☐ ☐	
ENGULFMENT				☐ ☐	
CONFIGURATION (ENTRAPMENT)				☐ ☐	
MECHANICAL				☐ ☐	
ELECTRICAL				☐ ☐	
SUBSTANCE HAZARD TO SKIN/EYES				☐ ☐	
HEAT STRESS				☐ ☐	
OTHER POTENTIAL HAZARDS (radiation, noise, etc, list)				☐ ☐	
				☐ ☐	
				☐ ☐	

CONFINED SPACES ENTRY PERMIT (2 OF 3)

PERSONNEL								
Entrant(s)			Time In		Time Out			
Attendant(s)								
Entry Supervisor(s)								
COMMUNICATION PROCEDURES								
Visual	☐	Voice	☐	Rope	☐	Radio	☐	
Other								

RESCUE AND EMERGENCY SERVICES				RESCUE PROCEDURES
Name		Phone		
Name		Phone		
Summoning Procedure				

CONFINED SPACES ENTRY PERMIT (3 OF 3)

ATMOSPHERIC TESTING RECORD										
Condition	Acceptable Level	Record continuous monitoring results every 2 hours								
OXYGEN	19.5% - 23%									
EXPLOSIVE (GAS/VAPOR)	<10% LFL									
EXPLOSIVE DUST	<LFL (5ft Visibility)									
CARBON MONOXIDE	50ppm									
HYDROGEN SULFIDE	10ppm									
OTHER (Specify)										
NAME(S) OF TESTER(S)										
TESTING EQUIPMENT	Type									
	Serial #									

ENTRY AUTHORIZATION (ENTRY AUTHORIZED BY)					
Signature		Date		Time	

ENTRY SUSPENSION (ENTRY SUSPENDED BY)					
Signature		Date		Time	
Resumed after Reevaluation		Date		Time	
Description					

ENTRY CANCELLATION (ENTRY CANCELLED BY)					
Name				Date	
Signature				Time	
Reason for Cancellation	☐	Entry Operations Completed	☐	Prohibited Condition Arose	
Problems Encountered					

RESCUE AND EMERGENCY SERVICES

Name	Rescue Duties	Rescue Equipment and PPE Authorized For Use	Training		Certified (Y/N)	Rescue Practice Date	Rescue Practice Session Description	Name of Trainer	Date of Training
			First Aid	CPR					

TRAINING RECORD

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name:	**Signature:**

INITIAL EVALUATION OF CONFINED SPACE RESCUE PLANS

Use this worksheet to determine if a permit-required confined space rescue plan is sufficient. This plan could be a response team of employees trained by the employer or calling 911. Both must pass muster. Answering "no" to any question means an alternative must be considered to satisfy the requirements in this guide.

Tasks	Results
1. Determine the rescue response time needed for permit-required confined spaces. In other words, how long can a person remain trapped in the confined space? Consider any PEL, REL time limits (e.g. H_2S has an NIOSH REL 10 ppm ceiling for 10 minutes) If there is a possible IDLH, a rescue team needs to be standing by. If the hazards are only physical (e.g. broken bones, abrasions) a longer response time can be tolerated.	Needed rescue response time _____ minutes
2. Calculate the time required for the rescue service by adding the needed time to: get the notification, arrive at the scene, set-up and be ready to enter. Consider the rescue team's distance from each worksite, quality of roads and traffic, reliability and training of the drivers. Then subtract the needed response time. The answer must be a positive number to continue.	Receive notification _____ minutes + Arrive at the scene _____ minutes + Set up and be ready for entry _____ minutes - Needed rescue response time _____ minutes = _____ minutes Must result in a positive number
3. Determine the rescue response service availability: a) Is the rescue service available when workers will enter the permit-required confined space? b) Are key rescue members available at these times? c) Can the rescue service notify the attendant when they are unavailable so entries can be prevented or stopped?	☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO
4. Has the rescue service passed the most recent performance requirement evaluations?	☐ YES ☐ NO
5. Is the planned 911 service willing to perform rescues: a) If you call 911, is a responder available? b) Is the 911 responder willing to perform rescue and first aid? c) Are the 911 responders able to perform rescues at the worksite?	☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO
6. Can the attendant immediately request a rescue?	☐ YES ☐ NO

EVALUATION OF CONFINED SPACE RESCUE PLANS

Follow this checklist to determine if a permit-required confined space rescue plan meets all performance requirements. This critique should occur during any periodic drills or following a successful rescue. Answering “no” to any question, means an appropriate corrective action must be considered.

Tasks	Results
1. Has the entire team been trained as entrants, and know the potential hazards of at least the types of spaces they may have to perform a rescue?	☐ YES ☐ NO
2. Can the team recognize signs, symptoms, and consequences of hazardous atmospheres possible in the permit confined space?	☐ YES ☐ NO
3. Is every team member: a) Provided with and trained in PPE necessary to perform rescues? b) Trained to perform rescues and use rescue equipment (e.g. ropes, backboards)?	 ☐ YES ☐ NO ☐ YES ☐ NO
4. Is every team member trained in first-aid and medical skills to treat victims injured or overcome by possible hazards?	☐ YES ☐ NO
5. Do team members perform duties safely and efficiently?	☐ YES ☐ NO
6. Do team members focus on their own safety before the victim’s?	☐ YES ☐ NO
7. If necessary, can the rescue service test the air identifying entry conditions?	☐ YES ☐ NO
8. Can team members find information that applies to rescues? a) Entry permits b) Hot work permits c) Safety Data Sheets	 ☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO
9. Does the rescue service know of any hazards from outside the permit area (e.g. nearby construction)?	☐ YES ☐ NO
10. If necessary, can the rescue service safely rescue victims from: a) A limited size opening (less than 2 ft. in diameter)? b) Limited internal space? c) Internal obstacles or hazards?	 ☐ YES ☐ NO ☐ YES ☐ NO ☐ YES ☐ NO
11. If necessary, can the rescue service safely perform an elevated rescue?	☐ YES ☐ NO
12. Does the rescue service have a plan for each type of rescue needed? a) A plan for each kind of permit space rescue operation at the worksite? b) Does the plan cover all types of possible necessary rescue operations?	 ☐ YES ☐ NO ☐ YES ☐ NO

PLANNING CONFINED SPACE RESCUE DRILLS

Follow this worksheet to check off that the rescue team's periodic drills – at least once every 12 months when a successful rescue has not been completed – covers all possible scenarios and worksite characteristics. Practices may occur in representative spaces or in the "worst-case" environment with the most restrictive access, entrance size, and configurations.

Tasks	Results
1. **Horizontal Access**. The entrance is located on the side of the permit space. Using retrieval lines may be difficult.	Is this a possibility at the worksite? ☐ YES ☐ NO Description attached? ☐
2. **Vertical Access**. The entrance is located: a) On the top of the permit space so rescuers must climb down, or b) On the bottom of the permit space so rescuers must climb up to enter.	Is this a possibility at the worksite? ☐ YES ☐ NO Description attached? ☐
3. **Restricted Entrance Size**. Smallest diameter entrance is 2 ft. or less. These are too small for rescuers to enter with a SCBA, or allow normal spinal immobilization of an injured employee.	Is this a possibility at the worksite? ☐ YES ☐ NO Description attached? ☐
4. **Unrestricted Entrance Size**. Smallest diameter entrance is 2 ft. or more, and allows relatively free movement into and out of the permit space.	Is this a possibility at the worksite? ☐ YES ☐ NO Description attached? ☐
5. **Open Internal Configuration**. The space has no barriers, obstacles, or obstruction (e.g. a water tank).	Is this a possibility at the worksite? ☐ YES ☐ NO Description attached? ☐
6. **Obstructed Internal Configuration**. The space has an obstacle that requires the rescuer to maneuver around it (e.g. baffle, mixing blades). Equipment brought into the space (e.g. ladder, scaffold) can be an obstruction if its position or size increases the rescue difficulty.	Is this a possibility at the worksite? ☐ YES ☐ NO Description attached? ☐
7. **Elevated Entrance Configuration**. The entrance is 4 ft. or more above grade, requiring high angle rescue procedures because of the difficulty transporting victims from the entrance to the ground.	Is this a possibility at the worksite? ☐ YES ☐ NO Description attached? ☐
8. **Non-elevated Entrance Configuration**. The entrance is less than 4 ft. above grade, and the rescue team can normally transport victims.	Is this a possibility at the worksite? ☐ YES ☐ NO Description attached? ☐

SCOPE

This chapter defines the requirements for ensuring cranes and crane operators are fully qualified to protect the safety of all employees according to OSHA regulation 1926 Subpart CC Cranes and Derricks in Construction. The information included here is general in nature and applies to all cranes, hoists and mobile lifting devices. Always refer to the manufacturers' information for specific requirements of the equipment being used.

POLICY

This policy applies to crane operators, cranes, and other material handling equipment for the movement of material by hoisting.

EMPLOYER RESPONSIBILITIES

A Competent Person designated by the Company will have the authority over all crane and hoisting operations. The competent person will ensure that all safety measures and systems are in place; all safety procedures are adhered to, and make sure regular inspections of the crane, operational site and rigging equipment are made.

- An employer must limit the use of a crane to the following personnel:
  - An employee who has been trained and qualified in safe operating procedures for the type of crane they will be using
  - A trainee who is under the direct supervision of a designated operator
  - Designated maintenance personnel while performing their duties
- Employers must maintain a crane and its accessories in good condition
- The original safety factor of equipment must not be reduced if modifications or changes are made to the equipment. Modifications or changes must be certified by a qualified registered engineer. The capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly to reflect any modifications or changes
- The manual provided by the crane manufacturer must be readily accessible for the crane operator's reference at the work site
- A load-rating chart must be permanently mounted in the cab of each crane, easily readable from the operator's normal operating station
- Certified written operational and rated load tests will be obtained from the manufacturer and kept available with the equipment. Equipment will be re-tested after any structural repairs or modifications which may only be made by the manufacturer or technician certified by the manufacturer
- The Company will comply with the manufacturer's specifications and limitations. If specifications are not available, a qualified engineer will determine the equipment's limitations, which must be documented and recorded. Attachments used with cranes must not exceed the capacity, rating, or scope recommended by the manufacturer

- Obtain all necessary permits and operator certifications for using fixed and mobile cranes. These will depend on the size and rated capacity of the crane, as well as the regulatory agency with jurisdiction (state or federal OSHA)
- A preventive maintenance program based on the crane manufacturer's recommendations will be established, and performed
- Any unsafe condition found during an inspection must be corrected by a trained and qualified employee or crane Service Company before the crane is put into operation. Designated repair personnel must have a permit to operate the type of crane being serviced. Maintenance records will be kept of all repairs and replacements
- Before any servicing or maintenance of equipment is done, personnel will perform proper applicable lockout/blockout/tagout procedures to ensure the safety of all workers

OPERATOR RESPONSIBILITIES

An employee selected to operate a crane must possess all of the following minimum physical qualifications and be examined for the qualifications at least once every 3 years:

- Have corrected vision that meets the same requirements as for the applicable state’s driver's license (possession of a state driver's license or doctor's certificate covers this requirement)
- Have effective use of all four limbs
- Be of a height sufficient to operate the controls and to have an unobstructed view over the controls into the work area
- Have coordination between eyes, hands, and feet
- Be free of known convulsive disorders and episodes of unconsciousness
- Be able to understand signs, labels, and instructions

INSPECTIONS

The Company requires a visual crane inspection before each shift by a designated competent person to ensure that the crane is working properly. Required crane inspections include initial, pre-use, monthly, quarterly and annual. Supporting inspection logs will be kept to satisfy this requirement. The following will be checked:

- Control mechanisms for wear and malfunction, each daily use
- Deterioration or leakage of air or hydraulic systems, each daily use
- Hydraulic system for oil level, each daily use
- Hydraulic hoses and fittings for leaks and deterioration
- All running ropes, each daily use
- Replace a hook having a crack, a throat opening of more than 15% of normal or more than 10-degree twist from the plane of an unbent hook
- Rope reeving in conformance with the original installation
- Electrical apparatus for malfunction, wear, dirt, and moisture accumulations
- Tires for specified pressure
- The ground conditions

Monthly inspections will be made and documented by a designated competent person. The things to be inspected monthly include the following:

- Structural members and boom for cracks, deformation, and corrosion
- Bolts and rivets for tightness
- Sheaves, drums, pins, bearings, shafts, gears, rollers, locking and clamping devices for wear, distortion, and cracks
- Power sources for performance
- Brake and clutch system parts, linings, pawls, and ratchets for excessive wear
- Load, boom angle, and other indicators for inaccuracies over their full range
- Travel, steering, braking, and locking devices for malfunction
- Tires for wear or damage
- Radiators and oil coolers for leakage, blockage of air passages, and improper performance
- Rust on piston rods and control valves
- Oil strainers and filters for blockage

The documentation of monthly inspections must include the parts of the crane checked, the results of the inspection and the name and signature of the inspector with the date of the inspection.

Records of the documentation must be kept for at least 3 months.

Occasional and Out of Service Inspections

- A crane which has been idle more than 1 month, but less than 6 months will receive an inspection before being placed in service
- A crane, which has been idle more than 6 months, will receive an inspection before being placed in service
- A standby crane will be inspected at not less than 6-month intervals

ASSEMBLY AND DISASSEMBLY OF CRANES

Employer procedures must be developed by a qualified person and satisfy specific requirements: providing adequate support and stability for all parts of the equipment, and positioning employees involved to minimize exposure to any unintended movement or collapse.

Follow all manufacturer established procedures when assembling and disassembling cranes. You must follow manufacturer procedures when using synthetic slings during assembly or disassembly rigging. Synthetic slings must be protected from abrasive, sharp or acute edges and configurations that might reduce the sling’s rated capacity.

Procedures

All assembly/disassembly work will be supervised by an A/D (Assembly/Disassembly) director. The A/D director must meet the criteria for both a competent person and a qualified person or be a competent person assisted by a qualified person.

The A/D director must:

- Understand the applicable procedures
- Review procedures immediately prior to beginning work unless they understand the procedures and has used them before for that equipment type and configuration
- Ensure that each crew member understands their tasks, the hazards, and any hazardous positions or locations to avoid
- Verify all capacities of any equipment used, including rigging
- Address hazards associated with the operation, including 12 specified areas of concern: site and ground conditions, blocking material, proper location of blocking, verifying assist crane loads, boom and jib pick points, center of gravity, stability upon pin removal, snagging, struck by counterweights, boom hoist brake failure, loss of backward stability and wind speed and weather

Inspection

Before using the completed assembly, the qualified person will inspect the assembly to ensure it is configured in accordance with the manufacturer equipment criteria. If the criterion is unavailable, the qualified person, with the assistance of a registered professional engineer, must develop the appropriate configuration criteria and ensure they are met.

Tests for Cranes

A crane, prior to initial use and after modification, will be given an operational test to insure compliance, including the following:

- Load hoisting and lowering mechanisms
- Boom hoisting and lowering mechanisms
- Travel mechanism
- Safety devices
- Boom extension mechanisms for a mobile hydraulic crane

A test load will not exceed 110% of the rated load at any working radius.

Results of operational tests and load tests will be kept at the job site.

Where re-rating is necessary, it will not be in excess of the original load rating unless a letter of approval is obtained from the manufacturer and maintained at the job site.

SAFE PRACTICES

The Company will verify that before operations begin, the proper safety devices are installed on the crane and in proper working order. If any of the safety devices such as but not limited to; the crane level indicator, boom stops, jib stops, foot pedal brake locks or horns are not in proper working order, the crane must be taken out of service and operation will not be used until it’s deemed in proper working order.

- Our Company will comply with the manufacturer's procedures, specifications and limitations applicable to the operation of all cranes and derricks. Where manufacturer's specifications are not available, the limitations assigned to the equipment will be based on the determinations of a qualified engineer competent in this field and those determinations will be documented and recorded. Attachments used with cranes will not exceed the capacity, rating or scope recommended by the manufacturer
- Rated load capacities, recommended operating speeds, special hazard warnings or instructions and the operations manual for the crane will be kept in the cab of the crane at all times
- Hand signals to crane and derrick operators will be those prescribed by the applicable American National Standards Institute (ANSI) standard for the type of crane in use. An illustration of the signals will be posted at the job site
- The designated competent person will inspect all machinery and equipment before each use, and during use, to make sure it's in safe operating condition. Any deficiencies will be repaired, or defective parts replaced, before being returned to use
- The Company will maintain a crane and its accessories in a safe condition
- A thorough, annual inspection of the hoisting machinery will be made by the designated competent person, a government or private agency recognized by the U.S. DOL. The Company will keep all dates and results of inspections for each hoisting machine and piece of equipment
- Whenever internal combustion engine powered equipment exhausts in enclosed spaces, tests will be made and recorded to see that employees are not exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres
- A portable dry powder fire extinguisher with at least a 5 BC rating, or higher, will be available in the cab, in the operating enclosure, or on the unit. The operator and maintenance employees will be trained in its use
- Modifications or additions that affect the safe operation of the equipment may not be made without the manufacturer's written approval. The original safety factor of the equipment must not be reduced if modifications or changes are made to the equipment. Modifications or changes will be certified by a qualified registered engineer. The capacity, operation and maintenance instruction plates, tags or decals will be changed accordingly to reflect any modifications or changes

Operators have the authority to stop or refuse to handle loads if they feel that the operation jeopardizes safety concerns. The operations must not proceed until a qualified person deems that the safety is assured.

Hazard Identification and Risk Assessment

The Company will ensure that a competent person conducts hazard identification and a designated risk assessment before work begins. Boundaries of the work zone must be identified by marking with flags and range limiting devices. The work zone must be defined using a 360-degree radius around the crane or the max radius of the crane.

Where the assessment identifies that the crane has the potential to hit and injure or pin/crush a worker against an object, the hazardous areas of the crane swing radius will be marked with warning lines or railings.

If the assessment identifies that the crane, load line, load or any part of the crane could get closer than 20 feet to an electrical power line, the following measures must be followed:

- Any overhead wire will be considered an energized line until a representative of the owner or utility has checked and indicated otherwise
- Before any crane operation is started closer than 20 feet to a power line the owner or utility representative will be notified
- Arrangements will be made with the utility operator/owner to de-energize and ground them.
- Except where electrical power lines and equipment have been de-energized and visibly grounded at the point of work or where an insulating barrier, not a part of the crane has been erected, or the employee is insulated or isolated from the crane, a crane will maintain the following clearances:

Voltage (KV)	Minimum Clearance Distance (Feet)
Up to 50	10
50 to 200	15
200 to 350	20
350 to 500	25
500 to 750	35
750 to 1000	45
Over 1000	As established by the line owner

Signal Person

A signal person is required when:

- The point of operation is not in full view of the operator
- The operator's view is obstructed in the direction the equipment is traveling
- Either the operator or the person handling the load determines that a signal person is needed because of site-specific safety concerns

The signal person is considered qualified if they:

- Know and understand the type of signals used at the worksite
- Are competent in using these signals
- Understand the operations and limitations of the equipment, including the crane dynamics involved in swinging, raising, lowering and stopping loads and in boom deflection from hoisting loads
- Know and understand the relevant signal person qualification requirements specified in 1926 subpart CC
- Passes an oral or written test and a practical test

Employers must use one of the following options to ensure a signal person is qualified

- Third party qualified evaluator. The signal person has documentation from a third party qualified evaluator showing that he or she meets the qualification requirements
- The employer's qualified evaluator (not a third party) assesses the individual, determines the individual meets the qualification requirements and provides documentation that specifies each type of signaling for which the signal person is qualified under the requirements of the standard

An operator will respond to signals only from the employee directing a lift. However, they must obey at all times an emergency stop signal from any employee. When two or more cranes are used to lift a load, a designated employee will give all signals.

General Crane Operations

An equipment operator will be familiar with the equipment and its proper care. If adjustments or repairs are necessary or if any defects are known, the operator will report the needed adjustments or repairs or the defects to the responsible supervisor and, upon changing shifts, notify the next operator of the defects.

An operator will test all controls before beginning a new shift. Any controls that do not operate properly will be adjusted or repaired before operations are begun.

No one under eighteen years of age will be employed to operate any power-driven hoisting equipment or assist in hooking on, loading slings or rigging operations.

Operators will not engage in any practice that will divert their attention while operating equipment. The operator will not eat, smoke or read while operating of the crane, or when physically unfit.

Equipment operators will be responsible for all operations under their direct control. When there is any doubt as to safety, an operator will stop operations and consult with the supervisor before continuing work.

Equipment operators will not leave a crane unattended unless the responsible supervisor notifies them that it is safe to do so. Before leaving, the operator will:

- Land any attached load
- Disengage clutches
- Put the controls in the off or neutral position
- Open the main switch or stop the engine
- Engage manual locking devices, in the absence of automatic holding equipment, and the crane is secured against accidental travel

When a tag or lock is on the switch or engine starting controls, the operator will not close the switch or the person who placed it there has removed start operations until the lock or tag.

Before closing the switch or starting the equipment, an operator will put all controls in the off or neutral position and will make sure that all personnel are in the clear.

If power fails during operation, an equipment operator will do all of the following:

- Set all brakes and locking devices

- Move all clutch or other power controls to the off or neutral position
- Communicate with the responsible supervisor in charge of equipment operations
- If practical, and applicable, land the load under brake control

An operator will respond to signals only from the designated signalman using appropriate signals, except where voice communications equipment is used. An operator will obey a stop signal from anyone. Operating signals will follow an established standard. Whistle signals can be used where only one crane is in operation.

A crane will be equipped with an audible signaling device that will be actuated before traveling without a signalperson and intermittently during travel. When moving a crane, the following signals will be used:

- Stop, 1 audible signal
- Go ahead, 2 audible signals
- Back up, 3 audible signals
- The operator, or maintenance personnel, will properly lubricate all working parts of the crane
- Cranes will be kept clean
- Whenever the operator finds the main or emergency switch open, it will not be closed; even when starting on regular duty, until it is determined that, no one is on or near the crane. The crane will not be oiled or repaired unless the main switch is open
- If the power goes off, the operator will immediately throw all controllers to the “OFF” position until the power is again available
- Before closing the main switch, the operator will make sure that all controllers are in the “OFF” position until the power is again available
- When lowering a load, the operator will proceed carefully and make sure the load is under safe control
- When leaving the cage, the operator will throw all controllers to the “OFF” position and open the main switch
- All necessary operator clothing and personal belongings will be stored so that they don’t interfere with access or operation
- Tools, oil cans, waste, extra fuses and other necessary articles will be stored in the tool box, and will not be permitted to lie loose in or about the cab
- The safety coordinator will ensure that operators are trained in the operation and care of the fire extinguishers provided
- A legible rating chart will be provided at the operator station showing the following information:
    - Load capacity relating to corresponding boom angles and operating radii for all boom lengths, jib lengths and angles. Where optional equipment, such as outriggers or extra counterweights are provided by the manufacturer, alternate ratings will be provided
    - Where structural competence limits the ratings, such information will be shown on the chart
    - The required parts of line for hoist reeving, including the size and construction of rope will be on the rating chart or in the operating manual
- A crane will not be operated with more than the designed amount of ballast or counterweight. The amount of ballast or counterweight will not be changed without authorization of the manufacturer in writing and making corresponding changes in the rating chart

- When assembling or disassembling a boom on the ground, it will be blocked to prevent dropping the boom and boom sections
- When a boom section is manually telescoped it will be positioned so through and through pinning of the cylinder eye may be accomplished and will be checked in a horizontal position
- When 2 or more cranes are used to lift a single load, one designated employee will direct the rigging, lift, and movement
- A locomotive crane will not be rotated into a position where other rail cars on an adjacent track might strike it, except when it has been verified that cars are not moving on the adjacent track and flag protection has been provided
- Specified tire pressures will be maintained

Outriggers and Stabilizers

- Outriggers and stabilizers must be fully extended or, if permitted by manufacturer procedures, deployed as specified in the load chart
- Set outriggers to remove equipment weight from the wheels, except for locomotive cranes. Outrigger floats, if used, must be attached to the outriggers, stabilizer floats, if used, must be attached to the stabilizers
- Each outrigger or stabilizer must be visible to the operator or to a signal person during extension and setting
- Place outrigger and stabilizer blocking under the float/pad of the jack or, if there is no jack, under the outer bearing surface of the outrigger or stabilizer beam. Blocking must be sufficient to sustain the loads and maintain stability and must be properly placed

Tower Cranes

Tower cranes are subject to additional requirements for erecting, climbing and dismantling, including a pre-erection inspection (29 CFR 1926.1435).

Attaching and Holding a Load

A load will be attached to the hook by means of a sling or other lifting device. The hoist rope will not be wrapped around a load except when setting or removing a pole.

Before starting to hoist, the operator will make sure:

- The hoist rope is not kinked
- The multiple part lines are not twisted around each other
- The hook is not swinging when brought over the load

No employees are permitted to pass or stand under a suspended load.

An operator will not load a crane beyond the rated load. A load that’s limited by structural competence rather than by stability will be checked by the operator to determine that the weight does not exceed the rated load.

Moving a Load

- When moving a load, an operator will avoid sudden acceleration and deceleration of a movements that would cause a swinging action by the load
- An operator will not move a load or hook if an employee is on it
- A load will be secured and balanced before it is lifted more than 6 inches
- An operator will test the hoisting brakes before moving a near rated load by raising the load a few inches and applying the hoisting brakes. This requirement applies to both single or multiple line reeving
- A load or boom will not be lowered below a point where less than 2 full wraps of rope remain on the drum
- A load will not be moved in a manner that would allow it to contact obstructions
- The rotational speed of a crane must not allow the center of the load to swing out beyond the radius of the point sheave in use
- A tag line will be used when rotation of the load would be hazardous
- A crane will not be used for dragging a load sideways
- Loads will not be lifted over the front area of a truck crane, unless it is within the capacity of the rating chart for the front area of the truck crane
- Floats or pads secured to outriggers will be used when the load to be handled at a particular radius exceeds the rated load without outriggers. A wood block used to support an outrigger will be:
    - Large enough to prevent shifting and toppling of the load
    - Strong enough to resist crushing
    - Free of knots and cracks that could affect its ability to support the load
    - Before moving with a load, a designated employee will determine the position to carry the load, boom location, ground conditions, travel route, speed of movement and location of overhead wires
- A crane, while moving, from one location to another, will have:
    - The boom carried in line with the direction of movement
    - The superstructure secured against rotation, except when negotiating a turn with an operator in the cab or the boom on a dolly
    - An empty hook restrained against movement
    - A crane with or without a load will not travel with the boom at a height that would allow it to bounce back over the cab
    - A crane operating at a fixed radius will have the boom-hoist pawl or other positive locking device engaged

Refueling

A crane fuel tank will not be refueled while the engine is running.

When refueling is done with portable containers, the containers will be safety cans having automatic closing caps and be labeled as approved by underwriters' laboratories, Inc., factory mutual laboratory or other nationally recognized laboratory.

Smoking or other sources of sparks and flame will be kept at least 25 feet from a refueling operation.

WIRE ROPE AND SLING INSPECTION

Running ropes in continuous service will have an inspection at least once a month. The inspection will include: measurement of diameter of rope; count of broken wires in 1 lay when concentrated; end connections for broken wires; corrosion, kinking, crushing, cutting, or other conditions affecting the capability of the rope; cracked, bent, worn, corroded, or improperly applied end connectors.

For rope in contact with equalizer sheaves or saddles, or on sheaves where rope travel is limited, the inspection will include moving the rope from its normal position on the sheave and examining the rope at the rope contact point.

Inspection of a non-rotating type rope will include verifying that the wires are not broken or worn within the rope.

A rope that has been idle more than 1 month will be given a complete inspection before being placed in service.

GENERAL MAINTENANCE

The Company will establish and maintain a preventative maintenance program under the supervision of an authorized and trained employee or outside service.

Before adjustments and repairs to a crane are started, the following steps will be taken:

- The crane will be placed where it does not interfere with other operations
- A "warning" or "out of order" sign will be placed at the controls, and the controls will be in the "off" position. The sign is not needed if the energy source is locked out
- The power plant will be disconnected, locked out, or made safe by other means
- The boom will be lowered to the ground or otherwise secured against dropping
- All hydraulic cylinders used for boom hoist and boom telescope on a mobile hydraulic crane will be retracted
- Hydraulic oil pressure from all hydraulic circuits will be relieved before loosening or removing hydraulic components of a mobile hydraulic crane
- The load block will be lowered to the ground or otherwise secured against dropping, except when operation is necessary for the adjustment
- After adjustments and repairs have been completed, the crane will not be returned to operations until all guards have been installed, safety devices activated, trapped air removed from the hydraulic system of a mobile hydraulic crane and maintenance equipment and warning signs or locks are removed
- Hazardous conditions identified by the inspection requirements will be corrected before operation of the crane is resumed

- Adjustments will be maintained to assure correct functioning of operating mechanisms, safety devices, control systems, power plants and brakes and clutches
- The original safety factor will be maintained when repairs and replacements are made. Hooks showing defects will be replaced. Pitted or burned electrical contacts affecting their operations will be replaced in sets
- A crane or its wire rope will not be used as a ground or to carry current. The ground will be attached to the part being welded while welding

Wire Rope and Sling Maintenance

Running wire ropes will be replaced when they show:

- 6 random broken wires in 1 rope lay or 3 broken wires in 1 strand of a rope lay
- Wear of 1/3 of the original diameter of outside individual wires
- Kinking, crushing, or bird caging
- Heat damage
- Reduction in nominal diameter of 3/64 inch for ropes to 3/4 inch, 1/16 inch for ropes 7/8 inch to 11/8 inch, 3/32 inch for ropes 11/4 inch to 11/2

A standing wire rope will be replaced if it has:

- More than 2 broken wires in 1 lay section beyond an end connection
- 1 broken wire at an end connection

A wire rope having more than one broken wire at a socketed fitting will be re-socketed.

Wire rope will be stored in a way that prevents damage or deterioration, and handled in a manner to prevent kinking or twisting.

Before cutting preformed rope, a seizing will be placed on each side of the cut to prevent unlaying of the strands. On non-preformed rope 7/8 inch in diameter or smaller, 2 seizings will be placed on each side of the cut, and for non-preformed rope more than 7/8 inch in diameter, 3 seizings on each side will be used.

During installation, do not drag wire rope in dirt or around sharp objects.

TRAINING

The Company will verify that only certified employees are allowed to operate cranes. All employees that were certified prior to November 10th, 2017 must be recertified within 4 years of this date through one of the following:

- An accredited crane operator testing organization
- An audited program provided by the Company
- Have U.S. military licensing by a government authority

Operators not certified prior to November 10th, 2017 must be certified through one of these programs prior to being allowed to operate cranes for our Company.

Crane operators will be designated based on their experience and training, which must include the minimum amounts of classroom sessions and hands-on training including lubricating points, adjustments, principles of crane operators, load charts, hand signals and inspections. Training will include use of fire extinguishers.

Crane operator qualifications must be maintained and refreshed every five years and may include vision and medical condition evaluations.

Crane Operator Requirements and Qualifications

Operators must pass a written examination, understand and be able to use a load chart, as well as calculate loads for the crane type.

While the OSHA operator qualification regulation does not include physical requirements for operators, ASME B30-5 has established physical requirements for operators. These ASME requirements have endorsed by several professional organizations and may be included in some state regulations. Always check with the governing authority to determine the requirements for your worksite.

ASME B30-5 identifies the following minimum physical requirements for crane operators and trainees:

- Have corrected vision that meets the same requirements as vision for a valid driver's license. Possession of a driver's license or a doctor's certificate is evidence of meeting this requirement
- Be able to read and understand signs, labels, and instruction manuals
- They will be able to distinguish colors, regardless of position of colors, if color differential is required for operation
- Have depth perception be able to distinguish between red, yellow, and green
- Their hearing, with or without hearing aid, must be adequate for a specific operation
- Have vision of at least 20/30 Snellen in one eye and 20/50 in the other eye with or without glasses
- No history of disabling medical condition which may be sufficient reason for disqualification

Qualifications for crane operators will be maintained every four years and will include medical and vision evaluations.

SITE-SPECIFIC CRANE OPERATION PLAN

A site-specific operation plan must be created prior to any crane work. This plan will be developed by a competent person and reviewed by all involved parties. Employers should refer to the OSHA standard 1926.1400-1442 for specific crane requirements.

Please see below for the following documents:

- Site-Specific Crane Operation Plan Checklist
- Crane/Boom Inspection Report
- Recommended Hand Signals for Controlling Crane Operations

SITE-SPECIFIC CRANE OPERATION PLAN AND CHECKLIST (PAGE 1 OF 2)

Company		Job Name and Location	
Job Supervisor		Dates on Site	
Project Engineer		Qualified Person	
Crane Operator		Qualified Rigger	

Scope of Work					
Roofing	☐	Sq. Ft.		Tons	
Siding	☐	Sq. Ft.		Tons	
Decking	☐	Sq. Ft.		Tons	
General Miscellaneous	☐	Sq. Ft		Tons	

General Description of Work

Site Layout	Yes	No
1. Has controlling contractor provided adequate access to site?	☐	☐
2. Is laydown area firm, properly graded, well drained, and accessible?	☐	☐

Pre-Construction Site Conference	Yes	No
Has a Pre-Construction Site Conference been held?	☐	☐

Please list those attending:	

SITE-SPECIFIC CRANE OPERATION PLAN AND CHECKLIST (PAGE 2 OF 2)

Sequence of Crane Activity	
• Give a general sequence of crane activities:	
• Material delivery date	
• How will activities be coordinated with other trades:	
Cranes	
• Crane type:	
• Crane brand:	
• Crane capacity:	
• How is the site prepared for the crane?	
• How many different locations will the crane have and where are they?	
• What is the path for overhead loads?	
• How will employees be notified of overhead loads?	
• Are there any critical lifts? (75% of capacity or dual crane) How many?	Yes ☐ No ☐
• Describe critical lifts:	
• Are lift permits attached for critical lifts?	Yes ☐ No ☐
• Are lift permits attached for all lifts over 5,000 lbs.	Yes ☐ No ☐

Crane Inspection Report

Use only equipment which is in safe working condition. DO NOT operate equipment if any inspected items need repair.

	Time:	Date:

Job Site Location:

Operator's Name:	**Supervisor's Name:**
Inspector(s) Name:	**Hour Meter Reading:**

Subcontractors On-Site (List Name and Trade):

Equipment Type:	**Equipment I.D. Numbers:**	**Manufacturer:**

OK	REPAIR	N/A	**GENERAL SITE INFORMATION:**
☐	☐	☐	Safety Program Manual on site?
☐	☐	☐	Are required OSHA Posters posted?
☐	☐	☐	Emergency Phone numbers posted?
☐	☐	☐	Tailgate/Toolbox talks up-to-date?
☐	☐	☐	Site Lift Plan completed?

OK	REPAIR	N/A	**GENERAL SITE INFORMATION:**
☐	☐	☐	Hazard assessment of work area?
☐	☐	☐	Controls in place for identified hazards?
☐	☐	☐	Crane swing areas signed and barricaded?
☐	☐	☐	Operator's manual on lift?
☐	☐	☐	Prelift meeting completed?

OK	REPAIR	N/A	**CARRIER VEHICLE:**
☐	☐	☐	Motor
☐	☐	☐	Crank case oil is clean and full
☐	☐	☐	Clutch /Converter
☐	☐	☐	Drive Line
☐	☐	☐	Transmission fluid at proper level
☐	☐	☐	Frame
☐	☐	☐	Brakes
☐	☐	☐	Differentials
☐	☐	☐	Outriggers
☐	☐	☐	Engine coolant is about 2" below cap

OK	REPAIR	N/A	**CARRIER VEHICLE:**
☐	☐	☐	Cab
☐	☐	☐	Steering
☐	☐	☐	Lights
☐	☐	☐	Fire Extinguisher
☐	☐	☐	Glass
☐	☐	☐	Warning Lights
☐	☐	☐	Access
☐	☐	☐	Rims & Bolts
☐	☐	☐	Cuts or bulges in the tires
☐	☐	☐	Tires properly inflated (look on load charts for MFGR recommendations)

OK	REPAIR	N/A	**HYDRAULICS:**
☐	☐	☐	Relief Valve(s)
☐	☐	☐	Restrictor Valves
☐	☐	☐	Pipe Lines
☐	☐	☐	Hose Lines
☐	☐	☐	Outrigger Cylinders
☐	☐	☐	Boom Hoist Cylinder
☐	☐	☐	Boom Crowd Cylinder
☐	☐	☐	Control Valves
☐	☐	☐	Swing Motor

OK	REPAIR	N/A	**HYDRAULICS:**
☐	☐	☐	Hoist Motor
☐	☐	☐	Pumps
☐	☐	☐	Bearings
☐	☐	☐	Check hydraulic oil level
☐	☐	☐	Mounting Bolts
☐	☐	☐	Swing Gear
☐	☐	☐	Swing Pinion
☐	☐	☐	Seals - Hydraulic

OK	REPAIR	N/A	**BOOM:**
☐	☐	☐	Shipper Welds
☐	☐	☐	Boom Welds
☐	☐	☐	Pins - Boom Pivot
☐	☐	☐	Support Roller
☐	☐	☐	Boom Pins

OK	REPAIR	N/A	**BOOM:**
☐	☐	☐	Bearing Sheave
☐	☐	☐	Load Block Sheave
☐	☐	☐	Load Block Hook
☐	☐	☐	Boom Main Section

OK	REPAIR	N/A	**WEDGE SOCKETS:**
☐	☐	☐	Wire rope size and wedge socket is a proper match?
☐	☐	☐	Dead end of wire rope extends at least 9 inches beyond wedge socket?
☐	☐	☐	Dead end of the wire rope is secured properly?

OK	REPAIR	N/A	SHEAVES:
☐	☐	☐	The wire rope is seated properly in the sheaves?
☐	☐	☐	The wire rope keepers (keeps cable from coming out of the sheaves) are in good shape?
☐	☐	☐	Check the bolts on the sheave plates for tightness?
☐	☐	☐	Check for any weld cracks?
☐	☐	☐	Signs of bent or buckled panels or parts?
OK	**REPAIR**	**N/A**	**OPERATIONAL CHECKS:**
☐	☐	☐	Crane operators' logs up-to-date and on-site?
☐	☐	☐	Operators familiar with load charts?
☐	☐	☐	Load chart is in cab?
☐	☐	☐	Hand signal charts on crane?
☐	☐	☐	Handrails leading into crane cab are good condition?
☐	☐	☐	Out riggers are extended out; working properly?
☐	☐	☐	Out rigger pads not cracked?
☐	☐	☐	Outriggers extended & swing radius barricades in place?
☐	☐	☐	Hydraulic hoses in good condition?
☐	☐	☐	The drum cable is properly spooled?
☐	☐	☐	Boom angle indicator is available and working?
☐	☐	☐	Swing through 360 degrees, does boom angle indicator stay the same throughout rotation?
☐	☐	☐	Does boom swing brake work properly?
☐	☐	☐	Back-up alarm is working?
☐	☐	☐	Does the horn work?
☐	☐	☐	Engine started, gauges are checked & working properly?
☐	☐	☐	Crane is leveled, working properly?
☐	☐	☐	Boom up, unlock the swing break, does it swing when level?
☐	☐	☐	Extend out the boom, are all sections extending evenly?
☐	☐	☐	Brakes & brake systems check out?
☐	☐	☐	Safety pressure relief valves check out?
☐	☐	☐	Is equipment a safe distance from edge of trench or excavation?
OK	**REPAIR**	**N/A**	**MATERIALS HANDLING:**
☐	☐	☐	Chains and slings inspected and tagged as required?
☐	☐	☐	Employees kept from under suspended loads?
☐	☐	☐	Materials properly stored or stacked?
☐	☐	☐	Employees using proper lifting methods?
☐	☐	☐	Tag lines used to guide loads?
OK	**REPAIR**	**N/A**	**HOOKS – Replace If:**
☐	☐	☐	If hook throat opening has increased by 15%
☐	☐	☐	If load-bearing point (throat) has been worn by 10%, the hook must be replaced.
☐	☐	☐	If hook tip is twisted by 10° or more, the hook must be replaced.
☐	☐	☐	Check for excessive damage from chemicals and for deformation and cracks.
☐	☐	☐	Check for and replace damaged, inoperative, or missing hook latches.

Unsafe Conditions, Situations, Acts, or Practices Observed: _____

_____

Comments: _____

_____

_____ _____

Signature (person performing inspection/evaluation if different from operator) **Date**

_____ _____

Operator's Signature **Date**

TRAINING RECORD

Trainer:	
Signature:	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

SCOPE

Demolition is an inherently hazardous process that requires careful planning. This chapter provides information on the safe work practices and requirements for all employees performing demolition work. The practices and procedures in this chapter will comply with the OSHA regulations contained in 1926 Subpart T, and the applicable regulations of Subpart U.

POLICY

This policy has been established to prevent injury and illnesses for employees engaged in demolition activities, and protect the public from potential hazards involved.

EMPLOYER RESPONSIBILITIES

This Company will:

- Provide all available descriptions of building to be demolished
- Obtain necessary approvals and permits. A permit may be required for the demolition/dismantling of any building, structure, scaffolding, or falsework more than three stories or 36 feet high
- Define extent of work
- Notify owners of neighboring structures before demolition
- Locate services
- Identify and notify employees and contractors of any hazardous materials or hazardous conditions onsite
- Plan work, select method of demolition, define appropriate means of material disposal and provide for adequate supervision of workers
- Notify the state OSHA division at least 24 hours before beginning any asbestos-related demolition work in which more than 100 sq. ft. of asbestos-containing material (greater than 0.1 percent asbestos by weight) will be disturbed.
- Secure worksite against unauthorized entry
- Ensure every employee is working in a safe environment and has the necessary training, equipment and supervision to perform their job safely

EMPLOYEE RESPONSIBILITIES

Employees are expected to:

- Follow all safety precautions, training and supervisor instructions
- Use appropriate PPE
- Make sure all equipment and machinery is guarded before use
- Keep tools in good repair
- Report any hazardous conditions or unsafe acts to a supervisor
- Verify all co-workers are clear before beginning work that may endanger others
- When uncertain, verify location of utilities with supervisor

- Keep unauthorized individuals from work site
- Report accidents immediately
- Understand all emergency procedures and know the location of exits, fire extinguishing equipment, and communication means before beginning work

HEALTH HAZARDS

The following are examples of health hazards that may be found during demolition that may require additional safety precautions as dictated by OSHA regulations and industry best practices:

- Asbestos dust
- Lead paint
- Fumes from gas cutting galvanized steel
- Polychlorinated biphenyls
- Synthetic mineral fibers
- Toxins from previous industrial processes
- Silica dust

PERSONAL PROTECTIVE EQUIPMENT

All employees engaged in demolition work will be provided with the necessary PPE, which will include, but is not limited to:

- Suitable non tear clothing
- Gloves appropriate for the task
- Safety glasses or goggles
- Hardhat
- Hearing protection
- Dust mask

PLANNING

Before demolition, an engineering survey of the structure must be conducted by a competent person to determine the condition of the framing, floors, and walls so measures can be taken, if necessary, to prevent the premature collapse of any portion of the structure. The demolition contractor must maintain a written copy of this survey.

Adjoining Buildings

When necessary, any adjacent structure(s) or improvements should also be surveyed. Nearby buildings may be susceptible to damage, and care must be taken to ensure adjacent buildings are unharmed by demolition activities. Photographing existing damage in neighboring structures is advisable.

Hazard Identification

The engineering survey allows evaluation of the entire job. The contractor should plan for the wrecking of the structure, the equipment to do the work, work force requirements and the protection of the public. The safety of all employees on the job site is be a prime consideration. During the preparation of the engineering survey, the contractor will plan for potential hazards such as fires, cave-ins and injuries.

Damaged Structures

If the structure to be demolished has been damaged by fire, flood, explosion or some other cause, appropriate measures, including bracing and shoring of walls and floors will be taken to protect workers and any adjacent structures.

Hazardous Substances

The presence of any type of hazardous chemicals, gases, explosives, flammable material or similar dangerous substances that have been used or stored on the site will be determined before any work begins. If the nature of a substance cannot be easily determined, samples will be taken and analyzed by a qualified person prior to demolition.

Safety Planning

During the planning stage of the job, all safety equipment needs will be determined. The required number and type of respirators, lifelines, warning signs, safety nets, special face and eye protection, hearing protection and other worker protection devices will be determined during the preparation of the engineering survey. A comprehensive plan is necessary for any confined space entry.

Utility Location

All electric, gas, water, steam, sewer and other service lines will be shut off, capped or otherwise controlled, at or outside the building before demolition work is started. Any utility Company involved must be notified in advance, and its approval or services, if necessary, will be obtained.

If it is necessary to maintain any power, water or other utilities during demolition, such lines will be temporarily relocated as necessary and/or protected. The location of all overhead power sources will also be determined, as they can prove especially hazardous during machine demolition. All employees will be informed of the location of existing or relocated utility services.

MEDICAL SERVICES AND FIRST AID

Before starting work, provisions will be made for prompt medical attention in case of serious injury. The nearest hospital, infirmary, clinic, or physician shall be located as part of the engineering survey. The job supervisor will be provided with instructions for the most direct route to these facilities. Proper equipment for prompt transportation of an injured worker, as well as a communication system to contact any necessary ambulance service, must be available at the job site. The telephone numbers of the hospitals, physicians or ambulances must be conspicuously posted.

First Aid Training

In the absence of an infirmary, clinic, hospital or physician that is reasonably accessible in terms of time and distance to the work site, a person who has a valid certificate in first aid training from the American Red Cross or equivalent training will be available at the work site to render first aid.

First Aid Equipment

A properly stocked first aid kit as determined by an occupational physician must be available at the job site. The contents of the kit will be checked before being sent out on each job and at least weekly to ensure the expended items are replaced. Provisions will also be made to provide for quick drenching or flushing of the eyes should any person be working around corrosive materials.

Police and Fire Contact

The telephone numbers of the local police, ambulance, and fire departments should be available at each job site. This information can prove useful to the job supervisor in the event of any traffic problems, such as the movement of equipment to the job, uncontrolled fires or other police/fire matters. The police number may also be used to report any vandalism, unlawful entry to the job site, or accidents requiring police assistance.

FIRE PREVENTION AND PROTECTION

A "fire plan" should be set up prior to beginning a demolition job. This plan should outline the assignments of key personnel in the event of a fire and provide an evacuation plan for workers on the site. Common sense should be the general rule in all fire prevention planning, as follows:

- All potential sources of ignition should be evaluated and the necessary corrective measures taken
- Electrical wiring and equipment for providing light, heat, or power should be installed by a competent person and inspected regularly
- Equipment powered by an internal combustion engine should be located so that the exhausts discharge well away from combustible materials and away from workers
- When the exhausts are piped outside the building, a clearance of at least six inches should be maintained between such piping and combustible material
- All internal combustion equipment should be shut down prior to refueling. Fuel for this equipment should be stored in a safe location
- Sufficient firefighting equipment should be located near any flammable or combustible liquid storage area
- Only approved containers and portable tanks should be used for the storage and handling of flammable and combustible liquids

Heating devices should be situated so that they are not likely to overturn and shall be installed in accordance with their listing, including clearance to combustible material or equipment. Temporary heating equipment, when utilized, should be maintained by competent personnel.

Smoking should be prohibited at or near hazardous operations or materials. Where smoking is permitted, safe receptacles will be provided for smoking materials.

Roadways between and around combustible storage piles should be at least 15 feet wide and maintained free from accumulation of rubbish, equipment, or other materials. When storing debris or combustible material inside a structure, such storage shall not obstruct or adversely affect the means of exit.

A suitable location at the job site should be designated and provided with plans, emergency information and equipment, as needed. Access for heavy fire-fighting equipment should be provided on the immediate job site at the start of the job and maintained until the job is completed.

Fire Extinguishing Preparation

Free access from the street to fire hydrants and to outside connections for standpipes, sprinklers, or other fire extinguishing equipment, whether permanent or temporary, should be provided and maintained at all times, as follows:

- Pedestrian walkways should not be so constructed as to impede access to hydrants
- No material or construction should interfere with access to hydrants, Siamese connections, or fire-extinguishing equipment

A temporary or permanent water supply of volume, duration and pressure sufficient to operate the fire-fighting equipment properly should be made available. Standpipes with outlets should be provided on large multi-story buildings to provide for fire protection on upper levels. If the water pressure is insufficient, a pump should also be provided.

An ample number of fully charged portable fire extinguishers should be provided throughout the operation. All motor-driven mobile equipment should be equipped with an approved fire extinguisher.

Alarm System

An alarm system, e.g., telephone system, siren, two-way radio, etc., shall be established in such a way that employees on the site and the local fire department can be alerted in case of an emergency. The alarm code and reporting instructions will be conspicuously posted and the alarm system should be serviceable at the job site during the demolition. Fire cutoffs must be retained in the buildings undergoing alterations or demolition until operations necessitate their removal.

OTHER SITE CONSIDERATIONS

- Illuminate all work areas appropriately, especially stairs, ladders, scaffolds and other areas where tripping hazards would pose significant hazard
- Guard wall openings to a height of 42 inches
- Cover and secure floor openings with material able to withstand the loads likely to be imposed
- If debris will be dropped through holes in the floor without the use of chutes, it must be completely enclosed with barricades not less than 42 inches high and not less than 6 feet back from the projected edge of the opening above
- Floor openings used for material disposal must not be more than 25% of the total floor area
- Use enclosed chutes with gates on the discharge end to drop material to the ground
- Design and construct chutes that will withstand the loads likely to be imposed without failing.
- Post signs at each level of structures, warning of the hazard of falling materials
- Protect entrances to multi-story structures with sidewalk sheds or canopies for a minimum of 8 feet. Canopies must be at least 2 feet wider than the structure entrance and be able to hold a load of 150 lbs. /sq. ft.

- Storage of material and debris must not exceed the allowable floor load
- Scaffolds must be equipped with appropriate means to protect passersby and workers from falling debris according to OSHA regulations
- Ensure scaffolds do not rely on the structural integrity of parts of the building that will be demolished
- Remove all glass from the site (windows, doors, skylights, fixtures) before demolition commences
- Remove combustible material and debris before demolition begins as well

SAFE PRACTICES

All employees are expected to follow these safe practices when performing demolition work.

Removing Walls and Masonry Sections

Demolition of exterior walls and floors must begin at the top of the structure and proceed downward. Masonry walls must not be permitted to fall on the floors of a building in masses that would exceed the safe carrying capacities of the floors.

No wall section, one story in height or higher, will be permitted to stand alone without lateral bracing, unless the wall was designed and constructed to stand without such support, and is safe enough to be self-supporting. All walls must be left in a stable condition at the end of each work shift. Employees shall not work on the top of a wall when weather conditions create a hazard.

Structural or load-supporting members on any floor must not be cut or removed until all stories above such a floor have been removed. In buildings of “skeleton-steel” construction, the steel framing may be left in place during the demolition of masonry. Walkways or ladders must be provided to enable workers to safely reach or leave any scaffold or wall.

Walls, which serve as retaining walls to support earth or adjoining structures, must not be demolished until the supporting earth has been properly braced or until adjoining structures have been properly underpinned. Walls, which will serve as retaining walls against which debris will be piled, must not be used unless they are capable of supporting the imposed load.

Dismantle steel construction column length by column length, and tier by tier.

Mechanical Demolition

No workers are permitted in any area when using a crane’s headache ball or clamshell to remove debris. Only workers necessary to perform such operations will be permitted in this work area at any time.

The weight of the demolition ball must not exceed 50 percent of the crane’s rated load. The crane boom and load-line must be as short as possible. The ball must be attached to the load-line with a swivel-type connection to prevent twisting of the load-line, and it must be attached by positive means in such a manner that the weight cannot become accidentally disconnected.

Ensure the cab of the crane used for mechanical demolition protects the operator from flying debris

Pulling Over Walls

When pulling over walls or portions thereof, all steel members affected must have previously been cut free. All roof cornices or other such ornamental stonework must be removed prior to pulling walls over.

Continued Inspections

During demolition, continuing inspections by a competent person will be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, or walls, or loosened material. No employee will be permitted to work where such hazards exist until they are corrected by shoring, bracing or other effective means.

Other Precautions during Demolition

- Do not leave structures in a condition where they are susceptible to collapse from ambient vibration, or natural forces like wind or earthquake
- Ensure unauthorized people are kept from the site during demolition. If people are permitted to remove or purchase materials from the site, ensure their safety
- Ensure necessary precautions are taken against harmful noise
- Keep dust under control by watering down debris frequently

SPECIAL STRUCTURES

When preparing to demolish any chimney, stack, silo or cooling tower, the first step must be a careful, detailed inspection of the structure by an experienced person. If possible, architectural/engineering drawings should be consulted. Particular attention should be paid to the condition of the chimney or stack. Workers should be on the lookout for any structural defects such as weak or acid-laden mortar joints, and any cracks or openings. The interior brickwork in some sections of industrial chimney shafts can be extremely weak. If stack has been banded with steel straps, these bands will be removed only as the work progresses from the top down. Sectioning of the chimney by water, etc. should be considered.

- When hand demolition is required, it should be carried out from a working platform
- Experienced personnel must install a self-supporting tubular scaffold, suspended platform or knee-braced scaffolding around the chimney. Particular attention should be paid to the design, support, and tie-in (braces) of the scaffold
- A competent person should be present at all times during the erection of the scaffold
- It is essential that there be adequate working clearance between the chimney and the work platform
- Access to the top of the scaffold should be provided by means of portable walkways
- The platforms should be decked solid and the area from the work platform to the wall should be bridged with a minimum of two-inch thick lumber
- A back rail 42 inches above the platform, with a mid-rail covered with canvas or mesh should be installed around the perimeter of the platform to prevent injury to workers below. Debris netting may be installed below the platform

- Excess canvas or plywood attachments can form a wind-sail that could collapse the scaffold
- When working on the work platform, all personnel should wear hard hats, long-sleeve shirts, eye and face protection (such as goggles and face shields), respirators, and safety belts, as required
- Care should be taken to assign the proper number of workers to the task. Too many people on a small work platform can lead to accidents

An alternative to the erection of a self-supporting tubular steel scaffold is to "climb" the structure with a creeping bracket scaffold. A competent person must make careful inspection of the masonry and a decision as to the safety of this alternative. It is essential that the masonry of the chimney be in good enough condition to support a bracket scaffold.

The area around the chimney should be roped off or barricaded and secured with appropriate warning signs posted. No unauthorized entry will be permitted to this area. It is also good practice to keep a worker, i.e., a supervisor, operating engineer, another worker or a "safety person", on the ground with a form of communication to the workers above.

Special attention should be paid to weather conditions when working on a chimney. No work should be done during inclement weather such as during lightning or high wind situations. The work site should be wetted down, as needed, to control dust.

Debris Clearance

If debris is dropped inside the shaft, it can be removed through an opening in the chimney at grade level.

- The opening at grade must be kept relatively small in order not to weaken the structure. If a larger opening is desired, a professional engineer should be consulted
- When removing debris by hand, an overhead canopy of adequate strength should be provided. If machines are used for removal of debris, proper overhead protection for the operator should be used
- Excessive debris should not be allowed to accumulate inside or outside the shaft of the chimney as the excess weight of the debris can impose pressure on the wall of the structure and might cause the shaft to collapse
- The foreman should determine when debris is to be removed, halt all demolition during debris removal, and make sure the area is clear of cleanup workers before continuing demolition

Demolition by Deliberate Collapse

Another method of demolishing a chimney or stack is by deliberate collapse. Deliberate collapsing requires extensive planning and experienced personnel, and should be used only when conditions are favorable. There must be a clear space for the fall of the structure of at least 45 degrees on each side of the intended fall line and 1½ times the total height of the chimney. Considerable vibration may be set up when the chimney falls, so there should be no sewers or underground services on the line of the fall. Lookouts must be posted on the site and warning signals must be arranged. The public and other workers at the job site must be kept well back from the fall area.

The use of explosives is one way of setting off deliberate collapse. Only qualified persons should undertake this type of demolition. The entire work area must be cleared of nonessential personnel before any explosives are placed. Though the use of explosives is a convenient method of bringing down a chimney or stack, there is a considerable amount of vibration produced, and caution should be taken if there is any likelihood of damage.

Demolition of Pre-Stressed Concrete Structures

The different forms of construction used in a number of more or less conventional structures built during the last few decades will give rise to a variety of problems when the time comes for them to be demolished. Pre-stressed concrete structures fall in this general category. The most important aspect of demolishing a pre-stressed concrete structure takes place during the engineering survey. During the survey, a qualified person should determine if the structure to be demolished contains any pre-stressed members.

There are four main categories of pre-stressed members. The category or categories should be determined before attempting demolition, bearing in mind that any pre-stressed structure may contain elements of more than one category.

Category 1

Members are pre-stressed before the application of the superimposed loads, and all cables or tendons are fully bonded in the concrete or grouted within ducts.

Category 2

Like Category 1, but the tendons are left ungrouted. This type of construction can sometimes be recognized from the access points that may have been provided for inspection of the cables and anchors. More recently, unbonded tendons have been used in the construction of beams, slabs, and other members; these tendons are protected by grease and surrounded by plastic sheathing, instead of the usual metal duct.

Category 3

Members are pre-stressed progressively as building construction proceeds and the dead load increases, using bonded tendons as in Category 1.

Category 4

Like Category 3, but using unbonded tendons as in Category 2.

Examples of construction using members of Categories 3 or 4 are relatively rare. However, they may be found, for example in the podium of a tall building or some types of bridges. They require particular care in demolition.

It is the responsibility of the demolition contractor to inform all workers on the demolition job site of the presence of pre-stressed concrete members within the structure. They should also instruct them in the safe work practice which must be followed to safely perform the demolition. Workers should be informed of the hazards of deviating from the prescribed procedures and the importance of following their supervisor's instruction.

Pre-Tensioned Members

Pre-tensioned members usually do not have any end anchors, the wires being embedded or bonded within the length of the member. Simple Pre-tensioned beams and slabs of spans up to about 7 meters (23 feet) can be demolished in a manner similar to ordinary reinforced concrete. Pre-tensioned beams and slabs may be lifted and lowered to the ground as complete units after the removal of any composite concrete covering to tops and ends of the units. To facilitate breaking up, the members should be turned on their sides. Lifting from the structure should generally be done from points near the ends of the units or from lifting point positions. Reuse of lifting eyes, if in good condition is recommended whenever possible. When units are too large to be removed, consideration should be given to temporary supporting arrangements.

Pre-Cast Units Stressed Separately from The Main Frames of the Structure, With End Anchors and Grouted and Ungrouted Ducts

Before breaking up, units of this type should be lowered to the ground, if possible. It is advisable to seek the counsel of a professional engineer before carrying out this work, especially where there are ungrouted tendons. In general, this is true because grouting is not always 100% efficient. After lowering, the units can be turned on their side with the ends up on blocks, after any composite concrete is removed. This may suffice to break the unit and release the pre-stress; if not, a sand bag screen, timbers, or a blast mat as a screen should be erected around the ends and demolition commenced, taking care to clear the area of any personnel. It should be borne in mind that the end blocks may be heavily reinforced and difficult to break up.

Monolithic Structures

The advice of the professional engineer experienced in pre-stressed work should be sought before any attempt is made to expose the tendons or anchorages of structures in which two or more members have been stressed together. It will usually be necessary for temporary supports to be provided so that the tendons and the anchorage can be cautiously exposed. In these circumstances it is essential that indiscriminate attempts to expose and de-stress the tendons and anchorages not be made.

Progressively Pre-Stressed Structures

In the case of progressively pre-stressed structures, it is essential to obtain the advice of a professional engineer, and to demolish the structure in strict accordance with the engineer's method of demolition. The stored energy in this type of structure is large. In some cases, the inherent properties of the stressed section may delay failure for some time, but the presence of these large pre-stressing forces may cause sudden and complete collapse with little warning.

Safe Work Practices When Working In Confined Spaces

Demolition contractors often encounter confined spaces when demolishing structure at industrial sites. These confined spaces can be generally categorized in two major groups: those with open tops and a depth that restricts the natural movement of air, and enclosed spaces with very limited openings for entry. Examples of these spaces include storage tanks, vessels, degreasers, pits vaults, casing and silos.

The hazards encountered when entering and working in confined spaces are capable of causing bodily injury, illness and death. Accidents occur among workers because of failure to recognize that a confined space is a potential hazard. It should therefore be considered that the most unfavorable situation exists in every case and that the danger of explosion, poisoning, and asphyxiation will be present at the onset of entry.

SAFE BLASTING PROCEDURES

Prior to the blasting of any structure or portion thereof, a complete written survey must be made by a qualified person of all adjacent improvements and underground utilities. When there is a possibility of excessive vibration due to blasting operations, seismic or vibration tests should be taken to determine proper safety limits to prevent damage to adjacent or nearby buildings, utilities, or other property.

The preparation of a structure for demolition by explosives may require the removal of structural columns, beams or other building components. This work should be directed by a structural engineer or a competent person qualified to direct the removal of these structural elements. Extreme caution must be taken during this preparatory work to prevent the weakening and premature collapse of the structure.

The use of explosives to demolish smokestacks, silos, cooling towers or similar structures should be permitted only if there is a minimum of 90 of open space extended for at least 150% of the height of the structure or if the explosives specialist can demonstrate consistent previous performance with tighter constraints at the site.

Fire Precautions

The presence of fire near explosives presents a severe danger. Every effort should be made to ensure that fires or sparks do not occur near explosive materials. Smoking, matches, firearms, open flame lamps, and other fires, flame, or heat-producing devices are prohibited around explosive magazines or in areas where explosives are being handled, transported or used. In fact, persons working near explosives should not even carry matches, lighters, or other sources of sparks or flame. Open fires or flames should be prohibited within 100 feet of any explosive materials. In the event of a fire, which is in imminent danger of contact with explosives, all employees must be removed to a safe area.

Electrical detonators can be inadvertently triggered by stray RF (radio frequency) signals from two-way radios. RF signal sources should be restricted from or near to the demolition site, if electrical detonators are used.

Personnel Selection

A blaster is a competent person who uses explosives. A blaster must be qualified by reason of training, knowledge or experience in the field of transporting, storing, handling and using explosives. In addition, the blaster should have a working knowledge of state and local regulations that pertain to explosives. Training courses are often available from manufacturers of explosives and blasting safety manuals are offered by the Institute of Makers of Explosives (IME) as well as other organizations.

Blasters shall be required to furnish satisfactory evidence of competency in handling explosives and in safely performing the type of blasting required. A competent person should always be in charge of explosives and should be held responsible for enforcing all recommended safety precautions in connection with them.

TRANSPORTATION OF EXPLOSIVES

Vehicles used for transporting explosives shall be strong enough to carry the load without difficulty, and shall be in good mechanical condition. All vehicles used for the transportation of explosives shall have tight floors, and any exposed spark-producing metal on the inside of the body must be covered with wood or some other non-sparking material. Vehicles or conveyances transporting explosives may only be driven by, and be under the supervision of, a licensed driver familiar with the local, state and Federal regulations governing the transportation of explosives. No passengers should be allowed in any vehicle transporting explosives.

Explosives, blasting agents, and blasting supplies will not be transported with other materials or cargoes. Blasting caps may not be transported in the same vehicle with other explosives. If an open-bodied truck is used, the entire load should be completely covered with a fire and water-resistant tarpaulin to protect it from the elements. Vehicles carrying explosives must not be loaded beyond the manufacturer's safe capacity rating, and in no case, should the explosives be piled higher than the closed sides and ends of the body.

Every motor vehicle or conveyance used for transporting explosives shall be marked or placarded with warning signs required by OSHA and the DOT. Each vehicle used for transportation of explosives shall be equipped minimally with at least a ten-pound rated, serviceable ABC fire extinguisher. All drivers should be trained in the use of the extinguishers on their vehicle.

In transporting explosives, congested traffic and high-density population areas should be avoided, where possible, and no unnecessary stops should be made. Vehicles carrying explosives, blasting agents, or blasting supplies shall not be taken inside a garage or shop for repairs or servicing. No motor vehicle transporting explosives will be left unattended.

STORAGE OF EXPLOSIVES

All explosives must be accounted for at all times and all not being used must be kept in a locked magazine. A complete detailed inventory of all explosives received and placed in, removed from, and returned to the magazine should be maintained at all times. Appropriate authorities must be notified of any loss, theft, or unauthorized entry into a magazine.

Manufacturers' instructions for the safe handling and storage of explosives are ordinarily enclosed in each case of explosives. The specifics of storage and handling are best referred to these instructions and the aforementioned IME manuals. They should be carefully followed. Packages of explosives should not be handled roughly. Sparking metal tools should not be used to open wooden cases. Metallic slitters may be used for opening fiberboard cases, provided the metallic slitter does not come in contact with the metallic fasteners of the case.

The oldest stock should always be used first to minimize the chance of deterioration from long storage. Loose explosives or broken, defective or leaking packages can be hazardous and should be segregated and properly disposed of in accordance with the specific instructions of the manufacturer. If the explosives are in good condition, it may be advisable to repack them. In this case, the explosives supplier should be contacted. Explosives cases should not be opened or explosives packed or repacked while in a magazine.

Storage Conditions

Providing a dry, well-ventilated place for the storage of explosives is one of the most important and effective safety measures. Exposure to weather damages most kinds of explosives, especially dynamite and caps. Every precaution should be taken to keep them dry and relatively cool. Dampness or excess humidity may be the cause of misfires resulting in injury or loss of life. Explosives should be stored in properly constructed fire and bullet-resistant structures, located according to the IME American Table of Distances and kept locked at all times except when opened for use by an authorized person. Explosives should not be left, kept, or stored where children, unauthorized persons or animals have access to them, nor should they be stored in or near a residence.

Detonators should be stored in a separate magazine located according to the IME American Table of Distances.

DETONATORS SHOULD NEVER BE STORED IN THE SAME MAGAZINE WITH ANY OTHER KIND OF EXPLOSIVES.

Ideally, arrangements should be made whereby the supplier delivers the explosives to the job site in quantities that will be used up during the workday. An alternative would be for the supplier to return to pick up unused quantities of explosives. If it is necessary for the contractor to store his explosives, he should be familiar with all local requirements for such storage.

PROPER USE OF EXPLOSIVES

Blasting operations will be conducted between sunup and sundown, whenever possible. Adequate signs should be sounded to alert to the hazard presented by blasting. Blasting mats or other containment will be used when there is a danger of rocks or other debris being thrown into the air, or when there are buildings or transportation systems nearby. Care should be taken to make sure mats and other protection does not disturb the connections to electrical blasting caps.

- Radio, television, and radar transmitters create fields of electrical energy that can, under exceptional circumstances, detonate electric blasting caps
- Certain precautions must be taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent power lines, dust storms, or other sources of extraneous or static electricity. These precautions shall include:
    - Ensuring that mobile radio transmitters on the job site that are less than 100 feet away from electric blasting caps, in other than original containers, will be de-energized and effectively locked
    - The prominent display of adequate signs, warning against the use of mobile radio transmitters, on all roads within 1,000 feet of the blasting operations

- Maintaining the minimum distances recommended by the IME between the nearest transmitter and electric blasting caps
- The suspension of all blasting operations and removal of persons from the blasting area during the approach and progress of an electric storm

After loading is completed, there should be as little delay as possible before firing. Each blast should be fired under the direct supervision of the blaster, who should inspect all connections before firing and who should personally see that all persons are in the clear before giving the order to fire. Standard signals, which indicate that a blast is about to be fired and a later all-clear signal shall have been adopted. It is important that everyone working in the area be familiar with these signals and that they be strictly obeyed.

Procedures After Blasting

Inspection after the Blast

Immediately after the blast has been fired, the firing line shall be disconnected from the blasting machine and short-circuited. Where power switches are used, they shall be locked open or in the off position. Sufficient time shall be allowed for dust, smoke and fumes to leave the blasted area before returning to the spot. An inspection of the area and the surrounding rubble will be made by the blaster to determine if all charges have been exploded before employees are allowed to return to the operation. All wires should be traced and the search for unexploded cartridges made by the blaster.

Disposal of Explosives

Explosives, blasting agents, and blasting supplies that are obviously deteriorated or damaged should not be used; they should be properly disposed of. Explosives distributors will usually take back old stock. Local fire marshals or representatives of the United States Bureau of Mines may also arrange for its disposal. Under no circumstances should any explosives be abandoned.

Wood, paper, fiber, or other materials that have contained high explosives should not be used again for any purpose, but should be destroyed by burning. These materials should not be burned in a stove, fireplace, or other confined space. Rather, they should be burned at an isolated outdoor location, at a safe distance from thoroughfares, magazines, and other structures. It is important to check that the containers are entirely empty before burning. During burning, the area should be adequately protected from intruders and all persons kept at least 100 feet from the fire.

TRAINING

We will ensure every employee is provided training on demolition safety. This training will be provided at no cost to the employee during working hours.

Training will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Components

The safety coordinator will ensure that every employee will be trained in the following minimum elements:

- OSHA regulations for demolition activities
- Pre-demolition activities
- Different types of building structures and materials and how to safely demolish structures of various materials
- Safety precautions for manual demolition and all expected mechanical demolition means
- Explosive safety
- HAZMAT assessment and safety
- Asbestos
- Noise, dust and other public nuisances
- Common demolition hazards and how to prevent injuries and illnesses from them

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

FORMS AND ATTACHMENTS

On the following pages, please find the following documents:

- Table of Distances for Storage of Explosive Materials
- Demolition Work Plan Outline
- Sample Demolition checklist
- Demolition Training Documentation

These forms may be reproduced for the purposes of implementing and maintaining a safety and health program.

TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS (PAGE 1 OF 4)

Quantity of explosives		Distances in feet							
Pounds over	Pounds not over	Inhabited buildings		Public highways with traffic volume of 3000 or fewer vehicles/day		Passenger railways— public highways with traffic volume of more than 3,000 vehicles/day		Separation of magazines	
		Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
0	5	70	140	30	60	51	102	6	12
5	10	90	180	35	70	64	128	8	16
10	20	110	220	45	90	81	162	10	20
20	30	125	250	50	100	93	186	11	22
30	40	140	280	55	110	103	206	12	24
40	50	150	300	60	120	110	220	14	28
50	75	170	340	70	140	127	254	15	30
75	100	190	380	75	150	139	278	16	32
100	125	200	400	80	160	150	300	18	36
125	150	215	430	85	170	159	318	19	38
150	200	235	470	95	190	175	350	21	42
200	250	255	510	105	210	189	378	23	46
250	300	270	540	110	220	201	402	24	48
300	400	295	590	120	240	221	442	27	54
400	500	320	640	130	260	238	476	29	58
500	600	340	680	135	270	253	506	31	62
600	700	355	710	145	290	266	532	32	64
700	800	375	750	150	300	278	556	33	66
800	900	390	780	155	310	289	578	35	70
900	1,000	400	800	160	320	300	600	36	72
1,000	1,200	425	850	165	330	318	636	39	78
1,200	1,400	450	900	170	340	336	672	41	82

TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS (PAGE 2 OF 4)

Quantity of explosives		Distances in feet							
Pounds over	Pounds not over	Inhabited buildings		Public highways with traffic volume of 3000 or fewer vehicles/day		Passenger railways— public highways with traffic volume of more than 3,000 vehicles/day		Separation of magazines	
		Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
1,400	1,600	470	940	175	350	351	702	43	86
1,600	1,800	490	980	180	360	366	732	44	88
1,800	2,000	505	1,010	185	370	378	756	45	90
2,000	2,500	545	1,090	190	380	408	816	49	98
2,500	3,000	580	1,160	195	390	432	864	52	104
3,000	4,000	635	1,270	210	420	474	948	58	116
4,000	5,000	685	1,370	225	450	513	1,026	61	122
5,000	6,000	730	1,460	235	470	546	1,092	65	130
6,000	7,000	770	1,540	245	490	573	1,146	68	136
7,000	8,000	800	1,600	250	500	600	1,200	72	144
8,000	9,000	835	1,670	255	510	624	1,248	75	150
9,000	10,000	865	1,730	260	520	645	1,290	78	156
10,000	12,000	875	1,750	270	540	687	1,374	82	164
12,000	14,000	885	1,770	275	550	723	1,446	87	174
14,000	16,000	900	1,800	280	560	756	1,512	90	180
16,000	18,000	940	1,880	285	570	786	1,572	94	188
18,000	20,000	975	1,950	290	580	813	1,626	98	196
20,000	25,000	1,055	2,000	315	630	876	1,752	105	210
25,000	30,000	1,130	2,000	340	680	933	1,866	112	224
30,000	35,000	1,205	2,000	360	720	981	1,962	119	238
35,000	40,000	1,275	2,000	380	760	1,026	2,000	124	248
40,000	45,000	1,340	2,000	400	800	1,068	2,000	129	258

TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS (PAGE 3 OF 4)

Quantity of explosives		Distances in feet							
Pounds over	Pounds not over	Inhabited buildings		Public highways with traffic volume of 3000 or fewer vehicles/day		Passenger railways— public highways with traffic volume of more than 3,000 vehicles/day		Separation of magazines	
		Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
45,000	50,000	1,400	2,000	420	840	1,104	2,000	135	270
50,000	55,000	1,460	2,000	440	880	1,140	2,000	140	280
55,000	60,000	1,515	2,000	455	910	1,173	2,000	145	290
60,000	65,000	1,565	2,000	470	940	1,206	2,000	150	300
65,000	70,000	1,610	2,000	485	970	1,236	2,000	155	310
70,000	75,000	1,655	2,000	500	1,000	1,263	2,000	160	320
75,000	80,000	1,695	2,000	510	1,020	1,293	2,000	165	330
80,000	85,000	1,730	2,000	520	1,040	1,317	2,000	170	340
85,000	90,000	1,760	2,000	530	1,060	1,344	2,000	175	350
90,000	95,000	1,790	2,000	540	1,080	1,368	2,000	180	360
95,000	100,000	1,815	2,000	545	1,090	1,392	2,000	185	370
100,000	110,000	1,835	2,000	550	1,100	1,437	2,000	195	390
110,000	120,000	1,855	2,000	555	1,110	1,479	2,000	205	410
120,000	130,000	1,875	2,000	560	1,120	1,521	2,000	215	430
130,000	140,000	1,890	2,000	565	1,130	1,557	2,000	225	450
140,000	150,000	1,900	2,000	570	1,140	1,593	2,000	235	470
150,000	160,000	1,935	2,000	580	1,160	1,629	2,000	245	490
160,000	170,000	1,965	2,000	590	1,180	1,662	2,000	255	510
170,000	180,000	1,990	2,000	600	1,200	1,695	2,000	265	530
180,000	190,000	2,010	2,010	605	1,210	1,725	2,000	275	550
190,000	200,000	2,030	2,030	610	1,220	1,755	2,000	285	570
200,000	210,000	2,055	2,055	620	1,240	1,782	2,000	295	590

TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS (PAGE 4 OF 4)

Quantity of explosives		Distances in feet							
Pounds over	Pounds not over	Inhabited buildings		Public highways with traffic volume of 3000 or fewer vehicles/day		Passenger railways— public highways with traffic volume of more than 3,000 vehicles/day		Separation of magazines	
		Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
210,000	230,000	2,100	2,100	635	1,270	1,836	2,000	315	630
230,000	250,000	2,155	2,155	650	1,300	1,890	2,000	335	670
250,000	275,000	2,215	2,215	670	1,340	1,950	2,000	360	720
275,000	300,000	2,275	2,275	690	1,380	2,000	2,000	385	770
Notes									

DEMOLITION WORK PLAN OUTLINE

Basic Information

- ☐ Contractor Name
- ☐ Project Name
- ☐ Project Location

Material-Handling Methods

- ☐ Hazardous Materials
- ☐ Utilities
- ☐ Emergency Response
- ☐ Transportation

Preparation

- ☐ Temporary Power and Water
- ☐ Site Security
- ☐ Temporary Shoring
- ☐ Work Impact Analysis

During Demolition

- ☐ Scaffolding
- ☐ Dust
- ☐ Fire Protection
- ☐ Vibration, Noise
- ☐ Adjacent Structures
- ☐ Traffic
- ☐ Soft Demolition Materials
- ☐ Steel, Machinery, Piping
- ☐ Concrete, CMU, Brick, Asphalt Paving
- ☐ Recycling
- ☐ Disposal
- ☐ Storage of Salvage Materials

DEMOLITION CHECKLIST

Once the demolition has commenced onsite, here are some recommended checks that should be completed by the demolition contractor and site supervisor and maintained throughout the course of the job.

	Requirement	Yes	No
1	Has a competent supervisor, experienced in demolition work, been appointed?	☐	☐
2	Are all onsite employees sufficiently trained and competent to complete their tasks and duties safely?	☐	☐
3	Is on-going hazard management being conducted onsite, and communicated through to employees and contractors effectively?	☐	☐
4	Are all site personnel wearing the correct personal protective clothing and equipment for the work at all times, and is the clothing/equipment being maintained effectively?	☐	☐
5	Is the site properly enclosed and are protective screens erected?	☐	☐
6	Have danger notices been erected? Is all access to the site by the public barred?	☐	☐
7	If required, is there sufficient propping to prevent premature structural collapse or damage to adjacent property?	☐	☐
8	Are all ladders and other equipment in good order?	☐	☐
9	Are any floors in danger of being overloaded?	☐	☐
10	If a crane is in use:	☐	☐
	(a) Are all non-essential personnel (except the crane operator and dogman) clear of the danger area when the crane is being used?	☐	☐
	(b) Are all crane windows properly protected, and does the crane require a FOPS canopy fitted?	☐	☐
11	Are pedestrians adequately protected?	☐	☐
12	Is sufficient watering taking place to keep down dust?	☐	☐
13	Are there sufficient fire extinguishers or other fire-fighting equipment onsite, and are they readily accessible?	☐	☐
14	Are good housekeeping practices being maintained, for example: are floors and access pathways clear of unnecessary debris and materials/equipment?	☐	☐
15	Does all electrical equipment have current test certification and tagging to verify safety for use?	☐	☐
16	Do plant and equipment being used onsite have daily checks conducted by the operator(s) to ensure proper running conditions and safety for use?	☐	☐
17	Do all onsite elevated work platforms and cranes have current certification to verify safety for use?	☐	☐

DEMOLITION TRAINING

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

SCOPE

This chapter provides the safe practices and requirements for employees authorized to drive a Company vehicle or personal car on Company business. It does not include information on vehicle inspections, maintenance or load securement, which are addressed in other chapters of this manual.

POLICY

Driving any vehicle presents significant risks to workers. This Company is committed to reducing traffic-related deaths and injuries. As part of this commitment, this Company maintains a driver safety policy designed to support a culture of safety and reduce accidents.

EMPLOYER RESPONSIBILITIES

This Company will:

- Establish and maintain policies and rules in accordance with applicable regulations and best industry practices to promote safety and prevent injuries and illnesses
- Ensure that every employee asked to drive a Company car or personal car on Company business has been trained in the Company's driver safety policy and safe driving practices
- Record and maintain documents pertaining to the eligibility and qualification of an employee to drive a Company car or a personal vehicle on Company business
- Ensure vehicles driven on Company business are in good repair and adhere to all legal regulations and requirements
- Encourage and respect the involvement of employees in the planning and implementation of safe driving policy
- Ensure drivers participate in regular safety meetings to promote a continued culture of safety and address safety concerns
- Devise and implement a system of disciplinary action and rewards to encourage safe driving habits, as appropriate
- Prevent unnecessary travel by employees

EMPLOYEE RESPONSIBILITIES

Company employees who, as part of their job, drive a Company vehicle or their own on Company business are expected to:

- Complete a driver safety course that addresses general driver safety as well as hazards specific to the job being done
- Ensure the roadworthiness of his or her vehicle before operation
- Operate the vehicle according to best safety practices
- Respond to accidents and near misses according to established Company policies and procedures
- Inform a supervisor of any changes to their Motor Vehicle Record that may impact their eligibility to drive

- Maintain a driver's license that permits them to perform their job in compliance with the law
- Demonstrate awareness and understanding of the Company driver safety policy
- Make recommendations to improve the Company's driver safety policy

SAFE PRACTICES

This Company recognizes that its greatest assets are its employees, a fact demonstrated by a commitment to their safety.

A driver safety program saves lives and reduces injuries. It also prevents material losses and helps this Company guard against the range of liabilities that may emerge from a vehicular accident.

Accordingly, management will provide resources needed to support a culture of safety and will actively encourage employees to participate in planning and implementation of the driver safety program.

If the Company operates any of the following types of commercial motor vehicles in interstate commerce, it will comply with applicable U.S. Department of Transportation (DOT) safety regulations, many of which may not be detailed in this chapter.

- A vehicle with a gross vehicle weight rating or gross combination weight rating of 10,0001 lbs. or more
- A vehicle designed or used to transport between 9 and 15 passengers for compensation
- A vehicle designed or used to transport 16 or more passengers
- Any size vehicle used in the transportation of materials classified as hazardous under the Hazardous Materials Transportation Act and are required to be placarded under the Hazardous Materials Regulations

FLEET

This Company will maintain a fleet of vehicles if necessary for business in accordance with relevant regulatory standards and vehicle manufacturer's advice.

Fleet Selection

The safety coordinator will work with this Company's insurance Company to establish guidelines for the selection of Company vehicles, and will include the following:

- The appropriate vehicle type for expected use
- Required safety equipment
- Maintenance procedures
- Inspection procedures
- Protections against unauthorized use
- Record-keeping procedures
- Insurance

The National Highway Transportation Administration provides information on vehicle safety according to make and model.

Preventive Maintenance

All Company vehicles will be maintained according to a regular schedule to ensure their safety and roadworthiness. All maintenance will be performed by a qualified individual or automotive shop according to the manufacturer's recommended service schedule.

In addition to regularly scheduled maintenance, fleet upkeep should include, but not be limited to:

- Basic inspections of the vehicle by the driver before every trip
- Immediate removal from service of any vehicle with mechanical problems
- Managerial certification of requested repairs before return to service

Recordkeeping

All vehicle maintenance, repair certification and driver review will be recorded and kept through the life of the vehicle.

Vehicle Inspection

The operator will inspect each vehicle or piece of equipment on a daily basis before and after operation. Each operator is responsible for the safe condition of the equipment. No employee may drive a vehicle having steering, brake or other safety problems until a mechanic has made repairs. Drivers will report any other unsafe conditions to their supervisor as soon as safely possible.

DRIVER SELECTION, QUALIFICATION AND EVALUATION

The safety coordinator will work with management and the Company's insurance Company to determine the qualification standards for motor vehicle operators.

Employment History

The evaluation for any new employee anticipated to drive a vehicle on Company business will include a reference check and review of driving history through past employers.

Licenses

Any driver of a Company vehicle or a personal vehicle on Company business will possess a valid driver's license appropriate for the vehicle that will be driven and the circumstances in which the vehicle will be driven. All government regulations and insurance Company requirements will be followed concerning driver qualification.

A driver will only operate a vehicle that requires a commercial driver's license (and any endorsement) if he or she is in possession of the appropriate license.

Motor Vehicle Records

This Company will check the driving records of any employee expected to drive for work. Further, periodic review of a motor vehicle record (MVR) for employees expected to drive for work reasons will indicate if they remain eligible to drive a Company vehicle or their own on Company business.

Initial Assignment

The Company will request and review an MVR for new applicants or current employees expected to add driving to existing responsibilities, whether operating their own vehicle or a Company vehicle. The MVR review will consider the most recent three years of driving and should include motor vehicle records from all states in which the applicant has lived in that time.

MVRs and the information contained therein will remain as confidential as possible. Discussions of motor vehicle records will be restricted to individuals with a legitimate “need to know.”

Any qualification standard may entail a multi-tiered or point system approach to driver eligibility based on the frequency of the employee’s anticipated work driving and the severity of traffic convictions recorded in the MVR

Following are some examples of violations that, having occurred in the past 3 years, may warrant ineligibility to drive on Company business:

- DWI/DUI
- Negligent motor vehicle homicide
- Operating with a suspended license
- Using a motor vehicle for commission of a felony
- Aggravated assault with a motor vehicle
- Operating a motor vehicle without the owner’s consent
- Reckless, careless or negligent driving, including speeding more than 15 MPH over limit
- Hit and run or leaving the scene of an accident with injury or death resulting, or property damage in excess of $1,000

Following are examples of violations that, having occurred more than three times in two years, may warrant ineligibility to drive:

- Minor moving violations
- Accidents

Annual Review

Employees cited for a violation that may affect their eligibility to drive on Company business will inform their supervisor.

In addition to the initial MVR review, a review of an employee’s MVR will occur annually to confirm the driver’s continued eligibility to drive for work.

Defensive Driver Training

The Company may consider or require the completion of a driver safety course or defensive driving course in determining eligibility to drive a Company vehicle or a personal vehicle while on Company business.

Driver Agreements

Employees who will operate a motor vehicle as part of their job are required to confirm awareness and understanding of the Company’s driver safety policy.

The safety coordinator, with the safety committee, will create a “driver agreement” that allows a driver to confirm his or her awareness and understanding of this policy, driver expectations, vehicle maintenance and care requirements, and the procedures for reporting moving violations and accidents.

Driver Qualification File

The Company will maintain a driver qualification file for every driver including all documents required to verify his or her qualifications.

Meetings

The safety coordinator, with the safety committee, will determine whether or under what conditions an employee may permit another individual to drive a Company vehicle.

A driver or other employee who permits an unauthorized individual to operate a Company vehicle faces disciplinary action and financial accountability for any costs incurred by allowing unauthorized personnel to operate a Company vehicle.

Securing Materials

The driver will prevent the unsafe movement of any materials such as tools or equipment by securing it appropriately. Drivers should secure anything that may present a hazard outside the passenger compartment.

Vehicle Occupancy

No Company vehicle transport more passengers than safely possible. Every adult in the vehicle must have a seatbelt. If children must be transported, each must have the appropriate child safety restraint. Vehicles may be operated only if each passenger is safely restrained in their seat.

Seat Belts

The Company recognizes that seat belts effectively prevent injuries and loss of life in an automotive accident.

All Company employees will wear seatbelts when operating a Company-owned vehicle or any vehicle on Company premises or on Company business. Any occupant of a vehicle owned by this Company, on Company premises, or in a vehicle on Company business will wear a seatbelt or, if required, an appropriate child restraint system.

This Company encourages its employees to always wear a seatbelt when driving or riding in an automobile, to ensure child restraints are used properly, and to encourage other passengers or drivers do the same.

Alcohol and Drug Use

The Company forbids employees from consuming or being under the influence of alcohol or illegal drugs during “duty hours.” Duty hours include working hours, break periods and on-call periods. The consumption of alcohol or illegal drugs while performing Company business or while in a Company facility may result in disciplinary action up to and including termination.

If an employee takes prescribed medication or over-the-counter medication known to affect the ability to operate a motor vehicle or other heavy machinery, the employee will inform his or her immediate supervisor and refrain from such duties until able to do so safely.

Drivers will remain aware of driving behaviors that indicate impairment such as weaving, inappropriate speed and erratic or abrupt driving. Staying a safe distance from drivers who may be impaired and bringing dangerous drivers to the attention of the authorities helps keep roads safe.

Drivers who operate a commercial motor vehicle as defined by the federal highway administration (FHA) must possess a CDL and are subject to FHA's regulations on alcohol and drug use and testing.

A drug free workplace policy and supporting procedures must be in place and communicated to all employees before drug testing. The rule requires pre-employment, reasonable suspicion, random, post-accident, return-to-duty and follow-up testing. For details on the program, refer to the Federal Motor Carrier Safety Regulations, Title 49, Part 382.

Distracted Driving

Driving skills rely on the focus of the vehicle operator. Every driver will devote his or her full attention to the task of driving while behind the wheel. Text messaging while driving is strictly prohibited. Distractions come in many forms and contribute to 25 to 30 percent of all traffic accidents. Distractions include, but are not limited to the following:

- Text messaging and other cell phone use (even with hands-free headset)
- Reaching for an object inside the vehicle
- Looking at an object, person or event outside the vehicle
- Eating and drinking
- Reading
- Grooming and hygiene
- Electronics use (computer, tablet, GPS)
- Adjusting non-critical controls
- Horseplay
- Emotional distractions

Fatigued Driving

Drowsy driving greatly increases the risk of an accident. All drivers will be trained in the dangers of driving drowsy and the importance of sufficient rest before operating a motor vehicle.

Aggressive Driving

The Company prohibits aggressive driving while operating a Company vehicle or a personal vehicle on Company business. Aggressive driving behaviors include, but are not limited to the following:

- Excessive Speed
- Tailgating
- Failure to signal lane change

- Running a red light
- Passing on the right
- Any offensive, rude, or hostile act or gesture directed at another driver

Young Drivers

Teenage drivers are the most likely to engage in risky driving behaviors, and vehicle crashes are the leading cause of death for 15-20-year-olds. Federal law prohibits drivers under 17 to operate a vehicle as part of their job, and it is at the discretion of the safety coordinator to prohibit driving for any employee based on a lack of driving experience.

Driving in Work Zones

All drivers in work zones must take special care. Patience and care goes a long way to contribute to driving safely around construction. Heavy machinery and workers can slow everything down, but driving rushed makes it difficult to observe other workers and leads to poor decision making. Workers must be vigilant and minimize distractions to respond quickly to the unexpected when behind the wheel, especially when driving where others are working.

MONITORING

As part of our driver safety policy, every work-related accident and near miss involving motor vehicles will be handled in a way to reduce risk and encourage future safe behaviors in the future.

Additionally, the Company's driver safety policy requires periodic review of the policy itself and its impact on the safety and health of employees.

Incident, Accident Analysis, and Reporting

If an employee experiences a vehicular accident while driving a Company car or a personal car on Company business, he or she will do the following:

- Stop the vehicle. If it can be done safely, move the vehicle off the road
- Call appropriate law enforcement authority if damage is done to another vehicle or property that does not belong to this Company For an emergency, call 911 to summon both police and emergency medical services
- Mark the scene as necessary for safety
- Gather the names of other drivers and witnesses
- Diagram the accident, noting vehicles involved, where vehicle occupants were seated at the time of the accident, the date, time and weather conditions
- Exchange the following information with other drivers involved: License plate number, registration information and insurance information
- Document the name and badge number of the responding law enforcement professional.
- Notify the supervisor as soon as safely possible
- Cooperate with law enforcement professionals and participate in the Company's accident investigation

Do not assume blame or apologize. Only give statements about what happened to police or an appropriate member of Company management.

Any accident will be investigated according to the Company's accident investigation policy. (See chapter on "Accident Investigation" for more details.) Use the Motor Vehicle Accident Report at the end of this chapter to accompany the Company's Accident/Incident Report.

This Company will comply with all recordkeeping requirements of our safety policy and any applicable regulatory authority.

Disciplinary Actions

Safety incidents involving an employee and a violation of our safety policy in a Company vehicle (or personal vehicle used on Company business) may result in disciplinary actions up to termination, including the revocation of driving privileges as determined by management.

Reward Program

It is at the discretion of the safety coordinator and, if appropriate, the safety committee to devise and implement a safe driver reward program to encourage safe driving habits and reward safe driving behaviors.

Policy Review

All aspects of this policy and the Company's driver safety program are subject to annual review by the safety coordinator and the safety committee to ensure the effectiveness of the policy to guarantee a safe working environment for Company employees.

TRAINING

This Company will train every employee who will drive for work related reasons on driver safety at no cost to the employee during working hours.

The Company will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

DRIVER TRAINING

The driver safety program focuses on training and prevention. All new drivers must complete an orientation to cover:

- Policies and procedures for drivers
- Governmental regulations
- Maintenance guidelines and inspection procedures
- Driver training that encourages safe, defensive road behavior

Training Components

The safety coordinator will ensure any employee at this Company who drives on work business is qualified and capable to drive. Drivers will complete training in the following minimum elements for driver safety:

- Defensive driving
- Safe distances

- Intersection driving
- Poor driving conditions
- Split-second decision making
- Distracted driving
- Driving in Work Zones
- Safety restraints

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of the employees attending the training

The Company will retain employee training records for the length of their employment.

FORMS AND ATTACHMENTS

On the following pages, please find the following document(s):

- Motor Vehicle Accident Report
- Driver Safety Training Documentation

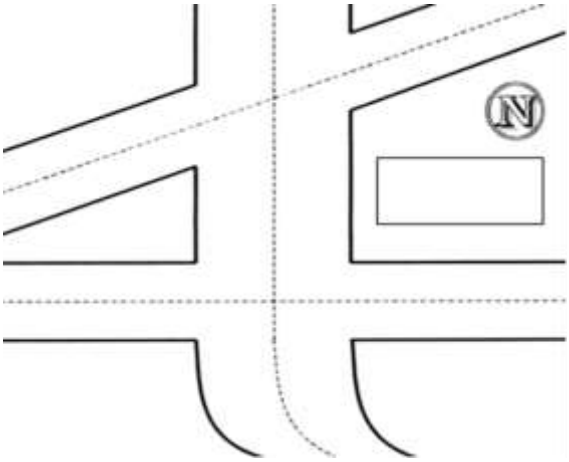
MOTOR VEHICLE ACCIDENT REPORT

AFTER AN ACCIDENT: 1 Stay Calm 2 If the vehicles are drivable and it is safe to do so, move them safely out of traffic 3 Apply first aid (if properly trained) 4 Call police, and if necessary, ambulance 5 Take brief notes

Vehicle Driver Name	Other Vehicle Driver Name
Address	Address
Phone Driver License #	Phone Driver License #
Vehicle Type	Other Vehicle Type
Vehicle License Plate #	Vehicle License Plate #
Owner's Name	Owner's Name
Address	Address
Vehicle Insurance Co. Name	Other Vehicle Insurance Co. Name
Name Policy is Under Policy #	Name Policy is Under Policy #

Passenger Info				

Accident Detail

Date of Accident	Explain how the accident happened
Time of Accident ☐ am ☐ pm	
Street	
City	
State/Province	
Approx. Speed: Your MPH Other MPH	Describe your vehicle's damage
Describe any Injuries	
	Describe other vehicle's damage
Investigating Officer Name	
Phone Badge #	
Police Department	
Investigating Officer Name	
Phone Badge #	
Police Department	
Witness Info	
Witness Info	
Report Completed By	
Signature	

SKETCH OF ACCIDENT SCENE

DRIVER SAFETY TRAINING

Trainer (include qualifications):	
Signature:	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

POLICY

This company has implemented the following earth moving policy to ensure the safety of its employees. All workers engaged in earth moving operations will follow these procedures and safe practices when operating or working around earth-moving equipment safely.

EMPLOYER RESPONSIBILITIES

This company will ensure that:

- All heavy equipment operators are trained and competent to operate their equipment safely
- All employees will be provided, and trained on the use of, the PPE necessary for their jobs
- All heavy equipment will be inspected and maintained in good working order
- Designate a competent person to implement this written earth moving policy

EMPLOYEE RESPONSIBILITIES

- Attend all required earth moving training
- Follow all safe practices established by the company
- Use and maintain all necessary PPE provided by the company
- Report any unsafe conditions or acts immediately

HAZARDS

The most common causes of injuries and fatalities when working around earthmoving equipment are:

- Falls – When climbing on and off the equipment
- Rollovers
- Workers struck by equipment
- Workers struck by material
- Electrocution
- Burns

You should always follow safe work practices and be aware of the hazards around you. It is also a good idea to be trained on the first aid techniques for treating common injuries; it could save a life.

PERSONAL PROTECTIVE EQUIPMENT

All employees are expected to be familiar with and use the necessary PPE associated with their job functions. This PPE can include, but is not limited to:

- Hardhats
- Safety shoes
- Safety gloves
- Reflective vests or clothing
- Safety glasses
- Hearing protection
- Fall protection devices
- Dust masks, or other respiratory protection

EQUIPMENT REQUIREMENTS

Requirements exist for all mechanized equipment used in construction and industry. All earth moving and mobile industrial equipment have common features and must follow the same safety requirements regardless of the specific type, intended purpose or configuration of the equipment.

This company will ensure that all earth moving equipment will comply with all applicable federal, state and local equipment requirements including:

General Requirements

The following are general safety requirements for earthmoving equipment:

- Levers that control hoisting or dumping devices on load hauling vehicles will have a latch or other device that prevents accidental starting or tripping of the mechanism
- Trip handles for tailgates of dump trucks must be located so that the operator is in the clear when dumping occurs
- All rubber-tired motor vehicle equipment is equipped with fenders, mud flaps may be used instead of fenders if the vehicle isn't designed for fenders

Seat Belts

- Seat belts must be provided on all equipment listed above, and must meet all safety requirements
- The tractors listed above must have seat belts for the operators when seated in the normal seating arrangement for tractor operation, even though back-hoes, breakers, or other similar attachments are used on these machines for excavating or other work

Brakes

- All earthmoving equipment must have a service braking system capable of stopping and holding the equipment fully loaded

Fenders

- Pneumatic-tired earth-moving haulage equipment (trucks, scrapers, tractors, and trailing units) whose maximum speed exceeds 15 miles per hour must be equipped with fenders on all wheels

Rollover Protective Structures (Rops)

- Rollover protective structures must meet all governmental requirements for rollover protective structures for designated scrapers, loaders, dozers, graders, and crawler tractors

Audible Alarms

- All bidirectional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, must have a working horn, distinguishable from the surrounding noise level, which can be operated as needed when the machine is moving in either direction
- No earthmoving or compacting equipment with an obstructed view to the rear can be used in reverse gear unless the equipment has an operating reverse signal alarm, or a ground guide signals that it is safe to do so

Scissor Points

- Scissor points on all front-end loaders or articulating equipment, that present a pinch or crush hazard to the operator during normal operation, must be guarded

Lift Trucks, Stackers, Etc.

- Equipment of this type must have the rated capacity clearly posted on the vehicle and be clearly visible to the operator
- When auxiliary removable counterweights are provided by the manufacturer, the alternate rated capacities of the vehicle must also be clearly posted. These ratings can't be exceeded

Modifications or Additions

- No modifications or additions that affect the capacity or safe operation of the equipment may be made without the manufacturer's written approval. If such modifications are made, the capacity, operation and maintenance instruction plates, tags or decals will be changed accordingly. In no case can the original safety factor of the equipment be reduced

Steering or Spinner Knobs

- Steering or spinner knobs must not be attached to the steering wheel unless the steering mechanism design prevents road reactions from causing the steering wheel to spin. The steering knob must be mounted within the periphery of the wheel

INSPECTIONS

All equipment will be checked at the beginning of each shift to ensure that the following parts, equipment and accessories are in safe operating condition and free of any damage that could cause failure:

- Any Trailer Brake Connections
- Emergency Stopping System (brakes)
- Steering Mechanism
- Seat Belts
- Safety Devices
- Parking System (hand brake)
- Tires
- Coupling Devices
- Operating Controls
- Horn

Any defects that are found must be repaired before the equipment can be used. These requirements also apply to secondary equipment such as Lights, reflectors, windshield wipers, defrosters and fire extinguishers.

These rules apply to the following types of earthmoving equipment:

- Scrapers
- Crawler (track) or wheel tractors
- Off-highway trucks
- Agricultural and industrial tractors
- Loaders
- Bulldozers
- Graders
- Similar equipment

JOBSITE SAFETY

The productivity and safety of heavy equipment operations are increased by using well-trained employees, along with properly maintained and serviced equipment. A well laid out worksite and work-plan always improves efficiency and safety on the jobsite.

General

Wherever possible, site planners should arrange for drive-through operations to reduce the need for vehicles to back up.

Keep foot traffic to a minimum in areas where trucks and equipment are operating. Where feasible, use barricades to protect workers.

