

OSHA 30-Hour Construction

Study Guide



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OSHA 30 Hr. Construction Training Program

Study Guide

The Purpose and Design of the Study Guide

U.S. OSHA created the Outreach Training Program for the purpose of expanding the knowledge base of employers and employees across the country relative to their standards and guidelines, thereby enhancing safety and health in the American workplace. OSHA requires specific topics to be included in every program.

The purpose of this study guide is to provide a thorough review of the 360training OSHA 30 Hr. Construction Training Program. Each lesson corresponds to those in the series and contains bulleted highlights, as well as note taking sections.

Module 1:

Introduction to OSHA and the OSH Act

The purpose of this two-hour course is to provide workers with introductory information about OSHA. The module is comprised of the following six lessons:

- Why is OSHA important to you?
- What rights do you have under OSHA?
- What responsibilities does your employer have under OSHA?
- What do the OSHA standards say?
- How are OSHA inspections conducted?
- Where can you go for help?

This section provides basic knowledge of OSHA's history and mission, worker rights under OSHA, employer responsibilities under OSHA, OSHA standards, OSHA inspections, and safety and health resources, including how to file an OSHA complaint. This part will prove beneficial for those who are directly or indirectly involved with OSHA and the OSH Act.

Key Terms

Material Safety Data Sheet (MSDS): A document that contains hazard-related information about a specific chemical or formulation.

OSHA: Occupational Safety and Health Administration

Personal Protective Equipment (PPE): All types of protective equipment such as hard hats, gloves, boots, and eye protection, along with respiratory aids.

Lesson 1:

Why Is OSHA Important to You?

Key Points

- OSHA began because, until 1970, there were no national laws for safety and health hazards.
- Since then, workplace fatalities have been cut by more than 60 percent and occupational injury and illness rates have declined 40 percent.
- State plan programs respond to accidents and employee complaints and conduct unannounced inspections just like federal OSHA.
- Some states have OSHA-approved plans that cover only state and local government workers.
- OSHA approves and monitors all state plans. The state plans must be at least as effective as federal OSHA requirements.
- Twenty-two states and territories operate complete plans and four cover only the public sector.
- Some statistics:
 - On average, 15 workers die every day from job injuries.
 - Over 5,600 Americans die from workplace injuries annually.
 - Each year, over 4 million non-fatal workplace injuries and illnesses are reported.
- The estimated cost of occupational injuries and illnesses ranges from \$145 billion to \$290 billion a year for direct and indirect costs. (See Handout 1)

Study Questions

1. The OSH Act is also known by what other name?

2. Which occupational groups do not come under OSHA coverage?

3. Name three actions OSHA uses to carry out its mission.

4. Which states have developed public sector state plans?

Lesson 2: What Rights Do You Have under OSHA?

Key Points

- The right to review the injury and illness log includes former employees, their personal representatives, and authorized employee representatives. (See Handout 2)

- OSHA regulations protect workers who complain to their employer about unsafe or unhealthful conditions in the workplace. (See Handout 3)

- You cannot be transferred, denied a raise, have your hours reduced, be fired, or punished in any other way because you have exercised any right afforded to you under the OSH Act.

- Since you are often closest to potential safety and health hazards, you have a vested interest in reporting problems so that the employer gets them fixed. If the hazard is not corrected, you should then contact OSHA. (See Handout 4)

- The OSH Act prohibits employment retaliation against an employee who complains to an employer, files a complaint related to workplace safety or health conditions, initiates a proceeding, contests an abatement date, requests information from OSHA, or testifies under the Act. In certain circumstances, an employee may refuse to work under seriously

threatening health or safety conditions. (See Handout 5)

- Other required training includes lockout-tagout, bloodborne pathogens, noise, confined spaces, fall hazards in construction, personal protective equipment, and a variety of other subjects.
- Under OSHA's standard 1910.1020, you have the right to examine and copy exposure and medical records, including records of workplace monitoring or measuring a toxic substance. This is important if you have been exposed to toxic substances or harmful physical agents in the workplace, as this regulation may help you detect, prevent, and treat occupational disease.
- If you file a complaint, you have the right to find out OSHA's action on the complaint and request a review if an inspection is not made. (See Handout 6)
- You have the right to talk to the inspector privately. You may point out hazards, describe injuries, illnesses or near misses that resulted from those hazards and describe any concern you have about a safety or health issue.
- You also have the right to find out about inspection results and abatement measures, and get involved in any meetings or hearings related to the inspection. You may also object to the date set for the violation to be corrected and be notified if the employer files a contest.
- "Good faith" means that even if an imminent danger is not found to exist, the worker had reasonable grounds to believe that it did. Since the conditions necessary to justify a work refusal are very stringent, refusing work should be an action taken as a last resort. If time permits, the condition should be reported to OSHA or the appropriate government agency.
- If you believe you have been punished for exercising your safety and health rights, you must contact OSHA within 30 days. (See Handout 7)

Study Questions

1. OSHA requires that each employer post certain materials in a prominent location at the workplace. What materials are these?
2. If an employer disagrees with the results of the OSHA inspection, he or she may submit a written objection to OSHA, called what?
3. Workers' safety and health responsibilities include what six?

Lesson 3: What Responsibilities Does Your Employer Have under OSHA?

Key Points

- Employers are required to determine if PPE should be used to protect their workers.
- The first and best strategy is to control the hazard at its source.
- The basic concept behind engineering controls is that, to the extent feasible, the work environment and the job itself should be designed to eliminate hazards or reduce exposure to hazards.
- If PPE is to be used, a PPE program should be implemented. This program should address the hazards present; the selection, maintenance, and use of PPE; the training of employees; and monitoring of

the program to ensure its ongoing effectiveness. (See Handout 8)

Study Questions

1. Employer recordkeeping responsibilities involves not only setting up a reporting system and providing copies of logs upon request, but also posting annual summaries and what else?
2. What types of workplaces are exempt from recordkeeping requirements?
3. Which general industry workers are among those most exposed to lead?
4. OSHA also requires that employers pay for most required PPE, except for what types that may be worn off the job?

Lesson 4: What Do the OSHA Standards Say?

Key Points

OSHA Standards are organized in the following way:

- The CFR is divided into Titles. OSHA's standards are in Title 29.
- Under each Part, such as Part 1926, major blocks of information are broken into subparts. For example, Subpart C is named General Safety and Health Provisions. Subpart C contains sections 1926.20 through 1926.35.

- All OSHA standards are available on OSHA's Web site. You can look them up by the standard number or do a search by topic. (See Handout 9)

Study Questions

1. What four categories do OSHA standards fall into?
2. OSHA issues standards for a wide variety of workplace hazards, including what seven?

Lesson 5: How are OSHA Inspections Conducted?

Key Points

- OSHA conducts inspections without advance notice, except in rare circumstances (for example, when there is a report of an Imminent Danger). In fact, anyone who tells an employer about an OSHA inspection in advance can receive fines and a jail term.
- Referrals usually are from a government agency, such as NIOSH or a local health department. They are handled the same way as complaints.
- A follow-up is made to see if violations cited on an earlier inspection were fixed.
- Monitoring inspections are made to make sure hazards are being corrected and workers are protected whenever a long period of time is needed for a hazard to be fixed.
- The CSHO may also interview workers, take photographs or video, and monitor worker exposure to noise, air contaminants, or other substances. The CSHO will conduct all worker interviews in private, although workers may request that a union representative be present.
- Citations are sent in the mail at a later date (no later than six months after the inspection).

- The CSHO takes the findings back to the office and writes up a report. The Area Director reviews it and makes the final decision about any citations and penalties.
- OSHA may adjust a penalty downward depending on the gravity of the violation, the employer's good faith (efforts to comply with the Act), history of previous violations, and size of the business.
- Although employers and workers each have rights to disagree with (or appeal) parts of an OSHA citation, the employer has more rights than workers related to citations.
- Employers may request an informal conference with OSHA to discuss a case. They can also reach a settlement agreement with OSHA that adjusts citations and penalties in order to avoid prolonged legal disputes.
- Workers may also contest the abatement time for any violation and an employer's petition for modification of abatement (PMA), but they cannot contest citations or penalties. If you, as a worker, plan to contest an abatement time, you should provide information to support your position.
- Both workers and the employer have the right to participate in the hearing and request a further review of the judge's decision by the commission.
- If a violation or abatement date is contested by the employer, the situation does not have to be fixed until there is a final legal order; however, if only the penalty is contested, the violation must be fixed by the date in the citation.