Jobsite

- All underground utilities in the work area must be located prior to digging. Utility companies must be notified in advance of your intention to excavate. (Check local codes for notification time requirements)
- When nearing an estimated location of underground utilities, the exact location must be determined and marked
- All equipment will comply with the safety requirements when working or being moved in the vicinity of power lines or energized transmitters
- Wherever equipment operations encroach on a public thoroughfare, a system of traffic controls must be used
- Flaggers are required where barricades or warning signs cannot control moving traffic
- Never use an elevating part of heavy equipment as a man-lift

Access Roadways and Grades

- No construction equipment or vehicles can be moved on any access roadway or grade unless the roadway or grade is constructed and maintained to handle the safe movement of that equipment
- Every emergency access ramp and berm used by an employer must be built to restrain and control runaway vehicles

Site Training

Instruction for drivers, operators, signalers and workers on foot is essential to reduce the hazards created by reversing vehicles and equipment.

All construction personnel must be made familiar with blind spots – the areas around every vehicle that are invisible to the operator or driver, even with the help of mirrors.

Site Clearing Requirements

Employees involved in site clearing must be protected from hazards of irritant and toxic plants and suitably instructed in the first aid treatment available.

All equipment used in site clearing operations must be equipped with rollover guards. In addition, rider-operated equipment will be equipped with an overhead and rear canopy guard meeting the following requirements:

- The overhead covering on this canopy structure must at least 1/8-inch steel plate or 1/4-inch woven wire mesh with openings no greater than 1 inch, or equivalent
- The opening in the rear of the canopy structure will be covered with at least 1/4-inch woven wire mesh with openings no greater than 1 inch

Environment

This company will ensure that all equipment operators understand the factors at the workplace that affect their job, these include:

- Ramps, slopes, and other surface conditions at the jobsite
- Composition and stability of the loads
- Maneuvering for loading and unloading of trucks and hoppers
- Pedestrian traffic in the area
- Confined, restricted, or hazardous places where equipment will be operated
- Material, utility, and overhead hazards

Site-Specific Information

- Always know where to get assistance in case of an accident or other emergency
- Know where to find the first aid kits
- Know where to find a fire extinguisher

SAFE PRACTICES

All company employees are expected to follow these safe practices and procedures when operating or working near earth moving equipment.

Equipment Knowledge

- Read the operators manual and operate the machine only if trained and considered competent to do so
- Make sure the machines controls are identifiable and clearly marked
- Wear appropriate clothing and PPE for your job
- Do a walk around to make sure the area is clear before moving the machine
- Don’t climb on the machine where hand and foot holds have not been provided. Use a three point climbing technique
- Start machine only while sitting in the operator’s seat and all personnel are clear
- Ensure all controls are in the neutral position before starting the machine
- Keep tires properly inflated, improper inflation may cause the machine to tip over under load
- Heavy equipment machines are required to have a seat belt and rollover protection (ROPS). Always use the seat belt

Basic Operation

Authorized operators must be able to demonstrate the ability to perform the following equipment tasks:

- Steering and maneuvering
- Digging and loading
- Refueling
- Moving
- Implement and attachment and operation
- Equipment inspections or maintenance as required

For additional information regarding the safe operation of a specific type of equipment, refer to manufacturer’s instructions and/or the applicable chapter of this manual.

Backing Up

Reversing vehicles and equipment on construction projects present serious hazards for workers on foot. Fatal accidents caused by workers being backed over by dump trucks and other equipment occur all too frequently. Anyone on foot near reversing vehicles and equipment is at risk.

Blind Spots

When working around earth moving equipment all ground workers need to be aware of equipment blind spots and swing areas. Around dump trucks and heavy equipment such as bulldozers and graders there are blind spots where the operator has no view or only a very limited view. The operator may not see someone standing in these blind spots. Anyone kneeling or bending over in these areas would be even harder to see. Consequently, the driver or operator must rely on mirrors and signalers to back up.

Dump trucks and other equipment that could contact overhead power lines must keep a minimum distance from them. The company will ensure that all operators and spotters/signalers know what the minimum distance requirement is for the power lines in the area.

Idle Equipment

- Whenever the equipment is parked, the parking brake will be set
- Equipment parked on inclines will have the wheels chocked and the parking brake set
- When equipment is left unattended, implements must be fully lowered, controls neutralized, power shut off, and brakes set
- Heavy equipment is considered unattended when the operator is 25 ft. or more away even if it's still in their view
- When the equipment operator is dismounted and within 25 ft. of the machine still in his view, the implements will be fully lowered, controls neutralized, and the brakes set to prevent movement
- All equipment left unattended at night, next to a highway or a construction area where work is in progress, must have appropriate lights, reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment

Equipment in Use

- Don't drive equipment up to anyone standing in front of an excavation or a fixed object
- Don't stand or walk under the elevated portion of any equipment, whether loaded or empty
- Don't hitch a ride on heavy equipment
- Don't put your arms or legs between the moving parts of the equipment, or outside the running lines of the vehicle
- Always maintain a safe distance from the edge of ramps or elevated platforms and from the edge of any excavation
- Brakes will be set and wheel blocks will be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading
- Make sure there is enough headroom under overhead installations, lights, pipes, sprinkler system, etc. for the safe passage of equipment

Equipment Guards

- An overhead guard will be used as protection against falling objects. This guard is intended to offer protection from the impact of small objects, not to withstand the impact of a falling capacity load
- A load backrest extension must be used, whenever necessary, to reduce the risk of the load or part of it from falling rearward
- Only approved heavy equipment can be used in hazardous locations

Spotters/Signalers

Any employee operating a vehicle or equipment with an obstructed view or near overhead power lines will have a designated spotter/signaller to protect against incidents or injuries.

- Operators and spotter/signalers will understand and use an approved set of signals to control equipment movement
- Operators will always obey the signaler or spotter
- Only one person will be designated as a signaler or spotter
- If possible, remain in the cab in areas where other equipment is likely to be backing up
- Make sure that all mirrors are in good condition and properly adjusted
- Blow the horn twice before backing up
- Stop the vehicle when a spotter, co-worker or anyone else disappears from view

Operating

When operating earthmoving equipment, drivers will:

- Keep the load as low as possible while traveling; always reduce speed when turning
- Keep speeds low on rough terrain to prevent bouncing, bucking, or side hopping
- Check for overhead lines or obstructions before raising any overhead implement
- Not drive across a steep slope
- Not allow the tires to spin when picking up or pushing a load
- Always look in the direction of, and keep a clear view of the path of travel
- Ascend or descend grades slowly
- When ascending or descending grades over 10 percent, loaded equipment will be driven with the load upgrade
- Keep the load and load carrying implement tilted back on grades
- Operate at a speed that will permit the equipment to be brought to a stop in a safe manner
- Avoid stunt driving and horseplay
- Always slow down for wet and slippery surfaces
- Ensure that ramps or bridge plates are properly secured before they are driven over, and their rated capacity never exceeded
- Run over loose objects on the roadway surface
- Not use heavy equipment to demolish structures that are taller than the machine unless it has overhead protection to prevent debris from striking the cab
- Not under-cut a bank which is higher than the machine
- Use extreme caution when approaching or operating near excavations
- Use dust suppression and control when required

- Pre-wet soil to make loading easier and to aid in dust control
- Rip tight soil before scraping or excavating to improve speed and efficiency
- Always load buckets or hoppers down grade to increase the speed of operation, lessen wear on equipment, and reduce the need for a push tractor
- Not use heavy equipment as a battering ram
- Make sure the machine has clearance in front and rear if equipped with rear implements
- Never place any body part under a raised implement unless it is properly blocked

Loading

When operating a loader, drivers will:

- Strike the bucket to avoid scattering loads before traveling with equipment
- Handle only loads that are within the rated capacity of the equipment
- Ensure the load is securely within the bucket or hopper as far as possible, and tilt the bucket backward to stabilize the load
- Use extreme care when tilting a load forward or backward when it's elevated
- Never tilt the bucket forward while it's elevated except to pick up a load
- Not tilt an elevated load forward except when it's in a deposit position over a hopper or stack
- Ensure all personnel not within a guarded enclosure, including truck drivers, stay clear of loading operations

Mounting & Dismounting

Safety regulations require that construction equipment have a means of access to the operator's station that will not endanger the operator, and must have skid-resistant walking, climbing, and work surfaces.

Ensure that your equipment complies with the law. Keep all running boards, treads, steps, footholds and platforms clear of mud, ice, snow, grease, debris and other hazards. Always use three point contact techniques when entering or exiting equipment.

Workers on Foot

Ground workers involved in earth moving operations will:

- Know how to work safely around trucks and operating equipment
- Understand and avoid entering or standing in blind spots
- Make eye contact with the driver or operator before approaching equipment
- Signal your intentions to the driver or operator
- When possible, avoid using vehicle ramps to enter and exit the site
- Not stand near vehicle paths, grading operations and other locations where heavy equipment is moving

Housekeeping

- Keep operator's compartment free of clutter and controls free of oil and grease
- Personal tools or equipment must be secured

TRAVELING/MOVING (ROADING) HEAVY EQUIPMENT

Traffic Rules

- All traffic regulations must be observed, including authorized site speed limits. Keep back at least three vehicle lengths from the vehicle ahead of you, and keep the equipment under control at all times
- Yield the right of way to ambulances, fire trucks, or other emergency vehicles
- Don't pass other vehicles traveling in the same direction at intersections, blind spots, or other dangerous locations
- Slow down and sound the horn at intersections of roadways, paths, and other locations where vision is obstructed. If the load being carried obstructs your forward view, travel with the load trailing (to the rear)
- Wherever possible, cross railroad tracks diagonally. Parking closer than 8 feet from the center of railroad tracks is prohibited

EQUIPMENT MAINTENANCE

General

Any time heavy equipment needs repair, is found to be defective, or unsafe in any way, the machine will be taken out of service until it has been restored to safe operating condition.

- Fuel tanks must not be filled while the engine is running
- Spilled oil or fuel must be carefully washed away or completely evaporated and the fuel tank cap replaced before restarting engine
- No equipment can be operated with a leak in the fuel system
- Never use an open flame to check electrolyte level in storage batteries or gasoline level in fuel tanks
- All repairs will be made by authorized personnel
- No repairs will be made in Class I, II, and III locations

Class 1 locations	Class 2 locations	Class 3 locations
Locations where easily ignitable fibers are present but not likely to be in the air in quantities sufficient to produce ignitable mixtures	Locations in which flammable gases or vapors are, or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures	Locations which are hazardous because of the presence of combustible dust

Repair Guidelines

- Repairs to the fuel and ignition systems of equipment that involve fire hazards can be only performed in designated locations
- Equipment in need of repairs to the electrical system will have the battery disconnected prior to the start of those repairs
- All parts of any heavy equipment need replacement can only be replaced with parts having safety ratings equal to the original part

- Equipment will not be altered so that the location of parts differs from the manufacturers original configuration, nor will they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts, except for fuel system conversions

Conversions

Heavy equipment originally approved to use gasoline for fuel may be converted to liquefied petroleum gas fuel provided the complete conversion results in a vehicle that meets the features for LP or LPS designated equipment.

Routine Maintenance

- Water mufflers must be filled daily, or as frequently as necessary, to prevent depletion of the supply of water below 75 percent of the filled capacity
- Equipment will be inspected daily before being placed in service, and will not be used if the examination shows any condition that affects the safety of the vehicle
- Where heavy equipment is used on a round-the-clock basis, it must be examined after each shift
- Heavy equipment will be kept in a clean condition, free of excess oil and grease. Noncombustible agents should be used for cleaning equipment. Solvents with a low flash point (below 100° F.) can't be used
- High flash point (at or above 100° F.) solvents may be used. The appropriate precautions for toxic fumes, ventilation, and fire hazard for the agent or solvent used must be followed

Repair Requirements

If, during inspection, defects are found, they must be immediately reported and corrected.

- Vehicles with mufflers having screens or other parts that may become clogged can't be operated if those screens or parts are clogged
- Any vehicle that emits hazardous sparks or flames from the exhaust system must immediately be removed from service until the cause of the sparks and flames has been eliminated
- When the temperature of any part of any equipment is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the equipment will be removed from service and not returned until the cause of the overheating has been eliminated

Repair Safety

When repairing earthmoving equipment it's important to follow these guidelines:

- Heavy machinery, equipment, or any of their parts, which are suspended by slings, hoists, or jacks, must be properly blocked or cribbed to prevent falling or shifting before employees can work under or between them
- Bulldozer and scraper blades, end-loader buckets, dump bodies or other elevating part, will be either fully lowered or blocked, while being repaired or when not in use. All controls will be in a neutral position, with motors stopped, and brakes set unless work being performed requires otherwise
- A safety tire rack, cage, or equivalent protection must be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices

Batteries

The use, care and charging of all batteries will conform to the following:

- Ventilation will be provided to ensure diffusion of the gases from the battery and to prevent the accumulation of an explosive mixture
- Face shields, aprons, and rubber gloves will be provided for workers handling acids or batteries
- Facilities for quick drenching of the eyes and body will be provided within 25 feet of battery handling areas
- Facilities will be provided for flushing and neutralizing spilled electrolyte and for fire protection

Gasoline & Diesel Refueling

Most types of earthmoving equipment are powered by diesel fuel or gasoline. Although diesel fuel isn't as volatile as gasoline, use the same precautions with each.

REFUELING SAFETY MEASURES

Refueling Station

- Refueling stations must be located outside, never refuel a vehicle indoors
- Turn off your vehicle engine. Put your vehicle in park and/or set the emergency brake
- If you experience a fire when refueling, leave the nozzle in the fill pipe and back away
- Leaving the nozzle in the vehicle will prevent the fire from becoming more dangerous
- Know where the pumping stations emergency shutdown button is located. In case of fire hit this shut off to prevent the fire from becoming any worse
- Use only the refueling latch provided on the gasoline dispenser nozzle. Never jam the refueling latch on the nozzle in the open position

When Refueling

- Don't smoke, light matches, or lighters when refueling
- Don't over-fill or top-off your vehicle tank, which can cause gasoline spillage
- Avoid prolonged breathing of gasoline vapors. Use gasoline only in open areas
- Keep your face away from the nozzle or container opening
- Before starting any equipment make sure the fuel cap is screwed on tightly, and that any spilled gas has evaporated or been cleaned up
- Never siphon gasoline by mouth for any reason. Gasoline can be harmful or fatal if swallowed. If someone swallows gasoline, do not induce vomiting. Contact an emergency medical service provider immediately

Fuel Safety

- Keep gasoline away from your eyes and skin; it may cause irritation. Remove gasoline-soaked clothing immediately
- Use gasoline as a fuel only. Never use it to wash your hands or as a cleaning solvent
- Rags or other material used to clean spilled fuel should be disposed of immediately in a metal container. Never carry a fuel soaked rag in your pocket
- Remember, gasoline vapors are highly flammable and explosive. Never assume that because there is no puddle of gas that there is no danger

Carbon Monoxide Hazards

Carbon monoxide (CO) is an odorless, colorless, highly poisonous gas created when any fuel is burned. Breathing high concentrations of Carbon Monoxide can be lethal in minutes. Even low concentrations over a long period are dangerous. Long-term exposure can cause permanent heart and brain damage.

When using fuel-powered equipment, there is a serious danger of carbon monoxide build up. For this reason, don't operate gasoline or diesel powered equipment indoors unless there is proper ventilation to prevent a buildup of carbon monoxide.

TRAINING

This company will provide training to all affected employees on the following topics:

- General equipment requirements
- Personal protective equipment & injuries
- General equipment operations
- General equipment and site safety
- Basic maintenance

Training will be provided by persons who have the knowledge, training and experience to train operators and evaluate their competence.

Trainees may operate heavy equipment only:

- Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence
- In areas where the operation does not endanger the trainee or other employees

Training will consist of a combination of the following:

- Formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material)
- Practical training (demonstrations performed by the trainer and practical exercises performed by the trainee)
- Evaluation of the operator's performance on the job-site

Refresher Training

Refresher training will be conducted:

- At least annually
- Whenever jobsite conditions, equipment or procedures and safe practices are changed
- When employees demonstrate a lack of understanding of company safe practices

Training Records

The company will create and maintain records of all employee training. These records will be kept for the length of their employment.

POLICY REVIEW

The company will review this policy at least annually, and whenever there are changes to our processes that can affect the procedures and safe practices.

SCOPE

This chapter covers the safe use of elevating work platforms (EWPs), also known as either aerial work platforms (AWPs) or mobile elevating work platforms (MEWPs). This category of equipment includes articulating aerial devices (cherry pickers) and scissor lifts. These devices can be vehicle mounted, self-propelled or unpowered, and are intended to provide workers access to work areas above ground.

The designs and styles of the devices vary greatly, ant the manufacturer's information should always be referenced before using a particular model.

POLICY

This Company has adopted this program for the safety of employees when working on or around "Vehicle Mounted Elevating and Rotating Work Platforms" from OSHA regulations.

The safety coordinator is designated by this Company as the competent person in authority over all aerial device work procedures. The Safety Coordinator, or designee, will ensure that all safety measures and systems are correctly installed, all safety procedures are adhered to, and ensure regular inspections of the operational site and aerial equipment are made. This Company has implemented, and will enforce, the following work practices and procedures to assure that no employee will be exposed to hazards during aerial lifting operations:

RESPONSIBILITIES

Because Elevated Work Platforms (EWPs) are often rented from an equipment supplier, there can be confusion as to the responsibilities of the parties involved. Generally, the responsibilities can be summarized in the following ways:

Equipment Owner or Supplier

The owner or supplier must ensure that the machine:

- Is maintained in good operating condition
- Conforms to appropriate regulations and standards
- Includes the operator's manual and correct load rating charts

The Employer

The Company and/or safety coordinator will:

- Make sure that the operator is fully trained to operate the particular equipment being used
- Verify that the machine has the correct load rating capacity for the job
- Maintain the equipment and all its protective devices
- Maintain a daily inspection log for each platform
- Require all workers to use the necessary PPE
- Keep the manufacturer's operating instructions and safety rules with the equipment

- Confirm and verify that all employees follow all safety procedures to protect all employees involved in aerial lifting operations or who work near aerial lifting operations
- Keep all work platform proper working order according to the manufacturer's instructions
- Remove any unsafe work platform from service until it is repaired
- Ensure all repairs are made by a qualified service person according to the manufacturer's instructions
- Make no modifications or alterations to work platforms without the written permission of the manufacturer or any other equivalent entity
- Ensure each work platform has a mechanical parking brake that will hold the unit on any slope it's capable of climbing
- Use wheel chocks, whenever possible, when installing or using an aerial lift on an incline

Employee Responsibility

An employee must:

- Operate an aerial device only after being trained and authorized by the Company
- Report known defects and hazards concerning an aerial device to the supervisor
- Operate the machine in a safe manner as prescribed by the manufacturer and according to Company safety and health policies
- Inspect the equipment each day or each shift before use
- Perform function tests before use
- Report any defects to the supervisor
- Read, understand, and obey the manufacturer's safety rules, including the operating manual and warning decals

Osha Regulations and Responsibilities

OSHA Regulations include the following requirements:

- EWPs must be engineered and tested to meet the applicable standards for that equipment
- Aerial devices must be checked each day before use by a trained worker
- The owner or supplier must keep a log of all inspections, tests, repairs, modifications, and maintenance
- The log must be kept up to date and include names and signatures of persons who performed inspections and other work
- Workers must be given oral and written instruction before using the platform for the first time. Instruction must include items to be checked daily before use

VEHICLE MOUNTED ELEVATING AND ROTATING WORK PLATFORMS

There are two basic types of elevating work platforms (EWP) – boom and scissor. Both types come in:

1. "On-Slab" models for use on smooth hard surfaces such as concrete or pavement

2. "Rough-Terrain" models for use on firm level surfaces such as graded and compacted soil or gravel

Both types share three major components: base, lifting mechanism, and platform assembly.

Scissor-Type Machines

These are raised and lowered by hydraulic pistons and an expanding scissor mechanism. Platforms are available in various configurations with different capabilities for extension and movement. Some have extendable platforms or platforms that can rotate. Extendable platforms should be retracted before raising or lowering the device. Typical machines are illustrated in Figure 1.

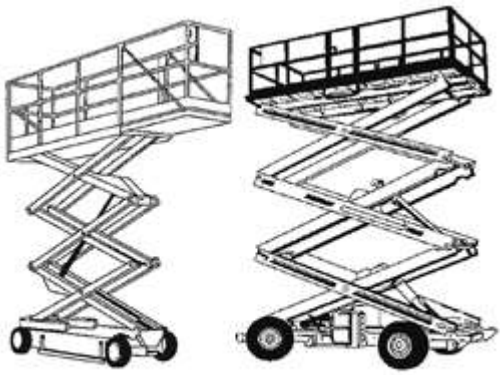


FIGURE 1: Scissor-type Powered

On-Slab Units

- Not designed for uneven or sloping ground
- Normally have solid rubber tires
- Generally powered by rechargeable DC battery
- Some are powered by internal combustion engine, either gasoline or propane
- Most have “pothole protection” – a metal plate lowered close to the ground to afford some protection against inadvertent movement into depressions or debris
- Lifting mechanism is hydraulic
- Normally have wider wheelbases, larger wheels, and pneumatic tires
- Some fitted with outriggers for extra stability
- Usually powered by internal combustion engines: gasoline, diesel, or propane
- DC Battery powered units are also available, but are not common

Rough-Terrain Units

- Similar in design to on-slab machines
- Built to handle rigorous off-slab challenges

Scissor-lifts range in capacity from 500 to several thousand pounds. They’re available with platform heights often reaching 50 feet or more. Scissor-lifts must be set up on stable, level ground, even with outriggers deployed. A slight imbalance or instability is amplified when the machine is raised.

EWP HAZARDS

The following are some of the basic hazards to be aware of during operations:

- Machine Tipping or Overturning – Many factors can cause instability sudden stops, depressions, drop-offs, overreaching and overloading. Overturning and tipping result in many fatalities and injuries
- Overriding Safety Features – Defective or disabled features such as the tilt or level warnings or a deadman switch; can prevent operators from knowing when they are in a dangerous situation. Overriding a deadman switch has resulted in fatalities; so has the malfunction of the tilt warning
- Overhead Powerline Contact – Contacting overhead wires can cause electrocution. This can happen with any type of machine – and with the loads carried by or overhanging the machine
- Falls from Elevated Platforms – Many falls occur because workers get in a hurry and fail to use standard fall protection procedures

- Makeshift Extensions – If an EWP can't reach the desired working height, don't compensate by using scaffold planks, ladders, blocks of wood or other makeshift arrangements, these practices lead to falls and machine instability
- Overloading the Platform – Elevating work platforms overloaded or loaded unevenly can become unstable and fail. Articulating type machines are especially sensitive to overloading. Always stay within the operating range specified by the manufacturer
- Failure to Cordon Off:
  - EWPs can be struck by other construction equipment or oncoming traffic if the work area isn't properly marked or cordoned off. Make sure there's enough clearance for all aerial work platforms
  - Workers have been injured when they inadvertently entered an unmarked area and were struck by falling material, tools, or debris
  - Workers have also been injured in unmarked areas by swinging booms and pinched by scissor mechanisms
- Accidental Contact – Many work platforms have blind spots. Moving the machine or platform can cause contact with workers or with obstacles. Use a designated signaler on the ground to guide the operator when the path of travel is not clear or access is tight
- Improper Blocking During Maintenance – Failing to block, or improperly blocking the machine, boom, or platform can cause serious crushing injuries and property damage
- Improper Access – Never enter or leave the platform by climbing the scissors or the boom. Don't use extension ladders to gain access. Ladders exert lateral loads on the platform and can cause it to overturn. For the safest access, lower the machine completely
- Moving with Platform Raised – Lower the platform before moving the machine unless:
  - The machine is designed to move with platform raised
  - The supporting surface is smooth and level. Slight dips and drops are amplified when the platform is raised and can cause the machine to overturn
- Improper Refueling – Take care when refueling. Gasoline, for instance, should be kept in approved containers and dispensed to prevent spills and sparking
- Pinch Points – Clothing, fingers and hands can get caught in scissor mechanisms. As platforms are raised, machines may sway. Workers can be pinched between guardrails and the structure. Position the platform so that work takes place above guardrail height

FALL PROTECTION REQUIREMENTS

The fall protection required for persons who work on aerial lifts depends on the type of aerial lift used. The table below shows acceptable fall protection.

Type of Lift	Fall Protection Required
Vehicle-Mounted Elevating and Rotating Work Platforms (ANSI A92.2 devices)	Platforms other than buckets or baskets must include guardrail systems – guardrails, a midrail and toeboards. Each person who works on a boom-supported platform must wear a body harness and lanyard attached to the boom or basket.
Manually Propelled Elevating Aerial Platforms (ANSI A92.3 devices)	The platform must have a guardrail at least 42 inches ±3 inches above the floor, a midrail and toeboards at least 4 inches high.
Boom-Supported Elevating Work Platforms (ANSI A92.5 devices)	The platform must have a guardrail at least 42 inches ±3 inches above the floor, a midrail and toeboards at least 4 inches high. Each worker on the platform must wear a body harness and lanyard attached to the boom or platform.
Self-Propelled Elevating Work Platforms (ANSI A92.6 devices)	The platform must have a guardrail 42 inches ±3 inches above the floor, a midrail and toeboards at least 4 inches high.

- Employees must maintain firm footing on the platform while working on the platform. The use of railings, planks, ladders or any other devices on the platform for achieving additional height is prohibited
- The Company will provide employees with a safety harness that has an approved lanyard that's affixed to attachment points provided and approved by the manufacturer. A fall arrest system will only be used when the aerial lift is designed to withstand the vertical and lateral loads caused by an arrested fall
- A body belt may be used with a restraint device with the lanyard and the anchor arranged so that the employee is not exposed to any fall distance. A restraint device is required where the aerial lift cannot withstand the vertical and lateral loads imposed by an arrested fall
- Belting off to an adjacent pole, structure, or equipment while working from an aerial work platform is prohibited
- The Company will not allow employees to exit an elevated aerial work platform, except where elevated work areas are inaccessible or hazardous to reach. When employees exit to unguarded work areas, adequate fall protection will be provided and used

Fall Protection for Aerial Devices

- Employees must always stand firmly on the floor of the basket, and must not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position
- Boom and basket load limits specified by the manufacturer must not be exceeded
- A safety belt or harness must be used with a lanyard attached to the boom or basket when working from an aerial lift. The employer must provide the safety belt, harness and lanyard. An in-plant, industrial-type aerial device used on a level surface and equipped with a platform with approved railings is exempt from this rule

- Body belts are not acceptable as part of a personal fall arrest system. The use of a body belt in a tethering system or in a restraint system is acceptable
- A boom platform must have a rail or other structure around its upper periphery that's at least 38 inches above the floor of the platform and with a toeboard at least 4 inches high. A basket of a cherry picker is considered to meet this requirement. A platform may have the guardrail removed from the working side if a safety belt and lanyard is worn by the employee on the platform

STABILITY AND TIPPING

In general, elevating work platforms are well manufactured and are safe to use within their specific limitations. However, as with any equipment or tool, there are rules to follow. One of the most dangerous hazards in operating elevating work platforms is tipping over. This can be caused by one or more of the following factors:

- Sudden movement of the unit or parts of the unit when elevated
- Making sudden stops while in motion with platform elevated
- Uneven or overloading of the platform
- Traveling or operating on a slope or uneven terrain
- Changing the weight distribution of the machine by replacing parts with others of a different weight or adding attachments not approved by the manufacturer
- Holes or drop-offs in the floor surface causing one wheel to drop suddenly
- Operating the equipment in windy conditions

FACTORS AFFECTING STABILITY

Dynamic Forces

Dynamic forces are forces generated by movement or change of movement. For example, applying the brakes suddenly or traveling too fast around corners can cause instability – as in a car or van. Sudden stops while raising or lowering the platform can also cause instability.

Traveling

Traveling the platform over rough or uneven ground can also cause instability. Figure 10 shows how a tire dropping 4 inches can cause the boom to sway 2 feet. It is important to lower the platform fully or to retract telescoping sections while traveling, particularly on uneven surfaces.

Stability on Inclined Surfaces

Unless recommended for such use by the manufacturer, no elevating work platform must be used on an inclined surface. Procedures for maintaining stability must be clearly outlined in the special warnings section of user's manual. The user must not deviate from the manufacturer's instructions.

EQUIPMENT INFORMATION

EWPs are designed for different uses. It is essential to select the appropriate equipment for the job.

Typical Mistakes

- Using an on-slab machine on rough terrain
- Using a unit undersized with respect to height, reach, and lifting capacity
- Lifting large materials that overhang the platform
- Using a scissor lift where the reach of a boom-type machine is needed
- Extending the platform with planks, ladders, or other devices because the machine cannot reach the required height

Factors to Consider

- Capacity – Does the machine have the lifting capacity, the reach and the height to complete the task?
- Surface Conditions – Are the surface conditions hard or soft, sloped or level? Will the ground have an effect on the type of machine selected?
- Platform Size and Configuration – Do you need a regular or extendable platform? Is rotation required? Are there space restrictions to consider?
- Mobility – Is a boom type better suited than a scissor lift for the job?
- Material to be Lifted – Will the machine be able to lift the size and weight of material required for the job?
- Access – Will the machine be able to travel around the workplace safely? Are there obstructions or depressions that will restrict the use of certain machines?
- Operator Skill or Training – Are the people on site competent to operate the machine? If a propane-powered engine is used, has the operator received propane training?
- Work Environment – If the work is to be done indoors, or in a poorly ventilated area, will an electrically powered machine be required?

Construction

- Aerial work platforms must be designed, constructed and tested to comply with the requirements of ANSI standards A92.2, A92.3, A92.5, and A92.6
- Aerial work platforms must not be field-modified for uses other than those intended by the manufacturer, unless the modification has been certified in writing by the manufacturer or by any other equivalent entity, to comply with the applicable ANSI standard, and to be at least as safe as the equipment was before modification
- Directional controls must be in compliance with all of the following provisions:
  - Be of the type that will automatically return to the off or neutral position when released
  - Be protected against inadvertent operation
  - Be clearly marked as to their intended function
- The platform must have a working overriding control that’s continuously activated for platform directional controls, and which automatically returns to the off position when released
- Aerial work platforms must be equipped with emergency controls at ground level
- Emergency ground level controls must be clearly marked as to their intended function and be capable of overriding the platform controls

- All of the following information must be clearly and permanently marked on each work platform
  - Special workings, cautions, or restrictions necessary for operation
  - Rated workload
  - A clear statement of whether or not the aerial work platform is electrically insulated
- Rotating shafts, gears and other moving parts that are exposed to contact must be guarded
- Attachment points must be provided for fall protection devices for personnel who occupy the platform on aerial work platforms

Elevating Work Platform Equipment

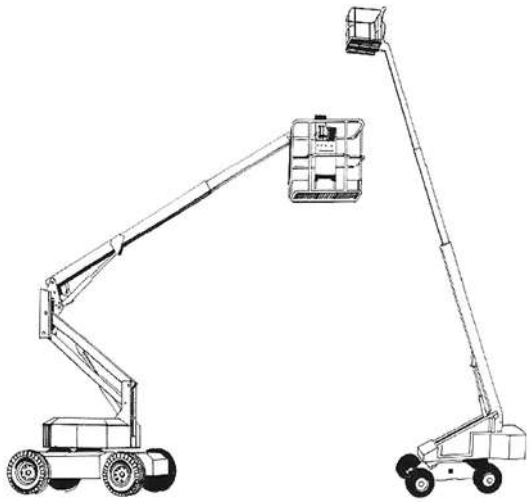
- The platform deck must be equipped with a guardrail or other structure around its upper periphery that must be 42 inches high, plus or minus 3 inches, with a midrail. (Chains or the equivalent may be substituted where they give equivalent protection.) Where the guardrail is less than 39 inches high, an approved personal fall protection system must be used
- The configuration of an elevating work platform may include a ladder for employees to use in reaching the platform deck. Any ladder device used in this way must have rungs located on uniform centers not to exceed 12 inches
- Any elevating work platform equipped with a powered elevating assembly and having a platform height exceeding 60 inches must be supplied with safe emergency lowering means compatible with the specific elevating assembly employed
- Elevating Work Platforms must include:
  - Toeboards at sides and ends, which must be at least 4 inches high
  - Exception: Toeboards may be omitted at the access openings
  - A hinged trap access door, if applicable
  - A platform with a minimum width of 16 inches

Guarding of Moving Parts

All rotating shafts, gearing and other moving parts must be guarded.

Self-Propelled Boom-Supported Platforms

- Normally fitted with rough-terrain undercarriages
- Some smaller on-slab units
- Platforms have lifting capacity of about 500 pounds or two workers
- Lack capacity of scissor-type machines; not intended for lifting materials
- Usually powered by an internal combustion engine: gasoline, diesel, or propane



Booms can be:

- Telescopic, articulating, or combination of both
- Raised and extended by hydraulic cylinders
- Can reach up to 150 feet

Platforms can extend well beyond the wheelbase

Although the controls of boom machines are fixed in position, operators can become disoriented by the machines rotation, and must remain aware of the direction of its movement. Many machines have color-coded directional arrows to help the operator move the machine in the right direction.

As with mobile cranes, stability decreases with length of boom and boom angle as the center of gravity moves in relation to the platform position. The machine will overturn if the center of gravity moves outside the machine's base.

Machines come with load charts that show safe operating configurations. Machines with booms long enough to cause overturning at low boom angles are required to have radius- limiting interlocks to prevent operation in unstable configurations.

Users must be familiar with the operating range of the individual make and model of the equipment they are using. This knowledge is essential in order to position the machine correctly and reach the work location safely.

Non-Self-Propelled or Push-Arounds

As the name indicates, these units are not self-propelled and must be transported from one location to another with an independent power source or manually in the case of the smaller devices.

The machines are intended primarily for use on smooth, level, hard surfaces or on- slab conditions. Some trailer-mounted units are available. Many of the smaller models can be folded up to pass through standard doorways, and can be transported by pick-up trucks. As a result, they are suitable for maintenance or renovation work.

Push-Arounds

- Raising mechanism normally powered by gasoline or propane engine or by electric motors, either AC or DC
- Normally raised and lowered by hydraulic cylinders
- Platform capacities vary from 300 to 1000 pounds or more but are generally less than 500 pounds
- Devices with capacity less than 500 pounds are Not Recommended for construction—this type is better suited to maintenance activities
- Platforms usually do not exceed 36 feet in height
- As platform is raised, risk of overturning increases
- Extra care required when operating at maximum height

Factors of Safety in Design of Work Platform Assembly

- Where the platform is supporting its rated workload by a system of wire ropes or lift chains, or both, the safety factor of the wire or chain must not be less than 6 to 1

- All critical components of a hydraulic or pneumatic system used in a work platform must have a bursting strength that exceeds the pressure attained when the system is subjected to the equivalent of four times the rated workload. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical hydraulic components must have a bursting safety factor of at least 2 to 1
- Automatic safety devices or systems must be provided to prevent free fall of the work platform should a failure of the power supply or elevating system occur

Construction and Modification

All aerial devices and elevating work platforms must be assembled and erected in accordance with these rules and must be maintained in safe operating condition.

- ANSI A92.2 — Vehicle Mounted Elevating and Rotating Aerial Devices
- ANSI A92.3 — Manually Propelled Elevating Work Platforms
- ANSI A92.5 — Boom Supported Elevating Work Platforms
- ANSI A92.6 — Self-Propelled Elevating Work Platforms

All electrical tests must conform to the requirements of the applicable NFPA 70 Standard or equivalent DC voltage test approved by the equipment manufacturer or equivalent entity.

Mobile elevating devices must be mounted on a vehicle capable of handling the imposed load. The vehicle must be a stable support for the aerial device.

The lifting and outrigger system of an aerial device must have a means to ensure that the system will not permit the work platform to drop in a free fall in event of a power or hydraulic line failure.

In addition to the welding requirements prescribed in ANSI A92.2, an aerial device must conform to the AWS D2.0, Specifications for Welding Highway and Railway Bridges standard.

Controls

- Any powered elevating work platform must have both upper and lower control devices
- An emergency stopping device must be provided at the upper controls of elevating work platforms
- Upper controls must be located within reach of the operator
- Lower controls must be capable of overriding the upper controls. Except in case of an emergency, the lower controls must not be operated unless approved by the employee in the basket or on the work platform
- Controls must be designed, guarded and oriented so that the operator doesn’t inadvertently move the machine in the wrong direction. Many machines have color-coded directional arrows on the chassis to aid the operator in moving the machine

Stability Requirements for New or Modified Aerial Devices

Each new or modified aerial device must be inspected and tested before initial use to assure compliance with all of the following requirements.

- Each aerial device mounted on a vehicle that meets the manufacturer's minimum vehicle specifications must be capable of sustaining a static load 1 ½ times its rated load capacity in every position where the load can be placed when the vehicle is on a firm and level surface. If having the outriggers extend to a firm footing is part of the definition of the configuration, they must be extended to provide leveling for determining whether the mobile unit meets the stability requirements
- Each aerial device mounted on a vehicle that meets the manufacturer's minimum vehicle specifications must be capable of sustaining a static load 1 1/3 times its rated load capacity in every position in where the load can be placed when the vehicle is on a slope of 5 degrees downward in the direction most likely to cause overturning
- If having the outriggers extended to a firm footing is part of the definition of the configuration, they must be extended to provide leveling for determining whether the mobile unit meets the stability requirements. If other facilities, such as a means of turntable leveling, are provided to minimize the effect of the sloping surface, then those facilities must be used to determine whether the mobile unit meets the stability requirements. Vertical towers designed specifically for operation only on a level surface must be excluded from this requirement
- None of the stability tests described must produce instability of the mobile unit, or cause permanent deformation of any component. The lifting of a tire or outrigger on the opposite side of the load does not necessarily indicate a condition of instability

Verification by the manufacturer or an equivalent entity that the stability of an aerial device meets the requirements may be used to demonstrate compliance

MANUALS, SIGNS, AND DECALS

Signs Clearly Visible to the Operator at the Controls Must Indicate:

- The equipment's rated working load
- All limiting operating conditions, including the use of outriggers, stabilizers and extendable axles
- The specific firm, level surface conditions required for use in elevated position
- All warnings that are specified by the manufacturer
- Other than for a boom-type elevating work platform, the direction of machine movement for each operating control
- The name/number of the ANSI standard that the platform was designed to meet
- The name and address of the owner

Ansi Standards Required Information

- Caution or restrictions of operation or both
- Operating instructions
- A permanently affixed plate containing the designed rating capacity

- The make, model, serial number and manufacturer's name and address
- The maximum platform height
- The maximum travel height, if not equal to the maximum platform height
- Maximum recommended operating pressure of hydraulic or pneumatic system(s) or both
- The nominal voltage rating of the batteries, if battery-powered
- A warning to study the operating manual before using the equipment
- A statement identifying whether or not the platform is insulated
- A notice outlining the required inspections
- Diagrams/description of various platform configurations and its capacity in each configuration
- Warnings against replacing, without the manufacturer's consent, components critical to the machine's stability

Each unit must have a manual containing instructions for maintenance and operations. If a unit can be operated in different configurations, then these must be clearly described, including the rated capacity in each configuration.

Many of these signs are vital to the operation of the machine and the protection of workers. All signs and decals must be kept clear of dust and grease so they can be easily read. Torn or damaged signs must be replaced.

PROCEDURES

This section provides for the safe operation and maintenance by the employer and the safe use by the employee of vehicle mounted elevating and rotating work platforms in, around and about a place of employment. Firefighting equipment and powered industrial trucks are not included in these rules.

Elevating Work Platforms

These rules apply to equipment that has a primary function of elevating personnel, together with their tools and necessary materials, on a platform that is mechanically positioned. The following units are covered:

- ANSI Standard A92.2, "Vehicle-Mounted Elevating Work Platforms," which applies to vehicle-mounted devices installed on commercial chassis and covers the following type of units:
  - Extensible boom aerial devices
  - Aerial ladders
  - Articulating boom aerial devices
  - Vertical towers
  - A combination of any of the equipment specified
- ANSI Standard A92.3, "Manually Propelled Elevating Work Platforms," which is adopted by applies to work platforms that are manually propelled, vertically adjustable by manual or powered means, and which may be towed or manually moved horizontally on wheels or casters that are an integral part of the work platform base
- ANSI Standard A92.5, "Boom-Supported Elevating Work Platforms," which applies to all integral frame, boom-supported elevating work platforms which telescope, articulate, rotate or extend beyond the base dimensions

- ANSI Standard A92.6, "Self-Propelled Elevating Work Platforms," which applies to self-propelled vertically adjustable integral chassis work platforms. Such work platforms are power operated with primary controls for all movement operated from the platform,

Equipment Not Covered

- Equipment that has a primary function other than elevating personnel, such as fork trucks or cranes that are adapted to elevating personnel, are not covered by these rules
- Also excluded from coverage of these rules is firefighting equipment that's covered by the provisions of the publication entitled "American National Practices for the Maintenance, Care, Testing and Use of Fire Department Aerial Ladders and Elevating Platforms"

SAFE PRACTICES

Operators must be familiar with the requirements for the specific machine they will use:

- The manufacturer's operating manual
- The manufacturer's warning and caution signs on the machine
- The location of all emergency controls and emergency procedures
- The daily maintenance checks to perform

General Safety Guidelines

- Always check for overhead power lines before moving the machine or operating the platform. The limits of approach from overhead power lines must be observed. If work must be done within these limits, make arrangements with the owner of the utility to have the power line de-energized. Allow for movement or sway of the lines as well as the platform. Be aware of overhanging tools or equipment
- Wear a full body harness and tie off to a designated tie-off point while the machine is moving
- Never leave the machine unattended without locking it or otherwise preventing unauthorized use
- Don't load the platform above its Rated Working Load (RWL). Wherever possible, keep the load below 2⁄3 of the RWL
- Make sure that all controls are clearly labeled with action and direction
- Keep guardrails in good condition and ensure that gate is securely closed before moving the platform. Don't remove guardrails while the platform is raised
- Shut off power and insert the required blocking before maintenance or servicing
- Deploy stabilizers or outriggers according to the manufacturer's instructions
- Position the boom in the direction of travel where possible
- Keep ground workers away from the machine and out from under platform
- Never access the platform by walking on the boom
- Don't try to push or move the machine by telescoping the boom
- Don't use the machine as a ground for welding
- Don't use a boom-supported platform as a crane
- Don't operate the EWP in windy conditions. For safe wind speeds, refer to the operator's manual

- Don’t place the boom or platform against any structure to steady either the platform or the structure
- Secure loads and tools on the platform so that machine movement will not dislodge them
- Make sure that extension cords are long enough for the full platform height and won’t be pinched or severed by the scissor mechanism
- Use three-point contact and proper climbing techniques when mounting or dismounting the machine
- Stunt driving and horseplay is prohibited
- Employees must keep a firm footing while working on the platform unless they are secured by safety harness and lanyard devices fixed to manufacturer-approved anchor points. Don’t railings or planks, ladders or any other device on the work platform to achieve additional height
- The operator will immediately report defects or malfunctions that become evident during operation and must stop use of the work platform until correction has been made
- Altering or disabling of safety devices or interlocks is prohibited

Important Note: Never operate equipment that you haven’t been trained on, or that you’re not comfortable operating. Your safety and that of others on site depends on competent, knowledgeable operation of the equipment.

Vehicles

Before a vehicle supporting an aerial ladder, is moved for highway travel:

- The ladders must be secured in the lower position, and the manually operated device at the base of the ladder, or other effective means, must be used to prevent elevation or rotation of the ladder
- The boom must be inspected to make sure that it’s properly cradled and the outriggers are in the stowed position

A vehicle supporting an aerial device must not be moved at the job site when the boom is elevated with employees in working position, unless the equipment is specifically designed for this type of operation and.

Pre-Operation Procedures

Before operating elevating work platforms and aerial devices, check the work area for:

- Drop-offs or holes in the ground
- Slopes
- Bumps or floor obstructions
- Debris
- Overhead obstructions
- Overhead wires, power lines, or other electrical conductors
- Hazardous atmospheres
- Adequate operating surface – ground or floor

- Sufficient ground or floor support to withstand all forces imposed by the platform in every operating configuration
- Wind and weather conditions

Before each elevation of the work platform, the operator must:

- Make sure the brakes are set and outriggers, when used, are positioned on pads or a solid surface
- Install wheel chocks before using an aerial device on an incline
- Check for overhead obstructions and high-voltage conductors. A minimum distance of ten feet from energized high-voltage conductors must be maintained at all times between the conductors and the operator and platform equipment
- Make sure that the load and its distribution on the platform meet the manufacturer's rated capacity. The manufacturer's recommended load limits must never be exceeded
- Operate all platform and ground controls to verify that they perform their intended function
- Make sure that guardrails are properly installed and gates are closed

Before and during driving while the platform is elevated, the operator will:

- Be required to look in the direction of, and keep a clear view of, the path of travel and assure that the path of travel is firm and level
- Keep a safe distance from obstacles, debris, drop-offs, holes, depressions, ramps or other hazards to safe elevated travel
- Maintain a safe distance from overhead obstacles
- The operator must limit travel speed according to conditions. Conditions to be observed are ground surface, congestion, slope, location of personnel and other factors that may create a hazard of collision or injury to personnel

Before use on each work shift, an aerial work platform must be given a visual inspection by the operator for defects that would affect its safe operation and use. The visual inspection will be done for all of the following:

- Cracked welds
- Bent or broken structural members
- Hydraulic or fuel leaks
- Damaged controls and cables
- Loose wires
- Tire condition
- Fuel and hydraulic fluid levels
- Slippery conditions on the platform

All unsafe items found because of the inspection of the aerial work platform or work area must be corrected before further use of the aerial work platform.

When the specified clearances can’t be maintained, the owner of electrical lines, the authorized representative or the utility must be notified and provided with all pertinent information before the commencement of operations near electrical lines.

Any overhead wire must be considered an energized line until the owner of the line or the authorized representative states that it is de-energized/visibly grounded, or the line is insulated for the system voltages and the task will not compromise the insulation of the conductor and/or cause an electrical hazard.

Operating Procedures

- The aerial work platform must be used according to the manufacturer's operating instructions and safety rules
- The manufacturer's rated load capacity for any given angle of elevation must not be exceeded. The Company will ensure that the load and its distribution on the platform comply with the manufacturer's specifications. The aerial work platform's rated load capacity must not be exceeded when loads are transferred to the platform at elevated heights
- Only personnel, their tools and necessary materials must be on or in the platform
- The guardrail system of the platform must not be used to support any of the following:
  - Materials
  - Other work platforms
  - Employees
- Personnel must maintain firm footing on the platform while working on the platform. The use of railings, planks, ladders or any other devices on the platform to achieve additional height is prohibited
- Fuel gas cylinders must not be carried on platforms that would allow the accumulation of gases
- A safety harness with a lanyard, that meets the construction Fall Protection safety standard and is affixed to attachment points provided and approved by the manufacturer will be provided by the Company and used by any employee using an aerial work platform. A fall arrest system must only be used if the aerial lift is designed to withstand the vertical and lateral loads caused by an arrested fall
- A body belt with a lanyard may be used as a restraint device when anchored so that the employee is not exposed to any fall distance. A restraint device is required where the aerial lift cannot withstand the vertical and lateral loads imposed by an arrested fall
- The Company does not allow employees to exit an elevated aerial work platform, except where elevated work areas are inaccessible or hazardous to reach. Employees may exit the platform with the knowledge and consent of the employer. When employees exit to unguarded work areas, fall protection must be provided and used as required
- Only aerial work platforms that are equipped with a manufacturer's installed platform controls for horizontal movement must be moved while in the elevated position
- Before and during driving while elevated, an operator of a platform must do both of the following:
  - Look in the direction of, and keep a clear view of, the path of travel and make sure that the path is firm and level

  - Maintain a safe distance from all of the following:
    - Obstacles
    - Drop-offs
    - Depressions
    - Overhead obstructions
    - Other hazards to safe elevated travel
    - Debris
    - Holes
    - Ramps
    - Overhead electrical lines
- Outriggers or stabilizers, when provided, will be used according to the manufacturer's instruction. Outriggers and stabilizers must be placed on pads or a solid surface
- Aerial work platforms must be elevated only when on a firm and level surface or within the slope limits allowed by the manufacturer's instructions
- Platform gates must be closed while the platform is in an elevated position
- Stunt driving and horseplay are prohibited
- Altering, modifying, or disabling safety devices or interlocks is prohibited
- Ropes, cords, and hoses must be prevented from becoming entangled in the aerial work platform
- A platform operator must ensure that the area surrounding the EWP is clear of personnel and equipment before lowering the platform
- Before and during travel, except as provided for horizontal movement, an operator must do all of the following:
  - Inspect to see that booms, platforms, aerial ladders, or towers are properly cradled or secured
  - Ensure that outriggers are in a stored position
  - Limit travel speed according to the following factors:
    - ☐ Condition of the surface
    - ☐ Congestion
    - ☐ Slope
    - ☐ Location of personnel
    - ☐ Other hazards
- Do not positioned the work platform against another object to steady the platform
- The aerial work platform must not be operated from a position on a truck, trailer, railway car, floating vessel, scaffold or similar equipment
- Do not use the boom and platform of the aerial work platform to move or jack the wheels off the ground unless the machine is designed for that purpose by the manufacturer
- If the platform or elevating assembly becomes caught, snagged or otherwise prevented from normal motion by adjacent structures or other obstacles, and control reversal does not free the platform, all employees must be removed from the platform before attempts are made to free it

Operating Instructions (Elevating Work Platforms)

- No employee will ride, or tools, materials, or equipment be allowed on a traveling elevated platform unless the following conditions are met:
  - The travel speed at Maximum Travel Height does not exceed 3 feet per second
  - Self-propelled units must have an electrical or other interlock means to prevent driving them with the platform height greater than the Maximum Travel Height or at speeds greater than permitted at Maximum Travel Height

    - The operating surface of the unit is level with no hazardous irregularities or accumulation of debris that might cause a moving platform to overturn
- Units must be assembled, used and disassembled according to the manufacturer's instructions
- Units must be assembled, and used only by employees who have been trained in their use. Units must be inspected for damaged and defective parts before use
- Units must not be loaded in excess of their working load and must be taken out of service when damaged or weakened from any cause. They must not be used until repairs are completed
- Employees must not sit, stand or climb on the guardrails of an elevating work platform or use planks, ladders, or other devices to gain greater working height or reach
- Employees must not work on units when exposed to high winds, storms or when they are covered with ice or snow (unless provisions have been made to ensure the safety of the employees)
- Employees climbing or descending vertical ladders must have both hands free for climbing
- Where moving vehicles are present, the work area must be marked with warning flags, roped-off or other effective means of traffic control must be provided
- Unstable objects such as barrels, boxes, loose brick, tools, debris, must not be allowed to accumulate on the work level
- Screens must be installed that extend along the entire opening between toeboards and guardrails, when the work being performed creates small debris or involves the use of small tools and materials if persons are will work or pass under the equipment,

Pin-On Platforms

- Pin-on platforms must be securely pinned to the boom or boom extension
- Employees on the elevated pin-on platform must be secured to the boom by a safety belt and lanyard or a body belt and safety strap

Operating Instructions (Aerial Devices)

- Aerial baskets or platforms must not be supported by adjacent structure(s) when workers are on the platform or in the basket while in an elevated position
- Lift controls must be tested before use to determine that they are in safe working condition
- Only authorized persons must operate an aerial device
- Belting off to an adjacent pole, structure, or equipment while working from an aerial device is not be permitted
- Employees must not sit or climb on the edge of the basket or use planks, ladders or other devices to gain greater working height
- Boom, basket and platform load limits specified by the manufacturer must not be exceeded
- When elevating personnel with the vehicle stationary the braking systems must be set
- Provided they can be safely installed, wheel chocks must be installed before using an aerial device on an incline
- When used, outriggers must be positioned on pads or a solid surface. All outriggers must be equipped with hydraulic holding valves or mechanical locks at the outriggers
- Climbers must not be worn while performing work from an aerial device

- When an insulated aerial device is required, the aerial device must not be altered in any manner that might reduce its insulating value
- An aerial device truck must not be moved when the boom is elevated in a working position with employees in the basket or platform except when all of the following are complied with:
  - The equipment is specifically designed for this type of operation
  - All controls and signaling devices are tested and are in good operating condition
  - An effective communication system must be maintained at all times between the basket or platform operator and where applicable, the vehicle operator
  - The route to be traveled is surveyed immediately prior to the work trip, checking for overhead obstructions, traffic, holes in the pavement, ground or shoulder, ditches, slopes, etc., for areas other than paved, a survey should be made on foot
  - The speed of the vehicle does not exceed three (3) miles per hour
  - Only one employee is in the basket
  - Both the driver and/or the elevated employee have been specifically trained for this type of work
- Lower level controls must not be operated unless authorized by the employee in the device, except in case of emergency
- Before moving an aerial device for travel, the boom(s) must be inspected to see that it is properly cradled and outriggers are in stowed position
- An employee, while in an elevated aerial device, must be secured to the boom, basket or tub of an aerial device by a safety belt, body belt or body harness equipped with safety strap or lanyard
  - Safety belts/body belts are prohibited for use in personal fall arrest systems, but may be used as part of a fall restraint or positioning device system
  - Safety belts/body belts used as part of a positioning device system must be rigged to prevent an employee from free falling more than 2 feet
  - A body harness may be used in a personal fall restraint, positioning or fall arrest system. When a body harness is used in a fall arrest system, the lanyard must be rigged with a deceleration device to limit maximum arresting force on an employee to 1,800 pounds and prevent the employee from hitting any levels or objects below the basket or platform, and must limit free fall to a maximum of 6 feet

Use – Near Power Lines

- Any overhead line must be considered energized until the owner, owner representative or utility indicates otherwise and the line has been visibly grounded
- Except as prescribed, or where insulating barriers not a part of, or an attachment to the aerial device, have been erected to prevent physical contact with the lines, an aerial device must maintain the distances from energized distribution and transmission power lines and equipment shown in Table 1
- A qualified lineman or a qualified line clearance tree trimmer, working on or near an exposed power transmission or distribution line from an aerial lift, must maintain the clearance distances shown in Table 2, unless they are insulated or guarded from the energized part by gloves or gloves and sleeves, or insulated, isolated, or guarded from any other conductive part or the energized part is insulated from the employee

- A qualified telecommunications employee must maintain the clearance distances shown in Table 3 when working from an aerial lift, unless they are insulated, isolated, or guarded from any other conductive part or the energized part is insulated from the employee

TABLE 1

Minimum Clearance Distances for Equipment		
Voltage	Clearance with Boom Raised	Clearance Boom Lowered and no Load in Transit
To 50kV	10 feet	4 feet
Over 50kV	10 feet + .4 inch per each 1 kV over 50 kV	10 feet
50 to 345kV		10 feet
346 to 750 kV		15 feet

TABLE 2

Minimum Working Distances for Qualified Line Clearance Tree Trimmers and Qualified Linemen	
Voltage Range Phase to Phase (KV)	Minimum Working Distance
2.1 to 15.0	2′0″
15.1 to 35.0	2′4″
35.1 to 46.0	2′6″
46.1 to 72.5	3′0″
72.6 to 121.0	3′4″
138.0 to 145.0	3′6″
161.0 to 169.0	3′8″
230.0 to 242.0	5′0″
345.0 to 362.0	7′0″
550.0 to 552.0	11′0″
700.0 to 765.0	15′0″
*NOTE: For 345 — 362 kV., 500 — 552 kV., and 700 — 765 kV., the minimum working distance and the minimum clear hot stick distance may be reduced that such distances are not less than the shortest distance between the energized part and a grounded surface.	

TABLE 3

Minimum Approach Distances for Qualified Telecommunications Employees	
Voltage Range (Nominal Phase to Phase)	Minimum Approach Distances
300 V and less	12″
Over 300 V, not over 750 V	18″
Over 750 V, not over 2 kV	24″
Over 2 kV, not over 15 kV	36″
Over 15 kV, not over 37 kV	42″
Over 37 kV, not over 87.5 kV	48″
Over 87.5 kV, not over 121 kV	54″
Over 121 kV, not over 140 kV	--″

- The clearance requirements of this rule do not apply to the following situations:
  - Where work is performed from an insulated aerial device that is insulated for the work and the work is performed in accordance with the provisions of construction safety standard "Power Transmission and Distribution" and "Telecommunications"
  - Where the owner, authorized representative, or utility representative have ensured that the conductor is insulated for the system voltages and the task will not compromise the insulation of the conductor and/or cause an electrical hazard
  - Where the electric power transmission or distribution lines have been de-energized and visibly grounded at the point of work or where insulating barriers that are not a part of an attachment to the aerial work platform have been erected to prevent physical contact with the line
  - Where work is being performed by journeymen electricians on equipment up to .5kV. Two journeymen electricians will be required for work within the minimum clearance on equipment over .5kV
- The insulated bucket, gloves and sleeves used to comply must be rated at more than the voltage to be worked on, or that with which they might come into contact

INSPECTION, TESTING, AND MAINTENANCE

The Company will comply with all of the following requirements:

- Each aerial work platform must be inspected, maintained, repaired, and kept in proper working condition in accordance with the manufacturer’s operating, maintenance, and repair manuals

- Any aerial work platform found not to be in a safe operating condition must be removed from service until repaired
- All repairs must be made by an authorized person in accordance with the manufacturer's operating, maintenance, and repair manuals
- If the aerial work platform is rated and used as an insulated aerial device, the electrical insulating components must be tested for compliance with the rating of the aerial platform in accordance with ANSI standard A92.2

Inspection and Tests

- An aerial device must be inspected and tested at least annually for permanent deformation and cracks by using 1 ½ times the rated load and for defects by visual inspection during and following the load test
- Written, dated and signed test reports must be made available by the employer for examination by regulatory agencies
- The insulated part of an EWP must not be altered in any way that might reduce its insulating value
- An annual electrical test of insulated aerial devices must be made. An equivalent DC voltage test may be used in place of the prescribed AC voltage
- Field inspection and tests must be performed only by an authorized and trained employee or outside service
- Lift controls must be tested daily before use to determine they are in safe working condition. An aerial device with defective controls must not be used until repaired
- All danger, caution and control markings and operational plates must be legible and not obscured

Equipment Inspection

All components that affect the safe operation of the EWP, and can change from day to day, must be inspected daily.

Users must check the operator's manual for a complete list of pre-operational checks. See the end of this section for Daily Inspection Checklists for Elevating Work Platforms and Aerial Devices.

Minimum Requirements

Before climbing onto a work platform, check:

- Tires for proper pressure and wheels for loose or missing lug nuts
- Steer cylinder, linkage, and tie rods for loose or missing parts, damage, and leaks
- Hydraulic oil for leaks and fluid level. Hydraulic hoses, lift cylinder(s), and connections for leaks or loose connections
- Fuel supply – adequate fuel, filler cap in place, no damage, leaks, or spills
- Battery for fluid level and state of charge
- Proper connection of all quick-disconnect hoses
- Structural components for damage, broken parts, cracks in welds, including scissor arms, outrigger arms, and pads

- Ladder or steps for damage and debris (ladder must be firmly secured to the platform and relatively free of grease, mud, and dirt)
- Beacon and warning lights for missing and defective lenses or caps
- Ground controls (manual and powered) – including emergency stop switch and platform lower/lift switch – for proper function and damaged and missing control sticks/switches
- Decals and warning signs to make sure they are clean, legible, and conspicuous

After mounting the platform, check:

- Platform assembly for missing or loose parts, missing or loose lock pins and bolts
- Platform floor for structural damage, holes, or cracked welds and any dirt, grease, or oil that can create a hazard
- Operator's manual to make sure it is in place
- Extendable platform deck for ease of extension/retraction and proper function of locking position of platform
- Guardrails to make sure they are in place and secure
- Access gate for ease of movement, missing parts, latch, and locking capabilities
- All fall protection anchorage points
- All control mechanisms for broken or missing parts
- All emergency controls for proper function – stopping, descending, master OFF switch
- All safety devices such as tilt and motion alarms for malfunction
- Swivels for freedom of rotation
- Scissors for smooth movement up and down
- Brakes for stopping capabilities
- Horn for proper function

Maintenance and Repairs

- The materials used to repair aerial devices and elevating work platforms must meet the standard specifications of strength, dimensions, and weights and must be able to support the rated workload
- Electrical wiring and equipment must meet NFPA 70 provisions
- All exposed surfaces must be free from sharp edges, burrs, or other hazardous projections

Electrical Ratings

- The EWP rating plate must indicate whether the aerial device is insulated or non-insulated and, if insulated, the rated line voltage for which the aerial device was designed and tested
- The insulating portion of an aerial device must not be altered in any manner that might reduce its insulating value

TRAINING AND PERMITS

Training Requirements

The Company will provide employees who will operate an aerial work platform with instruction and training regarding the equipment before a required permit is issued or reissued. Such instruction and training must include the following:

- Instruction by a qualified person in the intended purpose and function of each of the controls
- Proper use and care of all necessary PPE
- Training by a qualified person, or reading and understanding the manufacturer's or owner's operating instructions and safety rules
- Understanding by reading, or by having a qualified person explain, all decals, warnings, and instructions displayed on the aerial work platform
- Reading and understanding all of the following provisions of this "Training and Permits" standard, or being trained by a qualified person on their content

Employees who will use fall protection equipment must receive additional training specific to the type of equipment used.

Permits

The Company will provide operators of aerial work platforms with an operators permit. The operator must carry the permit or have it available at the jobsite/workplace, and must be displayed upon request by a regulatory agency. The permit must indicate the type of work platforms an operator has been trained on, and is qualified to operate. A permit to operate an aerial work platform is valid only when performing work for the Company who issued the permit.

The Company will certify that their employees are competent to operate applicable aerial work platforms at least once every three years. Permits will be issued at the time of certification or recertification.

A permit will contain the following information:

- The Company's name
- The operator's name
- The name of the issuing authority
- The types of aerial work platforms the operator is authorized to operate. These include:
  - Vehicle-mounted elevating work platform such as: extensible boom aerial devices, aerial ladders, articulating boom aerial devices, and vertical towers
  - Manually propelled elevating work platforms
  - Boom-supported elevating work platforms
  - Self-propelled elevating work platforms
- The date issued
- The expiration date

Training Records

The Company will maintain employee-training records for three years. These records will include the name of the employee, the type of training received, the date of the training, and the name of the instructor.

Retraining

Employees operating aerial devices and elevated work platforms should receive training annually, and any time there is a change in operating procedures or equipment. In addition, employees must be retrained anytime there is an accident or near miss, or they demonstrate a lack of understanding of safe work procedures, equipment operation or the use of PPE.

ATTACHMENTS

The following pages contain a sample inspection checklist that can be reproduced for Company use.

SCISSOR LIFT OPERATOR DAILY INSPECTION/CHECKLIST (PAGE 1 OF 2)

Company Name:				Site Location:			
Date				Time			
Person(s) Making Inspection:				Job Foreman/Supervisor			
Equipment Type:				Equipment #s:		Manufacturer:	
OK	Repair	N/A	**Mechanical**				
☐	☐	☐	Structural damage or cracked welds – Visual walk-around inspection.				
☐	☐	☐	Parking brake – Check operation.				
☐	☐	☐	Tires/wheels and fasteners – Visually inspect, check operation and tightness.				
☐	☐	☐	Guides/rollers and slider pads – Visually inspect, check operation, and ensure there is no metal to metal contact with slider, slider side, or running surface. Check for free movement of surface. Also check for free movement of the slider pin through the slider.				
☐	☐	☐	Railings and railing lock pins – Visually inspect and check tightness.				
☐	☐	☐	Entry chains or gates – Check operation and tightness.				
☐	☐	☐	Bolts and fasteners – Check tightness.				
☐	☐	☐	Safety Bar – Check operation.				
☐	☐	☐	Wheel Bearings and Kingpins – Visually inspect, check operation and lubricate.				
☐	☐	☐	Pothole Protection – Visually inspect and check operation.				
☐	☐	☐	Steering cylinder and tie rod – Visually inspect, check operation and lubricate.				
OK	Repair	N/A	**Electrical**				
☐	☐	☐	Battery fluid level – Visually inspect.				
☐	☐	☐	Control switches – Visually inspect and check operation.				
☐	☐	☐	Cables and wiring harnesses – Visually inspect.				
☐	☐	☐	Battery Terminals – Visually inspect and check tightness.				
☐	☐	☐	Terminals and Plugs – Check tightness.				
☐	☐	☐	Generator/receptacle – Visually inspect and check operation.				
☐	☐	☐	Limit switches – Check operation.				

SCISSOR LIFT OPERATOR DAILY INSPECTION/CHECKLIST (PAGE 2 OF 2)

OK	Repair	N/A	**Hydraulic**
☐	☐	☐	Hydraulic oil reservoir level – Check oil level.
☐	☐	☐	Hydraulic Hoses/Fittings – Visually inspect and check for leaks.
☐	☐	☐	Lift/lowering time – Check operation and refer to specification tables.
☐	☐	☐	Cylinders – Visually inspect and check operation.
☐	☐	☐	Emergency lowering – Check operation.
☐	☐	☐	Lift capacity – Check relief valve setting and refer to specification tables.
OK	Repair	N/A	**Miscellaneous**
☐	☐	☐	Manual – Visually check that proper manual is in box.
☐	☐	☐	Placards, I.D. plates, warnings and control labels – Replace if missing/illegible.
OK	Repair	N/A	**Prestart Checks**
☐	☐	☐	Ensure that there are no obstacles around the work platform and in the path of travel such as holes, drop offs, ditches, soft fill, or debris.
☐	☐	☐	Check overhead clearances.
☐	☐	☐	Make sure the batteries are fully charged. Disconnect the AC charger cord from the external power source.
☐	☐	☐	Make sure that the Free-Wheeling Valve is fully closed.
☐	☐	☐	Make sure all guardrails and lock-pins are in place and locked in position
☐	☐	☐	Make sure both side battery and hydraulic trays are closed and locked.

NOTE: At any point during this inspection there are any deficiencies, do not operate lift any further. Notify the proper personnel or repair unit as needed. Do not operate equipment without proper authorization and training.

Signature (person(s) performing inspection/evaluation)	Date

GENERAL ELEVATING WORK PLATFORM INSPECTION LIST

Items to check during the daily inspection:

- ☐ Tires for proper pressure and wheels for loose or missing lug nuts.
- ☐ Steer cylinder, linkage, and tie rods for loose or missing parts, damage, and leaks.
- ☐ Hydraulic oil for leaks and fluid level. Hydraulic hoses, lift cylinder(s), and connections for leaks or loose connections.
- ☐ Fuel supply – adequate fuel, filler cap in place, no damage, leaks, or spills.
- ☐ Battery for fluid level and state of charge.
- ☐ Proper connection of all quick-disconnect hoses.
- ☐ Structural components for damage, broken parts, cracks in welds, including scissor arms, outrigger arms, and pads.
- ☐ Ladder or steps for damage and debris (ladder must be firmly secured to the platform and relatively free of grease, mud, and dirt).
- ☐ Beacon and warning lights for missing and defective lenses or caps.
- ☐ Ground controls (manual and powered) – including emergency stop switch and platform lower/lift switch – for proper function and damaged and missing control sticks/switches
- ☐ Decals and warning signs to make sure they are clean, legible and conspicuous.

After mounting the platform, check:

- ☐ Platform assembly for missing or loose parts, missing or loose lock pins and bolts.
- ☐ Platform floor for structural damage, holes, or cracked welds and any dirt, grease, or oil that can create a hazard.
- ☐ Operator's manual to make sure it is in place.
- ☐ Extendable platform deck for ease of extension/retraction and proper function of locking position of platform
- ☐ Guardrails to make sure they are in place and secure.
- ☐ Access gate for ease of movement, missing parts, latch and locking capabilities.
- ☐ All fall protection anchorage points.
- ☐ All control mechanisms for broken or missing parts.
- ☐ All emergency controls for proper function – stopping, descending, master OFF switch.
- ☐ All safety devices such as tilt and motion alarms for malfunction.
- ☐ Swivels for freedom of rotation.
- ☐ Scissors for smooth movement up and down.
- ☐ Brakes for stopping capabilities.
- ☐ Horn for proper function.

SCOPE

This chapter contains the safe practices to protect employees from the hazard of musculoskeletal disorders (MSDs). Although OSHA does not currently have any regulations governing ergonomics, NIOSH provides guidelines to reduce the risk of these disorders from occurring. Our Company will make every practical effort to ensure workers are not exposed to ergonomic hazards.

POLICY

Some of the tasks workers perform such as lifting, reaching and repeating the same movements can strain our bodies. These tasks can result in an injury to the muscles, tendons, ligaments, nerves, blood vessels and joints of the neck, shoulders, arms, wrists, legs and back. This type of injury is called either musculoskeletal disorders (MSDs), or respective motion injuries (RMIs). MSDs are a common workplace injury in all industries. For these reasons, this Company has developed the following safe work practices to prevent employee injury.

EMPLOYER RESPONSIBILITIES

- Perform a job hazard analysis to identify particular jobs that pose a risk of MSDs to workers
- Consult with the safety committee or worker health and safety representative about risk identification
- Investigate any reported injury requiring medical attention or an unsafe condition that could lead to injury
- Implement controls to eliminate or minimize the risk factors

EMPLOYEE RESPONSIBILITIES

- Assist in the process of identifying risk factors
- Report any work-related injuries and signs or symptoms of an MSD immediately

JOB HAZARD ANALYSIS

The Company will perform an ergonomic assessment of all jobs and duties. For each task, it will identify which, if any, of the four primary risk factors (force, repetition, work posture, local contact stress) are present. These questions will be examined:

- Does the length of time spent doing a particular task increase the physical demands on an employee?
- Do any of the following increase the physical demands on the employee?
    - Layout of the workplace or workstation (such as work surfaces that are too high or too low or that result in excessive reaching distances)
    - Characteristics of the objects being handled (objects that are too large to handle or that their weight is unevenly distributed)
    - Environmental conditions (an atmosphere or objects cold enough to make a workers hands cold while the objects)
    - Organization of the work duties (a lack of variety of task resulting muscles not having a chance to rest and recover)

WHAT IS MSD?

An MSD is a disorder of the muscles, tendons, ligaments, joints, nerves, blood vessels or related soft tissue including a sprain, strain and inflammation that may be caused or aggravated by work.

Signs and Symptoms of MSD

It's important for the Company and workers to recognize the early signs and symptoms of MSDs. If treatment is needed, it can be started right away. You can also take steps in the workplace and outside it to avoid making the condition worse.

Signs and symptoms of MSDs can:

- Swelling
- Redness
- Difficulty moving a particular body part
- A symptom can be felt, for example:
  - Numbness
  - Tingling
  - Pain

If employees are experiencing signs or symptoms of an MSD, they need to inform their supervisor immediately.

Signs and symptoms of MSD may appear suddenly, from a single incident that causes an injury, or they may appear gradually over a longer period. Don't ignore early signs and symptoms of an MSD. Treatment may be needed to prevent the injury from getting worse.

POTENTIAL HEALTH EFFECTS

MSDs can affect an employee's ability to perform tasks at work. Early signs or symptoms of MSD's can progress into conditions that can have long-term effects, such as the following:

- Muscle strains to the neck, back, shoulders, or legs
- Tendonitis (swelling of a tendon)
- Carpal tunnel syndrome (pressure on a nerve in the wrist, resulting in numbness, tingling, pain, or weakness in the hand, wrist, or forearm

CUMULATIVE TRAUMA DISORDERS

Musculoskeletal injuries caused by working are common. The majority of these injuries are not accident related broken bones or strained ligaments. They usually develop over time as a result of repeated stress on a particular body part. The condition is often ignored until the symptoms become chronic and permanent injury occurs. Cumulative trauma disorders (CTDs) and repetitive motion injuries are terms used to refer to certain musculoskeletal injuries.

Carpal Tunnel Syndrome

Carpal Tunnel Syndrome (CTS) is a common nerve CTD. It's a progressively disabling and painful condition of the hand. CTS results from injury to the median nerve, which is located in the wrist. Since musculoskeletal strain from repeatedly flexing the wrist or applying arm-wrist-finger force doesn't cause observable injuries, it often takes months or years for workers to detect damage.

Symptoms of CTS include weakness, clumsiness, numbness, pain, tingling and a lack of sweating in parts of the hand innervated by the median nerve. CTS has been reported to occur from two to ten times more frequently in women than in men. The condition is progressive and can lead to compensable hand disabilities.

Tests Used to Determine the Presence of CTS:

- **Phalen's wrist-flexion test** - The patient props his or her elbows on a table and allows the wrists to drop into complete flexion for 30 to 60 seconds. If paresthesia and numbness occur almost immediately, the test is considered positive.
- **Forced wrist-flexion test** - The patient props his or her elbows on the table, one wrist is held and the other is in complete flexion for 20 to 30 seconds. If the patient has CTS, symptoms should occur immediately.
- **Tinel's sign test** - A percussion hammer is used to tap the patient at the wrist crease. If the patient feels a tingling in the hand along the median nerve distribution, the test is positive.
- **Electroneuromyography** - A physician performs this test, which requires an electromyograph and related equipment. Its purpose is to measure the median nerve's conduction velocity, the speed at which nerve impulses translate into muscle responses. If the velocity measures 5 milliseconds or more below normal, chances are, the median nerve is compressed in the carpal tunnel. A negative result, however, does not rule out CTS since a median nerve may be compressed yet its conduction velocity may remain normal. Electroneuromyography is the most reliable of these tests used to determine the presence of CTS.

Other CTDs Include:

Although CTS is the best known of repetitive motion disorders, other disorders can also be disabling.

- **Tenosynovitis** - Tenosynovitis is the inflammation of the tendons and sheaths. It is often associated with tasks demanding extreme wrist deviation. For example, wrist deviation is required to hold an in-line nut-runner in a horizontal position.
- **Trigger finger** - Trigger finger is a form of tenosynovitis that results when any finger must be frequently flexed against resistance. It may be avoided by designing tool handles for operation by the thumb, by more than one finger, with lower force requirements, or by not requiring constant pressure.
- **De Quervain's Disease** - In De Quervain's Disease, the tendon sheath of both the long and the short abductor muscles of the thumb narrows. The disease is common among workers, who perform repetitive manual tasks involving radial or inward hand motion and firm grips.

- **Tennis Elbow** - Also called epicondylitis, this form of tendinitis is an inflammatory reaction of tissues in the elbow region. In an industrial environment, tennis elbow may follow effort requiring palm-upward hand motion against resistance, such as using a screwdriver, or the violent upward extension of the wrist with the palm down. The condition may be avoided by ensuring that the rotation axis of the tool or machine coincides with the rotation axis of the forearm.
- **White Finger** - White Finger Disease or Raynaud's Syndrome occurs when blood vessels and nerves in the hands constrict from conditions such as cold temperature or vibration. The hands, fingers or fingertips may become cold, blue, numb, and lose fine manipulative ability. Upon recovery, the hands become red, accompanied by a burning sensation. It can be confused with the one-sided numbness of carpal tunnel syndrome.

TREATMENT

Treatment will vary according to the type of MSD. Treatment can include the application of cold or heat, medication, physical therapy and even surgery. MSDs are treated more effectively they're discovered and reported early.

Corrective Actions to Prevent CTDS

Based on risk assessment results, the Company will implement as many of the following actions as are warranted and feasible:

- Adjusting the height of work tables, conveyors, and seats
- Automating tasks to eliminate manual handling
- Reducing the frequency of tasks or increasing the frequency to a point where automation is necessary
- Reducing the size or weight of loads
- Providing arm rests
- Redesigning hand tools so that the axis of rotation or application of force coincides with the axis of rotation of the arm
- Providing operator training
- Using careful pre-placement screening to identify high risk employees
- Changing load positions in relation to the body or hands
- Minimizing the time that a load is held in the hands
- Eliminating gloves if they cause a problem or trying different gloves

Recommendations to help prevent the development of CTS include:

- Use of Low frequency vibration in hand tools should be eliminated or reduced
- Wrist deviation from the straight position should be minimized especially where a great deal of force must be exerted
- Where possible, a closed fist (rather than a pinch) should be used to reduce tendon tension

RISK FACTORS

The factors that contribute to the risk of MSDs are called risk factors. A risk factor is something that may cause or contribute to an injury. Two or more risk factors can be present at one time, increasing the risk of injury.

Workers may not always be able to identify all the risk factors in a task. However, it is important for workers to recognize situations when they are at higher risk. If a worker must bend awkwardly to lift a heavy object in a cramped area, the worker will be exposed to a greater risk of MSD than a worker who uses a mechanical lifting device or one who has enough room to follow safe lifting procedures.

The primary risk factors for MSDs are the physical demands of a task:

- Force
- Repetition
- Work posture
- Local contact stress

Other risk factors that can affect these physical demands include:

- Layout and condition of the workplace or workstation, for example, a workstation that is too high or too low can create awkward working postures
- Characteristics of objects handled- for example, and object that is slippery or has no handles may cause awkward postures and require greater force to handle the object in a stable manner
- Environmental conditions of the workplace- for example, cold temperatures or drafts reduce blood flow to the hands and arms, requiring more grip force
- Organization of work tasks- for example, a worker performing a variety of different tasks throughout the day is likely at less risk of injury than a worker who has little variety in their job, and is exposed to the same risk factor for a longer time

FORCE

The force that a worker exerts on an object is a primary risk factor. Muscles and tendons can be overloaded when you apply a strong force against an object. Holding a lighter object for long periods can also expose workers to a risk of MSD.

Three types of activity that require force:

- Force involved in lifting, lowering, or carrying
- Force involved in pushing or pulling
- Grip force

Lifting, Lowering, or Carrying

Lifting, lowering, or carrying an object or person requires force. A worker needs to exert more force to lift a heavy object than a light one.

Pushing or Pulling

Force is needed for pushing or pulling an object. Pushing may be less of a risk than pulling because it uses stronger back muscles.

Grip Force

Additional grip force is needed in situations such as the following:

- The worker is gripping a small tool
- The worker is handling slippery or odd- shaped objects that are difficult to hold
- Objects are too large for a comfortable grip
- Objects are grasped or handled using a pinch grip instead of a power grip
- Vibrating tools or equipment are used
- The worker is wearing heavy or bulky gloves that make gripping more difficult
- Handles or grip spans are too large or too small
- The handles on tools have an awkward shape
- The workers hands are cold

REPETITION

Repeatedly doing a task that uses the same muscles with little chance for rest or recovery, puts workers at a higher risk of injury when other risk factors are also present (such as an awkward posture or heavy force). This applies to both large and small muscles.

Situations that increase the risk of MSD include the following:

- There is not enough variety in the worker's tasks to give muscles a rest or opportunity to recover
- The worker is unaccustomed to the task, for example, when starting a new job or returning from a prolonged absence from work, or when the equipment or workstation has changed

WORK POSTURE

Posture refers to the position of different parts of your body. Muscles, tendons and ligaments must work harder, and can be stressed, when you're in an awkward posture. Awkward posture occurs when any joint of your body bends or twists excessively, outside a comfortable range of motion. If the position is held long enough for you to feel aches and pains, then your muscles have been held in one position for too long. A posture held for a long time is called a static posture.

Various work activities can result in awkward postures:

- Leaning sideways, such as when reaching into a low drawer to one side (awkward back posture)
- Bending down to work at a low level (awkward back posture)
- Reaching overhead (awkward shoulder posture)
- Flaring the elbows out to the side (awkward shoulder posture)
- Bending the wrist when moving objects or keyboarding (awkward wrist posture)
- Bending the neck down, such as looking at small components in poor lighting conditions (awkward neck posture)
- Twisting part of the body, such as twisting the neck to view documents while keyboarding for a long time (awkward neck posture)

The effects of awkward posture can be made worse by:

- Applying force in an awkward position, such as lifting a heavy object with arms above the body or using a strong grip with a bent wrist
- Holding an awkward position for a prolonged period (static posture), such as holding a telephone between the head and shoulder

LOCAL CONTACT STRESS

Local contact stress occurs when a hard or sharp object meets the skin. The pressure can injure the nerves and the tissues beneath the skin.

Here are some examples of activities that can result in local contact stress:

- Ridges and hard edges on tool handles digging into the hand
- Edges of work surfaces digging into the forearm or wrist
- Striking objects sharply with the hand, foot, or knee (such as striking the carpet stretcher with the area above the knee when laying carpet

The effects of local contact stress can be made worse if:

- The hard object contacts an area without much protective tissue, such as the wrist, palm, or fingers
- Pressure is applied repeatedly or held for a long time

Duration and Magnitude

Duration should be considered along with the four primary risk factors rather than separate from them. The amount of risk depends on how long the worker is exposed to the risk factor.

The person looking at risk factors should consider questions about duration for each:

- How long is the worker using force (for example, to lift or grip an object)?
- How long does the worker perform a repeated task?
- How long does the worker perform a task with an awkward body posture?
- How long is one part of the body exposed to the local contact stress?
- Magnitude, or “how much,” should also be considered for each risk factor:
- How much force is the worker using?
- How fast is the worker doing the repeated movements?
- How severe is the awkward posture?
- How hard is the edge digging into the skin, causing local contact stress?

Multiple Risk Factors

More than one risk factor can occur at the same time. The more risk factors in the task, the greater the risk of injury. This example is used to show how several risk factors might occur at one time.

TRAINING

This Company will ensure that employees who may be exposed to the risk of musculoskeletal injuries are trained on the following:

- The employer's program
- The exposures which have been associated with MSDs
- The symptoms and consequences of injuries caused by repetitive motion
- The importance of reporting symptoms and injuries to the employer
- Methods used by the employer to minimize MSDs
- The safe work procedures for some tasks, such as adjusting their workstation to fit the task correctly
- The proper use of any mechanical aids or PPE provided to them

IMPLEMENTING A REPETITIVE MOTION INJURY PREVENTION PROGRAM

Our Company will implement a prevention program when MSDs have occurred to more than one employee under all of the following conditions:

- The MSDs were predominantly caused) by a work-related repetitive job or operation
- The employees incurring the MSDs were performing a job process, or operation of identical work activity. Identical work activity means that the employees were performing the same repetitive motion task, such as but not limited to word processing, assembly or, loading
- The MSDs were identified and diagnosed by a licensed physician
- The MSDs were reported by the employees to the employer in the last 12 months

The program will include a worksite evaluation, control of exposures that have caused MSDs and training.

(1) Worksite evaluation—each job, process, or operation of identical work activity covered by this section, or a representative number of such jobs, processes, or operations of identical work activities, must be evaluated for exposures that have caused MSDs.

(2) Control of exposures that have caused MSDs—any exposures that have caused MSDs must be corrected in a timely manner, or if they are not capable of being corrected, the exposures must be minimized to the extent feasible. The employer must consider engineering controls, such as workstation redesign, adjustable fixtures or tool redesign, and administrative controls such as job rotation, work pacing or work breaks.

The Company will implement controls that cause the greatest reduction in MSDs, unless those controls would impose unreasonable costs.

Work Area Design

A work area should be designed to accommodate the person who actually works on a given job. For example, workstations should not force workers into awkward body positions. Workstations should be easily adjustable and selected to fit specific tasks, so that they are comfortable for the workers using them. The workspace should be large enough to allow for the full range of required movements, especially where knives, saws, hooks and similar tools are used.

The equipment used should be suited to the job. It should be organized so that:

- Forced air exhausts are not directed toward the user
- Workstation adjustment controls are convenient and easy to use
- Equipment with the longest and/or most frequent eye contact lies in the center of the work field
- Equipment used the most is located closest to the worker
- Glare is avoided
- Pronounced visual contrast differences between important subjects is avoided

Methods for Reducing Extreme and Awkward Postures Include:

- Adjustable fixtures and rotating tables so that the position of the work can be easily manipulated
- Workstations and bins that can accommodate the heights and reach limitations of a wide range of workers
- Work platforms that move up and down for certain operations

Hand and Wrist Postures

Some hand tools may force the wrist into awkward positions. The wrist position affects the effective strength of the contracting muscles. Therefore, as the angle of the joint increases or decreases from the neutral position, there is more stress on the tendons.

Examples of Methods to Reduce the Need to Use Excessive Force Include:

- Adjustable fixtures that allow operations and movements to be easily made
- Properly located bins so that workers do not have to toss products and by-products
- Mechanical or powered devices that eliminate the need for extreme manual force
- The suspension of heavy tools

MINIMIZING MANUAL MATERIALS HANDLING

Manual materials handling is another area in which injuries to employees can occur. This type of work entails lifting, bending and twisting, which can cause great damage to the human body if done improperly.

Lifting puts stress on two main body systems. One is the musculoskeletal system and the other is the cardiovascular system. Since the problem associated with the cardiovascular system deals with oxygen consumption or increased heart rate, the focus of most information regarding lifting has been the musculoskeletal system.

Mechanical Aids

One way to reduce manual materials handling problems is by using self-leveling dispensers, such as the spring-loaded tray dispensers used in many cafeterias.

The way these mechanisms work is that when a load is removed, the platform rises in order to maintain the top layer at a constant level. A worker does not have to bend over or stretch upward to receive work. Instead, work can be reached at a constant height. These dispensers can eliminate unnecessary motion and thereby reduce worker fatigue.

Many other types of mechanical aids are available to assist employees during manual materials handling.

Hooks, bars, rollers, jacks, platforms and trestles are examples of simple job aids. Drum handling units are in common use and exist as either a trestle or lever. In most cases, the engineer or ergonomist can find off-the-shelf aids readily available to fit the lifting task and to minimize the amount of manual lifting.

Other available equipment which will minimize, if not eliminate, manual materials handling includes the standard industrial equipment classes of conveyors, hoists and cranes, industrial vehicles (such as tow-motor or forklift trucks), and positioners. The International Material Management Society defines positioners as equipment used to transfer material from workplace to materials handling equipment, or vice versa. Positioners include manipulators, dumpers, up-enders, positioning tables, lifts, jacks, and transfer machines.

Today, with so much equipment available to the plant engineer or ergonomist, manual materials handling can be reduced, if not eliminated, for most tasks.

COMPUTER WORKSTATIONS

Work involving the extended use of computer workstations can be repetitious and confining, special attention must be paid to the user's comfort. Traditional ergonomic considerations include chair and table selection, rest breaks, office noise, light, and temperature. However, VDT use poses unique questions, such as:

- What type of screen image, character size and screen brightness is optimal for the task?
- How can screen glare and reflections be eliminated?
- What type of keyboard is best for the user and the task?
- Where should the screen, document holder and accessories be placed?

Visual Display Terminals (VDTs)

A hidden toll is taken on employees who daily sit in front of their flickering display screens. They pay this price with sore necks and shoulders, cramped fingers, tired eyes, strained backs, numb buttocks, and aching legs and feet. Tension headaches are common. It may be possible to trace these ailments directly to improper workspace layout.

A standard visual display terminal is an electronic device that displays information on a screen and works on a principle similar to that of a television set. It contains a source of electrons which, when beamed across the phosphor- coated screen, produces a visible image. The operator manipulates the image through specific commands entered through a keyboard or a pointing device such as a mouse.

The primary viewing area should be between 0 and 60 degrees below the horizontal line of sight. The screen should be tilted so that the middle of the screen is perpendicular to the viewing angle. The top row of data should not lie above eye level, and observation angles greater than 40 degrees should be avoided. To avoid distracting reflections, it may be necessary to tilt the screen or to use screen filters.

The recommend observation distance between the eye and cursor is between 17 and 24 inches in an upright sitting position. ANSI recommends that the minimum viewing distance be 12 inches. ANSI also specifies several optical quality requirements.

- The contrast ratio between the characters and the background should be at least 3:1
- Small characters must have a higher minimum contrast
- “Jittering” displays should be eliminated
- The discrete dots that make up the characters should not be perceptible, the characters must appear solid to the viewer
- Saturated blue on a dark background, thin lines or high-resolution information for text should be avoided
- Pure red in displays should also be avoided to help color-blind people read displays

Workstation Accessories

Workstation accessories are available to help provide a comfortable workstation and reduce fatigue.

Keyboards

ANSI recommends that keyboards be positioned to allow the user to keep an angle between the upper arm and forearm at 70 to 90 degrees. The angle may increase if the operator is leaning back, but the maximum angle should not exceed 135 degrees. The keyboard should consist of the standard QWERTY layout.

The keyboard should be stable for normal keying functions. A number keypad should be provided if the main task involves numerical data input from the keyboard. To reduce user discomfort, alternative keyboards may be needed, such as split-fixed or split and vertical inclined styles.

There a number of keyboard accessories, that can reduce the risk of MSD’s. One such accessory is the keyboard armrest. Because typists frequently rest their wrists on the keyboard or tabletop while typing, excessive strain is placed on tendons controlling the fingers and hands. The wrist rest elevates and rests the wrists and reduces tendon stress. (The usual recommendation is to use the wrist rest during pauses in typing.)

The keyboard drawer slides under a desk when not in use, allowing efficient use of desk space. When the drawer is extended, the keyboard can be raised or lowered.

The extension arm allows the operator to place the monitor in a comfortable location for maximum efficiency. The extension arm rotates, extends, and retracts a swiveling monitor platform for viewer comfort and glare reduction.

Workers should alternate computer work with other tasks that don’t require similar, close- work skills. Managers should be conscious of this work routine when planning a day’s work schedule. Frequent breaks should be provided to allow the operator to stretch, move and other non-hand intensive tasks.

Document Holders; Footrests

Document holders and footrests should be provided, if needed by individual operators. The document holder should be adjustable and extensible.

Work Surfaces

The work surface should provide adequate legroom so that the legs are not cramped. The height of the leg clearance should be at least equivalent to the highest point on the thigh or knee. ANSI recommends that when the leg is perpendicular to the floor, minimum leg clearance depth under the work surface is 60 percent of the buttocks-to-knee length. The size of the work surface should also accommodate the task.

Work Chairs

The height of a chair should allow the user to place the feet firmly on a support surface. The maximum seat depth should allow contact with the seat back at the lumbar region while allowing clearance behind the knees. Minimum seat width should be 18 inches or the thigh breadth of the seated user, whichever is greater.

If the chair design requires the user's feet to be flat on the floor, the seat pan angle should keep the angle between the upper and lower leg between 60 and 100 degrees. In addition, the angle between the seat pan and back should allow the user to maintain a working posture in which the torso-thigh angle is not less than 90 degrees (100 degrees is preferred). Chairs should have backrests with lumbar support.

If the chairs have arms, the distance between the armrests should be at least 18.2 inches. Appropriate chair castors should be provided.

Noise and Temperature

Noise should be reduced to a maximum of 55 decibels and sporadic noises above normal ambient sound levels should be prevented. ANSI recommends that surface temperatures of equipment intended to be touched not exceed 95° F. Air drafts should not be allowed to flow under desks. Care should be taken to see that heat does not build up under desks as well.

LIGHTING

Sufficient Lighting is essential to reduce worker fatigue and allow them to perform visual tasks. How a space is used and what it is used for influences how lighting should be applied. Other factors that influence lighting design for a task include appearance, economics, building costs, energy consumption, and the quality of lighting desired. Factors affecting the visual environment include lighting fixtures, visual tasks, lighting maintenance, lighting system design and the individuals' eyesight.

Lighting Quantity

The quantity of light is the amount of light that exists or is required at a workplace. The amount of light necessary for effective work depends on the type of the work, the quality of a worker's vision, and the environment where the work is done.

The absolute minimum amount of light required for reading, writing and many manual tasks is approximately one foot-candle. As a reference point, a light in an indoor exit sign has at least five foot-candles.

In the design of good lighting, safety and welfare should be taken into account as well as visual efficiency.

In some jobs where visual demands are not great, it is normal for recommended levels of illumination to be based on safety and the creation of a pleasant environment. The minimum lighting level for a workplace is 20 foot-candles. When light levels fall below 20 foot-candles, workers usually have a negative reaction to the lighting.

Too much light can be as damaging as too little. The quantity of lighting needed depends on the age of a person performing the task, the reflecting characteristics present, the amount of light needed to do a task, and the speed and accuracy required of the person performing the task. As the amount of lighting provided for a task increases, so does the luminance (light reflected upward) and, as a result, the accuracy and speed of vision improves. The best ergonomic solution for these varying needs is to provide general workplace lighting and supplement it with specific task lighting.

Lighting systems should be designed to provide a uniform distribution of light over the entire work area. To ensure that a given lighting level will be maintained, give more light initially than is minimally required. The reason for this is that such factors as dirt, use and time deteriorate lighting.

Over time, most lights will become dull, this generally happens when 80 percent of the stated life of the bulb or light has been used. The best ergonomic solution is to replace it at this point.

Quality of Lighting

The quality of lighting relates to the distribution of brightness in an environment. A good quality of lighting means that all brightness contributes favorably to visual performance, visual comfort, ease of seeing, safety, and aesthetics for the specific task.

A worker can normally see the task itself, the immediate background to the task, and the general surroundings.

The eyes tend to be attracted to brighter and more colorful parts of the field of vision. Therefore, light and color can be used to direct the focus of attention to the task. Lighting should be directed to the work, or special local lighting should be provided to match the needs of the work and the general lighting levels.

The level of brightness required for a task is determined by the degree of detail the operator has to meet, the time allowed for seeing, and the reflection characteristics of the task. The general level of brightness in the room also contributes to the level of brightness required for a task. In practice, it’s best to plan the lighting first in relation to what the operator needs to accomplish the task and then to plan the brightness of the other parts of the room to provide proper emphasis, visual comfort, and interest.

Poor quality industrial lighting is easy to recognize. It creates uncomfortable and hazardous situations.

Certain tasks, such as distinguishing fine details, require higher quality illumination than do others.

In addition, work areas where visual tasks are demanding, and are performed over a prolonged period require higher quality illumination.

Slight glare conditions may result in a loss of seeing efficiency and undue fatigue. Some factors that affect the quality of light include glare, shadows, colors, veiling, reflections and luminance distribution.

The Effect of Glare on the Quality of Light

Glare is a disturbance of the eye's ability to adapt to amounts of light. It can cause discomfort or reduce the ability to see, or both. It occurs when some parts of the field of view are excessively bright in relation to the general level of brightness. A common example is presented by a person who is trying to watch a television set in a bright room. The ergonomic solution is to lower the lighting in the room.

The degree of glare resulting directly from light sources depends on such factors as the brightness and sizes of the sources, their position in the operator's field of view, and the average brightness of the surroundings against which they are seen. Glare can cause discomfort without affecting the operator's ability to see the work, especially in very bright surroundings. Ensuring that lights are placed above the line of sight will help eliminate glare.

There are three major types of glare. They are absolute, adaptive and relative glare. Absolute glare exists when luminosity is so high that adaptation is impossible. Adaptive glare exists when adaptation to a certain amount of light has not yet been reached.

Relative glare is present when there is too much of a contrast in the visual field. In addition, glare can be classified as direct or specular. Direct glare results from a light source, whereas specular glare is created by reflection from a bright surface.

Direct glare can be reduced by:

- Avoiding bright light sources within 60 degrees of the center of the visual field
- Using shields, hoods, and visors to keep the direct light source out of the viewers' eyes
- Using indirect lighting
- Using several low intensity sources of light rather than one high intensity source

Specular glare can be reduced by:

- Using diffuse light
- Using a dull matte surface (flat paints, desk blotters) rather than polished surfaces
- Arranging direct light sources so that the viewing angle to the work is not equal to the angle of incidence from the source

Light Sources Used in the Industrial Environment

Daylight and electrical light are the two major sources of light used in industrial sites. Artificial light is commonly used in industrial buildings during daytime to provide additional local lighting on the work.

There are many instances where the amount of daylight in a building is inadequate or obstructed, and artificial lighting is required as permanent supplement to daylight. Daylight, however, is by far the best light source if it's available.

Work Areas with Nominal Lighting

Intensity at 750 lux must be individually tested to determine whether the area is suited for display workstations. In rooms with nominal lighting intensity of 1,000 lux or higher, there should not be any display workstations, unless special precautions are taken, such as using micromesh or glare filters (polarized and/or non-reflective coating should also be considered). See table

Recommended Work/Break Intervals

One break (5–10 minutes) for every hour of keying moderate workloads, with more frequent, short mini breaks or pauses (30–60 seconds) for more intense VDT use.

The key to a comfortable and productive office environment is recognizing each worker as an important individual with individual needs. This recognition will increase morale and heighten productivity.

ERGONOMIC SAFETY ANALYSIS

Contributing Factors (CF)	Reason for CF	Comments	Ergonomic Improvements

SCOPE

This chapter provides information on the safe practices and fall protection requirements of OSHA 1926 Subpart M and 1910 Subpart D. Included is information on fall protection equipment, the types of fall protection systems and limitations regarding alternative fall protection methods.

POLICY

This company has implemented this policy to ensure that proper safe work practices and procedures are followed to protect employees from the fall hazards. A Program Administrator will be designated as the responsible person for managing and supervising the Fall Protection Program.

EMPLOYER RESPONSIBILITIES

This company will:

- Provide adequate and timely resources to support the fall protection program
- Identify fall hazards and implement procedures to eliminate or control them
- Develop and maintain written fall protection procedures wherever an active fall protection system is being used
- Inform authorized employees about a foreseeable fall hazard before exposure
- Provide continuous fall protection or ensure that such protection is available to employees and within regulations
- Provide training to operate any active fall protection systems
- Ensure supervision of employees exposed to fall hazards
- Verify all fall protection procedures are understood and followed

FALL PROTECTION PROGRAM ADMINISTRATOR

The program administrator will:

- Develop and implement the managed fall protection program
- Be knowledgeable of current fall protection regulations, standards, equipment, and systems
- Advise and provide guidance to managers, employees, and other departments on all managed fall protection program matters
- Establish and assign all duties and responsibilities outlined in this policy to trained and qualified individuals
- Provide or verify that the personnel have the necessary resources to accomplish their duties and responsibilities
- Establish and implement a system to identify, eliminate, or control new and existing fall hazards
- Ensure that written procedures for fall protection, rescue, and evacuation are developed for every foreseeable fall hazard to which persons are exposed
- Develop training programs for all Authorized Persons
- Verify that all Authorized Persons are provided with training

- Measure and evaluate the effectiveness of the managed fall protection program by: conducting periodic program evaluations and making improvements
- Participate, either personally or through a designated qualified person, in the investigation of all incidents related to falls from heights, including:
  - Reviewing incident reports
  - Taking corrective action to eliminate causes
  - Making necessary reports to management
  - Maintaining an incident report system

COMPETENT AND QUALIFIED PERSONNEL

Effective fall protection relies on the efforts of all personnel. However, each worksite that demands fall protection measures must have personnel onsite with the knowledge and authority to prevent injury as hazards arise.

Qualified Person Responsibilities

A qualified person has successfully demonstrated his or her ability to solve problems relating to the project by possession of a recognized degree, certificate or professional standing or by extensive knowledge, training and experience.

Company employees who are identified as “a qualified person” are expected to:

- Analyze and design all anchor points for structural engineering strength requirements as set by this standard and also be in compliance with local and state building code requirements
- Analyze and design all horizontal lifeline systems for structural engineering strength requirements and also be in compliance with local and state building code requirements
- Establish the clearance requirements for each fall protection system selected
- Verify the fall protection equipment system is adequate for the specific fall hazards
- Verify that available clearance is adequate before allowing persons to work at heights
- Maintain a safety factor of 2.0 against failure of the structural system for both anchor points and horizontal lifeline systems
- Establish adequate vertical and horizontal clearance requirements for each fall protection system. Analyze swing fall consideration and establish limitation requirements for each fall protection system
- Supervise design, installation, and use of horizontal lifeline systems to ensure that they can maintain a safety factor of at least twice the impact of a worker free-falling six feet
- Supervises design, installation, and use of personal fall-restraint anchorages
- Supervises design, installation, and use of personal fall-arrest anchorages
- Verify that fall protection systems have been installed and inspected in compliance with this standard and all applicable federal, state, and local regulations
- Identify, evaluate, and impose limits on the workplace activities to control fall hazard exposures and swing falls
- Communicate limits to all Authorized Persons who use the fall protection systems
- Prepare, update, and approve written fall protection, rescue, and evacuation procedures

- Specify that written fall protection rescue, and evacuation procedures include:
  - Anchorage locations
  - Connecting means
  - Body supports
  - Other required fall protection equipment
- Review the written procedures as workplace activities change for needed additional practices, procedures, or training
- Verify that Authorized Persons:
  - Are trained and have reviewed the fall protection, rescue, and evacuation procedures reviewed before work begins
  - Provide or ensure that a prompt rescue can be accomplished with the rescue and evacuation procedures
  - Participate in the investigation of all incidents related to falls from heights
  - Immediately remove from service all damaged equipment or components (and equipment or components that have experienced a fall arrest)
  - Inspect for damage and follow the manufacturer's instructions for damaged equipment and equipment that has experienced a free-fall arrest
  - Periodically inspect all fall protection equipment as per the manufacturer's requirements and applicable regulations

Competent Person Responsibilities

A competent person can identify existing hazards as well as potential hazards. Furthermore a competent person has the authority to take prompt corrective actions to eliminate such hazards and ensure employees are out of harm's way until the hazards can be eliminated.