Study Questions

1. What are the four priority categories of OSHA inspection?

2. What are four major stages of an OSHA inspection and what occurs during each?
3. In the opening conference, what does the CSHO do?
4. Citations inform the employer and employees of what four matters?
5. How are willful, serious, other-than-serious, and repeat violations defined?

Lesson 6: Where Can You Go for Help?

Key Points

- OSHA standards such as those for hazard communication, egress, confined space and Bloodborne Pathogens require labels and signs. The employer must make sure that each sign or label posted can be understood by all workers, so the signs must be bilingual if workers do not understand or read English.
- Orientation manuals and training materials about your job should include information about how to work safely. (See Handout 10)
- If you have questions about a new job or task, or a job or task that has changed, be sure to ask for the written procedures and for additional training on them.
- If you are discussing a health concern with your health care provider, try to provide them with as much information about the chemical or substance as possible. For example, if you are getting headaches at work, try to get the names and MSDSs or labels of the chemicals to which you are exposed. (See Handout 11)
- Remember that discrimination for health and safety activity is illegal. If you are a union representative, you may wish to have your name on the complaint. (See Handout 12)

Study Questions

1. OSHA considers some jobs and tasks very hazardous, such as what?
2. What are QuickCards?
3. What can a worker request if he or she is currently an employee at a workplace of concern (meaning, where workers are getting sick from an unknown cause or are exposed to an agent or working condition that is not regulated by OSHA), if he or she has obtained the signatures of two other workers?

Module 2: Recordkeeping

This module is designed to assist employers in identifying and fulfilling the requirement to post certain records, maintain records of illnesses and injuries, and report specific cases to OSHA. Students who successfully complete this part will be able to identify the OSHA requirements for recordkeeping.

Key Terms

Asbestosis: An incurable restrictive lung disease often linked to occupational exposure.

BLS: Bureau of Labor Statistics

HCP: Health Care Professional

PLHCP: Physician or other Licensed Health Care Professional

Silicosis: An occupational lung disease, this is a respiratory disease caused by the inhalation of silica.

TB: Tuberculosis

Lesson 1: Recordkeeping

Key Points

- Recording/reporting a work-related injury, illness, or fatality does not mean the employer or employee was at fault, an OSHA rule has been violated, or that the employee is eligible for workers' compensation or other benefits.
- The purpose section of the rule includes a note to make it clear that recording an injury or illness neither

affects a person's entitlement to workers' compensation nor proves a violation of an OSHA rule. The rules for compensability under workers' compensation differ from state to state and do not have any effect on whether or not a case needs to be recorded on the OSHA 300 Log. Many cases will be OSHA recordable and compensable under workers' compensation. However, some cases will be compensable but not OSHA recordable, and some cases will be OSHA recordable but not compensable under workers' compensation.

- States with OSHA-approved plans may require employers to keep records for the state, even though those employers are within an industry exempted by the federal rule.
- For those states with OSHA-approved State plans, the state is generally required to adopt federal OSHA rules, or a state rule that is at least as effective as the federal OSHA rule. States with approved plans do not need to exempt employers from recordkeeping, either by employer size or by industry classification, as the final federal OSHA rule does, although they may choose to do so.
- All work-related cases involving loss of consciousness must be recorded.
- All work-related needlestick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material (as defined by 29 CFR 1910.1030) must be recorded.
- The OSHA standard requires the employer to keep a record of all work-related hearing loss cases where the employee's total hearing level is 25 decibels (dB) or more above audiometric zero in the same ear as the STS.

Study Questions

1. Are temporary employees, who are supervised on a day-to-day basis, also to be included in the size-exemption count?

2. If an employer employed 11 or more people at a given time during the year, is he or she eligible for the size-based partial exemption?
3. Certain state plans do not allow exemption due to industry classification, true or false?
4. An injury or illness must be recorded if it results in one or more of what six factors?
5. Define a Standard Threshold Shift.
6. A case of TB is not recordable when one of three factors is true. What are these three factors?