The competent person:

- Serves as the monitor in a safety-monitoring system, is responsible for recognizing hazards that cause falls, and warns workers about hazards
- Determines whether safety nets meet requirements
- Inspects a personal fall-arrest system after it arrests a fall and determines whether the system is damaged
- Evaluates alteration to a personal fall-arrest system and determines if it is safe to use
- Supervises installation of slide-guard systems
- Trains employees how to recognize fall hazards and follow safety procedures

Authorized Person Responsibilities

Company employees who are identified as "an authorized person" are expected to:

- Follow the instructions of the program administrator and the Competent Person regarding the use of fall protection systems
- Understand and adhere to the fall protection procedures
- Notify the Competent Person of unsafe or hazardous conditions or acts that may cause injury before proceeding with workplace activities

- Correctly use, inspect, maintain, store, and care for fall protection equipment and systems
- Inspect any fall protection equipment, prior to use, for defects or damage
- Notify the Competent Person of defects and damage found from inspections
- Use only equipment free of defects or damage

FALL PROTECTION REQUIREMENTS

Fall protection may be required in areas and activities including, but not limited to, the following:

- Ramps, runways, and other walkways
- Excavations
- Hoist areas
- Holes
- Formwork and reinforcing steel
- Leading edge work
- Unprotected sides
- Edges
- Overhand bricklaying and related work
- Roofing work
- Precast concrete erection
- Wall openings
- Residential construction
- Other walking/working surfaces

Employees will be protected from fall hazards and falling objects whenever an affected employee is above the established threshold height (6 feet for construction or 4 feet for general industry) above a lower level. Typical fall protection systems are shown in this table.

FALL PROTECTION SYSTEMS

Type of fall protection system	What it does
Personal fall-arrest system	Controls a fall
Personal fall-restraint system	Prevents a fall
Positioning-device system	Positions and limits fall to 2 feet
Guardrail system	Prevents a fall
Safety-net system	Controls (arrests) a fall
Warning line	Warns of fall hazard

FALL PROTECTION PLAN

Planning Fall Protection

Methods, systems, and procedures to control exposure to fall hazards must be established before work commences. Careful preparation lays the groundwork for an accident-free workplace. A site-specific fall protection plan must reflect all anticipated fall hazards at the worksite. The nature and scope of the planning effort depend on the complexity and size of the project.

Planning must at least identify fall hazards and the systems and procedures to control the hazards. Effective planning reduces exposure risks for workers during a project and for others after the project is finished. For example, anchor points used by construction workers on a project might also be used to protect window cleaners or other maintenance personnel.

Use the plan will:

- Identify all fall hazards that workers are likely to encounter during the project
- Describe how workers will gain access to the worksite (by ladders or stairs, for example)
- Describe how workers will prevent tools and materials from dropping to lower levels
- Establish procedures for inspecting, maintaining, and storing fall protection equipment
- Identify the tasks that expose workers to fall hazards
- Make sure workers use fall protection systems appropriate for their tasks
- Identify anchor point locations
- Describe the methods for setting anchors and securing lifelines
- Identify areas where workers may be exposed to falling objects and how they will be controlled
- Describe emergency-response procedures for rescuing workers who fall
- Post emergency responders' phone numbers and make sure workers know them
- Describe all equipment that will be available for rescuing workers who fall

Assign supervisory responsibility to a competent person: A competent person must know the site-specific fall protection plan, how to perform work tasks safely and the hazards associated with those tasks. You must designate a competent person to implement the fall protection plan.

Document accountability: Your fall protection plan must describe how workers and supervisors will comply with its requirements.

Establish a training program: Everyone covered by a fall protection plan must be trained by a competent person. Be sure to document the names of those who receive fall protection training and their training dates.

The training program must cover:

- Fall hazards that workers will encounter
- Types of systems that will protect workers from falls
- Workers' responsibilities under the fall protection plan
- Procedures for assembling, maintaining, and dissembling personal fall arrest systems

- How workers should comply with the plan
- Retraining procedures when the plan changes, tasks change or when workers are not following the plan

Update the plan when site conditions change: When worksite conditions change and affect how workers are protected from falling, you must update your fall protection plan so that it addresses the changes. An on-site qualified person must approve the changed plan.

The updated plan must:

- Describe the site-condition changes that required the update
- Include the qualified person's reasons for the update
- Include the date the qualified person approved the plan changes and the person's signature

Investigate accidents: If a worker falls or has a near miss incident, you must investigate the accident and, if necessary, change the plan so that similar events don't occur.

Keep the plan at the job site: You must keep a copy of the fall protection plan, with all approved changes, at the job site.

Other Fall Protection Requirements

If activities at height include any of the following, consult the appropriate regulation and/or policy for more information on appropriate fall protection:

- Scaffolds
- Cranes and derricks
- Steel erection work
- Tunneling operations
- Electric transmission lines/equipment
- Stairways and ladders

Covers for Roof Openings or Holes

Roof Openings are fall hazards and must either be covered or surrounded by a guardrail. Skylights will usually break unless guarded or screened.

A cover is necessary regardless of the fall distance and includes any rigid object used to overlay openings in floors, roofs, and other walking and working surfaces. Covers must be able to support at least twice the maximum anticipated load of workers, equipment, and materials. Covers should have full edge bearing on all four sides. All covers must be color-coded or marked with the word "Hole" or "Cover" and must be secured to prevent accidental displacement.

CONVENTIONAL FALL PROTECTION

Personal Fall Arrest System

These consist of an anchorage, connectors and a body harness and may include a deceleration device, lifeline, or suitable combinations. If a personal fall arrest system is used for fall protection, it must do the following:

- Limit maximum arresting force on an employee to 900 pounds used with a body belt
- Limit maximum arresting force on an employee to 1,800 pounds used with a body harness
- Be rigged so that an employee can neither free fall more than 6 feet nor contact any lower level
- Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet
- Have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet or the free fall distance permitted by the system, whichever is less

The use of body belts for fall arrest is prohibited; however, the use of a body belt in a positioning device system is acceptable.

Personal fall arrest systems must be inspected before each use for wear, damage, and other deterioration. Defective components must be removed from service.

Anchorage - a fixed structure or structural adaptation, often including an anchorage connector, to which the other components of the PFAS are rigged

Body Wear - a full body harness worn by the worker

Connector - a subsystem component connecting the harness to the anchorage, such as a lanyard

Deceleration Device - a subsystem component designed to dissipate the forces associated with a fall arrest event

Anchor

An anchor provides a secure point of attachment for a lifeline, lanyard, or deceleration device and is perhaps the most important personal fall arrest system component. It must support a minimum load of 5,000 pounds – a challenging requirement, particularly on wood framed and residential-type structures. If you don’t know how much weight an anchor will hold, you should have a qualified person design a complete fall protection system. The system must be installed under the supervision of the qualified person and it must maintain a safety factor of at least two – twice the impact force of a worker free-falling six feet.

Never use hoists or guardrails as anchors. They are not built to withstand the forces generated by a fall.

In addition to anchor strength, consider the following:

- Anchorage connector: Unless an existing anchorage has been designed to accept a lanyard or lifeline, you'll need to attach an anchorage connector — a device that provides a secure attachment point. Examples include tie-off adapters, hook anchors, beam connectors and beam trolleys. Be sure the connector is compatible with the lanyard or lifeline and appropriate for the task
- Attachment point: The anchorage can be used only as the attachment point for a personal fall-arrest system; it can't be used to support or suspend platforms
- Location: The anchorage should be located directly above the worker, if possible, to reduce the chance of a swing fall
- Fall distance: Because a personal fall-arrest system doesn't prevent a fall, the anchorage must be high enough above a worker so that the arrest system, rather than a lower level, stops the fall. Consider free-fall distance, lanyard length, shock-absorber elongation, and body-harness stretch in determining the height of an anchorage

Body Harness

The full-body harness has straps that distribute the impact of a fall over the thighs, waist, chest, shoulders and pelvis. Before you purchase harnesses, make sure that they fit those who will use them, they're comfortable and they're easy to adjust.

A full-body harness should include a back D-ring for attaching lifelines or lanyards and a back pad for support. Never use a body belt as part of a personal fall-arrest system.

Full-body harnesses must:

- Be made from synthetic fibers
- Have an attachment point, usually a D-ring, in the center of the back at about shoulder level. The D-ring should be large enough to easily accept a lanyard snap hook
- Have chest straps that are easy to adjust and strong enough to withstand a fall without breaking
- Are made for industrial use, not recreational climbing
- They meet ANSI and CSA standards

Connectors

An anchorage, a lanyard and a body harness are not useful until they're linked together. Connectors do the linking; they make the anchorage, the lanyard and the harness a complete system. Connectors include carabiners, snap hooks and D-rings. Connectors must be dropforged, pressed or made from formed steel or equally strong material. They must be corrosion-resistant, with smooth surfaces and edges that will not damage other parts of the personal fall arrest system.

Carabiner

This high-tensile alloy steel connector has a locking gate and is used mostly in specialized work such as window cleaning and high-angle rescue. Carabiners must have a minimum tensile strength of 5,000 pounds.

Snap hook

A hook-shaped member with a keeper that opens to receive a connecting component and automatically closes when released. Snap hooks are typically spliced or sewn into lanyards and self-retracting lifelines. Snap hooks must be high-tensile alloy steel and have a minimum tensile strength of 5,000 pounds. Use only locking snap hooks with personal fall-arrest systems; locking snap hooks have self-locking keepers that won't open until they're unlocked.

D-ring

D-rings are the attachment points sewn into a full-body harness. D-rings must have a minimum tensile strength of 5,000 pounds.

Deceleration Devices

Deceleration devices protect workers from the impact of a fall. Any mechanism with a maximum length of 3.5 feet, such as a rope grab, rip stitch lanyard, tearing or deforming lanyards, self-retracting lifelines, etc. which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest may be used as a deceleration device.

Shock Absorbing Lanyard

Because a shock-absorbing lanyard extends up to 3.5 feet, it's critical that the lanyard stops the worker before the next lower level. Allow about 20 vertical feet between the worker's anchorage point and the level below the working surface. Always estimate the total distance of a possible fall before using a shock-absorbing lanyard.

Remember: Never use a shock-absorbing lanyard if the shock absorber is even partially extended or if the lanyard has arrested a fall.

Self-Retracting Lanyards or Lifelines

Self-retracting lanyards and lifelines offer more freedom to move than shock-absorbing lanyards. Each has a drum-wound line that unwinds and retracts as the worker moves. If the worker falls, the drum immediately locks, which reduces free-fall distance to about two feet — if the anchorage point is directly above the worker. Some self-retracting lanyards will reduce free-fall distance to less than one foot. Self-retracting lanyards are available in lengths up to 20 feet. Self-retracting lifelines, which offer more freedom, are available in lengths up to 250 feet.

Rope Grab

A rope grab allows a worker to move up a vertical lifeline but automatically engages and locks on the lifeline if the worker falls.

When using a rope grab, keep the following in mind:

- The rope grab must be compatible with the lifeline
- The rope grab must be correctly attached to the lifeline (not upside down)
- Keep the lanyard (between the rope grab and the body harness) as short as possible
- Keep the rope grab as high as possible on the lifeline

Lifelines

A lifeline is a cable or rope that connects to a body harness, lanyard or deceleration device, and at least one anchorage. There are two types of lifelines, vertical and horizontal.

Vertical Lifeline: A vertical lifeline is attached to an overhead anchorage and must be connected directly to a worker's full-body harness, lanyard, retractable device, or rope grab; it must have a minimum breaking strength of 5,000 pounds. When a worker needs to move horizontally, however, a vertical lifeline can be hazardous due to the potential for a swing fall — the pendulum motion that results when the worker swings back under the anchor point. A swing fall increases a worker's risk of striking an object or a lower level during the pendulum motion.

Horizontal Lifeline: Unlike a vertical lifeline, the horizontal lifeline stretches between two anchorages. When you connect a lanyard or rope grab to a horizontal lifeline, you can move about freely, thus reducing the risk of a swing fall. However, horizontal lifelines are subject to much greater loads than vertical lifelines. Horizontal lifelines can fail at the anchorage points if they're not installed correctly. For this reason, horizontal lifelines must be designed, installed and used under the supervision of a qualified person.

Sag Angles: Any load on a horizontal lifeline will cause it to deflect or sag. The sag angle is a horizontal lifeline's angle of deflection when it's subjected to a load, such as a falling worker. Reducing the sag angle (making a horizontal lifeline too tight) actually increases the force on the line during a fall. As you tighten a horizontal lifeline, you increase the impact load dramatically!

For example, when the sag angle is 15 degrees, the force on the lifeline and anchorages subjected to a load is about 2:1. However, if you decrease the sag angle to five degrees, the force increases to about 6:1.

Fall Arrest Rules

When using personal fall arrest systems:

- If you fall, the impact force to the body has to be less than 1800 pounds, achieved by using shock absorbing lanyards and a harness
- Minimize fall distance; the maximum free fall distance can only be 6 feet
- There cannot be any structures below in your fall distance
- Maximum weight of an individual w/tools is 310 pounds

OTHER FALL PROTECTION SYSTEMS AND METHODS

Those who work on elevated surfaces must be familiar with systems and methods that control their exposure to fall hazards; they must also ensure that their equipment and tools don't endanger workers below them.

Common methods for protecting workers from falling objects include the following:

- Canopies suspended above the work area
- Barricades and fences to keep people from entering unsafe areas
- Screens, guardrail systems, and toeboards to prevent materials from falling to lower levels

The following guidelines will help you keep your tools and equipment where they belong:

- If you use toeboards, they must be strong enough to withstand a force of at least 50 lbs. applied in any downward or outward direction and be at least 3½" high
- If you need to pile material higher than the top edge of a toeboard, install panels or screens to keep the material from dropping over the edge
- If you use canopies as falling object protection, make sure they won't collapse or tear from an object's impact
- You can use guardrails with toeboards as falling object protection if the guardrail openings are small enough to keep the objects from falling through
- When you do overhand bricklaying work, keep material and equipment – except masonry and mortar – at least four feet from the working edge. Remove excess mortar and other debris regularly
- When you do roofing work, keep materials and equipment at least six feet from the roof edge unless there are guardrails along the edge. All piled, grouped, or stacked material near the roof edge must be stable and self-supporting

Fall Restraint System

OSHA allows the use of a fall restraint system instead of a personal fall arrest system. The fall restraint system must be rigged to prevent a worker from reaching a fall hazard and falling over the edge. A fall restraint system can consist of a full body harness or body belt that's connected to an anchor point at the center of a roof by a lanyard of a length that will not allow a worker to physically reach the edge of the roof.

A personal fall-restraint system prevents a worker from reaching an unprotected edge and thus prevents a fall from occurring. The system consists of an anchorage, connectors, and a body harness or a body belt. The attachment point to the body belt or full-body harness can be at the back, front, or side D-rings.

The anchorage for a fall-restraint system must support at least 3,000 pounds or be designed and installed by a qualified person and have a safety factor of at least two — twice the impact force of a worker free-falling six feet.

Positioning Device System

Positioning-device systems make it easier to work with both hands free on a vertical surface such as a wall or concrete form. Positioning-device systems are also called "class II Work-positioning systems" and "work-positioning systems."

The components of a positioning-device system — anchorage, connectors, and body support — are similar to those of a personal fall arrest system. However, the systems serve different purposes. A positioning-device system provides support and must stop a free fall within two feet; a personal fall arrest system provides no support and must limit free-fall distance to six feet.

- Anchorage. Positioning-device systems must be secured to an anchorage that can support at least twice the potential impact of a worker's fall or 3,000 pounds, whichever is greater

- Connectors. Connectors must have a minimum strength of 5,000 pounds. Snap hooks and D-rings must be proof-tested to a minimum load of 3,600 pounds without deforming or breaking
- Body support. A body belt is acceptable as part of a positioning-device system. However, it must limit the arresting force on a worker to 900 pounds and it can only be used for body support. A full-body harness is also acceptable but must limit the arrest force to 1,800 pounds. Belts or harnesses must have side D-rings or a single front D-ring for positioning

Guardrails

A guardrail system consists of a top rail, midrail, and intermediate vertical member. Guardrail systems can also be combined with toeboards that prevent materials from rolling off the walking/working surface.

Guardrail systems must be free of anything that might cut a worker or snag a worker's clothing. Top rails and midrails must be at least ¼-inch thick to reduce the risk of hand lacerations; steel and plastic banding cannot be used for top rails and midrails.

Other requirements for guardrails include:

- Wire rope used for a top rail must be marked at least every six feet with high-visibility material
- The top rail of a guardrail must be 42 inches (plus or minus three inches) above the walking/working surface. The top-edge height can exceed 45 inches if the system meets all other performance criteria
- Midrails must be installed midway between the top rail and the walking/working surface unless there is an existing wall or parapet at least 21 inches high
- Screens and mesh are required when material could fall between the top rail and midrail or between the midrail and the walking/working surface
- Intermediate vertical members, when used instead of midrails between posts, must be no more than 19 inches apart
- A guardrail system must be capable of withstanding a 200-pound force applied within two inches of its top edge in any outward or downward direction
- Midrails, screens, and intermediate structural members must withstand at least 150 pounds of force applied in any downward or outward direction

Safety Nets

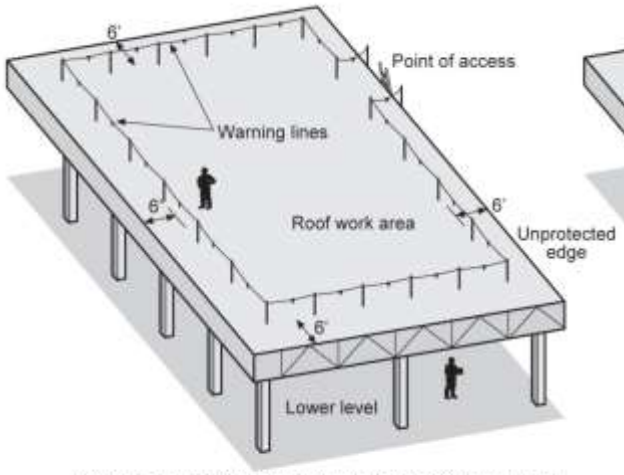
Safety-net systems consist of mesh nets and connecting components.

- Safety-net openings can't be more than six inches on a side, center to center
- Safety nets must not be installed more than 30 feet below the working surface
- An installed net must be able to withstand a drop test consisting of a 400-pound sandbag, 30 inches in diameter, dropped from the working surface
- Inspect safety nets regularly and remove debris from them no later than the start of the next work shift

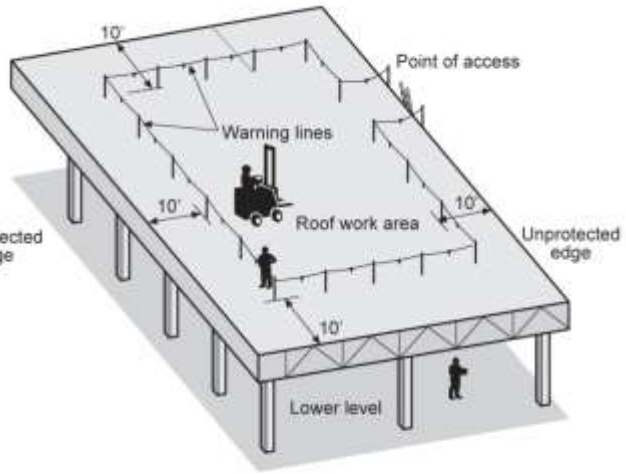
Warning Line System

Warning line systems consist of ropes, wires, or chains, and supporting stanchions that form a barrier to warn those who approach an unprotected roof side or edge. The lines mark off an area within which one can do roofing work without using guardrails or safety nets; warning line systems can be combined with guardrail systems, personal fall arrest systems, or safety monitoring systems to protect those doing roofing work on low slope roofs (4:12 or less, 2:12 in some jurisdictions).

When mechanical equipment is not being used, the warning line shall be erected not less than 6 feet from the roof edge. When mechanical equipment is being used, the warning line shall be erected not less than 6 feet from the roof edge that is parallel to the direction of mechanical equipment operation, and not less than 10 feet (3.1 m) from the roof edge that is perpendicular to the direction of mechanical equipment operation



Warning-line system where no mobile equipment is used



Warning-line system where mobile equipment is used

Safety Monitoring System

A safety monitoring system is a set of procedures assigned to a competent person for monitoring and warning workers who may be unaware of fall hazards. A safety monitoring system used in conjunction with a controlled access zone and a fall protection plan is also appropriate in situations where conventional fall protection is not feasible.

Controlled Access Zones

The controlled access zone is best thought of as a combination of a warning line system and a safety monitoring system.

It defines an area where workers can do leading edge, overhand bricklaying and related work, or work under a fall protection plan without using conventional fall protection. All others are prohibited from entering a controlled access zone. The zone is created by erecting a control line, or lines, to restrict access to the area. The control line warns workers that access to the zone is limited to authorized persons.

Control lines must meet the following criteria:

- Consist of ropes, wires, tapes, or equivalent materials and supporting stanchions
- Be flagged at least every 6 feet with high visibility material
- Be no less than 39 inches from the working surface at its lowest point and no more than 45 inches from the working surface at its highest point (50 inches in overhand bricklaying operations)
- Have a minimum breaking strength of 200 lbs.
- For work such as overhand bricklaying, the control lines should be 10-15 ft. from the unprotected edge

ALTERNATIVE FALL PROTECTION METHODS

If leading edge, precast concrete erection or residential-type construction work is being performed, an alternative fall protection system can be used provided the company can demonstrate that using the conventional systems aren't feasible or would create a fall hazard.

Alternative Fall Protection Plan

If implemented, an alternative fall protection plan used by this company will meet the following requirements:

- The fall protection plan will be prepared and maintained by a qualified person for the site where the work is being performed
- A copy of the fall protection plan and changes will be maintained at the job site
- A competent person will implement the fall protection plan
- The fall protection plan will document the reasons why the use of conventional fall protection systems are infeasible or why their use would create a greater hazard
- The fall protection plan will include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who can't be provided with protection from the conventional fall protection systems. For example, the employer must discuss the extent to which scaffolds, ladders, or vehicle mounted work platforms can be used to provide a safer working surface and thereby reduce the hazard of falling
- The fall protection plan will identify each location where conventional fall protection methods can't be used. These locations will then be classified as controlled access zones and adhere to all appropriate policies and regulations
- Where no other alternative measure has been implemented, the company will implement a safety monitoring system
- The fall protection plan must include a statement that provides the name or other method of identification for each employee designated to work in controlled access zones. No other employees may enter controlled access zones
- In the event an employee falls, or some other related, serious incident occurs, the company will investigate the circumstances of the fall or other incident to determine if the fall protection plan needs to be changed (e.g. new practices, procedures, or training) and will implement those changes to prevent similar types of falls or incidents

In addition, you must:

- Describe access to controlled-access zones will be limited, including procedures that authorize workers to enter controlled-access zones
- Describe how controlled-access zones will be identified and separated from other work areas
- Identify all workers who will enter controlled-access zones

INSPECTING AND MAINTAINING FALL PROTECTION EQUIPMENT

Employees will inspect fall protection systems and equipment regularly for wear or damage.

- Inspect manila, plastic, or synthetic rope used for top rails or midrails or a guardrail system frequently
- Inspect safety nets at least once a week, removing defective nets from service
- Inspect PFAS or positioning device systems every time they are used
- A PFAS that has been subjected to a fall must not be used again until a competent person determines it is safe

Lanyard Inspections

Snaps

Inspect closely for hook and eye distortions, cracks, corrosion, or pitted surfaces. The keeper (latch) should seat into the nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to firmly close the keeper. Keeper locks must prevent the keeper from opening when the keeper closes.

Thimbles

The thimble must be firmly seated in the eye of the splice and the splice should have no loose or cut strands. The edges of the thimble must be free of sharp edges, distortion, or cracks.

Wire Rope (Steel) Lanyard

Always wear gloves when inspecting a wire rope lanyard because broken strands can cause injury. To inspect, rotate the wire rope lanyard while watching for cuts, frayed areas or unusual wearing patterns on the wire. Broken strands will separate from the body of the lanyard.

Web Lanyard

While bending webbing over a pipe, observe each side of the webbed lanyard. This will reveal any cuts, snags or breaks. Swelling, discoloration, cracks and charring are obvious signs of chemical or heat damage. Observe closely for any breaks in stitching.

Rope Lanyard

Rotate the rope lanyard while inspecting from end-to-end for any fuzzy, worn, broken or cut fibers. Weakened areas from extreme loads will appear as a noticeable change in original diameter. The rope diameter should be uniform throughout, following a short break-in period.

Shock Absorber Pack

The outer portion of the pack should be examined for burn holes and tears. Stitching on areas where the pack is sewn to D-rings, belts or lanyards should be examined for loose strands, rips, deterioration or other signs of activation.

Shock-Absorbing Lanyard

Shock-absorbing lanyards should be examined as a web lanyard. However, also look for the warning flag or signs of deployment. If the flag has been activated, remove this shock-absorbing lanyard from service.

Common Types of Damage to Webbing and Lanyards

Heat

In excessive heat, nylon becomes brittle and has a shriveled brownish appearance. Fibers will break when flexed and must not be used above 180 degrees Fahrenheit.

Chemical

Change in color usually appears as a brownish smear or smudge. Transverse cracks appear when belt is bent over tight. This causes a loss of elasticity in the belt.

Ultraviolet Rays

Do not store webbing and rope lanyards in direct sunlight, because ultraviolet rays can reduce the strength of some material.

Molten Metal or Flame

Webbing and rope strands may be fused together by molten metal or flame. Watch for hard, shiny spots or a hard and brittle feel. Webbing will not support combustion, nylon will.

Paint and Solvents

Paint will penetrate and dry, restricting movements of fibers. Drying agents and solvents in some paints will appear as chemical damage.

Self-Retracting Lines

Check Housing

Before every use, inspect the unit’s housing for loose fasteners and bent, cracked, distorted, worn, malfunctioning or damaged parts.

Lifeline

Test the lifeline retraction and tension by pulling out several feet of the lifeline and allow it to retract back into the unit. Maintain a light tension on the lifeline as it retracts. The lifeline should pull out freely and retract all the way back into the unit. Do not use the unit if the lifeline does not retract. Also, check for signs of damage. Inspect for cuts, burns, corrosion, kinks, frays or worn areas. Inspect any sewing (web lifelines) for loose, broken or damaged stitching.

Braking Mechanism

Test the braking mechanism by grasping the lifeline above the load indicator and applying a sharp steady pull downward to engage the brake. There should be no slippage of the lifeline while the brake is engaged. Once tension is released, the brake should disengage and the unit should return to the retractable mode. Do not use the unit if the brake does not engage.

Snap Hook

Check the snap hook to be sure it operates freely, locks, and the swivel operates smoothly. Inspect the snap hook for any signs of damage to the keepers and any bent, cracked or distorted components.

Anchorage Connection

Make sure the carabiner is properly seated and in the locked position between the attachment swivel/point on the device and the anchor point

Self-Retracting Lines

Webbing

Grasp the webbing with your hands 6 to 8 inches apart. Bend the webbing in an inverted “U.” The surface tension resulting makes damaged fibers or cuts easier to detect. Follow this procedure the entire length of the webbing, inspecting both sides of each strap. Look for frayed edges, broken fibers, pulled stitches, cuts, burns and chemical damage.

D-Rings/Back Pads

Check D-rings for distortion, cracks, breaks, and rough or sharp edges. The D-ring should pivot freely. Inspect for any unusual wear, frayed or cut fibers, or broken stitching of the D-ring attachments. Pads should also be inspected for cracks, excessive wear, or other signs of damage.

Buckles

Inspect for any unusual wear, frayed or cut fibers, or broken stitching of buckle attachments.

Tongue Buckles/Grommets

Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. Roller should turn freely on frame. Check for distortion or sharp edges. Inspect for loose, distorted, or broken grommets. Webbing should not have additional punched holes.

Friction and Mating Buckles

Inspect the buckle for distortion. The outer bars and center bars must be straight. Pay special attention to corners and attachment points at the center bar.

Quick-Connect Buckles

Inspect the buckle for distortion. The outer bars and center bars must be straight. Make sure buckles engage properly.

Harness Fall Arrest Indicators

Inspect fall arrest indicators (located on the back D-ring pad) for signs of activation. Remove from service if broken or stretched between any of the four pairs of arrows.

Cleaning of Equipment

Basic care for fall protection safety equipment will prolong the life of the equipment and contribute to its safety performance. Proper storage and maintenance after use is as important as cleaning dirt, corrosives or contaminants off the equipment. The storage area should be clean, dry, and free of exposure to fumes or corrosive elements.

Nylon and Polyester

Wipe off all surface dirt with a sponge dampened in plain water. Squeeze the sponge dry. Dip the sponge in a mild solution of water and commercial soap or detergent. Work up a thick lather with a vigorous back and forth motion. Then wipe the belt dry with a clean cloth. Hang freely to dry but away from excessive heat.

Housing

Periodically clean the unit using a damp cloth and mild detergent, and towel dry.

Drying

Harness, belts, and other equipment should be dried thoroughly without exposure to heat, steam, or long periods of sunlight.

EMERGENCY PLANNING

The best strategy for protecting workers from falls is to eliminate the hazards that cause falls. If you can't eliminate the hazards, you must protect workers with an appropriate fall protection system or method. If a worker is suspended in a personal fall-arrest system, you must provide for a prompt rescue.

The emergency response plan outlines key rescue and medical personnel, equipment available for rescue, emergency communications procedures, retrieval methods, and primary first-aid requirements. Please see the chapter on Emergency Action Plans for more information.

Before Work Begins

- Identify emergencies that could affect your work site
- Establish a chain of command
- Document procedures for responding to emergencies and make sure they're available on-site
- Post emergency-responder phone numbers and addresses at the work site
- Identify critical resources and rescue equipment
- Train on-site responders
- Identify off-site responders and inform them about any conditions at the site that may hinder a rescue effort

- Identify emergency entry and exit routes
- Make sure responders have quick access to rescue and retrieval equipment, such as lifts and ladders

During Work

- Identify on-site equipment that can be used for rescue and retrieval, such as extension ladders and mobile lifts
- Maintain a current rescue-equipment inventory at the site. Equipment may change frequently as the job progresses
- Re-evaluate and update the emergency-response plan when on-site work tasks change

When an Emergency Occurs

- First responders should clear a path to the victim. Others should direct emergency personnel to the scene. You can use 911 for ambulance service; however, most 911 responders are not trained to rescue a worker suspended in a personal fall-arrest system
- Make sure only trained responders attempt a technical rescue
- Prohibit all nonessential personnel from the rescue site

After an Emergency

- Report fatalities to OSHA within eight hours
- Report injuries requiring overnight hospitalization with medical treatment (other than first aid) to OSHA within 24 hours
- Identify equipment that may have contributed to the emergency and put it out of service
- Have a competent person examine equipment. If the equipment is damaged, repair or replace it. If the equipment caused the accident, determine how and why
- Document in detail the cause of the incident and describe how it can be prevented from happening again
- Review emergency procedures. Determine how the procedures could be changed to prevent similar events. Revise the procedures accordingly

TRAINING

This company will ensure every employee is provided training on Fall Protection. This training will be provided at no cost to the employee during working hours.

The company will use only training material that is appropriate in content and vocabulary to the educational level, literacy, and language of employees.

Training Components

The program administrator will ensure that every employee will be trained in the following minimum elements:

- The nature of fall hazards in the work area
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used

- The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used
- The role of each employee in the safety monitoring system when this system is used
- The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs
- The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection
- The role of employees in fall protection plans

Training Records

Training records will include the following information as a written certification:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of the attendees

Employee training records will be maintained for the duration of the employee's employment.

Retraining

If the company has reason to believe that any employee who has already been trained doesn't have the understanding and skill required, the employee must be retrained. Examples where such retraining may be required include, but are not limited to, the following:

- Changes in the workplace render previous training obsolete
- Changes in the types of fall protection systems or equipment to be used render previous training obsolete
- Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill

FORMS AND ATTACHMENTS

On the following pages, please find the following document(s):

- Fall Hazard Assessment
- Employee Training for Fall Protection Certification

FALL HAZARD ASSESSMENT

Job Name:		Location:		Date Assessed:	
Related Operating Procedures Reviewed:		Yes ☐ No ☐	Location Marked and Entry Controlled		Yes ☐ No ☐

Fall Hazard Assessment Checklist	Yes	No
1. Can an employee enter the area without restriction and perform work?	☐	☐
2. Are fall prevention systems such as cages, guardrails, toeboards and manlifts in place?	☐	☐
3. Have slipping and tripping hazards been removed or controlled?	☐	☐
4. Have visual warnings of fall hazards been installed?	☐	☐
5. Can the distance a worker could fall be reduced by installing platforms, nets etc.?	☐	☐
6. Are any permanently installed floor coverings, gratings, hatches or doors missing?	☐	☐
7. Does the location contain any other recognized safety and or health hazards?	☐	☐
8. Is the space designated as a Permit Required Confined Space?	☐	☐
9. Have anchor points been designated and load tested?	☐	☐

Assessment Information

Initials	Hazard	Remarks/Recommendations
	Total potential fall distance:	
	Number of workers involved:	
	Frequency of task:	
	Obtainable anchor point strength:	
	Required anchor point strength: (not less than 5000 lbs.)	

Additional Requirements

Potential environmental conditions that could impact safety:

Initials	Condition	Remarks/Recommendations

Possible required structural alterations:		
Initials	Alteration	Remarks/Recommendations
Possible task modification that may be required:		
Initials	Task	Remarks/Recommendations
Training requirements:		
Initials	Requirement	Remarks/Recommendations
Personal protective equipment required:		
Initials	Requirement	Remarks/Recommendations

Comments:			
Authorization		☐Approved	
I certify that I have conducted a Fall Hazard Assessment of the above designated location and have detailed the findings of the assessment on this form. * Further detailed on attachment: Yes ☐ No ☐			
Title:		Name	
Signature		Date	Time

EMPLOYEE TRAINING FOR FALL PROTECTION

The Company certifies that the following employee has been trained in the understanding, knowledge, and skills necessary for the safe performance of duties assigned in areas of fall protection hazards.

_____ has demonstrated proficiency in the following areas of fall protection:

- ☐ The nature of fall hazards in the work area.
- ☐ The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
- ☐ The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, personal fall restraint systems, slide guard systems, positioning devices, and other protection to be used.
- ☐ The role of each employee in the safety monitoring system when this system is used.
- ☐ The limitations on the use of mechanical equipment during the performance of roofing work.
- ☐ The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
- ☐ The role of employees in the fall protection work plan.

Employee Tranied by	Date of Training
Signature of Trainer	Date
Employee Signature	Date

cc: Employee Personnel File

SCOPE

This chapter provides the safe practices and requirements for managing general waste at construction job sites. These safe practices will comply with all OSHA regulation 1926.252 requirements, as well as all applicable state and/or local regulations. This chapter does not address the handling of hazardous wastes, which is covered in a separate chapter.

POLICY

The Company has adopted this policy to inform employees of its General Waste Management Plan. This plan will ensure the safety and health of the employees. The safety coordinator is responsible for ensuring the following policy is enforced.

Waste Estimation

Before starting work, the Company will conduct an estimation of the wastes, trash and scrap materials that will be generated during its work. This will be performed so the need for containers, and waste removal system, if necessary, can be determined.

Disposal of Waste

The Company will coordinate with the project or site owner to ensure the proper disposal of wastes or scrap materials. The Company will ensure that the owner is aware of whether wastes and scrap materials will be taken off site or will be disposed of on the owner's site.

If waste material or debris will be disposed of by burning, that process will comply with all local fire regulations.

All solvent waste, oily rags and flammable liquids will be kept in fire resistant covered containers until removed from worksite.

Responsibilities

To ensure the proper disposal of wastes or reuse of scrap materials the Company has designated a safety coordinator to be responsible for waste management.

SAFETY HAZARDS

The Company will ensure that safe practices related to the immediate storage and handling of waste, scrap, or left-over materials are carried out. Always be aware of what you are handling. The proper personal protective equipment will be used when handling wastes and scrap material.

If work is being performed that requires materials to be dropped more than 20 feet to any point outside of a structure, an enclosed chute will be provided for the movement of the material.

If debris is dropped through holes in the floor without the use of chutes, the area where the material is to be dropped will be:

- Completely enclosed with barricades at least 42 inches high and 6 feet back from the edge of the opening above

- Signs warning of the hazard of falling materials will be posted at each level
- Waste removal will not be permitted from the lower area until debris handling ceases from the area above

HANDLING, ORGANIZATION, AND STORAGE

Our Company will ensure that waste materials are properly stored and handled to minimize the potential for a spill or impact to the environment. During outdoor activities, waste receptacles will be covered to prevent dispersion of waste materials and to control the potential for run-off.

The Company will ensure that all waste or scrap materials generated are stored properly and in an organized fashion.

All scrap lumber, waste material, and rubbish will be removed from the immediate work area as the work progresses.

The Company ensures that project related wastes will be stored and maintained in an organized fashion to encourage proper disposal and minimize risks to employees. Proper waste receptacles will be provided for trash and materials that may be reused or recycled during a project.

TRAINING

The Company will ensure employees are instructed in the proper methods to dispose of wastes.

- Employees of the Company will be instructed in the general disposal of non-hazardous wastes, trash, or scrap materials
- If wastes generated are classified as hazardous, employees will be trained to ensure proper disposal

Waste Segregation

Our Company requires employees to properly segregate waste or scrap materials to provide the opportunity for reuse or recycle.

SCOPE

This chapter covers the use of hand tools, portable electric tools, and fuel powered tools. This information complies with the requirements of OSHA 1910, Subpart P for general industry, or for the construction industry 1926, Subpart I. It does not cover hydraulic, pneumatic or powder-actuated tools; information on these tools are provided in separate chapters.

NOTE: This chapter does not cover electric or fuel powered lawn mowers, chainsaws, or other landscaping equipment. These are covered in separate chapters.

POLICY

The company, to ensure the safe use of tools, has created this policy. This policy is intended to ensure safety for employees who use power and hand tools, and must be followed.

EMPLOYER RESPONSIBILITIES

It is the company's responsibility to:

- Maintain all tools and equipment used by employees in safe, working condition
- Remove unsafe equipment from the worksite
- Ensure employees are properly trained in the safe use and operation of tools and equipment before using or operating the tools and equipment on the job
- Provide personal protective equipment to prevent injury and adverse health effects
- Select and use only tools with appropriate safety guards
- Ensure every job hazard analysis and safe job procedure considers the hazards introduced by power tools and hand tools

EMPLOYEE RESPONSIBILITIES

All company employees are expected to:

- Be aware of hazards presented by tools where they work
- Follow company safety policy and the instructions of the supervisor
- Comply with safe operating procedures for all equipment
- Properly use and maintain personal protective equipment
- Attend and participate in appropriate safety training
- Inspect tools and equipment daily to ensure they are in proper working order
- Report defective tools and equipment, and other safety concerns, and provide safety recommendations as appropriate

SAFE PRACTICES

- All hand and electrically power tools, whether furnished by the employer or the employee, will be maintained in a safe condition
- When power-operated tools are designed to have safety guards, the guards must be installed while the tool is in use

- Never carry a tool by its cord
- Never yank the cord of a tool to disconnect it from the receptacle
- Don’t raise or lower a power tool by its cord
- Keep cords away from heat, oil, and sharp edges
- Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters
- Keep all people not involved with the work at a safe distance from the work area
- Secure work with clamps or a vise, freeing both hands to operate the tool
- Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool
- Maintain tools with care; keep them sharp and clean for best performance
- Follow instructions in the user’s manual for lubricating and changing accessories
- Be sure to keep good footing and maintain good balance when operating power tools
- Follow good housekeeping procedures to keep floors free of debris and hazards
- Don’t allow dust, shavings, or other scraps to accumulate on or near machines, causing an operational hazard
- Wear proper apparel for the task. Do not wear loose clothing, sleeves, neckties, scarves, and jewelry that can become caught in moving parts
- Sharp tools such as chisels, drill bits, and awls must be carried in one of the following ways: with the edges or points protected; in a tool tray; in a cart; in a sheath; in the hand with the sharp edges turned away from the body
- Sharp or pointed tools, when stored in a rack or bin, must have the sharp edges or points inward or otherwise protected or stored to prevent injury
- Anti-kickback aprons must be provided to employees at no expense to the employees, and must be used where material can be kicked back
- Gloves should not be worn while operating machines
- Stationary tools and machines must be located where there is enough space for workers to handle material without interference from, or to, employees or machines. Operators should never have to stand in an aisle while operating a machine unless protection is provided
- Machines designed for a specific location must be secured to a floor, foundation, bench, table, or stand of sufficient strength and design to prevent overturning or unintentional movement
- Tools and machinery must be located so that light with the intensity of at least 50-foot candles from both natural and artificial light falls on the work. Supplementary illumination at the point of operation must be provided where necessary
- Any tool or machine, or component of a tool or machine that is not in proper working order must be immediately removed from service
- Tools and machines must be inspected at regular intervals and will be repaired in accordance with the manufacturer’s specifications. Untrained or unauthorized people must not modify them, and they cannot be returned to service until properly repaired
- Utilize a machine only if it is appropriate for the given task

- Employers must ensure that the height of tables and working surfaces of machines, auxiliary tables, and supports are appropriate and promote the safety of the operator; tables and supports must be large enough so that unwieldy pieces can be handled safely
- All circular saws 20 inches or more in diameter must be etched or otherwise permanently marked to include the manufacturer's designated operating speed; a saw blade must not be operated at a higher speed than shown on the blade. When a marked saw blade is re-tensioned for a different speed, the marking must be corrected to show the new speed

Guards

The exposed moving parts of power tools must be safeguarded. All tools must be used with the correct shield, guard, or attachment recommended by the manufacturer. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains or other reciprocating, rotating or moving parts of equipment must be guarded.

Guards, as appropriate, must be provided to protect the operator and others from the following:

- Point of operation
- In-running nip points
- Rotating parts
- Flying chips and sparks

Safety guards must never be removed or made inoperable when a tool is being used. Machines must not be used for operations of such variety as to necessitate the removal of safeguards.

Portable circular saws must be equipped at all times with guards. They must have guards above and below the base plate or shoe. The upper guard must cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard must cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard must immediately return to the covering position.

Switches and Controls

The following hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released:

- Drills
- Tappers
- Fastener drivers
- Disc sanders with discs greater than 2 inches
- Horizontal, vertical, and angle grinders with wheels more than 2 inches in diameter
- Belt sanders
- Reciprocating saws
- Saber saws, scroll saws, and jigsaws with blade shanks greater than ¼-inch wide
- Other similar tools

These tools also may be equipped with a “lock-on” control, provided it allows the worker to shut off the control in a single motion using the same finger or fingers.

The following hand-held power tools must be equipped with either a positive “on-off” control switch, a constant pressure switch, or a “lock-on” control:

- Grinders with wheels 2 inches or less in diameter
- Disc sanders with discs 2 inches or less in diameter
- Platen sanders, routers, planers laminate trimmers, nibblers, shears, and scroll saws
- Jigsaws, saber and scroll saws with blade shanks a ¼-inch (+/- .05 in.) or less in diameter

A constant-pressure control switch is the preferred device. Other hand tools such as the following hand-held power tools must be equipped with a constant-pressure switch:

- Circular saws having a blade diameter greater than two inches
- Chain saws
- Percussion tools with no means of holding accessories securely

PERSONAL PROTECTIVE EQUIPMENT

Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases must be provided with the particular personal protective equipment necessary to protect them from the hazard. All personal protective equipment (PPE) will meet NIOSH protective, maintenance requirements and OSHA regulations.

The required PPE when working with hand and power tools can include, but is not limited to:

- Snug-fitting clothing
- Hearing protection
- Eye and face protection
- Heavy-duty leather gloves
- Respiratory protection

HAND TOOLS

Wrenches, including adjustable, pipe, end and socket wrenches must not be used when jaws are sprung, cracked, or distorted to the point that slippage occurs. Impact tools, such as drift pins, wedges and chisels, must be kept free of mushroomed heads.

The wooden handles of tools must be kept free of splinters or cracks and must be kept tight in the tool. When hammering, use a hammer, not a tool designed for other purposes. All damaged or cracked tools, including saws, will be removed from service. Knives and scissors must be kept sharp.

When using saw blades, knives or other tools, direct tools away from aisle areas and other employees in close proximity.

Iron or steel hand tools may produce sparks that can ignite nearby flammable substances. Spark-resistant tools made of non-ferrous materials must be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used.

- Try to avoid prying, pulling, wedging, or lifting at sharp angles or overhead
- Wear eye protection and, where necessary, face protection

Use the following safe practices when working with hand tools.

Axes and Hatchets

- Unless it has a striking face, don't use the hatchet as a hammer. The head or the wooden handle can crack and break
- Hatchets with striking faces will only be used for driving common nails, not for striking chisels, punches, drills, or other hardened metal tools
- Never use an axe or hatchet as a wedge or chisel and strike it with a hammer
- Most carpenters prefer a hatchet with a solid or tubular steel handle and a hammerhead with a slot for pulling nails

Claw Hammers

- Start with a good quality hammer of medium weight (16 ounces) with a grip suited to the size of your hand
- Rest your arm occasionally to avoid tendinitis. Avoid overexertion in pulling out nails. Use a crow bar or nail puller when necessary
- When nailing, start with one "soft" hit, that is, with fingers holding the nail. Then let go and drive the nail in the rest of the way
- Strike with the hammer face at right angles to the nail head. Glancing blows can lead to flying nails. Clean the face with sandpaper to remove glue and gum. Don't use nail hammers on concrete, steel chisels, hardened steel-cut nails, or masonry nails
- Discard any hammer with a dented, chipped, or mushroomed striking face or with claws broken, deformed, or nicked inside the nail slot

Crow Bars

The tools include pry bars, pinch bars and wrecking bars. Shorter ones usually have a curved claw for pulling nails and a sharp, angled end for prying. Loads levered, lifted, or shifted by bars can land on fingers and toes.

- Make sure to clear the area and maintain control of the load
- Have enough rollers and blocking ready
- Never put fingers or toes under the load

Cold Chisels

Cold chisels are used to cut or shape soft metals as well as concrete and brick. In time the struck end will mushroom. This should be ground off. Don't use chisels with mushroomed heads. Fragments can fly off and cause injury.

Hand Planes

- Use only a plane that is suited to the job, and keep the iron sharp

- For long surfaces like door edges, use a fore plane 18" long and 2 ⅜" wide or a jointer plane 24" long and 2 ⅝" wide
- Square cutting heads must not be used on jointers and planers
- For shorter surfaces, use a jack plane 15" long and 2 ⅜" wide or a smoothing plane 10" long and 2 ⅜" wide
- Remember that sharp tools require less effort and reduce the risk of fatigue, overexertion, and back strain
- Work can also be easier with a door jack and supports on your workbench

Hand Saws

- Select the right saw for the job
- A 9 point is not meant for crosscutting hardwood. It can jump up and severely cut the worker's hand or thumb. Use an 11 point (+) saw for this kind of work
- When starting a cut, keep your thumb up high to guide the saw and avoid injury
- For cutting softwood, select a 9 point (-). The teeth will remove sawdust easily and keep the saw from binding and bucking
- Ripping requires a ripsaw

Plumb Bobs

- Designed for use in windy conditions, a mercury-filled plumb bob has considerable weight in proportion to its surface area
- The weight and point of the bob can make it dangerous
- Ensure that all is clear below when you lower the bob
- Don't let it fall out of your pocket, apron, or tool bag

Screwdrivers

- Do not use screwdrivers for prying, scraping, chiseling, scoring, or punching holes
- Only use a screwdriver that fits or matches the fastener
- Do not hold an object being worked on with a screwdriver in your hand, in your lap, or under your arm, except when protection is afforded by the object or other means
- A screwdriver used for electrical work must be equipped with a nonconductive handle
- Always make a pilot hole before driving a screw. Power drivers present obvious advantages when screws must be driven frequently or repeatedly

Sledgehammers

- When using a sledgehammer to drive thick tongue-and-groove planking tightly together, use a block of scrap wood to prevent damage to the planks
- Use sledgehammers carefully, serious bruises and broken bones have been caused by sledgehammers off-target and out of control
- Always check handle and head. Make sure head is secure and tight. Replace damaged handles
- Always wear eye protection

Utility Knives

- Use knives with retractable blades only. If used, fixed-blade knives must be carried in a protective sheath or equivalent
- Always cut away from your body, especially away from your free hand. When you're done with the knife, retract or sheathe the blade at once. A blade left exposed is dangerous, particularly in a toolbox

Wood Chisels

- Keep your hand that holds the work behind, not in front of, the chisel
- Keep chisels sharpened
- Keep chisels stored in a toolbox with protective caps when not in use
- Never use a chisel for prying
- Repeatedly striking the chisel with the palm of your hand may lead to repetitive strain injury
- With chisels and other struck tools, always wear eye protection
- Gloves are recommended to help prevent cuts and bruises

ELECTRIC TOOLS

- Operate electric tools within their design limitations according to manufacturer's instructions
- Use gloves and appropriate safety footwear when using electric tools
- Store electric tools in a dry place when not in use
- Do not use electric tools in damp or wet locations unless they are approved for that purpose
- Keep work areas well lighted when operating electric tools
- Ensure that cords from electric tools do not present a tripping hazard
- Unplug the tool before making adjustments or changing attachments
- The use of electric cords for hoisting or lowering tools must not be permitted
- Remove all damaged portable electric tools from use and tag them: "Do Not Use"

Electric Safety Features

To protect the user from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low-voltage isolation transformer. Three-wire cords contain two current-carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong must never be removed from the plug.

Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On double-insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.

In the construction industry, employees who use electric tools must be protected by ground-fault circuit interrupters (GFCI) or an assured equipment-grounding conductor program (AEGCP).

SAWS

The general safe practices listed below must be followed when operating any type of saw.

General Safety

The practice of inserting wedges between the saw disk and the collar to form what is commonly known as a wobble saw is prohibited.

Blade Guards

All portable, power-driven circular saws having a blade diameter greater than 2 in. must be equipped with guards above and below the base plate or shoe. The upper guard must cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard must cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard must automatically and instantly return to covering position.

Never operate an electric saw with the lower guard tied or wedged open. The saw may kick back and cut you, or another worker who uses the saw.

An exposed blade, still in motion, will force the saw to move, cutting anything in its path. Make sure that the lower guard returns to its proper position after a cut. Never operate a saw with a defective guard-retracting lever.

On most saws, the lower guard is spring-loaded and correct tension in the spring will automatically close the guard. However, a spring weakened by use and wear can allow the guard to remain open after cutting. Maintain complete control of the saw until the blade stops turning. Note: The guard may also be slow to return after 45° cuts.

Brake

An electric brake on some circular saws stops the blade from coasting once the switch is released. This greatly reduces the danger of accidental contact.

Trigger Safety

On some light-duty saws, a latch prevents the operator from accidentally starting the motor. The trigger on the inside of the handle cannot be pressed without first pressing a latch on the outside of the handle. On heavy-duty saws, a bar under the trigger switch helps to prevent accidental starting.

Clutch

Some worm-drive saws are equipped with a clutch to prevent kickback. Kickback occurs when a saw meets resistance and violently backs out of the work. The clutch action allows the blade shaft to continue turning when the blade meets resistance. The blade stud and friction washer can be adjusted to provide kickback protection for cutting different materials. Check friction washers for wear.

Blades

Understand the different designs, types and uses of blades, and only use blades suited for the job.

Blades should be sharpened or changed frequently. The teeth on a dull or abused blade will turn blue from overheating. Cutting will create a burning smell. Such blades should be discarded or reconditioned.

Re-sharpened blades can be substantially reduced in diameter. Make sure that the blade diameter and arbor diameter are right for the saw.

- Before changing or adjusting blades, disconnect the saw from the power source
- Ensure that arbor diameter and blade diameter are right for the saw
- Make sure it is clean and free of nails, concrete and other foreign objects. This precaution not only prolongs blade life but may also prevent serious injury
- Ensure that blades are installed in the proper rotational direction
- Do not strike metal when using a carbide-tipped blade. The tips can come loose and fly off, ruining the blade and injuring the operator. Inspect the blade regularly for cracked or missing tips

Changing, Adjusting, and Setting Blades: when changing blades, take the following precautions:

- Disconnect the saw from the power source
- Place the saw blade on a piece of scrap lumber and press down until the teeth dig into the wood. This prevents the blade from turning when the locking nut is loosened or tightened
- Make sure that keys and adjusting wrenches are removed before operating the saw

Proper adjustment of cutting depth keeps blade friction to a minimum, removes sawdust from the cut and results in cool cutting.

- The blade should project the depth of one full tooth below the material to be cut
- Carbide-tipped blades or miter blades should project only half a tooth below the material

If the blade is to run freely in the kerf (saw cut), teeth must be set properly, that is, bent alternate. The setting of teeth differs from one type of blade to another. Finer toothed blades require less set than rougher-toothed blades. Generally, teeth should be alternately bent ½ times the thickness of the blade. Sharp blades with properly set teeth will reduce the chance of wood binding. They will also prevent the saw from overheating and kicking back.

Safe Saw Practices

- Place the material to be cut on a rigid support such as a bench or two or more sawhorses
- Make sure that the blade will clear the supporting surface and the power cord
- The wide part of the saw shoe should rest on the supported side of the cut if possible
- Plywood is one of the most difficult materials to cut with any type of saw. The overall size of the sheet and the internal stresses released by cutting are the main causes of difficulty
    - Large sheets should be supported in at least three places, with one support next to the cut
    - Short pieces of material should not be held by hand. Use some form of clamping to hold the material down when cutting it

- NEVER use your foot or leg to support the material being cut
- Place the material to be cut with its good side down, so that if any splintering occurs, will be on the upper side
- Use just enough force to let the blade cut without laboring
- Never place a handheld saw in a fixed, upside-down position and feed material into it. Use a table saw instead
- When cutting, don't force the saw back onto line. Withdraw the blade and either start over on the same line or begin on a new line
- Keep the cord on the same side of your body as your cutting hand
- Stand to one side of the cutting line
- Never reach under the material being cut
- Always keep your free hand on the long side of the lumber and clear of the saw
- Maintain a firm, well-balanced stance, particularly when working on uneven footing

Plywood, wet lumber and lumber with a twisted grain tend to tighten around a blade and may cause kickback. Kickback occurs when an electric saw stalls suddenly and jerks back toward the operator. The momentarily exposed blade may cause severe injury.

Pocket Cutting

- Tilt saw forward
- Rest front of shoe on wood
- Retract lower guard
- Lower saw until front teeth almost touch wood
- Release guard to rest on wood
- Switch on the saw
- Keep the saw tilted forward, push it down, and forward with even pressure gradually lowering it until shoe rests flat on wood

DRILLS

Types

- Light duty drills are usually ¼ or ⅜ inch trigger-controlled variable speed drill
- Heavy duty drills are usually select the slower but more powerful one- or two-speed reversible ½ or ¼ inch drill
- Size of the drill is determined by the maximum opening of the chuck. For instance, a ⅜ inch drill will take only bits or attachments with a shank up to ⅜ inch wide
- For drywall screws, a drywall screw gun should be used. The driving bit should be replaced when worn

Attachments

Attachments such as speed-reducing screwdrivers, disk sanders and buffers can help prevent fatigue and undue muscle strain. A right-angle drive attachment is very useful in tight corners and other hard-to-reach places.

- Cutting and drilling attachments must be kept sharp to avoid overloading the motor
- Never crowd or push the tool beyond capacity
- Some attachments, such as hole saws, spade bits, and screwdrivers, require considerable control by the operator. If you do not feed the attachment slowly and carefully into the material, the drill can stop and severely twist or break your arm
- Stock should be clamped or otherwise secured to prevent it from moving
- Restrain the drill just before the bit or cutting attachment emerges through the material, especially when oversized spade bits are used
- Select the bit or attachment suitable to the size of the drill and the work to be done
- Make sure that the bit or attachment is properly seated and tightened in the chuck

Some operations require the use of an impact or hammer drill. For instance, drilling large holes in concrete or rock with a carboloy bit should be done with an impact drill

Follow manufacturer's instructions when selecting and using a bit or attachment, especially when working with drills or performing unfamiliar work.

SAFE DRILL PRACTICES

General Safety

Working with Small Pieces

- If a small piece starts to twist or spin with the drill, you can be injured
- Small work pieces should be properly secured and supported
- Never try to drill with one hand and hold a small piece of material with the other

Drilling from Ladders

- The top and bottom of the ladder must be secured to prevent the ladder from slipping or sliding
- Never reach out to either side. Overreaching can cause the ladder to slide or tip
- Never stand on the top step or paint shelf of a stepladder. Stand at least two steps down from the top
- When working from an extension ladder, stand no higher than the fourth rung from the top
- Never support yourself by holding onto a pipe or any other grounded object

Operation

- Always plug in the drill with the switch OFF
- Before starting to drill, turn on the tool for a moment to make sure that the shank of the bit or attachment is centered and running true
- Punch a layout hole or drill a pilot hole in the material so that the bit won't slip or slide when your start drilling. A pilot hole is particularly important for drilling into hard material such as concrete or metal
- With the drill OFF, put the point of the bit in the pilot hole or punched layout hole
- Hold the drill firmly in one hand or two hands, as necessary, at the correct drilling angle

- Turn on the switch and feed the drill into the material with the pressure and control required by the size of the drill and the type of material
- Don't enlarge a hole by reaming it out with the sides of the bit. Switch to a larger bit
- While drilling deep holes, especially with a twist bit, withdraw the drill several times with the motor running to clear the cuttings
- Never support material on your knee while drilling. Material should be firmly supported on a bench or other work surface for drilling
- Unplug the drill and remove the bit as soon as the work is finished
- When drilling into floors, ceilings, and walls, beware of wiring and plumbing
- Rotary and hammer drills generate extreme torque and must be handled with caution. Take occasional breaks to relax your arms and shoulders

Drilling Timbers

- When drilling timbers with a self-feeding auger bit, use a heavy-duty, low-rpm drill, ½ or ¼ inch in size
- Never attempt to drill heavy timbers by yourself, especially when working on a scaffold or other work platform

Other Materials

The main hazard in drilling materials other than wood is leaning too heavily on the tool. This can not only overload and burn out the motor but also cause injury.

- Always use a drill powerful enough for the job and a bit or attachment suited to the size of the drill and the nature of the work
- Punch a layout hole or drill a pilot hole can make the job safer and more efficient
- Use a drill press stand for drilling holes in metal accurately and safely
- Clamp small pieces in a vise and bolted to the table
- A drill press can also be used for cutting large holes in wood with a hole saw or speed bit

PLANES

Electric planes are available in various types and sizes, and are operated in similar ways. Depending on specific features, adjustments between models may differ.

Planes may be equipped with:

- Outfeed tables (back shoes) that are either fixed or movable
- Infeed tables (front shoes) that move straight up and down or move up and down on an angle to keep the gap between cutter head and table as small as possible
- Cutter heads with two or more straight blades (also called knives or cutter blades) or cutter heads with two curved blades

Never operate an electric plane while wearing a scarf, open jacket, or other loose clothing. Keep long hair tied up. Always wear eye protection and practice good housekeeping.

Standard Plane

- Hold with both hands to avoid contact with cutter blades
- Always keep both hands on the plane until motor stops
- Use the edge guide to direct the plane along the desired cut
- Never try to guide the plane with your fingers

Block Plane (Electric)

Designed for use on small surfaces, the block plane is operated with only one hand. It is more dangerous than the larger, standard plane. Keep your free hand well out of the way, in case the plane slips accidentally.

Plane Maintenance

- Make sure the work is free of obstructions: staples, nails, sand, or other foreign objects
- Keep blades in good condition and sharp
- Use a fine-grit oilstone when sharpening blades. Blades can be re-sharpened several times if they are not nicked or cracked

Changing Blades

Time and patience is required when raising or replacing cutter blades. Blades must be the same weight and seated at the same height to prevent the cutter head from vibrating. Any deviation can cause the head to run off balance. Blades can fly out and injure you or fellow workers.

Removing Blades

- Disconnect the plane from the power source. Turn the plane upside down and secure it in a fixed position
- Hold the cylinder head stationary by tapping a softwood wedge between the cutter head and the bearing (some tools are equipped with a locking device)
- Loosen all the screws and lift out one blade and throat piece. Turn the cutter head and repeat this procedure with other blades
- If necessary, clean parts thoroughly with recommended solvent

Installing Blades

- Replace one throat piece and blade. Tighten the two end screws lightly
- Take a hardwood straight edge and use the outfeed table (back shoe) as a gauge. Raise or lower the blade until both ends are level with the outfeed table at the blade’s highest point of revolution
- Tighten up the remaining screws. Set the rest of the blades in the same way. Turn the cylinder head and make sure that all blades are the same height
- Tighten up all the screws. Double-check the height of all blades. Tightening can sometimes shift the set. Double-check all the screws
- Turn the tool right side up and plug it in. Hold the tool in both hands with the cutter blades facing away from you and switch it on

Safe Plane Practices

- Always disconnect the plane from the power source before adjusting or changing blades or the cutter head
- For safe operation, make sure that blades (at their highest point of revolution) are exactly flush with the outfeed table
- Make sure to support work securely for safety and accuracy
- Use a jack (e.g. when planing doors and large pieces of plywood) to secure material and keep edges clear of dirt and grit
- When using an electric block plane, clamp or fasten the workpiece whenever possible. Keep your free hand well away from plane and material
- When using the standard power plane, adjust edge guide to desired guidance
- Adjust depth of cut to suit the type and width of wood to be planed
- To start a cut, rest the infeed table (front shoe) firmly on the material with cutter head slightly behind the edge of the material
- After finishing a cut, hold both hands on the plane until motor stops

RADIAL ARM SAWS

The motor and blade of the radial arm saw are suspended above the table. Because the motor and blade assembly can be locked in different positions, and can travel during the cut, you must pay special attention to keeping fingers and hands clear.

Injuries involving radial arm saws tend to be serious. By using appropriate guards and procedures, however, you can safely use the saw for crosscuts, miter cuts, ripping and dadoes.

Set-Up

- The saw must be adequately powered for the work
- Only use a radial arm saw in a well-lit area out of the way of traffic, with enough space to store and handle long lengths of wood
- Mark the floor with yellow warning lines to keep other personnel back from the saw
- Make sure all safety guards and devices are in place
- Choose the right blade for the job. A sharp tungsten carbide combination blade is good for both crosscutting and ripping without frequent re-sharpening

General Procedures

- Follow basic saw safety
- If you don’t have someone to help with long stock, use a roller stand or extension table to support the work
- Always return the motor head to the column stop
- When crosscutting or mitering, keep hands at least six inches away from the blade. Do not adjust length of cut until the motor is back at column
- Slope the tabletop back slightly to keep the blade at the column, to prevent it from contacting stock being placed in position

- Do not allow the blade to cut too quickly when crosscutting or mitering
- Avoid drawing the blade completely out of the cut. The cut piece, whether large or small, often moves. When the saw is rolled back towards the column, the teeth can grab the piece and shoot it in any direction
- Do not cut by pushing the saw away from you into the stock. The material can lift up and fly over the fence

Ripping and Crosscutting

- For regular ripping, turn the motor away from the column to the in-rip position. Feed stock into the saw from the right side
- To cut wide stock, change the saw to the out-rip position. Feed stock into the saw from the left side. Remember – the blade must turn up and toward you when feeding the stock
- Do not force the cut. Allow the blade through the wood at its own pace
- To avoid kickback, take the following precautions:
  - Maintain proper alignment of the blade with the fence
  - Adjust the anti-kickback device to ⅛ inch below the surface of stock being fed
  - Use a sharp blade, free of gum deposits and with teeth properly set
- When binding occurs, stop the saw and open the kerf with a wedge
- After completing the cut, remove the stock from the rotating blade to prevent overheating and possible kickback
- Always push the stock all the way through past the blade
- Do not leave the machine with the motor running
- Use a push stick when ripping narrow pieces. Have suitably sized and shaped push sticks for other jobs as well. See more information on push sticks and feather boards under “Table Saws”

Jigs

- Keep commonly used jigs on hand. Jigs such as those for making stair and doorframe wedges and tapers are designed to carry stock past the blade with the saw locked in the rip position
- When you are drawing the saw into the stock, clamp or nail jigs to the table to prevent slipping

Re-Sawing with Blade Horizontal

The rip fence on the radial arm saw is too low to support material to be re-sawn on edge. Therefore, the material must be placed flat on the table and the motor must be turned so the blade is parallel to the table. The closeness of the arbor requires an auxiliary tabletop and fence to re-saw thin stock.

Because the kickback fence can’t be used, and controlling stock is sometimes difficult, re-sawing on the radial arm saw can be hazardous.

- If no other equipment is available, rip the stock halfway through, then turn it around, and complete the cut
- On the second cut, be sure to push the two halves well past the blade once they have been cut apart. Push sticks and feather boards clamped to the table can reduce hazards

Dadoes

A dado head is an essential tool for cutting grooves, rabbets and dadoes. A groove is cut with the grain; a dado is cut across the grain; and a rabbet is a shoulder cut along the edge of a board.

- Dado heads do not run at the peripheral feed speed on a big radial arm saw. Which can result in either stopping the motor or lifting the work and throwing it back
- To prevent this, make several light passes, lowering the dado head ⅛ to ¼ inch each time
- Always make sure guards are in place before starting dado work
- Proper rotation of the teeth is up and toward you

Other Accessories

Rotary accessories of various types are advertised as turning the radial arm saw into a multi-function machine. Remember that the saw has its limitations.

Possible problems include the following:

- Shaper heads run too slowly for safe and smooth work. Templates, jogs, and fixtures that remove the operator's hands from the points of operation of shapers must be used when the nature of the work permits such use
- Grinding stones may run too fast or slow, and are not recommended
- Sanding drums tend to run too fast and may burn the wood

ROUTERS

A portable electric router can be used to cut dadoes, grooves, mortises, dovetail joints, moldings and internal or external curves. The router motor operates at very high speed (up to 25,000 rpm) and turns clockwise.

General Safety

- When starting a router with a trigger switch in the handle, keep both hands on the tool to absorb the starting torque
- When starting a router with a toggle switch on top of the motor, hold the router firmly with one hand and switch on power with the other, then put both hands on the tool for control and accuracy
- Always wear eye protection. Hearing protection may also be required. Remember, the speed and power of a router requires that it be operated with both hands
- The pulleys, spindles and cutting tools on routers must be guarded. Turn plates, jigs, and fixtures requiring the operator's hands to be removed from the point of operation may be used as a point of operation guard

Safe Router Practices

- Always support and secure the work with a vise or clamps. Never try to hold the work down with your hand or knee. Never rely on a second person to hold the material
- Make sure that the bit is securely mounted in the chuck and the base is tight

- Set the base on the work, template, or guide and make sure that the bit can rotate freely before switching on the motor
- Make sure that the cutting edge of the router bit contacts the material to the left of the cutting direction. Otherwise, the router will kick back or fly away from you
- Guide the router around the work counter-clockwise. Splinters left at corners by routing across the grain will be removed by the next pass with the grain
- Feed the router bit into the material at a firm but controllable speed appropriate to the type of material being cut

SABER, SCROLL AND JIGSAWS

The saber saw (or portable jigsaw) is designed for cutting external or internal contours. The saw should not be used for continuous or heavy cutting that can be done more safely and efficiently with a circular saw.

The reciprocating saw is a heavier type of saber saw with a larger and more rugged blade. This tool is often used by drywall and acoustical workers to cut holes in ceilings and walls. Equipped with a small swivel base, the saw can be used in corners or free hand in hard-to-reach places. The reciprocating saw must be held with both hands to absorb vibration and to avoid accidental contact.

Eye protection is required. Depending on conditions, you may also need respiratory protection.

Choosing the Proper Blade

Various blades, ranging from 7 to 32 teeth per inch, are available for cutting different materials. For the rough cutting of stock such as softwood and composition board, a blade with 7 teeth per inch will cut the fastest. For all-round work with most types of wood, a blade with 10 teeth per inch is satisfactory.

Safe Jigsaw Practices

Cutting

- Clamp the material as close to the cutting line as possible
- Before starting a cut, make sure that the saw will not contact the clamps, vise, workbench, or other support
- Never reach under the material being cut. Never lay down the saw until the motor has stopped
- Do not try to cut curves so tight that the blade will twist and break
- Always hold the base or shoe of the saw in firm contact with the material being cut

Note: When sawing into floors, ceilings, or walls, always check for plumbing and wiring.

External Cut

To start an external cut (from the outside in):

- Place the front of the shoe on the material
- Make sure that the blade is not in contact with the material or the saw will stall when the motor starts

- Hold the saw firmly and switch it on
- Feed the blade slowly into the material and maintain an even pressure
- When the cut is complete, do not lay down the saw until the motor has stopped

Inside Cuts

To start an inside cut (pocket cut):

- Drill a lead hole slightly larger than the saw blade
- With the saw switched off, insert the blade into the hole until the shoe rests firmly on the material
- Do not let the blade touch the material until the saw has been switched on

It is possible to start an inside cut without drilling a lead hole first — but only when it's necessary. To do this:

- Rest the front edge of the shoe on the material with the saw tipped backward. Keep the blade out of contact with the material
- Switch on the saw and slowly feed the blade into the material while lowering the back edge of the shoe
- When the shoe rests flat on the material and the blade is completely through, proceed with the cut
- Never try to insert a blade into, or withdraw a blade from, a cut or a lead hole while the motor is running
- Never reach under the material being cut

TABLE SAWS

The table saw most often used in construction is the 10-inch belt-driven tilting arbor saw. The dimension refers to the diameter of the saw blade recommended by the manufacturer.

General Safety

Basket Guards

- Basket guards may be fastened to the splitter, or hinged to either side of the saw on an L-shaped or S-shaped arm
- Keep the basket guard in place for normal operations such as straight and bevel ripping and miter cutting
- When the guard is removed to permit cutting of tenons, finger joints, rabbets, and similar work, use accessories such as feather boards, holding jigs, push sticks, and saw covers
- Some split basket guards have a see-through cover. Sheet metal baskets fastened to the splitter are less effective because you cannot see the saw blade

Kickback

To avoid kickback of the stock when cutting:

- Never stand directly behind the blade when cutting. Stand to one side. See that other workers stand clear as well

- Make sure the rip fence is aligned for slightly more clearance behind the blade than in front. This will help prevent binding
- Use a sharp blade with teeth properly set for the wood being cut. A dull or badly gummed blade will cause friction, overheating, and binding
- Install a splitter to keep the kerf (cut) open behind the blade. Also effective are anti-kickback fingers attached to the splitter

Splitters

Splitters prevent the kerf from closing directly behind the blade. Ideally, they should be slightly thinner than the saw blade and manufactured from high tensile steel. Splitters are not always needed with carbide-tipped saw blades, whose relatively wide kerf may provide the desirable clearance.

Disappearing splitters with anti-kickback fingers can be pushed down when in the way of a workpiece and pulled up if necessary after the machine has been shut off.

Roller Stand

A roller stand provides support when working with long pieces of stock. When using a roller stand:

- Adjust the height slightly lower than the saw table to allow for sagging of the material
- Set up the stand so the roller axis is at 90 degrees to the blade

Whatever the design, a support stand should be standard equipment in every carpentry and millwork shop. It can be used as an extension to a workbench, jointer or band saw and is especially important with the table saw.

Extensions

Made of wood or metal, tabletop extensions installed behind and to both sides of the machine can make the cutting of large sheets of plywood and long stock safer and more efficient.

In most cases, a space must be provided between extension and saw top for adjusting the basket guard and allowing scrap to fall clear.

Rip Fence

The rip fence is used mainly to guide the stock and maintain correct width of cut.

Adjust the fence slightly wider at the back to let the wood spread out behind the cut and reduce the risk of kickback.

You can add a piece of hardwood to the rip fence in order to rip thin pieces of wood and make dadoes and rabbets. The auxiliary fence can be set close to the cutters without the risk of contact between the blade and the steel fence.

Push Sticks and Feather Boards

Push sticks and feather boards are used when cutting narrow pieces of stock.

- Push sticks should be painted or otherwise marked to prevent loss

- The heel of the push stick should be deep enough to prevent it from slipping and strong enough to feed the stock through the saw
- A feather board clamped immediately in front of the saw blade will provide side pressure to the stock without causing binding and kickback. Use a push block to feed stock all the way through the saw

Safe Table Saw Practices

- Follow basic saw safety
- Keep the floor around the saw clear of scrap and sawdust to prevent slipping and tripping
- Always stop the machine before making adjustments. Before making major adjustments, always disconnect the main power supply
- Select a sharp blade suitable for the job
- Use the safety devices such as push sticks and feather boards
- Make sure nobody stands in line with a revolving blade
- Don't let anyone or anything distract you when you are operating the saw
- Keep your fingers folded in a fist rather than extended as you feed work into the saw
- Never reach around, over, or behind a running blade to control the stock
- Follow the manufacturer's recommendations in matching the motor size to the saw.
- Table saws must be properly grounded
- Check the power supply for ground and always use a ground fault circuit interrupter
- Extension cords must be of sufficient wire gauge for the voltage and amperage required by the saw and for the length of the run

JOINTERS

Jointers, also known as planers, used to make flat edges on boards are generally hand feed devices, and for that reason, use extreme care when feeding stock into or out of the cutting area.

Safe Jointer Practices

- Hand-fed planers and jointers with a horizontal or vertical head must have a cylindrical cutting head, and the knife projection must not extend more than 1/8-inch beyond the body of the head
- Square cutting heads must not be used on jointers and planers
- The opening in the jointer table must be kept as small as possible. The clearance between the edge of the rear table and the cutter head must not be more than 1/8 inch
- The table throat opening must not be more than 2½ inches when tables are set for zero cut
- A proper push block must be used when jointing short or narrow stock
- A hand-fed jointer with a horizontal or vertical cutting head must have an automatic guard covering all the sections of the cutting head on the working side of the fence or gauge; it must also have a guard covering the section of the head in back of the gauge or fence
- Each wood jointer with vertical head must have either an exhaust hood or other guard to enclose the revolving head, except for a slot wide enough for the application of the material to be jointed

- The minimum length of the piece jointed must not be less than four times the distance between the two tables. Neither half of the jointer table should be adjusted horizontally so that the clearance between the edge of the table and revolving knives is more than ¼ inch

QUICK-CUT SAWS

Hand-held portable circular cut-off saws are commonly known as “quick-cut saws.” They are widely used for cutting concrete, masonry products, sheet metal products (both steel and aluminum), and light steel sections such as angles and channels.

Hazards

Quick-cut saws are high-powered compared to similar tools. Hazards include high-speed blade rotation, blade exposure during operation, and exhaust from the internal combustion engine (the usual power source).

The saws create clouds of dust when dry-cutting masonry and showers of hot sparks when cutting metal products, especially steel.

These hazards can result in cuts, kickbacks, exposure to carbon monoxide fumes, exposure to dusts (silica from concrete and masonry products in particular), burns, flying particles hitting the eye, and other injuries from flying material when work is not secured for cutting or when blades fly apart.

These hazards can be controlled by:

- Using quick-cut saws properly and wearing the right protective equipment such as eye, hearing, and respiratory protection as well as face shields and gloves
- Securing work to keep it from shifting during cutting
- Being cautious around sharp edges left by cuts
- Keeping saws in good working condition, equipped with proper blades or disks, and used with all guards in place

A cut-off saw that strokes automatically without the operator’s control of each stroke must have a guard to keep the operator’s hands from coming in contact with a blade.

Care

- Quick-cut saws must be serviced and maintained in accordance with the manufacturers’ instructions
- Replacement parts should be those recommended by the manufacturer
- Cracked, broken, or worn parts should be replaced before the saw is used again
- Guards and air-intakes should be cleaned regularly and often
- Abrasive disks should be checked before installation and frequently during use
- Correct any excessive blade vibration before trying to make a cut
- In confined areas, make sure that ventilation is adequate

Safe Quick-Cut Saw Practices

Most of the following procedures are for gasoline-powered quick-cut saws.

Fueling

- Always shut off saw before fueling. Keep fuel container clear of work area
- Use caution when preparing the oil/gasoline mixture and when fueling the saw
- No smoking or ignition sources are allowed in the area where fuel is mixed or tanks are filled
- Fill the tank outdoors in a well ventilated space at least 10 feet from the area where the saw will be used. Spilled fuel should be wiped off the saw
- Avoid fueling the saw on or near formwork
- Don’t overfill the saw or run it without securing the fuel tank cap
- Check the saw for leaks

Starting

- Start the saw in an area clear of people and obstacles
- Put the saw on a smooth hard surface for starting
- Set the guard for the type of cut before starting
- Assume a solid well-balanced stance
- Set one foot on the rear handle
- Put one hand on the top handle to lift the blade off the surface, and use the other hand to pull the starter cord
- Once the saw is running, release the throttle and make sure the engine drops to idle without the disk or blade moving
- Run the engine at full throttle and let the disk or blade run freely to make sure it turns on the arbor without wobbling or vibrating

Operation

One of the major hazards with quick-cut saws is failure to support and secure the work to be cut.

The saw is powerful enough to throw material around unless it is securely held and supported. Standing on material to hold it down is not recommended.

For repeated cuts of masonry or metal pieces, a jig is ideal for efficiency and safety. The jig should be designed and built to hold material in place after measurement without further manual contact.

Stance and Grip

- The quick-cut saw is a heavy, powerful tool that must be held by hand
- Operators need a secure stance with legs apart for balance and support
- Hold the saw at a comfortable, balanced location in front of you
- Grip the saw firmly with one hand on each handle
- Hold your forward arm straight to keep the saw from kicking back or climbing out of the cut

Cutting

- Support the material being cut so that the disk or blade will not bind
- Support heavy materials on both sides of the cut so the cut piece will not drop or roll onto the operator's foot
- Make cuts as close as possible to the supporting surface
- When cutting, keep the throttle wide open. Ease the blade down onto the cut line. Don't drop or jam the blade down hard. Move the saw slowly back and forth in the cut
- Hold the saw so that disk or blade is at right angles to the work and use only the cutting edge of the disk or blade
- Beware of blade run-on. The blade may continue to rotate after the cut and run away with a saw set down too soon
- Don't force the saw to one side of the cut. This will bend the disk or blade and cause it to bind, possibly to break
- Water cooling is recommended for cutting masonry materials
- Keep pressure on the saw reasonably light
- Don't carry the saw any distance with the engine running
- Stop the engine and carry the saw with the muffler away from you

Disks and Blades

Disks and blades for quick-cut saws are available in three basic types:

- Abrasive disks
- Diamond-tipped blades
- Carbide-tipped blades

Use only the disks and blades compatible with the saw and rated for its maximum rpm. Blades or disks may fly apart if their rpm is not matched to saw rpm. If you have any doubts, consult the operating manual or a reputable supplier.

ABRASIVE DISKS – TYPES AND USES

Type	Uses	Materials
Concrete	All-around use, most economical for cutting concrete and masonry. Water-cooling recommended to increase disk life and to reduce dust.	Concrete, stone, masonry products, cast iron, aluminum, copper, brass, cables, hard rubber, plastics
Metal	Primarily for steel, not suited for masonry products. Water-cooling is not recommended with metal abrasive disks	Steel, steel alloys, other hard metals such as cast iron

Diamond Disks and Blades – Types and Uses

Diamond disks are normally used with water-cooling. They are now available for dry cutting, which may be necessary to avoid staining some masonry products.

When dry cutting with a diamond blade, let the blade cool for 10-15 seconds every 40-60 seconds. This can be done simply by pulling the saw out of the cut.

DIAMOND DISKS AND BLADES — TYPES AND USES

Type	Uses	Materials
Diamond Abrasive Disk	Cuts faster than other abrasive disks and creates less dust. Water-cooling is necessary to prevent heat build-up that can make disk disintegrate.	Stone, all masonry and concrete products. Not recommended for metal
Dry-Cut Diamond Blade	Fast cuts, lots of dust, very expensive. Let blade cool for 10-15 seconds every 40-60 seconds. Continuous cutting will damage the blade.	Stone, all masonry and concrete products. Not recommended for metal.

Carbide-Tipped Blades

These blades must be used with care. If a carbide-tipped blade encounters material harder than what it is designed to cut, the tips may fly off.

A carbide-tipped blade used with a quick-cut saw must be designed for that purpose. It must also be used only to cut the materials specified by the manufacturer.

Inspection / Installation

- Inspect disks and blades before installing them
- Make sure that contact surfaces are flat, run true on the arbor, and are free of foreign material
- Check that flanges are the correct size and not warped or sprung
- Check the label to make sure that the disk or blade is approved for use on high-speed quick-cut saws and has a rated rpm suitable to the saw being used
- Inspect the disk or blade for damage. Abrasive disks tapped lightly with a piece of wood should ring true. If the sound is dull or flat, the disk is damaged and should be discarded
- Make sure that diamond or carbide tips are all in place. Do not use diamond or carbide-tipped blades or disks if any tips are missing
- Do not drop abrasive disks. Discard any disk that has been dropped
- Use the proper bushing on the arbor so that the disk runs true on the shaft without wobbling or vibrating
- Discard badly worn disks that are uneven or “out of round”

TRAINING

The company will ensure every employee who uses hand and power tools is provided proper training on those tools before using them on the job. This training will be provided during working hours at no cost to the employee.

Training Components

The company's safety coordinator will ensure every employee will be trained on, and adhere to the requirements of, the following minimum elements:

- Proper storage, maintenance and use of any tool the employee will use in his or her job
- A description and identification of the hazards associated with tools
- The safeguards, including PPE, to protect the employee from tools and the hazards for which they are intended
- How to use tool safeguards and why
- Safety precautions necessary for working with the tool
- How to inspect tools for damage and what to do (e.g., contact the supervisor) if a tool is damaged, missing safeguards or other pieces, or otherwise unable to provide adequate protection
- Limitations of tools being used and the how to select the right tool for the job
- How to replace blades, change accessories, lubricate, charge and other similar activities associated with using power tools
- Where to find the manufacturer's instructions for power tools the employee is expected to use

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

HAND AND POWER TOOLS SAFETY TRAINING

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

(Retain at least 3 years)

SCOPE

OSHA does not have its own heat illness regulation but has interpretations that refer to the General Duty Clause and a technical manual (OTM Sect. III Ch. 4) that has heat illness information and guidelines.

Employers that have work environments with recognizable heat-related hazards can be cited for ignoring a recognized hazard like heat illness. This chapter provides information on Cal/OSHA's heat illness prevention program, which is recognized as an industry standard across the country

POLICY

Operations, indoor and outdoor, that involve working where there are high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities, have a high potential for causing heat-related illness.

This policy is the written plan to establish, implement, and maintain heat illness protection. It will be available at the worksite so that any employee can see it upon request.

This policy has been developed to address these issues. All employees will receive training relating to the causes and effects of, the personal and environmental factors that may lead to, and the prevention measures to fight, heat-related illnesses.

STANDARDS AND REGULATIONS

This company will ensure that all procedures and safe work practices adhere to the following applicable rules and regulations:

- OSHA General Duty Clause, Section 5(a)(1)
- OSHA sanitation regulation CFR 1926.51
- Title 8 of California Code of Regulations Section 3395

RESPONSIBILITIES

Preventing heat-related illness is a cooperative effort between this company and its employees.

This policy incorporates Cal/OSHA's updates of its heat-related illness regulations effective May 1, 2015 and addresses: training, shade, water, preventative breaks, first-aid response, acclimatization, and emergency procedures.

. The following provides appropriate steps for both employers and employees.

General Responsibilities – Employer

It is the responsibility of the company to:

- Conduct a risk assessment for all worksites to identify heat risks and safe work procedures
- Establish and implement safe work practices to lessen the effects of heat stress as much as reasonably practical

- Establish and implement supervisor and employee training so everyone can recognize and respond to heat illness symptoms
- Ensure that all relevant risk factors, health, first aid, and emergency response procedures are communicated to all employees and supervisors
- Adjust work practices as necessary when workers complain of heat illness
- Use engineering controls as the primary means of limiting employees' exposure to high heat conditions wherever possible;
- Oversee heat illness prevention training and acclimatization for new workers and for workers who have been off the job for a while
- Establish and implement emergency communication procedures to ensure quick access to first aid and emergency responders

Employee Responsibilities

Employees are expected to:

- Follow established safe work policy and procedures
- Know about and recognize initial heat illness symptoms in yourself and others
- Know how to appropriately respond to heat illness symptoms
- Participate in all required training
- Find out whether any prescription medications you are required to take can increase the risk of heat illness
- Get adequate rest and sleep
- Drink small amounts of water regularly to maintain fluid levels and avoid dehydration
- Report signs and symptoms of heat-related illness to supervisor immediately

HAZARDS

The body regulates its temperature through sweat and circulating blood to the skin; however, high temperatures and high humidity make this process more difficult. As the body’s ability to cool itself decreases, it must store the excess heat, raising the body’s core temperature. If the body’s temperature becomes too high, it ceases to be able to regulate itself which could result in death.

This company will ensure that all relevant risk factors, health, first aid, and emergency response procedures are communicated to all employees and supervisors. These include, but are not limited to, heat illness prevention (drinking fluids, rest, acclimatization, heat stress factors) and heat illness symptoms; procedures (high heat procedures).

Employees are expected to report symptoms to their supervisor, designated first aid responder, or outside emergency response personnel.

Risk Factors

Many factors determine the total risk a worker faces from excessive heat while at work. At the core of temperature-related risk factors is the basic question of how hot a worker feels. The factors that must be considered when assessing a worker's risk of heat illness include:

- **Temperature -** The apparent temperature can be affected by:
  - The season
  - Reflected heat
  - Heat from equipment
  - Working in direct sunlight

Keeping track of the temperature at the workplace is a critical element of any program to prevent heat-related illness

- **Humidity -** As humidity rises, sweat tends to evaporate less. As a result, body cooling decreases and body temperature increases.
- **Air Movement -** As long as the air temperature is less than the worker's skin temperature, air movement can help workers stay cooler by increasing both the rate of evaporation and the heat exchange between the skin and the air.
- **Job-specific Exertion –** The body generates more heat during heavy physical work. Heavy physical work requires careful evaluation, even at temperatures as low as 75° F, to prevent heat disorders. This is especially true for workers who are not acclimated to the heat
- **Clothing and PPE -** Heat illness can be caused or aggravated by wearing PPE such as fire or chemical retardant clothing. Coated and non-woven materials used in protective garments block the evaporation of sweat and can lead to substantial heat stress. The more or heavier clothing worn, the longer it takes evaporation to cool the skin
- **Time -** Working for long stretches of time and during the heat of the day exposes workers to a higher risk of heat illness. Workers should cycle through light work and heavy work, taking breaks as necessary.

Work According to Level of Exertion	
Light Work	Using a table saw Some walking about Operating a crane, truck, or other vehicle Welding
Moderate Work	Laying brick Walking with moderate lifting or pushing Hammering nails Tying rebar Raking asphalt Sanding drywall
Heavy Work	Carpenter sawing by hand Shoveling dry sand Laying block Ripping out asbestos Scraping asbestos fireproofing material
Very Heavy Work	Shoveling wet sand Lifting heavy objects

Equipment and Processes

Equipment and processes at the work site contribute greatly to the heat stress a worker faces.

Hot engines and work that involves high temperature processes can significantly raise temperature and put workers at risk. Contact with hot surfaces can also present the danger of burns.

Personnel-Specific

It is difficult to predict who will be affected by a heat illness and when, because individual susceptibility varies. There are, however, certain physical conditions that can reduce the body's natural ability to withstand high temperatures.

Age

As the body ages, its sweat glands become less efficient. Workers over the age of 40 may therefore have trouble with hot environments. Acclimatization to the heat and physical fitness can offset some age-related problems.

Weight

Workers who are overweight lose heat less efficiently and are more easily subject to heat-related illness.

Skin Pigmentation

Persons with lighter complexions are at a higher risk of sunburn and heat illnesses than those with higher levels of skin pigmentation, because skin with less pigmentation absorbs approximately 20% more heat.

Fitness

Being physically fit increases your ability to cope with the increased demands that heat places on your body.

Caffeine and Alcohol

Alcohol consumption within 24 hours of work leads to dehydration and increased risk of heat illness. While recent research suggests that caffeine may not be as detrimental to hydration as formerly believed, in large amounts it does act as a diuretic and can contribute to dehydration.

Medical Conditions

In order to pump blood to the skin and cool the body, the heart rate increases. This can cause stress on the heart, which is particularly hazardous to those with heart disease or high blood pressure.

Certain medications may cause heat intolerance by reducing sweating or increasing urination. People who work in a hot environment should consult their physician or pharmacist before working while taking certain medications.

Workers with recent illnesses involving diarrhea, vomiting, or fever have an increased risk of dehydration and heat illnesses because their bodies have lost salt and water.

HEAT ILLNESS HAZARDS

There are varying degrees of heat related illness and all company employees and supervisors will be trained on the symptoms of them and the procedures to follow in case of an emergency.

The effects of heat illnesses can range from mild discomfort to life threatening and consist of the following types. All company employees will be trained to recognize the symptoms of each.

Sunburn

Although sunburn is not classified as a heat illness, it can make it more difficult for the body to release heat in addition to causing pain and discomfort. A severe sunburn can cause blistering and become infected. Sunscreen and appropriate clothing can prevent sunburn.

Heat Rash

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

Workers experiencing heat rash should:

- Try to work in a cooler, less humid environment when possible
- Keep the affected area dry
- Dusting powder may be used to increase comfort

Heat Cramps

Heat cramps usually affect workers who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion.

Workers with heat cramps should:

- Stop all activity, and sit in a cool place
- Drink clear juice or a sports beverage
- Not return to strenuous work for a few hours after the cramps subside because further exertion may lead to heat exhaustion or heat stroke
- Seek medical attention if any of the following apply:
  - The worker has heart problems
  - The worker is on a low-sodium diet
  - The cramps do not subside within one hour

Heat Syncope

Heat syncope is a fainting (syncope) episode or dizziness that usually occurs in a warm environment when the body's blood pressure drops while attempting to dissipate heat. The result is less blood to the brain, causing light-headedness and fainting when a person stands up quickly or stands for a long period. Those who perform strenuous work outside in warm climates are at particular risk.

Workers with heat syncope should:

- Sit or lie down in a cool place when they begin to feel symptoms
- Slowly drink water, clear juice, or a sports beverage

Heat Exhaustion

Heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating. Workers most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.

Heat Stroke

Heat stroke is the most serious heat-related disorder. It occurs when the body becomes unable to control its temperature, the body's temperature rises rapidly, the sweating mechanism fails and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 106 degrees Fahrenheit or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not given.

Take the following steps to treat a worker with heat stroke:

- Call 911 and notify their supervisor
- Move the sick worker to a cool shaded area
- Cool the worker by either:
  - Soaking their clothes with water
  - Spraying, sponging, or showering them with water
  - Fanning their body

HEAT ILLNESS SYMPTOMS

Symptoms of Sunburn

Typically, there is initial redness, followed by varying degrees of pain, depending on the duration and intensity of exposure. Other symptoms can include swelling, itching, peeling skin, rash, nausea, fever, chills and fainting. Sunburns may be first or second degree burns.

Symptoms of heat rash include:

- A red cluster of pimples or small blisters
- More likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases

Symptoms of Heat Cramps Include:

- Muscle pain or spasms usually in the abdomen, arms, or legs
- Severe, sometimes disabling, cramps that typically begin suddenly in the hands, calves, or feet
- Hard, tense muscles

Symptoms of Heat Syncope Include:

- Light-headedness
- Dizziness
- Fainting

Symptoms of Heat Exhaustion Include:

- Heavy sweating and/or cold, clammy skin
- •Excessive thirst
- •Nausea
- Pale or flushed complexion
- Slightly elevated body temperature
- Chills
- High body temperature
- Extreme weakness or fatigue
- Dizziness, confusion, or hallucinations
- Slowed or weakened heartbeat
- Muscle aches and cramps
- Fast and shallow breathing
- Throbbing headache
- Slurred speech

NOTE: Pesticide poisoning has similar symptoms as heat exhaustion.

Symptoms of Heat Stroke Include:

- Nausea and vomiting
- Dizzyness and fainting
- Hot, flushed, dry skin
- Decreased sweating
- Decreased urination
- Increased body temperature (104 to 106ºF)
- Convulsions
- Headache
- Fatigue
- Rapid or slowed heart rate
- Shortness of breath
- Blood or urine in stool
- Confusion, delirium, loss of conciousness

Heat stroke can occur suddenly, without any symptoms of heat exhaustion. If a person is experiencing any symptoms of heat exhaustion or heat stroke, GET MEDICAL CARE IMMEDIATELY. Any delay could be fatal.

Emergency Response

The company will provide emergency medical services as quickly as possible if a worker suffers from heat illness.

All employees may contact 9-1-1 when necessary, but at least one accessible person for each crew will be designated responsible for initiating an emergency response. The emergency response can include immediate first aid, continued monitoring, contacting 9-1-1 and transporting the victim to emergency responders. An appropriately trained and equipped first aid provider at the worksite can decide on the appropriate response. If that person does not exist, then 9-1-1 will be called for any employee showing heat related illness symptoms.

A risk assessment will be conducted for all worksites that consider heat illness a risk factor: if 9-1-1 can be accessed from the worksite, whether the work site is served by the 9-1-1 system, and ensure emergency responders can access any victims. All employees will have access to a map of their location or clear, detailed and precise directions.

Employees and supervisors will know the basic first aid to stop the progression of heat illness.

REQUIREMENTS

Access to Shade

- When the outdoor temperature in the work area is expected to exceed 80 degrees Fahrenheit, the company must provide and maintain one or more shaded areas for employees that are either open to the air or supplied with ventilation or cooling. The amount of shade present must be at least enough to accommodate all of the employees on rest or recovery periods, allowing them to sit in a normal posture, fully in the shade, without being in physical contact with each other. The shaded area will be located as close as practicable to the employees work area
- Shaded areas must also be available during meal periods and be capable of accommodating all employees on meal periods who remain onsite
- When the outdoor temperature in the work area does not exceed 80 degrees, employers will either provide shade or provide timely access to shade if requested by an employee
- Employees will be allowed and encouraged to take a preventative cool-down rest in the shade when they feel the need to do so to protect themselves from overheating. Access to shade must be permitted at all times
- Employees who take a preventative cool-down rest will be:
    - Monitored and asked if they are experiencing any symptoms of heat illness
    - Encouraged to remain in the shade
    - Not ordered back to work until any signs of heat illness have subsided, or for at least five minutes once they have accessed the shade
- Employees who exhibit or report signs or symptoms of heat illness will take a cool-down period and will be provided with the necessary first aid or emergency response

- Exceptions
  - Where the company can demonstrate that it is infeasible or unsafe to have a shade structure, or otherwise to have shade present on a continuous basis, the employer may utilize alternative equivalent procedures for providing access to shade
  - Except for employers in the agricultural industry, cooling measures other than shade (e.g., use of misting machines) may be provided instead of shade if the employer can demonstrate that these measures are at least as effective as shade in allowing employees to cool

High-Heat Procedures

The company will implement high-heat procedures when the temperature equals or exceeds 95 degrees Fahrenheit. These procedures will include the following:

- Observing employees for alertness and signs or symptoms of heat illness by one of the following:
  - Having a supervisor or designated person observe employees for groups of 20 or less
  - Implementing a mandatory buddy system
  - Having regular communication with an employee by radio, phone, or other reliable method
- Authorizing at least one employee at the worksite to summon emergency services if no qualified first aid provider is available
- Reminding employees throughout the work shift to drink plenty of water
- Conducting pre-shift meetings before the start of work to review the high heat procedures with employees, including the need to drink water frequently and the right to take cool-down rests

Potable Water

An adequate supply of potable water will be provided continuously in all places of employment, along with single-service cups (unless the source is a drinking fountain). The water should be kept cool or cold if supplied in a hot environment. Potable water is defined as water that meets the drinking water standards of the state or local authority having jurisdiction, or water that meets the quality standards prescribed by the EPA’s drinking water regulations.

Fluid Intake

In a day's work in the heat, a worker may produce as much as 2 to 3 gallons of sweat. Because so many heat disorders involve excessive dehydration of the body, it’s essential that water intake during the workday be about equal to the amount of sweat produced. Most workers exposed to hot conditions drink less than needed because of an insufficient thirst drive.

A worker, therefore, should not depend on thirst to signal when and how much to drink. Instead, the worker should drink 5 to 7 ounces of fluids every 15 to 20 minutes to replenish the necessary fluids in the body. There is no optimum temperature of drinking water, but most people tend not to drink warm or very cold fluids as readily as they will cool ones. Whatever the temperature of the water, it must be agreeable and readily available to the worker. Individual drinking cups should be provided, unless a drinking fountain is used. OSHA sanitation standards prohibit the use of a common drinking cup.

Heat acclimatized workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average American diet contains sufficient salt for acclimatized workers even when sweat production is high. If, for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. Salt tablets **should not** be used.

Number and Duration of Exposures

Rather than be exposed to heat for extended periods during the course of a job, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work-rest cycles. Work-rest cycles give the body an opportunity to rid itself of excess heat, slow down the production of internal body heat, and provide greater blood flow to the skin.

Workers employed outdoors are especially subject to weather changes. A hot spell or a rise in humidity can create overly stressful conditions. The following practices can help reduce the risk of heat illness:

- Postponement of nonessential tasks
- Permit only those workers acclimatized to heat to perform the more strenuous tasks
- Provide additional workers to perform the tasks keeping in mind that all workers should have the physical capacity to perform the task and that they should be accustomed to the heat

Engineering Controls

A variety of engineering controls can be introduced to minimize exposure to heat. For instance, improving the insulation on a furnace wall can reduce its surface temperature and the temperature of the area around it. In a laundry room, exhaust hoods installed over those sources releasing moisture will lower the humidity in the work area. In general, the simplest and least expensive methods of reducing heat and humidity can be accomplished by:

- Opening windows in hot work areas
- Using fans
- Using other methods of creating airflow such as exhaust ventilation or air blowers

Rest

Providing cool rest areas in hot work environments considerably reduces the stress of working in those environments. There is no conclusive information available on the ideal temperature for a rest area. However, a rest area with a temperature near 76° F appears to be adequate and may even feel chilly to a hot, sweating worker, until acclimated to the cooler environment.

The rest area should be as close to the workplace as possible. Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter but frequent work-rest cycles are the greatest benefit to the worker.

The revised Cal-OSHA heat Illness regulation requires agricultural employers to ensure that employee takes a minimum ten minute net preventative cool-down rest period every two hours when temperatures reach 95 degrees or above.