Lesson 2: Reporting

Key Points

- Employers must enter each recordable case on reporting forms within seven calendar days (previously six working days) of receiving information that a recordable case has occurred.

For example, an employer must enter each recordable injury or illness on the OSHA 300 Log and 301 Incident Report within this timeframe.

- OSHA has eliminated the term "lost workdays" on forms and in the regulatory text. The use of the term has been confusing for many years because many people equated the terms "lost workday" with "days away from work" and failed to recognize that the former OSHA term included restricted days.

- Employees and their representatives must be involved in the recordkeeping system in several ways.

For example, the employer must inform each employee of how to report an injury or illness. Furthermore, he or she must set up a way for employees to promptly report work-related injuries and illnesses, and tell each employee how to report them.

Study Questions

1. You may disclose the Forms with personally identifying information only to a public health authority or law enforcement agency for uses and disclosures for which consent, an authorization, or opportunity to agree or object is not required under Department of Health and Human Services Standards for Privacy of Individually Identifiable Health Information, and under what other two conditions?
2. What injuries or illnesses must you consider to be privacy concern cases? Hint: There are six.
3. Preparing the Annual Summary requires what four steps?
4. An employer must save all of these forms for five years (from the end of the calendar year covered by the reports). What four forms are these?
5. An employer must update stored OSHA 300 Logs to include and reflect what?

6. An employer must provide copies of records within four business hours when requested by an authorized government representative such as whom? Hint: Three are specifically listed.

Module 3A:

Basic Safety Orientation

Employees may be exposed to many safety and health hazards while on the job. These include chemical hazards, fire hazards, electrical hazards, confined space hazards, etc. This part aims to present an overview of some basic workplace hazards and how employees can protect themselves from them.

Key Terms

Bloodborne pathogens: Infectious microorganisms found in human blood can cause diseases such as Hepatitis B and C and the Human Immunodeficiency Virus (HIV).

Guardrail: A protective railing enclosing an elevated platform.

Hazardous chemical: A chemical that can cause physical harm or be a health hazard.

Oxygen deficient atmosphere: An atmosphere containing less than 19.5 percent oxygen by volume.

Scaffold: A temporary platform on which workers can sit or stand when performing tasks at heights above the ground.

Lesson 1:

Hazard Communication and Protective Equipment

Key Points

- It is the responsibility of the employer to identify and inform all employees about potential hazards present in the workplace. Regarding chemicals, this can be achieved by having a written hazard communication program.

- Employers must inform all employees about the hazardous chemicals present at the worksite and how to handle them and themselves safely.
- All employers must evaluate the chemicals used at the worksite in order to determine the type of equipment that should be worn by their employees. Also, employers must train employees to properly handle and use PPE.
- Employees are required to read and understand the warnings written on labels before they handle the containers and their contents. If employees do not understand what is written on the labels, they must ask their supervisors before proceeding with the assigned tasks.
- An MSDS contains information on physical and chemical properties of the material, its acute or chronic health effects, along with exposure limits and handling instructions. At a worksite, there must be an MSDS for each hazardous chemical present and these must be immediately accessible to all employees.
- It must be noted that an employee's prescription glasses are not safety glasses and should not be used as a substitute.
- Face protection can be acquired by using a face shield. Shoulder-length chemical splash hoods are also used in order to get better protection from splashes.
- In some cases, personnel may require the use of specially designed hardhats. Electricians, for instance, require specially designed hardhats that can protect them from electrical shock.
- OSHA regulations require employers to ensure that workers cover and protect long hair to prevent it from getting caught in machine parts, such as belts and chains.

- For electrical work, rubber gloves provide the best protection. Gloves made of neoprene or latex can protect the hands from some chemicals.
- Foot protection can be obtained through steel toe boots, metatarsal guards, and chemical resistant boots.
- All protective clothing must be puncture-and wear-resistant. It must be noted that torn or ripped clothing does not provide full protection against hazardous materials.
- Employers must train all employees how to safely wear a respirator. Also, employees must be medically evaluated, and fit-tested with each type of respirator that they are required to wear.
- In environments that are extremely noisy, with volume rising above the action level of 85 dB, the creation and implementation of a formal hearing conservation program is required.
- A professional should fit employees individually for molded or preformed earplugs.