Acclimatization

A supervisor or designee will closely observe employees who have been newly assigned to a high heat area or job for the first 14 days of the employee's employment

When exposed to heat for a few days, the body will adapt and become more efficient in dealing with raised environmental temperatures. This process is called acclimatization. Acclimatization can take from 4 to 14 days, depending on the individual, of working at least two hours a day in the heat.

Acclimatization may be lost in as little as three days away from work. Employees, and supervisors, who return to work after a holiday or long weekend, need to understand this. Workers should be allowed to re-acclimatize to work conditions gradually.

PROCEDURES

This policy is the written plan to establish, implement and maintain heat illness protection. This policy will also be made available at the worksite so that any employee, who requests to, can see it.

Each worksite will have procedures in place that document how to provide:

- Enough refreshing, pure, and cool drinking water for all employees
- Available shade to encourage preventative cool down rests
- Acclimatization in high heat
- Weather condition monitoring and associated safety precautions
- Adjustments needed in high temperatures
- Training employees and supervisors
- Communicating this policy
- First Aid
- Emergency response
- Specific knowledgeable person(s) designated to implement these procedures

HIGH-HEAT PLANNING

The National Weather Service issues heat-related notifications that can help ensure work planning includes appropriate controls and processes to prevent heat-related illness and treat them as they arise:

Excessive Heat Outlook

Excessive Heat Outlooks are issued when the potential exists for an excessive heat event in the next 3-7 days.

Excessive Heat Watch

Excessive Heat Watches are issued by the National Weather Service when the heat is expected to be in excess of 105º F during the day combined with nighttime low temperatures of 80º F or higher are forecast to occur for two consecutive days.

Excessive Heat Warning and Advisories

Excessive Heat Warning/Advisories are issued within 12 hours of when the heat index is expected to be at least 105° F for more than 3 hours per day for 2 consecutive days, or more than 115° F for any length of time. These notices are issued when an excessive heat event is occurring, is imminent or has a very high probability of occurring. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.

Outdoor Working Procedures

When employees are working outdoors during high heat periods, steps will be taken to limit the effects of heat exposure when temperatures exceed an action level depending on the type of clothing being worn.

All other clothing	89° F
Double-layer woven clothes including coveralls, jackets and sweatshirts	77° F
Non-breathing clothes including vapor barrier clothing or PPE such as chemical resistant suits	52° F

These steps include

- Supplying at least one quart of drinking water per employee per hour throughout the shift
- Encouraging workers to frequently drink water and other hydrating beverages
- Monitoring workers for heat illness symptoms
- Hold pre-shift meeting to remind workers of high heat hazards

Workers with heat related illness symptoms will be relieved from duty and given a way to reduce their body temperature and monitored to determine if they need medical attention.

Workers are considered to be working outdoors when they are outside for more than 15 minutes in an hour. Work environments are considered outdoors when the factors affecting the temperature are not managed by engineering controls (e.g. air conditioning). Some examples include vehicle cabs, sheds, and tents.

Heat Protection

Employees working in areas that present heat hazards should follow these recommendations:

- When working in the heat, clothing should be loose fitting, lighter color to reflect sun, and should contain as much cotton as possible.
- Wear sunscreen
- Wear a hat
- Use UV eye protection (if possible)
- Change out of wet clothing when working in high humidity conditions

PPE

Employees who are required to wear specific types of PPE in high heat environments should consider the use of the following additional equipment:

- Cooling pad inserts for hardhats
- Insulated gloves
- Insulated suits
- Reflective clothing
- Infrared reflecting face shields

For extremely hot conditions, thermally conditioned clothing is available. One such garment carries a self-contained air conditioner in a backpack, while another is connected to a compressed air source that feeds cool air into the jacket or coveralls through a vortex tube. Another type of garment is a plastic jacket that has pockets that can be filled with dry ice or containers of ice.

Employees should discuss these options with their supervisor to determine if the provision of the items by the company is warranted.

BUDDY SYSTEM

A worker may not recognize his own signs and symptoms of heat-related illness. Workers should be encouraged to look after each other to ensure the team stays safe and healthy. A buddy system assigns each worker to one other worker to ensure there is at least one other person monitoring the heat health of every worker.

ACTIONS TO PREVENT HEAT-RELATED ILLNESS BASED ON TEMPERATURE

OSHA-Suggested Heat Index Thresholds		
Temperature	**Risk Level**	**Protective Measures**
<91° F	Lower Caution	Basic heat safety and planning
91° F – 103° F	Moderate	Implement precautions and heighten awareness
103° F – 115° F	High	Additional precautions to protect workers
>115° F	Very high/Extreme	Even more aggressive measures

As temperatures rise, managers and supervisors need to take responsibility for ensuring appropriate procedures are being followed to reduce the ill effects of heat on workers.

Lower Caution

- Adequate drinking water
- Available medical services
- Acclimatize new and returning workers who perform strenuous work
- Check forecast regularly

- Encourage workers to wear sunscreen and use other protections from direct sunlight
- Depending on site conditions, take actions for moderate risk conditions

Moderate Caution

- Follow “Lower Caution” precautions.
- Alert workers to index, identify additional precautions necessary
- Remind workers to drink small amounts of water through the day
- Respond to heat-related illnesses and medical emergencies immediately
- Review heat-related illness symptoms and signs and the established site- specific precautions
- Schedule frequent breaks in cool, shaded areas
- Acclimatize new and returning workers
- Set up a buddy system
- Instruct supervisors to watch workers for signs of heat-related illness

High Caution

- Follow “Moderate” precautions
- Have a knowledgeable person onsite to modify work activities and the work/rest schedule as necessary
- Establish and enforce work/rest schedules
- Adjust work activities
- Take extra precautions for workers in clothing that may add to a heat hazard
- Maintain effective communication with crew

Very High to Extreme

- Follow “High” precautions
- Reschedule non-essential outdoor work
- Move essential outdoor work to coolest part of work shift
- Stop work if necessary

EMERGENCY RESPONSE PROCEDURES

Our company has implemented heat illness emergency response procedures that include:

- Ensuring there is reliable communication method between employees and supervisors and/or emergency services in the event assistance for heat illness is needed
- Responding to the signs and symptoms of heat illness, including the procedures for providing first aid and additional emergency services as needed. These procedures will include:
    - Authorizing qualified supervisors or designated employees to provide first aid and/or contact emergencies services
    - Implement emergency procedures in cases of severe heat illnesses
    - Monitoring any employee displaying the signs and symptoms of heat illness, and not leaving them unattended or releasing them to leave the worksite without offering to provide first aid or emergency services

- Contacting emergency medical services, and/or transporting the employee to a medical provider or facility
- Ensuring that the personnel responsible for contacting emergency services are capable of providing the responders with clear and precise directions to the worksite

TRAINING

We will ensure every employee is provided training on preventing heat-related illness. This training will be provided at no cost to the employee during working hours.

Training will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Elements

Training will be provided to employees and supervisors before being assigned to any outdoor work for the first time and then at least annually on the following topics:

Employee Training Components

The safety coordinator will ensure all employees are trained in the following minimum elements:

- Heat related illness environmental factors
- Personal factors that increase susceptibility (e.g. age, acclimatization, medical conditions, water consumption, alcohol, caffeine, nicotine, and medical conditions)
- The company's heat illness procedures including but not limited to:
  - The company's methods of providing water, shade, cool-down rests and access to first aid
  - The employees right to request heat illness relief without fear of retaliation
- The importance of frequent consumption of small quantities of water, up to four cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties
- The importance of acclimatization (the body's ability to adjust to high temperatures over time), how it is developed, and how worksite procedures address it
- Symptoms of types of heat related illness, and the treatment for them
- The procedures that can be taken to prevent heat-related illness
- The importance of removing heat retaining PPE during breaks
- The importance of immediately reporting to the employer/supervisor, symptoms or signs of heat illness in themselves, or in co-workers
- The danger of rapid progression of heat illness form mild to life threatening
- The employer's procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary
- The employer's procedures for contacting emergency medical services, and if necessary, for transporting employees to an emergency medical service provider
- The employer's procedures for ensuring that, in the event of an emergency, clear and precise directions to the work site will be provided as needed to emergency responders. These procedures must include designating a person to be available to ensure that emergency procedures are initiated when appropriate

Supervisor Training

Supervisor training will cover:

- What employees need to know
- Procedures to implement this program
- Emergency response procedures (e.g. transportation, reaching an emergency medical service provider)

When it's reasonable to expect that workers will be exposed to the risk of heat illness, supervisors will be trained on the following topics before being permitted to supervise those workers.

- The information required to be provided to employees in the section immediately above
- The procedures the supervisor is to follow to implement the applicable provisions in this chapter
- The procedures the supervisor is to follow when an employee exhibits symptoms of possible heat illness, including emergency response procedures
- How to monitor weather reports and how to respond to hot-weather advisories

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

FORMS AND ATTACHMENTS

Please find the following document on the pages below:

- Heat Illness Training Documentation

This form may be reproduced for the purposes of implementing and maintaining a safety and health program.

HEAT ILLNESS TRAINING

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

(Retain at least 3 years)

SCOPE

This chapter provides information on the regulations, requirements and safe practices associated with operating heavy equipment. The policy defined here will comply with OSHA 1926 Subparts O, Motor Vehicles, Mechanized Equipment and Marine Operations, W, Rollover Protection and all other federal, state and/or local regulations.

For the purposes of this document, heavy equipment is defined as all free moving mobile equipment propelled by gasoline, propane, diesel or electricity, however it does not include automobiles and similar motor vehicles used by licensed motor vehicle operators on public roads and highways.

POLICY

This policy applies to excavating, earth moving, paving and logging equipment. It does not cover forklifts, elevating work platforms or cranes, which are addressed in separate chapters.

Only competent personnel may operate heavy equipment/mobile equipment. An individual's competency must be demonstrated by successful completion of the training and evaluation process specified in this policy. This policy establishes requirements to work in or around all types of mobile equipment.

EMPLOYER RESPONSIBILITIES

This Company is responsible for:

- Ensuring each employee is trained in the appropriate skills needed to do his or her job/operate their vehicles and equipment safely
- Ensuring training occurs under people qualified and experienced with the type of equipment used
- Allowing only trained and competent operators to operate heavy equipment
- Ensuring heavy equipment at the worksite has rollover protective structures (ROPS) and seatbelts as required
- Identifying and informing workers of the hazards of power lines and utilities during a storm
- Ensuring efficacy of all safety features on any piece of machinery or equipment onsite
- Establishing limited access zones to keep workers away from heavy machinery
- Obtaining all required permits for the use of heavy equipment, when necessary

EMPLOYEE RESPONSIBILITIES

Heavy equipment operators are expected to:

- Review all safe operating procedures in the operator's manual before working with a new piece of equipment
- Inspect equipment daily
- Maintain all walking and working surfaces free of grease and fluids
- Keep equipment away from unstable soil, steep grades or embankments to prevent rollovers
- Avoid heavy equipment without rollover protective structures (ROPS)

- Always put the transmission in park, shut off the motor, set the brakes, and perform any other needed shutdown procedures/lockout of controls and/or attachments before working on or around the equipment
- Ensure no one is behind the vehicle before backing up
- Keep unauthorized personnel and vehicles safe with barriers
- Ensure only essential workers are anywhere near the equipment
- Keep coworkers off equipment and out from under suspended loads
- Drive equipment safely

SAFE PRACTICES

All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, will have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.

A safety tire rack, cage or equivalent protection will be provided and used when inflating, mounting, dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

Heavy machinery, equipment, or parts thereof, which are suspended or held aloft by use of slings, hoists, or jacks will be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them. Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment, must be either fully lowered or blocked when being repaired or not in use. All controls must be in a neutral position, with the motors stopped and brakes set, unless work being performed requires otherwise.

Whenever the equipment is parked, the parking brake must be set. Equipment parked on inclines will have the wheels chocked and the parking brake set.

The use, care and charging of all batteries will meet OSHA requirements.

All cab glass (if present) will be safety glass, or equivalent, that introduces no visible distortion affecting the safe operation of any machine.

Working Near Power Lines

All equipment covered under this policy will comply with the following requirements when being moved near power lines or energized transmitters.

- For lines rated 50 kV or below, minimum clearance between the lines and any part of the equipment is 10 feet
- For lines rated over 50 kV, minimum clearance between the lines and any part of the equipment will be 10 feet plus 0.4 inch for each 1 kV over 50 kV, or twice the length of the line insulator, but never less than 10 feet
- In transit with no load and all attachment or dump beds lowered, the equipment clearance will be a minimum of 4 feet for voltages less than 50 kV, and 10 feet for voltages over 50 kV, up to and including 345 kV, and 16 feet for voltages up to and including 750 kV
- A spotter will be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means

- Any overhead wire will be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate it is not energized, and it has been visibly grounded
- Before working near transmitting towers where an electrical charge can be induced in the equipment or materials being handled, the transmitter must be de-energized or tests made to determine if electrical charge is induced on the equipment. The following precautions will be taken when necessary to dissipate induced voltages:
  - The equipment will be provided with an electrical ground
  - Ground jumper cables will be attached to materials being handled when an electrical charge is induced while working near energized transmitters. Crews will be provided with nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load
- Combustible and flammable materials will be removed from the immediate area before operations

Exception: These requirements don't apply if the electrical distribution and transmission lines have been de-energized and visibly grounded at point of work or where insulating barriers, which are not a part of (or an attachment to) the equipment or machinery, have been erected to prevent physical contact with the lines:

MOTOR VEHICLES

Motor vehicles as covered by this section are those vehicles that operate within an off-highway jobsite, not open to public traffic. The requirements of this section do not apply to equipment that is covered later in this chapter.

- All vehicles will have a service brake system, an emergency brake system and a parking brake system. These systems may use common components, and must be kept in good working condition
- Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use will be equipped with at least two headlights and two taillights in operable condition
- All vehicles, or combination of vehicles, will have brake lights in operable condition regardless of light conditions
- All vehicles will be equipped with an adequate audible warning device at the operator's station and in an operable condition
- All vehicles with cabs will be equipped with windshields and powered wipers. Cracked and broken glass will be replaced. Vehicles operating in areas or under conditions that cause fogging or frosting of the windshields will be equipped with operable defogging or defrosting devices
- All haulage vehicles, whose payload is loaded by means of power shovels, loaders or similar equipment, must have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials
- Tools and material must be secured to prevent movement when transported in the same compartment with employees

- Vehicles used to transport employees will have seats firmly secured and adequate for the number of employees to be carried
- Seat belts and anchorages meeting the DOT requirements are required on all motor vehicles
- Trucks with dump bodies must have a positive means of support, be permanently attached, and be capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done
- Operating levers controlling hoisting or dumping devices on haulage bodies will be equipped with a latch or other device that will prevent accidental starting or tripping of the mechanism
- Trip handles for tailgates of dump trucks will be so arranged that, in dumping, the operator will be in the clear
- Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders

Correct all defects corrected before placing the vehicle in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, etc., where such equipment is necessary.

All vehicles in use will be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use:

- Service brakes, including trailer brake connections
- Parking system (hand brake)
- Steering mechanism
- Emergency stopping system (brakes)
- Tires
- Horn
- Coupling devices
- Seat belts
- Operating controls
- Safety devices

EARTHMOVING EQUIPMENT

The rules under this heading apply to these types of earthmoving equipment:

- Scrapers
- Crawler or wheel tractors
- Agriculture
- Off-highway trucks
- Loaders
- Graders
- Bulldozers
- Similar equipment

Seat Belts

Earthmoving equipment, unless designed only for standup operation or it has no roll-over protection structure, must have seatbelts that meet Society of Automotive Engineers (SAE) specifications

Access Roadways and Grades

Any access road or grade must be constructed and maintained to accommodate construction equipment or vehicles permitted upon them.

Emergency access ramps and berms must restrain and control runaway vehicles.

Brakes

Earthmoving equipment must have a breaking system capable of stopping and holding the equipment, as specified by the appropriate SAE standard.

Fenders

Pneumatic-tired earth-moving haulage equipment, whose maximum speed exceeds 15 miles per hour, will be equipped with fenders on all wheels to meet the requirements of SAE J321a, Fenders for Pneumatic-Tired Earthmoving Haulage Equipment.

Audible Alarms

Bidirectional machines, such as rollers, compacters, front-end loaders, bulldozers and similar equipment, will be equipped with a horn, distinguishable from the surrounding noise level, which will be operated as needed, when the machine is moving in either direction. The horn must be kept in operating condition.

Earthmoving or compacting equipment with an obstructed view to the rear may not be used in reverse gear unless the equipment has in operation a reverse signal alarm distinguishable from the surrounding noise level or an employee signals that it is safe to do so.

Scissor Points

Scissor points on all front-end loaders are a hazard to the operator during normal operation and must be guarded.

Excavating and Other Equipment

Tractors must have seatbelts for operators when seated in the normal seating arrangement for tractor operation, regardless of whether they are being used with attachments for excavating.

OPERATING IN REVERSE

The following applies to all general industry and construction industry vehicles, machinery, or equipment capable of operating in reverse, and with an obstructed view to the rear (which may be caused by the vehicle itself, its load, its height, damage to windows/mirrors, weather conditions, or work done after dark in insufficient lighting.

An employer must not use any motor vehicle equipment having an obstructed view to the rear unless:

- The vehicle has a reverse signal alarm audible above the surrounding noise level
- The vehicle is operated in reverse only when a designated observer/ground guide signals that it is safe to do so

- Before operating the covered vehicle in reverse, the driver visually determines that no person is in the path of the vehicle
  - If a vehicle's reverse signal alarm is defective, the vehicle must either: be operated in reverse only when a designated observer or ground guide signals that it is safe to do so; or, be removed from service until the reverse signal alarm is repaired
  - A vehicle with operable video or similar technology that provides the driver with a full view behind the vehicle is exempt from this section

Reverse Signaling Operation Activities

While an employee is functioning as the designated observer/ground guide during reverse signaling activities (e.g., giving verbal instructions to drivers, signaling to drivers once reverse operation of the covered vehicle has begun, collecting tickets, etc.), the designated observer/ground guide must:

- Not engage in any activities other than those related to the vehicle being signaled
- Not use personal cell phones, personal head phones, or similar items that could pose a distraction for the designated observer/ground guide
- Be provided with and wear, during daytime operations, a safety vest or jacket in orange, yellow, strong yellow/green or fluorescent versions of these colors
- Be provided with and wear, during nighttime operations, a safety vest or jacket with retroreflective material in orange, yellow, white, silver, strong yellow/green or a fluorescent version of these colors
- Be visible at a minimum distance of 1,000 feet
- Not cross behind, in close proximity to a covered vehicle, while it is operating in reverse
- Always maintain visual contact with the driver of the covered vehicle while it is operating in reverse (if visual contact is lost, the driver must immediately stop the vehicle until visual contact is regained and a positive indication is received from the designated observer/ground guide to restart reverse operations)
- Maintain a safe working distance from the covered vehicle

PILE DRIVING EQUIPMENT

- Boilers and piping systems that are a part of, or used with, pile driving equipment must meet the applicable requirements of the American Society of Mechanical Engineers, Power Boilers
- Pressure vessels part of, or used with, pile driving equipment must meet applicable requirements of the American Society of Mechanical Engineers
- Overhead protection, which will not obscure the vision of the operator and which meets OSHA requirements, must be provided. Protection will be the equivalent of 2-inch planking or other solid material of equivalent strength
- Stop blocks must be provided for the leads to prevent the hammer from being raised against the head block
- A blocking device, capable of safely supporting the weight of the hammer, will be provided for placement in the leads under the hammer at all times while employees are working under the hammer

- Provide guards across the top of the head block to prevent the cable from jumping out of the sheaves
- When the leads must be inclined in the driving of batter piles, provisions must be made to stabilize the leads
- Fixed leads must have a ladder, and adequate rings, or similar attachment points, so the loft worker may engage his safety belt lanyard to the leads. If the leads are provided with loft platforms(s), protect such platform(s) by standard guardrails
- Steam hoses leading to a steam hammer or jet pipe must be securely attached to the hammer with at least ¼-inch diameter chain or cable to prevent whipping if the joint at the hammer breaks. Air hammer hoses must have the same protection as required for steam lines
- Safety chains, or equivalent means, are required for each hose connection to prevent the line from thrashing around in case the coupling becomes disconnected
- Steam line controls will consist of two shutoff valves, one of which will be a quick-acting lever type within easy reach of the hammer operator
- Guys, outriggers, thrustouts or counterbalances will be provided as necessary to maintain stability of pile driver rigs

Equipment

- Engineers and winchmen will accept signals only from the designated signalmen
- All employees must keep clear when piling is being hoisted into the leads
- When piles are being driven in an excavated pit, the walls of the pit must be sloped to the angle of repose or sheet-piled and braced
- When steel tube piles are being “blown out”, employees must be kept well beyond the range of falling materials
- When it’s necessary to cut off the tops of driven piles, pile driving operations will be suspended unless the cutting operations are located at least twice the length of the longest pile from the driver
- When driving jacked piles, all access pits must have ladders and bulkheaded curbs to prevent material from falling into the pit

SITE CLEARING

Protect employees engaged in site clearing from hazards of irritant and toxic plants and ensure each is suitably instructed in the first aid treatment available.

All equipment used in site clearing operations will be equipped with rollover guards meeting OSHA requirements.

Rider-operated equipment will be equipped with an overhead and rear canopy guard meeting the following requirements:

The overhead covering on this canopy structure will be ⅛-inch or greater steel plate or ¼-inch woven wire mesh with openings no greater than 1 inch, or equivalent.

The opening in the rear of the canopy structure must be covered with not less than ¼-inch woven wire mesh with openings no greater than 1 inch.

TRAINING

The Company will ensure that every Company driver and every designated observer/ground guide is trained in the requirements of this section. Re-training must take place if an employee is observed to be in violation of the requirements of this chapter, if an accident or near miss occurs, or if employees are not operating in a safe manner.

Additionally, we will only use training material that is appropriate in content and vocabulary to educational level, literacy and language of employees.

Implementation

Trainees may operate heavy equipment only:

- Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence
- Where such operation does not endanger the trainee or other employees

Training will consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee), and evaluation of the operator's performance on the job-site.

All operator training and evaluation will be conducted by persons who have the knowledge, training and experience to train heavy equipment operators and evaluate their competence.

Training Components

The Company's safety coordinator will ensure that every employee will be trained in the following minimum elements:

Equipment-Related Topics

- The equipment's safe operations and limitations
- Operating instructions, warnings, and precautions for the types of equipment the operator will be authorized to operate
- Differences between the equipment and an automobile
- Equipment controls and instrumentation: where they are located, what they do, and how they work
- Engine or motor operation
- Steering and maneuvering
- Visibility (including restrictions due to loading)
- Implement and attachment adaptation, operation, and use limitations
- Equipment capacity
- Vehicle stability
- Any equipment inspection and maintenance that the operator will be required to perform
- Refueling and/or charging and recharging of batteries
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of equipment that the employee is being trained to operate

Workplace-Related Topics

- Surface conditions and special hazards where the equipment will be operated
- Composition of loads to be carried and load stability
- Load maneuvering, loading, and unloading. (Includes trucks, hoppers, etc.)
- Pedestrian traffic in areas where the equipment will be operated
- Confined areas and other restricted places where equipment will be operated
- Hazardous (classified) locations where the equipment will be operated
- Ramps and other sloped surfaces that could affect the vehicle's stability
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause buildup of carbon monoxide or diesel exhaust
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation

Duplicative Training

If an operator has previously received training in a topic specified in this section, and such training is appropriate to the equipment and working conditions encountered, additional training in that topic is not required if the operator has been evaluated and found competent to operate the equipment safely.

Training Records

Training records will be kept for each employee to certify each operator has been trained and evaluated and will include the following information:

- The dates of the training sessions and evaluation
- A written description of the training program
- The names and qualifications of persons conducting the training or evaluation
- The names and job titles of all persons attending the training sessions
- Where the employee received safety training

FORMS AND ATTACHMENTS

On the following pages, please find the following document:

- Heavy Equipment Checklist

This form may be reproduced freely for the purposes of implementing and maintaining a safety and health program.

HEAVY EQUIPMENT SAFETY CHECKLIST INSPECT DAILY AND BEFORE USE ONSITE

Date		Time	☐ am ☐ pm	Equipment Type	
Location				Inspector	

Item	Good	Need Repair	N/A	Item	Good	Need Repair	N/A
Tires/Tracks				Blade/ Boom/ Ripper condition			
Hydraulic Oil				Exhaust system			
Hose Condition				Transmission fluid			
Oil leak/lube				Brake fluid			
Cab, mirrors, seat belt and glass				Cooling system fluid			
Horn				Windshield wipers and fluid			
Gauges				Coupling devices and connectors			
Lights				Fan belts/ hoses			
Turn signals				Cables / lines / etc.			
Backup lights and alarm				Notes			
Brakes							
Fire extinguisher							
Engine oil							

SCOPE

This chapter contains information on the hazard associated with highway and roadwork and the safe practices to use to avoid them.

POLICY

This policy for the prevention of employee exposure to hazardous Highway and Roadwork conditions is adopted in accordance with OSHA and MUTCD regulations.

This Company has implemented this plan to ensure that employees are aware how to avoid injury and illness in the workplace. The Company Safety Coordinator is the administrator of the Highway and roadwork safety policy and will be responsible for maintaining medical records, verifying training, and overall supervision of the company program.

Compliance with this plan is a condition of employment. The safety measures described in this policy reflect safe work practices for reducing highway work zone injuries and illness.

REFERENCES

OSHA construction industry regulations (29 CFR 1926, Subpart O) address operation of vehicles and equipment within an off-highway job site not open to public traffic. However, Subpart O is not exhaustive in its coverage of machinery types or safety equipment, nor does it address work practices, traffic control plans, or shift work. Flagging and signaling practices are discussed in general terms in Subpart G, which covers signs, signals and barricades. Subpart G defers to MUTCD on matters relating to hand signals, barricades and traffic control devices.

EMPLOYER RESPONSIBILITIES

The Company will be responsible for providing:

- All Company procedures and safe practices
- Initial and refresher training
- All necessary PPE

EMPLOYEE RESPONSIBILITIES

All employees will:

- Follow all Company procedures and safe practices
- Use and maintain their required PPE
- Report all injuries, unsafe conditions or acts immediately

Failure to comply with company policies and safe practices may result in disciplinary action, up to and including termination.

HAZARDS

Highway and roadwork personnel can be exposed to the risk of injury from:

- Being struck by construction equipment or vehicles or the motoring public traveling through work zones

- Noise work being performed and/or the equipment being used
- Being caught in equipment
- Being crushed by equipment roll-overs
- Being engulfed in an excavation (if being performed)
- Electrocution
- Respiratory injury from exposure to silica, asphalt or toxic metals found in paints on bridge renovation
- Strain and sprains from working in awkward positions or improper lifting
- Falls
- Chemical burns or dermatitis from concrete work
- Exposure to extreme weather
- Exposure to dangerous plants and animals

Compliance with OSHA and the MUTCD regulations is a necessary first step in providing a safe work environment. However, these sources, taken together, do not provide comprehensive guidance to ensure worker safety in highway work zones. To identify gaps in standards and regulations, the following work-zone conditions must be considered:

- Safety of all workers on foot around traffic vehicles
- Safe operation of construction vehicles and equipment in highway work zones
- Planning for safe operations within work zones
- Special safety issues associated with night work in highway construction

PPE

This company will provide all necessary Protective Equipment (PPE) to our employees.

Workers must wear the following PPE when required:

- Respiratory, eye, face, and hearing protection
- Head, hand and foot protection
- Proper class of safety vest at all times in the work zone
- High-visibility clothing and headgear. Bright-colored hard hats are more visible

HAZARD PREVENTION

To prevent these problems the company and its employees will use the follow procedures whenever practical.

Exposure to Equipment and Vehicle Traffic

This Company has assigned the Safety Coordinator as “The Traffic Control Supervisor.” The Safety Coordinator is knowledgeable in traffic control principles and is responsible for establishing a safety work zone.

The traffic control supervisor will:

- Ensure that the work zone is set up in accordance with the MUTCD
- Include employees in the walk- or drive-through as a training tool, and to emphasize that safety is a continuous priority

- Authorize the job supervisor to temporarily halt work until unsafe conditions related to temporary traffic control have been eliminated
- Document work zone setup and changes throughout the course of the project

When possible, the traffic control supervisor will close the road completely and reroute traffic. On interstate and similar roadway systems, worker exposure to traffic hazards will be minimized by forcing traffic moving in both directions onto one side of the road and completely closing off the work zone.

To reduce worker exposure to injury to the extent possible, the traffic control supervisor will use positive protective barriers to shield workers from intrusions by traffic vehicles.

Where installation of temporary traffic barriers is impractical or creates a greater hazard, channelizing devices such as traffic cones and barrels will be installed to delineate the work zone. Additional measures such as sensors, handheld radios and intrusion alarms may be implemented, but will not relied on as a primary protection against injury.

Use of Temporary Traffic Control Devices

When feasible, the traffic control supervisor will:

- Use temporary traffic control devices, such as signage, warning devices, paddles and concrete barriers, in a consistent manner throughout the work zone
- Set up temporary traffic control before beginning construction
- Provide flaggers with devices to increase their visibility to passing motorists and construction vehicles
- Keep channelizing devices clean and properly maintained to preserve their reflective intensity and visibility
- Ensure that all traffic control devices are operating properly and in place at all times
- For night work:
    - Reduce spacing between channelizing devices to compensate for reduced driver visibility
    - Ensure arrow panels are set at nighttime levels; daytime settings used at night produce blinding light
    - Increase the size of traffic control devices, reflective material and lettering to improve driver recognition

Motorist Education and Speed Enforcement

The traffic control supervisor is responsible for:

- Giving motorists plenty of advance warning of upcoming work zones
- Ensuring that motorists have real-time information in signage and in traveler’s advisory radio broadcasts
- Installing warning signs that provide estimated time of delay and other road closure information so that drivers have sufficient opportunity to exit and take a different route
- Keeping warning sign messages simple and brief
- Covering or taking down warning signs when workers are not present
- Removing channelizing devices when they are no longer needed
- Restoring normal speed limits when work is no longer in progress, when workers are no longer at the job site or when hazards have been removed or protected

- Use an advance media campaign to advise the public of upcoming roadwork
- Where possible, implement alternative speed control measures in the work zone:
  - Videotape speeding motorists to provide an incentive to slow down through the work zone
  - Use pace vehicles to pull into lanes and slow traffic
  - Increase presence of law enforcement at the beginning of the work zone
  - Use a variety of speed control methods throughout the course of a project so motorists don't learn how to anticipate and avoid speed controls
  - Use a law enforcement officer who is trained in work zone traffic control as a flagger in work zones where speed control is needed
  - Ensure that officers are trained in work-zone traffic control procedures and know the MUTCD
  - Ensure that officers working temporary traffic control are protected from work zone hazards

Workers who are responsible for traffic control work should:

- Wear a high visibility vest to be easily seen
- Place, relocate or remove TCDs when traffic flow is light
- When possible, work from platform on vehicle
- Use seat, seatbelt, fall restraint, or guardrail and a handhold when guardrail must be removed
- Stay in constant communication with driver
- Use shadow vehicle to warn drivers

Flaggers

Where required, the traffic control supervisor will:

- Assign flaggers to monitor operations in their immediate work area
- Authorize flaggers to halt operations in the event a hazard arises and the traffic control supervisor is not in the immediate area
- In the event multiple flaggers are required, ensure they have the appropriate sight distance or two-way radios to communicate effectively
- Avoid using flaggers whenever possible. Use alternative traffic management systems such as lane shifts, portable traffic signals, or remote signaling devices operated by workers away from the flow of traffic
- Use alternatives to flaggers when traffic control is required under hazardous conditions such as high traffic speeds, inclement weather, night work and other conditions that limit visibility

Noise Exposure

Many noise sources are common in roadwork

Some of the most common sources are:

- Heavy equipment
- Compressors
- Traffic
- Pile driving
- Pavement breakers

Effort should be made to make the jobsite less noisy. Noise levels can be reduced by:

- Buying or renting quieter equipment
- Keeping equipment well maintained

- Move noisy equipment away
- Erect sound barriers around equipment

Struck or Crushed

Tools and materials are two major hazards that cause road workers to be struck or crushed. To avoid injury employees should

To avoid being struck or crushed by materials:

- Keep workers out of lifting areas and from beneath loads
- Use safe methods for rigging, hoisting, and setting
- Use PPE - hard hats, footwear, eye protection
- Use lockout/tagout procedures for hazardous energy control during maintenance, repair, cleaning and inspection.

Runovers/Backovers

Being struck by equipment or vehicles is the biggest danger for workers on foot. These employees should stay alert at all times, check surroundings often, listen for warnings and keep a safe distance from traffic.

Engulfment

If excavation work is being performed at the jobsite, there's a hazard of employees becoming trapped by a trench collapse. Proper excavation work requires using the proper equipment and processes to prevent cave-ins.

Electrocution

Encountering electricity on the worksite can be hazardous. When electrical utilities are encountered on the worksite. Before digging:

- Call electrical, gas, and communications utilities
- Carefully review marked out areas, as they may not be exact. Hand-dig after getting within two feet of mark-out

When digging, look for:

- Signs of previous digging:
  - Changes in soil types
  - Asphalt patches or depressions
  - Concrete, plastic, or gravel
- If a line is hit, it must be immediately reported
- If it is a gas line, evacuate and secure area, then call the fire department

Respiratory Hazards

A variety of materials at jobsites can present respiratory hazards such as silica, asphalt and lead.

Silica

Silica is commonly found in construction materials and can be very harmful. Silica dust hazards include:

- High exposure tasks include sand blasting, rock drilling and concrete cutting
- Long-term exposure leads to lung disease (silicosis)
- Long-term exposure increases the risk of cancer

Asphalt

The fumes generated by asphalt work can pose long-term respiratory problems.

Lead

Lead is harmful and may damage nervous and reproductive systems. To prevent lead poisoning:

Strains and Sprains

Common strain and sprain injuries in Roadwork include:

- Hand and wrist problems
- Back injuries
- Strains, sprains, and overexertion

These injuries may be caused by:

- Working in awkward postures, such as raking asphalt
- Handling heavy materials, like in concrete formwork
- Using vibrating tools, like a pavement breaker
- Repetitive work, like rebar tying and operating a joystick
- Whole body vibration for equipment operators

Fall Hazards

Most of the injuries in roadwork are slips or trips on the same level, and are caused by.

- Tripping over materials or debris
- Falling on hills or embankments
- Stepping in holes or walking on irregular ground
- Stumbling while carrying loads that block vision
- Slips or trips in muddy, wet, or icy conditions

Falls from heights can also occur and are caused by:

- Falls from equipment
- Falls from formwork
- Falls from bridges
- Falls into excavations

Chemical Burns & Dermatitis

Chemical burns and dermatitis in construction is most often cause be concrete work, but can also occur by exposure to solvents, degreaser and cleaners. The company must provide employees with the necessary PPE, and make sure they have access to, and understand, the SDS for any chemicals they will be working with.

Working in extreme heat or cold presents a number of health hazards.

Heat Stress

Hot weather is hazardous and can lead to heat stress, heat exhaustion or heat stroke. Heat illnesses can be caused by a combination of:

- Heat exposure
- High humidity
- Non-breathing synthetic clothing
- Not drinking enough fluids to replace sweat
- Hard work, body heat, and not being "acclimatized"

Cold Stress

Cold weather is hazardous and can lead to hypothermia and frostbite. Employees will avoid cold stress hazards by:

- Wearing warm layers of correct clothing, head cover, warm gloves and wool socks
- Keeping dry
- Taking breaks in warm areas and drinking hot liquids
- Keep in good physical condition

Environmental Factors

Plants and animals can be hazardous and can cause rashes, illness and even death.

Outdoor work may expose you to bites from animals and insects skin problems from plants such as poison ivy, poison oak and hogweed.

To prevent these problems:

- Avoid contact with any animals
- Learn to recognize and avoid poisonous plants
- Wear long-sleeved shirts and pants, use insect repellants
- Check for tick bites each day for Lyme disease (red bull’s-eye)
- Get prompt medical/first aid treatment for any problems

SAFE PRACTICES

To protect employees, this company has established the following safe practices. All employees are required to use the practices to prevent injury or illness.

Traffic Safety

Protecting employees from traffic hazards requires the implementation of a traffic control plan. The traffic control supervisor is responsible for ensuring all highway and roadwork personnel are protected from the hazards of their jobs. The supervisor will design a safe work zone that may include the use of temporary traffic control devices and/or flaggers to control traffic patterns through the work zone.

Flaggers

The company will ensure that all flaggers:

- Have been properly trained on the safe practices of performing their job
- Wear the approved high visibility apparel for the work being performed
- Use the proper signaling devices for their work conditions

Noise

When working in a noisy work zone employees will wear the necessary hearing protection. If you have to shout to talk with someone 3 feet away, you need protection from noise. Employees will:

- Use hearing protectors provided by the Company
- Notify your supervisor if proper hearing protection is not available
- Make sure hearing protection fits and is comfortable
- Follow instructions for proper hearing protection use
- Get a hearing test about once a year to ensure your hearing protection works

Struck or Crushed

Highway and roadwork employees can be struck or crushed by tools or materials on the job. To avoid injury employees will use the following safe practices.

To avoid being struck by tools:

- Use point of operation guarding on portable hand tools
- Use a chain saw safety program
- Always use the appropriate PPE

To avoid being struck or crushed by materials:

- Keep workers out of lifting areas and from beneath loads
- Use safe methods for rigging, hoisting, and setting:
  - Steel plates
  - Manhole frames
  - Jersey barriers
  - Manhole covers
- Use PPE - hard hats, footwear, eye protection

Employees can also be injured when performing tree trimming and equipment maintenance.

To avoid being injured during these tasks:

- Restrict access during felling, trimming and loading
- Use protective structures on equipment
- Use safe hoisting and rigging for logs and limbs
- To avoid being struck by equipment parts:
  - Use Lockout/Tagout procedures for hazardous energy control during maintenance, repair, cleaning and inspection

Runovers/ Backovers

Being struck by equipment or vehicles is the biggest danger for roadwork workers on foot. These employees must:

- Remain alert at all times
- Check surroundings often, listen for warnings
- Keep a safe distance from traffic
- Stay behind protective barriers where possible
- Look out for each other, warn co-workers
- While on Roadwork sites, treat equipment and vehicles with caution

When working around equipment and vehicle operations:

- Stay out of "blind spots"
- Communicate with operators by radio signals and/or eye contact
- Do not approach until you communicate with and are acknowledged by the operator
- Stay outside a "safety circle" around equipment
- Stay clear of vehicles and know the traffic control plan
- Use spotters when you must work with your back to equipment or traffic

Engulfment

At jobsites where excavation work is being performed, the following steps will be taken before digging begins:

- Ensure that underground utilities are properly located and marked
- Call electrical, gas, and communications utilities
- Use extreme caution with digging equipment
- Determine the type of cave-in prevention required. This can include:
    - Sloping: Soil angled to increase stability
    - Benching: Steps in trench wall
    - Shoring: Support system made of posts, wales, struts, and sheeting or hydraulic shoring
    - Shielding: Protective frame or box to protect workers after a cave-in
    - Keeping spoil piles at least two feet away from trench edge

Trenching and excavation operations require that a designated “Competent Person” be on the jobsite. The Competent Person must inspect trenches:

- At least daily and at the beginning of each shift
- After precipitation, a thaw, and other events that could increase hazard
- For disturbed ground, water, toxics, and other hazards
- If walls sag or crack or the bottom bulges
- To keep spoil piles and equipment at least two feet from the trench edge
- If there are nearby sources of vibration such as railroads or pile driving
- That no worker is more than 25 feet from an exit

The designated Competent Person should immediately stop work if a hazard exists.

Electrocution

Work around electricity only if you have a reason to be there and you have been trained in all aspects of the job. Use extreme caution and keep your distance when working in the proximity of above ground utilities.

When working around power lines:

- Get the utility company to mark, flag and shield lines
- Assume it is live until tested. Have it de-energized and visibly grounded
- If it must remain energized, keep equipment and load at least 10 feet away and use a spotter to warn the operator
- Post signs at ground level to mark safe distance
- All workers and drivers who enter the area must be aware of the overhead lines

Tips for vehicle or equipment operators working around overhead lines:

- Mark a safe route for repeated travel
- Slow down

If contact occurs, do not touch equipment or the person making contact. If you are on the ground, stay away from the vehicle! Until lines are de-energized, the operator may be safest in machine.

- Do not touch any equipment or person in contact with the line
- Get the lines de-energized

If you are in the vehicle:

- Stay in the vehicle and do not touch any metal
- If you must get out, jump clear, then move slowly away

Accidental contact with buried utilities can cause explosion, fire and electrocution.

Before digging:

- Call electrical, gas, and communications utilities
- Carefully review marked out areas, as they may not be exact. Hand-dig after getting within two feet of mark-out

When digging, look for:

- Signs of previous digging:
  - Changes in soil types
  - Asphalt patches or depressions
  - Concrete, plastic, or gravel
- If a line is hit, it must be immediately reported
- If it is a gas line, evacuate and secure area, then call the fire department

Respiratory

Highway and roadwork can present respiratory hazards from exposure to substances such as silica, asphalt fumes and lead. For that reason, employees who are at risk will:

- Reduce airborne dust through ventilation and wetting
- Use NIOSH-approved toxic dust respirators
- Work upwind whenever possible
- Maintain a lower temperature to minimize asphalt fumes
- Use ventilation on paving machines
- Wear gloves and long sleeves to prevent skin contact

Exposure to lead can occur during welding, cutting and bridge renovation. To prevent lead exposure employees will:

- Remove paint before cutting or welding
- Use long-handled torches for cutting
- Use local exhaust ventilation
- Wear the proper respirator
- Wash face and hands before eating, smoking or drinking
- When possible, shower and change clothes before leaving work
- Get your blood lead tested periodically to assure you are not overexposed

Other respiratory hazards come from exposure to solvents and carbon monoxide. To avoid these hazards employees will:

- Review the product Safety Data Sheets (SDS)
- Limit exposure as much as possible
- Stay upwind of hazardous exposures
- Make sure that hazard controls such as fans are working
- Wear protective equipment such as respirators and skin coverings
- Promptly report any health complaints to your supervisor

Strains and Sprains

Strains and sprains can be avoided by figuring ways of doing the job differently.

To prevent injuries employees will:

- Plan and maintain a clear, level walking path
- Do not lift too much by yourself. Find some help
- Minimize manual materials handling with dollies, hoists, and other equipment
- Storage of materials for easy access
- Use tools that are comfortable and easy to handle
- Use proper lifting technique; lift with your legs and not your back
- Avoid working in awkward postures
- Do stretching exercises before work
- Maintain good physical condition in order to do the work that may be required

Falls

Slips, trips and falls are the most common injuries in the workplace. Most of the injuries in roadwork are due to slips or trips on the same level, however, falls from heights can also occur. To prevent these injuries employees will:

- If possible, avoid walking on muddy, wet, or icy surfaces
- Use footwear with ankle support and soles that grip
- Do not carry heavy loads, use hauling equipment
- Practice good housekeeping
- Fill in or mark hidden holes in ground
- Clear walking/working surfaces of tripping hazards
- Include walking routes in site safety plan
- Maintain good physical strength and conditioning

When working at heights or elevations falls can occur from:

- Equipment
- Formwork
- Bridges
- Excavation edges

To avoid falls from heights or elevations, employees will:

- Make sure guardrails are in place around large excavations
- Use seatbelts or restraints for riding in cars, trucks and personnel carriers
- Use modular erection to avoid work at heights on forms
- Use 3-point contact when climbing

Chemical Burns and Dermatitis

Most chemical injuries in highway and roadwork are caused by working with concrete. Wet concrete is harmful because it can cause dermatitis and skin burns. Other chemicals such a solvents and cleaners can cause injuries, and employees will prevent dermatitis and burns by:

- Wearing long-sleeved gloves
- Keeping concrete out of your boots
- Washing out or changing gloves or boots when contaminated inside
- Washing hands in clean water with pH-neutral soap
- Protecting cuts with bandages
- Wearing eye protection

Extreme Weather

Working outdoors in extreme heat or cold can result in injury or illness.

To protect yourself from heat illnesses:

- Wear light-colored clothing
- Gradually build up to heavy work
- Schedule heavy work during coolest parts of the day
- Take more breaks in extreme heat and humidity
- Drink plenty of water, at least several quarts during the workday

To protect yourself from cold related illnesses:

- Wear appropriate clothing
- Make sure to protect ears, face, hands, and feet
- Move into warm locations during work breaks; limit the amount of time outside on extremely cold days
- Carry cold weather gear, such as extra socks, gloves, hats, jacket, blankets, a change of clothes, and a thermos of hot liquid
- Include a thermometer and chemical hot packs in your first aid kit
- Avoid touching cold metal surfaces with bare skin
- Monitor your physical condition and that of your co-workers

Environmental Factors

Plants and animals can be hazardous and can cause rashes, illness and even death. To prevent these problems, employees must:

- Avoid contact with any animals
- Learn to recognize and avoid poisonous plants
- Wear long-sleeved shirts and pants, use insect repellants
- Check for tick bites each day for Lyme disease (red bull's-eye)
- Get prompt medical/first aid treatment for any problems

EMERGENCIES

There are many different potential emergencies on a roadwork site.

The most common emergencies include:

- A worker is killed or seriously injured
- Contact with gas line or electrical line
- Trench collapse
- Traffic entering the work zone
- Toxic chemical spill

Our company has established an emergency response plan for what to do in the event of an emergency.

Emergency steps for our Company include:

- Call 911 and get medical help as soon as possible
- Contact on-site first aid/CPR trained person
- Shut down equipment and evacuate the area if potential toxic exposures or chance of explosions becomes apparent
- On-site emergency coordinator contacts nearest fire department or EMS
- On-site emergency coordinator contacts utility company if applicable

To be prepared for emergencies, our employees must know the Company plan. After an emergency, if you have been affected by a tragedy or near miss, ask for counseling.

Emergency planning includes:

- A warning system and signal to alert workers for evacuation
- Everyone must know where emergency phone numbers are posted for hospital, fire fighters and/or utilities
- Everyone must know who the emergency coordinator is and who on the site is trained in first aid/CPR
- Everyone must be trained in the emergency plan and participate in regular drills

SAFE DRIVING

Many workers die while driving to and from work or between sites.

Safe driving tips include:

- Check vehicle to make sure all safety devices (brakes, turn signals, headlights, taillights, horn) are operable and effective
- Adjust mirrors to give yourself optimal view

- Always use seat belt
- Avoid distractions – don't eat, drink, or talk on cell phone - pull over or ask passenger to make calls
- NEVER drive if you are drowsy or have been drinking. Some prescriptions and over-the-counter drugs also affect driving
- Do not speed; go at or below posted limit - slower in bad conditions

Unless you drive safely, driving to or from work may be more dangerous than the job.

More safe driving tips:

- Buy vehicles with front and side air bags and ABS brake system
- Drive with headlights on - even in daytime
- Drive defensively
- Avoid aggressive driving (e.g., quick lane changes and tailgating)
- Map out a route ahead of time if you are unfamiliar with where you are headed
- Never let anyone ride in the bed of your pick-up truck
- After a night shift, drink coffee or caffeinated beverages only if you need it to help get you home

Road workers should remember that they face special driving hazards

Construction vehicle operators should:

- Keep cab clean to prevent slippery pedals and debris under brake pedal
- Keep all window glass clean and in good repair to prevent distortion
- Make sure all cargo is secured to prevent it from striking the cab
- Be careful when changing lanes, change only when necessary
- Keep a safe distance from vehicles in front of you
- Back up as little as possible
- Be especially cautious at railroad crossings

TRAINING

When hired, all employees will be trained on the hazards associated with their jobs and the hazard prevention techniques to use. This training can include the following topics depending on the work being done.

- Company safe practices
- Hazcom and SDS training
- Flagger training
- Proper lifting and climbing techniques
- Confined space work (if necessary)
- Working at heights

Refresher Training

Employees will receive refresher training annually, or if observed to commit unsafe acts regarding potentially hazardous circumstances, or when changing job conditions or assignments warrant it.

Training Records

The company will create and maintain records of all employee training. These records will include date of training, training content and attendance. These records will be kept for the length of their employment.

POLICY REVIEW

The company will review this policy at least annually, and whenever there are changes to our processes that can affect the procedures and safe practices.

SCOPE

This chapter contains the requirements and safe practices to be followed when performing hot tap work. These practices will comply with the applicable requirements of OSHA 1910.6 and 1910.147. This chapter does not contain information on the performing a Job Hazard Analysis, which is covered in a separate chapter.

POLICY

This Company has developed the following procedures to protect employees performing hot tap work.

The Company will ensure that the policies and procedures include:

- A Job Safety/Hazard Analysis (JSA/JHA)
- A description of the sequence of events
- Safety precautions to address the hazards
- An emergency response plan

The Company must ensure that:

- Only competent/qualified workers are permitted to carry out a hot tap operation
- The point in the pressure-containing barrier to be hot tapped is checked and strong enough for the hot tap to be done safely
- Adequate working space is available at the location of the hot tap
- Exit routes are available and their locations known by workers involved in the work
- Workers wear appropriate personal protective equipment when a hot tap is performed on equipment containing hydrocarbons, combustible fluids, superheated steam, or any other hazardous material
- Material being supplied to the equipment being hot tapped can be shut off immediately in an emergency
- The hot tap machine and fittings are of adequate design and capability for the process, conditions, pressure, and temperature
- The pressure in the equipment being hot tapped is as low as practical during the hot tap operation

The Company will ensure, where reasonably practicable, that a hot tap is not undertaken if at the proposed hot tap location:

- The equipment contains a harmful substance
- The equipment is in hydrogen service
- The equipment contains an explosive mixture

CONTROL OF HAZARDOUS ENERGY

Hot Tap: A procedure used in the repair, maintenance, and service activities, which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems. Use proper Lockout/Tagout procedures.

GENERAL REQUIREMENTS

Flammable substance lines: The connection, by welding, of branches to pipelines carrying flammable substances will be performed according to **Welding or Hot Tapping on Equipment Containing Flammables, APl Std. PSD No. 2201**, which is incorporated by reference as specified in 1910.6.

Federal, state, and local regulations or laws may contain additional requirements that must be taken into account when a hot tap program is developed at a specific facility.

PERSONNEL COMPETENCY AND QUALIFICATIONS

Hot tap machine operators and welders must be qualified in accordance with applicable codes and specifications. They should be thoroughly familiar with the welding and hot tap equipment and procedures to be used. Only skilled competent personnel should mount and assemble the hot tapping machine. These skills may be achieved either through on-the-job training or by a formal training program provided by the manufacturer of the hot tapping machine.

SITE SPECIFIC PLAN

Prior to conducting welding or hot tapping on piping or equipment in service, a site specific plan should be prepared which includes:

- Connection design, location, and carrier thickness
- Hot tap procedure
- Detailed written welding procedure (qualified in accordance with the applicable code) documenting heat input, as appropriate
- Health, safety, fire protection, emergency response, and other appropriate procedures and instructions, including owner and user requirements

Establish what needs to be accomplished, how the associated work is to be done, and whether hot tapping is appropriate.

An analysis should be performed to determine if alternates to hot tapping exist within reasonable engineering bounds, and whether hot tapping is appropriate.

If, after review, hot tapping is required, follow all safety and regulatory requirements.

- Do a review to determine whether fire hazards in the vicinity can be moved to a safe place
- Designate the competent person for each job
- Make sure all precautions used for hot work are followed

Always minimize the risk; hot work has the potential of personnel exposure or ignition hazards that could lead to a fire or explosion. The consequences of each hazard should be carefully weighed along with unexpected conditions that might occur.

Make sure the plan covers firefighting, personnel evacuation and/or alternate methods to finish the hot work without incident.

OSHA 1910.147 Control of Hazardous Energy (Lockout/Tagout) provides a specific exemption for performing hot tapping, with several criteria that must be met.

- Continuity of service is essential
- Shutdown of the system is impractical
- Documented procedures are followed
- Special equipment is used which will provide proven effective protection for employees

When all four of these factors cannot be met, the hot tapping should not be done and the work must be performed in conformance with the requirements of the OSHA Lockout/Tagout regulation. There may be other regulatory requirements for work on equipment subject to other regulations.

Refer to the Attachments at the end of this Chapter.

The final safety plan should be a written procedure specific to the hot tapping job to be done. If the specific job is reviewed and existing procedures are found to conform to the project needs, they can be used. If they do not address the specifics, a revised procedure should be written.

If several hot taps are to be done then each needs to have a separate procedure and permit.

The decision to authorize hot tapping should include a review of the metals consistency and line contents to ensure that hot tapping is appropriate.

PROCEDURES

Before work begins, the following conditions must be in place:

- A competent person is committed to be present during the hot tapping
- The area where the connection is to be made has been identified and physically marked
- The metal thickness has been verified and any metal imperfections that might prevent a proper weld have been completely evaluated and approved by a competent person. The measurements must be recent enough to represent the current metal condition
- A plan has been prepared to monitor and control process variables within their required limits while hot tapping or welding is being performed
- A contingency plan is in place
- All necessary testing for flammable vapors, oxygen, and hazardous air contaminants has been conducted
- Potential safety and health hazards have been assessed and personnel protective equipment (fire retardant clothing) is available for use as necessary
- Appropriate hot work, hot tapping, and confined space entry if required, permits have been obtained and approved

- A dedicated fire watch has been established and equipped with a suitable fire extinguisher or pressurized fire hose. This person must understand fire watch duties, be able to communicate with the personnel working in the area and have been trained in the use of the equipment.
- Signs and barriers have been provided when warranted to isolate the job site from unauthorized personnel or the public
- Procedures have been prepared and are in place to isolate the work area in the event of an emergency
- Personnel are trained and familiar with the hot tap or welding procedures and the use and location of applicable equipment

Welding

- Select and use a welding procedure which is qualified for the specific application as determined by a qualified person
- Make sure that the welder is qualified for the specified procedure and appropriate code.
- Ensure that the fitting is positioned and supported before welding, so that misalignment of the hot tapping machine will not occur
- Always protect the weld area during cleaning, preparation, welding, and weld inspection if blowing dirt, snow, or rain is present
- Make sure that downstream pumps designed to be equipped with screens or strainers have them in place in case of a lost coupon

Inspection

Make sure you visually inspect all attachment welds after welding and before attaching the hot tap machine. Dye penetrant, ultrasonic, or magnetic particle inspection is also recommended before the hot tapping machine is installed.

When these are interim tests conducted after the first weld pass, the weld area must be thoroughly cleaned of any foreign material or residues before doing any more welding passes. These procedures should not be relied upon to replace the need for hydrostatic or pneumatic testing.

Remember; when reinforcing is specified, either the hot tap machine operator or the owner of the in service equipment may want to pressure test the nozzle prior to installing the reinforcing pad.

Installation

- The hot tap valve must be of adequate size and rating, be of the proper metal consistency, and be a full opening valve. The hot tap valve should be tested for seat leakage prior to installation
- During installation, the valve should be centered on the nozzle flange or fixture
- Run the boring bar through the valve opening to be sure the cutter does not jam or drag
- Calculate the travel distance of the cutter to ensure that the tap can be completed within the dimensional limits
- Make sure that the cut will be stopped before the cutter or pilot drill touches the opposite side of the tapped pipe or equipment

- Make sure that the retrieved cut out coupon can be retracted far enough to allow unimpeded closure of the tapping valve
- Confirm that the bleed-off valve will hold pressure and is not plugged
- Make sure that precautions have been established for safe bleed off and disposal of material collected in the machine above the hot tap valve

Test the weld and machine before cutting is started:

- Always check tightness of bolts, packing, packing nuts, and any bypass line to avoid possible leakage
- When the current temperature of the line or vessel will permit, conduct a hydrostatic test of the welded attachment and hot tapping machine in accordance with the code. The temperature of the metal should be considered to prevent brittle fracture

SAFETY RULES AND PROCEDURES

Physical Hazards

- Always protect against slip, trip, and fall hazards from cables, hoses, and lines
- Personal protective equipment must be worn (head, foot, eye, respiratory, and thermal protection in accordance with requirements for the work environment)
- Utilize Fall protection procedures and equipment when necessary
- Make sure there is protection from electrical hazards associated with welding machines or electric lighting (use of bonding, grounding, low voltage, or GFCI)
- Make sure there is protection against eye and face injuries caused by flying particles, molten metal, liquid chemicals, acids, caustic liquids, or irritating chemical gases or vapors

Thermal Burns

- High temperature contact exposure can cause serious burns
- Avoid contact by using good work practices and protective clothing. Injuries have occurred due to sparks or hot metal falling into pockets, folds of rolled up sleeves, pants- cuffs, or work boots. Frayed clothing is easily ignited. Wear fire resistant clothing

Health Hazards

- Always wear the proper protective equipment and make sure there is good ventilation
- Health hazards can occur during or shortly after exposure (e.g. irritation of the eyes or respiratory system caused by inhalation exposure to fumes)
- Make sure you know what is in the area you are working in. Materials used or stored in the area (hydrogen sulfide, chlorine, or ammonia) can create hazards
- Welding can create health hazards. Arc flash can cause eye irritation or burns. Fumes from zinc can cause metal fume fever. Working in a hot environment can cause heat stress and oxygen deficiency
- Make sure there is an effective hazard communication program that identifies materials warranting special attention that may be associated with the specific work and workplace activity

- Safety Data Sheets (SDS) should be available to aid in identifying materials in the area and contained in the piping or equipment to be hot tapped or welded upon. For welding fumes, risk relates to inhalation exposure. Emphasis on monitoring, ventilation, and respiratory protection are key factors in risk reduction
- A hearing conservation program may be required depending on noise exposures

Fumes

Toxic fumes can be generated during welding. Fumes from welding on metals containing alloys of lead, zinc, cadmium, beryllium, and certain other metals are recognized hazards.

Paints, particularly those containing lead, can produce toxic fumes when heated or burned. Toxicity is an independent property of the hazardous material. The risk involved depends on the composition and quantity of fumes in conjunction with exposure. The composition of the welding consumables, the coatings or paints, the process used, and the circumstances and conditions will affect the level of toxicity.

Control Procedures

- Where electrode material concerns are identified, investigate whether an approved acceptable material substitution is available
- The area should be cleaned for coatings
- Appropriate ventilation should be considered in all cases
- Respiratory protection may be necessary if monitoring indicates a need
- Always determine the level of exposure through measurement and/or analysis, or applicable prior experience
- Make sure to minimize skin contact and breathing of vapors or fumes through engineering or administrative controls, or provide the appropriate personal protective equipment
- Always keep work areas clean and well ventilated, clean up spills promptly
- Use soap and water or approved cleaner to remove materials that contact skin. Do not use gasoline or similar solvents
- Promptly remove and wash oil-soaked clothing, and do not use oil soaked leather gloves, aprons, or other materials

FLAMMABLE LIQUIDS, VAPORS, SOLIDS, AND DUSTS

The work area around the hot tap work site should be hydrocarbon vapor and gas free. Check the area for any drums or other portable containers containing flammable or combustible materials.

When hot tapping is done on a vessel or piece of equipment within a unit while other parts of the same unit are in operation, the site specific plan must determine that no unconfined flammable or combustible material will be present in the work area, and that no reasonable probability exists of any such material entering the area while hot work is being done.

Precautions may include, but are not limited to:

- Cover common drains

- Make sure all sewer traps are full and functional, using a steady flow of water when necessary; caution must be taken to ensure that hydrocarbon does not enter the work area from sewers
- Halt transfer operations in areas where tanks are receiving flammable liquids or gases
- Continually monitor to ensure that the atmosphere is free of flammable material
- Block off any relief valves in the area

Remember; in areas where hot tapping and associated welding are approved, process operators should be made aware of the work in process and must not release flammable liquids or vapor until the hot work has stopped.

Hot work should not be permitted where adjacent equipment is being opened, disassembled, steamed, ventilated, or flushed without considering how such actions might affect the hot work.

Combustible Materials

Combustible materials should be removed from the work area or protected from welding sparks or slag. Noncombustible covers or wetting down should be utilized.

Metal Chemistry

Burn through and cracking: Burn through will occur when the unmelted area beneath the weld pool can no longer contain the pressure within the pipe or equipment. Weld cracking results when fast weld cooling rates produce a hard, crack-susceptible weld microstructure. Fast cooling rates can be caused by flowing contents inside the piping and equipment that removes heat quickly.

Careful thought should be given to evaluating heat transfer during welding to determine the heat input and related welding variables in order to prevent overheating and burn through of the in-service piping or equipment.

Evaluate the expected cooling rate of the weld to determine the heat inputs required to produce welds and heat affected zones, which are free of cracking.

Make sure an engineering evaluation is conducted before in-service welding is performed on materials that contain laminations or other imperfections. Vessels or lines to be welded and hot tapped must also be inspected for adequate wall thickness and absence of imperfections. To minimize the risk of burn through, the metal thickness should be adequate for the pressure and temperature involved so that the hot tapping machine, equipment, and personnel can be safely supported and operated.

A determination must be made of the metal chemistry. The metal chemistry of the weld materials, the hot tap fitting, and the welding rod electrode must be compatible with the metal chemistry of the equipment to be welded or hot tapped. (E.g., a low-hydrogen process and electrodes are often advisable to minimize weld-cracking problems.)

Special welding considerations may be needed for high tensile strength steels to avoid weld cracking and the need for post weld heat treatment.

Burn through prevention: To avoid overheating and burn through, the welding procedure specifications should be based on experience in performing welding operations on similar piping or equipment, and/or be based on heat transfer analysis.

To minimize burn through, the first weld pass to equipment or piping less than ¼ in. (6.4 mm) thick should be made with a 3/32 in. (2.4 mm) or smaller diameter-welding electrode to limit heat input. Subsequent passes should be made with a 1/8 in. (3.2 mm) diameter electrode, or smaller if the metal thickness does not exceed 1/2 in. (12.7 mm).

The use of low heat input levels can increase the risk of cracking in high carbon equivalent materials. For equipment and piping wall thicknesses greater than ½ in. (12.7 mm), where burn-through is not a primary concern, larger diameter electrodes may be used.

Where burn-through is of concern, care should be taken by avoiding the use of excessive welding current.

Using low hydrogen rods may be preferable to reduce the possibility of burn-through and cracking when welding on high carbon-equivalency components.

Flow in Lines

For metal thickness less than ¼ in. (6.4 mm), some flow during hot tapping minimizes the potential for several undesirable conditions. Overheating liquids, burn through caused by elevated metal temperatures, and fluid thermal expansion in closed systems are less likely when flow is maintained.

Higher flow increases the weld-cooling rate and the risk of cracking. When welding, it is desirable to provide some minimum level of flow while avoiding high flow rates. The need for a minimum level of flow is a trade-off between the need to minimize the risks of burn-through and cracking.

References to use: Battelle Institute Report Investigation and Prediction of Cooling Rates during Pipeline Maintenance Welding, and Battelle's Hot Tap Thermal Analysis Models or Edison Welding Institute Project J6176.

For metal thickness between ¼ in. (6.4 mm) and ½ in. (12.7 mm), flow also increases the weld-cooling rate and risk of cracking. Minimizing the flow rate reduces the risk of cracking and keeps the risk of burn through low. For metal thickness greater than ½ in. (12.7 mm), the effect of flow on both weld cooling rates and the risk of burn-through may be negligible.

When welding or hot tapping on a flare line, there may be insufficient or interrupted flow that can result in a flammable mixture during the welding operation. In these circumstances, it may be necessary to purge or flood the line with steam, inert gas, or hydrocarbon gas to prevent the formation of flammable mixtures.

Metal Thickness

Piping or equipment base metal thickness must provide support for the new connection and the hot tapping machine. Alternately, reinforcing pads or auxiliary support of the hot tapping machine may be provided. The base metal must be free of laminations, hydrogen attack, or stress corrosion cracking.

A qualified person or competent person with appropriate experience to conduct the evaluation must evaluate imperfections that might prevent a sound weld from being made.

Minimum base thickness requirements must be stated in the written documentation for the job. A minimum base metal thickness of 3/16 in. (4.8 mm) is recommended for most applications of welding and hot tapping.

The actual minimum thickness is a function of the thickness required for strength, plus a safety factor, usually 3/32 in. (2.4 mm), to prevent burn through. Exceptions to the recommended thickness may be permitted when metallurgical requirements and pressure (vacuum) limitations specified by a qualified Company specialist are met.

Fittings

Make sure a qualified or competent person selects the proper fitting for the connection. Fittings must be properly sized to accommodate the hot tapping machine, to allow for full depth of cutter penetration within the travel limits of the machine, and to allow for uninterrupted tapping valve closure when the cutter and cut out coupon are retrieved.

POST WELD HEAT TREATMENT

Some equipment and piping is unsuitable for welding in service, because the metal chemistry or thickness of the metal and/or the contents require post weld heat treatment which normally cannot be done while the equipment or piping is pressurized. In such cases, mechanically attached fittings or taking the equipment out of service should be considered.

When post weld heat treatment is performed, the work should be reviewed to identify potential ignition sources and provide the appropriate permits and procedures.

Metal Temperature

The site-specific plan should include considering whether heating the weld area before welding is needed when the metal temperature is low enough (below the atmospheric dew point) so that moisture forms on the metal surface.

Welding should not be performed on lines or equipment when atmospheric temperature is colder than –50° F (–45° C) unless special precautions, such as providing temporary shelter, space heaters, etc., are taken.

Preheating may be required by the welding procedure to avoid cracking whenever the base metal has high carbon equivalency or high tensile strength.

Connections

Welding or hot tapping should not be permitted closer than 18 in. (46 cm) to a flange or threaded connection or approximately 3 in. (8 cm) to a welded seam (including a longitudinal seam of welded piping) unless determined by an engineering review to be acceptable.

Make sure that the hot tap location ensures that the connection is positioned to allow for the installation, operation, and removal of the hot tapping machine.

Access and egress in case of a potential release or emergency should be established and communicated to all workers and must address emergency response needs.

Remember; welding and hot tap connections, repairs, and alterations must be designed to the applicable codes.

The design must cover the specification of gaskets, valves, and bolts.

Reinforcing pads or saddles must be included in the design when required by the applicable code.

Under Vacuum

Hot tapping and hot work must not be performed on vessels under vacuum (less than atmospheric pressure) unless a qualified person concurs after performing an engineering evaluation.

Potential Concerns:

- Heat from welding might cause the wall of the vessel to buckle locally and deform inward at the hot work location
- Deformation or buckling could cause the vessel to rapidly collapse
- If welding penetrates the vessel wall, the reduced pressure could draw in oxygen and allow the contents of the vessel to react at potentially violent rates. (There may be a high probability of introducing air, along with flame, when welding on vessels under vacuum.

Prior to approving welding or hot tapping on vessels under vacuum, an engineering evaluation should determine:

- What temperature would be reached during the hot work
- What the LEL will be in the vessel at the calculated temperature (fuel lean is preferred since inadvertent introduction of air caused by breakthrough could bring portions of a fuel-rich mixture into the combustible range)
- What precautions are necessary to prevent burning through the vessel wall?

PIPING AND EQUIPMENT CONTENTS

Welding and hot tapping should not be performed on piping or equipment containing these materials:

- Vapor/air or vapor/oxygen mixtures near or within their flammable explosive range. The higher temperature from the heat of welding may cause a vapor mixture to enter the flammable range with the welding or subsequent hot tapping providing a source of ignition
- Oxygen or oxygen enriched atmosphere. The oxygen may cause a vapor mixture to enter the flammable range and may affect the base metal being welded
- Compressed air systems, unless known to be free of flammables and combustibles such as lubricating oil residues
- Hydrogen, unless an appropriate engineering review has been performed by a qualified person who approves welding on such equipment

- Carbon and ferritic alloy steel is susceptible to high-temperature hydrogen attack during process operations. A review must be conducted to ensure that the equipment has been operated within the Nelson curve for the particular steel involved
- Temperature-sensitive, chemically reactive materials (E.g. peroxides, chlorine, or other chemicals that might violently decompose or become hazardous from the heat of welding)
- Caustics, amines, and acids (HF acid), if the concentrations and temperatures are such that the original fabrication specifications require post weld heat treatment. These services may cause cracking in the weld area or heat affected zone
- Certain unsaturated hydrocarbons (ethylene) may experience exothermic decomposition due to high temperatures caused by welding; creating localized hot spots on piping or equipment walls that could lead to failure
- Where hot work is being clone on the outside surface of a vessel or piping precautions should be in place to protect against overpressure due to thermal expansion of the contents

MACHINES

- Hot tapping machines may be powered by hand, air, hydraulic fluid, or electricity. These machines must be able to retain and remove the blank or coupon
- Make sure seals and materials of construction of the hot tapping machine are compatible with the contents in the piping or vessel
- Material of the drill or cutter must be suitable for effective penetration of the metal of the piping or vessel being tapped
- Make sure that hot tapping machines are designed and constructed to withstand the temperatures, pressures, and mechanical stress which may be imposed during their operation
- Hot tap machines must be special equipment that will provide proven effective protection for employees. This provision is in accordance with U.S. Federal OSHA requirements in 1910.147 Lockout/Tagout
- Before hot tapping is attempted, the machine, cutter, and pilot bit should be carefully inspected to ensure that they are in satisfactory condition and capable of being left in service (if necessary) in the event of mechanical problems or hot tap valve leakage
- All hot tapping machines have maximum and minimum working pressure, and high and low temperature ratings
- During hot tapping, careful thought must be given to the possibility of operational upsets that may alter the process temperature or pressure
- Always remember that the hot tapping machine may have to remain in place for an extended period of time if removal of the machine is not successful

Remember

Knowledge, experience, and planning along with good procedures, competent personnel with appropriate skills who perform their work in conformance to procedures, and proper equipment are keys to safe and successful hot tapping.

Hot tapping should not be emergency work; when precautions cannot be established in advance and accommodated, then the unit or equipment should be taken out of service or shut down.

TANKS OR VESSELS

Make sure that welding on the exterior of tanks or vessels in service is not conducted unless controls are established, and in place, to prevent flammable vapors from reaching the area of the welding. Work must be stopped immediately should any flammable vapors be detected in the welding area.

Hazards associated with welding or hot tapping on tanks in operation include (but are not limited to):

- Tank venting, with vapors reaching the work area where welding is taking place
- Product within the tank rising and overflowing
- Inadvertently allowing the liquid level within the tank to fall below the point of welding, thereby losing the heat sink provided by the liquid, and exposing the vapor space within the tank to an ignition source

Make sure that welding is not conducted above the liquid level or on a vessel that is double walled and/or which has an internal lining such as glass, polymeric or alloy cladding until inspection and analysis are made by a qualified person to determine whether it is possible to perform the work safely.

When welding and hot tapping is to be done on the outside surface of a vessel, and if the area is otherwise safe for the use of an open flame, precautions should be taken:

- Make sure pressure within the vessel is maintained in a range determined to be acceptable by a qualified person during the job analysis
- Atmosphere within the vessel must be incapable of being ignited because it is too rich or too lean or is non-combustible or non-reactive as determined during the job analysis and reviews based on the chemical analysis or other reliable information
- Make sure welding is not performed on metal contacting a vapor space without a heat sink
- Liquid level in the tank must be maintained at least 3 ft. (1 m) above the area where the work is being performed when welding or hot tapping on atmospheric tanks in service (because of the potential danger of creating an explosive atmosphere inside the tank vapor space)
- Remember; to the extent possible, the tank should be static with no flow in or out
- Make sure that measurements of atmospheric tank levels are verified by a hand tape gauge to verify the accuracy of automatic or remote reading gauges
- Always take adequate precautions to prevent burning through the tank or vessel wall during welding associated with hot tapping
- Make sure that when under a vacuum, the additional evaluations and precautions are addressed

DECKS OF FLOATING ROOF TANKS

Welding must not be permitted on the decks of floating roof tanks in service. Floating roof tanks are subject to unique flammability hazards in specific locations:

- Inside the pontoons
- Between the deck and liquid surface near the tank roof gauge float compartment
- Near the roof seal vent

- Near the floating roof lift leg vent
- Between the primary and secondary seal
- Near the roof drain

ABOVE OR BELOW GRADE

For hot tapping and welding work above or below grade, provisions must be made for an easily accessible means of egress.

Tests must be conducted for oxygen, flammable vapors, and toxic air contaminants, and permit(s) issued listing the requirements and approving the entry into the confined space and hot work, to assure that the atmosphere in excavations and confined spaces is safe for entry and hot work.

Make sure that the job analysis determines if regulatory Permit Required Confined Space provisions (1910.146), training (1926.21), or ventilation (1926.353(b)) apply.

When oxygen deficiency, flammable vapors, or hazardous air contaminants are present, an air mover or other positive means of ventilation must he provided.

Respiratory equipment may be required to provide protection from hazardous contaminants, vapors, or fumes emitted as a result of welding.

Air monitoring may be required during work activity to assure that air quality remains within the permitted safe work levels.

LINED PIPING, LINED EQUIPMENT, OR CASED LINES

Welding or hot tapping should not be permitted on in-service lines or equipment with cladding, or with glass, lead, refractory, plastic or strip linings, unless specifically authorized by specialized procedures or following an engineering evaluation.

When welding or hot tapping on underground lines that run through casings, care must be taken to assure that the annular space is gas free and that the work is performed on the pipeline and not on the casing.

Hot Tapping on Piping

Remember; hot tapping on piping may have specific regulatory requirements.

Flow should be established in the line to carry heat away from the weld site and to prevent buildup of hydrostatic pressure due to liquid expansion in static blocked-in piping. Reviews of piping and consumable welding material should be included in the job analysis.

A review should determine potential thermal or personnel hazards associated with the material contained in the piping. The need for knowledgeable review by qualified persons increases as temperatures and pressures increase.

UPSTREAM OF EQUIPMENT AND VALVES

Always avoid hot tapping upstream of rotating equipment or automatic control valves, unless such equipment is protected from the cuttings by filters or traps.

LOCKOUT/TAGOUT (PAGE 1 OF 2)

<table>
<tr><td>Company:</td><td colspan="4" rowspan="2">This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.</td></tr>
<tr><td>Equipment:</td></tr>
<tr><td colspan="5">1. Notify Employees: Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance. (Document name or job title of authorized and affected employees)</td></tr>
<tr><td colspan="2">Authorized Employees</td><td colspan="3">Affected Employees</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="3">2. Prepare for Shutdown: The authorized employee shall refer to the Company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.</td><td colspan="2">3. Equipment Shutdown: If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).</td></tr>
<tr><td>Type(s) of Energy</td><td colspan="2">Magnitude</td><td colspan="2">Type of Operating Controls:</td></tr>
<tr><td>□ Mechanical</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>□ Potential</td><td colspan="2"></td><td colspan="2">Location of Operating Controls:</td></tr>
<tr><td>□ Electrical</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>□ Thermal</td><td colspan="2"></td><td colspan="2">Shutdown Procedure:</td></tr>
<tr><td>□ Chemical</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="3">4. Equipment Isolation: Set the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).</td><td colspan="2" rowspan="4">5. Lock out the energy isolating device(s) with individual locks</td></tr>
<tr><td>Type(s) of energy isolating device(s)</td><td colspan="2">Location(s) of energy isolating device(s)</td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td></td><td colspan="2"></td></tr>
</table>

LOCKOUT/TAGOUT (PAGE 2 OF 2)

Company	Equipment
6. Release Stored Energy: Stored or residual energy (such as that in capacitors, springs, elevated machine members, hydraulic systems, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.	
Type(s) of Energy	Method(s) to dissipate or restrain
□ Mechanical	
□ Potential	
□ Electrical	
□ Thermal	
□ Chemical	
7. Verify Isolation: Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.	
Method to verify isolation:	
Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.	
8. The machine or equipment is now locked out.	

RESTORING EQUIPMENT TO SERVICE

When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken:

1. **Check the machine or equipment** and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
2. **Check the work area** to ensure that all employees have been safely positioned or removed from the area.
3. **Verify** that the controls are in neutral.
4. **Remove the lockout devices** and reenergize the machine or equipment.

Note: The removal of some forms of blocking may require reenergizing the machine before the blocking can be safely removed.

Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

HOT TAP PERMIT (PAGE 1 OF 2)

Contractor:			
Subcontractor:			
Project:		Contract No.	
Location:			
Date of Hot Tap:		Time:	
Service being tapped:		Line Number:	
Line Type and Size		Tap Size:	

If the answer to any of the following questions is yes, the hot tap cannot be made!	YES	NO
Is hot tap diameter greater than 50% of run pipe diameter? If yes, a full encirclement pad or split tee is required.	☐	☐
Is stress relief required?	☐	☐
Is pressure greater than 700psi (4.83 MPa)? Pressure Reading:	☐	☐
Is temperature less than 70°F (21°C) or greater than 600°F (315°C)? Temperature Reading:	☐	☐
Is pipe or plate minimum thickness less than 3/16 of an inch (4.8 mm)? Thickness Reading:	☐	☐
Is required flow rate in line specified in job plan? Flow Rate:	☐	☐
Does hot tap area include existing weld seams?	☐	☐
Are there any obstructions that may interfere with tapping machine clearance?	☐	☐
Is tank or liquid vessel level less than 3 feet (915 mm) above tap location? Level:	☐	☐
Is hot tap upstream of rotating equipment without filters or traps?	☐	☐

HOT TAP PERMIT (PAGE 1 OF 2)

Preparations Checklist	Date Completed	By (Print Name)
Careful consideration has determined hot tap is required.		
Engineering design, with drawing approvals complete, is prepared.		
There are exceptions to the requirements; detailed in the		
JSA (write N/A as appropriate)		
Welding procedure is developed and signed.		
Inspection has demonstrated the machine, cutter, and pilot bit are in satisfactory condition.		
JSA is detailed, complete, and signed.		
Hot tap procedure is detailed, complete, and signed.		
Inspection has determined the area/material to be hot tapped is within the requirements		

Signatures		Date
Construction Mgr.:		
Construction Engineer:		
Subcontractor:		
Project Safety:		
Client Representative:		
Registered Professional Mechanical Engineer:		

JOB SAFETY ANALYSIS (PAGE 1 OF 2)

Project:		Activity	
Contract:			
Location:			

#	Job Steps	Potential Hazards	Safe Procedures/Controls
1	Pre-hot tap pipe inspections (E.g. diameter, checking ovality, actual wall thickness, evidence of corrosion, soundness of any longitudinal seam, carbon equivalent etc.)		
2	Preparation of pipe external service for weld/joint		
3	Exclusion of moisture during operation (e.g. tent, preheat etc.)		
4	Fit up and alignment		
5	Weld/joint cleanliness		
6	Welding /jointing operation		

JOB SAFETY ANALYSIS (PAGE 2 OF 2)

#	Job Steps	Potential Hazards	Safe Procedures/Controls
7	Tapping operation		
8	Pressure Testing		
9	Commissioning/purging		
10	Final inspections tests		
11			
12			

Equipment to be used	**Inspection requirements**	**Training requirements**

SCOPE

This chapter provides information on the requirements and safe practices for housekeeping and sanitation. This includes the requirements regarding potable water, toilet and washing facilities, food and eating areas and temporary sleeping areas, if applicable. All Company work practices will comply with OSHA regulations 1910.22 and/or 1926.25, whichever is applicable, as well as any state or local regulations.

POLICY

This Company has established a rigorous sanitation and housekeeping policy to ensure a safe, healthy, productive work environment Good housekeeping reflects employee pride in the workplace, and it must be practiced to ensure a safe working environment.

EMPLOYER RESPONSIBILITIES

The Company will:

- Train all employees on our safe housekeeping and sanitation practices
- Provide and maintain proper sanitation facilities to promote worker health
- Maintain all necessary waste removal and storage procedures and facilities
- Provide employees with the necessary tools and supplies to maintain a safe working environment
- Provide any needed PPE

EMPLOYEE RESPONSIBILITIES

All employees are expected to:

- Adhere to this Company's safe housekeeping practices
- Maintain a clean work area
- Report any hazardous or unsafe conditions or acts immediately
- Use and maintain any required PPE

HOUSEKEEPING

There are several common workplace hazards that are avoidable, if proper housekeeping practices are followed. These include, but are not limited to:

- Tripping on items left on floors or stairs and slipping on soiled surfaces
- Being struck by falling objects
- Running into piles of material or protrusions
- Health hazards presented by unsanitary conditions
- Impeded access to exit routes in case of a fire or other emergency
- Fire hazards presented by improper disposal of flammable or combustible materials

By ensuring good housekeeping practices at the worksite, the employer reduces certain hazards, and provides a range of benefits, including:

- More efficient materials handling
- Greater control over workplace materials and inventory
- Streamlined maintenance routines and reduced janitorial workload
- Efficient use of space
- Greater employee morale and productivity

HAZARDS

The hazards associated with poor housekeeping and sanitation include:

- Injuries from slips, trips and falls
- Illnesses from unsanitary workplace conditions
- Exposure to hazardous materials and/or vermin

Good Housekeeping Planning

To be effectively implemented, good housekeeping practices must be built into everyday work procedures and be complemented by a work environment that encourages organization, cleanliness and a systematic, efficient means to store, move, use and dispose of materials.

Poor housekeeping can block exits and access to emergency equipment. Failure to remove trash and other debris also increases the risk of fire/explosion, and the presence of pests.

In the interest of safe housekeeping, the following requirements will be met by this Company's housekeeping plan:

- Workers will participate in jobsite cleanup during their shift
- Workers will dispose of rubbish quickly and properly
- Materials, tools, and equipment will be stored to prevent tipping, and away from walkways, ceilings, and power lines
- Work and travel areas must remain tidy, well lit, and well ventilated
- Any hazardous areas or conditions must be marked with a sign to prevent injury or illness

Daily, weekly and monthly cleaning procedures should be implemented to help establish routines that maintain workplace cleanliness and organization.

Housekeeping Safe Practices

- All aisles, passageways, storerooms, and service rooms must be kept clean and orderly
- Aisles and passageways will be marked or otherwise identified, and when mobile equipment and employees use the same aisle or passageway, clearances must be provided and maintained to ensure safe passage
- Materials, including scrap and debris, will be piled, stacked or placed in a container to prevent creating hazards to employees, and as often as necessary, to keep work and travel areas orderly

- Loose materials not being used will not be allowed to accumulate
- Keep equipment and areas around equipment clear of scrap and waste
- Do not drop material or rubbish freely from any level; use chutes or other approved devices
- Sufficient inventories of cleaning supplies will be kept on-site. Cleaning chemicals must be stored in spill-proof containers away from toxic or reactive chemicals
- Workplaces and passageways that are slippery from oil or grease, other substances, or other causes will be cleaned or covered with sand, sawdust, or other material to prevent slipping
- Where any wet process, such as food processing or car washing, is performed, adequate drainage will be maintained or false floors, platforms, or mats used
- Where an employee is required to work on a wet surface in a wet process, the surface will be slip resistant
- Guardrails temporarily removed for materials delivery will be immediately replaced when work is done and involved workers must wear fall protection until guardrails are back in place
- Keep electrical cords away from areas where people could trip over them
- Keep electrical cords away from wet areas. Never let a cord sit in water
- Keep floors and passageways free from protruding nails, electrical cords, splinters, holes, or loose boards
- Kitchens must be furnished with sufficient trash receptacles
- Garbage capable of rotting or becoming putrid must be placed in a covered container. Container contents will be disposed of at frequent and regular intervals
- Refrigerators must be cleaned out each week, and counters, microwaves, and sinks should be cleaned each day
- Workers are discouraged from eating at desks or anywhere not designated for eating
- Ensure restrooms are cleaned and sanitized daily. Adequate stock of paper goods and soap must be maintained at all times to ensure a hygienic workplace
- Hose and electric conductors must be elevated over or placed under the walkway or working surfaces or be covered by adequate crossover planks
- Access to exits, fire alarm boxes and fire-extinguishing equipment will be maintained at all times
- Oils, paints thinners, solvents, waste, rags or other flammable substances must be kept in fire-resistant covered containers when not in use
- During construction, alteration or repairs, form and scrap lumber with protruding nails, and all other debris, must be kept cleared from work areas, passageways and stairs, in and around buildings or other structures
- Combustible scrap and debris must be removed at regular intervals during construction. Safe methods will be provided for such removal
- Containers must be provided for the collection and separation of waste, trash, oily and used rags and other refuse
- Containers used for garbage and other oily, flammable or hazardous wastes, such as caustics, acids or harmful dusts must be equipped with covers

- Garbage and other waste must be disposed of at frequent and regular intervals
- Where vegetation is a hazard, employees will be protected by vegetation control or other means of protection, such as, but not limited to, a barrier, PPE or medication

SANITATION

The Company will ensure that all requirements regarding potable water, toilet and washing facilities, food and eating areas and temporary sleeping areas (if applicable) will meet the required relevant regulations.

Potable Water

Potable water must be provided and placed in locations readily accessible to all employees. The water must be suitably cool and available continuously in sufficient amounts to keep all workers hydrated, taking into account the air temperature, humidity and nature of the work performed. The water will be dispensed in sanitary single-use drinking cups, or by fountains. Common drinking cups are prohibited.

Portable containers used to dispense drinking water must be tightly covered, regularly cleaned and refilled at least daily. Containers must have a tap, and water must not be dipped from containers. The containers must be clearly marked as to the nature of their contents, made of a material that maintains water quality, and not used for any other purpose.

Potable drinking water, as well as toilet and hand-washing facilities, must be maintained in accordance with appropriate public health sanitation practices.

Non-Potable Water

Outlets for non-potable water, such as water for industrial or firefighting purposes only, will be identified by signs that clearly indicate the water is unsafe, and is not to be used for drinking, washing or cooking purposes. There will be no cross-connection, open or potential, between a system that furnishes potable water and a system that furnishes non-potable water.

Jobsite Toilets

Toilets at construction jobsites must be provided for employees according to the table below table. Toilet facilities must be adequately ventilated, readily accessible, and maintained in a clean and sanitary condition. Mobile crews may be provided transportation to nearby toilet facilities.

Number of Employees	Facilities Required
20 or less	1
20 or more	1 toilet seat and 1 urinal per 40 employees
200 or more	1 toilet seat and 1 urinal per 50 employees

Job sites, not provided with a sanitary sewer, shall be provided with one of the following toilet facilities unless prohibited by local codes:

- Privies (where their use will not contaminate ground or surface water)
- Chemical toilets
- Recirculating toilets
- Combustion toilets

Gender Considerations

Access to sanitary facilities can be challenging on some construction sites. Temporary facilities are usually unisex, and often not very well maintained or over used. Where practicable, employers should consider establishing gender specific facilities, or facilities with internal and external locking systems

Permanent Work Location Toilets

Employees working in a permanent location (factory or office) must be provided toilet facilities, in toilet rooms separate for each sex according to the table below. The number of facilities to be provided for each sex shall be based on the number of employees of that sex for whom the facilities are furnished.

Where toilet rooms can only be occupied by one person at a time, can be locked from the inside, and contain at least one water closet, separate toilet rooms for each sex are not required. Where such single-occupancy rooms have more than one toilet facility, only one such facility in each toilet room will be counted.

Number of employees	**Minimum number of facilities (1)**
1 to 15	1
16 to 35	2
36 to 55	3
56 to 80	4
81 to 110	5
111 to 150	6
Over 150	(2)
1. Where toilet facilities will not be used by women, urinals may be provided instead of water closets, except that the number of water closets in such cases may not be reduced to less than 2/3 of the minimum specified 2. Additional fixture for each additional 40 employees	

Each lavatory must have:

- Hot and cold running water, or tepid running water
- Hand soap or similar cleansing agents
- Individual hand towels or sections thereof, of cloth or paper, air blowers or clean individual sections of continuous cloth toweling, convenient to the lavatories

Washing Facilities

Employers must provide onsite general washing facilities (one per 20 employees) for construction projects, must keep them in sanitary condition, and must provide suitable cleaning agents/single-use towels for the removal of hazardous and other substances.

Whenever showers are required by a particular standard, the showers will provide:

- One shower for each 10 employees of each sex, or numerical fraction thereof, who are required to shower during the same shift
- Body soap or other appropriate cleansing agents convenient to the showers
- Hot and cold water feeding a common discharge line
- individual clean towels for all employees who use the showers

Eating and Drinking Areas

No employee will be permitted to consume food or beverages in a toilet room or in any area exposed to a toxic material.

All employees' food service facilities and operations shall meet the applicable laws, ordinances and regulations of the jurisdictions in which they are located.

Receptacles constructed of smooth, corrosion resistant, easily cleanable or disposable materials will be provided and used for the disposal of waste food. The number, size and location of such receptacles must be adequate to encourage their use and not result in overfilling. These receptacles must be emptied at least once each working day, unless unused, and shall be maintained in a clean and sanitary condition. Receptacles will have a solid tight-fitting cover unless sanitary conditions can be maintained without use of a cover.

No food or beverages shall be stored in toilet rooms or in an area exposed to a toxic material.

All employee food service facilities and operations shall be carried out in accordance with sound hygienic principles. In all places of employment where all or part of the food service is provided, the food dispensed shall be wholesome, free from spoilage, and shall be processed, prepared, handled, and stored in such a manner as to be protected against contamination.

Vermin Control

Every enclosed workplace will be constructed, equipped and maintained, so far as reasonably practicable, as to prevent the entrance or harborage of rodents, insects and other vermin. A continuing and effective extermination program will be instituted where their presence is detected.

TRAINING

This Company will verify that all employees are trained on:

- Our housekeeping and sanitation policy
- How to avoid slips, trips and falls
- Proper waste disposal procedures and storage locations

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

SCOPE

The Company requires all employees to present themselves in a professional manner, with regard to attire, personal hygiene and appearance. These standards are commensurate with our organizational practices of appropriate business conduct, professionalism and dress code.

POLICY

Our Company has implemented this policy to ensure a safe and professional workplace. This Policy covers:

- Work-appropriate hygiene
- Acceptable levels of personal grooming
- Appropriate business attire
- Distribution employees
- Workplace inappropriate attire
- Personal protective equipment
- Policy compliance

EMPLOYER RESPONSIBILITIES

All managers, supervisors and employees will abide by the policies set forth in the personal hygiene and dress policy. Failure to do so will result in disciplinary action.

EMPLOYEE RESPONSIBILITIES

This Company's employees are expected to meet hygiene requirements during regular business hours for the duration of their employment.

- Maintain personal cleanliness by bathing daily
- Oral hygiene (brushing of teeth) required
- Use deodorant/anti-perspirant to minimize body odors
- Do not wear heavily scented perfumes, colognes and lotions; these can cause allergic reactions, migraines, and respiratory difficulty for some employees
- Keep fingernails clean and trimmed (¼ inch long or less)
- Wash hands after eating, or using the restrooms

PERSONAL GROOMING

- Clothing must be clean, pressed, in good condition and fit appropriately
- Socks or hose must be worn with shoes
- Neat and well-groomed hair, sideburns, mustaches, and beards (no artificial colors e.g. pink, green, etc. are permitted that would be deemed unprofessional)
- Moderate make-up

PERSONAL HYGIENE AND DRESS

- Secured long hair (hair must be tied back to prevent the potential for being caught in equipment)
- Clothing must not interfere with the safe operation of equipment
- No dark glasses (unless prescribed by a physician)
- Limited jewelry and no dangling or large hoop jewelry that may create a safety hazard to self or others. A general rule of thumb is that if a pencil can be passed through a hoop earring it is not safe to wear near operating equipment
- Body piercing must be limited to three per ear. Other visible body piercing is unacceptable, unless demanded by religion/culture
- Tattoos perceived as offensive, hostile or that diminish the effectiveness of the employee's professionalism must be covered, and not visible

ATTIRE

Any Company staff that maintains regular, in-person contact with customers will be required to wear appropriate attire.

Men
Women

Inappropriate Attire

The following items are not permitted in any area during normal working hours:

- Sweat pants
- Jogging pants
- Pants that expose the midriff, underwear or leggings
- Gym shorts
- Bicycle shorts or other athletic shorts
- Low-cut tops
- Halter tops
- Spaghetti strap tops
- Tops that expose the midriff or underwear
- Mini-skirts

- Any form of clothing that is mesh, sheer, see-through or otherwise revealing
- Any form of clothing that is generally offensive, controversial, disruptive or otherwise distracting
- Any form of clothing that is overtly commercial, contains political, personal or offensive messages
- Plastic flip-flops or sandals
- Beach footwear

CLARIFICATION

Every Company employee is responsible for using good judgment and common sense for his or her attire at all times. If an employee is deemed to be wearing inappropriate attire, his/her Manager is responsible for coaching the employee accordingly.

Individual situations relating to appropriate workplace attire may be addressed on a case-by- case basis. If you have questions about these guidelines or particular dress requirements, contact your manager.

COMPLIANCE

Departure from appropriate grooming, hygiene and attire standards will result in employee counseling and/or disciplinary action up to and including termination of employment. Theme days are occasionally approved by the Company and/or appropriate department, when a deviation from these guidelines is appropriate, and when the business necessities will not be affected. Personal appearance standards may be reviewed periodically and updated as deemed necessary.

SCOPE

This chapter provides information on our safe practices and requirements for maintaining indoor air quality (IAQ). Although OSHA does not have IAQ standards, it does have standards regarding ventilation and on some air contaminants that can be involved in IAQ problems.

In addition, California and New Jersey have implemented indoor air quality regulations; always check with state and local agencies to determine there are any applicable regulations that affect your workplace.

POLICY

This Company has implemented an Indoor Air Quality (IAQ) program to protect employees from potential health risks at the workplace. Although control of airborne contaminants is the focus of these guidelines, ventilation, temperature and humidity are also important.

EMPLOYER RESPONSIBILITIES

In an effort to protect employees this Company will:

- Maintain a good working relationship with building management on indoor environmental issues
- Place office furniture and equipment in locations based on the adequate air circulation, temperature control, and pollutant removal functions of the HVAC system
- Coordinate with building management when responsibility for design, operation, and maintenance of the ventilation system is shared
- Avoid procedures and products that can cause IAQ problems
- Integrate IAQ concerns into purchasing decisions
- Ensure use of only necessary and appropriate pest-control practices; use nonchemical methods when possible
- Work with building management and/or contractors, before starting to remodel or renovate to identify ways of minimizing building-occupant exposure, and to ensure that the air-distribution system is not disrupted
- Develop a preventive IAQ management program following guidance issued by the EPA and the National Institute for Occupational Safety and Health

A sample HVAC inspection sheet is attached to the end of this chapter that can be used for regular inspections and maintenance.

EMPLOYEE RESPONSIBILITIES

All Company employees are expected to follow these procedures to reduce or eliminate workplace air pollution:

- Do not block air vents or grilles
- Water and maintain office plants properly
- Dispose of garbage promptly and properly

- Store food properly
- Avoid bringing products into the building that could release harmful odors or contaminants
- Notify the building or facility manager immediately if you suspect an IAQ problem

HAZARDS

The greatest challenge posed by IAQ investigations is that the reported symptoms and health complaints are generally diverse and usually not suggestive of any particular medical diagnosis or readily associated with a causative agent. A typical spectrum of symptoms includes headaches, unusual fatigue, itching or burning eyes, skin irritation, nasal congestion, dry or irritated throats and other respiratory irritations. It is often difficult to prove a cause that would substantiate an OSHA violation. However, in some instances, specific illnesses can be associated with identifiable exposures in the indoor environment and employers may be subject to an OSHA citation. Examples of such illnesses include Legionnaires disease, histoplasmosis, carbon monoxide poisoning, and certain allergic reactions associated with exposure to molds.

Serious Air Quality Hazards

Examples of IAQ problems that normally indicate a “Serious” hazard may exist include the following:

- Complaints of headaches, nausea, lethargy, and/or dizziness (especially if onset was sudden and/or severe) and carbon monoxide poisoning from combustion sources is suspected
- Complaints of fever/chills and fatigue, or cough and shortness of breath (especially severe or widespread complaints), other symptoms, or physician-diagnosed disease (e.g., Legionnaires’ disease, histoplasmosis) consistent with exposure to airborne microorganisms
- Wheezing or other indications, where chemicals are present, that might prompt or aggravate asthma in a worker
- Complaints of significant mold growth within a building

Physician-Diagnosed Illnesses Associated with Microbial Contamination INCLUDE:

- Allergic rhinitis or sinusitis
- New-onset asthma
- Hypersensitivity pneumonitis
- Pneumonia
- Fever/flu-like illness
- Recurrent airborne infections

Symptoms Associated with Microbial Contamination Include:

- Dry, irritated or sore throat
- Wheezing
- Difficulty breathing or shortness of breath
- Chronic postnasal drip

- Chronic cough
- Continual throat clearing
- Frontal headaches or facial pain that increases with bending over or straining
- Eustachian tube dysfunction (ear pain)
- Altered hearing, smell and/or taste
- Recurrent fevers or chills in addition to general malaise and muscle ache

SOURCES OF INDOOR AIR POLLUTION

Indoor air quality is affected by pollution from inside and outside of buildings and by poor ventilation. Human metabolic activity, smoking, structural components of the building, building contents, biological contamination, office and mechanical equipment, and outside air pollutants that enter the building—all are sources of indoor air pollution.

Inside Air Contaminants

Indoor sources of air pollutants due to chemicals can be attributed to building materials and products used in the building. Formaldehyde vapors can be emitted from urea-formaldehyde foam insulation, particleboard, plywood, and some glues and adhesives commonly used during construction. Other contaminants include fibrous glass, various organic solvents from glues and adhesives, and acetic acid used as a curing agent in silicone caulking.

Chemicals and emissions from equipment also contribute to indoor air pollution. These include, for example, methyl alcohol from spirit duplicators, butyl methacrylate from signature machines, ammonia and acetic acid from blueprint copiers, and ozone from photocopiers. Other inside contaminants include:

- Improperly applied pesticides
- Boiler additives such as n, n-diethylethanolamine
- Improperly diluted cleaning agents such as rug shampoo
- Tobacco smoke of all types (also commonly referred to as environmental tobacco smoke)
- Combustion gases from sources common to cafeterias and laboratories
- Cross-contamination from poorly ventilated sources that leak into other air zones

Indoor air problems due to biological pollutants often involve some type of microbiological contamination. Three conditions are necessary for microbial contamination to occur: high humidity (over 60 percent), appropriate temperatures and suitable growth media. Such contamination can result from water damage to carpets or furnishings or from standing water in ventilation system components. A respiratory problem known as hypersensitivity pneumonitis can result from bacteria and microbiological products that may originate in ventilation system components.

Outside Air Contaminants

Pollutants from outside the building or office space can also contribute heavily to indoor air problems. Examples of these contaminants are motor vehicle exhaust, boiler gases and previously exhausted air. Major sources are improperly located exhaust and intake vents and periodic changes in wind conditions.

One of the most common contaminants from outside is carbon monoxide gas from basement parking garages, recirculated through the building ventilation system. Other outside contaminants include the by-products of construction or renovation, such as asphalt, solvents and dusts. Gasoline vapors can also infiltrate basements and sewage systems and are usually caused by leaks from ruptured underground tanks at nearby service stations.

Inadequate Ventilation

Inadequate ventilation is a key factor associated with poor indoor air quality. Ventilation problems commonly encountered include:

- Insufficient outdoor air supplied to the office space
- Poor air distribution and mixing, which causes stratification, draftiness and pressure differences between office spaces
- Extremes of fluctuations in temperature and humidity (sometimes caused by poor air distribution)
- Air filtration problems caused by improper or inadequate maintenance to the building ventilation system

In many cases, these ventilation problems have been created or exacerbated by energy conservation measures. Such measures include reducing or eliminating outdoor air; reducing infiltration and exfiltration; lowering thermostats in winter and raising them in summer; eliminating humidification or dehumidification systems; and early shutdown and late start-up of ventilation systems.

CONTROL STRATEGIES

There are four control strategies this Company has established to protect employees, they are education and training; dilution ventilation; modifying processes and equipment; and air cleaning.

Education and Training

The Company will provide all employees with timely information on the health and physical hazards associated with products and materials. Employers are required to develop and implement a hazard communication program where any hazardous chemicals are known to be present and to which employees may be exposed. If required, this Company's' hazard communication program is covered in the Hazcom chapter of this manual.

Engineering Controls

This Company will incorporate all practicable engineering controls to eliminate or reduce air contaminants by using any of the following methods.

Dilution Ventilation

The Company will ensure that ventilation systems are designed to supply sufficient oxygen for normal respiration, to dilute contaminants in occupied spaces, remove contaminants emitted from work areas and to control odors. This Company also will ensure that its ventilation systems comply with The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) standards.

The primary method of controlling air contaminants in most buildings is general ventilation. General dilution ventilation requires a clean air supply to dilute all the contaminants of concern and exhaust openings located near the contaminant source or work area.

Recirculation of exhausts will be avoided by locating the intake and outlet remotely. The Company will ensure that reentry of exhaust air is avoided by discharging exhaust above the roof away from openings and air intakes.

Modifying Processes and Equipment

Pollution emission rates will be reduced, where practical, by modifying processes and equipment. The Company will strive to remove polluting substances that are part of the work process, and will substitute less toxic materials for contaminating substances. If the elimination of contaminating substances cannot be eliminated, we will attempt to reduce the quantity being used.

Equipment may be subject to modification that would reduce contamination. Using equipment differently or installing barriers may also reduce emissions at their source.

Air Cleaning

This Company will implement control strategies that involve removing air contaminants before the air is recirculated. Filters, electronic air cleaners, adsorption and absorption techniques will be employed for the removal techniques for pollutant gases where feasible.

Administrative Controls

In the event that adequate air quality cannot be achieved through engineering controls, the Company will implement all practicable administrative controls to protect workers. These may consist of any of the following:

Work Schedule: Through scheduling, managers can significantly reduce the amount of pollutant exposure in their buildings by:

- Eliminating or reducing the amount of time a worker is exposed to a pollutant (i.e., scheduling maintenance or cleaning work to be accomplished when other building occupants are not present)
- Reducing the amount of chemicals being used by or near workers (i.e., limit the amount of chemicals being used by the worker during maintenance or cleaning activities)
- Controlling the location of chemical use (i.e. perform maintenance work on moveable equipment in a maintenance shop as opposed to the general area, or locate the equipment (e.g., printers, copiers) in a separate room)

Housekeeping: Housekeeping practices should include

- Preventing dirt from entering the environment (using, for example, walk-off mat systems), removing dirt once it is in the building
- Disposing of garbage
- Storing food properly
- Choosing cleaning products and methods that minimize the introduction of pollutants into the building

EVALUATING MICROBIOLOGICAL CONTAMINATION

The Company will investigate potentially serious hazards when the following three criteria are met:

- **A Source:** The building is significantly water damaged, contaminated with molds, or reservoirs of other microorganisms (e.g., Histoplasma, Legionella) exist
- **An Exposure Pathway:** An exposure pathway is likely
- **Illness and Symptoms:** A physician has diagnosed a building-related illness or building occupants are suffering from symptoms consistent with exposure to the potential source

Evaluating the Source

Consideration should be made of the possible extent of contamination. Small areas of contamination (i.e., traces of mold on a wall or ceiling tile) may not necessarily warrant classification as a serious hazard (although it may be a superficial indicator of hidden problems), as opposed to a contaminated air plenum or an extensively water-damaged wall.

Normally, mold contamination is easily recognizable due to moldy odors and their unique visual characteristics. Other specialized sampling may be required if Legionella or any other pathogenic (disease-causing) microorganism is suspected.

Evaluating the Potential for an Exposure Pathway

Bio-aerosol sampling has been used by many investigators to demonstrate the existence of exposure pathways. However, the numerous technical limitations and difficulties associated with this method make the sampling results extremely difficult to interpret. In general, bio-aerosol sampling should not be performed, unless there are special circumstances that warrant this approach. You should qualitatively evaluate factors such as the magnitude and proximity of the contaminated materials and potential exposure pathways. See Table for potential sources and pathways for consideration.

Evaluating Illnesses and Symptoms

Examples of illnesses and symptoms consistent with exposure to molds and other microorganisms are indicated below. You must recognize that many of the listed symptoms are relatively common complaints and are not necessarily reflective of a workplace exposure or serious illness.

ATTACHMENTS

The following page contains a sample HVAC maintenance checklist that may be reproduced and used for performing maintenance and inspections.

HVAC System Maintenance Checklist

The following checklist can be used to investigate the HVAC system to make sure it is operating properly (e.g., the right mix of fresh air, proper distribution, and filtration systems are working, etc.)

Cooling Towers

- ☐ Written maintenance and inspection program
- ☐ Operated in accordance with manufacturer specifications
- ☐ Inspected regularly (monthly, or as required).
- ☐ Treatment of waste to control microorganisms, as required.
- ☐ Recordkeeping of biocide use – brand, volume, and results
- ☐ Training of workers for hazards involved.

Humidifiers

- ☐ Written maintenance and inspection program
- ☐ Inspected weekly during operation
- ☐ Cleaned and disinfected as required.
- ☐ No visual buildup of mold or slime
- ☐ Disinfectants removed before reactivating humidifiers.

Cooling Coils

- ☐ Written maintenance and inspection program
- ☐ Monthly (or, as required) inspections during operation
- ☐ Removal of dirt, slime, and mold, as required
- ☐ Upstream filters operating properly

Drain Pans, Drainage Systems

- ☐ Written maintenance and inspection program
- ☐ Monthly inspection (or, as required)
- ☐ Drains maintained in free-flowing condition.
- ☐ No accumulation of stagnant water
- ☐ No buildup of slime, mold, or dirt
- ☐ Removal of dirt, slime, and mold, as required
- ☐ Sample water for microbes, as required

Duct and Plenum Equipment

- ☐ Written inspection and maintenance program
- ☐ Supply, exhaust, return grilles, and ducts clear and clean.
- ☐ Routine inspection of ducts, debris, and microbial growth (e.g., semi-annually)
- ☐ Provisions of cleanout (e.g., within four feet downstream of duct expansions, supply air openings, or where particulate deposition may occur).
- ☐ Ductwork attached, not dented.
- ☐ Insulation intact, not wet, and no microbial growth
- ☐ Ductwork properly balanced.

Filtration Systems

- ☐ Written maintenance, operating, and inspection programs
- ☐ Routine inspection
- ☐ Provision for measuring pressure drops across the filtration system

SCOPE

This chapter provides information on the safe practices when working with ladders and/or stairs. The policy and procedures covered where will comply with the requirements of the OSHA ladder and stairway regulations in 1926 Subpart X and/or 1910 Subpart D, whichever is applicable.

It does not address working at elevations or fall protection, those items are addressed in separate chapters.

POLICY

Ladders are valuable tools, but they present a range of hazards that workers need to understand in order to use them safely. This Company has created this policy to ensure employees understand how to use ladders safely, how to select the right ladder for a job, how to store and maintain ladders and how to recognize ladders that may be hazardous.

EMPLOYER RESPONSIBILITIES

This Company is responsible for:

- Making sure all ladders meet safety requirements and are maintained in safe, working condition
- Selecting ladders to purchase according to needs of operations
- Ensuring employees are trained in safe ladder selection and use
- Removing ladders from service when they are no longer safe to be used
- Requiring employees use ladders as safely as possible

EMPLOYEE RESPONSIBILITIES

Employees will:

- Participate actively in ladder safety training
- Recommend safety improvements and report safety hazards to supervisor, safety team or other appropriate personnel
- Report damaged or otherwise unsafe ladders
- Follow safe practices when using ladders
- Transport and store ladders according to best safe practices

HAZARDS

Most ladder falls involve portable ladders that move, tilt or shift while a worker is climbing or descending. Unstable or slippery base surfaces are the primary reasons ladders fail. Other reasons include a misstep or a slip of the foot, loss of balance, an overreach and being struck by a vehicle or another object.

LADDER TYPES

Portable Ladders

Workers can reduce ladder fall risks by doing the following:

- Frequently inspecting and maintaining ladders
- Matching tasks to appropriate ladders
- Setting up ladders correctly
- Climbing and descending ladders properly

Any portable ladder used during construction activities: must be meet the following specifications

- Non-self-supporting and self-supporting portable ladders must support at least four times the maximum intended load; extra heavy-duty type 1A metal or plastic ladders must be able to support 3.3 times the maximum intended load. The ability of a self-supporting ladder to sustain loads must be determined by applying the load to the ladder in a downward vertical direction. The ability of a non-self-supporting ladder to sustain loads must be determined by applying the load in a downward vertical direction when the ladder is placed at a horizontal angle of 75.5 degrees
- The minimum clear distance between side rails for portable ladders must be 11.5 inches
- The rungs and steps of portable metal ladders must be corrugated, knurled, dimpled, coated with skid-resistant material, or treated to minimize slipping

Non-Self-Supporting Ladders

Single Portable or Straight Ladders

The single portable or straight ladder is indispensable for general use. It is the most common type of portable ladder and has the widest range of applications. When used on slippery surfaces, this ladder must have slip-resistant feet or be secured to prevent it from sliding.

Rubber or neoprene ladder shoes are recommended for smooth, dry surfaces, and spikes are recommended for snow or ice. Single portable ladders must not be longer than 30 feet and be used by only one worker at a time.

Extension or Section Ladder

Extension ladders consist of two or more sections that travel in guides or brackets, allowing adjustable lengths. The sections must be assembled so that the sliding upper section is on top of the lower section. Each section must overlap its adjacent section a minimum distance, based on the ladder's overall length. See Table 2.

The overall length of an extension ladder is determined by adding the lengths of the individual sections, measured along the side rails.

Note: Install positive stops on individual ladder sections to ensure the required overlap.

TABLE 1

Number of Sections for metal ladders	Maximum Length (in feet)
one section (or any section of a multiple-section ladder)	30
two-section ladder	48
more than two sections	60

TABLE 2

Normal Length of Ladder (in feet)	Overlap (in feet)
Up to and including 36	3
Over 36, up to and including 48	4
Over 48, up to 60	5

Extension ladders are made of wood, metal, or reinforced fiberglass. Wood ladders cannot have more than two sections and must not exceed 60 feet. Metal and fiberglass ladders can have as many as three sections; however, the overall length must not exceed 72 feet. See Table 1. Individual sections of any extension ladder must not be longer than 30 feet.

Extension ladders are for use by only one person at a time.

Make sure extension ladders have non-slip bases if there is a chance the ladder can slip. Cord-face ladder shoes are recommended for wet surfaces, rubber or neoprene ladder shoes for smooth dry floor surfaces, and steel spikes for ice or snow. Be careful if you use an extension ladder on oily, metal or concrete surfaces. Place the ladder securely and tie it off to prevent it from slipping.

Self-Supporting Ladders

Standard Stepladder

The standard stepladder, a general-purpose ladder, has flat steps and a hinged back. It is self-supporting and nonadjustable. An industrial model, designed for heavy service demands, has oversize back legs, heavy-duty flat steps, and knee braces that increase rigidity and durability.

Standard stepladders should be used only on surfaces that offer firm, level footing such as floors, platforms and slabs. They are available in metal, wood, or reinforced fiberglass versions, and are intended to support only one worker at a time. Remember not to stand on, or work from, the top step. The ladders must have a metal spreader or locking arms. They cannot be longer than 20 feet, measured along the front edge of the side rails.

Two-Way Stepladder

The two-way stepladder is similar to the industrial standard stepladder; however, each side of this ladder has a set of steps. The extra set of steps offers convenience and versatility: One person can work from either side or two people can work from the ladder at the same time — one on each side.

Platform Ladder

The platform ladder is a special-purpose ladder that has a large stable platform from which you can work at the highest standing level. The ladder's length is determined by the length of the front edge of the side rail from the bottom of the ladder to the base of the platform. The length of a platform ladder cannot exceed 20 feet.

Trestle Ladder

A trestle ladder is a self-supporting portable ladder that has two sections hinged at the top, forming equal angles with the base. A variation of the trestle ladder, the extension trestle ladder, includes a vertically adjustable single ladder that can be locked in place. (The single extension section must lap at least three feet into the base section.) Trestle ladders are used in pairs to support planks or staging. The rungs are not intended to be used as steps.

The angle of spread between open front and back legs must be 5 ½ inches per foot of length. The length cannot be more than 20 feet, measured along the front edge of the side rails. Rails must be beveled at the top and have metal hinges to prevent spreading. Metal spreaders or locking devices are also required to keep the rails in place.

Ladder Storage

The storage area should be well ventilated. Wood ladders should not be exposed to moisture or excessive heat. Avoid storing ladders near stoves, steam pipes or radiators.

Store straight or extension ladders in flat racks or on wall brackets. Make sure there are enough brackets to support the ladder so that it does not sag. If the ladder rails have a lateral curve, the wall brackets should match the curve.

Store stepladders vertically, in a closed position, to reduce the risk of sagging or twisting. Secure stored ladders so that they will not tip over if they are struck.

Store ladders, especially wood ladders, promptly after using them. Exposure to moisture and sun will shorten the life of a wood ladder.

Transporting Ladders

When you hand-carry a ladder, keep the front end elevated, especially around blind corners, in aisles, and through doorways. You will reduce the chance of striking another person with the front of the ladder.

When you transport a ladder in a truck or trailer, place it parallel to the bed. Avoid tossing, throwing or dropping it in the bed. If you transport a long ladder on a short truck bed over long distances, support the ladder so it will not sag or bend.

Drive slowly over rough terrain. Tie the ladder securely to eliminate nicking, gouging, chafing and road shock.

Fixed Ladders

A fixed ladder must be capable of supporting at least two loads of 250 pounds each, concentrated between any two consecutive attachments. Fixed ladders also must support added anticipated loads caused by ice buildup, winds, rigging and impact loads resulting from the use of ladder safety devices.

Individual rung/step ladders must extend at least 42 inches above an access level or landing platform, either by the continuation of the rung spacing as horizontal grab bars, or by providing vertical grab bars that must have the same lateral spacing as the vertical legs of the ladder rails.

Each step or rung of a fixed ladder must be capable of supporting a load of at least 250 pounds applied in the middle of the step or rung.

The minimum clear distance between the sides of individual rung/step ladders and between the side rails of other fixed ladders must be 16 inches.

The rungs of individual rung/step ladders must be shaped to prevent slipping off the end of the rungs. The rungs and steps of fixed metal ladders must be corrugated, knurled, dimpled, coated with skid-resistant material or treated to minimize slipping.

The minimum perpendicular clearance between fixed ladder rungs, cleats and steps, and any obstruction behind the ladder must be 7 inches, except that the clearance for an elevator pit ladder must be 4.5 inches.

The minimum perpendicular clearance between the centerline of fixed ladder rungs, cleats and steps, and any obstruction on the climbing side of the ladder must be 30 inches. If obstructions are unavoidable, clearance may be reduced to 24 inches, provided a deflection device is installed to guide workers around the obstruction.

The step-across distance between the center of the steps or rungs of fixed ladders and the nearest edge of a landing area must be no less than 7 inches and no more than 12 inches. A landing platform must be provided if the step-across distance exceeds 12 inches.

Fixed ladders must have cages, wells, ladder safety devices or self-retracting lifelines where the length of climb is less than 24 feet but the top of the ladder is at a distance greater than 24 feet above lower levels. Fixed ladders without cages or wells must have at least a 15-inch clear width to the nearest permanent object on each side of the centerline of the ladder.

If the total length of a climb on a fixed ladder equals or exceeds 24 feet, at least one of the following items is required:

- Ladder safety devices
- Self-retracting lifelines, and rest platforms at intervals not to exceed 150 feet
- A cage or well, and multiple ladder sections, each ladder section not to exceed 50 feet in length, these ladder sections must be offset from adjacent sections, and landing platforms must be provided at maximum intervals of 50 feet

The side rails of through or side-step fixed ladders must extend 42 inches above the top level or landing platform served by the ladder. For a parapet ladder, the access level must be at the roof if the parapet is cut to permit passage through it; if the parapet is continuous, the access level is the top of the parapet.

Steps or rungs for through-fixed-ladder extensions must be omitted from the extension; and the extension of side rails must be flared to provide between 24 inches (61 cm) and 30 inches clearance between side rails.

When safety devices are provided, the maximum clearance between side rail extensions must not exceed 36 inches.

Cages for Fixed Ladders

Horizontal bands must be fastened to the side rails of rail ladders, or directly to the structure, building or equipment for individual-rung ladders.

Vertical bars must be on the inside of the horizontal bands and must be fastened to them.

The inside of the cage must be clear of projections.

Horizontal bands must be spaced at intervals not more than 4 feet apart measured from centerline to centerline.

The bottom of the cage must be between 7 feet and 8 feet above the point of access to the bottom of the ladder.

The top of the cage must be at least 42 inches above the top of the platform, or the point of access at the top of the ladder.

Wells for Fixed Ladders

- Wells must completely encircle the ladder
- Wells must be free of projections
- The inside face of the well on the climbing side of the ladder must extend between 27 inches and 30 inches from the centerline of the step or rung
- The inside width of the well must be at least 30 inches
- The bottom of the well above the point of access to the bottom of the ladder must be between 7 feet and 8 feet

SAFE PRACTICES

Anytime there is a break in elevation of 19 inches or more, and no ramp, runway, embankment or hoist is provided, the Company will provide either a stairway or a ladder.

The point of access between levels must always allow free passage. If there is work being performed that limits free access, another point of access must be provided.

All employees will use the following safe practices when working with or on ladders:

- Inspect ladders for damage or wear before use
- Ladders must be maintained free of oil, grease, and other slipping hazards

- Ladders will not be loaded beyond the maximum intended load or the manufacturer's rated capacity
- Ladders may only be used for the purpose for which they were designed
- If a work area for 25 or more employees can be accessed only by a ladder (or anytime two-way traffic relies on a ladder), the Company will provide either a double-cleated ladder or two or more separate ladders to serve two-way traffic
- Ladder rungs, cleats and steps must be parallel, level, and uniformly spaced when the ladder is in position for use
- Ladders must not be tied or fastened together to create longer sections unless they are specifically designed for such use
- A metal spreader or locking device must be provided on each stepladder to hold the front and back sections in an open position when the ladder is being used
- When splicing side rails, the resulting side rail must be equivalent in strength to a one-piece side rail made of the same material
- Two or more separate ladders used to reach an elevated work area must be offset with a platform or landing between the ladders, except when portable ladders are used to gain access to fixed ladders
- Ladder components must be constructed to prevent injury from punctures or lacerations, and prevent snagging of clothing
- Wood ladders must not be coated with any opaque covering, except for identification or warning labels, which may be placed only on one face of a side rail
- Ladders with conductive metal sides will be marked with the words "WARNING — Do not use around energized electrical equipment" and must not be used around energized electrical equipment.
- Non-self-supporting ladders must be used at an angle where the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder. Wood job-made ladders with spliced side rails must be used at an angle where the horizontal distance is one-eighth the working length of the ladder
- Fixed ladders must be used at a pitch no greater than 90 degrees from the horizontal, measured from the backside of the ladder
- Ladders must be used only on stable and level surfaces unless secured to prevent accidental movement
- Ladders may not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement. Slip-resistant feet must not be used as a substitute for the care in placing, lashing, or holding a ladder upon slippery surfaces
- Ladders placed in areas such as passageways, doorways, or driveways, or where they can be displaced by workplace activities or traffic, must be secured to prevent accidental movement, or a barricade must be used to keep traffic or activities away from the ladder
- The area around the top and bottom of the ladders must be kept clear
- The top of a non-self-supporting ladder must be placed with two rails supported equally unless it is equipped with a single support attachment
- Ladders must not be moved, shifted, or extended while in use

- Ladders must have nonconductive side rails if they are used where the worker or the ladder could contact exposed energized electrical equipment
- The top or top step of a stepladder must not be used as a step
- Cross bracing on the rear, section of stepladders must not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Ladders must be inspected by a competent person for visible defects on a periodic basis and after any incident that could affect their safe use
- Single-rail ladders must not be used
- When ascending or descending a ladder, the worker must face the ladder
- Each worker must use at least one hand to grasp the ladder
- A worker on a ladder must not carry any object or load that could cause the worker to lose balance and fall

Structural Defects of Ladders

Portable ladders with structural defects-such as broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components-must immediately be marked defective, or tagged with "Do Not Use" or similar language and withdrawn from service until repaired.

Fixed ladders with structural defects-such as broken or missing rungs, cleats, or steps, broken or split rails, or corroded components-must be withdrawn from service until repaired. Ladder repairs must restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.

Defective fixed ladders are considered withdrawn from use when they are:

- Immediately tagged with "Do Not Use" or similar language
- Marked in a manner that identifies them as defective
- Blocked (such as with a plywood attachment that spans several rungs)

STAIRWAYS

Landings for stairways that will not be a permanent part of the structure must be at least 30 inches in the direction of travel and extend at least 22 inches in width at every 12 feet or less of vertical rise.

Stairs will be installed between 30 deg. and 50 deg. from horizontal. Riser height and tread depth shall be uniform within each flight of stairs, including any foundation structure used as one or more treads of the stairs. Variations in riser height or tread depth shall not be over ¼-inch in any stairway system.

Where doors or gates open directly on a stairway, a platform must be provided, and the swing of the door cannot reduce the width of the platform to less than 20 inches.

Metal pan landings and metal pan treads, when used, will be secured in place before filling with concrete or other material.

All parts of stairways must be free of hazardous projections, such as protruding nails.

Slippery conditions on stairways must be eliminated before the stairways are used to reach other levels.

Temporary Service

Except during construction of the actual stairway, stairways with metal pan landings and treads will not be used where the treads and/or landings have not been filled in with concrete or other material, unless the pans of the stairs and/or landings are temporarily filled in with wood or other material. All treads and landings must be replaced when worn below the top edge of the pan.

Except during construction of the actual stairway, skeleton metal frame structures and steps must not be used (where treads and/or landings are to be installed later) unless the stairs are fitted with secured temporary treads and landings. Temporary treads must be made of wood or other solid material and installed the full width and depth of the stairs.

Stair Rails

Stairways having four or more risers, or rising more than 30 inches in height, whichever is less, must have at least one handrail. A stair rail also must be installed along each unprotected side or edge. When the top edge of a stair rail system also serves as a handrail, the height of the top edge must not be more than 37 inches nor less than 36 inches from the upper surface of the stair rail to the surface of the tread.

- Winding or spiral stairways must be equipped with a handrail to prevent using areas where the tread width is less than 6 inches
- Stair rails must not be less than 36 inches in height
- Screens or mesh, when used, must extend from the top rail to the stairway step, and along the opening between top rail supports
- Intermediate vertical members, such as balusters, when used, must not be more than 19 inches apart
- Other intermediate structural members, when used, must be installed so that there are no openings of more than 19 inches wide

Handrails

- Handrails and the top rails of the stair rail systems must be capable of withstanding, without failure, at least 200 pounds of weight applied within 2 inches of the top edge in any downward or outward direction, at any point along the top edge
- The height of handrails must not be more than 37 inches nor less than 30 inches from the upper surface of the handrail to the surface of the tread
- The height of the top edge of a stair rail system used as a handrail must not be more than 37 inches nor less than 36 inches from the upper surface of the stair rail system to the surface of the tread
- Stair rail systems and handrails must be surfaced to prevent injuries such as punctures or lacerations and to keep clothing from snagging

- Handrails must provide an adequate handhold for employees to grasp to prevent falls
- The ends of stair rail systems and handrails must not have dangerous projections such as rails protruding beyond the end posts of the system
- Temporary handrails must have a minimum clearance of 3 inches between the handrail and walls; stair rails systems, and other objects
- Unprotected sides and edges of stairway landings must have a standard 42-inch guardrail system

Midrails

Midrails, screens, mesh, intermediate vertical members or equivalent intermediate structural members must be installed between the top rail and stairway steps of the stair rail system.

Midrails, when used, must be located midway between the top of the stair rail system and the stairway steps.

TRAINING

The Company will ensure every employee receives training on ladder and stair safety. This training will be provided at no cost to the employee during working hours.

This Company will use only training material that is appropriate in content and vocabulary to the educational level, literacy, and language of its employees.

Training Components

Our safety coordinator will ensure that employees receive training from a competent person in the following:

- Nature of fall hazards in the work area
- Correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used
- Proper construction, use, placement, and handling of stairways and ladders;
- Maximum load-carrying capacities of ladders used. In addition, retraining must be provided for each employee, as necessary, so that the employee maintains the understanding and knowledge acquired through compliance with the standard

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

The Company will maintain all employee training records for the length of their employment.

FORMS AND ATTACHMENTS

On the following pages, please find the following document(s):

- General Ladder Setup Procedure
- Ladders and Stairs Safety Training Documentation

GENERAL LADDER SETUP PROCEDURE

- Move the ladder near your work. Get help if it is too difficult to handle alone
- Make sure there are no electrical wires overhead
- Carefully “walk” the ladder up until it is vertical. Keep your knees bent slightly and your back straight
- The ladder should be closed. Position the ladder with the base section on top of the fly section. Block the bottom of the ladder against the base of the structure
- Set up the ladder on a secure, level surface or secure it so that it can’t be displaced
- Firmly grip the ladder, keep it vertical and carefully move back from the structure about one quarter the distance of the ladder’s working length. This allows you to place it at the correct angle against the structure.
- Lock the spreaders on a stepladder. Secure the lock assembly on extension ladders
- Use traffic cones or other barriers to protect the base of the ladder if vehicles or pedestrians could strike it
- Make sure that a non-self-supporting ladder extends at least three feet above the top support point for access to a roof or other work level

1. Raise the fly section. After the bottom rung of the fly section clears the bottom rung of the base section, place one foot on the base rung for secure footing
2. Lean the ladder against the structure. The distance from the base of the ladder to the structure should be one quarter the distance of the ladder’s working length. Both rails should rest firmly and securely against the structure.

Quick tip — 4:1 Ladder Setup

A non-self-supporting ladder should have a set-up angle of about 75 degrees — a 4:1 ratio of the ladder’s working length to setback distance.

Here’s how to achieve it: Stand at the base of the ladder with your toes touching the rails. Extend your arms straight out in front of you. If the tips of your fingers just touch the rung nearest your shoulder level, the angle of your ladder has a 4:1 ratio.

LADDERS AND STAIRS SAFETY TRAINING

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

(Retain at least 3 years)

SCOPE

This chapter includes the requirements and safe practices for protecting employees from harmful lead exposure. Lead exposure can occur in a wide range of occupations, both in construction and general industry. The safe practices covered here will comply with OSHA regulations 1910.1025 and/or 1926.62, whichever is applicable. This section does not provide Information on the development and enforcement of a Respiratory Protection Program, which is covered in a separate chapter.

POLICY

This Company has established these policies and procedures to protect our employees from the hazards of lead exposure.

EMPLOYER RESPONSIBILITIES

This Company will:

- Perform initial air monitoring to determine if any worker's exposure exceeds 30 µg/m^3
- Implement engineering and work practice controls to limit worker exposure to lead
- Provide a respiratory protection program for workers exposed above 50 µg/m^3
- Provide protective clothing if workers are exposed above 50 µg/m^3, or if workers are exposed to irritating compounds of lead
- Notify the state OSHA department prior to work if disturbing more than 100 square or linear feet of material, and the material disturbed is more than 5,000 parts per million (0.5%). Exception: If the only task is torch cutting or welding, and if less than one hour per shift
- Provide hygiene facilities, including change rooms and showers, in most cases
- Implement a medical surveillance program
- Train workers regarding the harmful effects of lead and protective measures
- Post warning signs
- Maintain exposure and medical records of affected workers
- Under certain conditions, transfer workers to a non-lead-exposed job without loss of pay or benefits

EMPLOYEE RESPONSIBILITIES

All employees will:

- Follow all Company safe practices
- Receive training on the health hazards of lead
- Receive appropriate personal protective equipment and training on how to use it
- Receive a copy of air-monitoring results
- Receive a copy of OSHA's Lead Standard

- Receive medical monitoring. If exposed to airborne lead at levels above 30 µg/m^3 for more than 30 days per year, employers must provide a medical surveillance program that includes blood testing for lead and medical examinations. Under the lead-in-construction regulations, certain high-risk construction jobs require monitoring even without documented high airborne lead levels

HEALTH HAZARDS

Lead enters the body in several ways:

- Workers can inhale in lead dust, mist, or fumes
- Workers can ingest lead dust that gets on their hands, beards, or clothes, or that gets in or on food, drinks, or anything else they put in their mouths
- Leaded gasoline can be absorbed through the skin

Once lead gets into the body, it stays there for a long time. Lead can build up in the body to dangerous levels over time. Too much lead in the body can damage the brain, nerves, kidneys and blood cells.

Lead can also affect the ability to conceive and bear a healthy child. If a pregnant woman is exposed to lead, it can harm her fetus. Men with lead exposure can have damaged sperm.

Overexposure to lead is common. Although many people with high lead levels do not feel sick or poisoned, their health may be seriously affected. The longer people have elevated lead levels, the greater the risk of health problems. Sometimes the damage is permanent.

Individuals respond differently to lead. Some symptoms of lead poisoning or overexposure include:

- Male impotency
- Muscle or joint pains
- Stomach aches and cramps
- Tiredness
- Irritability
- Muscle weakness
- Trouble concentrating

NOTE: According to the current federal lead hazard standard, if the sugar in a one-gram packet of sugar were lead dust, it could contaminate one hundred 10' x 10' kitchens.

POTENTIAL LEAD EXPOSURE

General Industry

- Lead production or smelting
- Lead fishing-weight production
- Battery manufacturing and recycling
- Scrap metal handling
- Indoor firing ranges
- Brass, copper, and lead foundries
- Machining and grinding lead alloys
- Radiator manufacturing and repair
- Lead soldering
- Ceramic glaze mixing

Construction Activities

- Demolition of old structures
- Thermal stripping, sanding or scraping of paint
- Abrasive blasting or rivet busting of structures with lead paint
- Welding, burning, and torching of old painted metal
- Steel-bridge maintenance
- Use of marine paints
- Home renovation and remodeling

Other Sources of Lead

- Paint in houses built before 1978
- Marine paints
- Drinking water from lead-soldered pipes
- Soil and air near buildings and factories where people work (or have worked) with lead
- Soil in areas where lead-containing pesticides were used
- Leaded gasoline

PROTECTING WORKERS

Whether your Company is doing construction, demolition or general industrial work, if your employees can be exposed to lead, you must protect them from lead hazards.

Lead is considered hazardous when it exceeds the OSHA Permissible Exposure Level (PEL) of 50 micrograms per cubic meter of air (50 mg/m^3) averaged over an eight-hour period. The PEL, is the highest concentration of lead that a worker can be exposed to without needing protective equipment.

If employee's lead exposure levels can't be kept below the PEL by using engineering or administrative controls, the Company will implement medical surveillance and a Respiratory Protection program.

Employees, who may be exposed to lead above the PEL, must be provided with respirators that will protect them. In addition to respirators, you must provide workers with the following:

- Proper protective clothing — such as coveralls, gloves, and eye protection
- Hand washing facilities — so they can wash their hands before eating or drinking
- Training covering lead hazards, hazard communication, and use of respirators
- Medical surveillance that includes biological monitoring

OSHA has established categories of trigger tasks, activities that could expose workers to lead, based on increasing exposure levels (shown in the table below). In general, the more a task exposes a worker to lead above the PEL, the more protection a worker needs to control exposure.

Trigger Task Examples	Exposure Levels	Respiratory Protection
Manual scraping, sanding, and demolition tasks; heat gun work; power tool cleaning with a dust collector	Up to 10 times the PEL	• N, P, or R 100 filtering facepiece • Half-face respirator with HEPA or N, P, or R 100 cartridges
Power tool cleaning without a dust collector	Ten to 50 times the PEL	• Full-face respirator with HEPA or N, P, or R 100 cartridges • Tight-fitting powered air-purifying respirator wit HEPA or N, P, or R 100 cartridges
Torch burning, abrasive blasting, welding, and cutting	Fifty to 1,000 times the PEL	• Half-mask supplied-air respirator operated in the pressure-demand or positive-pressure mode.

MEDICAL SURVEILLANCE

If Company employees may be exposed to lead levels above the PEL, the Company will provide a medical surveillance program, without cost to employees and at a reasonable time and place, for all employees who are or may be exposed above the action level for more than 30 days per year. All medical examinations and procedures are performed by or under the supervision of a licensed physician.

Biological monitoring is available according to the following schedule:

- Blood sampling and analysis for lead and zinc protoporphyrin levels to each employee at least every 6 months
- At least every two months for each employee whose last blood sampling and analysis indicated a blood lead level at or above 40 µg/100 g of whole blood. This frequency will continue until two consecutive blood samples and analyses indicate a blood lead level below 40 µg/100 g of whole blood
- A warning sign will be posted at each regulated work area that exceeds the PEL
- Signs will be illuminated and cleaned as necessary so that the legend is readily visible

The Company will maintain an accurate record of all monitoring that includes: the date(s), number, duration, location and results of each of the samples taken, including a description of the sampling procedure used to determine exposure.

- A description of the sampling and analytical methods used and evidence of their accuracy
- Name, social security number, and job classification of the employee monitored and of all other employees whose exposure the measurement is intended to represent
- The type of respiratory protection worn, if any
- These monitoring records will be maintained for at least 40 years or for the duration of employment plus 20 years, whichever is longer

The Company will maintain an accurate record for each employee subject to medical surveillance. This record will include:

- The name, social number, and description of the duties of the employee
- A copy of the physician's written opinions
- Results of any airborne exposure monitoring done for that employee and the representative exposure levels supplied to the security physician
- Any employee medical complaints related to exposure to lead

The Company will keep, or assure that the examining physician keeps, a copy of the medical examination results, including medical and work history; a description of the laboratory procedures; a copy of the results of biological monitoring. These medical records will be maintained for at least 40 years, or for the duration of employment plus 20 years, whichever is longer.

The Company will maintain an accurate record for each employee removed from current exposure to lead. Each record will include:

- The name and social security number of the employee
- The date on each occasion that the employee was removed from current exposure to lead as well as the corresponding date on which the employee was returned to his or her former job status
- A brief explanation of how each removal was or is being accomplished
- A statement with respect to each removal indicating whether or not the reason for the removal was an elevated blood lead level
- Medical removal records will be maintained for at least the duration of an employee's employment

Environmental monitoring, medical removal, and medical records will be provided upon request to employees, designated representatives, and OSHA.

Biological monitoring

Biological monitoring is another term for blood testing. Blood tests are one way to identify workers who may be overexposed to lead. These tests must be done under the direction of a licensed physician. If tests show the amount of lead in a worker’s blood is increasing, you must reduce the worker’s exposure level.

Doctors or Other Health-Care Providers

Workers who are concerned about lead over-exposure for themselves or others in their household should see a doctor. The doctor can arrange for blood lead level testing and help interpret any exposure and health effects. It is important for the doctor to know if you have been exposed to lead, even if you have no symptoms.

These are rules for employers on using lead safely and ensuring that workers are protected from the harmful effects of lead. OSHA will investigate complaints from workers who believe they are being overexposed to lead or other chemicals.

SAFE PRACTICES

When workers disturb lead paint, you must make sure they clean it up daily — by containing it, wetting it down, and then sweeping it or HEPA vacuuming it. If you require workers to wear respirators, you must first develop a written respiratory protection program that covers medical evaluations, fit testing and worker training.

Workers can carry lead dust home on clothes and shoes, affecting the health of others in the family. Young children are especially sensitive to the effects of lead.

Protect you and your family from lead exposure:

- Use separate work clothes and shoes or boots while at work
- Keep your street clothes in a clean place
- Do not wear your work clothes and shoes or boots home
- If possible, shower at work before going home
- Launder your clothes at work. If you must take clothes home, wash and dry them separately
- Wash your hands and face before you eat, drink, or smoke
- Eat, drink, and smoke only in areas free of lead dust and fumes

Containment

Close off the work area with heavy-duty plastic sheeting and secure the sheeting with duct tape. To secure an access door, tape heavy-duty plastic to the perimeter of the door. Leave the plastic a couple of inches long so you can tape it to the floor. Cut a lengthwise slice in the plastic so you can walk through it. Finally, tape a second plastic sheet to the top of the door so that it will drape against the first sheet. Vertical containment for exterior work can be erected using plastic sheeting over scaffolding or a wood frame.

Keep everyone except protected workers out of work area. Keep worksite dust and debris from contaminating non-work area. Make sure workers, tools, equipment, etc. are cleaned, wrapped, or de-contaminated before leaving the contained area.

Multiple-Bucket Mopping

Use at least two buckets for mopping work surfaces – one for washing and one for rinsing. A general household cleaner is fine. Change the wash solution and rinse water often. Wrap or bag mop heads and sponges to discard when the job is complete. Empty wastewater in toilet or sanitary line "clean-out", not street drains, gutters, or on the ground.

HEPA Vacuuming

A HEPA (high efficiency particulate air) vacuum is designed to pick up very small particles (0.3 microns, or about 1/500th the width of a human hair). Household and shop vacuum cleaners spread dust around. HEPA vacuums capture it.

Keep in Mind

- Minimize the amount of lead-based paint you disturb

- Contain the work area and cover or remove belongings
- Protect workers from harmful lead exposure
- Work wet
- Contain and filter wastewater
- Clean up daily and dispose of waste correctly

WORKING WITH LEAD PAINT

In order to protect workers, customers, and the environment when working with lead-based paint, lead and its compounds must be handled properly. Mishandling lead and its compounds can contaminate the job site, pollute the environment, and harm others. Lead damages the brain, nervous system, blood cells, kidneys, and reproductive organs – the effects can be permanent.

Lead dust, a by-product of remodeling and painting 'prep' work, is the major source of lead poisoning in children. If you have questions about working with lead-based paint that this guide does not answer, do not hesitate to contact your State Health Division.

Public health agencies became concerned about lead after many tested children showed high levels of lead in their blood. After refiners removed lead from gasoline, children's blood lead levels dropped. Now the biggest source of lead in the environment is from lead paint. Most childhood lead poisoning results from ingested lead-paint dust.

Detecting Lead-Based Paint

The best way is to have it tested by a professional; the State Health Division certifies inspectors and risk assessors who provide this service. Lead was restricted in residential paint in 1978. In general, the older a building, the greater the chance that it contains lead-based paint. Houses built before 1950 are very commonly painted with lead paint.

OSHA allows the use of lead test kits for positive determination only, i.e., that lead is present. Negative results do not guarantee that lead is absent and must be confirmed by a laboratory. If lead is present, then you must provide worker protection. Health Division rules prohibit making the results of test kits known to clients, since residential lead inspections can only be performed by certified inspectors or risk assessors.

Pre-Renovation Notification

The Environmental Protection Agency requires that Remodelers distribute a lead-paint hazards pamphlet to clients before beginning remodeling work. (A remodeler is any professional who disturbs more than two square feet of paint in a residence or child- occupied facility built before 1978.) For more information on these requirements, contact the State Health Division.

Lead Paint Abatement

Abatement is the permanent removal or elimination of lead-based-paint hazards from surfaces and from soil. “Permanent” means that the treatment must last 20 years. Abatement strategies for surfaces include encapsulation (application of a tough coating), containment (placement of a rigid barrier over the painted surface), and paint removal or replacement of building components. Soil can be paved over or removed and replaced. Lead-based-paint abatement rules do not apply to most residential painting and remodeling work. “Prep” work, painting, and other contracting that are part of renovation or routine home maintenance are not regulated. However, when the primary purpose of your work is removing lead-based paint, the work is considered “abatement”. Keep in mind that OSHA and Department of Environmental Quality requirements apply.

Rugs, carpets or upholstery that has been contaminated by lead dust cannot be cleaned. Their porous surfaces are lead-dust traps. No known methods can clean them effectively once they are contaminated. Always cover or remove these items before starting work.

WORKING WITH LEAD-BASED PAINT

Topic	Why you should be concerned	What you should do
Understand the Rules	OSHA requires contractors who work with lead-based paint to follow specific procedures. Contractors are responsible for understanding the procedures and for training their employees to follow them.	Review this guide. It highlights requirements and offers guidelines on protecting you, your workers, your customers, and the environment from lead-based-paint contaminants.
Contain Work Areas	Uncontained lead dust, chips, and debris settle on soil, plants, and furniture. Cleanup or replacement can be very expensive. It is a good idea to notify neighbors before work begins. It is good P. R. and it gives them a chance to close windows, move play equipment, cover garden spots, etc. in case any lead debris moves into the next yard	Interiors • Turn off and seal the HVAC system. • Remove belongings or wrap them in plastic —especially rugs and upholstered furniture. • Cover floors and carpet with double layers of heavy-duty plastic sheeting and tape the sheeting to the skirting boards. • Use protected passageways or plastic runners between work areas and exits. • Close off the work area with heavy-duty plastic sheeting • Work on one room at a time. • Keep all residents, especially children and women of childbearing age, out of the work area. Exteriors • Spread heavy-duty plastic sheeting at least 10 feet from the foundation, covering the ground and vegetation. • Move play equipment away from the work areas and cover sand pits. • Close nearby windows and doors. • Use a shade cloth to contain dust. • Capture and filter wastewater; make sure it doesn't run into a storm drain. • Keep all residents, especially children and women of childbearing age, out of the work area.
Choose an appropriate work method	Some paint-removal activities produce toxic fumes and mists, and other methods spread lead dust. Cleaning up uncontained contaminants can be very expensive.	Minimize the amount of lead-based paint you disturb. If you need to remove lead-based paint, review the table on the following page. It highlights what you need to know about various methods for removing lead-based paint: what you should do, what you should avoid, and your responsibilities under OSHA's safety and health rules.
Clean up work areas promptly	Cleanup methods such as dry sweeping and using household or shop vacuums spread dust and debris.	Work wet and clean up daily. Wet debris before sweeping. For cleanup, wet down debris and use a HEPA vacuum (see the "Best practices" page).
Dispose of waste correctly	Paint chips, sludge, and contaminated PPE may be hazardous waste. Disposing of them improperly could harm customers, neighbors, or the environment.	Clean up daily using wet methods and HEPA vacuum. Collect visible paint chips. Put the debris into heavy-duty plastic bags, buckets, or similar containers, and secure them. Contact the DEQ to find out how to dispose of waste.
Do a clearance test	Even though your finished project may look clean, high levels of contaminated dust may still be present on some surfaces, exposing residents to lead hazards.	Hire a certified lead-based paint risk assessor to conduct a clearance test. (This dust-wipe sampling technique requires laboratory analysis). Contact the Health Division for a list of certified risk assessors and for more information about cleanup practices.

REMOVING LEAD-BASED PAINT: METHODS AND PRACTICES (PAGE 1 OF 2)

	What You Should Avoid	What You Should Do
Hand Scraping and Sanding 	Do not use dry scraping or sanding. This method spreads lead dust, the most common source of lead poisoning, particularly among children and pets. Their injuries could be your responsibility.	Work wet and contains the work area. Use a hand or backpack sprayer or hose with fine spray nozzle to wet surfaces. Cover the floors of interior rooms with double layers of plastic sheeting before you begin work. Close all windows. Contain the work area.
Using Heat 	Avoid using extreme heat. Lead-based paint heated above approx. 950° F can generate harmful toxic fumes. Does not use open-flame torching. When an open flame heats lead-based paint, it generates toxic fumes.	Use a heat gun and keep the setting low (below 750° F) or work wet with a hand scraper, sanding sponge or wire brush.
Using Power Sanders, Grinders, and Saws 	Do not use uncontained power sanding, grinding, or abrasive lasting. Lead dust is the most common source of household lead poisoning, particularly among children and pets. Their injuries could be your responsibility. Site cleanup costs can be very expensive.	Use only powered sanding and grinding equipment fitted with a special shrouding and a HEPA vacuum exhaust. If shrouded HEPA-vac tools are not available, use a complete containment system. Always use a complete containment system with abrasive sandblasting equipment.
Using Power Washers 	Do not use uncontained power washing and hydro-blasting. Lead-contaminated water can enter storm drains; most street drains empty directly into creeks or streams. Filter wastewater. Never empty filtered water into street drains or on the ground. Contaminated ground may require expensive clean up and/or removal and replacement of topsoil or landscaping.	For single family residences ONLY: minimize runoff to drains by allowing water to infiltrate to the soil using landscape cloth and by diverting water from hard surfaces to where it can infiltrate. Where runoff reaches drains, minimize the movement of paint chips into the storm drain by placing burlap or commercial filtering media over the drain, and held in place with bio-bags or other means, to filter out the paint chips. Visually inspect drain when complete to remove any visible paint chips. For commercial and multi-family residences, contact DEQ to determine if a wash water permit and the associated guidance are required.

REMOVING LEAD-BASED PAINT: METHODS AND PRACTICES (PAGE 2 OF 2)

Using Chemical Paint Strippers 	Avoid inhaling or contacting chemical paint strippers. The chemicals are harsh and some produce harmful vapors. Methylene chloride, a common paint stripper, is particularly hazardous	Use chemical paint strippers only for small tasks. Cross-ventilate work areas, use non-corrosive, nonvolatile strippers, and wear chemically resistant gloves. The sludge from stripping work is hazardous waste; dispose of it correctly.
Manual Demolition 	Avoid doing manual demolition work in uncontained areas — cleaning up contaminated living space, household goods, and adjoining areas can be very expensive.	Always contain and cover work areas, work wet, and clean up daily, alternating wash and HEPA vacuum cycles.

SCOPE

This chapter covers the requirements machine guarding and complies with the OSHA Machine and Machinery Guarding regulations in 1910 Subpart O. It does not address safeguards for hand held power tools or lockout/tagout procedures, which are covered in other chapters of this manual.

POLICY

It is the policy of this Company to ensure safe operation of machines and equipment. The following policy provides the safe practices and procedures to protect employee's safety through hazard identification and evaluation, safeguarding and training.

EMPLOYER RESPONSIBILITIES

This Company will:

- Correct identified safety hazards with appropriate engineering and administrative controls
- Provide all affected employees with training on machine safe operating methods, based on each of their job duties
- Encourage employees to perform their jobs with safety and health as their priority
- Conduct periodic hazard analyses of work areas to assess equipment safety
- Establish and follow a program of periodic and regular inspections of all machine guards, parts and auxiliary equipment are in safe operating condition properly adjusted, maintained and repaired or replaced as needed
- Maintain records of inspections and maintenance

EMPLOYEE RESPONSIBILITIES

Employees are expected to:

- Be aware of hazards presented by equipment and machinery where they work
- Follow Company safety policy and the instructions of the supervisor
- Comply with safe operating procedures for all equipment
- Attend and participate in appropriate safety training
- Report safety concerns and provide safety recommendations as appropriate

HAZARDS

Moving machine parts have the potential to cause severe workplace injuries, such as crushed fingers or hands, amputations, burns, or blindness. Safeguards are essential for protecting workers from these preventable injuries. Any machine part, function or process that could cause injury must be safeguarded.

Hazardous Motions

A wide variety of mechanical motions and actions can present hazards to workers. These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth and any parts that impact or shear.

Rotating motion can be dangerous; even smooth, slowly rotating shafts can grip clothing or skin and force an arm or hand into a dangerous position. Injuries due to contact with rotating parts can be severe.

Collars, couplings, cams, clutches, flywheels, shaft ends, spindles, meshing gears and horizontal or vertical shafting are examples of common rotating mechanisms that may be hazardous. The danger increases when projections such as setscrews, bolts, nocks, abrasions, and projecting keys or setscrews are exposed on rotating parts.

Hazardous Actions

A wide variety of mechanical actions can present hazards to the worker. These can include:

- Cutting
- Punching
- Shearing
- Bending

These different types of hazardous mechanical actions are basic in varying combinations to nearly all machines, and recognizing them is essential to protecting workers from the dangers they present

Where Mechanical Hazards Are Present

Three basic areas requiring safeguarding:

- Point of Operation: The point of operation is where the work is actually done on the material. The type of work being done can include the following:
  - Cutting
  - Forming
  - Punching
  - Bending
  - Shaping
  - Turning
  - Boring
  - Drilling
  - Grinding
  - Shearing
- Power Transmission Apparatus: The power transmission apparatus includes components of mechanical systems that transmit energy to parts of the machine including the following:
  - Flywheels
  - Couplings
  - Chains
  - Sprockets
  - Pulleys
  - Cams
  - Cranks
  - Shafts
  - Belts
  - Spindles
  - Gears
  - Rods

Other Moving Parts: there are ranges of parts in a mechanical system that may move during operation. These parts include moving parts that feed material, reciprocate, rotate or move transversely

Non-Mechanical Hazards

Machines obviously present a variety of other hazards that cannot be ignored. Remember that things other than safeguarding moving parts can affect the safe operation of machines.

All power sources for machines are potential sources of danger. When using electrically powered or controlled machines, for instance, the equipment as well as the electrical system itself must be properly grounded. Replacing frayed, exposed or old wiring will also help to protect the operator and others form electrical shocks or electrocution. High-pressure systems also need careful inspection and maintenance to prevent possible failure from pulsation, vibration or leaks. Such a failure could cause, among other things, explosions or flying objects.

Machines often produce noise that can result in a number of hazards to workers. Noise can startle and disrupt concentration and interfere with communications, thus hindering the worker's safe job performance.

Engineering controls such as the use of sound-dampening materials can help control the harmful effects of noise. In addition, administrative controls that involve removing the worker from the noise source can be an effective measure when feasible.

Because some machines require the use of cutting fluids, coolant, and other potentially harmful substances, operators, maintenance workers, and others in the vicinity may need protection. These substances can cause ailments ranging from dermatitis to serious illnesses and disease. Specially constructed safeguards, ventilation, and protective equipment and clothing are possible temporary solutions to the problem of machinery-related chemical hazards until these hazards can be better controlled or eliminated from the workplace.

PROTECTIVE CLOTHING AND PPE

When engineering controls are not available or are not fully capable of protecting employees from hazards, protective clothing or PPE will be used.

To provide adequate protection, the protective clothing and equipment selected must always be:

- Appropriate for the particular hazards
- Maintained in good condition
- Properly stored when not in use, to prevent damage or loss
- Kept clean, fully functional, and sanitary

The necessary PPE can include, but is limited to:

- Hardhats
- Face shields, safety goggles or glasses
- Hearing protection
- Coveralls, jackets, vests, aprons, full-body suits
- Special sleeves and gloves
- Safety shoes and boots or other acceptable foot guards

It’s important to note that protective clothing and equipment can create hazards. A protective glove can become caught between rotating parts, or a respirator face-piece can hinder the wearer's vision, for example, require alertness and continued attentiveness whenever they are used.

Other parts of the worker's clothing may present additional safety hazards. For example, loose-fitting shirts might possibly become entangled in rotating spindles or other kinds of moving machinery. Jewelry, such as bracelets and rings, can catch on machine parts or stock and lead to serious injury by pulling a hand into the danger area.

SAFE PRACTICES

Safeguards are essential for protecting workers from preventable injuries. Remember, any machine part, function or process that could cause an injury must be safeguarded. When the operation of a machine or accidental contact with it can injure the operator or others nearby, the hazards must be either controlled or eliminated.

This information describes the various hazards of mechanical motion and describes some techniques for protecting workers from these hazards. General information includes where mechanical hazards occur, the hazards created by different kinds of motions and the requirements for effective safeguards, as well as a brief discussion of non-mechanical hazards.

Installation of Machines

- Electrically powered machines must be grounded as prescribed in the National Electrical Code
- A machine must be placed so that the operator or other employee tending the machine doesn’t need to stand in an aisle
- A machine must be located so that there’s enough space for the operator to handle the material and run the machine without interference to or from another employee or machine
- A machine installed on a bench, table or stand must be secured to prevent unintentional movement or tipping
- A stationary machine must be anchored or provided with anti-slip pads to prevent unintentional movement

In-running nip point hazards are caused by the rotating parts on machinery. There are three main types of in-running nips.

Parts can rotate in opposite directions while their axes are parallel to each other. These parts may be in contact or in close proximity. In the latter case, the stock fed between the rolls produces the nip points. This danger is common on machines with intermeshing gears, rolling mills and calendars.

Nip points are also created between rotating and tangentially moving parts. Some examples would be the point of contact between a power transmission belt and its pulley, a chain and a sprocket, and a rack and pinion.

Nip points can occur between rotating and fixed parts that create a shearing, crushing or abrading action. Examples are spoked handwheels or flywheels, screw conveyors or the periphery of an abrasive wheel and an incorrectly adjusted work rest.

- Reciprocating: Reciprocating motions may be hazardous because, during the back-and-forth or up-and-down motion, a worker may be struck by or caught between a moving and a stationary part
- Transverse: Transverse motion (movement in a straight, continuous line) creates a hazard because a worker may be struck or caught in a pinch or shear point by the moving part

SAFEGUARD REQUIREMENTS

Safeguards must meet these minimum general requirements:

- Prevent contact: The safeguard must prevent hands, arms, and any other part of a worker's body, from making contact with dangerous moving parts. A good safeguarding system eliminates the possibility of the operator or another worker placing parts of their bodies near hazardous moving parts
- Secure: Workers should not be able to easily remove or tamper with the safeguard, because a safeguard that can easily be made ineffective is no safeguard at all. Guards and safety devices should be made of durable material that will withstand the conditions of normal use. They must be firmly secured to the machine
- Protect from falling objects: The safeguard should ensure that no objects could fall into moving parts. A small tool that is dropped into a cycling machine could easily become a projectile that could strike and injure someone
- Create no new hazards: A safeguard defeats its own purpose if it creates a hazard of its own such as a shear point, a jagged edge, or an unfinished surface that can cause a laceration. The edges of guards, for instance, should be rolled or bolted in such a way that they eliminate sharp edges
- Create no interference: Any safeguard that impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded. Proper safeguarding can actually enhance efficiency since it can relieve the worker's apprehensions about injury
- Allow safe lubrication: If possible, one should be able to lubricate the machine without removing the safeguards. Locating oil reservoirs outside the guard, with a line leading to the lubrication point, will reduce the need for the operator or maintenance worker to enter the hazardous area

Machine Controls

Engineering controls, which eliminate the hazard at the source and don’t rely on the worker's behavior for their effectiveness, offer the best and most reliable means of machine safeguarding. Therefore, engineering controls must be the employer's first choice for eliminating machine hazards.

- Powered electrical equipment must have an on-off switch
- When unexpected motion would cause injury, an actuating machine control, except for an emergency device for a powered fixed or transportable machine must be guarded or located to prevent accidental actuation
- Unless its function is self-evident, each operating control device must be identified as to its function

- A powered machine that is attended by more than one employee must be equipped with an actuation device for each employee who is exposed to a point-of-operation hazard. The machine will activate only after concurrent use of all actuation devices
- When unexpected motion would cause injury, precautions must be taken to prevent a machine from automatically restarting upon the restoration of power after a power failure
- Where a machine workstation is remotely located from the machine controls, either a red emergency stop device must be provided at the machine workstation if a hazard exists that could cause an injury, or the actuation of the controls must require continuous depression during the hazardous portion of the machine cycle
- Equipment that is operated in series so that one piece of equipment automatically supplies another must be interlocked so that when any equipment in the series is stopped for any reason, the initial stopping causes the upstream equipment to stop if continued operation would create a hazard
- Reactivation must require a separate positive action by the employee who initiated the stop

MACHINE SAFEGUARDING

There are many ways to safeguard machines. The type of operation, the size or shape of stock, the method of handling, the physical layout of the work area, the type of material and production requirements or limitations will help to determine the appropriate safeguarding method for the individual machine. As a rule, power transmission apparatus is best protected by fixed guards that enclose the danger areas. For hazards at the point of operation, where moving parts actually perform work on stock, several kinds of safeguarding may be possible. One must always choose the most effective and practical means available. Safeguards can be grouped under five general classifications:

- Guards
- Devices
- Location/Distance
- Feeding/Ejection Mechanisms

GUARDS

Guards prevent access to danger areas. There are four general types of guards:

- Fixed: As its name implies, a fixed guard is a permanent part of the machine. It is not dependent upon moving parts to perform its intended function. It may be constructed of sheet metal, screen, wire cloth, bars, plastic or any other material that is substantial enough to withstand whatever impact it may receive and to endure prolonged use. This guard is usually preferable to all other types because of its relative simplicity and permanence
- Interlocked: When this type of guard is opened or removed, the tripping mechanism and/or power automatically shuts off or disengages and the machine cannot cycle or be started until the guard is back in place. An interlocked guard may use electrical, mechanical, hydraulic or pneumatic power or any combination of these. Interlocks should not prevent "inching" by remote control if required. Replacing the guard should not automatically restart the machine. To be effective, all movable guards should be interlocked to prevent occupational hazards

- Adjustable: Adjustable guards are useful because they allow flexibility in accommodating various sizes of stock
- Self-Adjusting: The openings of these barriers are determined by the movement of the stock. As the operator moves the stock into the danger area, the guard is pushed away, providing an opening that is only large enough to admit the stock. After the stock is removed, the guard returns to the rest position. This guard protects the operator by placing a barrier between the danger area and the operator. The guards may be constructed of plastic, metal or other substantial material. Self-adjusting guards offer different degrees of protection

REQUIRED GUARDING

Method of Feeding Machine	Safeguarding Required
A. Automatic feed • Automatic roll feed • Automatic push pull • Transfer • Dial feed	Fixed barrier guard, or die enclosure guard, or gate or moveable barrier device, or interlocked press barrier, or an operating device that assures machine action will be stopped before the operator can reach into the point of operation.**
B. Semiautomatic feed Chute feed (both gravity and follow feed) Slide or push feed Dial feed Sliding dies Revolving dies	Fixed barrier guard, or die-enclosure guard, or gate or moveable barrier device, or 2-hand control.
C. Manual feed	Fixed barrier guard, or die-enclosure guard, or gate or moveable barrier device, or sweep device, or pullout device, or restraint device, or electronic control device, or two-hand control.
** Where two or more machines are used in inline operations, with automatic loading and unloading equipment, either the safeguards required in “A” above, or an interlocked enclosure, must be used in conjunction with each machine.	

Guard Construction

Many builders of single-purpose machines provide point-of-operation and power transmission safeguards as standard equipment. However, not all machines in use have built-in safeguards provided by the manufacturer.

Guards designed and installed by the builder offer two main advantages:

- They usually conform to the design and function of the machine.
- They can be designed to strengthen the machine in some way or to serve some additional functional purposes.

User-built guards are sometimes necessary for a variety of reasons. They have these advantages:

- Often, with older machinery, they are the only practical safeguarding solution
- They may be the only choice for mechanical power transmission apparatus in older plants, where machinery is not powered by individual motor drives
- They permit options for point-of-operation safeguards when skilled personnel design and make them
- They can be designed and built to fit unique and even changing situations
- They can be installed on individual dies and feeding mechanisms
- Design and installation of machine safeguards by plant personnel can help to promote safety consciousness in the workplace

However, they also have disadvantages:

- User-built guards may not conform well to the configuration and function of the machine
- There is a risk that user-built guards may be poorly designed or built

Point-of-Operation Guards

Although point-of-operation safeguarding is complicated by the number and complexity of machines, and by the different uses for individual machines, it is still extremely important.

Poorly designed, built or installed guards may create a hazard rather than eliminating one. To be effective, the guards must safeguard the employee while allowing the work to continue with minimum disruption to the production process.

Where operator exposure exists, machines must be equipped and operated with a point-of-operation guard or a point-of-operation protection device for every operation performed, except where the point of operation is limited to an opening of ¼ inch or less.

Point-of-operation guards must:

- Be reliable in construction, application, and adjustment
- Be attached to the machine, die, etc. (check stability of mounting)
- Not introduce any hazards
- Be designed, constructed, and located to facilitate inspection
- Minimize the possibility of removing or misusing essential parts

A barrier guard may have feed holes for the stock, which must be of such size and distance from the die as to prevent entry of a hand or finger of the operator into the point of operation or other nip points.

All guards must be installed, maintained and adjusted to provide safe operation.

Mechanical Power Transmission Apparatus Guarding

A significant difference between power transmission guards and point-of-operation guards is that the former type needs no opening for feeding stock. The only openings necessary for power transmission guards are those for lubrication, adjustment, repair and inspection. These openings should be provided with interlocked covers that cannot be removed except by using tools for service or adjustment.

Power transmission guards will cover all moving parts so that no part of the operator's body can be exposed to them.

Die-Enclosure and Fixed Barrier Guards

- A die-enclosure guard must be attached to the machine in a fixed position and must be so designed and constructed that the operator cannot reach over, under, or around the guard and into the point of operation
- At least a 1-inch clearance must be provided between the top edge of the guard and the slide or any projection thereon, to prevent a shearing hazard caused by slide travel. The guard must extend at least 1 inch above the bottom of the slide at the top of the stroke in order to prevent a shearing hazard
- The guard must afford at least 50% visibility where visibility is necessary for proper placement of materials, and permit easy feeding of the stock through openings. Where rods are used, they must be vertical
- A fixed barrier guard must enclose the point of operation and must be secured to the machine by fasteners that would discourage removal by unauthorized personnel

Interlocked Press-Barrier Guards

An interlocked press-barrier guard, when utilized, must enclose the die space or work area and be interlocked such that the slide cannot be actuated unless the guard or hinged or movable section is in position.

Guard Material

Under many circumstances, metal is the best material for guards. Guard framework is usually made from structural shapes, pipe, bar, or rod stock. Filler material generally is expanded, perforated or solid sheet metal or wire mesh. It may be feasible to use plastic or safety glass where visibility is required.

Guards made of wood generally are not recommended because of their flammability and lack of durability and strength. However, in areas where corrosive materials are present, wooden guards may be the better choice.

Fans

Blades of a fan, located within 7 feet of a floor or working level and used for ventilation or the cooling of an employee, must be guarded with a firmly affixed or secured guard. Any opening in the guard must not have any of its dimensions more than 1 inch, and the distance to the blade must be at least as shown in Table 1.

TABLE 1 FANS: SAFETY-RELATED DIMENSIONS

Smallest Dimension in Guard	Minimum Distance from Guard to Blade
Greater than 0 up to ¼ inclusive	½ inch
Greater than ¼ up to ⅜ inclusive	1 ½ inches
Greater than ⅜ up to ½ inclusive	2 ½ inches
Greater than ½ up to ¾ inclusive	4 inches
Greater than ¾ up to 1 inclusive	6 times the smallest dimension

A fan used for cooling whose blade is less than 7 feet above the floor or working level must meet the distance requirements of Table 2 below. Where the openings are larger than those shown in the table, the distance from the guard to the blade must prevent any part of the employee's body from making contact with the blade.

TABLE 2: FANS: SAFETY-RELATED DIMENSIONS

Distance of Opening from Point-of-Operation Hazard (Inches)	Minimum Width Opening (Inches)
½ to 1½	¼
1½ to 2½	⅜
2½ to 3½	½
3½ to 5½	⅝
5½ to 6 ½	¾
6½ to 7½	⅞
7½ to 12½	1 ¼
12½ to 15½	1 ½
15½ to 17½	1 ⅞
17½ to 31½	2 ⅛

Powered Rotating Equipment

Saws and other powered rotating equipment must be guarded unless state standards supersede them. The worker must be protected from contact with all points of operation. See the "Hand and Power Tools" chapter for more information on saw operation.

If a machine or tool with rotating parts or components exposes employees to dust or particles, it must be connected to an exhaust/ventilation system.

Pinch Points

When an employee is exposed to a hazard created by a pinch point other than point of operation, the hazard must be guarded or the employee otherwise protected.

Machines with Cylinders

An extractor, parts washer, or tumbler, manually controlled and equipped with an inside revolving cylinder, must be equipped with a cover or door interlocked in such a manner as to prevent opening the door when the inside cylinder is in motion, and to prevent power operation of the inside cylinder when the cover or door is open. An inch control or constant pressure control that bypasses the interlock may be used to aid loading and unloading.

Avoiding Crushing Accidents

Employees will not place their body beneath equipment, such as vehicles, machines, or materials, supported only by a jack, overhead hoist, chain fall, or any other temporary single supporting means, unless safety stands, blocks, or other support system capable of supporting the total imposed weight is used to protect the employee in case of failure of the supporting system.

DEVICES

A safety device may perform one of several functions.

- Stop the machine if a hand or any part of the body is inadvertently placed in the danger area
- Restrain or withdraw the operator's hands from the danger area during operation
- Require the operator to use both hands-on machine controls, thus keeping both hands and body out of danger
- Provide a barrier that is synchronized with the operating cycle of the machine in order to prevent entry to the danger area during the hazardous part of the cycle

Devices must not create a hazard to the operator.

Presence Sensing

A presence-sensing device must be designed and installed so that, when the operator’s hands or any other part of his body, disturb the sensing field, the downward travel of the machine’s cycle is prevented or stopped. This type of device must not be used as a tripping means. In addition, to protect all areas of entry to the point of operation not protected by the presence-sensing device, a partial enclosure must be used that does not create a pinch point or shear hazard.

The photoelectric (optical) presence-sensing device uses a system of light sources and controls that can interrupt the machine's operating cycle, if the light field is broken, the machine stops and will not cycle. This device must be used only on machines that can be stopped before the worker can reach the danger area. Equipment must be installed so that failure of the light/photoelectric relay/other energy source makes the machine inoperative. The design and placement of the device depends upon the time it takes to stop the mechanism and the speed at which the employee's hand can reach across the distance from the guard to the danger zone.

The radiofrequency (capacitance) presence-sending device uses a radio beam that is part of the machine control circuit. When the capacitance field is broken, the machine will stop or will not activate. Like the photoelectric device, this device will only be used on machines that can be stopped before the worker can reach the danger area. This requires the machine to have a friction clutch or other reliable means for stopping.

The electromechanical sensing device has a probe or contact bar that descends to a predetermined distance when the operator initiates the machine cycle. If there is an obstruction preventing it from descending its full-predetermined distance, the control circuit does not actuate the machine cycle.

Pull-back/Pull-out Devices: This type of device is primarily used on machines with stroking action. The pull-back/pull-out device must include attachments for the operator’s hands or arms. The attachments must be connected to the machine so that the operator’s hands or fingers are removed from the point of operation as the machine cycles.

Authorized personnel must be trained on, and responsible for, proper adjustment of the device for each setup and operator change. If more than one operator is required, a set of pullout devices must be provided for each operator.

Each pullout device used must be visually inspected and checked for proper adjustment at the start of each shift, following a new set-up, and when operators are changed. Necessary maintenance or repair, or both, must be completed and documented before the machine is operated.

Restraint: The restraint (holdout) device generally utilizes cables or straps that are attached to the operator's hands and a fixed point. The cables or straps must be adjusted to let the operator's hands travel within a predetermined safe area. There is no extending or retracting action involved. Consequently, hand-feeding tools are often necessary if the operation involves placing material into the danger area.

Safety Trip Controls

Safety trip controls provide a quick means for deactivating the machine in an emergency. A pressure-sensitive body bar, when depressed, will deactivate the machine. If the operator or anyone trips, loses balance or is drawn toward the machine, applying pressure to the bar will stop the operation.

The positioning of the bar, therefore, is critical. It must stop the machine before a part of the employee's body reaches the danger area.

When pressed by hand, the safety deactivates the machine. Because the trip-rod has to be actuated by the operator during an emergency situation, its proper position is also critical.

Safety tripwire cables are located around the perimeter of or near the danger area. The operator must be able to reach the cable with either hand to stop the machine.

Two-Hand Controls

The two-hand control requires an operator to provide constant, concurrent pressure on both controls to activate a machine. Pressure must be maintained by both hands, which are located a safe distance from the danger area and any pinch points, until the machine completes its cycle. Otherwise, the machine stops or returns to its starting position.

Two-hand control devices must be the anti-tie down type and located in a manner to prevent bridging. If repeating would cause an injury, an anti-repeat device must be incorporated into the control system. This kind of control requires a part-revolution clutch, brake, and a brake monitor if used on a power press.

Controls for more than one operating station must be able to be activated and deactivated in complete sets of two-hand controls per operating station, and must be capable of being supervised by the employer.

Two-hand controls for single-stroke operation will be designed to require release of all operator’s hand controls before a second stroke can be initiated.

If foot control is provided, the selection method between hand and foot control must all be separated from the stroking selector, and must be designed so that the selection may be supervised by the employer.

A two-hand control may be a mechanically, pneumatically, or electrically controlled system.

Two-Hand Trips

The two-hand trip requires concurrent application of both the operator's control buttons to activate the machine cycle, after which the hands are free. This device is usually used with machines equipped with full-revolution clutches. The trips must be placed far enough from the point of operation to make it impossible for the operator to move his or her hands from the trip buttons or handles into the point of operation before the first half of the cycle is completed. The distance from the trip button depends upon the speed of the cycle and the band speed constant.

To be effective, both two-hand controls and trips must be located so that the operator cannot use two hands or one hand and another part of his/her body to trip the machine. Thus, the operator's hands are kept far enough away to prevent them from being placed in the danger area prior to the slide/ram or blade reaching the full "down" position.

Gates

A gate is a moveable barrier that protects the operator at the point of operation; the gate must be interlocked so that the machine will not begin a cycle unless the gate guard is in place, and in the closed position. A gate or movable barrier device must enclose the point of operation before power can be transmitted to the machine. In many instances, gates are designed to be operated with each cycle.

This type of guard can be used where the gate is a component of a perimeter safeguarding system. Here the gate may provide protection not only to the operator but to pedestrian traffic as well.

Point-of-Operation Devices

A point-of-operation device differs from a guard in that it allows the operator access to the point of operation for loading and unloading the die in a press operation. It prevents actual operation either until the hands are removed, or removes the hands from the point of operation as the press slide descends. A point of operation device may be a barrier device.

A point-of-operation device must be designed, constructed and located so that it prevents, during normal operations, an employee's hands or fingers from remaining within the point of operation during the downward movement of the slide/cycle.

Adjustable Press-Barrier Devices

An adjustable press-barrier device must be attached to the frame of the press or die shoe and must have front and side sections adjustable for dies or jobs of any size.

Adjustments must be verified by qualified and authorized personnel before the press is returned to production. With the use of an adjustable press-barrier device, authorized personnel must be instructed regarding proper adjustments of the device and that these adjustments are an important part of their jobs. An operator must not be allowed to make any change in the adjustments without approval of supervisory personnel.

Where the adjustable press-barrier device cannot be adjusted to give sufficient clearance (for example, for the insertion or removal of an irregularly shaped piece), mechanical feeds, ejectors and/or other point-of-operation devices must be used.

Holdout and Restraint Devices

A holdout or restraint device must be securely anchored and adjusted so that the operator is restrained from reaching into the point of operation. A set of restraints must be provided for each operator if more than one operator is required for the machine.

LOCATION AND DISTANCE

The examples mentioned below are a few of the numerous applications of the principle of safeguarding by location/distance. A thorough hazard analysis of each machine and particular situation is essential before attempting this safeguarding technique.

To consider a part of a machine to be safeguarded by location, the dangerous moving part of a machine must be positioned so that those areas are not accessible or do not present a hazard to a worker during the normal operation of the machine.

This may be accomplished either by locating a machine so that the hazardous parts of the machine are located away from operator workstations or other areas where employees walk or work, or by positioning a machine with its power transmission apparatus against a wall and leaving all routine operations conducted on the other side of the machine. Additionally, enclosure walls or fences can restrict access to machines. Another possible solution is to have dangerous parts located high enough to be out of the normal reach of any worker.

The feeding process can be safeguarded by location if a safe distance can be maintained to protect the worker's hands. The dimensions of the stock being worked on may provide adequate safety.

For instance, if the stock is several feet long and only one end of the stock is being worked on, the operator may be able to hold the opposite end while the work is being performed. An example would be a single-end punching machine. However, depending upon the machine, protection might still be required for other personnel.

The positioning of the operator's control station provides another potential approach to safeguarding by location. Operator controls may be located at a safe distance from the machine if there is not a reason for the operator to tend it.

Slide-Lock Devices

When a slide-lock device or block is used, an additional point of operation guard or device must be used to protect the operator before the slide lock device is in position and secures the slide from closing. Visual indication of the operation of the slide lock device must be provided.

FEEDING AND EJECTION

Hand-feeding tools, such as but not limited to, pushers, pliers, pinchers, tweezers, suction discs or magnets, are intended for placing and removing materials in order to permit safe feeding of material by the operator.

Many feeding and ejection methods do not require the operator to place his or her hands in the danger area. In some cases, no operator involvement is necessary after the machine is set up. In other situations, operators can manually feed the stock with the assistance of a feeding mechanism. Properly designed ejection methods do not require any operator involvement after the machine starts to function.

Some feeding and ejection methods may even create hazards themselves. For instance, a robot may eliminate the need for an operator to be near the machine but may create a new hazard itself by the movement of its arm.

These feeding and ejection methods must not be accepted in lieu of other guards or devices. Guards and devices must still be used where they are necessary and where they can serve to provide protection from exposure to hazards.

Types of Feeding and Ejection Methods

Automatic Feed: Automatic feeds reduce the exposure of the operator during the work process, and sometimes do not require any effort by the operator after the machine is set up and running.

Semi-automatic Feed: With semi-automatic feeding, as in the case of a power press, the operator uses a mechanism to place the piece being processed under the ram at each stroke. The operator does not need to reach into the danger area, and the danger area is completely enclosed.

Automatic ejection: Automatic ejection may employ either an air-pressure or a mechanical apparatus to remove the completed part from a press. It may be interlocked with the operating controls to prevent operation until part ejection is completed. This method requires additional safeguards for full protection of the operator.

Semi-automatic Ejection: Semi-automatic ejection employs mechanical means initiated by the operator to remove the completed part from a press.

Robot: Essentially, robots perform work that would otherwise have to be done by an operator. They are best used in high-production processes requiring repeated routines where they prevent other hazards to employees. However, they may create hazards themselves, and if they do, appropriate guards must be used.

Hand-Operated Levers

A hand lever-operated press or machine must be equipped with a spring latch on the operating lever to prevent premature, accidental tripping. The operating lever on a hand-tripped machine having more than one operating station must be so interlocked as to prevent operation of the press except by concurrent action of all levers. A guard or device must be used in conjunction with the hand-operated lever to safeguard the point of operation, or the lever must be located so that the operator cannot reach into the point of operation.

Foot Pedals and Protection

All foot pedals must be guarded or otherwise protected to prevent unintended operation from falling or moving objects, or by accidental stepping onto the pedal.

Mechanical pedal return springs must be the compression type operated on a rod or guided within a hole or tube. If operated on a rod, the inside diameter of the spring must be no greater than the diameter of the rod, plus ⅛ inch. If guided within a hole or tube, the inside diameter of the hole or tube shall be no greater than the outside diameter of the spring coil, plus ⅛ inch. A spring, in its initial compressed position, must be wound so that the space between coils is less than the diameter of the wire.

A pedal counterweight, if provided, must have the path of the travel of the weight enclosed or guarded. A mechanical foot pedal must be securely mounted on a press leg where the pedal is an integral part of the press.

Applications

While these aids do not give complete protection from machine hazards, they may provide the operator with an extra margin of safety. Sound judgment is needed in their application and usage. Following are several examples of possible applications:

- Awareness Barriers: An awareness barrier does not provide physical protection, but serves to remind a person that he or she is approaching the danger area. Generally, awareness barriers are not considered adequate when continual exposure to the hazard exists
- Although the barrier does not physically prevent a person from entering the danger area, it calls attention to it. For an employee to enter the danger area an overt act must take place, that is, the employee must either reach or step over, under or through the barrier
- Miscellaneous Protective Shields: Shields, another aid, may be used to provide protection from flying particles, splashing cutting oils, or coolants
- Holding Fixtures and Hand-Feeding Tools: Although special hand tools may be used to place or remove stock, particularly from or into the point of operation of a machine, hand tools must not be substituted for the required guarding or point-of-operation devices. Where hand tools are used for placing materials into and removing them from a point of operation, the employer will ensure the tools are designed so that the operator is not required to place a hand within the point of operation

Exceptions:

- A bending operation on a press brake involving less than 25 pieces of 1 bend, if not guarded, will use of a hand tool when the operator must hold the work piece within 4 inches of the point of operation, and a conspicuous sign must be posted on the machine stating: “Hand tools must be used to hold stock.”
- A guard or device for the point of operation of a non-production arbor press or straightening press is not required if the machine is equipped with a hand control that is designed to stop the ram action or return the ram to the up position when released.
- A push stick or block may be used when feeding stock into a saw blade.

MACHINERY MAINTENANCE AND REPAIR – LOCK-OUT/TAG-OUT

If possible, machine design should permit routine lubrication and adjustment without removal of safeguards. However, when safeguards must be removed, and the machine serviced, the Company lockout/tagout procedure must be followed. The maintenance and repair crew must never fail to replace the guards before the job is considered finished and the machine released from lockout.

If maintenance or repair workers would be exposed to electrical elements or hazardous moving machine parts in the performance of the job, all power sources must be shut off and locked out before work begins. Warning signs or tags are inadequate insurance against the untimely energizing of mechanical equipment.

Please refer to the Lockout/Tagout chapter of this manual for specific lockout/tagout requirements and procedures.

TRAINING

We will ensure every employee is provided training on machine and equipment safety. This training will be provided at no cost to the employee during working hours.

Training will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Components

The safety coordinator will ensure every employee is trained in the following minimum elements:

- A description and identification of the hazards associated with particular machines
- The safeguards themselves, how they provide protection, and the hazards for which they are intended
- How to use the safeguards and why
- How and under what circumstances safeguards can be removed, and by whom (in most cases, repair or maintenance personnel only)
- What to do (e.g., contact the supervisor) if a safeguard is damaged, missing, or unable to provide adequate protection

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be maintained for 3 years from the date on which the training occurred.

FORMS AND ATTACHMENTS

Please find the following documents on the pages below:

- Machine Guarding Checklist
- Machine Guarding and Equipment Safety Training Documentation

These forms may be reproduced for the purposes of implementing and maintaining a safety and health program.

MACHINE GUARDING CHECKLIST (PAGE 1 OF 3)

Answers to the following questions will help determine the safeguarding needs of the workplace by drawing attention to hazardous conditions or practices requiring correction.

Yes	No	Requirements for All Safeguards
☐	☐	Do the safeguards provided meet the minimum OSHA requirements?
☐	☐	Do the safeguards prevent workers' hands, arms, and other body parts from making contact with dangerous moving parts?
☐	☐	Are the safeguards firmly secured and not easily removable?
☐	☐	Do the safeguards ensure that no objects will fall into the moving parts?
☐	☐	Do the safeguards permit safe, comfortable and relatively easy operation of the machine?
☐	☐	Can the machine be oiled without removing the safeguard?
☐	☐	Is there a system for shutting down the machinery before safeguards are removed?
☐	☐	Can the existing safeguards be improved?
Yes	No	Point of operation:
☐	☐	Is there a point-of-operation safeguard provided for the machine?
☐	☐	Does it keep the operator's hands, fingers and body out of the danger area?
☐	☐	Is there evidence that the safeguards have been tampered with or removed?
☐	☐	Could you suggest a more practical, effective safeguard?
☐	☐	Could changes be made on the machine to eliminate the point-of-hazard?
Yes	No	Power transmission apparatus:
☐	☐	Are there any unguarded gears, sprockets, pulleys or flywheels on the apparatus?
☐	☐	Are there any exposed belts or chain drives?
☐	☐	Are there any exposed setscrews, key ways, collars, etc.?
☐	☐	Are starting and stopping controls within easy reach of the operator?
☐	☐	If there is more than one operator, are separate controls provided?

MACHINE GUARDING CHECKLIST (PAGE 2 OF 3)

Yes	No	Other moving parts:
☐	☐	Are safeguards provided for all hazardous moving parts of the machine, including auxiliary parts?
Yes	No	Non-mechanical Hazards
☐	☐	Have appropriate measures been taken to safeguard workers against noise hazards?
☐	☐	Have special guards, enclosures, or personal protective equipment been provided, where necessary, to protect workers from exposure to harmful substances used in machine operation?
Yes	No	Electrical Hazards
☐	☐	Is the machine installed in accordance with National Electrical Code requirements?
☐	☐	Are there loose conduit fittings?
☐	☐	Is the machine properly grounded?
☐	☐	Is the power supply correctly fused and protected?
☐	☐	Do workers occasionally receive minor shocks while operating any of the machines?
Yes	No	Training
☐	☐	Do operators and maintenance workers have the training on how to use the safeguards and why?
☐	☐	Have operators and maintenance workers been trained in where the safeguards are located, how they provide protection and what hazards they protect against?
☐	☐	Have operators and maintenance workers been trained in how and under what circumstances guards can be removed?
☐	☐	Have workers been trained in the procedures to follow if they notice guards that are damaged, missing or inadequate?
Yes	No	Protective Equipment and Proper Clothing
☐	☐	Is protective equipment required?
☐	☐	If protective equipment is required, is it appropriate for the job, in good condition, kept clean and sanitary, and stored carefully when not in use?
☐	☐	Is the operator dressed safely for the job (i.e., no loose-fitting clothing or jewelry)?

MACHINE GUARDING CHECKLIST (PAGE 3 OF 3)

Yes	No	Machinery Maintenance and Repair
☐	☐	Have maintenance workers received up-to-date instruction on the machines they service?
☐	☐	Do maintenance workers lock out the machine from its power sources before beginning repairs?
☐	☐	Where several maintenance persons work on the same machine, are multiple lockout devices used?
☐	☐	Do maintenance persons use appropriate and safe equipment in their repair work?
☐	☐	Is the maintenance equipment itself properly guarded?
☐	☐	Are maintenance and servicing workers trained in the requirements of lock-out/tag-out hazard, and do the procedures for lock-out/tag-out exist before they attempt their tasks?

Evaluator's Name	Signature	Date

MACHINE GUARDING AND EQUIPMENT SAFETY TRAINING

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

SCOPE

This chapter defines the requirements for obtaining a safe work permit. The permit identifies the hazards of a job, the necessary precautions to protect workers performing the task, and the emergency procedures that will be followed in the event of an emergency. The permit must be approved by a supervisor or manager with appropriate oversight and be available to workers during the work performed under the permit.

POLICY

This Company has established a permit to work system to ensure potentially hazardous work is carried out safely, even if a standard work procedure has not been established for the task.

EMPLOYER RESPONSIBILITIES

This Company will:

- Introduce an appropriate permit to work system
- Monitor the permit to work system to ensure its efficacy
- Train personnel in the permit to work system
- Ensure personnel is competent to understand and follow work permits
- Coordinate the planning, issue and return of permits
- Ensure implementation of effective controls against unintentional release of hazardous energy or chemicals (LOTO)
- Inform contractors of the permit to work system to ensure safety of all personnel onsite

PERMIT ISSUER RESPONSIBILITIES

The issuer of a safe work permit will:

- Ensure workers understand the nature of the work performed under a safe work permit, including hazards and necessary precautions
- Inform personnel who may be affected by work performed under a permit to work before the work begins, and inform them when work is complete
- Ensure jobs done under different work permits that interact are done safely by cross referencing the permits and ensuring appropriate precautions
- Ensure the work site is examined before work begins, when there has been a suspension of work and when work is complete
- Discuss permits with the oncoming permit issuer during shift changes

SUPERVISOR RESPONSIBILITIES

Supervisors are expected to:

- Understand the permit to work system at their worksite
- Discuss permitted work with the permit issuer
- Post applicable permits at the worksite, or see that they are posted

- Inform the individual(s) performing work under a work permit system about hazards and the precautions that must be taken
- Verify that necessary precautions are taken throughout the work
- Ensure workers only perform work within scope of permit
- Inform permit issuer when work has been completed

EMPLOYEE RESPONSIBILITIES

Those working under a permit to work must do the following:

- Have an understanding of the permit to work system, permits under which they work (including the hazards present and controls demanded for their job)
- Prevent the start of any work that requires a permit until the permit has been issued and posted
- Ensure the worksite and equipment is left safe when work is stopped
- Stop work and consult a supervisor when there is concern over safety or circumstances change that may alter the terms of a permit

SAFE PRACTICES

A safe work permit authorizes work of a specific type for a specific time at a specific location. The permit must document hazardous conditions, the precautions the worker must take and limitations the worker will face during the work that requires the permit.

The permit also serves as a means of communication between management, supervisors and operators; and those performing hazardous work. This system defines how a job can be safely carried out by ensuring appropriate personnel have considered possible risks and arranged appropriate precautions to avoid those risks.

The permit to work system helps ensure the following:

- Potentially hazardous work has been authorized by the appropriate authority
- Workers are aware of the details of the job they are expected to do, its hazards and the limitations they face
- Appropriate precautions and are taken and appropriate equipment is available to protect workers from hazards
- Supervisors are aware of hazardous work being performed
- Records are kept illustrating the precautions taken to protect workers from hazards and the verification by authorized personnel that those precautions are taken
- Permits are displayed and filed appropriately
- Safe handover/handback of responsibilities between personnel (shift changes, multiple- trade procedures, work completion)

THE PERMIT TO WORK FORM

The permit form itself is at the center of the permit to work system. While different types of work demand different forms to ensure all the requisite information is recorded, the following is a typical list of the information needed on a permit to work form:

- Permit title
- Worksite identification
- Precautions in case of emergency
- Acceptance signature
- Cancellation
- Permit reference no.
- Work to be completed
- PPE
- Handover procedures
- Job location
- Hazard identification
- Issuance information
- Hand-back procedures

General Rules

Permits may only be issued and signed by authorized personnel, and will be issued to and signed by the person actually carrying out the work (or the person in charge of a group).

Only the work specified on the permit may be performed.

During the work process, the authorized person must monitor to ensure that agreed upon procedures are being followed. He or she may stop work at any time to ensure issues that may disrupt agreed upon procedures or present a new risk are resolved.

Work under a permit to work may not extend beyond the determined time limit. A new permit may be necessary.

When there is a shift change or the person in charge changes, a new permit must be issued.

TYPES OF SAFE WORK PERMITS

Hot Work

Hot work permits are used when heat or sparks are generated by work such as welding, burning, cutting, riveting, grinding, drilling, and where work involves the use of pneumatic hammers and chippers, non-explosion proof electrical equipment (lights, tools, and heaters), and internal combustion engines.

Three Hazards When Performing Hot Work:

1. The presence of flammable materials in the equipment
2. The presence of combustible materials that burn or give off flammable vapors when heated
3. The presence of flammable gas in the atmosphere, or gas entering from an adjacent area, such as sewers that have not been properly protected. (portable detectors for combustible gases can be placed in the area to warn workers of the entry of these gases)

Work must not begin until the appropriate level of authority has endorsed the Permit for Work. The procedure for safe hot work, must be followed according to Company policy.

Confined Spaces

A confined space entry permit is required for entry into some confined workspaces as described in the policy on permit-required confined workspaces.

Work in confined spaces may present a number of hazards, including, but not limited to the following:

- Hazardous atmospheres
- Flammable
- Engulfing potential
- Temperature extremes
- Slippery surfaces
- Oxygen deficient
- Toxic
- Trapping and asphyxiation risk
- Noise
- Falling objects

Hazardous Energy Control Process

Hazardous energy control or lockout/tagout procedures demand workers adhere carefully to a set of procedures that ensures the risks of a given job are accounted for, in terms of the possible release of hazardous energy or chemicals.

Operations that call for lockout/tagout procedures fall under the permit to work system.

Cold Work and Other Permits

Do not apply the permit to work system to every job, as this will serve to weaken the intended impact of the permit to work system. Permits to work should be reserved for non-routine jobs and routine jobs that are hazardous, but have no safe work procedures.

A work permit must be issued for jobs that pose special hazards including, but not limited to, the following:

- Oxygen-deficient atmosphere
- High temperature and pressure
- Confined spaces
- Ignition sources outside of designated areas
- Radioactive materials
- Lasers
- Excavations
- Flammable/ combustible atmosphere
- Hazardous chemicals
- Altering safety devices or equipment
- Electric work on live circuits
- Work at elevation
- Work on lines that may contain hazardous materials or conditions
- Changes to equipment and/or processes

TRAINING

- We will ensure every employee is provided training on the permit to work system. This training will be provided at no cost to the employee during working hours
- Training will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees

Training Components

The safety coordinator will see that all employees are trained based on their expected work responsibilities.

Permit issuers and supervisors should be trained in the following:

- Industry best safety practices and regulations applicable to the work being done
- Worksite policies and procedures
- Histories of failures and successes of the permit to work system

Permit issuers and supervisors must demonstrate competence in the following:

- The processes and equipment for the work being done
- Awareness of potential hazards for the job and how to control those hazards
- Company safety policies and legal requirements as they pertain to the work being done
- Steps to safely hand over responsibilities to oncoming permit issuer at shift's end
- Safe emergency procedures, including those for worksite specific contingencies

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training

Employee training records will be retained for the length of their employment.

FORMS AND ATTACHMENTS

On the following pages, please find the following documents:

- Sample General Work Permit

These forms may be reproduced for the purposes of implementing and maintaining a safety and health program.

General Permit to Work

Only authorized personnel may issue a work permit.

Permit Number:	**Supervisor audit:** Signature: _____ Date: _____
Date:	**Annual Safety Audit:** Signature: _____ Date: _____
Emergency Notification:	

WORK REQUEST

1) Permit Type: ☐ Hot Work ☐ Vehicle Access ☐ Confined Space Entry ☐ Hot Tap ☐ IDLH Situation ☐ Excavation ☐ Other: _____ _____

2) **Facility Name:** _____ **Location of Work:** _____

3) **Work to be undertaken:** _____

_____

4) **Company performing job :** _____

5) **Task Supervisor:** _____ **6) Number in Work Party:** _____

HAZARDS IDENTIFICATION

7)

☐ Hazardous Atmospheres	☐ Trapped Pressure	☐ Dangerous Chemicals	☐ Electricity
☐ Open Flames or Arcs	☐ Crane Operation	☐ Adjacent Operations	☐ Heavy Loads
☐ Flying Particles or Sparks	☐ Danger of Falling	☐ Excavation Collapse	☐ Noise
☐ NORM or other Radiation	☐ Moving Machinery	☐ Weather Hazards	☐ Wildlife
☐ Temperature Extremes	☐ Overhead Hazards	☐ Flammables/ Combustibles/ Explosives	☐ Engulfment
☐ Bypassed / Disabled Safety Systems	☐ SDS Reviewed		☐ Other:_____

WORK PREPARATION

8)	Electrical Equipment is:	☐ De-energized	☐ Locked	☐ Tagged	☐ Verified safe	☐ N/A
9)	Vessels/Piping are:	☐ Depressurized ☐ Flushed	☐ Disconnected ☐ Inert Gas Purged	☐ Blinded ☐ Ventilated	☐ Double Blocked & Bled	☐ N/A
10)	Valves are:	☐ Closed ☐ Removed	☐ Locked ☐ Open	☐ Tagged	☐ Blinded	☐ N/A
11)	Sewer Drains are:	☐ Blocked		☐ Covered		☐ N/A
12)	Equipment / Machinery / Energy Sources Secured From Unexpected Movement or Startup?			☐ Yes		☐ N/A
13)	Additional Lighting Required?			☐ Yes		☐ N/A
14)	Welding Ground Attached to Work Surface		☐ Yes	☐ No		☐ N/A

REQUIRED PROTECTIVE APPAREL/EQUIPMENT

15)

☐ Hard Hat	☐ Safety Glasses w/ Sideshields	☐ Tinted Lenses	☐ Goggles	☐ Faceshield
☐ Welding Hood	☐ Cutting Glasses	☐ Hearing Protection	☐ FR Hood	☐ Insulate Hood

16) Gloves: ☐ General Purpose ☐ Chemical Resistant ☐ Heat Resistant ☐ Dielectric ☐ Other

17) Footwear: ☐ Safety toe boots/shoes ☐ Chemical Resistant Safety toe boots/shoes ☐ Boot Covers

18) Respiratory Protection: ☐ SCBA ☐ Hose Line w/ Escape Unit ☐ HEPA Filter ☐ Dust/Mist ☐ Chemical Cartridge: Type: _____

19) Protective Clothing: ☐ Normal ☐ Flame Resistant ☐ Water or Chemical Resistant ☐ Disposable

20) Fall Arrest: ☐ Harness ☐ Lanyard ☐ Retrieval Line ☐ Vertical Retrieval Device ☐ Other

21) Personal Monitor: ☐ H2S ☐ Methane ☐ Multi-Function ☐ Other: _____

General Permit to Work

Page 2

Permit Number:

EMERGENCY PREPAREDNESS

22) Is Firefighting Equipment Readily Available, In Good Condition, Recently Inspected? ☐ Yes ☐ N/A

23) Is a Fire Watch Needed? If Yes, Names: _____

Do they know and understand their duties? ☐ Yes

24) Is Emergency equipment Readily Available, In Good Condition, Recently Inspected? ☐ Yes ☐ N/A

25) Are Rescue Provisions Determined? ☐ Yes Specify: _____ ☐ N/A

ATMOSPHERIC MONITORING (attach extra forms as needed)

26)

	Oxygen 19.5% - 23.5% Entry 19% - 23.5%	LEL Hot Work 0% Entry ≤ 10%	H_2S <10 ppm	CO Entry < 25 ppm (if applicable)	Other	NORM (if applicable)	Time	Initials
Initial Check								
Recheck								
Recheck								
Recheck								

27) ☐ Continuous monitoring required or ☐ Periodic monitoring required every _____ minutes

EXCAVATIONS

(for excavations that contain or have the potential to contain a hazardous atmosphere or other serious safety hazard) ☐ Applicable

28) Is the Excavation 4 or more feet deep ☐ Yes ☐ No (skip question 29)

29) Is the Excavation a Permit Required Confined Space? ☐ Yes (fill out CONFINED SPACE ENTRY section) ☐ No

ADDITIONAL PERMIT CONDITIONS AND OTHER HAZARDS NOT PREVIOUSLY LISTED

30) ☐ Applicable ☐ Not Applicable Specify: _____

ISOLATION VERIFICATION

31) Process/Mechanical Isolations ☐ N/A

☐ Applicable (attach control procedures)

32) Electrical Isolations ☐ N/A

☐ Applicable (attach control procedures)

CONFINED SPACE ENTRY

☐ Applicable ☐ Not Applicable

(Permit issuer completes 33-35 and 37-38, and the attendant completes 36)

33) Space to be entered: _____ 34) Purpose of Entry: _____

35) Standby Attendants:

Printed Name:_____ Signature:_____ Date:_____ Time:_____

Printed Name:_____ Signature:_____ Date:_____ Time:_____

AUTHORIZED ENTRANTS TO CONFINED SPACE

36)

Entrant	Entry Into		Exit From		Entry Into		Exit From	
	Date	*Time*	*Date*	*Time*	*Date*	*Time*	*Date*	*Time*

37) **Entrant/Attendant Communication (for all confined space entries)**

☐ Visual Contact ☐ Radios ☐ Voice ☐ Tagline Signals

☐ Other: _____

38) **Confined Space Rescue & Emergency Services (Only required for permit-required confined spaces)**

For emergency notification during regular hours call: _____ and dial 911. After hours, call: _____

Is Non-Entry Rescue Feasible? ☐ Yes (Must meet the following requirements) ☐ No

☐ All entrants are equipped with proper non-entry rescue equipment including a full body harness and lifeline

☐ Lifelines are attended by personnel who are physically capable of removing each entrant(s) from the confined space.

☐ The space is configured to allow non-entry rescue without the entrant(s) becoming trapped or entangled.

☐ A Mechanical retrieval device is utilized for vertical entries greater than 5 feet deep (N/A if less than 5 feet).

Rescue Team/Service: _____

Signatures of rescue team: _____

_____

_____

General Permit to Work

Page 3

Permit Number:

WORK BRIEFING

All members of the work party have been briefed on:

☐ Potential Hazards ☐ JSA / Safe Work Procedures ☐ Conditions of the Permit ☐ Emergency Action / Rescue ☐ Means of Egress & Muster Area

PERMIT AUTHORIZATION/VALIDATION

39) I understand my duties as firewatch. Signed: _____ (Company) _____

40) I have taken over fire watch from watchman noted above at (time) _____ Signed: _____ (Company) _____

41) I certify that I have prepared this work and equipment according to all applicable safety policies and will perform this work within the guidelines of this permit. This permit will be voided if any unsafe conditions arise or if the conditions of this permit are no longer met. I will brief incoming workers on all appropriate precautions before permitting them to join the work party.

Signed: _____ *task or entry supervisor* Signed: _____ *relief task or entry supervisor*

42) I certify that I have examined the work location and reviewed the procedures to be undertaken and ensure that everyone in the work party have been briefed on the associated hazards and emergency actions and therefore authorize the performance of this work in accordance with the conditions and guidelines contained in this permit. the permit will be voided if unsafe conditions arise or if any conditions of the permit are not met.

Signed: _____ *permit issuer*

43)

	Permit Issued	Permit Expiration *(not to exceed one full work shift)*
Time		
Date		

Revalidation *(may only be revalidated during original validation period)*					
Time					
Date					
Initials					

PERMIT CANCELLATION / POST ENTRY REVIEW

44) I have inspected the work area and/or confined space and cancel or remove this permit for the following reasons:

☐ Job completed in Full ☐ Expiration of Authorized Time Period ☐ Occurrence of Non-Authorized Condition

If occurrence of non-authorized condition, please explain: _____

_____

_____

Signed: _____ *Task/entry supervisor or permit issuer*

Date: _____

Time: _____ AM/PM

☐ Post-Confined Space Entry Review Conducted

☐ No review needed; not Confined space

SCOPE

This chapter provides the safe practices and requirements for performing plumbing and boiler work. These practices will comply with all applicable federal, state and/or local regulations. This chapter does not cover the practices for welding, fall protection or working in confined spaces, which are covered in separate chapters.

POLICY

This Company has created the following policies and procedures to ensure the safety of its employees who perform plumbing and boiler maintenance and repair.

EMPLOYER RESPONSIBILITIES

This Company will:

- Ensure that only trained certified plumbers are permitted to perform plumbing and boiler work
- Verify employees know the safe practices for plumbing and boiler work
- Comply with all applicable safety and health regulations
- Provide employees with all necessary PPE

EMPLOYEE RESPONSIBILITIES

All Company personnel are expected to:

- Follow the Company safe practices for plumbing and boiler work
- Use and maintain all required PPE
- Report all unsafe conditions and acts immediately

HAZARDS

Employees involved in plumbing and boiler work are at risk of injury from:

- Chemical exposure to plumbing glues
- Electrical shock
- Burns caused by open flames, welding and soldering, heated equipment and hot water or steam
- Mold exposure
- Physical strains
- Working in confined spaces

PERSONAL PROTECTIVE EQUIPMENT

Employees performing plumbing and boiler work will be trained on the use of, and provided with, the following PPE as required:

- Hardhats
- Safety shoe or boots with non-slip soles

- Eye protection
- Work gloves (heat insulated if necessary)
- Fall protection, if working at heights
- Respirators in needed

SAFE PRACTICES - PLUMBING

Plumbing work can consist of a wide range of activities including:

- Fixing leaking faucets or broken pipes
- Unclogging sinks or drains
- Repairing or installing toilets
- Eliminating Odor from showers and sinks
- Replacing water heaters

When performing any of these tasks:

- Always follow the manufacturer's instructions
- Always wear eye protection
- Wear protective clothing when necessary

Electrical Safety

- Before servicing anything that has an electrical connection, disconnect it from its electrical source by either unplugging the appliance or turning off the power at the breaker or fuse box
- Utilize lockout/tagout procedures so that no one will restore power while you are working. See the “Hazardous Energy Control” chapter for more specific information
- After turning off the power to the circuit, test the circuit to be certain that there is no power. Some devices can store a hazardous electrical charge even when disconnected from an electrical source
- Always discharge these devices before attempting service. If you are unfamiliar with a device or its components, consult with a professional before attempting service
- When working with electrical equipment, wear rubber-soled shoes, avoid damp locations, and hold all tools by their insulated handles
- Never touch conductive surfaces such as pipes or metal bracing. Use a non-conductive fiberglass ladder when working with electricity. Avoid shorting electrical circuits
- Serious injury can result from sharp edges. When reaching into a service area, cabinet, or housing there may be sharp edges. Use caution when reaching into something
- Always practice proper and reasonable safeguards, as well as those suggested by the manufacturer of the devices and tools you use

Fixing Leaks

- Locate the main water shutoff valve
- Locate all fixture shutoff valves
- Depending on the leak to be fixed, close the fixture or main water shutoff valve to prevent water damage

- Drain water from the lines or toilet tank
- Repair the faucet or, if necessary, replace it
- Unclog sinks using a plunger or snake, DO NOT use a chemical drain cleaner if the blockage is total

Replacing a Toilet

- Rough in the closet bend and toilet floor flange first. When replacing a toilet, make sure to scrape off the old wax gasket. A putty knife works well. Remove the old bolts from the floor flange and scrape the flange clean to prevent leaks at the base of the new bowl. If the old flange is cracked or broken, replace it with a new floor flange
- When setting in the floor flange, always make sure that the underside of the flange is at the level of the finished floor. Tighten the screws that hold the floor flange to the floor. As you do this, use a small level to be sure the flange is level
- Set the new floor bolts in plumber's putty and insert them through the flange. Adjust the bolts so they line up with the center of the drainpipe
- Turn the toilet bowl upside down and stick the new wax gasket over the toilet horn on the bottom of the bowl. Caution: a cold wax ring won't seat right, warm it up before installing it
- Lay on a bead of plumber's putty around the entire bottom edge of the bowl
- Lower the bowl into place over the flange, using the bolts to guide you. Twist slightly as you press down firmly. You should feel the toilet being pushed into the wax ring, if you don't, your flange is too low, which means you will not get a good wax seal between the flange and the horn (waste outlet)
- Level the bowl. Add shims as needed. Make sure you've got the toilet lined up squarely in relation to the wall. Tighten the nuts and washers onto the bolts by hand, now you're ready to install the tank
- Move the rubber tank cushion into position on the back part of the bowl. Fit the rubber gasket onto the flush valve opening on the bottom of the tank
- Position the tank over the bowl; then tighten the nuts and washers onto the mounting bolts
- Using an adjustable wrench, tighten the hold-down bolts at the base of the bowl. Check to see that the bowl is still level
- Fill the bolt caps with plumber's putty and place them over the bolt ends. Seal the base of the toilet bowl with plumber's putty or silicone caulk
- Cut the end of your supply line stub out and attach a shut off valve. Connect the shutoff valve to the toilet tank with a flexible supply hose

Drain Odors

The odor in the shower, sink or other pipes is caused by bacteria that is breeding and multiplying in the bio-film that is coating the vertical drain pipe/tailpiece between the fixture trap and the actual drain outlet in the fixture. It is not the vent pipe unless you know for a fact the trap is being siphoned. The gurgling/suction noise is unmistakable.

The reason you smell this is simple. The motion of the water first hitting the bio-film releases some of the bacteria molecules into the air. Remove the drain strainer in the shower and you will see a layer of slimy goo on the side of the pipe leading down to the trap. Try removing it now and cleaning off this goo. Do the same in the sink. You will have to remove the sink stopper to gain access to the vertical tailpiece.

The overflow tube that leads from the top of the sink to the tailpiece can also be a contributor to the problem. It is tougher to clean.

Clogged Drains

To clear a clogged drain (No chemicals involved):

- Pour ½ cup of salt down the drain followed by boiling water. Continue to flush with very hot tap water until the clog is clear
- Put some dish soap down the drain, follow it with some hot water, this should unclog the drain
- For **slow-running drains**, you can shake a half box of baking soda down the drain, and then dump in one cup of vinegar. It should bubble and foam, so you may want to cover with a towel. When it stops foaming, flush the drain with very hot water for 2-3 minutes
- If you can get at the drainpipe, open it up. Get a water hose, put the hose up through the drainpipe and turn the water on. It will hit the clog and wash it out. One way to clear up plumbing is by using a simple plunger. When using a plunger, use a great deal of force to press the plunger handle down over the drain obstruction. Wait a minute and then see if the clog is cleared. You can then repeat the drain cleaning process as necessary
- No chemical or clogged drain tip will work as effectively as a drain clearing “snake”

PLUMBING GLUES

Different types of pipe such as ABS, PVC or CPVC will require specific types of glue that can be hazardous.

Application Hazards

Pipe cleaning and priming solutions are toxic and highly flammable. Plumbing glue, cleaning, and priming solutions applied onto parts in hot or warm weather will release substantially more fumes. Using plumbing glues, cleaning, or priming solutions indoors or in enclosed spaces will cause excessive amounts of fumes to build up in those areas.

- Always use caution when using, handling, or dispensing plumbing glues and related chemicals
- Make sure you wear safety glasses, goggles or a full-face shield, safety gloves, long pants, and a long shirt that will protect your arms. Wear a respirator when vapors and fumes are exposed to your nose and mouth. Safety shoes that do not absorb spillage are required
- Safety data sheets (SDS) must be available to all workers and personnel
- Always read the SDS and take the appropriate cautionary measures
- Avoid getting plumbing glues and other related chemicals on or into your body
- Wash thoroughly after handling plumbing glues and other related chemicals
- Do not eat, drink or smoke while handling plumbing glues and related chemicals. Post no smoking signs at storage areas

- Avoid breathing vapors or mists generated by PVC glues and related chemicals
- All workers who handle PVC glues and related chemicals must be trained to handle them safely. Containers of these chemicals must be properly labeled. When these chemicals are used in other types of containers, only use portable containers approved for flammable liquids
- Always use non-sparking tools when working with glues and chemicals
- Keep containers tightly closed when not in use. Empty containers may contain residual flammable liquid or vapors. Empty containers must be handled with care. Do not expose containers to welding arcs, torches, or any other sources of ignition
- Make sure proper ventilation controls are utilized when using plumbing glues, cleaning solutions and primers during indoor or enclosed space application. Explosion proof or local exhaust systems may be needed to ensure that exposure to toxic and flammable vapors is minimized. Ensure that respiratory protection is available at the job site
- Make sure plumbing glues are stored in a cool dry place. Do not store glues in direct sunlight, or other sources of intense heat
- Make sure containers of plumbing glue and related chemicals are stored away from incompatible chemicals that include caustic soda, organic acids and oxidizing agents. Avoid storing in places where freezing is possible
- Storage facilities where large volumes of plumbing glues and chemicals are dispensed and handled may require the continued use of respiratory protection when adequate ventilation of the facility is not available
- Make sure that when a chemical spill occurs, respiratory protection is on site for clean-up operations
- Always avoid overexposure to these chemicals. Symptoms of overexposure can include coughing, sneezing, and shortness of breath
- Emergency eyewash stations must be available for workers and personnel in areas where there is any possibility of chemical exposure to the eyes. Hold the eyes open while flushing with an adequate amount of gently flowing water until the eyes have been completely flushed out. When irritation of the eyes persists, seek medical attention
- An emergency shower station must be available to all employees and personnel in areas where large volumes of plumbing glues and related chemicals are stored, handled, and dispensed
- Remove contaminated clothing immediately and place them in an approved metal container that can be sealed until they have been properly cleaned or disposed of
- Place contaminated clothing, rags or empty chemical containers in sealed metal containers. Dispose of at an approved disposal site

BRAZING, SWEATING, AND SOLDERING

- Adequate ventilation must always be provided when performing any of these operations
- If these operations are performed in confined spaces, respirators or self-contained breathing apparatus may be required
- Burn hazards are always associated with these operations and proper personal protective equipment (such as safety glasses, or welding, goggles for brazing, heavy welders gloves, sturdy pants or a welding apron, and heavy boots) must be used by all personnel involved

- Personnel involved in brazing, sweating, or soldering (hot work) should always notify co-workers of areas where hot work is being performed. If possible, shield those areas to prevent contact by any co-workers
- The danger of explosion or fire is ever-present due to the fuel gas and oxidizer being used; or by other flammable or combustible materials present in the work-zone. Always keep a properly rated and filled fire extinguisher readily available, and have a fire watch posted when doing hot work in particularly susceptible areas
- When sweating in copper pipe for residential wood frame structures, it is a good idea to slightly dampen the area with a spray bottle of clean water to prevent marring, damaging, or igniting the surrounding material

The hazard from smoke, vapors and fumes result from:

- Burning flux
- The by-products of combustion (carbon monoxide)
- From the fuel of the gas torch being used
- From paint or other anti-rust coatings burning off the metal being welded or heated

The acid flux used in hot work is toxic when ingested or inhaled. Wear gloves and use ventilation when handling flux.

Additional hazards relate to the fabrication and preparation processes such as the grinding and mechanical cutting of the material being used.

Lead Exposure in Brazing, Sweating and Soldering:

Lead may be encountered in all of these operations in the form of lead solder, lead paint and lead alloys used in brazing. When absorbed into your body in certain doses, lead is a toxic substance. Lead is not absorbed through your skin, except in certain organic compounds.

Ways in Which Lead May Cause Contamination:

- When lead is scattered in the air as a dust, fume or mist (such as when old lead paint is burned off metal) it can be inhaled and absorbed through your lungs and upper respiratory tract. Adequate ventilation will prevent unsafe atmospheric levels of lead in the workplace
- You can also absorb lead through your digestive system, if you swallow it. Do not eat food in areas where work with lead takes place. Always wash your hands after working in areas where exposure to lead contaminants may be possible
- Only unleaded solder may be used for work (sweating and soldering) on fresh water supply lines
- If you have concerns that you may have exposure to lead in excess of safe limits, have the air tested in your workplace, or have your doctor perform a blood test
- See the Lead Exposure chapter for more information on working with lead. Contact the state OSHA department if disturbing more than 100 square or linear feet of material, or the material disturbed is more than 5,000 parts per million. Exception: If the only task is torch cutting or welding, and if less than one hour per shift

Safe Handling, Use and Storage of Compressed Gas Cylinders (CGC):

- Valve caps must be installed and valves must be closed off before a cylinder is moved, when it is empty, and at the completion of each job
- Gas cylinders must be kept far enough away from hot operations and external heat sources so that sparks, flames, or slag will not reach them. If impractical, fire resistant heat shields must be utilized
- CGCs must be legibly marked to clearly identify the gas contained and stored in a manner that prevents hazards of tipping, falling, or rolling
- Gas cylinders must be checked periodically for corrosion, general distortion, cracks, or any other defects anywhere on the cylinder
- If a special valve wrench is needed, it must be left in position on the valve while the cylinder is in use
- Regulators, hoses, and torches must be carefully inspected and removed from service if worn or damaged

Color-coded hoses must be used:

- **RED** to identify fuel gas
- **GREEN** to identify oxygen
- **BLACK** for inert gas (or air hose)

Fuel gas cylinders and oxygen cylinders must be separated by distance and fire-resistant barriers while in storage.

Burns are a common injury when doing hot work, and the proper first aid training for burns is a useful asset for these operations.

BOILERS

Boiler installation and maintenance will only be performed by trained certified personnel. If the work requires entry into a permit required confined space, additional training is required.

All boilers, used in commercial and public facilities, that produce steam (either low or high pressure), hot water heating for use in comfort air heating systems, and hot water supply for use in domestic water systems (such as showers, sinks, pools, or for miscellaneous use), which includes potable hot water heater-type boilers, must be registered and inspected.

Permits may be required for high-pressure boilers over fifteen (15) psig steam, air tanks, and LPG propane storage tanks over 125 gallons. Permit exceptions and inspection frequency depend on capacity, operating pressures and other factors specific to the boiler/tank/vessel in question, as well as the regulatory agency with jurisdiction (state or federal OSHA).

Boilers used for hot water supply or potable hot water supply can be further defined in the following two categories:

- A hot water supply boiler means a boiler designed for operation at a pressure not exceeding 160 psig or temperatures not exceeding 250 degrees Fahrenheit at or near the boiler outlet if the boiler's: heat input exceeds 200,000 BTUs per hour; water temperature exceeds 210 degrees Fahrenheit; or nominal water-containing capacity exceeds 120 gallons
- A potable water heater means a boiler designed for operation at pressures not exceeding 160 psig and water temperatures not exceeding 210 degrees Fahrenheit if the boiler's heat input exceeds 200,000 BTUs per hour or nominal water-containing capacity exceeds 120 gallons

Always wear the proper personal protective equipment when performing work on boilers.

CAUSES OF BOILER ACCIDENTS

Boiler systems are designed for safety and efficiency. The boiler operator is the key to safe boiler operations. Having knowledge about boiler systems and maintenance can ensure years of safe, reliable service.

History has shown that without proper operation and maintenance, boiler conditions and safety deteriorate causing potential hazards due to neglect and misunderstanding.

Routine maintenance is well within the ability of most boiler operators.

TRAINED PROFESSIONALS ARE NEEDED WHEN THERE ARE:

- Leaking safety and or safety relief valves
- Feed water to boiler
- Steam leaks (steam systems)
- High stack temperatures (excess of 350º F)
- Insufficient heat for building
- Condensate dripping down stack or out the front of the boiler
- Constantly resetting of controllers and safety devices

Boiler accidents can occur when the boiler is allowed to operate without adequate water in the boiler. Proper functioning low water cutoffs are essential to prevent these types of accidents. Boiler damage can run from severe buckling and deforming of the boiler to complete meltdown or potential boiler explosions.

Another type of boiler accident and the most lethal is excessive pressure. These accidents occur when the boiler can no longer contain the excessive pressure allowed to build in the boiler. Excessive pressure accidents, even in small boilers, have been known to destroy a building.

Fuel related accidents usually occur when there is a failure to purge combustible gases from the firebox before ignition is attempted. Leaking fuel valves can also be the cause of these accidents. If the operator notices any gas odor, the boiler should be shut down and the fuel supplier notified immediately.

Never bypass safety devices with jumper wires to restart your boiler. Unintended ignition of unburned combustion gases in the firebox is possible.

BOILER WATER TREATMENT

Boiler systems (steam/water) lose water through steam and water leaks. Additional water called “make-up water” is added to the boiler to replace these losses. The amount of make-up water and the level of naturally occurring impurities in water will determine the type of water treatment required. Boiler heating systems that have very few leaks will require a simple water treatment program.

All water contains dissolved minerals, and these minerals, if allowed to reach high enough levels in the boiler water, will come out of solutions and form as a hard shell on the hot surfaces of the boiler. This hard shell is called “scale” and is often found on the outside of the fire tubes or the inside of water tubes.

Scale insulates the heating surfaces reducing the ability of the fire tubes to transfer heat from the hot combustion to the boiler water. High stack temperatures or ruptured tubes are common problems related to scale build up. Boiler water also contains dissolved gases such as oxygen or carbon dioxide. These gases, in the presence of water and metal, can cause corrosion. Corrosion eats away the metal affecting the durability of the boiler.

Boiler Inspections

- A boiler requires an ongoing, routine maintenance and inspection program. Well-trained maintenance personnel, boiler operators, and boiler inspectors are important components to the safe operation of a boiler
- Routine boiler inspections are required
- A boiler should be examined internally and externally to determine the operating condition of the boiler and to ascertain the true condition of the boiler
- Boiler inspectors examine the structural integrity of the boiler along with the associated safety devices attached to the boiler. These devices must remain in good operating condition for the continued safe operation of the boiler
- The loss of water (low water), furnace explosion, over pressure and excessive temperature are the principal causes for boiler accidents and are primarily the direct result of the missing or inoperative controls and safety devices, lack of maintenance, untrained operators, and complacency. These are some reasons why boiler inspections are so important and what could result if boilers are left uninspected
- Boiler operation and maintenance are closely tied together. Good operation includes performing necessary daily and periodic maintenance. Low maintenance cost depends on good daily operating control, given that the system and fuel are compatible

BOILER OPERATIONS

- Review Safe Operating Practices for applicable equipment and perform pre-operating checks
- Conduct a hazard assessment. Take action to reduce or minimize hazards. Determine the need to implement Confined Space policy and practices
- Wear personal protective equipment consistent with the hazard and as directed by your supervisor
- Be aware of loose or slippery materials, tripping hazards and other obstructions. Take appropriate measures to eliminate these conditions

- Determine routing for portable electrical cords and equipment lines to avoid tripping hazards
- Ensure GFCI outlet is used for portable electrical supply. If no GFCI outlet is available, utilize a portable GFCI protector/strip that is Underwriter Laboratories (UL) approved for commercial use. For portable GFCI devices, plug the equipment/tool directly into the portable GFCI device
- Proper lifting techniques will be used. Get help or use equipment if necessary
- Ensure adequate ventilation
- Be aware of first aid kit, fire extinguishers, alarm, and hose locations. Check routinely to make sure they are working properly. Follow good housekeeping practices to reduce risk of fires, slipping, and tripping
- Ensure eyewash stations and shower stations are readily accessible, and in good operating condition in case of exposure to skin and eye irritants
- Be particularly aware of wet stains on insulation, piping and associated joints, as these may indicate a small leak that could become a major steam leak
- Correct fuel leaks immediately, securing boilers or other heat sources as appropriate

BOILER MAINTENANCE

By far the worst strategy is reactive boiler maintenance. This may be defined as repairs made only when there is a failure. There is no planning or anticipation of repairs to prevent a failure. It is only when the equipment fails that the operators will evaluate the cause, and then make repairs.

On the other end of the boiler maintenance spectrum is a proactive maintenance program. This type of maintenance approach uses scientific testing techniques and analysis to anticipate and correct, by either repair or replacement, problems before they arise.

Real time monitoring has contributed greatly to the ability to view and respond to changes in boiler operation and overall process performance. Operators can compare past baseline results against current readings to determine if a problem may be forth coming.

The key to properly analyzing boiler room conditions is having accurate data available. Boiler room logs are an important part of this process. Critical predetermined readings, such as fuel consumption and flue gas temperatures, are recorded on a daily or even a per shift basis. These recorded readings give the operator a baseline they can use to compare present readings.

If the flue gas temperature of a boiler has gradually increased over the course of a month, the operator will be able to evaluate the system. He might then determine that there has been a build-up of scale reducing heat transfer.

Keep in mind that every boiler operation is different; some require more extensive logs than others do. This is a topic that management and boiler operators must review and jointly decide on what’s required.

Following is a suggested list of points that require daily recordings:

- Water Level
- Blowdown Water Column
- Visual check of Combustion
- Feedwater Pressure / Temperature
- Feedwater Pump Operation
- Gas Pressure
- General Boiler / Burner Operation
- Low Water Cut Off Tested
- Blowdown Boiler
- Boiler Operating Pressure / Temperature
- Condensate Temperature
- Flue Gas Temperature
- Oil Pressure and Temperature

Operating a steam generator whether it is a low, medium, or high-pressure design is a complex undertaking. Important physical and chemical balances are necessary for safe and efficient control.

ACHIEVING EFFICIENCY

The primary duty of the boiler operator is to achieve optimum operating efficiency of the equipment consistent with high reliability and low cost. The steam generator's efficiency depends on proper control of time, temperature, turbulence and oxygen.

Time and Temperature

Before a boiler begins to achieve efficient operation, the technician must raise the furnace to operating temperature. The fuel-burning rate must be maintained to produce the desired number of pounds of steam per hour to run the stream of turbines — if generating electricity — and supply steam for heat and process needs.

Turbulence

The turbulence in fossil-fuel boiler systems results from the combination of forced-draft fans located in the fuel-supply section and the induced-draft fans located in the stack breeching. The drafts introduced by these large volume air handlers produce the turbulence necessary for efficient operation. They also create a demand for emission controls, which are very important to air-quality improvements that are being emphasized today and will only be more important in the future.

EFFICIENCY AND MAINTENANCE

Modern equipment contains very effective instrumentation to control these four key operating characteristics. Simultaneous with operating control, those same instruments provide the indicators that predict maintenance needs and timing.

During daily operations, operators prepare logbooks with information collected from instrumentation at frequent enough intervals to detect trends early. This early detection is critical to operating efficiently and at low cost.

A furnace and steam-generating boiler system consists of:

- A setting, or support structure
- A fuel- handling and supply system
- A fuel-burning control system
- Space above the fuel for heat transfer by radiation and convection
- Boiler tubes for conducting heat to the water

- Boilers for steam generation and storage
- Air and ash-handling equipment
- And many support systems, such as condensers, pumps, de-aerators, water softeners, and soot blowers

For smaller steam requirements, highly efficient packaged boilers and steam generators are available. Where loads fluctuate greatly or where frequent startups and shutdowns are necessary, it might be preferable to install several smaller, packaged units rather than one large furnace and boiler. These units are usually gas or oil fired.

FAILURE CAUSE AND PREVENTION

The primary cause for boiler failure during operation is low water. According to authorities on boiler explosions, an estimated 75 percent of boiler failures are due to this cause. The main cause for this high level of accidents is the assumption that boilers require little or no attention because of the redundant, automatic controls they feature.

- Without regular operation and maintenance controls, a series of automatic-control failures can occur, preceding an explosion. First, the automatic feed device fails, causing the low-water condition
- Then, the low-water fuel cutout fails to sense the low-water condition and stop the fuel supply. Third, the safety pop valve fails to actuate to relieve the pressure buildup
- Although all of these devices are automatic, they have a finite life span under the conditions in which they operate. Mechanical wear, fatigue, corrosion, and erosion take their toll

Preventing Failure

Four steps will ensure more reliable and energy-efficient boiler operations and prevent failure.

1. First, match the best equipment available with the type of service and fuel required

2. Second, verify proper operation, including all necessary controls and safety equipment, by having the installation checked annually by the insurance Company’s service representative

3. Third, specify as a part of the installation contract that the system be inspected by an authorized insurance Company or state or local inspector before acceptance. This step ensures the installation meets all ordinances and that installers followed good practices

4. Finally, provide operators with a logbook for recording daily events and a preventive maintenance program for regular, daily, weekly, monthly, semiannual and annual maintenance procedures. These procedures should include repair, replacement, inspection, cleaning, and lubricating. Technicians should schedule these tests annually and perform them periodically

UNIT HEATERS

Many institutional and commercial organizations also use unit heaters to provide heat to parts of their facilities. These units heat space by a combination of conduction, convection, and radiation, and steam and hot water are the most frequently used sources.

The most common reasons unit heaters fail include improper installation, installation in a corrosive environment, and lack of maintenance. Annual inspection and cleaning several months before the heating season is highly recommended.

Steam and hot water heaters often fail due to internal corrosion and water hammer. Technicians can minimize corrosion by treating the makeup water with a filming amine, which protects the tube walls, due to the formation of carbonic acid.

Technicians can control water hammer by using the right type and size of steam trap for removing condensate from the heaters. They should check traps for proper operation and clean steam-line filters annually.

Long drip legs correctly installed in the condensate lines help to keep a static head of condensate to overcome pressure loss across condensate piping, strainers and traps.

Technicians can remove the drip-leg caps annually for cleanout and inspection to determine the amount of scale buildup occurring. They can install vacuum breakers between the heating units and the trap if a control valve regulates the steam supply. This tactic prevents pressure in the tubes from dropping below atmospheric pressure.

Gas and oil-fired heaters are subject to internal corrosion due to atmospheric conditions. The only solution is to move them to a location less vulnerable to corrosive substances.

Overfiring caused by drafts can occur, causing the burners to fail prematurely. If technicians cannot eliminate the draft, adding outside air might reduce the overfiring problem.

Finally, technicians should clean the contactors and inspect them for oxidation and pitting, replacing them if they look badly burned. The coil itself can crack and break from fatigue, due to frequent cooling and heating. Technicians can make a temporary fix by reconnecting the broken ends with a conducting fastener and washers, but they should replace the faulty coil with the proper part as soon as possible.

Providing appropriate training and conducting operating-floor visits can help managers ensure technicians follow these procedures and log all important events, including unsafe conditions, operating problems, and equipment issues.

BOILER STACKS AND CHIMNEYS

Any boiler using a combustible fuel source requires a stack or chimney. The stack or chimney aids combustion in natural draft boilers by helping to ensure a steady supply of combustion air that mixes with the fuel. The primary purpose of a stack or chimney, though, is to exhaust the products of combustion at some elevation above the boiler, which aids the environmental conditions in the immediate area around the boiler.

The height of the stack or chimney is determined by several factors including:

- Height of the nearest building or roof line
- Prevailing wind direction
- Height of surrounding manmade structures or natural landforms
- Location of air intake vents

- Type of boiler draft (natural or fan assisted)
- Type of fuel
- Local and/or national requirements

Stacks and chimneys should be designed by a competent engineer who will address all of the necessary factors for the specific application, including any jurisdictional (local, state or provincial, and national) requirements.

Stacks and chimneys should be inspected periodically by a reputable and competent person familiar with stack and chimney design and construction. Jurisdictional requirements may specify who is allowed to make these inspections. Stacks and chimneys deteriorate with age and are very susceptible to seismic or wind damage due to their height.

During a stack or chimney inspection, the following items, as a minimum, should be observed:

- The stack/chimney base or foundation
- External supports or guy wires, if used
- Connection to the breeching or boiler
- Condition of bricks and mortar joints in masonry stacks/chimneys
- Condition of metal and joints in metallic stacks/chimneys
- Condition of cap, cone, or spark arrestor, if used, at the top of the stack/chimney
- The height and diameter of the stack/chimney based upon the original design
- Vertical orientation (is it plumb?)
- Condition of brick or metallic liner in masonry stacks/chimneys
- Condition of interior metal and joints in a double-wall metallic stack/chimney
- The internal passageway (no obstructions or blockage)

Note: The above list is not intended to be exhaustive, but is provided as a basic guide.

If repairs to a stack or chimney are required, the owner should be directed to contact the authority having jurisdiction over the stack/chimney to determine if a permit or other documentation is necessary. This jurisdictional authority may be local (city), state or provincial, or national. Two examples of this are:

- The stack of a small gas-fired boiler may be within the jurisdiction of the city building or mechanical inspection department
- The stack of a large sawdust-fired industrial boiler may be within the jurisdiction of the state or provincial environmental protection department

RECOVERING BOILER SYSTEMS AFTER A FLOOD

Floods, whether caused by nature or by structural or mechanical failures, can produce deaths, injuries and severe property damage. The following information is provided to assist in the recovery of boiler systems affected by flooding to help mitigate further risks to public safety and property damage.

- Safety of the personnel performing inspections and repairs is the highest priority
- Because floodwaters contain many hazardous chemicals and bacteria, personnel safety procedures should be developed and enforced

- All utilities in the boiler room should be turned off until inspection and necessary repairs of the individual systems allow reactivation
- A careful visual inspection of the entire boiler system should be made, both internally and externally, with notations of obvious problems and any special equipment or personnel needed to facilitate repairs
- Keep in mind that some equipment may only be repaired by the original manufacturer or its licensed agents in order to maintain warranties and/or certification
- The boiler setting or foundation should be examined closely to determine if it has been weakened or undermined. Any movement of the boiler or building will have an adverse effect on piping and other equipment connected to both the boiler and building structure
- Waterlogged insulation will hasten external corrosion of boilers and pipes. If removal is deemed necessary, remember that asbestos is still present in many boiler rooms and requires handling by specially licensed personnel. Employers or contractors engaged in asbestos-related work by disturbing more than 100 sq. ft. of asbestos-containing material (if greater than 0.1 percent asbestos by weight), must register with their state OSHA division at least 24 hours before beginning work
- If the insulation is left in place and the boiler is fired before thoroughly drying, steam can be generated within the insulation layers, creating the potential for explosive damage to the external lagging
- Refractory and firebrick should be checked for deterioration or loosening
- Feedwater and condensate return systems should be thoroughly cleaned of any mud, silt or debris. After the boiler is put back in operation, the water quality should be checked often for contamination of any kind
- Pressure relief devices should be checked for corrosion or any damage that would cause binding and failure to operate. Only qualified personnel should perform disassembly or repair of a pressure relief device. Some jurisdictions require this work to be performed by a Company holding the National Board "VR" symbol stamp. The outlet and discharge line of the pressure-relieving device should be inspected for blockage
- All drains and blow-off lines should be inspected to ensure there is no blockage by debris
- Electric/electronic controls should be evaluated for replacement or repair as needed. Flame safeguard controls, ignition transformers and safety shutoff valves on the fuel system that have the potential for causing furnace explosions should be replaced. Other fuel system components should be drained and cleaned or replaced as necessary. All work performed on the fuel system and safety devices must comply with jurisdictional requirements
- All electric motors and wiring should be inspected closely to determine if repair or replacement is necessary. All electrical work must comply with jurisdictional requirements
- Check to make sure air inlets are clear and chimneys or stacks are open
- These items are not intended to be all-inclusive, as boiler systems and equipment vary in design and operation

TRAINING

This Company will ensure the employees performing plumbing and boiler work are trained on the following topics as applicable:

- Safe work practices
- Proper use of tools and PPE
- Confined space work, if needed
- Welding, brazing and soldering, depending on the work
- Working at height, if required

SCOPE

This chapter provides information on the requirements and safe practices to be used when working with pneumatic tools. These safe practices will comply with OSHA regulation 1926.302, and all applicable state or local requirements.

POLICY

This policy is intended to ensure safety for employees who use pneumatic tools, and must be followed by all employees.

EMPLOYER RESPONSIBILITIES

It is the Company's responsibility to:

- Maintain all tools and equipment used by employees in safe, working condition
- Ensure only trained employees operate pneumatic tools and equipment
- Remove unsafe equipment from the worksite; ensure employees are properly trained in the safe use and operation of tools and equipment before using or operating the tools and equipment on the job
- Provide personal protective equipment to prevent injury and adverse health effects
- Select and use only tools with appropriate safety guards
- Ensure every job hazard analysis and safe job procedure considers the hazards introduced by pneumatic tools

EMPLOYEE RESPONSIBILITIES

All Company employees are expected to:

- Be aware of hazards presented by tools where they work
- Follow Company safety policy and the instructions of the supervisor
- Comply with safe operating procedures for all equipment
- Properly use and maintain personal protective equipment
- Attend and participate in appropriate safety training
- Inspect tools and equipment daily to ensure they are in proper working order
- Report defective tools and equipment, and any other safety concerns, and provide safety recommendations as appropriate

PNEUMATIC HAZARDS

Working with pneumatic tools presents specific dangers, and employees will be trained on these hazards, and how to avoid them. Pneumatic tools hazards include:

- Air embolism: This is the most serious hazard, since it can lead to death. If compressed air from a hose or nozzle enters even a tiny cut on the skin, it can form a bubble in the bloodstream – with possible fatal results

- Whipping Hose Danger: A severed air hose can whip around violently until the air is shut off.. When using quick disconnect type fittings, install the male end on the tool
- Physical damage: Compressed air directed at the body can easily cause injuries – including damage to eyes and eardrums
- Air Temperature: Under certain conditions, the air temperature can be low enough to cause frostbite, or even make you more susceptible to certain types of cumulative trauma injuries. Wearing gloves can help if they can be worn without creating the additional hazard of becoming caught up in any rotating or reciprocating parts
- Flying particles: Compressed air at only 40 pounds per square inch can accelerate debris to well over 70 miles per hour when it is used to blow off dust, metal shavings, or wood chips. These particles then carry enough force to penetrate the skin

WARNING: Make sure air pressure is set at a suitable level for the tool or equipment being used. Before changing or adjusting pneumatic tools, turn off air pressure.

PERSONAL PROTECTIVE EQUIPMENT

Employees using pneumatic tools and can be exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases must be provided with the particular personal protective equipment (PPE) necessary to protect them from the hazard. All personal protective equipment must meet the requirements and be maintained according to OSHA requirements.

PPE for working with pneumatic tool can include, but is not limited to:

- Gloves
- Safety Glasses
- Hard Hat
- Ear Plugs
- Protective Shoes, or Boots
- Eye protection

Wearing loose clothing, sleeves, neckties, scarves and jewelry is prohibited because it can become caught in moving parts

SAFE PRACTICES

Employees of this Company will follow the safe practices listed below when operating pneumatic tools:

General Safety

- All pneumatically powered tools and similar equipment, whether furnished by the employer or the employee, will be maintained in a safe condition
- When pneumatic tools are designed to have safety guards, the guards must be installed the tool is in use
- Never carry a tool by its hose
- Never yank the hose to disconnect it from the receptacle

- Keep cords and hoses away from heat, oil, and sharp edges
- Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters
- Keep all people not involved with the work at a safe distance from the work area
- Secure work with clamps or a vise, freeing both hands to operate the tool
- Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool
- Maintain tools with care; keep them sharp and clean for best performance
- Follow instructions in the user's manual for lubricating and changing accessories
- Be sure to keep good footing and maintain good balance when operating power tools
- Follow good housekeeping procedures to keep floors free of debris and hazards
- Do not allow dust, shavings, or other scraps to accumulate on or near machines
- Tools and machines must be located where there is enough space for workers to handle material without interference from, or to, employees or machines. Operators should never have to stand in an aisle while operating a machine unless protection is provided
- Except for portable hand tools, machines designed for a specific location must be secured to a floor, foundation, bench, table, or stand of sufficient strength and design to prevent overturning or unintentional movement
- Tools and machinery must be located so that light with the intensity of at least 50-foot candles from both natural and artificial light falls on the work. Supplementary illumination at the point of operation must be provided where necessary
- Any tool or machine, or component of a tool or machine that is not in proper working order must be immediately removed from service
- Tools and machines must be inspected at regular intervals and will be repaired in accordance with the manufacturer's specifications
- Untrained or unauthorized people must not modify them, and they cannot be returned to service until properly repaired
- Screens must also be set up to protect nearby workers from flying fragments around chippers, riveting guns, staplers, or air drills
- Pneumatic power tools must be secured to the hose by some positive means to prevent the tool from becoming accidentally disconnected
- Compressed air must not be used for cleaning purposes except where reduced to less than 30 psi, and then only with effective chip guarding and appropriate PPE. (The 30 psi requirement does not apply for concrete form, mill scale and similar cleaning purposes)
- Never point compressed air guns toward anyone
- Never "dead-end" an air gun against yourself or anyone else
- Always check that the compressor is set at the correct pressure. Construction Pneumatic tools are designed to work at 90 psi (100 psi max)
- Before use, always be sure that the tools and hoses are in good condition, and that the couplings are properly secured
- Before connecting the air hose to the tool, ALWAYS safely blow out the hose, this will ensure there is no debris or water inside the hose

- Make sure all auxiliary safety devices, including whip checks, safety clips, excessive Flow Check Valves are installed
- Ensure tools receive proper lubrication and all steel is secured in tool, in good condition and always sharp
- Never assume that a tool is empty. Check the magazine for fasteners that may be left in the tool. Even if you think the tool is empty or disconnected, never point it at anyone or yourself. Unseen fasteners could fire from the tool
- Disconnect the tool when not in use Always disconnect the tool from the airline when it is not in use, when you leave the work area or when moving the tool to a new location
- Never leave a tool unattended because people who are not familiar with the tool might handle it and injure themselves or others
- Do not play with compressed air, and do not use compressed air to blow dust off your clothes.
- Do not use diesel fuel as a lubricant, cleaning or de-icing fluid
- Prolonged use of any vibrating tools can cause hand and arm damage, use them carefully and wisely
- A chip guard must be used when compressed air is used for cleaning
- Do not exceed the manufacturer’s safe operating pressure for hoses, pipes, valves, filters, and other fittings
- Replace worn-out absorption pads and springs
- Never tamper with safety devices
- Keep hands away from discharge area – on nailers in particular
- Review the manufacturer's instruction before using a tool
- Post warning signs where pneumatic tools are used. Set up screens or shields in areas where nearby workers may be exposed to flying fragments, chips, dust, and excessive noise
- Ensure that the compressed air supplied to the tool is clean and dry. Dust, moisture and corrosive fumes can damage a tool. An in-line regulator filter and lubricator increases tool life
- Keep tools clean and lubricated, and maintain them according to the manufacturers' instructions
- Use only the attachments that the manufacturer recommends for the tools you are using
- Be careful to prevent hands, feet, or body from injury in case the machine slips or the tool breaks
- Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible
- Match the speed rating of saw blades, grinding wheels, cut-off wheels, etc. to tool speed
- Never use air to blow dust or dirt out of work clothes
- Turn off the pressure to hoses when the system is not in use
- Turn off the air pressure when changing pneumatic tools or attachments
- At the end of the shift, put a teaspoon of oil in the air inlet and run the tool for a second or two to protect against rust
- Use an inline regulator filter and lubricator to prevent damage from dust, moist air, and corrosive fumes

- Before start-up, check the couplings and fittings, blow out the hose to remove moisture and dirt, and clean the nipple before connecting the tool
- Set the air pressure according to the manufacturer's specifications and open gradually
- Safety clips or retainers must be installed and maintained on pneumatic impact (percussion) tools

Tool Safety

The use of pneumatic tools at the worksite creates a range of hazards. However, appropriate training, tool inspection, tool maintenance and safe practices can prevent injuries. All employees will adhere to the following equipment safety practices.

Guards

All tools must be used with the correct shield, guard, or attachment recommended by the manufacturer. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded.

Guards, as appropriate, must be provided to protect the operator and others from the following:

- Point of operation
- In-running nip points
- Rotating parts
- Flying chips and sparks

Safety guards must never be removed or made inoperable when a tool is being used.

Switches and Controls

The following hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released:

- Drills
- Tappers
- Fastener drivers
- Buffers, sanders, and grinders
- Wrenches
- Jack Hammers, Riveting guns
- Percussion tools with no means of holding accessories securely
- Other similar tools

These tools also may be equipped with a "lock-on" control, provided it allows the worker to shut off the control in a single motion using the same finger or fingers.

Air Hoses

- Compressed air hoses and connections to tools must be designed for the tool operating pressure (their pressure ratings cannot be less than the supply source)
- The air supply line must also be regulated to maintain pressure at under the tool rating

- The use of hoses for hoisting or lowering tools is not permitted
- All hoses exceeding ½-inch inside diameter must have a safety device at the source to reduce pressure in case of hose failure
- Hose connections must have a positive-locking action or the connecting sections must have a safety chain to restrain any whipping action if the sections become disconnected
- Make sure hoses are clear of traffic and pose no tripping hazards
- Never “kink” a hose to stop airflow
- Use the proper hose and fittings of the correct diameter
- Use hoses specifically designed to resist abrasion, cutting, crushing, and failure from continuous flexing
- Choose air-supply hoses that have a minimum working pressure rating of 150 psi or 150% of the maximum pressure produced in the system, whichever is higher
- Check hoses regularly for cuts, bulges, and abrasions. Tag and replace, if defective
- Blow out the airline before connecting a tool.
- Make sure that hose connections fit properly and are equipped with a mechanical method of securing the connection
- Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose
- Do not operate the tool at a pressure above the manufacturer's rating
- Turn off the air pressure to hose when not in use or when changing tools or attachments
- Do not carry a pneumatic tool by its hose
- Avoid creating trip hazards caused by hoses laid across walkways or curled underfoot
- Do not use compressed air to blow debris or to clean dirt from clothes

Air Systems

Where indoor air systems are used, this Company will ensure:

- All pipes supplying air have a large enough inside diameter to ensure adequate air supply
- The main supply pipe slopes down, away from the compressor (1/16 inch per foot)
- Air storage is provided along lengthy airlines
- Pipeline branch outlets are at the top of the main pipeline
- Cutoff valves are provided at each branch pipeline throughout the system
- Water legs extend from the bottom of each branch line
- A refrigerant-type dryer is installed on the system
- Air hoses are kept as short as practical
- A regular maintenance program is followed

When an outdoor air system is used, the Company will ensure:

- A moisture trap and a filter/regulator/lubricator are installed at the compressor
- Air hoses and fittings are large enough so that airflow is not restricted. Minimum hose size is $^{3}/_{8}$ inch ID with $^{1}/_{2}$ inch ID hose used for any application over 25 feet

- Air hoses are no longer than 150 feet
- The air system is lubricated regularly
- A regular maintenance program is followed

TOOL TYPES

Pneumatic tools are powered by air pressure. The amount of air pressure required to operate a tool is normally 90 psi. The pressure may vary based on the job being performed. The following sections provide information on commonly used pneumatic tools. As with any type of equipment, the manufacturers' instructions and guidelines should always be followed.

Nailers and Staplers

Nail guns, staplers and other pneumatic fastening tools are used every day on construction jobs. They are effective tools, but also cause tens of thousands of serious injuries each year. Nail gun safety is critical because more injuries to construction workers are caused by nail guns than any other tool. These injuries are often not reported or treated properly

All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 psi pressure at the tool, have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.

A portable powered stapler or nailer must be designed so that the operator is required to make not less than two separate operations to activate the tool, with one operation being to place/press the tool against the work surface.

Safe Fastener Practices

- Avoid awkward work positions
- Use a hammer if you can't reach the work while holding the nailer or for work at face or head height
- Position ladders as close to your work as possible. Don't over reach
- Check the tool and air source before use
- Check the work piece for knots or anything else that could cause a ricochet
- Keep your hands at least a foot away from the nailing point
- Keep the gun pointed away from your body and from co-workers
- Set up operations so that others are not in the line of fire from nail guns

Abrasive Blast Cleaning Nozzles

All blast cleaning nozzles must be equipped with an operating valve that must be held open manually. The nozzle must have a support that will hold the nozzle when it is not in use.

Airless Spray Guns

Airless spray guns that atomize paints and fluids at high pressures (1,000 pounds or more per square inch) must be equipped with automatic or visible manual safety devices that prevent pulling of the trigger and prevent the release of the paint or fluid until the safety device is manually released.

In lieu of the above, a diffuser nut, which will prevent high pressure, high velocity release, while the nozzle tip is removed, plus a nozzle tip guard that will prevent the tip from coming into contact with the operator, or other equivalent protection, must be provided.

The two biggest hazards with using airless spray guns are fire/explosion and injection of spray material. To minimize these risks all employees will use the following safe practices.

Safe Spray Gun Practices

- Spray in well-ventilated areas with good air movement. Use only non-sparking fans if one is needed
- Remove, extinguish, or unplug all ignition sources such as:
  - Cigarettes
  - Pilot lights; stoves and ranges, water heaters, furnaces
  - All electric appliances
- Put gas-powered sprayers outside the building and run the hose into the room to be sprayed. Even though the sprayer is outside, always ground the sprayer to prevent static sparking
- Keep the work area free of debris that could contribute to a fire such as:
  - Open or empty paint/material cans
  - Open or empty solvent/thinner cans
  - Rags, especially used ones
  - Paper, masking
- Prevent sparks and static sparking
  - Use only grounded hoses Check hoses periodically for electrical continuity using and ohmmeter
  - Tape wall switches to help prevent them from being used
  - Use only grounded metal pails when spraying/painting, flushing or cleaning Connect the pail to a true earth ground according to your local electric code
- Ground the sprayer regardless of the power source!
- Connect the pail to a true earth ground according to your local electric code. Some airless sprayers have a grounding lug to use with a ground wire clamp

To help prevent accidentally triggering/spraying the gun:

- Put the trigger safety latch on when you are not spraying
- Always keep the trigger guard on the gun! The guard helps prevent the trigger from being bumped or otherwise accidentally triggered

Other safety considerations

- Wear a respirator when using toxic or noxious paint or solvent. Follow the material manufacturers guidelines to select the correct respirator and or cartridges
- Read and save the instruction manuals supplied with the equipment

Jackhammers

Use of heavy jackhammers can cause fatigue and strains. Heavy rubber grips reduce these effects by providing a secure handhold.

Noise is another hazard associated with pneumatic tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

Safe Jackhammer Practices

- Position the jackhammer as near as possible to the work location. Place the compressor as far as possible from the work area to reduce the level of noise
- Inspect the jackhammer and associated equipment before every shift or start of operations for defects or damage. Check if all components are complete, securely in place and in good condition
  - Check air hoses for breaks, cracks, and worn or damaged couplings
  - Ensure that the rating of the hose is sufficient for the job intended
  - Inspect the electrical cord for frays, wear, and other signs of damage
- Secure hose ends to prevent whipping if an accidental cut or break occurs
- Workers must sling the electrical cord on their shoulder to prevent its accidental severing
- Use the proper weight of the jackhammer for the job. Use a lighter jackhammer for the job as much as possible
- Use the proper point for the material to be broken. Remember to use rock point for rock, spade point for asphalt, and chisel point for concrete. Never use a broken or cracked point
- Lift the jackhammer properly by using the legs. This helps you avoid back strain or injury
- Position the bit where you wish to the start the cut, then widen your stance to an athletic position prior to pulling the trigger
- Operate the tool at a slight angle with it leaning back towards you. This way, you prevent the point from becoming stuck in the material and the tool from getting out of control
- Check for dust when operating jackhammer – If necessary, use water suppression and/or respiratory equipment to limit exposure levels
- Do not jackhammer down beyond the depth of the cutting bit
- Release air trigger whenever lifting up on the jackhammer. If jackhammer trigger is operated when jackhammer is not being held down with pressure, it could jump around uncontrolled and injure the worker
- When moving the jackhammer from place to place during operation, place your hand between the handle and the operating lever
- Shut off the air supply and relieve pressure from the supply hose before changing tool points. Do the same when leaving the jackhammer unattended

- Immediately remove defective or malfunctioning jackhammers and other tools until they are properly repaired
- Barricade the work area as much as possible to keep spectators and untrained personnel from being exposed to the hazards of jackhammer operations
- In the event the jackhammer bit “gets stuck”
  - Attempt to free the bit by moving the jackhammer back and forth from side to side
  - If bit is still stuck, put a second bit into the jackhammer and work at stuck bit from an angle

TRAINING

The Company will ensure every employee who uses pneumatic tools is provided proper training on those tools before using them on the job. This training will be provided at no cost to the employee during working hours.

Training Components

The Company’s safety coordinator will ensure every employee will be trained on, and adhere to the requirements of, the following minimum elements:

- Proper storage, maintenance and use of any tool the employee will use in his job
- A description and identification of the hazards associated with tools
- The safeguards, including PPE, to protect the employee from tools, the hazards for which they are intended
- How to use tool safeguards and why
- Safety precautions necessary for working with the tool
- How to inspect tools for damage and what to do (e.g., contact the supervisor) if a tool is damaged, missing safeguards or other pieces, or otherwise unable to provide adequate protection
- Limitations of tools being used and the how to select the right tool for the job
- How to replace blades, change accessories, lubricate, charge and other similar activities associated with using power tools
- Where to find the manufacturer’s instructions for tools the employee is expected to use

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

POLICY

This Company has implemented this policy to protect its employees from exposure to airborne hazards in excess of permissible exposure limits (PELs), or to oxygen-deficient atmospheres. The respiratory program administrator responsible for verifying engineering controls and work practices to protect workers from such hazards are rigorously enforced.

The respiratory program administrator or designee will be responsible for the periodic evaluation of the program. The evaluation will be based on results of an air quality-monitoring program, medical evaluations, changing work environment, equipment changes, work requirements and employee responses. All respiratory equipment will be NIOSH certified, and selections will be made based on identified and potential hazards, estimated exposures and contamination information.

EMPLOYER RESPONSIBILITIES

It is the responsibility of this Company to:

- Prevent exposure to airborne hazards and when the hazards can't be removed, to reduce them to the lowest achievable level through engineering and administrative controls before resorting to respirators
- Protect workers against health effects of exposure to hazardous substances by requiring them to use respirators and appropriate equipment if they are, or may be, exposed to substances at levels above permissible exposure limits (PELs) as defined in OSHA 1910.1000 (tables Z-1 and Z-2). Companies must also check to see if their state OSHA has more stringent standards for specific hazardous substances
- Establish and maintain a written respiratory protection program when necessary
- Provide training and medical evaluations for the respiratory protection program at no cost to the employee
- Evaluate workplace respiratory hazards, workplace and user factors to make respiratory protection equipment selections, providing suitable respirators
- Select enough types of NIOSH-certified respirators appropriate to hazards so each user has an acceptable, correctly fitting choice
- Make sure respirator use doesn't create a hazard, respirator users have access to essential information about respirator safety when respirator use isn't required, and respirator users are medically cleared to use the respirator they use
- Identify an appropriately licensed healthcare professional (PLHCP) to perform medical evaluations and provide a written recommendation regarding respirator use
- Ensure follow-up medical examinations are provided for when required
- Provide the PLHCP with the respiratory protection program and the OSHA regulations covering respiratory protection
- Require fit testing for all employees who will wear a respirator and ensure the fit test is passed before they are permitted to use a respirator
- Establish and implement procedures for use, maintenance and inspection of respirators
- Provide employees using atmosphere-supplying respirators with high purity breathing gases

- Ensure filters, cartridges and canisters are labeled and color coded with NIOSH (the National Institute for Occupational Safety and Health) approval label
- Evaluate the workplace to check that the program is being properly implemented and continues to protect against all hazards
- Establish and retain all necessary documentation for the respirator program

EMPLOYEE RESPONSIBILITIES

Employees are expected to:

- Participate in training
- Follow the respiratory protection program
- Use and care for respiratory protection devices appropriately
- Report any problems or concerns about the respiratory protection program
- Report any injuries, respiratory difficulties, or suspected hazardous atmospheres to appropriate supervisor

SAFE PRACTICES

Program Overview

If respirators are necessary to protect employee health, the Company must begin a written respiratory program specific to the hazards at the worksite. The program will include the following:

- Procedures for selecting respirators
- Medical evaluations of employees required to use respirators
- Fit testing procedures for tight-fitting respirators
- Procedures for proper use of respirators in routine, infrequent, and foreseeable emergency situations
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding and otherwise maintaining respirators
- Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators
- Training of employees in the respiratory hazards to which they are potentially exposed during routine, infrequent, and emergency situations
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance
- Procedures for regularly evaluating the effectiveness of the program

Voluntary Respirator Use

This Company may provide respirators to employees or allow employees to use their own respirators even if there are no conditions that require workers to be equipped with such devices.

However, employees who use respirators voluntarily must be medically able to use them safely. Such use of a respirator must not create its own hazards and workers who voluntarily use respirators must be provided with information on the conditions and requirements of respirator use. See the Information for Employees Using Optional Respirators, in the attachments section at the end of this chapter for additional information.

Respirator Selection

The respiratory program administrator, with the help of the safety committee, will identify and evaluate the respiratory hazard(s) in the workplace; this evaluation will include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form.

If the administrator cannot identify or reasonably estimate the employee exposure, the atmosphere will be treated as IDLH (atmospheres Immediately Dangerous to Life or Health). An appropriate respirator will be selected based on the respiratory hazard(s) to which the worker is exposed and the workplace and user factors that affect respirator performance and reliability. NIOSH-certified respirators will be selected from a sufficient number of respirator models and sizes so the respirator is acceptable to, and correctly fits, the user. The respirator will be used in compliance with the conditions of its certification.

Respirators for IDLH Atmospheres

The Company will provide the following respirators for employee use in IDLH atmospheres:

- A full face-piece pressure-demand SCBA certified by NIOSH for a minimum service life of thirty minutes
- A combination full face-piece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply

TABLE 1

Altitude (ft.)	Oxygen-deficient atmospheres (% 02) for which the employer atmosphere may rely on supplying respirators
< 3,001	16.0 – 19.5
3,001 – 4,000	16.4 – 19.5
4,001 – 5,000	17.1 – 19.5
5,001 – 6,000	17.8 – 19.5
6,001 – 7,000	18.5 – 19.5
7,001 – 8,000	19.3 – 19.5

Respirators provided only for escape from IDLH atmospheres will be NIOSH-certified for escape from the atmosphere in which they will be used.

All oxygen-deficient atmospheres will be considered IDLH.

Exception: If the Company demonstrates that, under all foreseeable conditions, the oxygen concentration can be maintained within OSHA-approved ranges (i.e., for the altitudes set out Table 2), then any atmosphere-supplying respirator may be used.

TABLE 2: ASSIGNED PROTECTION FACTORS[5]

Type of Respirator[1, 2]	Quarter mask	Half mask	Full facepiece	Helmet/Hood	Loose-fitting facepiece
1. Air-Purifying Respirator	5	103	50	—	—
2. Powered Air-Purifying Respirator (PAPR)	—	50	1,000	25/10004	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
Demand mode	—	10	50	—	—
Continuous flow mode	—	50	1,000	25/1000[4]	25
Pressure-demand or other positive-pressure mode	—	50	1,000	—	—
4. Self-Contained Breathing Apparatus (SCBA)					
Demand mode	—	10	50	50	—
Pressure-demand or other positive pressure mode (e.g., open/closed circuit)	—	—	10,000	10,000	—

Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

The assigned protection factors in Table I are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134(d)(2)(ii).

Non-IDLH Atmospheres

Respirators must be adequate to protect the health of the employee and ensure compliance with all other statutory and regulatory requirements, under routine, infrequent, and reasonably foreseeable emergencies. The respirator selected will be appropriate for the chemical state and physical form of the contaminant.

Using assigned protection factors (APF) as indicated in Table 2 will ensure sufficient respiratory protection for employees.

The APF can be used to identify the Maximum Use Concentration (MUC) for a given hazard by multiplying the APF and OSHA's established permissible exposure limit (PEL) for a given substance. If the workplace atmospheric level of the contaminant exceeds the MUC, a respirator with a higher APF needs to be selected.

For protection against gases and vapors, the Company will provide:

- Atmosphere-supplying respirator
- Air purifying respirator that is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant

(If there is no ESLI appropriate for conditions in the workplace, there must be a change schedule for canisters and cartridges based on objective information or data to ensure that canisters and cartridges are changed before the end of their service life. The Company will describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.)

For protection against particulates, the Company will provide:

- Atmosphere-supplying respirator
- Air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR part 84
- Contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH

MEDICAL EVALUATION

Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. Employees will be provided a medical evaluation to determine the employee's ability to use a respirator before the employee is fit tested or required to use the respirator in the workplace. Employee medical evaluations may be ended when the employee is no longer required to use a respirator.

Procedures

A physician or other licensed health care professional (PLHCP) will perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.

Information for the PLHCP

The following information must be provided to the PLHCP:

- Type and weight of the respirator to be used by the employee
- Duration and frequency of respirator use (including use for rescue and escape)
- Expected physical work effort
- Additional protective clothing and equipment to be worn
- Temperature and humidity extremes that may be encountered

Any supplemental information already provided to the PLHCP regarding an employee need not be provided for subsequent medical evaluation if the information and PLHCP remain the same.

The PLHCP must be presented with a copy of the written respiratory protection program and a copy of OSHA regulation 1910.134.

When the employer replaces a PLHCP, the employer must ensure that the new PLHCP obtains this information, either by providing the documents directly to the PLHCP or having the documents transferred from the former PLHCP. However, OSHA does not expect employers to have employees medically reevaluated solely because a new PLHCP has been selected.

Administration of the Medical Questionnaire and Examinations

All medical questionnaires and examinations are confidential and handled during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire is administered so that the employee understands its content. All employees are provided an opportunity to discuss the questionnaire and examination results with their physician or other licensed health care professional (PLHCP).

Medical Determination

A written recommendation from the PLHCP will include the following information:

- Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator
- The need, if any, for follow-up medical evaluations
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation

If the respirator is a negative pressure respirator and the PLHCP finds a medical condition that may place the employee's health at increased risk if the respirator is used, the Company will provide a powered air purifying respirator (PAPR) if the PLHCP's medical evaluation finds that the employee can use such a respirator. If a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the Company is no longer required to provide a PAPR.

Additional Medical Evaluations

At a minimum, additional medical evaluations will be provided if:

- An employee reports medical signs or symptoms that are related to ability to use a respirator
- A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, and temperature) that may result in a substantial increase in the physiological burden placed on an employee

Follow-Up Medical Examination

A follow-up medical examination is provided for employees who give a positive response to any question among questions 1 through 8 in Section 2, Part A of the OSHA Respirator Medical Evaluation Questionnaire, or whose initial medical examination demonstrates the need for a follow-up medical examination.

The follow-up medical examination will include any medical tests, consultations or diagnostic procedures that the PLHCP deems necessary to make a final determination.

Fit Testing

Before an employee may be required to use any respirator with a negative or positive pressure tight-fitting face-piece; the employee must be fit tested with the same make, model, style, and size of respirator that will be used.

This Company will:

- Ensure that employees using a tight-fitting face-piece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT) as stated in this section
- Ensure that an employee using a tight-fitting face-piece respirator is fit tested prior to initial use of the respirator, whenever a different respirator face-piece (size, style, model, or make) is used, and at least annually thereafter
- Conduct an additional fit test whenever the employee reports, or the PLHCP, supervisor, or program administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight

- Give an employee a reasonable opportunity to select a different respirator facepiece and be retested if after passing a QLFT or QNFT, the employee subsequently notifies the program administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable

The fit test will be administered using an OSHA-accepted QLFT or QNFT protocol. QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.

If the fit factor, as determined through an OSHA-accepted QNFT protocol, is equal to or greater than 100 for tight-fitting half face-pieces, or equal to or greater than 500 for tight-fitting full face-pieces, the QNFT has been passed with that respirator.

Fit Testing of Tight-Fitting Atmosphere-Supplying and Air-Purifying Respirators

Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators will be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

- Qualitative fit testing of these respirators will be accomplished by temporarily converting the respirator user's actual facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator facepiece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator facepiece
- Quantitative fit testing of these respirators will be accomplished by modifying the facepiece to allow sampling inside the facepiece in the breathing zone of the user, midway between the nose and mouth. This requirement will be accomplished by installing a permanent sampling probe onto a surrogate facepiece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the facepiece
- Any modifications to the respirator facepiece for fit testing will be completely removed, and the facepiece restored to NIOSH-approved configuration, before that facepiece can be used in the workplace

RESPIRATOR USE

No conditions are permitted that may result in face-piece seal leakage (facial hair). Employees must wear respirators in hazardous environments and practice continued effective respirator operation throughout the work shift.

Facepiece Seal Protection

Respirators with tight-fitting facepieces may not be worn by employees who have:

- Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function
- Any condition that interferes with the face-to-facepiece seal or valve function

If an employee wears corrective glasses or goggles or other personal protective equipment, they must be worn in a manner that does not interfere with the facepiece seal.

User Seal Check

Employees must perform a user seal check each time they put on the respirator using the following procedures: User seal checks are not substitutes for qualitative or quantitative fit tests.

Positive pressure check.

Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

Negative pressure check.

Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures if the employer demonstrates that the manufacturer's procedures are equally effective.

Continuing Respirator Effectiveness

Appropriate surveillance will be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, this Company will reevaluate the continued effectiveness of the respirator.

Employees must leave the respirator use area:

- To wash their faces and respirator face-pieces as necessary to prevent eye or skin irritation associated with respirator use
- If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the face-piece
- To replace the respirator, filter, cartridge, or canister elements

If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the face-piece, the employer must replace or repair the respirator before allowing the employee to return to the work area.

IDLH Atmospheres

For all IDLH atmospheres:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere
- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere
- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue
- The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue
- The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation
- Employee(s) located outside the IDLH atmospheres are equipped with
- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA
- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry
- Equivalent means for rescue where retrieval equipment is not required

RESPIRATOR MAINTENANCE AND CARE

Cleaning and Disinfecting

Each respirator user will be provided with a respirator that is clean, sanitary and in good working order. The Company will inspect the respirators to see that they're cleaned and disinfected using the appropriate procedures. The respirators will be cleaned and disinfected at the following intervals:

- Respirators issued for the exclusive use of an individual employee will be cleaned and disinfected as often as necessary to be maintained in a sanitary condition
- Respirators issued to more than one employee or maintained for emergency use will be cleaned and disinfected before being worn by different individuals
- Respirators used in fit testing and training must be cleaned and disinfected after each use

See the Respirator Cleaning document in the attachments section at the end of this chapter for cleaning information. Follow those the procedures for cleaning and disinfecting respirators except where respirators are cleaned using manufacturer recommendations that are at least as effective:

Storage

Respirators will be stored as follows:

- All respirators will be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture and damaging chemicals, and will be packed or stored to prevent deformation of the facepiece and exhalation valve

- In addition to proper storage procedures, emergency respirators will be:
  - Kept accessible to the work area
  - Stored in compartments or in covers that are clearly marked as containing emergency respirators
  - Stored in accordance with any applicable manufacturer instructions

Inspection

Respirators will be inspected as follows:

- All respirators used in routine and infrequent situations must be inspected before each use and during cleaning
- All respirators maintained for use in emergency situations will be inspected at least monthly according to the manufacturer's recommendations, and must be checked for proper function before and after each use
- Emergency escape-only respirators will be inspected before being carried into the workplace for use

The Company will verify that respirator inspections include the following:

- A check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters
- A check of elastomeric parts for pliability and signs of deterioration

Self-contained breathing apparatus must be properly inspected monthly. Air and oxygen cylinders will be maintained in a fully charged state and be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. The Company will determine that the regulator and warning devices function properly.

For respirators maintained for emergency use, this Company will:

- Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator
- Provide this information on a tag or label attached to the storage compartment for the respirator, kept with the respirator, or included in inspection reports stored as paper or electronic files. This information must be maintained until replaced following a subsequent certification

Repairs

Respirators that fail an inspection or are otherwise found to be defective will be removed from service, and be discarded, repaired or adjusted using the following procedures:

- Repairs or adjustments to respirators will only be made by trained personnel using only the respirator manufacturer's NIOSH-approved parts

- Repairs must be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed
- Reducing and admission valves, regulators and alarms will be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer

Identifying Filters, Cartridges, And Canisters

All filters, cartridges and canisters used in the workplace will be labeled and color-coded with the NIOSH approval label. The label must not be removed and remain legible.

BREATHING AIR QUALITY AND USE

The Company will provide employees using atmosphere-supplying respirators (supplied-air and SCBA) with breathing gases of high purity.

Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration accords with the following specifications:

- Compressed and liquid oxygen will meet the United States Pharmacopoeia requirements for medical or breathing oxygen
- Compressed breathing air will meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1, to include:
  - Oxygen content of 19.5-23.5%
  - Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less
  - Carbon monoxide content of 10 ppm or less
  - Carbon dioxide content of 1,000 ppm or less
  - Lack of noticeable odor
- The employer must ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air
- The employer must ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution

The employer must ensure that cylinders used to supply breathing air to respirators meet the following requirements:

- Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 180)
- Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air
- The moisture content in the cylinder does not exceed a dew point of -50 deg. F at 1 atmosphere pressure
- The employer must ensure that compressors used to supply breathing air to respirators are constructed and situated to:
  - Prevent entry of contaminated air into the air-supply system
  - Minimize moisture content so that the dew point at 1 atmosphere pressure is 10° F below the ambient temperature

  - Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters will be maintained and replaced or refurbished periodically following the manufacturer's instructions
  - Have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag must be maintained at the compressor
- For compressors that are not oil-lubricated, the employer must ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm
- For oil-lubricated compressors, the employer must use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply must be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm
- The employer must ensure that breathing air couplings are incompatible with outlets for non-respirable worksite air or other gas systems. No asphyxiating substance will be introduced into breathing airlines
- The employer must use only the respirator manufacturer's NIOSH-approved breathing-gas containers, marked and maintained in accordance with the Quality Assurance provisions of the NIOSH approval for the SCBA as issued in accordance with the NIOSH respirator-certification standard at 42 CFR part 84

PROGRAM EVALUATION AND RECORDKEEPING

Program Evaluation

Workplace evaluations must ensure the respiratory protection program is being implemented and will consult employees to make sure they are using their respiratory protection devices properly.

Employees will be consulted to assess their views on the program and identify problems with the program including, but not limited to the following: respirator fit, respirator selection in regard to hazards, respirator use, and respirator maintenance.

Recordkeeping

This Company will establish and retain written information about medical evaluations, fit tests, and this respiratory program to facilitate employee involvement in the respirator program, to audit the adequacy of the program and to provide a record for OSHA.

Fit Testing Records

A record of the qualitative and quantitative fit tests must include:

- The name or identification of the employee tested
- Type of fit test performed
- Specific make, model, style, and size of respirator tested
- Date of test
- The pass/fail results for QLFTs or the fit factor and strip chart recording or other recording of the test results for QNFTs

Fit test records will be retained for respirator users until the next fit test is administered.

Medical Evaluation Records

All records of medical evaluations will be retained and made available.

Employee's medical record will be maintained for as long as the employee is employed plus thirty years. (An exception may be made for employees who have worked for less than a year, provided the records were released to that employee upon termination.

We will provide an employee or a designated representative access to a record on request or provide it in a reasonable time, place, and manner. If the record cannot be accessed within 15 working days, the requestor must be provided with a reason for the delay and the earliest date when the record will be available.

TRAINING

This Company will ensure every employee is provided training on respiratory protection. This training will be provided at no cost to the employee during working hours.

The Company will use only training material that is appropriate in content and vocabulary to the educational level, literacy, and language of employees.

Training Components

The respiratory program administrator will ensure that every employee will be trained in the following minimum elements before they use a respirator:

- Proper respiratory protection selection
- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator
- What the limitations and capabilities of the respirator are
- How to wear and use the respirator effectively in emergency situations, including situations in which the respirator malfunctions
- How to inspect, put on and remove, use, and fit check the seals of the respirator
- What the procedures are for maintenance and storage of the respirator
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators
- The general requirements of OSHA 1926.103 and 1910.134

Training Records

Training records will include the following information:

- Dates of the training sessions
- Contents or a summary of the training sessions
- Names and qualifications of persons conducting the training
- Names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

Retraining

Retraining will be done annually, and when any of the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill
- Any other situation arises in which retraining appears necessary to ensure safe respirator use

FORMS AND ATTACHMENTS

On the following pages, please find the following documents:

- Respirator Medical Evaluation Questionnaire
- Respiratory Protection Program Employee Acknowledgement
- Information for Employees Using Respirators When Not Required
- Respirator Inspection
- Respirator Cleaning Record
- Employee Medical Release
- Respiratory Protection Training Documentation

RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE (PAGE 1 OF 7)

To the Employee:	Can you read? (check one)	□ Yes	□ No

Your employer must allow you to answer the questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A.

Section 1. The following information must be provided by every employee who has been selected to use any type of respirator (please print).

Today's Date		Your Name		Your Age	
Sex	□ Male □ Female	Your Height		Your Weight	
Your Job Title					

A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code)		The best time to phone you at this number?	□ AM	□ PM
Has your employer told you how to contact the health care professional who will review this questionnaire (check one)?			□ Yes	□ No

Check the type of respirator you will use (you can check more than one category)	□ N, R, or P disposable respirator (filter-mask, non-cartridge type only).
	□ other type (for example, half- or full-face-piece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

Have you worn a respirator (check one)	□ Yes	□ No	If yes, what type(s)?	

Section 2. (Mandatory) Questions 1 thru 9 below must be answered by every employee selected to use any type of respirator (please check "yes" or "no").

1. Do you now smoke tobacco, or smoked tobacco in the last month?	□ Yes	□ No
2. Have you ever had any of the following conditions?		
Seizures (fits)	□ Yes	□ No
Diabetes (sugar disease)	□ Yes	□ No
Allergic reactions that interfere with your breathing	□ Yes	□ No
Claustrophobia (fear of closed-in places)	□ Yes	□ No
Trouble smelling odors	□ Yes	□ No

RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE (PAGE 2 OF 7)

3. Have you ever had any of the following pulmonary or lung problems?					
Asbestosis	□ Yes	□ No	Silicosis	□ Yes	□ No
Asthma	□ Yes	□ No	Pneumothorax (collapsed lung)	□ Yes	□ No
Chronic bronchitis	□ Yes	□ No	Lung cancer	□ Yes	□ No
Emphysema	□ Yes	□ No	Broken ribs	□ Yes	□ No
Pneumonia	□ Yes	□ No	Any chest injuries or surgeries	□ Yes	□ No
Tuberculosis	□ Yes	□ No	Any other lung problem that you've been told about	□ Yes	□ No

4. Do you currently have any of the following symptoms of pulmonary or lung illness?					
Shortness of breath	□ Yes	□ No	Coughing that wakes you early in the morning	□ Yes	□ No
Shortness of breath when walking fast on level ground or walking up a slight hill or incline	□ Yes	□ No	Coughing that occurs mostly when you are lying down	□ Yes	□ No
Shortness of breath when walking with other people at an ordinary pace on level ground	□ Yes	□ No	Coughing up blood in the last month	□ Yes	□ No
Have to stop for breath when walking at own pace on level ground	□ Yes	□ No	Wheezing	□ Yes	□ No
Shortness of breath when washing or dressing yourself	□ Yes	□ No	Wheezing that interferes with your job	□ Yes	□ No
Shortness of breath that interferes with your job	□ Yes	□ No	Chest pain when you breathe deeply	□ Yes	□ No
Coughing that produces phlegm (thick sputum)	□ Yes	□ No	Any other symptoms that might be related to lung problems	□ Yes	□ No

5. Have you ever had any of the following cardiovascular or heart problems?					
Heart attack	□ Yes	□ No	Swelling in your legs or feet (not caused by walking)	□ Yes	□ No
Stroke	□ Yes	□ No	Heart arrhythmia (heart beating irregularly)	□ Yes	□ No
Angina	□ Yes	□ No	High blood pressure	□ Yes	□ No
Heart failure	□ Yes	□ No	Any other heart problem that you've been told about	□ Yes	□ No

RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE (PAGE 3 OF 7)

6. Have you ever had any of these cardiovascular or heart symptoms?					
Frequent pain or tightness in your chest	□ Yes	□ No	In the past 2 years, have you noticed your heart skip/miss a beat?	□ Yes	□ No
Pain or tightness in your chest during physical activity	□ Yes	□ No	Heartburn or indigestion that is not related to eating	□ Yes	□ No
Pain or tightness in your chest that interferes with your job	□ Yes	□ No	Any other symptoms that you think may be related to heart or circulation problems	□ Yes	□ No
7. Do you currently take medication for any of the following problems?					
Breathing or lung problems	□ Yes	□ No	Blood pressure	□ Yes	□ No
Heart trouble	□ Yes	□ No	Seizures (fits)	□ Yes	□ No
8. If you have ever used a respirator, have you ever had any of the following problems?					
(If you have never used a respirator, check here and go to question 9)	□ I have never used a respirator		Any other problem that interferes with your use of a respirator	□ Yes	□ No
Eye irritation	□ Yes	□ No	General weakness or fatigue	□ Yes	□ No
Skin allergies or rashes	□ Yes	□ No	Anxiety	□ Yes	□ No
9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire?				□ Yes	□ No
Questions 10 to 15 below must be answered by employees who have been selected to use either a full-face-piece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.					
10. Have you ever lost vision in either eye (temporarily or permanently)?				□ Yes	□ No
11. Do you currently have any of the following vision problems?					
Wear contacts	□ Yes	□ No	Color blind	□ Yes	□ No
Wear glasses	□ Yes	□ No	Any other eye/vision problem	□ Yes	□ No
12. Have you ever had injury to your ears, including a broken eardrum?				□ Yes	□ No

RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE (PAGE 4 OF 7)

13. Do you currently have any of the following hearing problems?					
Difficulty hearing	□ Yes	□ No	Any other hearing or ear problem	□ Yes	□ No
Wear a hearing aid	□ Yes	□ No			
14. Have you ever had a back injury?				□ Yes	□ No
15. Do you currently have any of the following musculoskeletal problems?					
Weakness in any of your arms, hands, legs, or feet	□ Yes	□ No	Difficulty fully moving your head side to side	□ Yes	□ No
Back pain	□ Yes	□ No	Difficulty bending at your knees	□ Yes	□ No
Difficulty fully moving your arms and legs	□ Yes	□ No	Difficulty squatting to the ground	□ Yes	□ No
Pain/stiffness when leaning forward or backward at the waist	□ Yes	□ No	Climbing a flight of stairs or a ladder carrying more than 25 lbs	□ Yes	□ No
Difficulty fully moving your head up or down	□ Yes	□ No	Any other muscle or skeletal problem that interferes with using a respirator	□ Yes	□ No
Part B.					
Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.					
1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen?				□ Yes	□ No
If “yes,” do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you are working under these conditions				□ Yes	□ No
2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals?				□ Yes	□ No
If “yes,” name the chemicals if you know them:					

RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE (PAGE 5 OF 7)

3. Have you ever worked with any of the materials, or under any of the conditions, listed below? (e.g., grinding or welding this material):					
Asbestos	☐ Yes	☐ No	Aluminum	☐ Yes	☐ No
Silica (e.g., in sandblasting)	☐ Yes	☐ No	Coal (for example, mining)	☐ Yes	☐ No
Tungsten/cobalt (e.g., grinding or welding this material)	☐ Yes	☐ No	Iron	☐ Yes	☐ No
Beryllium	☐ Yes	☐ No	Tin	☐ Yes	☐ No
Any other hazardous exposures	☐ Yes	☐ No	Dusty environments	☐ Yes	☐ No

If "yes," describe these exposures	
4. List any second jobs or side businesses you have	
5. List your previous occupations	
6. List your current and previous hobbies	

7. Have you been in the military services?	☐ Yes	☐ No
If "yes," were you exposed to biological or chemical agents (either in training or combat)?	☐ Yes	☐ No
8. Have you ever worked on a HAZMAT team?	☐ Yes	☐ No
9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications)	☐ Yes	☐ No

If "yes," name the medications if you know them	

10. Will you be using any of the following items with your respirator(s)?								
HEPA Filters	☐ Yes	☐ No	Cartridges	☐ Yes	☐ No	Canisters (for example, gas masks)	☐ Yes	☐ No

RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE (PAGE 6 OF 7)

11. How often are you expected to use the respirator(s) (check yes or no for all answers that apply to you)?					
Escape only (no rescue)	□ Yes	□ No	Less than 2 hours per day	□ Yes	□ No
Emergency rescue only	□ Yes	□ No	2 to 4 hours per day	□ Yes	□ No
Less than 5 hours per week	□ Yes	□ No	Over 4 hours per day	□ Yes	□ No
12. During the period you are using the respirator(s), is your work effort:					
a. Light (less than 200 kcal per hour)?	□ Yes	□ No	If "yes," how long does this period last during the average shift: _____ hrs. ____ min.		
Examples of a light work effort are sitting while writing, typing, drafting, or performing light assembly work; or standing while operating a drill press (1-3 lbs.) or controlling machines.					
b. Moderate (200 to 350 kcal per hour)?	□ Yes	□ No	If "yes," how long does this period last during the average shift: _____ hrs. ____ min.		
Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.					
c. Heavy (above 350 kcal per hour)?	□ Yes	□ No	If "yes," how long does this period last during the average shift: _____ hrs. ____ min.		
Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8- degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).					
13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using the respirator?				□ Yes	□ No
If "yes," describe this protective clothing and/or equipment					
14. Will you be working under hot conditions (temps. exceeding 77° F)?				□ Yes	□ No
15. Will you be working under humid conditions?				□ Yes	□ No
16. Describe the work you will be doing while using your respirator(s):					
17. Describe any special or hazardous conditions you might encounter when you are using your respirator(s) (for example, confined spaces, life-threatening gases)					

RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE (PAGE 7 OF 7)

18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):			
Name of first toxic substance			
Estimated maximum exposure level per shift		Duration of exposure per shift	
Name of second toxic substance			
Estimated maximum exposure level per shift		Duration of exposure per shift	
Name of third toxic substance			
Estimated maximum exposure level per shift		Duration of exposure per shift	
Name of any other toxic substances you will be exposed to while using your respirator:			
19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, and security):			
20. Additional Comments			

Employee Name	Employee Signature	Date
Physician Name	Physician Signature	Date

RESPIRATORY PROTECTION PROGRAM EMPLOYEE ACKNOWLEDGEMENT

By my signature below, I acknowledge that I have received instruction and have read the Company's Respiratory Protection Program. I have been given the opportunity to ask questions and have received answers, instruction, and clarification to my questions. I understand the contents of and agree to follow the Company policy regarding this Respiratory Protection Program.

Respiratory Protection Program received on _____, 20 ___

Printed Name of Employee	Social Security Number
Signature of Employee	Date
Printed Name of Trainer	
Signature of Trainer	Date

cc: Employee file

INFORMATION FOR EMPLOYEES USING OPTIONAL RESPIRATORS

To the employer: The statement below must be read by all employees using respirators not required under the Respiratory Protection Standard	
To the employee:	Can you read? Yes ☐ No ☐
Your employer is required to have you read the statement below if you are using respirators not required under the Respiratory Protection Regulation. Ensure you keep a copy of this form for your personal records.	

OSHA RESPIRATORY PROTECTION STATEMENT

To the Respirator User:

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, of if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You Should Do the Following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

Keep track of your respirator so that you do not mistakenly use someone else's respirator.

EMPLOYEE INFORMATION

Employee Name:		Work Location:	
Facility:		ID/Clock Number:	
Job Title:		Dept./Phone:	

CERTIFICATION: I certify that I have read and understand the below Respiratory Protection Statement as required by the Occupational Safety and Health Administration (OSHA).

Employee Signature:	Date:

RESPIRATOR INSPECTION RECORD (PAGE 1 OF 2)

OWNER INFORMATION			
Owner's Name (if individually issued):			
Company Name		Department	
Employee ID # (if applicable)		Work Phone	
RESPIRATOR INFORMATION			
Type of Respirator			
Manufacturer		Model #	
Size #		Respirator ID #	
Date of Inspection		Time	
INSPECTION CRITERIA			
Estimated Frequency (Check all that apply):	☐ Hourly ☐ Twice each Shift ☐ Daily ☐ Weekly ☐ Monthly	☐ Before Use ☐ After Use	
This inspection is being conducted PRIOR to use.		Initials	
This inspection is being conducted AFTER use.		Initials	

COMPONENT:	DEFECTS FOUND	CORRECTIVE ACTION TAKEN:
Cartridge Holder:		
Cartridge Threads/Fittings:		
Cartridge/Canister:		
Cartridge Filter:		
Connections:		
Elastomeric Parts Deteriorating?		
Elastomeric Parts Pliable?		

RESPIRATOR INSPECTION RECORD (PAGE 2 OF 2)

COMPONENT:	DEFECTS FOUND	CORRECTIVE ACTION TAKEN:
Exhalation Valve Assembly:		
Facepiece:		
Gaskets:		
Harness Assembly:		
Headbands:		
Hose Assembly:		
Inhalation Valve:		
Nose Cup Valves:		
Speaking Diaphragm:		
Other:		

Comments:			
Inspector's Name		Title	
Signature		Date	

FORM RETENTION INFORMATION	ATTACHMENTS
Retention File: Location:	Yes ☐ No ☐
Date Filed: Filed By:	*See Following Pages ☐

RESPIRATOR CLEANING RECORD (PAGE 1 OF 2)

OWNER INFORMATION			
Owner's Name (if individually issued):			
Company Name		Department	
Employee ID # (if applicable)		Work Phone	
RESPIRATOR INFORMATION			
Type of Respirator			
Manufacturer		Model #	
Size #		Respirator ID #	
Date of Inspection		Time	

CLEANING REQUIREMENTS FOR TIGHT FITTING RESPIRATORS		
Estimated Frequency (Check all that apply):	☐ Hourly ☐ Twice each Shift ☐ Daily ☐ Weekly ☐ Monthly	☐ Before Use ☐ After Use

COMPONENT:	Cleaning Requirements
Cartridge Holder:	
Cartridge Threads/Fittings:	
Cartridge/Canister:	
Cartridge Filter:	
Connections:	
Elastomeric Parts Deteriorating?	
Elastomeric Parts Pliable?	
Exhalation Valve Assembly:	
Facepiece:	

RESPIRATOR CLEANING RECORD (PAGE 2 OF 2)

Gaskets:	
Harness Assembly:	
Headbands:	
Hose Assembly:	
Inhalation Valve:	
Nose Cup Valves:	
Speaking Diaphragm:	

Respirator Cleaning Procedures

These procedures are provided for employee use when cleaning respirators. They are general in nature, and the employee as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators, provided such procedures are as effective as those listed in 29 CFR 1910.134 Appendix B-2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth below.

Procedures for Cleaning Respirators:

1. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure - demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

2. Wash components in warm (110 deg. F maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

3. Rinse components thoroughly in clean, warm (110 deg. F maximum), preferably running water. Drain.

4. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

a. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 110 deg. F.

b. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 110 deg. F.

c. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

5. Rinse components thoroughly in clean, warm (110 deg. F maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

6. Components should be hand-dried with a clean lint-free cloth or air-dried.

7. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

8. Test the respirator to ensure that all components work properly.

Inspector's Name		Title	
Signature		Date	

RESPIRATOR INSPECTION

Straps

- ☐ Check connections to facepiece.
- ☐ Check for continued elasticity.
- ☐ Check connections for neck and top of head.

Face piece

- ☐ Check overall shape for deformities.
- ☐ Check all metal pieces for bending.
- ☐ Check sealing surfaces for elasticity.
- ☐ Assure that there are no tears, scratches or other damage to the sealing surface.

Valves

- ☐ Check inhalation valves for flexibility and proper seating.
- ☐ Check exhalation valve for presence, flexibility, and proper seating.
- ☐ Assure that exhalation valve sealing surfaces are smooth and undamaged.
  Valve Cover
- ☐ Check for presence of exhalation valve cover.
- ☐ Check exhalation valve cover for cracks.

Valve Cover

- ☐ Check for presence of exhalation valve cover.
- ☐ Check exhalation valve cover for cracks.

Gaskets

- ☐ Check cartridge holders for gasket presence.
- ☐ Check gasket surface for smoothness.
- ☐ Check cartridge fitting/housing for cracks or anything preventing proper cartridge seating.

Cartridges

- ☐ Check that cartridge is correct cartridge for the task/job.
- ☐ Check that cartridge edge or bead that seats against the cartridge holder gasket is smooth and undamaged.
- ☐ Check that cartridge has just been removed from sealed packaging or has adequate remaining use time for intended task/job.

Overall

- ☐ Check whole assembly for damage or wear

FULL FACE RESPIRATOR FIELD INSPECTIONS (PAGE 1 OF 2)

Straps

☐ Check connections to facepiece.
☐ Check for continued elasticity.
☐ Check connections for neck and top of head.

Face Piece

☐ Check overall shape for deformities.
☐ Check all metal pieces for bending.
☐ Check sealing surfaces for elasticity.
☐ Assure that there are no tears, scratches, or other damage to the sealing surface.

Lens

☐ Check lens for flaws or cracks.
☐ Check lens holder for cracks and deformities.
☐ Check lens holder for secure seal against lens edge.

Valves

☐ Check inhalation valves for presence, if accessible on this model respirator.
☐ Check inhalation valves for flexibility and proper seating, if accessible on this model respirator.
☐ Check exhalation valve for presence, flexibility, and proper seating, if accessible on this model.
☐ Assure that exhalation valve sealing surfaces are smooth and undamaged, if accessible.

Valve Cover

☐ Check exhalation valve cover for presence, if accessible on this model respirator.
☐ Check exhalation valve cover for cracks, if accessible on this model respirator.

Amplifier

☐ If equipped with voice amplifier, check for continued function.

Gaskets

☐ Check cartridge holders for gasket presence.
☐ Check gasket surface for smoothness.
☐ Check cartridge fitting/housing for cracks or anything that would prevent proper cartridge seating.

Cartridges

☐ Check that cartridge is correct cartridge for the task/job.
☐ Check that cartridge edge or bead that seats against the cartridge holder gasket is smooth and undamaged.
☐ Check that cartridge has just been removed from sealed packaging or that the use log on these cartridges reflects adequate remaining use time for the intended task/job.

FULL FACE RESPIRATOR FIELD INSPECTIONS (PAGE 2 OF 2)

Canister Hose

☐ Check canister hose assembly for flexibility and wear.
☐ Check canister hose connections for damage and wear.

Canister Belt

☐ Check canister belting and harness assembly for damage and wear.
☐ Check all connections for smooth operation.

Canister

☐ Check that canister is correct canister for the task/job.
☐ Check that the canister connection point is smooth and damaged.
☐ Check that the canister seal has just been removed or that the log on this canister reflects adequate remaining use time for the intended task/job.
☐ If Type N canister, check that the window shows the catalyst is still working.

Overall

☐ Check whole assembly for damage or wear.

EMPLOYEE MEDICAL RELEASE FOR RESPIRATORY PROTECTION USE

Physician's Full Name		Telephone Number			
Street Address					
City		State		Zip	

I, examined ,

Physician's Name | Employee's Name

on

Employee's Social Security Number | Date of Examination

As a result of this examination, I find that this employee is:

Approved	Not Approved	For:
☐	☐	The use of negative pressure respiratory protection.
☐	☐	The use of positive pressure respiratory protection.
☐	☐	The use of self-contained breathing apparatus.
☐	☐	The wearing of protective clothing such as a Tyvek suit when wearing respiratory protection.

Comments/Observations:

Physician's Signature	Date

cc: Personnel file

RESPIRATORY PROTECTION TRAINING

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

SCOPE

This chapter provides information for working on scaffolds and elevated walking and working surfaces. The information contained here will comply with OSHA 1926 Subpart L – Scaffold Specifications and 1910 Subpart D Walking-Working Surfaces.

POLICY

This Company has implemented this policy to ensure that employees are not exposed to hazards while working on or with scaffolding or elevated work platforms. The Company's designated competent scaffolding person is responsible for ensuring the following engineering controls, training requirements, and safe work practices are enforced to protect our employees from hazards associated with the erecting, use, and dismantling of scaffolds.

EMPLOYER RESPONSIBILITIES

It is the responsibility of the Company to:

- Ensure employees are trained appropriately to their level of responsibility regarding scaffolds
- Acquire appropriate scaffolding for the job to be performed
- Keep all equipment, including scaffolds, safe for use by employees
- Have at least one qualified person at every job that requires scaffolding

QUALIFIED PERSON RESPONSIBILITIES

It is the responsibility of the qualified person to:

- Be competent in fall protection
- Review work plans to determine if scaffolds are necessary
- Design scaffolds to the required specifications
- Ensures the onsite scaffolding meets requirements of the job and all safety guidelines
- Train employees who perform work on scaffolds and work platforms to recognize the hazards specific to that type of work and understand the procedures necessary to control them

COMPETENT PERSON

It is the responsibility of the competent person to:

- Take prompt measures to eliminate conditions that may pose harm to employees
- Ensure scaffold components from different manufacturers do not intermix
- Evaluate direct connections and confirm the supporting surfaces are capable of supporting the loads imposed on them
- Inspect all suspension scaffold ropes before each shift and after anything that might affect a rope's integrity
- Supervise the erection, moving, dismantling, and altering of scaffolds

EMPLOYEE RESPONSIBILITIES

All Company employees are expected to:

- Complete all requisite training before using scaffolds
- Follow Company safety policy and best industry practices
- Perform pre-use inspection before accessing the scaffold
- Report any unsafe condition to the appropriately qualified person

SCAFFOLD PLATFORM CONSTRUCTION

Capacity

Scaffolds and their components must be able to support their own weight and 4 times the maximum intended load.

Counterweights used to balance adjustable suspension scaffolds, must be able to resist at least four times the tipping moment imposed by the scaffold operating at either the rated load of the hoist, or one-and-a-half (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.

Suspension rope and connecting hardware must be able to support 6 times the maximum intended load of non-adjustable suspension scaffolds.

On adjustable suspension scaffolds, the suspension rope and connecting hardware must support twice the stall load of the hoist if that is greater than 6 times the maximum intended load of the scaffold.

Planking and Decking

Platforms on working levels of scaffolds must be planked or decked between the front uprights and the guardrail supports as follows:

- Platforms will be entirely planked and decked with space not more than one-inch wide between the platforms and uprights
- The platform will not deflect more than 1/60 of the span when loaded
- All platforms will be kept clear of debris or other obstructions
- Wood planks will be inspected to see that there are graded for scaffold use, are sound and in good condition, straight grained, free from saw cuts, splits and holes
- Platforms and walkways will be at least 18 inches in width. When the work area is less than 18 inches wide, guardrails and/or personal fall arrest systems will be used
- Where platforms are overlapped to create a long platform, the overlap will occur only over supports, and will not be less than 12 inches unless the platforms are nailed
- The front edge of all platforms will not be more than fourteen inches from the face of the work without guardrails or PFAS
- A platform greater than 10 feet in length will not extend over its support more than 18 inches, unless it is designed and installed so that the cantilevered portion of the platform is able to support employees without tipping, or has guardrails which block employee access to the cantilevered end

- Don’t cover wood with opaque finishes, other than the edges for making identification
- Coatings will not obscure the top or bottom wood surfaces
- Each end of the platform, unless cleated or otherwise restrained by hooks or equivalent means, will extend over the centerline of its support at least six inches
- Scaffold components manufactured by different manufacturers will not be intermixed unless the components fit together without force and the scaffold's structural integrity is maintained. Scaffold components made of dissimilar metals will not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component

Distance from Work Face

The front edge of all platforms must be within 14 inches of the face of the work unless guardrail and/or personal fall arrest systems are used to prevent employees from falling, except the following:

- Outrigger scaffolds may be no more than 3 inches from the face of work
- For plastering and lathing operations, the maximum distance from the face is 18 inches

SUPPORTED SCAFFOLDS

Supported scaffolds are platforms supported by legs, outriggers beams, brackets, poles, uprights, posts, frames or similar rigid support. The structural members, poles, legs, posts, frames and uprights, must be plumb and braced to prevent swaying and displacement.

Supported scaffolds with a height to base width ratio of more than 4:1 must be restrained by guying, tying, bracing or an equivalent means.

The following placements must be used for guys, ties and braces;

- Install guys, ties, or braces at the closest horizontal member to the 4:1 height and repeat vertically with the top restraint no further than 4:1 height from the top
- Vertically – every 20 feet or less for scaffolds less than three feet wide and every twenty-six feet or less for scaffolds more than three feet wide
- Horizontally – at each end; at intervals not to exceed 30 feet from one end

Supported scaffold poles, legs, posts, frames and uprights will bear on base plates and mudsills or other adequate firm foundation and will include the following;

- Footings will be level, sound, rigid, and capable of supporting the loaded scaffold without settling or displacement
- Unstable objects will not be used to support working platforms
- Front-end loaders and similar pieces of equipment will not be used to support scaffold platforms unless specifically designed by the manufacturer for such use
- Forklifts will not be used to support scaffold platforms unless the platform is attached to the fork and the fork-lift is not moved horizontally while the platform is occupied

Supported scaffold poles, legs, posts, frames, and uprights will be plumb and braced to prevent swaying and displacement.

Erection and Dismantling

- A safe means of access must be provided for employees erecting or dismantling a scaffold where the provision of safe access is feasible and does not create a greater hazard. A competent person will determine whether it is feasible or would pose a greater hazard to provide, and have employees use a safe means of access. This determination must be based on site conditions and the type of scaffold being erected or dismantled
- Hook-on or attachable ladders must be installed as soon as scaffold erection has progressed to a point that permits their safe installation and use
- When erecting or dismantling tubular welded frame scaffolds, (end) frames, with horizontal members that are parallel, level and are not more than 22 inches apart vertically may be used as climbing devices for access, provided they are erected in a manner that creates a usable ladder and provides good hand hold and foot space

SUSPENSION SCAFFOLDS

A suspension scaffold contains one or more platforms suspended by ropes or other non-rigid means from an overhead structure such as single-point, multi-point, multi-level, two-point, adjustable, boatswain's chair, catenary, chimney hoist, continuous run, elevator false car, go-devils, interior hung, masons' and stone setters' scaffolds.

- All support devices must rest on surfaces that can support four times the scaffold load when operating at the rated load of the hoist, or at least one-and-a-half times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater
- A competent person must evaluate all direct connections prior to use to confirm that the supporting surfaces are able to support the imposed load
- Suspension scaffolds must be secured to prevent them from swaying
- Guardrails, a personal fall-arrest system or both must protect employees more than 10 feet above a lower level from falling
- A competent person must inspect ropes for defects before each shift and after every occurrence that could affect a rope's integrity
- When scaffold platforms are more than 24 inches above or below a point of access, ladders, ramps, walkways, or similar surfaces must be used
- When using direct access, the surface must be less than 24 inches above or 14 inches horizontally from the surface
- When lanyards are connected to horizontal lifelines or structural members on single-point or two-point adjustable scaffolds, the scaffold must have additional independent support lines equal to the suspension lines and have automatic locking devices
- Outrigger beams must be placed perpendicular to their bearing support
- Emergency escape and rescue devices must not be used as working platforms, unless designed to function as suspension scaffolds and emergency systems

- Tiebacks must be secured to a structurally sound anchorage on the building or structure. Sound anchorages do not include standpipes, vents, other piping systems or electrical conduit. A single tieback must be installed perpendicular to the face of the building or structure. Two tie-backs installed at opposing angles are required when a perpendicular tieback cannot be installed
- Only those items specifically designed as counterweights must be used
- Counterweights must be secured by mechanical means to the outrigger beams
- Vertical lifelines must not be fastened to a counterweight
- Sand, masonry units or rolls of roofing felt may not be used for counterweights
- The suspension ropes must be long enough to allow the scaffold to be lowered to the level below without the rope passing through the hoist, or the end of the rope configured to prevent the end from passing through the hoist
- Repaired wire may not be used
- Drum hoists must contain no less than four wraps of the rope at the lowest point
- The Company will replace wire rope when the following conditions exist:
    - Six randomly broken wires in one rope lay or three broken wires in one strand in one lay
    - One third of the original diameter of the outside wires is lost
    - Evidence that the secondary brake has engaged the rope
    - Kinks
    - Heat damage
    - Any other physical damage that impairs the function and strength of the rope
- Suspension ropes supporting adjustable suspension scaffolds must be a diameter large enough to provide sufficient surface area for the functioning of brake and hoist mechanisms
- Suspension ropes must be shielded from heat-producing processes
- Power-operated hoists used to raise or lower a suspended scaffold must be tested by a qualified testing laboratory
- The stall load of any scaffold hoist must not exceed three times its rated load
- The stall load is the load at which the motor or engine of a power-operated hoist stalls or the power to the prime-mover is automatically disconnected
- The use of gasoline power-operated hoists or equipment are not permitted
- Drum hoists must have at least four wraps of suspension rope at the lowest point of scaffold travel
- Gears and brakes must be enclosed
- An automatic braking and locking device, in addition to the operating brake, must engage when a hoist makes instantaneous change in momentum or an accelerated overspeed.
- Manually operated hoists used to raise or lower a suspended scaffold must be tested an listed by a qualified testing laboratory
- These hoists require a positive crank force to descend

Welding Safety

To reduce the possibility of welding current arcing through the suspension wire rope when performing welding from suspended scaffolds, the following precautions must be taken, as applicable:

- An insulated thimble must be used to attach each suspension wire rope to its hanging support. Excess suspension wire rope and any additional independent lines that is in contact with the scaffold must be insulated
- The suspension wire rope must be covered with insulating material extending at least 4 feet above the hoist. If there is a tail line below the hoist, it must be insulated to prevent contact with the platform. The portion of the tail line that hangs free below the scaffold must be guided or retained, or both, so that it does not become grounded
- Each hoist must be covered with insulated protective covers
- If the scaffold grounding lead is disconnected at any time, the welding machine must be shut off
- An active welding rod or uninsulated welding lead must not be allowed to contact the scaffold or its suspension system
- A grounding conductor is connected from the scaffold to the structure and is at least the size of the welding lead
- The grounding conductor is not attached in series with the welding process or the work piece
- The tail line is guided, retained, or both, so that it does not become grounded
- Each suspension rope and any other independent lines are insulated from grounding

ACCESS TO ALL SCAFFOLDS

When scaffold platforms are more than 2 feet above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers), stairway-type ladders, ramps, walkways, integral pre-fabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface must be used. Do not use crossbraces as a means of access.

Type of accesses that are permitted: portable ladders tied off to the structure; hook-on ladders; attachable ladders; stairways; stair towers; ramps and walkways; or integral prefabricated frames.

When erecting or dismantling supported scaffolds, a safe means of access will be provided when a competent person has determined the feasibility and analyzed the site conditions.

FALL PROTECTION

Fall protection includes guardrail systems and personal fall arrest systems.

Guardrails

All scaffolds more than six feet above the lower level will protect employees with guardrails on each open side of the scaffold. Guardrails will be installed along the open sides and ends before releasing the scaffold for use by the employees, other than erection or dismantling crews.

Guardrails are not required when:

- The front end of all platforms are less than 14 inches from the face of the work
- When employees are plastering and lathing 18 inches or less from the front edge

Materials such as steel or plastic banding will not be used for toprails or midrails.

Fall Arrest Systems

Personal fall arrest systems include harnesses, components of the harness/belt such as Dee-rings, and snap hooks, lifelines, and anchorage point. Employees working on scaffolds 10-feet or more above ground/floor level will use fall protection in accordance with the Company's Fall Protection Program.

The following chart illustrates the type of fall protection required for specific scaffolds.

Type of Scaffold	Fall Protection Required
Aerial lifts	Personal fall-arrest system
Boatswains' chair	Personal fall-arrest system
Catenary scaffold	Personal fall-arrest system
Crawling board (chicken ladder)	Personal fall-arrest system, or a guardrail system, or a ¾ inch diameter grabline or equivalent handhold securely fastened beside each crawling board
Float scaffold	Personal fall-arrest system
Ladder jack scaffold	Personal fall-arrest system
Needle beam scaffold	Personal fall-arrest system
Self-contained scaffold	Both a personal fall-arrest system and a guardrail system
Single-point and two-point suspension scaffolds	Both a personal fall-arrest system and a guardrail system
Supported scaffold	Personal fall-arrest system or guardrail system
All other scaffolds not specified above	Personal fall-arrest system or guardrail systems that meet the required criteria

Fall Protection for Scaffold Erectors and Dismantlers

The Company will have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds, and will provide fall protection where the installation and use of such protection is feasible and does not create a greater hazard.

SAFE PRACTICES

Scaffolds will be constructed and loaded according to the design of a qualified person.

- Stationary scaffolds over 125 feet in height and rolling scaffolds over 60 feet in height will be designed by a professional engineer
- All scaffolding systems, components and fall protection systems will be inspected by a qualified person before first use, before each work shift begins, after erecting or moving and periodically through the work day to ensure the system is erected properly, that there is no damage to components of the system and that the system is being used properly and safely
- Damaged or deteriorated equipment will not be used
- Modifications of scaffold by non-qualified employees are prohibited. Only qualified and competent personnel are permitted to modify scaffolding systems. Disciplinary action for non-qualified modifications will be enforced
- Any system or component of a system that is found to have a defect in manufacturing or design, damage, excessive wear, weathering or corrosion, will be immediately removed from service and tagged to indicate that it is not to be used with a prominent tag, as shown below, which states:

- Any repairs or modifications to a scaffold system or component of a system must be approved by the designated qualified person before implementation
- Any violation of the above policy, misuse of scaffolds or misconduct while working on scaffolds will be subject to disciplinary action within the scope of Company policy, up to and including termination of employment

Use of Scaffolds

- Never load scaffolds or their components in excess of their maximum intended loads or rated capacities, whichever is less
- Don’t use shore or lean-to scaffolds
- A competent person must inspect scaffolds and scaffold components for visible defects before use and after any occurrence that could affect a scaffold’s structural integrity
- Unless a registered professional engineer designed the scaffolds specifically for movement, no scaffold may be moved horizontally while employees are on them
- Only experienced and trained employees will erect, move or dismantle scaffolds, and only under the supervision and direction of a competent person

- Employees may not work on scaffolds covered in slippery material like ice or snow (except as needed to remove it)
- Use tag lines to control swinging loads from making unintentional contact while being hoisted
- Ropes that support adjustable suspension scaffolds must be large enough in diameter to provide enough surface area for the functioning of brake and hoist mechanisms
- Employees may not work on or from scaffolds during storms or high winds, unless a competent person has determined it is safe, and the employees are protected by a personal fall arrest system or wind screens
- Stationary manufactured scaffolding must be tied to and braced against a building at least every 30 feet horizontally and 26 feet vertically, unless otherwise guyed
- Adjusting screws on stationary manufactured scaffolding must have an adjustment of less than 18 inches from baseplate to bottom of frame with a minimum of 6 inches retained within the frame
- Suspension ropes must be shielded from heat-producing processes and corrosive substances
- No debris can be allowed to accumulate on platforms to cause a hazard

Clearance Distances Between Scaffolds and Powerlines

The following table provides the clearance distances between scaffolds and powerlines, or any other conductive material, while being erected, used, dismantled, altered or moved.

Insulated Lines Voltage	**Minimum Distance**	**Alternatives**
Less than 300 volts	3 feet	
300 to 50 kv	10 feet	
More than 50 kv	10 feet plus 0.4 inches for each 1 kv over 50 kv	Two times the length of the line insulator, but never less than 10 feet
Uninsulated Lines Voltage	**Minimum Distance**	**Alternatives**
Less than 50 kv	10 feet	
More than 50 kv	10 feet plus General Rule: 0.4 inches for each 1 kv over 50 kv	Two times the length of the line insulator, but never less than 10 feet

However, scaffolds can be moved closer if necessary to perform the work, provided the power lines are de-energized or protective coverings are installed to help prevent accidental contact.

Ladder Safety on Scaffolds

Employees may not increase the working level on top of scaffold platforms with makeshift devices like boxes or barrels.

Ladders may not be used to increase the working level height of an employee unless the following criteria are met:

- When the ladder is placed against a structure that's not a part of the scaffold, the scaffold must be secured against the sideways thrust exerted by the ladder
- The platform units must be secured to the scaffold to prevent their movement
- The ladder legs must be on the same platform or other means must be provided to stabilize the ladder against unequal platform deflection
- The ladder legs must be secured to prevent them from slipping or being pushed off the platform

Falling Object Protection

Where there is a danger of tools, materials or equipment falling from a scaffold and striking employees below, the following provisions apply:

- The area below the scaffold to which objects can fall must be barricaded, and employees must not be permitted to enter the hazard area
- A toeboard must be erected along the edge of platforms more than 10 feet above lower levels for a distance sufficient to protect employees below, except on float (ship) scaffolds where an edging of ¾ x 1 ½ inch wood or equivalent may be used in lieu of toeboards
- Where tools, materials, or equipment are piled to a height higher than the top edge of the toeboard, paneling or screening extending from the toeboard or platform to the top of the guardrail must be erected for a distance sufficient to protect employees below
- A guardrail system must be installed with openings small enough to prevent passage of potential falling objects
- A canopy structure, debris net, or catch platform strong enough to withstand the impact forces of the potential falling objects must be erected over the employees below

Canopies, when used for falling object protection, must comply with the following criteria:

- Canopies must be installed between the falling object hazard and the employees
- When canopies are used on suspension scaffolds for falling object protection, the scaffold must be equipped with additional independent support lines equal in number to the number of points supported, and equivalent in strength to the strength of the suspension ropes
- Independent support lines and suspension ropes must not be attached to the same points of anchorage

Where used, toeboards must be:

- Capable of withstanding, without failure, a force of at least 50 pounds applied in any downward or horizontal direction at any point along the toeboard
- At least three and ½ inches high from the top edge of the toeboard to the level of the walking/working surface. Toeboards must be securely fastened in place at the outermost edge of the platform and have less ¼-inch clearance above the walking/working surface. Toeboards must be solid or with openings not over one inch in the greatest dimension

Stilts

OSHA does not prohibit the use of stilts for scaffold work; however, some states have limitations and requirements for their use. Companies should consult state and local authorities to ensure compliance with all regulations.

An employee may wear stilts on a scaffold only if it is a large area scaffold.

When an employee is using stilts on a large area scaffold where a guardrail system is used to provide fall protection, the guardrail system must be increased in height by an amount equal to the height of the stilts being used by the employee.

Surfaces on which stilts are used must be flat and free of pits, holes and obstructions, such as debris, as well as other tripping and falling hazards.

Stilts must be properly maintained. Any alteration of the original equipment must be approved by the manufacturer.

POWERED PLATFORMS

Powered platforms must comply with the design and manufacturing requirements prescribed in ASME standard A120.1, “Safety requirements for powered platforms for exterior building maintenance.”

Powered platforms must comply with the requirements of OSHA 1910.66, “Powered platforms for building maintenance,” in addition to the following:

Intermittent Stabilization Systems

- A powered platform must be suspended by 2 or more cables. Where 2 cables are used, each employee on the work platform must use a safety harness and lanyard that is attached to an individual lifeline. The lifeline must be secured to the building structure and must be independent of any cable and structures that support the powered platform
- Where thrustouts are used in place of a roof car, they must be anchored to the building structure with fasteners that are capable of sustaining the imposed load

Roof Cars

- A roof car must be used when it is necessary to move a working platform horizontally to a work or storage position
- Movements of a roof car must be restricted to a designated path of travel. Mechanical stops must be provided to prevent the roof car from travelling outside the intended path of travel. The stops must be capable of withstanding a force equal to 100% of the inertial effect of the roof car under power and must be designed to prevent a crushing or shearing hazard
- The stability factor against overturning must not be less than 5 for horizontal traversing of the carriage, including the effects of impact and wind
- Where a roof car is used, safety interlocks must be provided to ensure that the working platform will not leave the stored position until the required positive position anchor is engaged and to ensure that the roof car cannot move when the working platform is not in the stored position

Safety Factors

All the parts of a powered platform that are subject to stress, except for the wire rope, must have a design safety factor of not less than 5. Wire rope must have a design safety factor of not less than 10.

Working Platforms

A working platform that is used on the exterior of a building must be equipped with rollers that will be in contact with the building face. Where the vertical working travel of a working platform is more than 130 feet, the platform must be equipped with guide rollers or guide shoes, which must positively engage guides, such as "t" rails or indented mullions. The guide rollers or guide shoes must enter the guides at the lowest possible speed and must not require any manual assistance from an employee while the work platform is in motion.

Inspections and Tests

An employer that has a powered platform under the employer's control must do all of the following:

- Provide operating instructions and a checklist for a visual inspection that must be used by the operator before each daily use of the platform. The visual inspection must include a check of the platform controls and safety interlocks
- Provide for a physical inspection and service and repair when required, of the platform by a trained and authorized employee or an outside service every 30 days, or before each use cycle if the equipment is used less often than every 30 days. The inspection, service, or repair must be logged to show the date and the signature of the authorized employee or outside service and the work done
- Provide for inspections and operating tests not less than annually or after major alterations to determine that all components of the platform, including safety and operating equipment, comply with the provisions of these rules. Such inspections and operating tests must be made by a trained and authorized employee or outside service

A special inspection of platform governors and secondary brakes must be made at least annually by an authorized and trained employee or outside service to verify that the initiating device for the secondary brake operates at the proper overspeed. If a test can’t be made in the field, the initiating device or hoisting machine, or both, must be sent to a shop that’s equipped to perform the test. When the tested parts are reinstalled, the powered platform must be re-inspected before returning it to service

MAINTENANCE

The following maintenance must be performed, as required, during the regular, 30-day inspection:

- Replacement of any worn or defective parts noted during the inspections noted above
- Electrical connections must be tightened and controller contacts and relays must be cleaned
- Gears, shafts, bearings, brakes, and hoisting drums must be aligned

In addition:

- Hoisting ropes must be inspected, and replaced when there are 6 or more broken wires in any 1 lay or when the wire rope becomes damaged or deteriorated
- Hoisting ropes must be reshackled at the non-drum ends at least once every 2 years. In reshackling a rope, enough must be cut from the end to remove damaged or fatigued portions. The rope must be retagged and the limit switches reset, if necessary

Wire Rope

Wire rope for a scaffold must be replaced if any of the following conditions exists:

- In any length of 8 diameters, the total number of visible broken wires is more than 6 in 1 rope lay or 3 wires in 1 strand
- It has been kinked, crushed, or bird-caged or has sustained any other damage that distorts the wire rope structure
- It shows heat or corrosive damage
- It contains a broken wire within 18 inches (460.8 mm) of the end attachment
- It shows evidence of core failure. A lengthening of rope lay, protrusion of the rope core, and a reduction in rope diameter suggests core failure.
- Outer wire wear is more than 1/3 of the original outer wire diameter
- Any other condition that a competent person determines has significantly affected the integrity of the rope

In addition:

- Wire rope that is bent to form an eye over a bolt or rod, which has a diameter that is less than 4 times the rope diameter, must be equipped with a metal thimble
- End fittings should be swaged or zinc-poured sockets
- Where wire clips are used, industry safety standards must be followed and the U-bolts must be installed on the dead end or short end of the wire rope
- Wire rope must be stored in a manner to prevent damage or deterioration.
- Before cutting wire rope, a seizing must be placed on each side of the cut on preformed wire rope, 2 seizings must be placed on each side of 718-inch size or smaller non-preformed wire rope, and 3 seizings must be placed on each side of 1-inch or larger size non-preformed wire rope
- Wire rope must be maintained in a lubricated condition over its entire length with the same type of lubricant that is used by the manufacturer

Fiber Rope

A fiber rope must be inspected visually before the start of each daily use as follows (a rope that has any of the conditions specified below must be replaced or returned to the manufacturer for repair):

- Externally for any of the following conditions:
  - Abrasions
  - Decay
  - Lack of strength
  - Variation in size or roundness of the strands
  - Cut or broken fibers
  - Burns
  - Softness
- Internally, by separating the strands at 3-foot intervals, for any of the following conditions:
  - Broken fibers
  - Mildew or mold
  - Powdering
  - Presence of grit
  - Color change of the fibers
  - Short loose fibers
- A fiber rope that is subjected to an impact load that is equal to or more than its rated capacity must also be replaced
- A fiber rope must be stored in a dry room in coils or on a reel
- A wet fiber rope must be dried by placing it in the sunshine or a warm room hanging loosely over a rounded peg or hook
- A fiber rope must not be kinked or run over sharp corners, must not be used when frozen, and must not be left in freezing temperatures when wet
- A thimble must be used with fiber rope if the rope is bent to form an eye over a bolt or rod that has a diameter that is less than 4 times the rope diameter

Synthetic Rope

A synthetic rope shall be inspected visually before the start of each job for all of the following conditions (a rope that has any of these conditions shall be replaced or returned to the manufacturer for repair):

- Abrasions
- Cut or broken fibers
- Burns
- Melted fibers
- Variation in size or roundness of the strands
- Because of the variance in manufacturing methods, the manufacturer's recommendations will be followed
- A synthetic rope shall not be kinked, run over sharp corners, used when frozen, or left in freezing temperatures when wet
- A synthetic rope that is subjected to an impact load that is equal to or more than its rated capacity shall be replaced
- A thimble shall be used with synthetic rope if the rope is bent to form an eye over a bolt or rod that has a diameter that is less than 4 times the rope diameter

AERIAL LIFTS

Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to job-sites above ground:

- Extensible boom platforms
- Aerial ladders
- Articulating boom platforms
- Vertical towers
- A combination of any such devices

Aerial equipment may be made of metal, wood, fiberglass reinforced plastic (FRP), or other material; may be powered or manually operated; and are deemed to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis

For additional information on the use of aerial lifts, please refer to the Elevating Work Platforms chapter (if applicable) in this manual.

TRAINING

The Company will ensure all employees are trained on scaffold safety. This training will be provided at no cost to the employee during working hours.

Only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees will be used.

Training Components

The Company's designated competent scaffolding person will ensure that every employee who performs work from a scaffold receives training in the following minimum elements:

- The nature of any electrical hazards, fall hazards, and falling object hazards in the work area
- The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used
- The proper use of the scaffold and the proper handling of materials on the scaffold
- The maximum intended load and the load-carrying capacities of the scaffolds used
- Any other safety topics deemed pertinent to the particular work-site, scaffold system, or fall protection systems being used

The Company's designated competent scaffolding person will ensure that all employees involved in erecting, disassembling, moving, operating, repairing, maintaining or inspecting a scaffold will be trained in the following minimum elements:

- The nature of scaffold hazards
- The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold being used
- The design criteria, maximum intended load-carrying capacity, and intended use of the scaffold
- Any other safety topics deemed pertinent to the particular work-site, scaffold system, or fall protection systems being used

Retraining is required when the Company's designated competent scaffolding person has reason to believe an employee lacks the skill or understanding needed to perform work that involves the erection, use, or dismantling of scaffolds safely. The employee will be retrained so that the required proficiency is regained. Retraining is required in all the following situations:

- When changes at the worksite create new hazards about which an employee has not been previously trained
- When changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained
- Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the required skill, knowledge, and proficiency for the work involved

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

The Company will retain all employee training records for the length of their employment.

FORMS AND ATTACHMENTS

On the following pages, please find the following documents:

- Summary of Training Requirements for Scaffold users
- Fall Hazard Assessment Checklist
- Scaffolds and Work Platforms Training Record Sheet

These forms may be reproduced freely for the purposes of implementing and maintaining a safety and health program

SUMMARY OF TRAINING REQUIREMENTS FOR SCAFFOLD USERS

	Those Who Work from Scaffolds	Those Who Erect and Dismantle Scaffolds
Critical Scaffold Issues	• Falling objects • Fall protection • Material handling on scaffolds • Scaffold load capacities	• Scaffold design criteria • Scaffold erecting, disassembling, moving, and maintenance procedures • Scaffold erecting, disassembling and, moving hazards • Scaffold load capacities
What They Need to Know	• How to use appropriate fall protection systems • How to control scaffold hazards • How to use scaffold walkways, platform components, and access areas • Maximum-intended and load-carrying capacities of scaffolds	• Hazards involved in erecting/dismantling • Erection/dismantling planning procedures • How to deal with electrical hazards • How to inspect components • Appropriate design criteria • Maximum-intended and load-carrying capacities of scaffolds
Who Can Train Them	Any qualified person who has training and experience in the above critical scaffold issues and who can teach the issues to scaffold users.	Any competent person who has training and experience in the above critical scaffold issues who can teach the issues to erectors/dismantlers, and who has authority to control scaffold hazards.
How Often to Train Them	• Before beginning a new job • Whenever changes at the worksite present new hazards • Whenever they fail to demonstrate skills related to any of the critical scaffold issues	• Before they begin a new job • Whenever changes at the worksite present new hazards • Whenever they fail to demonstrate skills related to any of the critical scaffold issues

Fall Hazard Assessment

Job Name:		Location:	
Date Assessed:	Related Operating Procedures Reviewed: ☐ YES ☐ NO	Location Marked and Entry Controlled: ☐ YES ☐ NO	

FALL HAZARD ASSESSMENT CHECKLIST		
1. Can an employee enter the area without restriction and perform work?	☐ YES	☐ NO
2. Are fall prevention systems such as cages, guardrails, toeboards, and manlifts in place	☐ YES	☐ NO
3. Have slipping and tripping hazards been removed or controlled?	☐ YES	☐ NO
4. Have visual warnings of fall hazards been installed?	☐ YES	☐ NO
5. Can the distance a worker could fall be reduced by installing platforms, nets etc.?	☐ YES	☐ NO
6. Are any permanently installed floor coverings, gratings, hatches, or doors missing?	☐ YES	☐ NO
7. Does the location contain any other recognized safety and or health hazards?	☐ YES	☐ NO
8. Is the space designated as a Permit Required Confined Space?	☐ YES	☐ NO
9. Have anchor points been designated and load tested?	☐ YES	☐ NO

Assessment Information: (indicate specifics with initials)

Initials	Hazard	Remarks/Recommendations
	Total potential fall distance:	
	Number of workers involved:	
	Frequency of task:	
	Obtainable anchor point strength:	
	Required anchor point strength: (not less than 5000 lbs)	

Additional Requirements:

Potential environmental conditions that could impact safety:

Initials	Condition	Remarks/Recommendations

Possible required structural alterations:

Initials	Alteration	Remarks/Recommendations

Possible task modification that may be required:

Initials	Task	Remarks/Recommendations

Training requirements:

Initials	Requirement	Remarks/Recommendations

Personal protective equipment required:

Initials	Requirement	Remarks/Recommendations

Comments:

☐ **Approved** **AUTHORIZATION:**

I certify that I have conducted a Fall Hazard Assessment of the above designated location and have detailed the findings of the assessment on this form. * Further detailed on attachment: ☐ YES ☐ NO

Title:	Date:	Time:
Name:	Signature:	

SCAFFOLDS AND WORK PLATFORMS TRAINING RECORD SHEET

Trainer (include qualifications):	
Date:	
Content of Training:	
Attendees	
Print Name	**Signature**

SCOPE

This Silica Dust policy meets the new Silica regulation requirements for both General Industry and Construction work, including the compliance timetables from 2016 up to 2021.

The policy covers occupational risk, health effects, and symptoms training for employees to understand how to take control of their own health.

Also covered are the permissible exposure levels (PEL) with air monitoring and medical surveillance to identify hazards and employee exposure.

Engineering and administrative controls along with safe work practices to be employed to protect workers such as: dust reduction, restricted areas and personal hygiene. Also included are personal protective equipment (PPE) steps, especially respiratory protection to be used when necessary, along with: first aid, spill and disposal procedures, recordkeeping requirements, and the table to control common construction tasks without monitoring workers' silica exposure.

POLICY

This company policy implements the necessary procedures for employees, safety personnel and supervisors to provide the OSHA required protection for employees who could be exposed to an unsafe level of airborne silica.

EMPLOYER RESPONSIBILITIES

- Prevent employees from being exposed to an airborne silica level above the Permissible Exposure Level (PEL) of 50 (µg/ m^3) Establish a written exposure control plan to identify high exposure tasks and protection methods.
- Designate a competent person to implement the written exposure control plan
- Enforce housekeeping practices that limit workers silica exposure.
- Offer medical exams—including chest X-rays and lung function tests—every three years for workers who are required by the standard to wear a respirator for 30 or more days per year
- Appropriately train workers and supervisors before starting work.
- Keep records of workers' silica exposure and medical exams

EMPLOYEE RESPONSIBILITIES

- Attend all silica exposure training
- Follow all safe practices established by the company
- Use and maintain all necessary PPE provided by the company
- Report any unsafe conditions or acts immediately

SILICA INFORMATION

Crystalline silica, also called alpha silica or free silica, is silicon dioxide (SiO_2). In pure, natural form, SiO_2 crystals are tiny, very hard, translucent and colorless. The most common types of crystalline silica encountered in industry are quartz and cristobalite.

Quartz content can vary greatly among different rock types. Granite can contain anywhere from 10 to 40% quartz; shales have been found to average 22%, and sandstone averages almost 70% quartz.

Silicates, composed of SiO_2, are also a source of silica. Silicates include mica, soapstone, talc, tremolite and Portland cement.

OCCUPATIONAL RISK

Silica is present in almost every process where natural minerals are handled. In construction work, employees who are handling rock, brick, sand or drilling, quarrying or tunneling through the earth's crust may be exposed to silica.

In general industry work, employees are exposed to silica dusts from cleaning, etching, polishing or the manufacture of asphalt or cement.

HEALTH EFFECTS

Silicosis: Silicosis is lung damage caused by breathing dust containing fine particles of crystalline silica that become embedded in the lungs, causing the lungs to develop fibrotic nodules and scarring. The scar tissue makes the lungs hard and stiff. The scarring can greatly reduce the function of the lungs making it difficult and sometimes painful to breathe.

Silica also reduces the body's ability to fight off infections making workers more susceptible for developing other lung illnesses and infections. If workers smoke, silica exposure may greatly increase the risk of developing lung cancer. The incidence of tuberculosis is high among silicosis victims.

Silica dust can also irritate a worker's eyes. Goggles or safety glasses should be worn if eye irritation is a problem.

SYMPTOMS

Early stages of the disease may go unnoticed, but symptoms can include: shortness of breath during physical exertion; fever; occasionally bluish skin at the ear lobes or lips.

Progression of silicosis can lead to:

- Fatigue
- Labored breathing
- Loss of appetite
- Pain in the chest
- Respiratory failure, which may cause death

In severe cases, fibrous tissue can hinder the flow of blood in vessels of the lung, and the heart can enlarge in an effort to pump more blood.

Types of Silicosis

Chronic silicosis: The most common form of the disease; may go undetected for years in the early stages. Chest x-rays may not reveal an abnormality until after 15 or 20 years of exposure. If you believe you are overexposed to silica dust, visit a doctor who knows about lung diseases. The progress of silicosis can only be stopped; but cannot be cured.

Accelerated silicosis: A form of silicosis that shows symptoms within five to 10 years.

Acute silicosis: A form of silicosis that develops in workers exposed to very high levels of crystalline silica. Symptoms may appear within only a few weeks of an initial exposure.

EXPOSURE LEVELS

On June 23, 2016 two new OSHA regulations, (1910.1053 for General Industry work and 1926.1153 for Construction work) and exposure limits took effect.

This new silica regulation establishes the following provisions:

- Establishes an action level for airborne respirable crystalline silica of 25 micrograms per cubic meter of air (µg/ m^3) averaged over an 8-hour shift
- Reduces the permissible exposure limit (PEL) for respirable crystalline silica to 50 (µg/ m^3), averaged over an 8-hour shift
- Requires employers to: use engineering controls (such as water or ventilation) to limit worker exposure to the PEL; provide respirators when engineering controls cannot adequately limit exposure; limit worker access to high exposure areas; develop a written exposure control plan, offer medical exams to highly exposed workers, and train workers on silica risks and how to limit exposures
- Requires medical exams to monitor highly exposed workers and gives them information about their lung health

After this date, companies will have one to five years to comply with most requirements, based on the following schedule:

Construction - June 23, 2017, one year after the effective date.

General industry and maritime - June 23, 2018, employers must comply with all requirements of the standard, except for the following:

- Medical surveillance must be offered to employees who will be exposed at or above the action level for 30 or more days a year starting on June 23, 2020. (Medical surveillance must be offered to employees who will be exposed above the PEL for 30 or more days a year starting on June 23, 2018.)

Hydraulic Fracturing - June 23, 2018, two years after the effective date for all provisions except

- Engineering Controls, which have a compliance date of June 23, 2021

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) will only be used when engineering and administrative controls do not provide adequate worker protection and reduce to at least the PEL. PPE is the last line of defense for limiting silica exposure and may include:

- Hardhats
- Gloves
- Coveralls

- Eye Protection
- Safety Shoes or Boots
- Dust Masks or Respirators

Respiratory Protection

Only when all engineering or administrative controls have been implemented, and the level of respirable silica still exceeds the PEL, may an employer rely on a respirator program to protect workers.

When respirators are required to protect employees for silica dust exposure the company's Respirator Program will be strictly followed.

Copies of the Respirator Program will be made available to all employees upon request.

- The respirator program will comply with the OSHA standards for respiratory protection, this includes proper respirator selection, medical evaluations, fit testing, cleaning and maintenance procedures, and training
- The company must select and provide an appropriate respirator that will effectively protect their employees
- Respirators must be approved by NIOSH for protection against the silica PEL and provide the require APF
- When abrasive blasting is done, the type C supplied-air, positive pressure, demand type abrasive blasting respirator will be worn
- An abrasive-blasting respirator must cover the wearer's head, neck, and shoulders to protect from rebounding abrasives

EMERGENCY FIRST AID

Eye Exposure

If crystalline silica dust gets into the eyes, wash immediately with large amounts of water, lifting the lower and upper lids occasionally.

If irritation is present after washing, get medical attention.

Portable eyewashes will be kept at jobsites in the field away from the company locations.

Breathing

- If a person breathes in large amounts of crystalline silica dust, move the exposed person to fresh air immediately
- If breathing has stopped, perform chest compressions (if trained)
- Keep the person warm and at rest
- Get medical attention as soon as possible

SPILL AND DISPOSAL PROCEDURES

If crystalline silica is spilled or released in hazardous concentrations, the following steps will be taken:

- Ventilate the area
- Wear respirators during clean-up
- Collect spilled material in the most convenient and safe manner for reclamation or disposal in a secured sanitary landfill

RECORDKEEPING

Training, medical records, air monitoring, engineering control maintenance records, and injury records will be kept by the company and made available upon request.

The site safety coordinator or their designee is responsible for the recordkeeping program.

CONTROL OF SILICA DUST IN CONSTRUCTION WORK

The table below lists some of the most common construction tasks and dust control methods, so employers know exactly what they need to do to limit worker exposures to silica. The dust control measures listed in the table include methods known to be effective, like using water to keep dust from getting into the air or using ventilation to capture dust. In some operations, respirators may also be needed.

Employers who follow the recommendations shown in Table 1 (below) correctly do not need to monitor workers' silica exposure and get it below the PEL.

TABLE 1: JOB/TASK SPECIFIC SILICA EXPOSURE CONTROL METHODS

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	When used outdoors	None	APF 10
	When used indoors or in an enclosed area	APF 10	APF 10
Handheld power saws for cutting fiber- cement board (with blade diameter of 8 inches or less)	For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the airflow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
	When used outdoors	None	APF 10
	When used indoors or in an enclosed area	APF 10	APF 10
Drivable saws	For tasks performed outdoors only: Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
Handheld and stand-mounted drills (including impact and rotary hammer drills)	Use drill equipped with commercially available shroud or cowling with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the airflow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	None	None
Dowel drilling rigs for concrete	For tasks performed outdoors only: Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	APF 10	APF 10
Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector. OR Operate from within an enclosed cab and use water for dust suppression on drill bit.	None None	None None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.		
	When used outdoors.	None	APF 10
	When used indoors or in an enclosed area.	APF 10	APF 10
	OR Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the airflow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.		
	When used outdoors.	None	APF 10
	When used indoors or in an enclosed area.	APF 10	APF 10
Handheld grinders for mortar removal (i.e., tuckpointing)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	APF 10	APF 25
Handheld grinders for uses other than mortar removal	For tasks performed outdoors only: Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. OR Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	None	None
	When used outdoors.	None	None
	When used indoors or in an enclosed area.	None	APF 10

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. OR	None	None
	Use machine equipped with dust collection system recommended by the manufacturer. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the airflow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.	None	None
Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	None
Large drivable milling machines (half-lane and larger)	For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.	None	None
	For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions. OR	None	None None
	Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab. When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None None	None None
Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions. OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None None	None None

The key to preventing silicosis is preventing silica dust from being in the air. Employers are required to provide and assure the use of appropriate controls for dusts containing crystalline silica.

When implementing the control measures specified in Table 1 above, the company will ensure:

- Tasks performed indoors or in enclosed areas have an exhaust method that minimizes the accumulation of visible airborne dust
- Tasks performed using wet methods will have enough water at flow rates to minimize release of visible dust
- Methods used for work performed in a cab or booth will:
  - Be maintained as free as practicable from settled dust
  - Have door seals and closing mechanisms that work properly
  - Have gaskets and seals that are in good condition and working properly
  - Be maintained with by continuous delivery of fresh air
  - Have intake air that is filtered through an approved filter
  - Have heating and cooling capabilities

If the company does not use the control methods in the above table, they must:

- Measure the amount of silica that workers are exposed to if it may be at or above an action level of 25 µg/ m^3 averaged over an eight-hour day
- Protect workers from respirable crystalline silica exposures above the permissible exposure limit of 50 µg/ m^3, averaged over an eight-hour day

- Use dust controls to protect workers from silica exposures above the PEL
- Provide respirators to workers when dust controls cannot limit exposures to the PEL

If employees use a respirator 30 or more days a year, they will need to be offered a medical exam.

The company will reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, or when the employer has any reason to believe that new or additional exposures at or above the action level have occurred.

CONTROLLING SILICA DUST IN GENERAL INDUSTRY WORK

The Table below lists some of the most common general industry businesses where employees may be exposed to silica dust

- Abrasive blasting
- Cement/Concrete product manufacturing
- Foundries
- Mineral Processing
- Pottery manufacturing
- Refractories
- Asphalt Paving Products
- Cut Stone
- Glass work
- Paint and Coatings
- Railroads
- Shipyard work
- Asphalt Roofing Materials
- Dental Laboratories
- Jewelry
- Porcelain Enameling
- Ready Mix Concrete
- Structural Clay

These tasks generally involve the use of pressurized abrasives, grinders, drills and saws. The dust control methods include the use of dust collection, ventilation, wetting methods (streaming water and misting), and if necessary respirators.

Where it can be shown that the action level will not be exceeded, no respiratory protection is required. When working in an enclosed area or when the length of exposure exceeds 4 hours, respiratory protection with an Assigned Protection factor (APF) of 10 may be required. This can be provided by a NIOSH approved N95 dust mask or another respirator type.

When performing general industry work, the company will use air monitoring test results to determine the level of respiratory protection necessary.

The key to preventing silicosis is to develop and enforce controls to prevent airborne silica dust.

When implementing a silica exposure program the company must:

- Measure the amount of silica that workers are exposed to if it might be at the action level of 25 µg/ m^3.
- Protect workers from respirable crystalline silica exposures above the PEL (50 µg/ m^3)
- Enforce controls to protect workers from silica exposures above the PEL
- Provide respirators to workers when dust controls cannot limit exposures to the PEL

If employees use a respirator 30 or more days a year, they will need a medical exam.

The company will reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, and when any exposure at or above the action level have occurred.

SILICA DUST EXPOSURE CONTROL PROGRAM

The Occupational Silica Dust Control Program includes the following parts:

- Hazard Identification
- Worksite Air Monitoring
- Respiratory Protection
- Engineering Controls
- Administrative Controls
- Safe Work Practices
- Medical Examinations and Evaluation
- Training and Informing Workers on Hazards of Silica Dust
- Personal Protective Equipment
- Recordkeeping
- Emergency First Aid Procedures for Silica Dust
- Spill and Disposal Procedures

HAZARD IDENTIFICATION

When a task presents a potential silica exposure hazard, the Safety Coordinator, or designee, is responsible for identifying silica dust exposure hazards and controls prioritizing feasible engineering and then administrative controls.

WORKSITE AIR MONITORING

When a silica dust hazard is identified, the process and the workers' breathing zone will be monitored for silica dust concentrations. Employee exposure measurements will represent actual breathing zone exposure conditions for a representative sample of each affected job description.

Hazardous tasks identified will be monitored at least every four months and whenever a change is made to the process. Engineering controls will be monitored for efficacy immediately after implementation and quarterly thereafter.

The company will ensure that all monitoring equipment is maintained in good working order, and that any analyzing laboratory meets OSHA regulations.

Employees will be able to view all air monitoring records; copies of the records can be obtained from the Safety Coordinator upon request.

Employees should be monitored, as necessary or required, to enforce developed administrative controls and safe work practices.

RESPIRATORY PROTECTION

When implementing respiratory protection measures, we will ensure:

- Tasks performed indoors or in enclosed areas have an exhaust method that minimizes the accumulation of visible airborne dust

- Wet method controls have enough water to minimize visible dust.
- Work performed in a cab or booth will:
  - Be maintained as free as practicable from settled dust
  - Have door seals and closing mechanisms that work properly
  - Have gaskets and seals in good condition and working properly
  - Have a continuous supply of fresh air
  - Have intake air filtered through an approved filter
  - Have heating and cooling capabilities

ENGINEERING CONTROLS

The company will use engineering controls whenever possible to control silica dust exposures. The company will not use abrasives that contain more than 1% crystalline silica during blasting.

The Safety Coordinator is responsible for inspecting and maintaining engineering controls at all jobs/tasks where silica exposure hazards have been identified.

Substitute with less hazardous materials: Do not use silica sand or other substances containing more than 1% crystalline silica as abrasive blasting materials.

Dust-reduction systems: When using powered tools or equipment to cut, grind, core, or drill concrete or masonry materials, a dust-reduction system will be used to effectively reduce airborne particulate. Exceptions include operations where it can be shown the PEL is not exceeded, roofing operations with tile, pavers or similar materials; and during the first 24 hours of an emergency operation.

Dust Extraction: Wherever possible, concrete cutting and drilling equipment should be fitted with collection devices to eliminate dust at the source. A vacuum with a high-efficiency particle air (HEPA) filter can be used to clean dust from work areas. Wear an appropriate respirator when exposure approaches PELs.

Wet work: Where dust extraction is not practical, airborne silica dust can be minimized or reduced by using water in the process Such as using saws and drills that provide water to the point of action. A respirator may still need to be worn during wet work.

Wet clean up may also be used to remove dust. Waste material will be stored at designated, clearly marked location and will be removed at least weekly.

Isolation: Use containment methods such as blast-cleaning cabinets when sandblasting. Cabs of vehicles or machinery cutting or drilling through rock that might contain silica should be enclosed and sealed.

Ventilation: Use local exhaust systems to remove silica dust from industrial processes at the point of operation. Dilution ventilation may be used to reduce the silica dust concentration to below the PEL in large areas.

Adequate measures will be taken to ensure that discharge does not produce health hazards to the outside environment. A dust collector will be set up so that accumulated dust can be removed without contaminating work areas.

- Ventilation systems will be inspected and maintained by a designated competent person
- Ventilation systems will be checked at least weekly to determine if they are functioning properly

ADMINISTRATIVE CONTROLS

Air Monitoring

Air monitoring is used to determine exposures, evaluate engineering controls, select respiratory protection, evaluate the efficacy of safe work practices, and determine the need for medical surveillance.

- Exposure measurements should be made in the employee's breathing zone
- Long-term or short-term respirable samples can be used
- Total sampling time must be at least 7 hours
- Monitoring should be repeated at least quarterly

Restricted Areas

- Post warning signs in areas where silica exposure already exists or is possible restricting unauthorized employees
- Warning signs should contain one of the following:
  - WARNING SILICA DUST HAZARD: RESPIRATOR REQUIRED
  - SILICA DUST CAN CAUSE SILICOSIS: RESPIRATOR REQUIRED

SAFE WORK PRACTICES

Whenever practical, working where silica dust may be created should be done:

- In non-enclosed areas
- Downwind from other employees
- In regulated/restricted areas
- When other workers are not around

Housekeeping Procedures

Dry sweeping and using compressed air are prohibited for removing dust in jobs/tasks identified with silica exposure hazards.

Supervisors are responsible for ensuring that work areas are dust free at the end of each shift.

- Remove dust on overhead ledges, floors and equipment before it becomes airborne due to traffic, vibration and random air current
- Gentle wash down of surfaces is preferable if practical
- Never dry sweep or use compressed air for cleanup of dust that may contain silica
- Use wet methods or vacuums with a HEPA filter for clean-up

Personal Hygiene

Employees working at hazardous jobs/tasks will practice good personal hygiene to avoid unnecessary exposure.

- Hand-washing facilities will be conveniently located throughout a worksite.
- Lockers will be provided for employees to store uncontaminated street clothes. Eating/lunch areas will be located away from exposure areas
- Employees will eat, smoke, or use smokeless tobacco in designated areas only
- Workers should park their cars where they will not be contaminated with silica
- Workers should shower (if possible) and change out of work clothes contaminated with silica dust before they leave the jobsite
- Work clothes must not be cleaned by blowing or shaking. They should be vacuumed with a HEPA filter vacuum before removal

Contaminated clothing will be vacuumed with a HEPA filter vacuum to remove silica dust.

Lockers or containers will be provided to store clean clothes at the jobsite. Employees are required to wash their hands and shower (when feasible) before leaving the worksite.

When worksites are located in the field away from normal operation the Company will provide water in portable containers to hand washing

MEDICAL SURVEILLANCE

Employees who will work in hazardous jobs will be given free and reasonably convenient medical exams by an approved health care provider.

Initial Testing

An initial medical examination to establish a baseline will be given within 30 days of assignment unless they have received an acceptable examination within the last three years.

This examination will include:

- A medical and work history regarding exposure to respirable crystalline silica, dust, and other agents affecting the respiratory system
- A history of respiratory system dysfunction, including signs and symptoms of respiratory disease history of tuberculosis; and smoking status and history
- A physical examination with special emphasis on the respiratory system
- A chest X-ray
- A pulmonary function test
- Testing for latent tuberculosis infection
- Any other tests deemed appropriate by the health care provider

Periodic Testing

Employees who use a respirator for at least 30 days a year will have a medical examination when they start the job, and then every three years.

Medical examinations will include:

- Chest X-rays
- Pulmonary function tests
- Tuberculosis evaluation

Employees whose chest X-rays show the development of silicosis will be transferred or removed from the hazardous situation. Input from the attending physician will be considered in making this decision.

Medical records will be given to employees or their representatives who ask for them.

Silicosis cases will be reported to state health departments and recorded on OSHA logs.

TRAINING

Employees working in hazardous jobs will be trained to understand and recognize the risks of airborne silica exposure and how to control those risks by following safe work procedures before starting the work and then at least annually.

Training for Occupational Silica Dust Exposure Will Include the Following Topics:

- Health hazards of silica dust exposure (including signs and symptoms of silicosis, lung cancer, chronic obstructive lung disease (COPD) and decreased lung function)
- Operations and materials that can produce silica dust exposures
- Engineering and work practice controls used to protect employees from exposures
- The importance of proper use and maintenance of equipment, including dust-reduction systems, and other controls
- The importance of good personal hygiene and housekeeping practices when working near dust from concrete, cleaning up appropriately before eating, cleaning clothes appropriately, avoiding other activities that could cause exposure to airborne dusts
- Additional safe work practices and procedures, including: safe handling and disposal procedures; the safe use of hazardous substances; fire protection; emergency and first aid procedures; electrical safety; safety in confined spaces; and other training required under hazard-specific regulations
- Proper use of respirators and the respirator standard
- Recognition of poorly ventilated areas and confined spaces
- The details of the Occupational Silica Dust Exposure Program

In addition, supervisors must be trained:

- To know and understand the employee-related information outlined above in this section
- To identify tasks that may result in employee exposure to dust or other hazards, and, as necessary, initiate procedures that reduce employee exposure to dust or other hazards

Training will be performed by a competent person. Records of attendance, dates of training, and training material will be documented and retained by the company.

Additional training or reference material on silica dust exposure will be given to employees who ask for them.

ATTACHMENTS

The following page contains an agreement form that must be completed by all affected employees indicating their commitment to this program. Completed copies of this document will be retained by the Company for the length of employment.

EMPLOYEE AGREEMENT

I have read and understand the requirements of this Silica safety program and will participate in all training and safety precautions.

Employee Signature	Employee Signature
Employee Signature	Employee Signature
Employee Signature	Employee Signature
Employee Signature	Employee Signature
Date	Time

SCOPE

This chapter defines the requirements and safe practices to be used for the safe operation of skid steer loaders. The current Occupational Safety and Health Administration (OSHA) regulations for the construction industry do not specifically address skid-steer loaders, however. OSHA does have regulations that apply to the operation of motor vehicles and mechanized equipment. They address operator restraints, operating procedures, rollover protection, machine guarding and maintenance procedures. The information in this chapter addresses skid steer loader specifically, for information on other types of equipment, please refer to the heavy equipment chapter of this manual.

POLICY

This Company has implemented the following policies and procedures to protect employees responsible for operating skid-steer loaders or working near skid-steer loaders Employees are at risk may of being crushed or caught by the machine or its parts. Skid-steer loaders have features that expose workers to other risks of injury.

EMPLOYER RESPONSIBILITIES

This Company will:

- Train all designated employees before allowing them to operate a loader
- Provide all employees operating or working around skid steer loaders with the necessary PPE

EMPLOYEE RESPONSIBILITIES

All affected employees are expected to:

- Follow all Company safe practices when working on or around skid steer loaders
- Wear and maintain all required PPE
- Report any unsafe condition or acts immediately

HAZARDS

The operator’s seat and controls are located between the lift arms and in front of the arm pivot points. As a result, operators must enter and exit from the loader through the front of the machine and over the bucket. If the operator doesn’t enter or exit properly, a foot or hand control can be activated and cause movement of the lift arms, bucket or other attachment. Such an incident could cause death or serious injury. The skid-steer loader is very compact and places the operator close to the zone of movement for the lift arms.

Deaths have occurred from:

- Pinning between the bucket and frame of the machine or between the lift arms and frame
- Crushing incidents
- Rollovers
- Pinning between the loader and another object
- Being run over

Fatalities involving pinning between the bucket and frame or between the lift arms and frame resulted from the following activities:

- Working or standing under a raised loader bucket
- Leaning out of the operator's compartment into the path of the moving lift arms (pinned against frame)
- Entering or exiting (pinned between bucket and frame)
- Unknown (pinned between bucket and frame)

PERSONAL PROTECTIVE EQUIPMENT

This Company will provide employees with the PPE necessary to protect them from injury. This includes, but is not limited to:

- Hardhats
- Safety shoes or boots
- Safety glasses or goggles
- Hearing protection
- Respiratory protection (if required)

ANSI/SAE STANDARD

The SAE has developed a standard for the American National Standards Institute (ANSI) addressing skid-steer loaders. The SAE standard SAE J1388 contains design guidelines that address machine rollovers and the hazards of being pinned between the lift arms and frame and between the bucket and frame.

To conform to this recommended practice, manufacturers must do the following:

- Provide warnings, operator instructions, and service procedures
- Equip the machine with seat belts
- Provide a means to prevent the lift arm from lowering when the operator is entering or exiting from the machine
- Provide handholds and steps to facilitate entry and exit from the loader
- Provide ROPS with side screens
- Provide two openings for emergency exit
- Provide safety signs and instructions to warn of hazards during normal operations and servicing

The Company will comply with OSHA regulations, maintain equipment in accordance with ANSI/SAE standards and take the following measures to prevent injury when operating or working near skid steer loaders:

- Always use and maintain the safety devices provided by manufacturers:
- Liftarm supports
- Interlocked controls
- Seat belts
- ROPS
- Follow safe operating procedures

- Follow safe mounting and dismounting procedures
- Follow proper maintenance procedures
- Train workers to read and follow the manufacturer's procedures for operating and servicing skid steer loaders

SAFE PRACTICES

OSHA requires this Company to protect workers from the hazards associated with operating and maintaining heavy equipment. The regulations that apply to skid-steer loaders are summarized as follows:

- Seat belts that meet the requirements of the Society of Automotive Engineers (SAE) standard will be provided on all Construction Equipment
- All bi-directional machines will be equipped with a horn, distinguishable from the surrounding noise level, and will be operated as needed when the machine is moving in either direction
- Scissors points on all front-end loaders, that constitute a hazard to the operator during normal operation, will be guarded
- End loader buckets and similar equipment must be either fully lowered or blocked when being repaired or when not in use
- All controls must be in a neutral position, with the motors stopped and the brakes set, unless work being performed requires otherwise
- All equipment manufactured after September 1972, must be equipped with a Roll Over Protection System (ROPS) that meets the minimum performance standards prescribed in 29 CFR 1926.1001 and 1926.1002 or must have a system that is designed, fabricated and installed to support at least two times the weight of the equipment applied at the point of impact
- No modifications or additions that affect the capacity or safe operation of the equipment may be made without the manufacturer's written approval. If modifications or changes are made, the capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly

USING AND MAINTAINING SAFETY DEVICES

Regularly inspect and maintain all safety devices provided by manufacturers.

Liftarm Supports

Use the liftarm supports provided by or recommended by the manufacturer when it is necessary to work or move around the machine with the bucket in a raised position while the controls are unattended.

- Machines now being manufactured have either the pin-type supports (which can be operated from inside the operator's cab) or the strut-type supports (which may also be operated from inside the cab or may require the help of a coworker)
- If the machine is not equipped with lift arm supports, contact the equipment dealer or manufacturer's representative for help in selecting proper support procedures
- Never use concrete blocks as supports. They can collapse under even light loads
- Hoists and jacks used for support must be free of defects such as bent, cracked or twisted parts or pinched, frayed, or twisted cable. They must also be capable of supporting the load

Interlocked Controls

Regularly inspect and maintain interlocked controls in proper operating condition. These systems require the operator to be properly positioned and restrained before the loader can be used.

- Never bypass or defeat interlocked controls
- Make sure that the seat belt is always securely fastened around the operator when the loader is in operation

Always use restraint bars if they are provided. Although workers and employers may perceive safety features such as interlocked controls and seat belts as obstacles to efficient machine operation, bypassing these devices increases the risk of death or serious injury.

Seat Belts

Make sure that the seat belt is secured around the operator whenever the seat is occupied.

- The seat belt protects the operator in several ways. If seat belts are part of the interlocked control system, they protect workers from being caught and crushed between the lift arms and frame
- During rollovers, the seat belt maintains the operator within the protective envelope of the ROPS
- The seat belt can also protect the operator from leaning or being jostled into the operating zone of the lift arms and bucket

Retrofit Packages

If side screens, interlocks, ROPS and seat belts are not present, contact the equipment dealer or manufacturer's representative about the availability of retrofit packages or replacement parts.

SKID-STEER OPERATIONS

- Make sure that you understand all manufacturers' warnings and instructions before you operate your skid steer loader
- Operate the loader from the operator's compartment, never from the outside
- Stay seated when operating the loader controls
- Work with the seat belt fastened and the restraint bar in place
- Keep your arms, legs, and head inside the cab while operating the loader
- When possible, plan to load, unload, and turn on level ground
- For maximum stability, travel and turn with the bucket in the lowest position possible
- Never exceed the manufacturer's recommended load capacity for the machine
- Operate on stable surfaces only
- Avoid traveling across slopes; travel straight up or down with the heavy end of the machine pointed uphill
- Always face the direction of travel
- Keep bystanders away from the work area
- NEVER modify or bypass safety devices

Entering and Exiting from the Loader Safely

- Enter only when the bucket or other attachment is flat on the ground, or when the lift-arm supports are in place. Use supports supplied or recommended by the manufacturer
- When entering the loader, face the seat and keep a three-point contact with handholds and steps
- Never use foot or hand controls for steps or handholds
- Keep all walking and working surfaces clean and clear of debris

Before leaving the operator's seat:

- Lower the bucket or other attachment flat to the ground
- Set the parking brake
- Turn off the engine

If you are unable to exit through the front of the machine, use the emergency exit through the roof or across the back.

Maintaining the Loader in Safe Operating Condition

- Follow the manufacturer's instructions for maintaining the loader
- Keep the foot controls and the operator's compartment free of mud, ice, snow, and debris

Before servicing the loader:

- Set the parking brake
- Lower the bucket or other attachment flat to the ground
- Turn off the engine
- Remove the key from the switch

If the machine cannot be serviced with the bucket on the ground, use the lift arm supports recommended or provided by the manufacturer. If the machine is not equipped with lift arm supports, contact the equipment dealer or manufacturer's representative for help in selecting proper supports.

Never work on the machine with the engine running unless directed to do so by the operator's manual. Follow the manufacturer's safety recommendations to complete the task. If the adjustments require that the engine be in operation, use two persons to perform the task.

TRAINING

The Company will ensure every operator is competent to operate the equipment safely through successfully completing training and evaluation.

Training must at least inform employees on the safe operation including:

- Applicable standards
- The equipment’s limitations and use
- Rated load capabilities
- Special workplace hazards

Training Records

Training records will be kept for each employee to certify each operator has been trained and evaluated and will include the following information:

- The dates of the training sessions and evaluation
- A written description of the training program
- The names and qualifications of persons conducting the training or evaluation
- The names and job titles of all persons attending the training sessions
- Where the employee received safety training

SKID-STEER LOADER POSTER

Do:

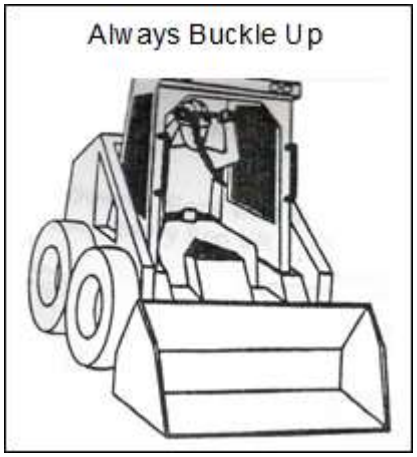
- Read and follow the manufacturer's operating manual.
- Use the safety treads and grab handles to get on and off the loader. Remember to always maintain three points of contact.
- Use the seat bar and fasten the seat belt.
- Keep feet on the pedals when operating the loader.
- Only use approved attachments and buckets.
- Keep other people away from the work area.
- Carry bucket or attachments as low as possible.
- Load, unload and turn on level ground.
- Wear hearing and head protection

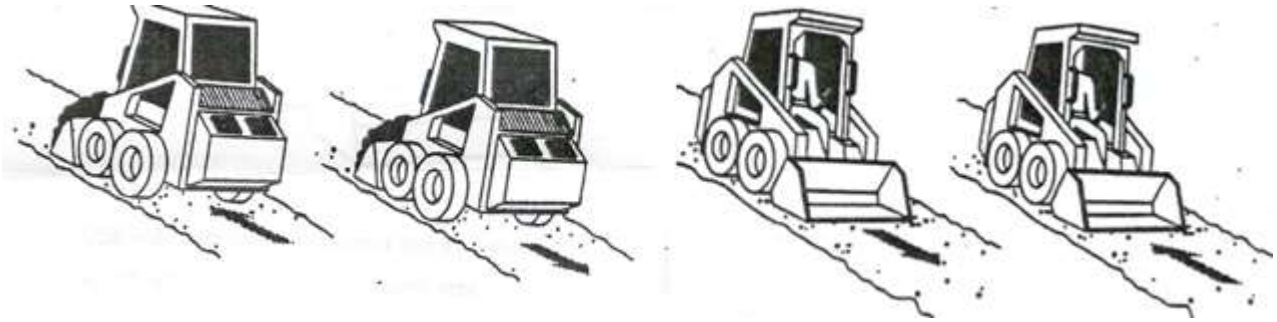
Do Not:

- Do not use loader without approved Roll-Over Protection (ROP) and Falling Object Protection (FOP) cab.
- Do not exceed rated operating capacity.
- Do not carry passengers.
- Do not travel or turn with the lift arms up.
- Do not leave the loader with the engine running or with the lift arms up.
- Do not travel across a grass slope.
- Do not approach overhead electrical wires

Check the Following Before Starting the Engine:

- Fuel and oil
- Hydraulic fluid
- Cooling system
- Operator cab, seat belt and seat bar
- Lift arm and cylinder pivot points
- Tires
- GO straight up and down slopes with the heavy end of the loader uphill.





SCOPE

This chapter provides the safe work practices and requirements for performing rigging operations, and complies with OSHA regulations 1910.184, 1926.251, and 1926.753 as applicable. This chapter does not cover crane use or operator certification, which are covered in a separate chapter.

POLICY

This Company has implemented the following policy to protect its employees from the hazards of working with and/or around slings, rigging, and hoisting equipment.

EMPLOYER RESPONSIBILITIES

This Company will:

- Ensure that cranes and crane operators are certified and qualified for the work being performed
- Verify that employees performing rigging operations are trained
- Enforce all rigging and lifting safe practices
- Provide all employees with the necessary PPE

EMPLOYEE RESPONSIBILITIES

- Follow all safe practices
- Use all required PPE
- Report any unsafe conditions or acts immediately

HAZARDS

The primary hazards associated with rigging and lifting operations include:

- Falling loads
- Electrocution from overhead power lines

PPE

All employees engaged in rigging and lifting operations will wear the necessary PPE, which will include:

- Hardhats
- Steel toes safety shoes or boots
- Heavy duty leather gloves
- Safety glasses or goggles
- Approved clothing

EQUIPMENT

This section provides information on the use of the tools and equipment associated with rigging and lifting operations.

LIFTING DEVICES

Cranes, derricks, hoists and other lifting devices will only be operated by trained qualified personnel.

Chain Falls and Hoist and Pullers

A chain fall or hoist and puller must be used at not more than its rated capacity, which must be permanently labeled or marked on it. An accessory, such as a chain or cable used to secure or support a chain fall or hoist and puller, will have a capacity of not less than the chain fall or hoist and puller. An object subject to a lift or pull by a chain fall will have the capacity to absorb the lift or pull without creating a hazard to an employee in the area.

A chain fall or hoist and puller must be secured to an anchorage, and the load must be attached to the chain fall or hoist and puller in a manner that will prevent inadvertent disengagement. When a chain fall or hoist and puller are under the tension of a load, a positive action must be required to release the tension.

In addition, the chain fall or hoist and puller must be visually inspected for observable defects before each shift by the employee using the tools. A hoist and puller lever handle must not be operated with an extension handle except as furnished by the manufacturer.

SLINGS

This Company will determine that all employees involved with rigging and lifting operations are trained on the proper use of sling and hitches before being allowed to their assigned tasks.

Cranes, derricks and hoists rely upon slings to hold their suspended loads; slings are the most commonly used materials-handling apparatus. This section provides information on the proper selection, maintenance and use of slings.

Slings can be made of chain, wire rope, metal mesh, natural fiber rope, synthetic fiber rope or synthetic web. In general, use and inspection procedures tend to place these slings into three groups: chain, wire rope and mesh, and fiber rope web. Each type has its own particular advantages and disadvantages. The determination of what sling to use for a lift will be based on the size, weight, shape, temperature and sensitivity of the material to be moved, as well as the environmental conditions under which the sling will be used.

Chain Slings

Alloy steel chain slings will have permanently affixed durable identification stating size, grade, rated capacity and reach.

Sling Use

Chain slings will be used because of their strength and ability to adapt to the shape of the load. Care must be taken, however, when using alloy chain slings because sudden shocks will damage them. Misuse of chain slings can damage the sling, resulting in sling failure and possible injury to an employee.

Alloy steel chain slings will not be used with loads in excess of the rated capacities. Slings will be used according to the manufacturer's recommendations.

Safe Operating Temperatures

Alloy steel chain slings will be permanently removed from service if they are heated above 1000° F. When exposed to service temperatures in excess of 600° F, the maximum working load limits will be reduced according to manufacturer's recommendations.

Inspection

Chain slings must be inspected before each use for stretching, binding, wear, or nicks and gouges. If a sling has stretched more than three percent of its original length, it is unsafe and must be discarded.

In addition to the regular inspection, a thorough periodic inspection of alloy steel chain slings in use will be made based on the frequency of use, the severity of service conditions the nature of lifts being made and the experience gained on the service life of slings used in similar circumstances. These periodic inspections will be conducted at least annually, and a record of the most recent inspection will be kept, and made available for examination upon request.

Deformed Attachments

- Steel chain slings with cracked or deformed master links, coupling links or other components will be removed from service
- Slings will be removed from service if hooks are cracked, have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook

Repairing and Reconditioning Steel Chain Slings

- Worn or damaged chain slings or attachments will not be used until repaired
- When welding or heat testing is performed, slings will not be used unless repaired, reconditioned and proof tested by the sling manufacturer or an equivalent entity
- Mechanical coupling links or low carbon steel repair links will not be used to repair broken lengths of chain

Attachments

- Hooks, rings, oblong links, pear shaped links, welded or mechanical coupling links or other attachments will have a rated capacity at least equal to that of the alloy steel chain with which they are used or the sling will not be used in excess of the rated capacity of the weakest component
- Makeshift links or fasteners formed from bolts or rods, or other such attachments, will not be used

Proof Testing

The employer will verify that each new, repaired or reconditioned alloy steel chain sling, including all welded components in the sling assembly, will be proof tested by the sling manufacturer or equivalent entity according to the ASTM Specification A391-65 and/or ANSI G61.1 before use. The employer will retain a certificate of the proof test and will make it available for examination.

Wire Rope

A second type of sling is made of wire rope. Wire rope is made of individual wires that have been twisted to form strands. Strands are then twisted to form a wire rope. Wire ropes with a fiber core are more flexible but are less resistant to environmental damage. Conversely, a core that is made of a wire rope strand has a greater strength and is more resistant to heat damage.

Sling Use

Wire rope slings will not be used with loads in excess of the rated capacities. Slings will be used according to the manufacturer's recommendations.

Minimum Sling Lengths

- Cable laid and 6 x 19 and 6 x 37 slings will have a minimum clear length of wire rope 10 times the component rope diameter between splices, sleeves or end fittings
- Braided slings will have a minimum clear length of wire rope 40 times the component rope diameter between the loops or end fittings
- Cable laid grommets, strand laid grommets and endless slings will have a minimum circumferential length of 96 times their body diameter

Safe Operating Temperatures

Fiber core wire rope slings of all grades will be permanently removed from service if they are exposed to temperatures exceeding 200° F. When non-fiber core wire rope slings of any grade are used at temperatures above 400° F or below minus 60° F, recommendations of the sling manufacturer regarding use at that temperature will be followed.

Safety Factors

- The designed safety factor for the hoisting cable on:
  - A hot metal crane must not be less than 8
  - Any other crane must not be less than 5

End Attachments

- Welding of end attachments, except covers to thimbles, will be performed before the assembly of the sling
- Welded end attachments will not be used unless proof tested by the manufacturer or equivalent entity at twice their rated capacity prior to initial use. The employer will retain a certificate of the proof test, and make it available for examination

Requirements

- Wire rope for a crane bent to form an eye will be equipped with a metal thimble
- An eye in a wire rope sling must not be formed by using a knot. Michigan prohibits the use of wire rope clips to form an eye in a wire rope sling. Check state and local standards for specific provisions
- A wire rope end fitting must be a clamp, swage or a zinc or equivalent poured socket

- Before cutting wire rope, seizings must be placed as follows:
  - 1 seizing on each side of the cut on preformed wire rope
  - 2 seizings on each side of ⅞ inch size or smaller non-preformed wire rope
  - 3 seizings on each side of 1 inch or larger size non-preformed wire rope
- Wire rope that has an independent wire rope core must be used on all molten metal applications and in areas where the environmental atmosphere will cause deterioration of a hemp center
- The unreeling or uncoiling of wire rope must be done as recommended by the rope manufacturer and with care to avoid kinking or inducing a twist
- Rope clips attached with U-bolts must have the U-bolts on the dead or short end of the rope. The spacing and number of all types of clips must adhere to manufacturer recommendations. Clips must be dropforged steel in all sizes manufactured commercially. When a newly installed rope has been in operation for an hour, all nuts on the clip bolts must be retightened
- If a load is supported by more than one part of rope, then the tension in the parts must be equal

Removal from Service

Wire rope slings will be immediately removed from service (and not used again for load-carrying service) if any of the following conditions are present:

- In running ropes, there are 6 randomly distributed broken wires in 1 lay, or 3 broken wires on 1 strand in 1 lay
- In rotation-resistant ropes, 2 randomly distributed broken wires in 6 rope diameters or 4 randomly distributed broken wires in 30 rope diameters
- In standing ropes, there are more than 2 broken wires in 1 lay in sections beyond end connections or more than 1 broken wire at an end connection
- There are reductions from nominal diameter of more than the following:
  - One sixty-fourth of an inch for a diameter to and including 5/16 of an inch
  - One thirty-second of an inch for a diameter ⅜ of an inch to and including ½ of an inch
  - Three sixty-fourths of an inch for a diameter 9/16 of an inch to and including ¾ of an inch
  - One sixteenth of an inch for a diameter ⅞ of an inch to and including 1⅛ inches
  - Three thirty-seconds of an inch for a diameter 1¼ inches to and including 1½ inches
  - Wear or scraping of one-third the original diameter of outside individual wires
  - Kinking, crushing, bird caging or any other damage resulting in distortion of the running portion of the wire rope structure
  - Evidence of heat damage
  - Corrosion of the rope or end attachments
  - End attachments that are cracked, deformed, or worn
  - Hooks that have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook

Wire Rope Sling Inspection

Wire rope slings must be visually inspected before each use. The operator and/or rigger will check the twists or lay of the sling. If ten randomly distributed wires in one lay are broken, or five wires in one strand of a rope lay are damaged, the sling must not be used. End fittings and other components will also be inspected for any damage that could make the sling unsafe.

Field Lubrication

Although every rope sling is lubricated when manufactured, it also must be lubricated in the field to increase the sling's useful service life. There is no set rule on how much or how often this should be done. It depends on the conditions under which the sling is used. The heavier the loads, the greater the number of bends, or the more adverse the conditions under which the sling operates, the more frequently lubrication is required.

Storage

Wire rope slings will be stored in a well-ventilated, dry building. To avoid corrosion and rust, never store wire rope slings on the ground or allow them to be continuously exposed to the elements. If it is necessary to store wire rope slings outside, make sure that they are kept off the ground and protected.

Discarding Slings

Wire rope slings can provide a margin of safety by showing early signs of failure. The following factors indicate when a wire sling needs to be discarded:

- Severe corrosion
- Localized wear (shiny worn spots) on the outside
- A one-third reduction in outer wire diameter
- Damage or displacement of end-fittings by overload or misapplication
- Distortion, kinking, bird caging or other evidence of damage to the wire rope structure
- Excessive broken wires

Wire rope slings, like chain slings, must be cleaned before inspections because they are subject to damage hidden by dirt or oil. In addition, they must be lubricated according to manufacturer's instructions. Lubrication prevents or reduces corrosion and wear due to friction and abrasion. Before applying any lubricant, however, make sure the sling is dry. Applying lubricant to a wet or damp sling traps moisture against the metal and hastens corrosion.

Corrosion may be indicated by pitting, but it is sometimes hard to detect. If a wire rope sling shows any sign of significant deterioration, that sling must be removed until it can be examined by a person who is qualified to determine the extent of the damage.

Many operating conditions affect wire rope life. They are bending, stresses, loading conditions, speed of load application (jerking), abrasion, corrosion, sling design, materials handled, environmental conditions and history of previous usage.

In addition to the above operating conditions, the weight, size and shape of the loads to be handled also affect the service life of a wire rope sling. Flexibility also is a factor, use ropes when smaller radius bending is required. Less flexible ropes will be used when the rope must move through or over abrasive materials.

Metal Mesh Slings

Metal mesh slings will be used for lifting objects with sharp edges, such as sheet metal. Metal mesh slings also make it easier to balance loads because of their wide load bearing surfaces.

Sling Marking

Each metal mesh sling will have permanently affixed to it a durable marking that states the rated capacity for vertical basket hitch and choker hitch loadings.

Handles

Handles will have a rated capacity at least equal to the metal fabric and exhibit no deformation after proof testing.

Attachments of Handles to Fabric

The fabric and handles will be joined so that:

- The rated capacity of the sling is not reduced
- The load is evenly distributed across the width of the fabric
- Sharp edges will not damage the fabric

Sling Coatings

Coatings that diminish the rated capacity of a sling will not be applied.

Sling Testing

No new and repaired metal mesh slings, including handles, will be used unless proof tested by the manufacturer or equivalent entity at a minimum of 1½ times their rated capacity. Elastomer impregnated slings will be proof tested before coating.

Proper Use of Metal Mesh Slings

Metal mesh slings will not be used to lift loads in excess of their rated capacities based on the manufacturer's recommendations.

Safe Operating Temperatures

Metal mesh slings that are not impregnated with elastomers may be used in a temperature range from minus 20° F to plus 550° F without decreasing the working load limit.

Metal mesh slings impregnated with polyvinyl chloride or neoprene may be used only in a temperature range from zero degrees to plus 200° F. For operations outside these temperature ranges or for metal mesh slings impregnated with other materials, the sling manufacturer's recommendations will be followed.

Repairs

- Metal mesh slings that have been repaired will not be used unless repaired by a metal mesh sling manufacturer or an equivalent entity
- Once repaired, each sling will be permanently marked or tagged, or a written record maintained, to indicate the date and nature of the repairs and the person or organization that performed the repairs
- Records of repairs will be made available for examination

Removal from Service

Metal mesh slings will be immediately removed from service if any of the following conditions are present:

- A broken weld or broken brazed joint along the sling edge
- Reduction in wire diameter of 25 percent due to abrasion or 15 percent due to corrosion
- Lack of flexibility due to distortion of the fabric
- Distortion of the female handle so that the depth of the slot is increased more than 10 percent
- Distortion of either handle so that the width of the eye is decreased more than 10 percent
- A 15 percent reduction of the original cross-sectional area of metal at any point around the handle eye
- Distortion of either handle out of its plane

Fiber Rope Web Slings

Fiber rope and synthetic web slings are used primarily for temporary work, such as construction and painting jobs, and in marine operations. They also are the best choice for use on expensive loads, highly finished parts, fragile parts and delicate equipment.

Fiber rope deteriorates on contact with acids and caustics. Fiber rope slings will not be used around these substances unless the manufacturer recommends them for that use.

Sling Use

- Fiber rope slings made from conventional three strand construction fiber rope will not be used with loads in excess of their rated capacities
- Fiber rope slings will have a diameter of curvature meeting at least the minimums specified
- Slings will be used only according to the manufacturer's recommendations

Sling Operating Temperatures

Natural and synthetic fiber rope slings, except for wet frozen slings, may be used in a temperature range from minus 20° F to plus 180° F without decreasing the working load limit. For operations outside this temperature range and for wet frozen slings, the sling manufacturer's recommendations will be followed.

Splicing

- Spliced fiber rope slings will not be used unless they have been spliced according to the following minimums:
    - In manila rope, eye splices will consist of at least three full tucks, and short splices will consist of at least six full tucks, three on each side of the splice center line
    - In synthetic fiber rope, eye splices will consist of at least four full tucks, and short splices will consist of at least eight full tucks, four on each side of the center line
    - Strand end tails will not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices.
    - For fiber rope under one inch in diameter, the tail will project at least six rope diameters beyond the last full tuck.

  - For fiber rope one inch in diameter and larger, the tail will project at least six inches beyond the last full tuck.
  - Where a projecting tail interferes with the use of the sling, the tail will be tapered and spliced into the body of the rope using at least two additional tucks (which will require a tail length of approximately six rope diameters beyond the last full tuck)
- Fiber rope slings will have a minimum clear length of rope between eye splices equal to 10 times the rope diameter
- Knots will not be used in lieu of splices
- Clamps not designed specifically for fiber ropes will not be used for splicing
- For all eye splices, the eye will large enough to provide an included angle of less than 60 º at the splice when the eye is placed over the load or support requirements, and according to any additional recommendations of the manufacturer

End Attachments

Fiber rope slings will not be used if end attachments in contact with the rope have sharp edges or projections.

Removal from Service

Natural and synthetic fiber rope slings will be immediately removed from service if any of the following conditions are present:

- Abnormal wear
- Powdered fiber between strands
- Broken or cut fiber
- Variations in the size or roundness of strands
- Discoloration or rotting
- Distortion of hardware in the sling

Repairs

Only fiber rope slings made from new rope will be used. Use of repaired or reconditioned fiber rope slings is prohibited.

Inspection

When inspecting a fiber rope sling, look first at its surface. Look for cuts, gouges or worn surface areas; dry, brittle, scorched or discolored fibers; or melting or charring of any part of the sling. If any of these conditions are found, the supervisor must be notified and a determination made regarding the safety of the sling. If the sling is found to be unsafe, it must be discarded.

Next, check the sling's interior. It should be as clean as when the rope was new. A buildup of powder-like sawdust on the inside of the fiber rope indicates excessive internal wear and that the sling is unsafe.

Synthetic Web Slings

Each sling will be marked or coded to show the rated capacities for each type of hitch and type of synthetic web material.

Webbing

Synthetic webbing will be of uniform thickness and width and selvage edges will not be split from the webbing's width.

Fittings

Fittings will be:

- Of a minimum breaking strength equal to that of the sling
- Free of all sharp edges that could in any way damage the webbing

Attachment of End Fittings to Webbing and Formation of Eyes

Stitching will be the only method used to attach end fittings to webbing and to form eyes. The thread will be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.

Sling Use

Synthetic web slings will not be used with loads in excess of the rated capacities.

Environmental Conditions

When synthetic web slings are used, the following precautions will be taken:

- Nylon web slings will not be used where fumes, vapors, sprays, mists or liquids of acids or phenolics are present
- Polyester and polypropylene web slings will not be used where fumes, vapors, sprays, mists or liquids of caustics are present
- Web slings with aluminum fittings will not be used where fumes, vapors, sprays, mists or liquids of caustics are present

Safe Operating Temperatures

Synthetic web slings of polyester and nylon will not be used at temperatures in excess of 180° F. Polypropylene web slings will not be used at temperatures above 200° F.

Repairs

- Synthetic web slings that have been repaired will not be used unless repaired by a sling manufacturer or an equivalent entity
- Each repaired sling will be proof tested by the manufacturer or equivalent entity to twice the rated capacity prior to its return to service. The employer will retain a certificate of the proof test and make it available for examination
- Slings, including webbing and fittings, which have been repaired in a temporary manner will not be used

The most commonly used synthetic web slings are made of nylon, polypropylene and polyester. They have the following properties in common:

- Strength – can handle a load of up to 300,000 pounds

- Convenience – can conform to any shape
- Safety – will adjust to the load contour and hold it with a tight, non-slip grip
- Load protection – will not mar, deface, or scratch highly polished or delicate surfaces
- Long life – are unaffected by mildew, rot, or bacteria; resist some chemical action; and have excellent abrasion resistance
- Economy – have a low initial cost plus a long service life
- Shock absorbency – can absorb heavy shocks without damage
- Temperature resistance – are unaffected by temperatures up to 180˚ Fahrenheit

Because each synthetic material has unique properties, it must be used according to the manufacturer's instructions, especially when dealing with chemically active environments.

Synthetic web slings must be removed from service if any of the following defects exist:

- Acid or caustic burns
- Melting or charring of any part of the surface
- Snags, punctures, tears, or cuts
- Broken or worn stitches
- Wear or elongation exceeding the amount recommended by the manufacturer
- Distortion of fittings

Fiber ropes and synthetic webs are generally discarded rather than service or repaired. Operators must always follow the manufacturer's recommendations.

Hitches

Hitches are used to attach slings to the load to be lifted. There are three basic type of hitches vertical, choker and basket.

The type of hitch used will affect the working load limit (WLL) of the sling. The WLL is the maximum weight that the sling can handle, and is determined by the angle of the sling in reference to the load line.

Vertical: A vertical hitch is a single sling that attaches directly from the load line to the load. This hitch provides a lifting capability that matches the WLL of the sling, and is used for loads that have secure attachment points.

Choker: A choker hitch wraps around the load and through itself. The must be tightened around the load before the lift is attempted. Due to the stress created at the choke point, slings rigged with a choker hitch can only handle about 75% of their WLL.

Basket: Basket hitches can be used as a single or double lifting device. The cradle configuration of this hitch allows the two extending ends (legs) of the sling to function as if they were two separate slings. The capacity of the sling in this hitch is twice that of the same sling in a vertical hitch, but only if the sling angle of each leg is 90°. Lifting with both legs at 90° would normally require two lifting devices or a spreader bar.

Reduction Factor (RF)	Angle From Horizontal	Tension Factor (TF)
1.000	90°	1.000
0.996	85°	1.004
0.985	80°	1.015
0.966	75°	1.035
0.940	70°	1.064
0.906	65°	1.104
0.866	60°	1.155
0.819	55°	1.221
0.766	50°	1.305
0.707	45°	1.414
0.643	40°	1.555
0.574	35°	1.742
0.500	30°	2.000

When slings or sling legs are used at an angle during a lift, the sling capacity is reduced. How much it is reduced depends on the sling angle (see table.

Note that the rated capacity of a 30° Basket is only one half that of a 90° Basket. Sling angles below 30° will not be used. A sling angle of 60° or more is preferred

GENERAL SAFE PRACTICES

Cranes being used in steel erection activities will be visually inspected prior to each shift by a competent person, the inspection will include observation for deficiencies during operation.

If any deficiency is identified, an immediate determination will be made by the competent person as to whether the deficiency constitutes a hazard. If the deficiency is determined to constitute a hazard, the hoisting equipment will be removed from service until the deficiency has been corrected

Whenever there is any doubt as to safety, the operator will have the authority to stop and refuse to handle loads until safety has been assured.

- A qualified rigger will inspect the rigging prior to each shift
- The headache ball, hook, or load will not be used to transport personnel
- Cranes or derricks may be used to hoist employees on a personnel platform provided that all provisions are met
- Safety latches on hooks will not be deactivated or made inoperable except:
    - When a qualified rigger has determined that the hoisting and placing of purlins and single joists can be performed more safely by doing so
    - When equivalent protection is provided in a site-specific erection plan

Working Under Loads

Routes for suspended loads will be pre-planned to ensure that no employee is required to work directly below a suspended load except for:

- Employees necessary for the hooking or unhooking of the load
- When working under suspended loads, the following criteria will be met:
    - Materials being hoisted will be rigged to prevent unintentional displacement
    - Hooks with self-closing safety latches or their equivalent will be used to prevent components from slipping out of the hook
    - All loads will be rigged by a qualified rigger

Multiple Lift Rigging Procedure

A multiple lift will only be performed if the following criteria are met:

- A multiple lift rigging assembly is used
- A maximum of five members are hoisted per lift
- Only beams and similar structural members are lifted
- All employees engaged in the multiple lift have been trained in these procedures
- No crane will be used for a multiple lift unless approved by the manufacturer's specifications

The components of the multiple lift rigging assembly will be designed and assembled with a maximum capacity for total assembly and for each individual attachment point. This capacity, certified by the manufacturer or a qualified rigger, will be based on the manufacturer's specifications with a 5-to-1 safety factor for all components.

The total load will not exceed:

- The rated capacity of the hoisting equipment specified in the hoisting equipment load charts
- The rigging capacity specified in the rigging rating chart

SAFE OPERATING PRACTICES

The operator and rigger will select slings based on their intended use, the size and type of load and the environmental conditions of the workplace. All slings must be inspected before use.

- Slings that are damaged or defective will not be used
- Slings will not be shortened with knots or bolts or other makeshift devices
- Sling legs will not be kinked
- Slings will not be loaded in excess of their rated capacities
- Slings used in a basket hitch will have the loads balanced to prevent slippage
- Slings will be securely attached to their loads
- Slings will be padded or protected from the sharp edges of their loads
- Suspended loads will be kept clear of all obstructions
- All employees will be kept clear of loads about to be lifted and of suspended loads
- Hands or fingers will out from between the sling and its load while the sling is being tightened
- Shock loading is prohibited
- A sling will not be pulled from under a load when the load is resting on the sling

SAFE LIFTING PRACTICES

There are four primary factors to consider when safely lifting a load:

- The size, weight, and center of gravity to the load
- The number of legs and the angle the sling makes with the horizontal line
- The rated capacity of the sling
- The history of the care and usage of the sling

Size, Weight, and Center of Gravity of the Load

The center of gravity of an object is that point where the entire weight is considered balanced. To make a level lift, the crane hook must be directly above this point. While slight variations are usually permissible, if the crane hook is too far to one side of the center of gravity, dangerous tilting will result causing unequal stresses in the different sling legs. This imbalance must be compensated for at once. No lift will be performed if the load angle is more than 10º.

Number of Legs and Angle with the Horizontal

As the angle formed by the sling leg and the horizontal line decreases, the rated capacity of the sling also decreases. In other words, the smaller the angle between the sling leg and the horizontal, the greater the stress on the sling leg and the smaller (lighter) the load the sling can safely support. Larger (heavier) loads can be safely moved if the weight of the load is distributed among more sling legs.

Rated Capacity of the Sling

The rated capacity of a sling varies depending upon the type of sling, the size of the sling and the type of hitch. Operators must know the capacity of the sling. Charts or tables that contain this information generally are available from sling manufacturers. The values given are for new slings. Older slings must be used with additional caution. Under no circumstances will a sling's rated capacity be exceeded.

Sling Care and Usage

The mishandling and misuse of slings are the leading cause of sling-related accidents. The majority of injuries and accidents, however, can be avoided by becoming familiar with the essentials of proper sling care and use.

Proper care and use are essential for maximum service and safety. Slings must be protected with cover saddles, burlap padding or wood blocking as well as from unsafe lifting procedures such as overloading to prevent sharp bends and cutting edges.

Before making a lift, check that the sling is properly secured around the load and that the weight and balance of the load have been accurately determined. If the load is on the ground, do not allow the load to drag along the ground. This could damage the sling. If the load is already resting on the sling, make sure there's no sling damage before making the lift.

Make sure the hook is positioned directly over the load, and seat the sling squarely within the hook bowl. This will prevent bending of the hook or overstressing the sling.

Wire rope slings are subject to damage from contact with sharp edges of the loads being lifted. These edges can be blocked or padded to minimize damage to the sling.

After the sling is properly attached to the load, use these lifting techniques.

- Make sure that the load is not lagged, clamped or bolted to the floor
- Guard against shock loading by taking up the slack in the sling slowly. Apply power cautiously to prevent jerking at the beginning of the lift, and slowly accelerate or decelerate
- Check the tension on the sling. Raise the load a few inches, stop and check for proper balance and that all items are clear of the path of travel
- Keep all personnel clear while the load is being raised, moved or lowered. Crane or hoist operators must watch the load at all times when it is in motion

- Never allow more than one person to control a lift or give signals to a crane or hoist operator except to warn of a hazardous situation
- Never raise the load higher than necessary
- Never leave the load suspended in the air
- Never work under a suspended load or allow anyone else to

Once the lift has been completed, clean the sling, check it for damage and store it in a clean, dry, airy place. It is best to hang it on a rack or wall.

Remember, damaged slings cannot lift as much weight as new or older well cared for slings. Proper and safe use and storage of slings will increase their service life.

If using load blocks, they must be enclosed and guarded against rope jamming during normal operations.

Never allow anyone to ride on the hook or load. A hook must be equipped with a latch, unless the application makes the use of a latch impractical as determined by a qualified person. When required, a latch must be provided to bridge the throat opening of the hook for the purpose of retaining slings, chains, or other equipment, under slack conditions.

INSPECTIONS

Each day before being used, the sling and all fastenings and attachments will be inspected for damage or defects by a competent person designated by the employer. Additional inspections will be performed during sling use, where service conditions warrant. Damaged or defective slings will be immediately removed from service.

TRAINING

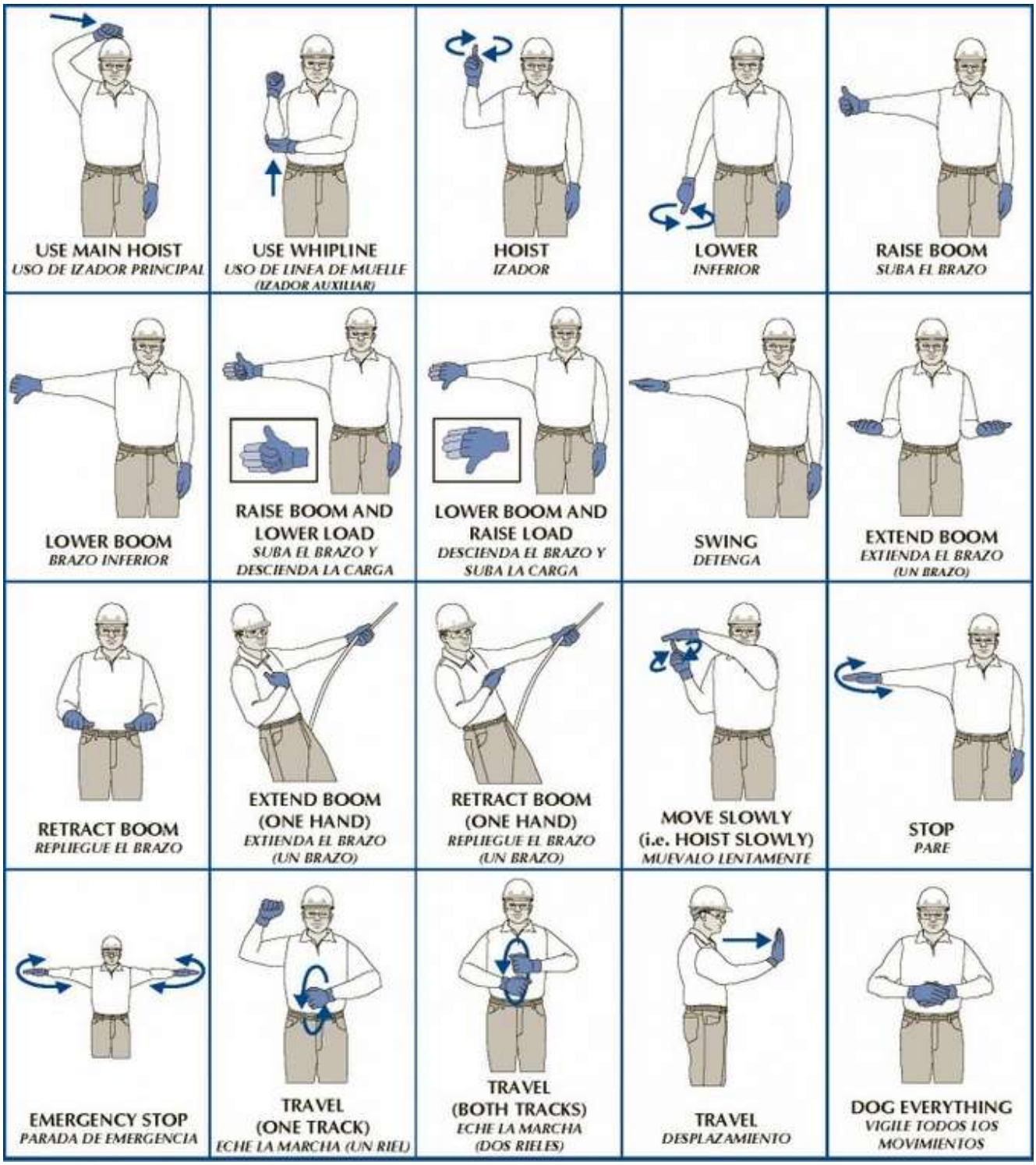
This Company will ensure that all employees engaged in rigging and lifting operations understand:

- The use of approved hand signals (see attachment)
- How to perform hook inspections
- The basics of weight capacity
- The different sling types
- The types of hitches and their use
- The use of padding
- The basics of sling and load angles

ATTACHMENTS

The following page illustrates the recommended hand signals for controlling cranes and other lifting devices.

RECOMMENDED HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS



SCOPE

This chapter provides information on the hazards of slips, trips and falls, as well as the safe practices that will be used to prevent them. These practices will comply with the parts of OSHA Walking and Working Surfaces regulation 1910 Subpart D that apply to slip, trip and fall hazards. This chapter does not specifically cover working at elevations or fall protection systems; please refer to the Fall Protection and Walking and Working Surfaces chapters for information on those policies and safe practices.

POLICY

This company has established the following policies and practices to reduce the number of injuries and deaths due to slips, trips and falls.

EMPLOYER RESPONSIBILITIES

- Owners, managers, and supervisors must make a commitment to prevent accidental slips, trips, and falls
- Regular, frequent inspections of working and walking areas will be conducted to identify environmental and equipment hazards that could cause slips, trips, and falls. Special attention will be given to the working and walking surfaces, housekeeping, lighting, vision, stairways and ladders. Immediate corrective action will be taken to correct any problems that are identified
- Safety training on the prevention of slips, trips, and falls will be provided for all new employees
- Regular retraining will be provided for all employees
- Special attention will be given to proper techniques for walking, carrying loads, climbing and descending stairways, using ladders, mounting and dismounting vehicles and other equipment, etc. Unsafe practices will be corrected immediately
- All slips, trips, and falls, with or without injury, will be recorded and thoroughly investigated. Corrective action to prevent repeat occurrences will be taken immediately

EMPLOYEE RESPONSIBILITIES

- Are required to wear proper footwear for their work and environment whether in the office or field
- All slips, trips, and falls, with or without injury, must be reported immediately
- Will use proper tools, hand trucks, dollies, carts and hoists to lift and move heavy objects. Do not exceed the rated capacity of a hoist or lifting device
- Inspect items to be handled for slivers, jagged edges, burrs, and rough or slippery surfaces. Wear protective gloves
- Wipe off oily, wet, slippery or dirty items before trying to handle them. To adjust your grip, set the object down
- Never carry an object they cannot see over or around, plan your route of travel and be sure it is clear of obstacles
- When moving items on dollies or hand trucks, push rather than pull whenever possible
- Will avoid extreme and awkward postures by using adjustable fixtures and rotating tables, workstations, and delivery bins

SLIPS, TRIPS, AND FALLS

Slips and trips can happen anywhere, can result in falls, possible disability or death and can be very costly to both the company and the worker.

Slips, trips and falls are a leading cause of general industry accidents, ranking second behind motor vehicle accidents. Listed below are some basic definitions of slips, trips and falls.

Slips

Slips occur when there is too little friction or traction between feet (footwear) and a walking/working surface, resulting in loss of balance. Most slips are caused by:

- Wet product or spills on smooth floors or walking surfaces
- Dry product or spills making walking surfaces slippery
- Highly-polished or freshly waxed floors
- Transitioning from one surface to another such as carpet to vinyl or grid to smooth concrete
- Loose, irregular surfaces such as gravel
- Sloped, uneven or muddy terrain
- Weather hazards
- Leaves, pine needles and other plant debris (wet or dry)

Trips

Trips occur when a worker's foot or lower leg hits an object and their upper body continues moving, resulting in loss of balance. Trips can be caused by:

- Uncovered hoses, cables, wires or extension cords across aisles or walkways
- Clutter, obstacles in aisles, walkway and work areas
- Open cabinet, file or desk drawers and doors
- Changes in elevation or levels
- Unmarked steps or ramps
- Rumpled or rolled-up carpets/mats or carpets with curled edges
- Irregularities in walking surfaces, such as thresholds or gaps
- Missing or uneven floor tiles and bricks
- Damaged steps
- Non-uniform, improper or irregular steps
- Debris, accumulated waste materials
- Trailing cables, pallets, tools in gangways
- Objects protruding from walking surface
- Sidewalk/curb drops
- Speed bumps
- Tire bumpers
- Wheelchair ramps and curbs
- Driveways

Falls

A fall occurs when a worker's body becomes too far off its center of balance. There are two basic types of falls, same-level falls and elevated falls.

- Same-level falls: high frequency and low severity
- Elevated falls: lower frequency and high severity

Same-level falls are generally slips or trips. Injuries result when the individual hits a walking or working surface or strikes some other object during the fall.

Same-Level Falls

The force that allows you to walk without slipping is commonly referred to as traction or friction. The coefficient of friction (COF) is a measure of the traction workers have when working. Common experience shows that dry concrete sidewalks have good traction, while icy surfaces or freshly waxed floors can have low traction. A higher COF means more friction, and therefore more traction. The COF depends on two things, the quality of both the walking surface and the soles of your shoes. Slips are primarily caused by a slippery surface and compounded by wearing the wrong footwear. In normal walking, two types of slips occur:

- The first of these occurs as the heel of the forward foot contacts the walking surface. Then, the front foot slips forward, and the person falls backward
- The second type of fall occurs when the rear foot slips backward. The force to move forward is on the sole of the rear foot. As the rear heal is lifted and the force moves forward to the front of the sole, the foot slips back and the person falls
- To prevent slips and falls, a high COF between the shoe and walking surface is needed. On icy, wet and oily surfaces, the COF can be as low as 0.10 with shoes that are not slip-resistant. A COF of 0.40 to 0.50 or more is needed for good traction. To put these figures in perspective, a brushed concrete surface and a rubber heel will often show a COF greater than 1.0. Leather soles on a wet, smooth surface, such as ceramic tile or ice, may have a COF as low as 0.10
- Shoes with soft, rubber soles and heels with rubber cleats provide a high COF
- Providing dry walking and working surfaces, and slip-resistant footwear, will prevent slips and their resultant falls and injuries. In work areas where the walking and working surface is likely to be slippery, non-skid strips or floor coatings will be used. If the working surface is very slippery, no footwear will provide a safe COF
- "Fall-trips" occur when a worker's front foot strikes an object and suddenly stops. The upper body is then thrown forward, and a fall occurs
- As little as a 3/8" rise in a walkway can cause a person to "stub" their toe, resulting in a trip and fall. The same thing can occur when going up a flight of stairs: only a slight difference in the height of subsequent steps, and a person can trip and fall
- Another type of working and walking surface fall is the "step and fall". This occurs when the front foot lands on a surface lower than expected, such as when unexpectedly stepping off a curb in the dark. In this type of fall, the person normally falls forward. A second type of "step and fall" occurs when a person steps forward or down, and either the inside or outside of the foot lands on an object higher than the other side. The ankle turns and one tends to fall forward and sideways

Elevated Falls

Most elevated falls occur when employees working on ladders or scaffolds lose their balance. More than 60 percent of elevated falls are from less than 10 feet.

Elevated falls, or falls from height, are normally due to:

- A lack of, or improper use of, fall protection
- Poor housekeeping practices
- Improper PPE
- Improper climbing techniques
- Accidental contact with objects or electricity

These accidents are avoidable if safe work practices are used.

Falls from Ladders

Ladders may be fixed or portable. They may be straight, extension or stepladders, and may be made of wood, metal, plastic or fiberglass. They can be light, medium, heavy or extra heavy-duty.

The materials from which ladders are constructed have advantages and disadvantages in weight, durability, flexibility, conductivity and strength. The intended use of the ladder should determine the type purchased, and only American National Standards Institute (ANSI)-approved ladders will be used.

Don’t use metal ladders in locations where the ladder or its user could contact electrical equipment or circuits.

The lower ends of the siderails will be equipped with slip-resistant pads, particularly if the ladder is to be used on hard surfaces. The same is true for the upper ends of the siderails if they are to rest against a surface.

Ladders will be set at a 4:1 angle, or as near to that angle as possible. For each four feet of rise from the base to the upper resting edge of the ladder, the base should be one foot out from a vertical line from the upper resting edge of the ladder to the working surface.

The base of the ladder must be set so that it won’t slip or settle into soft ground. The resting edge of the ladder will have both siderails in contact with the supporting wall. Whenever there’s any question about the stability of the ladder, additional precautions will be taken to stabilize the ladder as it’s being climbed. Tying the top of the ladder to the supporting structure can also keep the ladder from slipping or sliding.

Ladders must be inspected before use: check for cracks, loose rungs, slivers and sharp edges.

Never paint ladders, as the paint can hide potentially dangerous conditions. Wooden ladders can be coated with linseed oil or an oil-based wood preservative to keep them from drying out and cracking. Allow ladders to dry thoroughly before using them or the rungs will be slippery.

The rungs and siderails of ladders must be kept free of oil, grease, and mud and must be kept dry.

Since the shoe has limited contact with the rung or step of a ladder, it is very important that both rungs and shoes have a high COF. Only shoes with heels may be worn when climbing ladders; users should be taught that the rung or step of the ladder should be just in front of the heel, under the arch of the foot. Stepping or standing on a ladder with the front part of the shoe is inviting a slip and fall. Always face the ladder when climbing or descending.

Falls from Vehicles and Equipment

Death or serious injury is a frequent result of extra riders falling from the bed of a truck.

Far too many injuries occur in the simple process of getting in and out of trucks or truck beds. When the steps are metal, there is a low COF which becomes even lower if they are wet, muddy, or oily. Keep the steps clean and dry.

Whenever mounting or climbing on a vehicle or machine, have a good handhold before stepping up. Pulling yourself up reduces the force between your shoe and the step and reduces the danger of a slip. As with a ladder, the foot should be placed on the step or rung just in front of your heel, under the arch.

Always face the vehicle or equipment when mounting and dismounting. When stepping down backward, one steps down on the ball of the foot, which is best; when stepping down forward, however, one lands on the heel, thus increasing the chances of falling, twisting an ankle or knee, or suffering some other injury.

Practice the "Three-Point System". This system can significantly reduce the chances of injuring yourself through a slip or fall while climbing ladders or while entering or exiting a vehicle. The Three-Point System means that three of your four limbs are in contact with the ladder or vehicle at all times, either one hand and two feet, or two hands and one foot, only one limb is in motion at any one time.

Falls from Loading Docks

- Loading docks and ramps are dangerous areas. They are frequently congested, heavy- traffic areas, and working and walking surfaces are often wet. Metal dock plates can wear smooth and become very slippery; in particular, the edge of a dock plate invites trips and falls
- Accidental backward steps can result in a fall from the dock. Portable railings, which can be easily removed from the edge of the dock, could prevent many dangerous falls. They are removed when a truck is at the dock, and replaced as soon as the truck or trailer leaves
- Proper housekeeping, well-designed traffic patterns, and the use of abrasive, skid-resistant surface coatings will reduce the risk of slips, trips, and falls
- Ramps and gangplanks have hazards similar to loading docks. The slopes should be as gradual as possible, as wide as possible, and as dry as possible. They should also have skid-resistant surfaces

Falls on Stairs

Stairwells will be well lighted, with sturdy handrails on both sides. Persons using the stairwell should have one hand free to be able to use the handrail.

All the steps will have the same rise and depth, with visible edges. They must be kept free of grease, oil and obstacles that could cause slips and trips. Avoid carrying heavy or bulky objects that obscure your vision and/or require the use of both hands. Carry smaller, lighter loads, and make more trips, or obtain help with the load.

Fixed Ladders

Fixed ladders are mounted on buildings and other tall structures that require workers to climb to high levels to perform some functions. Such ladders must be securely attached to the structure and be capable of supporting a minimum of 250 pounds of concentrated live weight. The rungs should be a minimum of 16 inches wide and a maximum of 12 inches apart. There will be seven inches of toe space between the rung and the structure to which it is attached. Fixed ladders extending more than 20 feet above the ground or floor level will be surrounded by a cage, beginning at 7 to 8 feet above the ground.

If a catwalk or working area is provided at the top of the ladder, it must have a protective railing at least 42 inches high. A toeboard, four-inches high, around the edge of the work area will be provided.to reduce the risks of a person stepping off the edge or having tools fall from the work area.

Workers climbing or descending a fixed ladder must have both hands free. Small tools can be carried in a tool belt; rope and pulleys or some other mechanical system must raise other tools and materials.

INJURIES

The most common injuries resulting from slips trips and falls are:

- Sprains and strains
- Bruises and contusions
- Fractures
- Abrasions and lacerations

These injuries usually occur to workers:

- Knee, ankle and/or foot
- Wrist and /or elbow
- Back and /or shoulder
- Hip
- Head

ENVIRONMENTAL FACTORS

Proper housekeeping in work and walking areas can contribute to safety and the prevention of falls. Not only is it important to maintain a safe working environment and walking surface, these areas must be kept free of obstacles that can cause slips and trips. One method that promotes good housekeeping in work environments is the painting of yellow lines to identify working and walking areas. Objects of any kind should never obstruct these areas.

Adequate lighting to ensure proper vision is also important in the prevention of slips and falls. Moving from a light to a dark area, or vice versa, could cause temporary vision problems that might cause a person to slip on an oil spill, or trip over a misplaced object.

Carrying an oversized object can also obstruct one's vision and result in a slip or a trip. This is a particularly serious problem on stairs.

HUMAN FACTORS

Slips, trips and falls can also be caused by a number of physical factors such as:

- Failing eyesight and /or visual perception
- Age
- Physical condition and fatigue
- Stress or illness
- Medications, alcohol and drug effects

BEHAVIORS THAT LEAD TO FALLS

In addition to wearing the wrong footwear, there are specific behaviors that can lead to slips, trips and falls.

- Walking too fast or running can cause major problems. In normal walking, the most force is exerted when the heel strikes the ground, but in fast walking or running, one can land harder on the heel of the front foot and push harder off the sole of the rear foot; thus, a greater coefficient of friction (COF) is required to prevent slips and falls. Rapid changes in direction create a similar problem
- Other problems that can lead to slips, trips and falls are: distractions, not watching where one is going, carrying materials that obstruct the view of the pathway, wearing sunglasses in low-light areas, and failure to use handrails. These and other behaviors, caused by lack of knowledge, impatience, or bad habits developed over time, can lead to falls, injuries, or even death

SAFE PRACTICES

All Company employees are expected to follow these safe practices to avoid slip, trip and fall injuries:

- Wear footwear that is appropriate for the conditions inside and outside. On smooth or wet surfaces, wear slip-resistant soles. On snowy, icy, and rainy days, wear boots to work and change after arriving
- Clean footwear of mud, snow, etc., when entering a building
- Be aware of changes in elevation and changes in walking surfaces. When moving from carpet to tile or dry tile to wet tile, etc., the friction (grip) between the sole of the shoe and the floor surface lessens. Alter your stride to take shorter, slower steps
- Walk; don’t run through work areas. When possible, stay on marked travel aisles and paths. Don’t take shortcuts around machinery and equipment. Avoid areas that are cluttered or dimly lit
- When carrying a load, make sure you can see over and around it. Scan the area ahead and plan your travel path. Get help to carry heavy or awkward objects. Use carts or other mechanical aids

- Clean up, correct, remove or report unsafe conditions such as spills, electric cords, frayed carpets, worn stairs and other hazards that could result in a slip/trip/fall injury
- Warn others that a hazard exists by placing signs or cones, or by isolation with caution tape or barricades
- Do not allow equipment, tools, materials or other obstacles to accumulate in aisles or walkways. Never store or place items on stairs
- Keep desk and file cabinet drawers closed when they are not being used, or when unattended
- Always use a ladder or step stool. Never stand on a chair, desk, shelf, crate, box or any other unstable items to try to reach something. If you must routinely reach items in high locations, purchase a ladder or steps to allow it to be done safely
- Walk erect using even strides and good balance. Always use handrails when available
- Use “three-point positioning” when entering or exiting trucks, equipment, or construction vehicles. Maintain three points of attachment at all times, both hands and one foot or both feet and one hand
- Enter and exit equipment while facing it. Use all of the steps, never jump
- Keep floors clean and free of water, oil or grease. Areas such as mechanics bays may be periodically steam-cleaned. Tiled floors that have been worn or filled smooth can be etched to restore a rougher surface
- Apply non-slip surfacing such as adhesive-backed sheets, anti-slip paint, open-spaced grates, or mats to ramps, docks, platforms, or stairways recognized as hazardous
- Paint edges where elevation changes occur with “caution-yellow” paint. Post signs to warn of dangerous areas
- During winter months, remove snow and ice, and apply sand and salt before work and frequently after work begins. Note areas that drain poorly, retain snow, or are habitually slippery, and initiate permanent changes to eliminate the hazard

Safe Climbing

Workers will have both hands free to hold the ladder's siderails, not the rungs, when climbing or descending. Small tools can be carried in a tool belt, but a better choice is to raise tools and supplies with a rope. Never raise or lower power tools by the cord or while they are plugged into an electrical source.

Makeshift ladders, chairs, boxes and barrels may not be used as substitutes for a ladder.

SLIP, TRIP AND FALL PROTECTION

Our Company will take all practical measures to protect employees from slip, trip and fall hazards depending on the environment and the type of work being performed.

Signs and Markings

Safety signs of slip, trip and fall hazards will be posted to remind workers of the hazards, particularly where hazards cannot be removed or corrected.

Yellow striping to identify walking and working areas will be installed. Striped areas will indicate that no objects may be placed in these areas. Dropped and spilled materials must be removed immediately.

Slip-Resistant Materials

Slip resistant coatings will be applied to concrete, metal and wood surfaces to increase the COF and reduce the risks of slips and falls. These materials can consist of:

- Abrasive coatings formulated to resist grease, oil, water, and other chemicals
- Skid-resistant products for use on stair treads, ramps, and other hazardous walking and working surfaces
- Rubber or rubber-like mats

Fall Protective Devices

Workers at high elevations, such as ladders, platforms or catwalks, will be protected from falling by a fall protective device. This can be a protective cage, a lifeline, lanyard or safety harness.

The system will provide maximum protection, but will also be reasonably comfortable and not restrict a worker's necessary work activity. This Company will also provide instruction on the safe use of this protective equipment.

For additional information on the use of fall protection equipment, please refer to the Fall Protection chapter of this manual.

Shoes and Boots

It is very important to wear the proper footwear for your work and environment. Shoes or boots should provide three major types of protection:

- The soles and heels should be slip-resistant
- The toe of the shoe should resist crushing injuries
- The shoe should support the ankle

ANSI sets standards for shoes and boots. Never purchase work shoes that don’t meet these standards. A typical ANSI rating could be 1-75 C-25. This means the toe will withstand 75-foot pounds of impact and 2,500 pounds of compression.

Chevron-pattern or cleat-designed soles are best for slippery situations because of the suction or squeezing action they provide. The softer soles are better for slippery indoor conditions; the harder, more rugged cleat-type sole is preferred for tough outdoor use.

Leather that covers the foot and ankle portion of the foot is preferred in most work environments. Rubber is satisfactory for wet conditions, but not with pesticides or petroleum However, when working in wet environments or around chemicals, oils, greases or pesticides, boots made of polyvinyl chloride (PVC), a blend of PVC and polyurethane, or neoprene will be used.

LEARNING HOW TO FALL

Naturally, the goal is not to slip, trip, and fall; however, the possibility of a fall still exists. There are correct ways to fall.

Recommended procedures are:

- Tuck your chin in, turn your head and throw an arm up/out. It is better-to land on your arm than on your head
- While falling, twist or roll your body to the side. It is better to land on your buttocks and side than on your back
- Keep your wrists, elbows and knees bent. Do not try to break the fall with your hands or elbows. When falling, the objective is to have as many square inches of your body contact the surface as possible, thus, spreading out the impact of the fall

SAFE LIFTING

Manually moving material can often be the cause of slips and falls. Attempting to move heavy or awkward shaped items can alter your center of gravity and result in slips or falls. These types of accidents often result in painful back injuries. In order to avoid these problems always follow safe lifting techniques.

POLICY

A SWPPP must be prepared before construction begins, ideally during the project planning and design phases. This is because much of the information required by the SWPPP is already part of the project design documentation, and because the design may need to be modified to incorporate controls during construction and post-construction. It may be completed at the end of the design phase or at the initiation of the construction phase prior to any activity with the potential to cause water pollution.

Implementation of the SWPPP begins when construction begins, typically before the initial clearing, grubbing, and grading operations, since these activities can usually increase erosion potential on the site. During construction, the SWPPP should be referred to frequently, and amended by the owner and contractors as changes occur in construction operations, which could have significant effects on the potential for discharge of pollutants.

SCOPE

Construction projects that disturb one acre or more of soil, or the project results in the disturbance of less than one acre but is part of a larger common plan of development or sale of one or more acres.

A local municipality may require a SWPPP for projects that require a grading permit or if it is determined that the project poses a significant water quality risk threat.

ASSESS CONSTRUCTION SITE AND PLANNED ACTIVITIES

The planning phase is the source of much of the information needed for the SWPPP. The basis for stormwater pollution control decisions is also made at this phase via the normal review process with the local municipality. Information to be collected includes contractor activities, disturbed areas and erosion potential, and site history.

CONTRACTOR ACTIVITIES

Information about contractor activities is required for the selection of proper BMPs. Details that should be recorded include:

- Equipment storage, cleaning and maintenance areas and activities
- Points of ingress and egress to the construction site
- Material loading, unloading, and storage practices and areas, including construction materials, building materials and waste materials
- Materials, equipment, or vehicles that may come in contact with stormwater

DISTURBED AREAS AND EROSION POTENTIAL

The physical condition of the site and adjacent areas should be reviewed. A project layout showing what is being constructed, limits of construction, project schedule, and existing features should be developed. Site characteristics including drainage patterns, soils, vegetation, surface water bodies, and steep or unstable slopes should be noted. A hydrology report, soils report, and a grading/drainage plan should be prepared

Physical conditions at the site will change as construction progresses. The SWPPP must be amended to address conditions as activities change at the site.

The hydrology reports should assess information such as drainage areas and patterns, rainfall information and expected run-on and runoff volumes and flow rates, etc. A soil report will identify soil constraints, design criteria, and soil stability. Both of these reports are used in the preparation of the preliminary grading and drainage plan. The grading and drainage plan should identify areas of cut and fill, slope during and after grading, protection of existing vegetation, and areas of soil disturbance. They also form the technical basis for selection of erosion and sediment control BMPs.

SITE HISTORY

Existing site characteristics such as vegetation, environmental features, and areas of historic contamination (natural and/or industrial or agricultural) should also be recorded on the project layout. Soil laboratory analysis may be required should prior contamination be suspected. The selection and implementation of construction BMPs will be affected by what existing features need to be protected or mitigated during construction.

IDENTIFY AND SELECT BMPS

The owner, the owner's design consultant, or the contractor, may select BMPs at the discretion of the owner. The contract between the owner and contractor should specify the responsibilities of the owner and contractor with regards to stormwater pollution control during construction. Owners must be aware that regardless of the contractual agreement between the owner and contractor with respect to BMP selection and SWPPP implementation, the owner is ultimately responsible for compliance with the General Permit.

A guide to selecting BMPs for construction activities is presented in the following sections.

BMPs are generally selected in a three-step process:

- Define BMP Objectives
- Identify BMP category
- Select appropriate BMPs

DEFINE BMPS OBJECTIVES

Selection and implementation of BMPs is based on the pollution risks associated with the construction activity. The pollution prevention objectives of BMPs are defined based on a review of information gathered during the assessment of the site and planned activities. Once defined, BMP objectives are developed and BMPs selected. The BMP objectives for construction projects are as follows:

CONTROL OF EROSION, AND DISCHARGE OF SEDIMENT:

Minimize Disturbed Areas: Only clear land which will be actively under construction in the near term (e.g., within the next 6-12 months), minimize new land disturbance during the rainy season, and avoid clearing and disturbing sensitive areas (e.g., steep slopes and natural watercourses) and other areas where site improvements will not be constructed.

Stabilize Disturbed Areas: Provide temporary stabilization of disturbed soils whenever active construction is not occurring on a portion of the site. Provide permanent stabilization during finish grade and landscape the site.

Protect Slopes and Channels: Safely convey runoff from the top of the slope and stabilize disturbed slopes as quickly as possible. Avoid disturbing natural channels. Stabilize temporary and permanent

channel crossings as quickly as possible and ensure that increases in runoff velocity caused by the project do not erode the channel.

Control Site Perimeter: Delineate site perimeter to prevent disturbing areas outside the project limits. Divert upstream run-on safely around or through the construction project. Local codes usually state that such diversions must not cause downstream property damage, or be diverted into another watershed. Runoff from the project site should be free of excessive sediment and other constituents. Control tracking at points of ingress to and egress from the project site.

Retain Sediment: Retain sediment-laden waters from disturbed, active areas within the site.

MANAGE NON-STORMWATER DISCHARGES AND MATERIALS:

Practice Good Housekeeping: Perform activities in a manner to keep potential pollutants from coming into contact with stormwater or being transported off site to eliminate or avoid exposure.

Contain Materials and Wastes: Store construction, building, and waste materials in designated areas, protected from rainfall and contact with stormwater runoff. Dispose of all construction waste in designated areas, and keep stormwater from flowing onto or off of these areas. Prevent spills and clean up spilled materials.

IDENTIFY BMP CATEGORIES

Once the BMP objectives are defined, identify the category of BMP best suited to meet each objective. The particular BMP selected from each category depends on specific site conditions, construction activities, and cost considerations.

There are six BMP categories available for selection. They are:

- Erosion Control (EC)
- Sediment Control (SE)
- Wind Erosion Control (WE)
- Tracking Control (TR)
- Non Stormwater Management (NS)
- Waste Management and Materials Pollution Control (WM)

BMPs for contractor activities are listed in the TR, NS, and WM categories. BMPs for erosion and sediment control are listed in the EC, SE, WE, and TR categories.

SELECT BMPS

BMPs for Erosion and Sediment Control

BMPs for erosion and sediment control are selected to meet the BMP objectives based on specific site conditions, construction activities, and cost. Various BMPs may be needed at different times during construction since activities are constantly changing site conditions.

Selection of erosion control BMPs should be based on minimizing disturbed areas, stabilizing disturbed areas, and protecting slopes and channels. Selection of sediment control BMPs should be based on retaining sediment on-site and controlling the site perimeter. Erosion and sediment control BMPs are listed in the EC, SE, WE, and TC categories.

BMPs for Contractor Activities

Certain contractor activities may cause pollution if not properly managed. BMPs should be selected based on the contractor activities information collected in the SWPPP. The materials and BMP objectives for contractor activities are practicing good housekeeping and containing materials and waste. BMPs for contractor activities are selected from the TR, NS and WM categories.

CONSIDERATIONS FOR SELECTING A BMP

Is it expected to rain? Selection of a BMP is different for the rainy season versus the dry season. What activities can be postponed or re-scheduled until after the rains or performed during the dry season?

How much water is being used? The more water used and wastewater generated, the more likely that pollutants transported by this water will reach the drainage system or be transported off site

What are the site conditions? BMPs may differ depending on whether the activity is conducted on a slope or flat ground near a drainage structure or watercourse. Conducting activities away from certain sensitive areas will reduce the cost and inconvenience of implementing BMPs

What about accidents? Controls for common activities should be established, and preparations should be made to allow for quick response to accidents or spills. In the event of a spill or exposure of construction compounds, what are the contingency plans for sampling the contaminated stormwater? Can the analysis be done in the field or should laboratory analysis be required? Are sample bottles available on-site, appropriate test strips, etc.?

SWPPP PREPARATION

The General Permit requires that the owner prepare a SWPPP for projects that will create one acre or more of soil disturbance. The General Permit also requires that the SWPPP applies to all areas that are directly related to the construction activity, including but not limited to staging areas, storage yards, material borrow areas, and access roads, etc. In some cases, the owner may enter into agreements with the contractor or stormwater quality professionals for preparation and implementation of the SWPPP.

However, owners must be aware that regardless of the contractual agreement between the owner and contractor with respect to BMP selections and SWPPP implementation, the owner is ultimately responsible for compliance with the General Permit. It is highly recommended that the owner and contractor jointly review the SWPPP during its development or during a pre-construction conference.

- The SWPPP is a document that addresses water pollution control during construction
- The SWPPP must be prepared and available on the project site before the project owner, developer, or contractor begins any activity with the potential to cause water pollution. The SWPPP must be available on site at all times and must be implemented year-round throughout the duration of the construction project
- The SWPPP must be completed before any construction activity starts. No construction activity having the potential to cause water pollution shall be performed until the SWPPP has been completed, certified, and appropriate BMPs have been implemented. Construction activities that will not threaten water quality, such as traffic control, may proceed without a complete SWPPP if allowed by the local agency
- The SWPPP should be directed at personnel on the construction project (e.g., supervisor, foreman, and inspectors). The SWPPP should provide specific guidance on actions to be taken by these personnel and should be presented in a format that accommodates day-to-day use (e.g., loose leaf, pullout sections, and checklists)
- The SWPPP should provide a simple narrative and diagram that locates the construction site, identifies potential pollutant sources on site, and shows the location of the BMPs to be used to minimize erosion and sedimentation during construction. It should also describe measures which eliminate or reduce pollution of stormwater runoff by any chemicals and materials used during the construction process. The level of detail will vary with the intensity, size, and type of construction

SWPPP IMPLEMENTATION: STAFF TRAINING

Training is imperative to the success of the BMPs identified in the SWPPP. Adequate training is required if these BMPs are to be installed and maintained properly. These BMPs will fail if not properly installed and maintained. Thus, only trained personnel should be assigned these responsibilities. A construction stormwater pollution prevention training program should be held for all construction personnel.

A good program will include:

- SWPPP Preparation Training. This training is geared towards owners, engineers, contractors, and water quality professionals involved in preparation and certification of SWPPPs. The training must cover all aspects of construction site water pollution control, including, SWPPP documentation and BMP selection
- SWPPP Implementation Training. This training is geared towards owners, contractors, superintendents, foremen, and key staff designated in the SWPPP as being responsible for certifications, inspections, monitoring, and project oversight

- The first training element must familiarize the individuals with the content and organization of the SWPPP, pollution control objectives, and responsibilities for pollution control, BMPs, inspection procedures, and monitoring procedures. The second training element must focus on the SWPPP for the particular project site for which the individual is responsible, including site-specific responsibilities, BMPs, and other measures
- BMP Implementation Training. This training is geared towards owners, contractors, superintendents, foremen, tradesmen, laborers, and for other staff that work on the construction site including subcontractors. The training should cover responsibilities for BMP implementation, how to implement BMPs, general good housekeeping, and protection of BMPs in place

Construction water pollution control training typically includes off-site and on-site training. Off- site training is most appropriate for SWPPP Preparation training with instruction provided by trade associations, colleges, Regional Boards, County, or other water quality professionals. SWPPP Implementation training can be conducted through a combination of off-site training for the general subjects, and on-site training for a site specific SWPPP, with instruction provided by trade associations, colleges, Regional Boards, Counties, water quality professionals, and experienced owner and contractor superintendents. BMP implementation training is usually conducted on the project site with instruction provided by experienced owner and contractors' superintendents and foremen.

Subcontractor employees can impact water quality and potentially jeopardize compliance with the General Permit, thus subcontractor staff must also receive appropriate training. The owner may wish to contractually require that subcontractors employ trained staff.

SITE INSPECTIONS

The General Permit requires inspections before and after a storm event, and once each 24-hour period during extended storm events, to identify BMP effectiveness and implement repairs or BMP changes as soon as feasible. At the onset of a construction project (e.g., clearing, grubbing, or earth movement) it may be more appropriate to perform inspection of the BMPs on a regular basis instead of just before and after a storm. This will allow sufficient time for any corrections or improvements to be made before the storm. An inspector should be identified in the SWPPP. Inspection can usually be performed as part of a regular oversight and inspection of the project site.

According to the General Permit, a tracking or follow-up procedure must follow an inspection that identifies deficiencies in the BMPs. The result of the inspection and assessment must be written. Include the date of the inspection, weather information, the person(s) who performed the inspection, observations, and descriptions of inadequate BMPs, and the corrective actions that were taken, such as BMPs that were fixed or additional BMPs that were implemented. Inspection records must be retained for three years from the date they were generated. It is highly recommended that records be retained for at least three years following the date coverage is terminated under the General Permit; even longer retention of records is recommended where sites have been subject to enforcement actions or are involved in litigation regarding issues covered by the permit.

BMP MONITORING

The type of BMP monitoring depends on which BMP is implemented. In the case of contractor activity BMPs, the monitoring consists of visual inspection to ensure that the BMP was implemented and maintained according to the SWPPP.

Such inspection would include:

- Looking for evidence of spills and resulting clean-up procedures (e.g., supplies of spill cleanup materials)
- Verifying adequacy of trash receptacles
- Verifying waste disposal practices (e.g., recycle vs. hazardous waste bins)
- Examining integrity and use of containment structures
- Verifying use of employee education programs for the various activities
- Noting the location of activity (e.g., outdoor vs. indoor, concrete vs. grass)
- BMPs for any chemicals or fuels not addressed in the SWPPP must be developed

In the case of erosion and sediment control BMPs, the monitoring program should consist of regular inspection to determine the following:

Are erosion and sediment control BMPs installed properly? The SWPPP BMPs should include details or references to allow for the proper construction of structural or vegetative erosion and sediment control devices. The inspector should ensure that these systems are installed according to the SWPPP in the proper locations

Are the BMPs effective? The effectiveness of the BMP would be based on the presence of sediment behind or within control devices, the presence of sediment downstream of the site, and signs of erosion in stabilized areas after a storm event

Have drainage patterns changed? If the site has undergone significant grading operations, resulting in a change of drainage patterns, adjustment to the BMPs will likely be required to address this change. The inspector shall determine the extent of changes to the drainage pattern and the necessity for additional or reconfigured BMPs

Are areas stabilized as quickly as possible after completion of construction activities in an area? Disturbed active and inactive construction areas (inactive construction areas may be defined as areas in which no construction activity will occur for a period of 30 days or longer) should be stabilized as soon as practical. If construction, climatological, or other site conditions do not allow stabilization, the SWPPP should define alternative approaches

Are the BMPs properly maintained? Maintenance of erosion and sediment control BMPs is critical. Erosion controls should be installed as soon as practical after an area becomes inactive, and before the onset of rain. The capacity of sediment controls must be restored prior to the next rain event

BMP MAINTENANCE

The inspector should inspect the site on a regular basis, during and after any storm generating runoff to determine maintenance requirements and general condition of the installed system. The local agency may also inspect the site on a routine basis to assess the maintenance performed on the systems. All maintenance related to a storm event should be completed within 48 hours of the storm event. The following maintenance tasks should be performed on a regular basis:

- Removal of sediment from barriers and sedimentation devices
- Replacement or repair of worn or damaged silt fence fabrics
- Replacement or repair of damaged structural controls
- Repair of damaged soil stabilization measures.
- Other control maintenance as defined in each BMP fact sheet.

STORMWATER POLLUTION CONTROL DOCUMENTATION

Records of inspections, compliance certifications, and non-compliance reporting are to be retained for at least three years by the owner. It is suggested that records of incidents such as spills or other releases be kept. Analyzing a history of this information can provide insight into modifying the BMPs. Photographs should also be kept.

Keep a record of maintenance activities or any other BMPs that are of an action nature. Activity based BMPs such as Good Housekeeping must be documented in each inspection; often, this documentation is the only evidence that the BMPs have been implemented.

EROSION CONTROL

Scheduling EC-1

Developing a written plan sequencing construction activities and other BMPs while considering the local climate to reduce the amount and duration of exposed soil through activities such as vehicle use.

Preservation of Existing Vegetation EC-2

Carefully planned preservation of existing vegetation such as trees, vines, shrubs and grasses to protect the soil from erosion.

Hydraulic Mulch EC-3

Applying a mixture of shredded wood fiber or a hydraulic matrix, and a stabilizing emulsion or tackifier with hydro-mulching equipment, which temporarily protects exposed soil from rain or wind.

Hydroseeding EC-4

Applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, to temporarily protect exposed soils from erosion by water and wind.

Soil Binders EC-5

Applying and maintaining a soil stabilizer to exposed soil surfaces to temporarily prevent water and wind erosion of exposed soils on construction sites.

Straw Mulch EC-6

Placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a tackifier stabilizing emulsion. Straw mulch protects the soil surface from the impact of raindrops, preventing soil particles from becoming dislodged.

Geotextiles and Mats EC-7

Mattings of natural materials are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Matting may be used to stabilize soils until vegetation is established.

Wood Mulching EC-8

Applying a mixture of shredded wood mulch, bark, or compost to disturbed soils. The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Earth Dikes and Drainage Swales EC-9

A temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Velocity Dissipation Devices EC-10

Rock, grouted riprap, or concrete rubble, which placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

Slope Drains EC-11

A pipe that directs surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with earth dikes and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Streambank Stabilization EC-12

Stream channels, stream banks, and associated riparian areas are dynamic and sensitive ecosystems that respond to changes in land use activity. Stream bank and channel disturbance resulting from construction activities can increase the stream’s sediment load, which can cause channel erosion or sedimentation and have adverse effects on the biotic system. BMPs can reduce the discharge of sediment and other pollutants to minimize the impact of construction activities on watercourses. Streams may require numerous measures to prevent any increases in sediment load to the stream.

Polyacrylamide EC-13

Polyacrylamide (PAM) can be applied to disturbed soils at construction sites to reduce erosion and improve settling of suspended sediment.

PAM increases the soil's available pore volume, increasing infiltration and reducing the quantity of stormwater runoff that can cause erosion. Suspended sediments from PAM treated soils exhibit increased flocculation over untreated soils. The increased flocculation aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

SEDIMENT CONTROL

Sediment control uses passive systems to filter or settle already detached soil particles out of the water or wind.

These BMPs intercept and slow or detain the flow of stormwater so sediment can settle and be trapped.

Sediment control practices can consist of installing linear sediment barriers (such as silt fence, sandbag barrier, and straw bale barrier); providing fiber rolls, gravel bag berms, or check dams to break up slope length or flow; or constructing a sediment trap or sediment basin. Linear sediment barriers are typically placed below the toe of exposed and erodible slopes, down-slope of exposed soil areas, around soil stockpiles, and at other appropriate locations along the site perimeter.

A few BMPs may control both sediment and erosion, for example, fiber rolls and sand bag barriers. These BMPs are either erosion control (EC) or sediment control (SC) based on the BMPs most common and effective use.

Sediment control BMPs are most effective when used in conjunction with erosion control BMPs. The combination of erosion control and sediment control is usually the most effective means to prevent sediment from leaving the project site and potentially entering storm drains or receiving waters.

Under limited circumstances, sediment control, alone may be appropriate. For example, applying erosion control BMPs to an area where excavation, filling, compaction, or grading is currently under way may not be feasible when storms come unexpectedly. Using sediment controls to establish a perimeter controls may be appropriate provided the following conditions are met:

- Weather monitoring is under way
- Inactive soil-disturbed areas have been protected with an effective combination of erosion and sediment controls
- An adequate supply of sediment control materials is stored on-site and there are sufficient forces of labor and equipment available to implement sediment controls on the active area prior to the onset of rain
- A Stormwater Pollution Prevention Plan (SWPPP) adequately describes the methods to protect active areas

Silt Fence SE-1

A filter fabric that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Sediment Basin SE-2

A temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged.

Sediment Trap SE-3

A containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Check Dams SE-4

A small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or reusable products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing the velocity of flowing water, allowing sediment to settle and reducing erosion.

Fiber Rolls SE-5

Straw, flax, or other similar materials bound into a tight tubular roll. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Gravel Bag Berm SE-6

A series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flows, preventing erosion.

Street Sweeping and Vacuuming SE-7

Self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Sandbag Barrier SE-8

A series of sand-filled bags placed on a level contour to intercept sheet flows. Sandbag barriers pond sheet flow runoff, allowing sediment to settle out.

Straw Bale Barrier SE-9

A series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers can pond sheet runoff, which allows sediment to settle out.

Storm Drain Inlet Protection SE-10

A sediment filter or an impounding area around or upstream of a storm drain, drop inlet, or curb inlet. Storm drains inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction.

Chemical Treatment SE-11

The application of chemicals to stormwater to aid in the reduction of turbidity caused by fine suspended sediment.

WIND EROSION CONTROL

Applying water or other dust palliatives to prevent or alleviate dust nuisance. In addition to the following Wind Erosion Control WE-1, the following erosion controls also control wind erosion.

- Preservation of existing vegetation EC-2
- Hydraulic Mulch EC-3
- Hydroseeding EC-4
- Soil Binders EC-5
- Straw Mulch EC-6
- Geotextiles and Mats EC-7

Wind Erosion Control WE-1

Wind erosion or dust control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

TRACKING CONTROL

Preventing or reducing the tracking of sediment off-site by vehicles leaving the construction area. Dirty streets and roads near a construction site create a public nuisance.

Stabilized Construction Entrance/Exit TC-1

A point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Stabilized Construction Roadway TC-2

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion, and control dust.

Entrance/Outlet Tire Wash TC-3

An area located at stabilized construction access points to remove sediment from tires and under carriages and to prevent sediment from being transported onto public roadways.

NON-STORMWATER MANAGEMENT

Only stormwater and authorized non-stormwater discharges should be discharge from the construction site. Necessary non-stormwater discharges include: irrigating vegetative control measures, pipe flushing and testing, and street cleaning.

Non-stormwater BMPs are source controls that prevent pollution by limiting or reducing potential pollutants at their source or eliminating off-site discharge. They also minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning, fueling, and maintenance operations to stormwater drainage systems or watercourses.

These BMPs will be implemented according to the conditions and applicability.

Water Conservation Practices NS-1

Activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

- Keep water equipment in good working condition
- Stabilize water truck filling area
- Repair water leaks promptly
- Washing of vehicles and equipment on the construction site is discouraged
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required
- Direct construction water runoff to areas where it can soak into the ground or be collected and reused
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs
- Lock water tank valves to prevent unauthorized use

Dewatering Operations NS-2

Managing the discharge of pollutants when non- stormwater and accumulated precipitation must be removed from a work location so that construction work may be accomplished.

- Sediment Basin (See also SE-2). A temporary basin with a controlled release structure that is formed by excavation or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment basins are generally larger than Sediment Traps (SE-3).
- Sediment Trap (See also SE-3). A temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment traps are generally smaller than Sediment Basins (SE-2).
- Weir Tanks. Separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

- Dewatering Tanks. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.
- Gravity Bag Filter. Also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects sand, silt, and fines.
- Sand Media Particulate Filter. Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed using other methods.
- Pressurized Bag Filter. A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Vendors provide bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.
- Cartridge Filter. Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

Paving and Grinding Operations NS-3

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent run-on and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

Temporary Stream Crossing NS-4

A temporary stream crossing is a temporary culvert, ford or bridge placed across a waterway to provide access for construction purposes for a period of less than one year. Temporary access crossings are not intended to maintain traffic for the public. The temporary access will eliminate erosion and downstream sedimentation caused by vehicles.

Clear Water Diversion NS-5

Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a project, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the construction of the diversion.

Clear water diversions are used in a waterway to enclose a construction area and reduce sediment pollution from construction work occurring in or adjacent to water. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, aqua barriers, cofferdams, filter fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes.

- Filter Fabric Isolation Technique. A filter fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. This structure is composed of filter fabric, gravel bags, and steel t-posts.

- Turbidity Curtain Isolation Technique. A turbidity curtain is a fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out.
- K-Rail River Isolation. This temporary sediment control or stream isolation method uses K-rails to form the sediment deposition area, or to isolate the in-stream or near-bank construction area. Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.
- Stream Diversions. The selection of which stream diversion technique to use – pumped diversion, excavated channels and flumes - will depend upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.

Illicit Connection/Discharge NS-6

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Potable Water/Irrigation NS-7

Potable Water/Irrigation consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Vehicle and Equipment Cleaning NS-8

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Vehicle and Equipment Fueling NS-9

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Vehicle and Equipment Maintenance NS-10

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a “dry and clean site”. The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Pile Driving Operations NS-11

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of precast concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce or eliminate the discharge of potential pollutants to the storm drain system, watercourses, and waters of the United States.

Concrete Curing NS-12

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. Proper procedures reduce or eliminate the contamination of stormwater runoff during concrete curing.

Concrete Finishing NS-13

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

Material Over Water NS-14

The proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants to a watercourse.

Demolition Adjacent To Water NS-15

Protecting water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

Temporary Batch Plants NS-16

The construction of roads, bridges, retaining walls, and other large structures in remote areas, often requires temporary batch plant facilities to manufacture Portland Cement Concrete (PCC) or asphalt cement (AC). Temporary batch plant facilities typically consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; above ground storage tanks containing concrete additives and water; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout.

Proper control and use of equipment, materials, and waste products from temporary batch plant facilities will reduce the discharge of potential pollutants to the storm drain system or watercourses, reduce air emissions, and mitigate noise impacts.

WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Waste management and materials pollution control BMPs, like non-stormwater management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These BMPs also involve day-to-day operations of the construction site, are under the control of the contractor, and are additional “good housekeeping practices” which involve keeping a clean, orderly construction site.

Waste management consists of implementing procedural and structural BMPs for handling, storing, and disposing of generated waste including: solid, sanitary, concrete, hazardous, and equipment related waste.

Materials pollution control consists of implementing procedural and structural BMPs in the handling, storing, and the use of construction materials. The BMPs are intended to prevent the release of pollutants during stormwater and non-stormwater discharges.

The objective is to prevent or reduce the opportunity for contamination of stormwater runoff from construction materials by covering and/or providing secondary containment of storage areas, and by taking adequate precautions when handling materials. These controls must be implemented for all applicable activities, material usage, and site conditions.

Material Delivery and Storage WM-1

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in a designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Material Use WM-2

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Stockpile Management WM-3

Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called “cold mix” asphalt), and pressure treated wood.

Spill Preventions and Control WM-4

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

- Vehicle and Equipment Maintenance
  - If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills
  - Regularly inspect onsite vehicles and equipment for leaks and repair immediately
  - Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite
  - Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids
  - Place drip pans or absorbent materials under paving equipment when not in use
  - Use absorbent materials on small spills rather than hosing down or burying the spill
  - Remove the absorbent materials promptly and dispose of properly
  - Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
  - Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater
  - Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters
  - Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking
- Vehicle and Equipment Fueling
  - If fueling must occur, onsite, use designated areas, located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills
  - Discourage "topping off" of fuel tanks
  - Always use secondary containment, such as a drain pan, when fueling to catch spills/leaks

Solid Waste Management WM-5

Prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Hazardous Waste Management WM-6

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Contaminated Soil Management WM-7

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Concrete Waste Management WM-8

Prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, performing onsite washout in a designated area, and training employee and subcontractors.

Sanitary/Septic Waste Management WM-9

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Liquid Waste Management WM-10

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

SCOPE

To ensure the safety and health of our employees, this Company has developed a comprehensive emergency action plan to prepare for weather emergencies likely in its geographic location. This chapter includes information on weather conditions that may require special emergency planning and specific workplace training.

POLICY

This Company has developed this weather emergency policy plan to prepare for natural disasters likely in its geographic location. The policy provides information on the following weather conditions and the actions the Company and its employees will need to take in the event of their occurrence:

- Hurricanes and tropical storms
- Tornadoes
- Electrical storms

Other weather emergencies that may require planning include blizzards, dust storms, and flooding. This Company will consider the likelihood and potential severity of harm of adverse weather and implement appropriate procedures to ensure the safety and well-being of all employees.

HURRICANES AND TROPICAL STORMS

The best time to address emergency plans for tropical weather and ensure appropriate preparations are being made is before the hurricane season starts in late spring.

PREPAREDNESS

Risk Assessment

A business in a coastal area should know whether it is located in an evacuation zone or contingency zone. If a business owner is uncertain of the level of threat at a place of business, the local emergency management office and the National Weather Service can provide information to determine the workplace's vulnerability to strong winds and storm surges during a tropical weather event.

A business in the evacuation zone or contingency zone may need to be evacuated and should include as part of its emergency plans the specific evacuation routes and approximate travel times along those routes.

A number of other factors influence the risk a place of business faces as a hurricane approaches, including the building's elevation, quality of construction and state of repair.

HURRICANE PREPARATIONS

Employees

Preparation for tropical weather events (and all emergencies) should include updating the list of employees and their contact information and assigning specific duties to personnel in the event of a hurricane watch or warning. Keep in mind that employees may not be familiar with their hurricane preparation tasks, and may require training accordingly.

While employees will want to spend the time leading up to a significant weather event preparing their own families and homes, some staff will be needed to ready the workplace for an approaching storm.

Determining who is responsible for what and how the tasks will be completed is best done before the start of the hurricane season to ensure readiness when an actual storm is likely to impact business.

Facility and Equipment

If evacuation of the facility is likely, be sure appropriate preparations are made for the safety of the business's records, equipment and furniture. Preparations, depending on the outlook for the storm and the place of business, may include disconnecting power, securing equipment and storing items safely at a different location, perhaps offsite. Moving and securing equipment can be a cost- and labor-consuming process. Adequate planning helps ensure sufficient protection.

Each business has unique needs in this regard, and it is up to business owners and safety management to address these needs.

Another concern for hurricane preparation is collecting an appropriate stock of emergency supplies.

Consider including the following in a business' hurricane preparation kit:

- Non-perishable food (don't forget a can opener) and a gallon of water per person per day
- Flashlights and batteries
- Battery-powered or hand crank radio
- First aid kit
- Tools, lumber, sheeting, sandbags, etc. as needed to secure the facility
- Water cleanup supplies

It may be difficult to procure such supplies after a hurricane watch has been issued, so it is best to gather and restock the stockpile at the start of the hurricane season.

STORM CATEGORIZATION AND TROPICAL STORM ADVISORIES

The National Weather Service issues weather alerts to advise affected areas about approaching storms.

Hurricanes are assigned a category number based on their severity, shown in the table below.

SAFFIR-SIMPSON HURRICANE SCALE

Scale Number (Category)	Sustained Winds (MPH)	Damage
1	74-95	**Minimal**: Unanchored mobile homes, vegetation and signs.
2	96-110	**Moderate**: All mobile homes, roofs, small crafts, flooding
3	111-130	**Extensive**: Small buildings, low-lying roads cut off.
4	131-155	**Extreme**: Roofs destroyed, trees down, roads cut off, mobile homes destroyed. Beach homes flooded
5	>155	**Catastrophic**: Most buildings destroyed. Vegetation destroyed. Major roads cut off. Homes flooded.

Hurricane Watch

When the National Weather Service issues a hurricane watch for a coastal area, it means that tropical-storm-force winds are possible there within 48 hours.

As soon as a watch is issued, preliminary preparations should be made while monitoring the news for more information as it becomes available.

Make sure the hurricane supply stockpile is completely stocked, and begin securing and protecting equipment and data according to hurricane readiness plans as soon as possible. After a warning has been issued, or an evacuation order made, supplies and fuel may be difficult to come by in the affected area.

Hurricane Warning

A hurricane warning is issued 36 hours in advance of tropical-storm-force winds and indicates that the affected coastal area may expect hurricane conditions.

If your business is in an evacuation zone, evacuation should occur according to the recommendation of local officials. Evacuation for businesses in a contingency zone may also be called for in the event of a stronger storm. It is imperative to keep up to date with storm information as the storm progresses to ensure your response is appropriate to the threat.

While it is important to take the appropriate steps to secure objects, it is more important to ensure the safety of personnel. All preparations must be completed in time for employees to evacuate before storm conditions make evacuation routes impassable.

If an evacuation is not called for, wind/rain damage and utility loss is still a possibility. Be ready to follow appropriate emergency protocols and make necessary repairs as needed.

RESPONSE AND RECOVERY

Hurricane Landfall

During the storm, when evacuation isn't called for, employees should take shelter in interior rooms and hallways. Lower floors are safer, but basements may be subject to flooding. Some locations may not be suitable to provide workers shelter, and hurricane preparation plans must keep this in mind.

Monitor newscasts to respond appropriately as conditions change, and make sure everyone stays safely inside until dangerous conditions have passed.

Hurricane Aftermath

Returning to areas subject to evacuation may pose dangers and delays to drivers, as floods and high winds can leave roads in bad shape and officials may limit travel through the area for recovery efforts. Make sure to follow newscasts to hear official instructions.

When the worksite is reoccupied, it may be necessary to assess damage and identify hazardous situations that the storm may have caused.

Hazards that may be present include the following:

- Flooding
- Unsanitary water supply (use emergency water until officials give the okay to drink tap water)
- Structural damage and utility line breaks
- Hazardous wildlife
- Looting and similar crime

The emergency plan should include a process for handling the insurance Company after significant damage to facilities. Be sure to document storm damage thoroughly and wait until the adjuster has a chance to see damage before repairing it. Damages that create a hazard or subject the building to additional weather exposure, however, must be addressed to prevent further harm or damage.

TORNADOES

A tornado is a violently rotating column of air with circulation reaching the ground. They most often form from severe thunderstorms, beginning as a funnel cloud. On a local scale, it is the most destructive of all atmospheric phenomena. The wind in a tornado can reach speeds up to 300 miles per hour and can uproot trees, destroy buildings, and turn harmless objects into deadly missiles. Damage paths can be in excess of one mile wide and 50 miles long.

Just like hurricanes, tornadoes are assigned a Number based on their severity. The tornado scale, called the Fujita scale, is shown below.

FUJITA SCALE OF TORNADO INTENSITY

Scale	Wind Speed Range (MPH)
F0	< 72
F1	73-112
F2	113-157
F3	158-206
F4	207-260
F5	261-318

While tornadoes can occur at any time during the year, they are most likely to occur between the April and July. “Tornado Alley” spans across the middle of the United States, but storms that spin off tornados can occur anywhere depending on weather conditions.

Tornadoes strike suddenly, often with little warning. It is important to prepare before weather conditions spawn a twister.

PREPAREDNESS

Ask your local emergency management office or the American Red Cross chapter about the tornado threat in your area. Ask about community warning signals.

- Purchase a NOAA Weather Radio with a battery backup and tone-alert feature that automatically alerts you when a Watch or Warning is issued (tone alert not available in some areas). Purchase a battery-powered commercial radio and extra batteries as well
- Know the county or parish in which you live. Counties and parishes are used in Watches and Warnings to identify the location of tornadoes. Determine places to seek shelter, such as a basement or storm cellar
- If an underground shelter is not available, identify an interior room or hallway on the lowest floor
- Know the locations of designated shelters in places where you, your family and your fellow workers work or live such as public buildings, nursing homes and shopping centers. Practice going to your shelter with your fellow workers or family
- Ask local officials whether a registered engineer or architect has inspected public and private schools for shelter space
- Ask your local emergency manager or American Red Cross chapter if there are any public safe rooms or shelters nearby
- Assemble a disaster supplies kit. Keep a stock of food and extra drinking water
- Make a record of your personal property. Take photographs or videotapes of the exterior and interior of your home, including personal belongings. Store these documents in a safe place, such as a safe deposit box
- Tornadoes strike with some warning, but not usually enough for a full evacuation. Do your best to get to safety

- Tornadoes are typically accompanied by hail. Hail travels very fast, and a moderately sized hailstone can put out your eye or break your finger. Large hailstones have killed livestock and other large animals
- If you must go outside, wear your hard hat. It can protect your head from most hailstones. Downed hail presents a slipping hazard

Safe Room and Shelter

If you are concerned about wind hazards where you live, especially if you live in high-risk areas, you should consider building a shelter.

- Extreme windstorms in many parts of the country pose a serious threat to buildings and their occupants
- Your residence may be built to code, but that does not mean that it can withstand winds from extreme events like tornadoes
- The purpose of a wind shelter or safe room is to provide a space where you and your household can seek refuge that provides a high level of protection. You can build a shelter in your basement, beneath a concrete slab-on-grade foundation or garage floor, or in an interior room on the first floor
- Shelters built below ground level provide the greatest protection, but a shelter built in a first-floor interior room can also provide the necessary protection
- Belowground shelters must be designed to avoid accumulating water during the heavy rains that often accompany severe windstorms
- To protect its occupants, an in-house shelter must be built to withstand high winds and flying debris, even if the rest of the residence is severely damaged or destroyed
- The shelter must be adequately anchored to resist overturning and uplift
- The walls, ceiling, and door of the shelter must withstand wind pressure and resist penetration by windborne objects and falling debris
- The connections between all parts of the shelter must be strong enough to resist the wind
- If sections of either interior or exterior residence walls are used as walls of the shelter, they must be separated from the structure of the residence, so that damage to the residence will not cause damage to the shelter

TORNADO ADVISORIES AND RESPONSES

When a tornado weather advisory is issued, appropriate steps must be taken to make sure workers are safe should a tornado strike.

Tornado Watch

When the National Weather service issues a tornado watch, it means tornadoes are possible. Remain alert for approaching storms.

Communicate with your fellow workers. All information should be related to one another.

- Listen to NOAA Weather Radio, commercial radio, or television newscasts for the latest information
- Be alert for approaching storms. When you see any revolving funnel shaped clouds, report them immediately by telephone to your local police department or sheriff’s office

Danger signs of a possible tornado include:

- Dark, often greenish sky
- Large hail
- A large, dark, low-lying cloud (particularly if rotating)
- Loud roar, similar to a freight train

Some tornadoes are clearly visible, while rain or nearby low-hanging clouds obscure others.

- Occasionally, tornadoes develop so rapidly that little, if any, advance warning is possible
- Before a tornado hits, the wind may die down and the air may become very still
- A cloud of debris can mark the location of a tornado even if a funnel is not visible
- Tornadoes generally occur near the trailing edge of a thunderstorm. It is not uncommon to see clear, sunlit skies behind them
- Avoid places with wide-span roofs such as auditoriums, cafeterias, large hallways, supermarkets, or shopping malls
- Be prepared to take shelter immediately. Assemble supplies to take to the shelter such as a flashlight, battery powered radio, water, and first aid kit. Do not forget about pets and what they will need
- Determine where you would take shelter in case a Tornado Warning was issued. Storm cellars or basements provide the best protection. If underground shelter is not available seek shelter in an interior room or hallway on the lowest floor

Tornado Warning

When the National weather service issues a Tornado Warning, A tornado has been sighted or has been indicated by weather radar. Take shelter immediately.

When a tornado has been sighted, go to your shelter immediately.

- In a small building, move to a pre-designated shelter, such as a basement, storm cellar, or safe room
- If there is no basement, go to an interior room on the lower level (closets, interior hallways). Put as many walls as possible between you and the outside. Get under a sturdy table and use arms to protect head and neck. Stay there until the danger has passed
- Stay away from windows, doors, and outside walls. Go to the center of the room. Stay away from corners. Corners attract debris
- In a school, nursing home, hospital, factory, or shopping center, go to predetermined shelter areas
- Interior hallways on the lowest floor are usually safest. Stay away from windows and open spaces
- In a high-rise building, go to a small, interior room or hallway on the lowest floor possible
- Locations of exits, assembly points and equipment (first aid kits) should be clearly identified and mapped. Exit routes should be clearly marked and well lit, wide enough to accommodate the number of evacuating personnel, unobstructed, and clear of debris at all times
- Get out of vehicles, trailers and mobile homes immediately and go to the lowest floor of a sturdy nearby building or a storm shelter. Mobile homes, even if tied down, offer little protection from tornadoes

- If caught outside with no shelter, lie flat in a nearby ditch or depression, and cover your head with your hands. Be aware of the potential for flooding. Do not get under an overpass or bridge. You are safer in a low, flat location
- Never try to out drive a tornado in a car or truck. Tornadoes can change direction quickly and can lift up a car or truck and toss it through the air. Get out of the car immediately and take shelter in a nearby building or safe shelter. If there is no time to get indoors, get out of the car and lie in a ditch or low-lying area away from the vehicle. Remember, stay alert to the potential for flooding
- Tornadoes are erratic and move swiftly. Watch out for flying debris. Flying debris from tornadoes causes most fatalities and injuries

After Tornado

- Monitor weather reports for further developments
- Wait until dangerous weather advisories end to travel
- Shut off gas at the main switch. Keep your nose open to the smell of natural gas, and listen for a hissing noise. Use flashlights rather than candles if possible. Gas line breaks can be very dangerous
- Watch out for downed wires and potentially hazardous debris
- Photograph damage for insurance claims and repair damage that would allow further wear, leave other damage for investigation by insurance adjusters
- Stay off the telephone except for emergencies
- Provide first aid as needed if you are sufficiently trained. Summon emergency help as appropriate

LIGHTNING HAZARDS

The most immediately dangerous hazard faced by workers during a lightning storm is the passing of the electrical current from a lightning bolt through the worker's body. Burns and cardiopulmonary arrest (heart and lungs stopping) as a result of a lightning strike can be deadly.

Direct Strike

When a cloud–to-ground strike hits a worker directly (or an item they are holding), it often results in cardiac arrest and unconsciousness or death. A direct strike typically happens when the victim is on open ground. The current moving over the skin can cause burns, but the flow of the current through the body causes the most damage, disrupting cardiovascular and nervous system function.

Sideflash

When lightning strikes a taller object near the victim, the taller object will conduct most of the current, but some of the energy is discharged through the worker as well. Sideflashes are most likely to occur when a person takes shelter from precipitation under a tree.

Step Voltage

When lightning strikes a tall object, the flow of electrical energy is dispersed out from the site of the strike. If a worker is near enough to the location of the strike, the ground current flows between the points of contact the person's body makes with the ground. The wider the distance between these points, the more damage a lightning strike will do to the victim. Most injuries and deaths from lightning occur because of ground current.

30-30 for Lightning Safety

- **30 seconds:** Measure the seconds between seeing lightning and hearing thunder. 30 seconds or less means to seek shelter immediately.

30 Minutes: Wait an entire half-hour after the last visible lightning strike or audible thunderclap before leaving the shelter. Most lightning deaths occur after the storm has seemingly passed

Conducted Current

Metal provides a path for the electrical current in a lightning strike to easily flow. Conduction injuries cause most indoor lightning injuries. During an electrical storm, workers must avoid touching metal items or objects connected to metal items to prevent injury from conducted current. Cables, cords, plumbing and fences all conduct the electricity from lightning and should be avoided during an electrical storm.

Streamer

Streamers from the ground rise through objects and the atmosphere to meet leaders and equalize the charge between the ground and clouds. Even when these streamers fail to connect with the leader, the current can cause significant harm.

Secondary Effects

In addition to lightning striking individuals, electrical storms cause damage that otherwise pose hazards to workers.

Fires

Fires can result from lightning strikes in one of two ways. The heat from a lightning bolt can ignite combustible matter at the site of the lightning strike. Further, electrical fires can ignite along circuits and flammable or combustible materials in containers can ignite causing explosive blazes. Response to fires caused by a lightning strike depends on the location and general nature of the fire. Consult the fire prevention plan and the emergency action plan for more information on appropriate emergency response to such a fire.

Fallen Branches

When a tree is struck by lightning, damaged branches can collapse and crush anything below. Fallen tree branches can also block roadways and break electric wires.

Fallen Power Lines

Report fallen power lines immediately to the local utility Company or emergency responders. Workers should never attempt to touch or move fallen electric wires unless it is an explicit part of their job and appropriate steps have been taken to ensure the line is not energized. If an electric wire falls on a vehicle, it is best to drive the vehicle away, or wait until the line is moved if driving away is not possible.

Equipment Damage

Lightning can cause power surges that can damage equipment or cause harm to employees. The best way to prevent potentially dangerous surges is to prevent them with proper circuit design and protecting equipment. Equipment must be grounded and bonded appropriately and any facility where workers will be present must be wired according to applicable standards and regulations.

CONTROLS

Storm Preparedness

An important step in avoiding harm from lightning strikes is to be prepared for an electrical storm before one approaches the worksite.

Weather Monitoring

It is the responsibility of the safety coordinator of this Company to ensure monitoring of the weather in preparation for any expected outdoor work activity. Employees will receive a weather report as part of a daily worksite safety analysis before any work outdoors. This report will include a reminder of expected response to lightning whenever there is a thunderstorm watch issued by the local weather service, or there is a possibility that employees will encounter an electrical storm during the workday.

All weather service warnings and watches, and the recommendations of the weather service will be conveyed to workers as soon as practicable and followed.

Shelter Provision

It is the policy of this Company to provide access to adequate shelter for workers whenever possible in the event of potentially harmful weather. A safe building must have a roof, walls and floor.

If employees must work at a remote site where a quick-moving storm may prevent workers from reaching ideal shelter, there must be sufficient room in a fully enclosed vehicle for all workers at the site. It is important that workers note the distance between the worksite and shelter so that there is a clear understanding of how long it will take to reach the shelter versus the speed of a storm’s approach.

Detecting and Predicting Electrical Storms

Knowing where a storm is and its approximate rate of approach, helps determine when outdoor work needs to cease so workers can seek shelter.

Storm Detector

This Company may use a storm detector at worksites, especially remote ones, to detect an incoming storm. These devices detect severe weather activity many miles away, approximate its distance fairly accurately and precisely, and warn the user of its approach.

Flash to Bang Method

A method to approximate the distance to a lightning strike that requires no equipment involves counting the seconds between the strike and the sound of the thunder that accompanies it. After witnessing a lightning strike, count the seconds until the thunder reaches the worksite.

It takes sound about 5 seconds to travel a mile.

Subsequent counts can help workers and/or supervisors have a better understanding of the storm's speed of approach.

Clouds

Dark threatening clouds — especially where meteorological prediction models point to a likely electrical storm — indicate an approaching hazard. Ominous clouds are a good indicator that workers need to wrap up the job they are doing and begin moving toward shelter as soon as safely possible.

RESPONDING TO LIGHTNING

It is always best to err on the side of caution in matters of safety. It is advisable to begin moving to shelter upon auditory detection of thunder. If you can hear an electrical storm, you are close enough to be struck by its lightning. Avoid all bodies of water when an electrical storm approaches.

Suspending Activity

All outdoor work must cease when an electrical storm moves within six miles of the worksite. If a storm detector is in use, this limit can be expanded significantly. Work must also be suspended when the weather service issues a storm warning for the work location. Upon notification of work cessation for severe weather, employees will seek shelter as soon as safely possible.

Taking Shelter

Buildings

Enclosed buildings are the safest place to be during an electrical storm. Employees must take shelter in a building whenever one can be reached safely. It is safest to unplug or turn off electrical appliances and avoid corded equipment and plumbing fixtures. Any object in contact with pipes (plumbing or gas) and cables (especially electrical, but also communications) can conduct electricity and poses a hazard during an electrical storm. Stay away from windows and doors as much as possible until the danger of a lightning strike passes.

Cars

If employees cannot reach a safe building during an electrical storm, the next best solution is to take shelter in an enclosed car. A convertible car or open cab of heavy equipment does not provide protection from lightning. Employees must ensure all the windows are rolled up and avoid touching the doors or metal in the interior until the storm has passed.

Shelterless Response

If it is impossible for an employee to reach the shelter of an enclosed building or vehicle, he or she should take the following precautions to ensure safety:

- Stay off and away from tall things, especially solitary tall things surrounded by flat terrain; avoid being the highest point in an open field
- Get off and away from vehicles or machinery that are not enclosed
- Avoid standing in groups
- Avoid conductors like metal fences, rails, poles, etc.
- Put down any item that may conduct electricity
- Move to low ground like a ditch or a gully if one is near (but not one with water)
- Get to land if on water and avoid streams or lakes
- Avoid any flammable, explosive or combustible materials

If you feel tingles or your hair stand on end, or otherwise fear you are in immediate danger of being struck by lightning, take the following steps to reduce harm from a potential strike:

- If possible, find some kind of insulating material upon which you can crouch (e.g. a coil of rope, plank of wood, sleeping bag, woolen shirt)
- Remove metal objects or objects that contain metal that may touch your skin (including a baseball cap)
- Squat down as low as possible on the balls of your feet
- Place your hands over your ears or on the back of your neck, with your head between your knees
- Make yourself as small and low as possible and do your best to keep your heels off the ground and together

DO NOT LIE DOWN FLAT ON THE GROUND.

Responding to a Coworker Being Struck by Lightning

In addition to the measure of current moving through the victim, the speed of medical response after being struck determines the likelihood of the victim surviving a strike. Call for emergency responders immediately.

A lightning victim does not carry an electrical charge and can be safely touched. First aid should be rendered as quickly as possible. Common injuries that result from a lightning strike include burns, wounds and fractures.

Check breathing and pulse if the victim has lost consciousness, begin CPR according to your level of training. Check for broken bones and cover burns with a dry sterile dressing, there may be two areas burned by where the lightning entered and exited the body.

Even if a lightning strike victim seems unhurt, they should receive medical attention promptly. When there are multiple victims, treat those who are unconscious first.

Do not render first aid beyond your level of training.

Resuming Activity

Work activities may not resume until the designated supervisor determines it is safe from severe weather.

All workers must wait 30 minutes from hearing the last thunderclap or wait for the end of a weather-service issued warning before leaving shelter from an electrical storm to return to work.

SCOPE

This chapter provides the safe practices and requirements for performing welding, cutting and brazing, also known as hotwork. Our safe practices will comply with OSHA regulations 1910.254 and/or 1926.350, whichever is applicable. This chapter does not include information about the installation and/or maintenance of gas distribution piping and manifold systems.

POLICY

We are committed to preserving the safety of employees and maintaining a place of employment free from recognized hazards. Accordingly, only properly trained employees, authorized to perform such operations may perform welding, cutting, brazing, grinding and other hotwork. If it is impossible to eliminate fire hazards from such work, appropriate control steps will be taken to ensure the safety of workers, including engineering and administrative controls and personal protective equipment.

This welding, cutting and brazing program is designed to protect life and property from fire, atmospheric contaminants and other associated hazards during these operations, and will be enforced rigorously.

EMPLOYER RESPONSIBILITIES

It is our responsibility to:

- Ensure the safe use of cutting and welding equipment on site, including the use of required PPE
- Establish areas for cutting and welding and establish procedures based on the fire potentials of facilities
- Designate a person to authorize cutting and welding operations if they are done outside of designated areas
- Ensure that cutters, welders and their supervisors are trained to operate their equipment according to safe processes; rules and instructions covering the operation and maintenance of oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems, must also be readily available
- Inform contractors of fire hazards

SUPERVISOR RESPONSIBILITIES

Supervisors of employees who must perform welding are expected to:

- Be responsible for the safe handling and use of equipment to cut or weld
- Determine fire hazards and combustibles that are or may arise at the work location
- Prevent ignition of combustibles by the following:
    - Move work away from combustibles or install guards to prevent fire hazards
    - Ensuring cutting or welding work is done at a time when nearby operations will not expose combustibles to ignition from such work
    - Secure authorization from management before any cutting or welding is begun

- Ensure the cutter or welder does not go ahead without approval of safe conditions;
- Determine that fire protection and extinguishing equipment are located at the site
- Ensure the availability of a fire watch as required

EMPLOYEE RESPONSIBILITIES

Employees who, as part of their work responsibilities engage in welding, brazing, cutting, grinding or any other activity that can produce spark, heat or atmospheric toxicants are expected to:

- Perform only job activities for which they are trained and competent
- Perform hotwork in designated, appropriately ventilated areas unless authorized otherwise
- Refrain from welding or other hotwork without appropriate authorization
- Refrain from tampering with safety devices
- Follow all other safe work practices as outlined in this policy

HAZARDS

The hazards associated with welding cutting and brazing include:

- Fire
- Burns
- Vision Hazards
- Respiratory hazards
- Falls (if working at heights)

PERSONAL PROTECTIVE EQUIPMENT

Employers must provide all of the following to protect employees from injuries likely to be caused by the assigned task of welding, cutting and hotwork (more specific information is provided later in this document):

- Face and eye protection, such as safety glasses or face shields
- Foot protection
- Additional necessary clothing or equipment, such as gloves, aprons, hearing protection devices, respirators, lifelines, safety belts, lanyards, and curtains
- Ventilation, where necessary to protect an employee against toxic materials
- Except for long-sleeve shirts required to protect the employee from ultraviolet rays to the arms, and ankle length trousers, clothing and equipment will be provided without expense to employees

Effective safeguards will protect workers on platforms, scaffolds or other spaces that present a falling hazard. Welding cable and equipment will remain clear of passageways, ladders and stairways to ensure safe travel.

After welding operations are completed, the welder will mark the hot metal or provide some other means of warning other workers.

Eye Protection

Welders must use helmets or hand shields during all arc welding or arc cutting operations, excluding submerged arc welding. The Company also will provide helpers or attendants with proper eye protection.

Goggles or other suitable eye protection must be worn during all gas welding or oxygen cutting operations. Employees may use spectacles without side shields, with suitable filter lenses during gas welding operations on light work, for torch brazing or for inspection.

All operators and attendants of resistance welding or resistance brazing equipment must use transparent face shields or goggles, depending on the particular job, to protect their faces or eyes, as required. The Company will provide eye protection in the form of suitable goggles where needed for brazing operations other than arc welding and brazing, or resistance welding or brazing.

Welders must use helmets or hand shields during all arc welding or arc cutting operations, excluding submerged arc welding. The Company also will provide helpers or attendants with proper eye protection.

Goggles or other suitable eye protection must be worn during all gas welding or oxygen cutting operations. Employees may use spectacles without side shields, with suitable filter lenses during gas welding operations on light work, for torch brazing or for inspection.

All operators and attendants of resistance welding or resistance brazing equipment must use transparent face shields or goggles, depending on the particular job, to protect their faces or eyes, as required.

The Company will provide eye protection in the form of suitable goggles where needed for brazing operations other than arc welding and brazing, or resistance welding or brazing.

The specifications for such protectors are as follows:

- Helmets and hand shields must be made of material that insulates for heat and electricity

Welding Operation	Shade No.
Shielded metal-arc welding - 1/16-, 3/32-, 1/8-, 5/32- inch electrodes	10
Gas-shielded arc welding (nonferrous) - 1/16-, 3/32-,	11
Gas-shielded arc welding (ferrous) - 1/16-, 3/32-, 1/8-	12
Shielded metal-arc welding:	
3/16-, 7/32-, 1/4-inch electrodes	12
5/16 -, 3/8-inch electrodes	14
Atomic hydrogen welding	10-14
Carbon arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 inch to 6 inches	4 or 5
Heavy cutting, 6 inches and over	5 or 6
Gas welding (light) up to 1/8 inch	4 or 5
Gas welding (medium) 1/8 inch to 1/2 inch	5 or 6
Gas welding (heavy) 1/2 inch and over	6 or 8

NOTE: In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter or lens that absorbs the yellow or sodium line in the visible light of the operation.

- Helmets, shields, and goggles must be not readily flammable and must be capable of withstanding sterilization
- Helmets and hand shields must be arranged to protect the face, neck, and ears from direct radiant energy from the arc
- Helmets must be provided with filter plates and cover plates designed for easy removal
- All parts must be constructed of a material that will not readily corrode or discolor the skin
- Goggles must be ventilated to prevent fogging of the lenses as much as practicable
- All glass for lenses must be tempered, substantially free from air bubbles, waves and other flaws. Except when a lens is ground to provide proper optical correction for defective vision, the front and rear surfaces of lenses and windows must be smooth and parallel
- Lenses must bear some permanent distinctive marking by which to identify the source and shade
- Filter lenses must meet the test for transmission of radiant energy prescribed by any of the following consensus standards:
    - ANSI Z87.1, "American National Standard Practice for Occupational and Educational Eye and Face Protection"
    - ANSI Z87.1, "American National Standard Practice for Occupational and Educational Eye and Face Protection"
    - ANSI Z87.1, "American National Standard Practice for Occupational and Educational Eye and Face Protection”
- Where work permits, enclose the welder in an individual booth painted with a finish of low reflectivity such as zinc oxide and lampblack or enclose with noncombustible screens similarly painted. Booths and screens must permit circulation of air at floor level
- Protect workers or other persons adjacent to the welding areas from the rays by noncombustible or flameproof screens or shields or must be required to wear appropriate goggles

Protective Clothing

Protect employees exposed to the hazards created by welding, cutting or brazing operations with personal protective equipment as required to ensure safety and meet regulatory requirements. Appropriate protective clothing required for any welding operation will vary with the size, nature and location of the work.

SAFE PRACTICES

All employees engaged in welding, cutting and brazing are expected to follow these safe practices.

Fire Prevention and Protection

Cutting or welding may only occur in fire-safe areas.

If the object to be welded or cut cannot be moved, movable fire hazards need to be moved at least 35 feet away. If it is impossible to move them, safeguards to confine heat, sparks and slag must protect the immovable fire hazards.

Where combustible materials are on the floor, employees must sweep the floor clean for a radius of 35 feet. Combustible floors must be kept wet (protect welder form shock if arc welding), covered with damp sand, or protected by fire-resistant shields.

Floor openings or cracks in the floor that cannot be closed, as well as holes in walls, open doorways and open or broken windows must be guarded to prevent sparks from reaching readily combustible material. Employees must shutdown ducts that could carry sparks to combustibles, or emplace appropriate safeguards before hotwork.

Fire extinguishing equipment appropriate to the present hazard will be ready for instant use during hotwork.

An inspector will inspect the worksite and designate precautions before granting authorization to proceed with cutting or welding in the form of a written permit.

Fire Watch

Firewatchers must be present for welding or cutting in locations where an unplanned flame might develop or when any of the following is true:

- Appreciable combustible material is within 35 feet to the point of operation
- Sparks may easily ignite appreciable combustibles more than 35 feet away
- Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas (including concealed spaces in walls or floors)
- Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation

Welding and cutting by gas utility firms on live mains is exempt from this rule when the main if is filled under positive pressure with natural or manufactured gas and air movers are used to ventilate areas where fumes might accumulate.

Firewatchers must have fire-extinguishing equipment readily available and training in its use. They must be familiar with facilities for sounding an alarm in the event of a fire and will watch for fires in all exposed areas. Firewatchers must try to extinguish flames only when within the capacity of the equipment available. Otherwise, they must sound the alarm.

The fire watch will continue for at least a half hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires.

Prohibited Areas

Cutting or welding is prohibited in the following situations:

- In areas not authorized by management
- In sprinklered buildings where the sprinkler’s ability to stop fire have been impaired
- In explosive atmospheres, including those that may develop inside uncleaned or improperly prepared spaces that contained explosive materials, or where there is an accumulation of combustible dusts
- In an area nearer than 35 feet to the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, baled paper, or cotton

- In a metal partition, wall, ceiling or roof that has a combustible covering or walls of sandwich-type construction
- In pipes or other metal near enough to combustible walls, partitions, ceilings, or roofs to ignite them by conduction

Containers

Welding or cutting must not be performed on drums, barrels, tanks, or other containers until they have been cleaned of all flammable combustible or toxic materials or fumes.

All pipelines or other connections to drums, barrels or tanks must be disconnected or blanked.

Hollow spaces or cavities must be vented and either filled with water or purged with an inert gas before preheating, cutting, or welding.

An opening must be maintained during welding and cutting to vent gases or vapors.

Confined Spaces

Ventilation is required to work in any confined space.

Leave gas cylinders and welding machines outside of confined spaces. Before starting operations, block the wheels of heavy portable equipment to prevent movement.

A welder will only enter a confined space with Company-provided means to be removed in case of emergency. When using safety belts and lifelines for this purpose, they need to be attached to the welder's body so that his body cannot be jammed in a small exit opening.

As with any work done in a hazardous confined space, the worker will have an attendant stationed outside with a preplanned rescue procedure. The attendant must be able to observe and/or communicate with the welder at all times and put rescue plans promptly into effect.

See the “Confined Spaces” chapter for specific information on working in those areas.

Health Protection and Ventilation

The factors that govern the amount of contamination to which welders may be exposed are the dimensions of the workspace, the number of welders working, and the evolution of hazardous fumes, gases or dust.

When the welding area is screened on all sides, the screens need to be arranged to allow sufficient ventilation — mounted about 2 feet from the floor, unless the work being done is near enough to the ground to require them to be lower to prevent harm to nearby workers.

Ventilating systems must ensure toxic fumes, gases, or dusts remain under permissible levels for all workers.

First-aid equipment remains available according to the emergency action plan. Report all injuries immediately. Trained personnel will provide first aid until professional medical attention is available.

Precautionary Labels

Fluxes, coatings, coverings and filler metals used in welding and cutting may employ potentially hazardous materials, including, but not limited to the following:

- Fluorine compounds
- Lead
- Beryllium
- Mercury
- Zinc
- Cleaning compounds
- Cadmium
- Chlorinated hydrocarbons

Appropriate ventilation or respirator equipment must control hazards presented by these chemicals and oxygen cutting stainless steel. Find more detail on controlling hazards these chemicals present in CFR 1910.252.

Welding material suppliers are responsible for determining hazards associated with a given material used for welding or cutting. Materials used in hotwork must be labeled with safety warnings according to the hazards the materials present and all workers must understand what the warnings mean.

Ventilation for General Welding and Cutting

Mechanical ventilation for welding or cutting on metals other than those listed above and any of the following is true:

- The space is less than 10,000 cubic feet per welder
- The room has a ceiling height of less than 16 feet
- The space is confined
- The welding space has structural barriers that significantly obstruct cross ventilation

Natural ventilation is sufficient for welding or cutting operations where these restrictions are not present.

Ventilation will be at least 2,000 cubic feet per minute per welder, except where workers have local exhaust hoods and booths or have airline respirators approved for such purposes.

Mechanical local exhaust ventilation may be by means of either of the following:

- Freely movable hoods near the work provided with a rate of airflow in the direction of the hood of 100 linear feet per minute in the zone of welding when the hood is at its most remote distance from the point of welding. The rates of ventilation required to accomplish this velocity using a 3-inch wide flanged suction opening are shown in table 0-2
- A fixed enclosure with a top and at least two sides that surround the welding or cutting operations with a rate of airflow sufficient to maintain a velocity away from the welder of at least 100 linear feet per minute

Welding Zone	Minimum air flow cubic feet / minutes	Duct Diameter, inches
4 to 6 inches from arc or torch	150	3
6 to 8 inches from arc or torch	275	3 ½
8 to 10 inches from arc or torch	425	4 ½
10 to 12 inches from arc or torch	600	5 ½

Confined Spaces Ventilation

Adequate ventilation for all welding and cutting operations in confined spaces must prevent the accumulation of toxic materials or oxygen deficiency. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. All air replacing used for ventilation must be clean and respirable.

If such ventilation can't be provided, the Company will provide airline respirators or hose masks approved by the National Institute for Occupational Safety and Health (NIOSH) for this purpose.

Areas immediately hazardous to life require a full-facepiece, pressure-demand, self-contained breathing apparatus or a combination full-facepiece, pressure-demand supplied-air respirator with an auxiliary, self-contained air supply approved by NIOSH.

Where welding operations occur in confined spaces requiring hose masks, hose masks with blowers, or self-contained breathing equipment, a worker stationed on the outside of such confined spaces will ensure the safety of those working within.

Never use oxygen for ventilation.

See the Confined Spaces chapter for specific information on working in those areas.

Industrial Applications

Observe OSHA requirements where field shop operations are involved for fabrication of fittings, river crossings, road crossings and pumping and compressor stations.

Special protection against electric shock for arc welding will be provided in wet conditions, or under conditions of high humidity.

In pressure testing of pipelines, protect workers and the public against injury by blowing out closures or other pressure restraining devices. Ensure protection against expulsion of loose dirt trapped in the pipe.

Employees will follow the appropriate standard for the following welding applications:

- Conduct the welded construction of transmission pipelines in accordance with the Standard for Welding Pipe Lines and Related Facilities, API Std. 1104
- The connection, by welding, of branches to pipelines carrying flammable substances must be performed in accordance with Welding or Hot Tapping on Equipment Containing Flammables, API Std. PSD No. 2201
- The use of X-rays and radioactive isotopes for the inspection of welded pipeline joints must be carried out in conformance with the American National Standard Safety Standard for Non-Medical X-ray and Sealed Gamma-Ray Sources, ANSI Z54.1

OXYGEN-FUEL GAS WELDING AND CUTTING

Mixtures of fuel gases and air or oxygen may be explosive and require appropriate guards.

Mixing air or oxygen with flammable gases will occur only at the burner or in a standard torch. Unapproved attachments or devices to mix air and fuel gasses are forbidden.

Acetylene may not be generated, piped (except in approved cylinder manifolds), or used at a pressure in excess of 15 psi. Liquid acetylene is also forbidden.

Only approved apparatus such as torches, regulators or pressure-reducing valves, acetylene generators, and manifolds must be used.

Anyone in charge of the oxygen or fuel-gas supply equipment, and oxygen or fuel-gas distribution piping systems must be instructed and judged competent by their employers before being left in charge.

Rules and instructions covering the operation and maintenance of oxygen or fuel-gas supply equipment including generators, and oxygen or fuel-gas distribution piping systems must be readily available

CYLINDERS AND CONTAINERS

Marking

All portable cylinders used for the storage and shipment of compressed gases must be constructed and maintained according to the regulations of the U.S. Department of Transportation, 49 CFR Parts 171-179.

Compressed gas cylinders must be legibly marked, with either the chemical or the trade name of contents. The cylinder marking must not be readily removable. Whenever practical, the marking will be located on the shoulder of the cylinder. Unlabeled cylinders will not be used. Cylinders must be marked as empty at the time of depletion.

Compressed gas cylinders connections must will ANSI B57.1 requirements.

All cylinders with a water weight capacity of over 30 pounds must be equipped with means of connecting a valve protection cap or with a collar or recess to protect the valve.

Storage

Keep cylinders away from radiators and other sources of heat and at least 20 feet from combustible materials. Do not store cylinders in areas where the temperature is excess of 125° F.

Cylinders stored inside of buildings must be in a well-protected, well-ventilated and dry location. Keep cylinders out of unventilated areas such as lockers, cupboards, basements or pits unless approved ventilation is provided to keep the area purged of any accumulation of gases.

Keep cylinders in designated spaces away from elevators, stairs or gangways. The storage spaces must be located where cylinders will not be knocked over or damaged by passing or falling objects.

Storage must be set up to ensure first-in, first-out usage.

A cylinder storage area must be posted with the names of the individual gases stocked, and the different gases must be grouped by type. Groupings must separate the flammable gases from the oxidizing gases.

Store cylinders in a secure area, with a warning posted against tampering by unauthorized individuals.

Empty cylinders must have their valves closed. Valve protection caps, where a cylinder accepts a cap, must always be in place, hand-tight, except when cylinders are in use or connected for use.

Fuel-Gas Cylinder Storage

Cylinders, except those in actual use or attached ready for use, stored inside a building, must be limited to a total gas capacity of 2,000 cubic feet or 300 pounds of liquefied petroleum gas.

When storing cylinders in excess of 2,000 cubic feet total gas capacity of cylinders or 300 pounds of liquefied petroleum gas inside of a building, a separate room or compartment must be used with the following specifications:

- Noncombustible construction having a fire resistance rating of at least one hour
- Walls or partitions continuous from floor to ceiling and securely anchored
- At least one wall must be an exterior wall

Special buildings, rooms or compartments used to store cylinders, must not have any open flames and must be well ventilated. They may also be used for storage of calcium carbide in quantities not to exceed 600 pounds, when contained in metal containers with the following specifications:

- Of sufficient strength to prevent rupture
- With a screw top or equivalent
- Water- and air-tight
- No solder used in a manner that the package would fail in a fire. Acetylene cylinders must be stored valve end up

Oxygen Storage

Oxygen cylinders must not be stored near highly combustible material, especially oil and grease; or near reserve stocks of carbide and acetylene or other fuel-gas cylinders, or near any other substance likely to cause or accelerate fire; or in an acetylene generator compartment.

Oxygen cylinders stored in outside generator houses must be separated from the generator or carbide storage rooms by a noncombustible partition having a fire-resistance rating of at least 1 hour. This partition must be without openings and must be gastight.

Oxygen cylinders in storage must be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high having a fire-resistance rating of at least one-half hour.

If a liquid oxygen system is used to supply gaseous oxygen for welding or cutting and the system stores more than 13,000 cubic feet of oxygen connected in service or ready for service, or more than 25,000 cubic feet of oxygen, including unconnected reserves on hand at the site, it must comply with the provisions of NFPA No. 566.

Handling Procedures

- A chain, bracket, or other restraining device must be used at all times to prevent cylinders from falling

- Cylinders, cylinder valves, couplings, regulators, hose and apparatus must be kept free from oily or greasy substances. Oxygen cylinders or apparatus must not be handled with oily hands or gloves. A jet of oxygen must never be permitted to strike an oily surface, greasy clothes, or enter a fuel oil or other storage tank
- When transporting cylinders by a crane or derrick, a cradle, boat, or suitable platform must be used. Slings or electric magnets must not be used for this purpose. Valve- protection caps, where cylinder is designed to accept a cap, must always be in place
- Cylinders must not be dropped, struck, or permitted to strike each other violently
- Valve-protection caps must not be used for lifting cylinders from one vertical position to another. Bars or another force must not be used under valves or valve-protection caps to pry cylinders loose when frozen to the ground or otherwise fixed. A frozen or ice-clogged valve must be thawed by either warm air or use of warm water, and dried, before using. Boiling water or a flame must not be used. Valve-protection caps are designed to protect cylinder valves from damage
- Unless cylinders are secured on a special truck, regulators must be removed and valve-protection caps, when provided for, must be put in place before cylinders are moved
- Cylinders not having fixed hand wheels must have keys, handles, or nonadjustable wrenches on valve stems while these cylinders are in service. In multiple cylinder installations, only one key or handle is required for each manifold
- Cylinder valves must be closed before moving cylinders
- Cylinder valves must be closed when work is finished
- Valves of empty cylinders must be closed
- Cylinders must be kept far enough away from the actual welding or cutting operation so that sparks, hot slag, or flame will not reach them, or fire-resistant shields must be provided
- Cylinders must not be placed where they might become part of an electric circuit
- Contacts with third rails, trolley wires, etc., must be avoided. Cylinders must be kept away from radiators, piping systems, layout tables, etc., that may be used for grounding electric circuits such as for arc welding machines. Any practice such as the tapping of an electrode against a cylinder to strike an arc must be prohibited
- Cylinders must never be used as rollers or supports, whether full or empty
- The numbers and markings stamped into cylinders must not be tampered with
- No person, other than the gas supplier, must attempt to mix gases in a cylinder. No one, except the owner of the cylinder or person authorized by him, must refill a cylinder
- No one must tamper with safety devices in cylinders or valves
- Cylinders must not be dropped or otherwise roughly handled
- Unless connected to a manifold, oxygen from a cylinder must not be used without first attaching an oxygen regulator to the cylinder valve. Before connecting the regulator to the cylinder valve, the valve must be opened slightly for an instant and then closed. Always stand to one side of the outlet when opening the cylinder valve
- A hammer or wrench must not be used to open cylinder valves. If valves cannot be opened by hand, notify the supplier

- Do not tamper with cylinder valves and do not attempt to repair them. If trouble is experienced, send the supplier a report promptly indicating the character of the trouble and the cylinder's serial number. Follow the supplier's instructions
- A cylinder’s regulator, gauge, or hose must never be interchanged between fuel gas, oxidizing gas, or inert gas
- Complete removal of the stem from a diaphragm-type cylinder valve must be avoided
- Fuel-gas cylinders must be placed with valve end up whenever they are in use. Liquefied gases must be stored and shipped with the valve end up
- Cylinders must be handled carefully. Rough handling, knocks, or falls are liable to damage the cylinder, valve, or safety devices and cause leakage
- Before connecting a regulator to a cylinder valve, the valve must be opened slightly and closed immediately. The valve must be opened while standing to one side of the outlet, never in front of it. Never crack a fuel-gas cylinder valve near other welding work or near sparks, flame, or other possible sources of ignition
- Before a regulator is removed from a cylinder valve, the cylinder valve must be closed and the gas released from the regulator
- Nothing must be placed on top of a cylinder when in use which may damage the safety device or interfere with the quick closing of the valve
- If cylinders are found to have leaky valves or fittings that cannot be stopped by closing of the valve, the cylinders must be taken outdoors away from sources of ignition and slowly emptied
- Place a warning tag on cylinders having leaking fuse plugs or other leaking safety devices not to approach them with a lighted cigarette or other source of ignition. Notify the supplier promptly and follow his instructions as to their return
- Safety devices must not be tampered with
- Fuel-gas must never be used from cylinders through torches or other devices equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold
- The cylinder valve must always be opened slowly
- An acetylene cylinder valve must not be opened more than one and one-half turns of the spindle, and preferably no more than three-fourths of a turn
- Where a special wrench is required, it must be left in position on the stem of the valve while the cylinder is in use so that the fuel-gas flow can be quickly turned off in case of emergency. In the case of manifolded or coupled cylinders, at least one such wrench must always be available for immediate use

ARC WELDING AND CUTTING

Workers designated to operate arc-welding equipment must have been properly instructed and qualified to operate such equipment.

Application of Arc Welding Equipment

Arc welding equipment will comply with the National Electrical Manufacturers Association (NEMA) EW-1 requirements, or the ANSI C33.2 and Underwriters’ Laboratories.

Environmental conditions

Standard machines for arc welding service must carry their rated load with rated temperature rises where the temperature of the cooling air does not exceed 104° F and where the altitude does not exceed 3,300 feet. Arc welding machines must be suitable for operation in atmospheres containing gases, dust and light rays produced by the welding arc.

Unusual service conditions may exist, and in such circumstances, machines must be especially designed to meet the requirements of the service. Chief among these conditions are:

- Exposure to unusually corrosive fumes
- Exposure to excessive oil vapor
- Exposure to abnormal vibration or shock
- Exposure to weather
- Exposure to steam or excessive humidity
- Exposure to flammable gases
- Exposure to excessive dust
- Exposure to unusual seacoast or shipboard conditions

Voltage

When an arc-welding machine is operated without being connected to a load, the open circuit voltage must not exceed the values shown in the table below when rated voltage is applied to the primary winding or when a generator type arc-welding machine is operating at maximum rated no-load speed.

Welding Current	**Max. Open Circuit (no-load) Voltage**	
	Manual and Semiautomatic Machines	**Automatic Machines**
AC	80 rms	100 rms
DC > 10% ripple voltage	80 rms	100 average
DC > 10% ripple voltage	100 average	100 average

When special welding and cutting processes require values of open circuit voltages higher than the ones shown above, adequate insulation or other means must be provided to prevent the operator from making accidental contact with the high voltage.

For AC welding under wet conditions or warm surroundings where perspiration is a factor, the use of reliable automatic controls for reducing no load voltage is recommended to reduce the shock hazard.

Design

A controller that is part of an electric motor driven welder must have the capacity for carrying rated motor current and be capable of making and interrupting stalled rotor current of the motor. It may serve as the running overcurrent device if provided with the number of overcurrent units as approved.

On all types of arc welding machines, control apparatus must be enclosed except for the operating wheels, levers or handles.

Input power terminals, tap change devices and live metal parts connected to input circuits must be completely enclosed and accessible only by using tools.

Terminals for welding leads must be protected from accidental electrical contact by personnel or by metal objects i.e., vehicles, crane hooks, etc. Protection may be obtained by use of: Dead- front receptacles for plug connections; recessed openings with non-removable hinged covers; heavy insulating sleeving or taping or other equivalent electrical and mechanical protection. If a welding lead terminal that is intended to be used exclusively for connection to the work is connected to the grounded enclosure, a conductor at least two AWG sizes smaller than the grounding conductor must be used and the terminal must be marked to indicate that it is grounded.

No connections for portable control devices such as push buttons to be carried by the operator must be connected to an AC. circuit of higher than 120 volts. A grounding conductor in the control cable must ground exposed metal parts of portable control devices operating on circuits above 50 volts. Autotransformers or AC reactors must not be used to draw welding current directly from any AC power source having a voltage exceeding 80 volts.

Installation of Arc Welding Equipment

Installation including power supply must be in accordance with the requirements of OSHA electrical regulations. In addition, a welding cable must be protected against damage, entanglement or contact with power supply or high-tension wires.

Grounding

The frame or case of the welding machine (except engine-driven machines) must be grounded according to the methods prescribed in OSHA electrical regulations.

- Conduits containing electrical conductors must not be used for completing a work-lead circuit
- Pipelines must not be used as a permanent part of a work-lead circuit, but may be used during construction, extension or repair providing current is not carried through threaded joints, flanged bolted joints, or caulked joints, and that special precautions are used to avoid sparking at connection of the work-lead cable
- Chains, wire ropes, cranes, hoists and elevators must not be used to carry welding current
- Where a structure, conveyor or fixture is regularly employed as a welding current return circuit, joints must be bonded or provided with adequate current collecting devices
- All ground connections must be checked to determine that they are mechanically strong and electrically adequate for the required current

Supply Connections and Conductors

A disconnecting switch or controller must be provided at or near each welding machine that is not equipped with such a switch or controller mounted as an integral part of the machine. The switch must be in accordance with OSHA electrical regulations. Overcurrent protection must be provided as specified in OSHA electrical regulations. A disconnect switch with overload protection or equivalent disconnect and protection means, permitted by OSHA electrical regulations, must be provided for each outlet intended for connection to a portable welding machine.

For individual welding machines, the rated current-carrying capacity of the supply conductors must be not less than the rated primary current of the welding machines.

For groups of welding machines, the rated current-carrying capacity of conductors may be less than the sum of the rated primary currents of the welding machines supplied. The conductor rating must be determined in each case according to the machine loading based on the use of each welding machine and the allowance permissible in the event that not all the welding machines supplied by the conductors will be in use at the same time.

In operations involving several welders on one structure, DC welding process requirements may require the use of both polarities; or supply circuit limitations for AC welding may require distribution of machines among the phases of the supply circuit. In such cases, no load voltages between electrode holders will be 2 times normal in DC or 1, 1.41, 1.73, or 2 times normal on AC machines. Similar voltage differences will exist if both AC. and DC welding are done on the same structure.

- All DC machines must be connected with the same polarity
- All AC machines must be connected to the same phase of the supply circuit and with the same instantaneous polarity

Operation

Workers assigned to operate or maintain arc-welding equipment must be acquainted with the requirements for safe arc welding and cutting.

Before starting operations all connections to the machine must be checked to make certain they are properly made. The work lead must be firmly attached to the work; magnetic work clamps must be freed from adherent metal particles of spatter on contact surfaces. Coiled welding cable must be spread out before use to avoid serious overheating and damage to insulation.

Grounding of the welding machine frame must be checked. Special attention must be given to safety ground connections of portable machines.

There must be no leaks of cooling water, shielding gas or engine fuel. A welder must not let live electrodes or holders touch his or her bare skin or damp clothing. When arc welding is performed in wet conditions or under a condition of high humidity, the welder must be protected against electric shock.

It must be determined that proper switching equipment for shutting down the machine is provided. Printed rules and instructions covering operation of equipment supplied by the manufacturers must be strictly followed.

Electrode holders not in use must be placed so they cannot make electrical contact with persons, conducting objects, fuel, or compressed gas tanks. Electrode holders must not be cooled by immersion in water. Cables with splices within 10 feet of the holder must not be used. The welders must not coil or loop welding electrode cable around parts of his body.

A welding machine must be disconnected when moved and turned off when not in use.

Maintenance

The operator will report any equipment defect or safety hazard to his supervisor and the use of the equipment must be discontinued until its safety has been assured. Repairs must be made only by qualified personnel.

Machines that have become wet must be thoroughly dried and tested before being used.

Spliced welding cable must not be used within 10 feet of an arc-welding machine.

Cables with damaged insulation or exposed bare conductors must be replaced. Joining lengths of work and electrode cables must be performed by using a connecting means that is specifically intended for the purpose. The connecting means must have insulation adequate for the service conditions.

RESISTANCE WELDING

All equipment must be installed by a qualified electrician in conformance with regulatory requirements. There must be a safety-type disconnecting switch or a circuit breaker or circuit interrupter to open each power circuit to the machine, conveniently located at or near the machine, so that the power can be shut off when the machine or its controls are to be serviced.

Ignition tubes used in resistance welding equipment must be equipped with a thermal protection switch.

Workers designated to operate resistance-welding equipment must have been properly instructed and judged competent to operate such equipment.

Controls of all automatic or air and hydraulic clamps must be arranged or guarded to prevent the operator from accidentally activating them.

Spot and Seam Welding Machines

An external weld initiating control circuit for a non-portable spot or seam welding machine must operate at not more than 120 volts for stationary equipment and not more than 36 volts for portable equipment.

Stored energy or capacitor discharge type of resistance welding equipment and control panels involving high voltage (over 550 volts) must be suitably insulated and protected by complete enclosures, all doors of which must be provided with suitable interlocks and contacts wired into the control circuit (similar to elevator interlocks). Such interlocks or contacts must be designed to interrupt power and short circuit all capacitors when the door or panel is open. A manually operated switch or suitable positive device must be installed, in addition to the mechanical interlocks or contacts, as an added safety measure assuring absolute discharge of all capacitors.

All doors and access panels of all resistance welding machines and control panels must be kept locked and interlocked to prevent access by unauthorized persons to live portions of the equipment. A door or access panel will be considered locked if a key or wrench is required to open it.

All press welding machine operations, where there is a possibility of the operator's fingers being under the point of operation, must be effectively guarded by the use of a device such as an electronic eye safety circuit, two hand controls. Adequate guards must protect all chains, gears, operating bus linkage and belts. One or more safety emergency stop devices must be provided on all multi-spot welding machines with a minimum of one stop device at each operator position.

The hazard of flying sparks must be eliminated, wherever practical, by installing a shield guard of safety glass or suitable fire-resistant plastic at the point of operation. Additional shields or curtains must be installed as needed to protect passing persons from flying sparks.

All foot switches must be guarded to prevent accidental operation of the machine.

Two or more safety emergency stop buttons must be provided on all special multi-spot welding machines, including 2-post and 4-post weld presses.

On large machines, four safety pins with plugs and receptacles (one in each corner) must be provided so that when safety pins are removed and inserted in the ram or platen, the press becomes inoperative.

Where technically practical, the secondary of all welding transformers used in multi-spot, projection and seam welding machines must be grounded. This may be done by permanently grounding one side of the welding secondary current circuit. Where not technically practical, a center tapped grounding reactor connected across the secondary or the use of a safety disconnect switch in conjunction with the welding control are acceptable alternates. Safety disconnect must be arranged to open both sides of the line when welding current is not present.

Portable Welding Machines

All portable welding guns must have suitable counterbalanced devices for supporting the guns, including cables, unless the design of the gun or fixture makes counterbalancing impractical or unnecessary.

All suspended portable welding gun equipment, except the gun assembly, must be equipped with a safety chain or cable capable of supporting the total shock load in event of failure of any component of the supporting system.

When a trolley is used to support a portable welding machine with a clevis for attachment to a safety chain, the clevis must be made of wrought or forged steel and capable of supporting the shock load if the trolley fails.

All initiating switches, including retraction and dual schedule switches, located on the portable welding gun must be equipped with suitable guards capable of preventing accidental initiation through contact with fixtures, operator's clothing, etc. Initiating switch voltage must not exceed 24 volts.

The movable holder, where it enters the gun frame, must have sufficient clearance to prevent the shearing of fingers carelessly placed on the operating movable holder.

The secondary and case of all portable welding transformers must be grounded. Secondary grounding may be by center tapped secondary or by a center tapped grounding reactor connected across the secondary.

Flash Welding Equipment

Flash welding machines must be equipped with a hood to control flying flash. In cases of high production, where materials may contain a film of oil and where toxic elements and metal fumes are given off, ventilation must be provided.

For the protection of the operators of nearby equipment, fire-resistant curtains or suitable shields must be set up around the machine and in such a manner that the operators' movements are not hampered.

Maintenance

Periodic inspection must be made by qualified maintenance personnel, and a certification record maintained. The certification record must include the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, for the equipment inspected. The operator must be instructed to report any equipment defects to his supervisor and the use of the equipment must be discontinued until safety repairs have been completed.

TRAINING

Hotwork training for employees, appropriate to their duties, and the related hazards will be provided at no cost to the employee and will be conducted during working hours.

Training material will be appropriate in content and vocabulary to the educational level, literacy and language of employees.

Training Components

Employees who work with or around welding, brazing, cutting or similar operations will be trained in the following minimum elements:

- Compressed gas hazards and cylinder safety and storage
- Fire hazards in the workplace
- The roles and responsibilities for a fire watch while welding
- Location and use of fire extinguishers
- Housekeeping efforts around welding
- Personal protective equipment selection, fitting and use;
- Welding in confined spaces
- Basic rules for any welding technique used at work
- Protective devices like valves, backflow preventers, etc.
- Hazards associated with chemicals used in welding
- Hazards associated with light and non-visible spectrum radiation in welding

Training Records

Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions

- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions

Employee training records will be retained for the length of their employment.

FORMS AND ATTACHMENTS

On the following pages, please find the following documents:

- Welding, Cutting and Brazing Checklist
- Ventilation Requirements for Welding and Cutting
- Sample Hotwork Permit
- Welding, Cutting and Brazing Training Record Sheet

These forms may be reproduced freely for the purposes of implementing and maintaining a safety and health program.

WELDING, CUTTING AND BRAZING CHECKLIST FOR GENERAL INDUSTRY (PAGE 1 OF 5)

(A negative answer to any question indicates an area of safety or health concern.)

Company Name		Date / Time	
Supervisor		Inspector	
Physical Address of Worksite			

Installation and Operation of Oxygen-Fuel Gas Systems for Welding and Cutting				
Yes	No	N/A	Date Corrected	Question
				Is acetylene generated, piped or used at a pressure of 30 p.s.i. or less?
				Have personnel in charge of the oxygen or fuel gas supply equipment been instructed and judged competent before being left in charge?
				Is the gas content of compressed gas cylinders marked with either the chemical or the name of the gas?
				Are cylinders stored away from radiators and other sources of heat?
				Are cylinders stored inside kept in a well-ventilated, dry location at least 20 feet from highly combustible material?
				Are cylinders stored in assigned places away from elevators, stairs, or gangways and where they will not be knocked over or damaged?
				Are the valves of empty cylinders kept closed?
				Are valve protection caps in place and hand-tight except when in use or connected for use?
				Are fuel gas cylinders except those in use or attached for use, which are stored inside a building, limited to a total gas capacity of 2,000 cubic feet or 300 pounds of liquefied petroleum gas?
				Are acetylene cylinders stored valve end up?
				If oxygen cylinders are stored in outside generator houses, are they separated from the generator or carbide storage rooms by a gastight, noncombustible partition having a fire-resistance rating of at least one hour?
				Are stored oxygen cylinders separated from fuel gas cylinders or combustible material by a minimum of 20 feet, or by a noncombustible barrier at least five feet high with a fire-resistance rating of at least one-half hour?
				Are cylinders, cylinder valves, couplings, regulators, hose and apparatus kept free from oily or greasy substances?
				Do you ensure that cylinders are not dropped, struck or permitted to strike each other violently?
				Do you ensure that valve-protection caps are not used for lifting cylinders from one vertical position to another?
				Do you ensure that cylinders that do not have fixed hand wheels, have keys, handles or nonadjustable wrenches on the valve stems while the cylinders are in service?
				Are cylinder valves closed before moving a cylinder, and when work is finished?

WELDING, CUTTING AND BRAZING CHECKLIST FOR GENERAL INDUSTRY (PAGE 2 OF 5)

				Are cylinders kept away from sparks, hot slag, or flames produced by welding or cutting operations, or are fire-resistance shields provided?
				Are cylinders placed where they will not become part of an electric circuit?
				Do you insure that cylinders are not used as rollers or supports, and that only proper tools are used to open cylinder valves?
				Are fuel gas cylinders placed valve end up while in use?
				Are cylinders with leaky valves or fittings taken outdoors and slowly emptied?
				Are warning signs posted which prohibit open flame or other sources of ignition near cylinders with leaking fuse plugs or other leaking safety devices, and are the cylinders tagged?
Manifold Systems				
Yes	No	N/A	Date Corrected	Question
				Do you ensure that oxygen manifolds are not located in an acetylene generator room?
				Do you ensure that portable outlet headers are used indoors only for temporary service where conditions preclude a direct supply from outlets located on the service piping system?
				Is each outlet on the service piping which supplies a portable outlet header equipped with a readily accessible shutoff valve?
				Are master shutoff valves for both oxygen and fuel gas provided at the entry end of the portable outlet header?
				Are portable outlet headers provided with frames to support the equipment securely in the correct operating position?
				When acetylene cylinders are coupled in a manifold, are flash arresters installed between each cylinder and the coupler block?
				In service piping systems, are distribution lines installed and maintained in a safe operating condition?
				Are emergency gas cocks or valves provided for all buildings?
				Is underground pipe and tubing and outdoor ferrous pipe and tubing protected against corrosion?
General Requirements				
Yes	No	N/A	Date Corrected	Question
				Is flashback protection provided by an approved device that will prevent flame from passing into the fuel gas systems?
				Are hoses showing defects repaired or replaced?
				Are pressure-reducing regulators used only for the gas and pressures for which they are intended?
				Is the repair of regulators performed by properly instructed, skilled mechanics?
				Are gauges on oxygen regulators marked “USE NO OIL”?
				Are union nuts and connections on regulators inspected before use to detect faulty seats?

WELDING, CUTTING AND BRAZING CHECKLIST FOR GENERAL INDUSTRY (PAGE 3 OF 5)

Acetylene Generators (if applicable)				
Yes	No	N/A	Date Corrected	Question
				Is ample space provided around the generator for operation and maintenance?
				Are generators placed where water will not freeze, and is the use of sodium chloride to prevent freezing prohibited?
				Are portable generators located at a safe distance from the welding position?
				Are the walls, floors and roofs of outside generator houses constructed of noncombustible materials?
				Are exit doors readily accessible in case of emergency?
				Are generators installed inside buildings enclosed in a separate room?
				Are the walls, partitions, floors, and ceilings of inside generator rooms of noncombustible construction with a fire-resistance rating of at least one hour?
				Are generator rooms or buildings well ventilated with vents located at floor and ceiling levels?
				Do generator rooms or buildings have natural light during daylight hours or artificial light restricted to electric lamps installed in a fixed position?
				Are operating instructions posted in a conspicuous place near the generator or available for ready reference?
				Is the generator room electrically wired in accordance with 1910.307 (hazardous locations)?
				Do you ensure that the water-carbide residue mixture drained from the generator is not discharged into sewer pipes or stored in areas near open flames?
				Do you ensure that calcium carbide is kept in metal packages strong enough to prevent rupture?
				Are the packages marked “Calcium Carbide - Dangerous If Not Kept Dry”?
				Do you ensure that the calcium carbide stored indoors does not exceed 600 pounds and that the storage area is dry, waterproof and well-ventilated?
				Are carbide containers that are stored outside periodically examined for conditions that could affect water or air tightness?
Application, Installation and Operation of Arc welding and Cutting Equipment				
Yes	No	N/A	Date Corrected	Question
				Have employees who are designated to operate arc-welding equipment been properly instructed and qualified?
				Are open circuit (no load) voltages of arc welding and cutting machines as low as possible, consistent with satisfactory welding?
				When open circuit voltages must be higher, are means provided to prevent the operator from making accidental contact with the higher voltages?
				Is control apparatus enclosed on all types of arc welding machines?

WELDING, CUTTING AND BRAZING CHECKLIST FOR GENERAL INDUSTRY (PAGE 4 OF 5)

				Are terminals for welding leads protected from accidental electrical contact by personnel or metal objects?
				Do you ensure that no connections for portable control devices, such as push buttons carried by the operator, are connected to an AC. circuit of higher than 120 volts?
				Is the frame or case of the welding machine effectively grounded and the grounding checked?
				Is a separate disconnecting switch or controller provided at or near each welding machine?
				Are electrode holders placed so that they cannot make electrical contact with persons, conducting objects, fuel, or compressed gas tanks?
				Has the operator been instructed to report any equipment defect or safety hazard to his supervisor, and is use of the equipment discontinued until repaired by qualified personnel?
				Are work and electrode lead cables frequently inspected for wear and damage, and are cables with damaged insulation or exposed bare conductors replaced?
Installation and Operation of Resistance Welding Equipment				
Yes	No	N/A	Date Corrected	Question
				Have personnel who are designated to operate resistance-welding equipment been properly instructed and judged competent to operate such equipment?
				Are all doors and access panels of all resistance-welding machines and control panels kept locked and interlocked?
				Has a shield guard of safety glass or suitable fire-resistant plastic been installed at the point of operation?
				Are foot switches guarded to prevent accidental operation of the machine?
				Are two or more safety emergency stop buttons provided on all special, multisport welding machines, including 2-post and 4-post weld presses?
				Are flash welding machines equipped with hoods to control flying flash?
				Are periodic inspections of the machines made by qualified maintenance personnel, and are records of the inspections maintained?
Fire Prevention and Protection				
Yes	No	N/A	Date Corrected	Question
				Is suitable fire extinguishing equipment maintained in a state of readiness for instant use?
				Are fire watches on duty whenever welding or cutting is performed in locations where a major fire might develop?
				Before cutting or welding is permitted, is the area inspected by the individual responsible for authorized cutting and welding operations?
				Where practicable, are all combustibles relocated at least 35 feet from the work site?
				Does management recognize its responsibility for the safe usage of cutting and welding equipment on its property?

WELDING, CUTTING AND BRAZING CHECKLIST FOR GENERAL INDUSTRY (PAGE 5 OF 5)

				Do supervisors recognize their responsibilities in the safe management of welding and cutting operations?
				Are welders or helpers who are working on platforms, scaffolds, or runways protected against falling by railings, safety belts or lifelines?
				Is welding cable and other equipment kept clear of passageways, ladders and stairways?
				Are helmets, hand shields and goggles worn during all arc welding or cutting operations?
				Has a hazard assessment been performed to determine if hazards are present or likely to be present?
				Are employees who are exposed to the hazards created by welding, cutting, or brazing operations protected by personal protective equipment as?
				When welding or cutting is being performed in any confined space, are gas cylinders and welding machines left outside?
				Before operations are started, is heavy, portable, wheel-mounted equipment securely blocked to prevent accidental movement?
Health Protection and Ventilation				
Yes	No	N/A	Date Corrected	Question
				Where a welder must enter a confined space through a manhole or other small opening, have means been provided for his quick removal in case of emergency?
				Are ventilation or respiratory protective devices provided where necessary and do they meet OSHA requirements?
				Are employees trained to render first aid, and is first aid equipment available at all times?

VENTILATION REQUIREMENTS FOR WELDING AND CUTTING

Metal Compound	Requirements Confined Space	Requirements Indoors	Requirements Outdoors
Fluorine Compound	Air replacement or airline respirator or self-contained breathing apparatus needed	Air sample tests to determine if exhaust hood, booth, and airline respirator are required	Same as indoors
Lead Zinc (Galvanized Metals)	Air replacement or airline respirator or self-contained breathing apparatus	Exhaust hood or booth	Combination particulate and vapor and gas removing type respirator if tests indicate need
Beryllium	Exhaust hood or booth and airline respirator if air sample tests indicate need	Exhaust hood or booth and airline respirator if air sample tests indicate need	Exhaust hood or booth and airline respirator if air sample tests indicate need

- Airline or self-contained breathing apparatus are required in confined areas that are immediately hazardous to life.
- Local exhaust hoods or booths must provide airflow of 100 linear feet per minute.
- Mechanical ventilation at 2,000 cubic feet of air per minute per welder is required when:
  - Welding or cutting on metals other than described above
  - When there is less than 10,000 cubic feet of space per welder
  - Where the ceiling height is less than 16 feet
  - In confined spaces or where structural barriers such as partitions or balconies significantly obstruct cross ventilation

Note: Mechanical ventilation is necessary when an exhaust hood or fixed booth provide for a rate of airflow sufficient to maintain a velocity away from the welder or not less than 100 linear feet per minute.

HOTWORK PERMIT

This permit is required for operations that involve open flames or that produce sparks or heat outside of designated areas, including, but not limited to brazing, cutting, welding and grinding.

Date	
Task	
Location	
Person doing Hotwork	

Precautions have been taken to prevent fire and to control hazards present in the above location for the job described, and hotwork may commence.

Authorizing Individual (sign please)

Person Doing Hotwork (sign please)

Fire Watch (sign please)

Start Date:	Start Time:
Finish Date:	Finish Time:

OK	PRECAUTION	N/A
	Area is fire safe	
	Moveable fire hazards moved	
	Unmoveable fire hazards guarded	
	Openings, cracks, doorways, windows guarded or closed	
	Fire extinguisher available	
	Fire watch	
	Floors clean for 35' radius	
	Combustible floors wetted or	
	In authorized area	
	Ducts and conveyer systems to	
	Worker trained appropriately	
	Contractors informed of hazards	
	Containers cleaned and ventilated	
	Pipelines to containers disconnected or blocked	
	PPE available and used	
	Hot metal warning sign	
	Ventilation provided	
	Confined spaces permit	
	Other:	

Fire Watch Signoff

Work was fire safe through the entire watch period. The area was monitored for _____minutes (at least 30) to ensure fire safety.

Fire Watch (sign please

DISCLAIMER

OSHA's "Safety and Health Regulations" are continuously being reinterpreted. Therefore, Safety Services Company is unable to completely guarantee the exactness of the information conveyed in this publication. Safety Services Company assumes no responsibility and shall be held harmless for any inaccuracies or omissions contained within this pocket manual and shall not be held liable to any extent or form for any injury or loss resulting from the manner in which this information is interpreted and/or applied.

Careful effort has been dedicated in order to provide a simplified, understandable explanation of OSHA regulations based on currently available information. This "Injury & Illness Prevention Program" is distributed with the agreement that Safety Services Company is not employed in providing legal or other specialized business services. Should expert assistance be required, retain the services of a competent professional.

NOTES

NOTES

EMPLOYEE SIGNOFF

This is to certify that I have received a copy of the Company Injury & Illness Prevention Manual.

I have read these instructions, understand them, and will comply with them while working for the Company.

I understand that failure to abide by these rules may result in disciplinary action and possible termination of my employment with JET Commercial LLC

I also understand that I am to report any injury to my foreman or superintendent immediately and report all safety hazards.

I further understand that I have the following “Safety Rights”:

- I am not required to work in any area I feel is not safe.
- I am entitled to information on any hazardous material or chemical I am exposed to while working.
- I will not be discriminated against for reporting safety concerns.

Employee Name	Signature	Date

Supervisor Name	Signature	Date

cc: Employee File