Study Questions

1. Respiratory protection can be obtained through two basic types of respirators; name them and describe their functions.
2. Of these two types of respirators, which one is further broken down into its own two types?
3. Based on their names, what functions would you think these two types serve?

Lesson 2: Workplace Hazards and Protection

Key Points

- If employees are required to work near energized electrical equipment, they must be made aware of the general electrical safety guidelines.
- Because electrical hazards can also cause burns, assume that all overhead wires are energized at lethal voltages. Never assume that a wire is safe to touch even if it is down or appears to be insulated.
- If an overhead wire falls across your vehicle while you are driving, stay inside the vehicle and continue to drive away from the line. If the engine stalls, do not leave your vehicle. Warn people not to touch the vehicle or the wire. Call or ask someone to call the local electric utility company and emergency services.
- Personal fall arrest systems provide the highest level of protection from falling as they are designed for each individual employee.

Before use, all personal fall arrest systems must be inspected to make sure they do not have any cuts, tears, mold, or anything else that can cause the system to fail.

- Look for fall hazards such as unprotected floor openings/edges, shafts, skylights, stairwells, and roof openings/edges.
- Practice good housekeeping. Keep cords, welding leads, and air hoses out of walkways or adjacent work areas.
- Workers must always position themselves on a ladder so that at least three limbs are in contact with it at all times. Workers must face the ladder when climbing up or down.

- To ensure safety, employers must make sure that all ladders are made to support at least four times their anticipated load.
- Those scaffolds that have been approved should be marked with green tags. Yellow tags are used if there are any limitations associated with the scaffold. Scaffolds unsuitable for use should be marked with red tags.
- Employees who are required to work on or near energized parts must ensure that these parts are properly locked out and tagged out. Only authorized personnel may affix locks and tags on energy sources.
- Before employees enter a confined space, they must disconnect or block all piping. Also, it is necessary for them to check the atmosphere inside the confined space to ensure that it is not hazardous.
- Do not enter permit-required confined spaces without being trained and without having a permit to enter.
- Review, understand, and follow employer's procedures before entering permit-required confined spaces and know how and when to exit.

Maintain contact at all times with a trained attendant either visually, via phone, or by two-way radio. This monitoring system enables the attendant and entry supervisor to order you to evacuate and to alert appropriately trained rescue personnel to rescue entrants when needed.

- In case an employee detects a fire, he or she must immediately report it, hit the alarm, and then follow the procedures specified in the facility's Emergency Action Plan and call for help. Employees must only try to extinguish the fire in its early stage and then only when it is safe to do so and when they have been trained to do it.
- If a victim is in a state of shock, immediately call for help.

- Unless victims may have a spinal injury, they should be laid on their backs with their legs raised and supported approximately 8-12 inches off the ground. They should also be kept warm, and it is very important to keep them calm. A supervisor should be alerted and asked to call for medical assistance.
- A bleeding wound must be elevated and then cleaned and wrapped with an uncontaminated bandage.
- In the absence of an infirmary, clinic, hospital, or physician that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid.
- For second- and third-degree burns, medical assistance should be sought.
- Victims who have fractured their bones or who have sustained head and neck injuries must not be moved.
- Employees must make sure that they never come in contact with any blood or body fluids. If they have to handle any such fluids, they must wear PPE, especially gloves and safety glasses.
- Employers must provide readily accessible hand washing facilities.
- Protective clothing must be removed before leaving the work area, and disposed of in an appropriately designated area or container for storage, washing, decontamination, or disposal.
- Heat stress can cause various disorders, including heat exhaustion, heat cramps, and heat stroke. Due to the severity of the consequences of heat stress, employees must regularly monitor their workplaces and take preventive measures to avoid it.

If employees experience heat cramps, they should first be taken to a shelter that is either air-conditioned or fanned and given water to drink. Medical attention should immediately be sought if the employee starts vomiting.

- If not treated immediately, heat stroke can be fatal.

Study Questions

1. Stay at least how far away from overhead wires during cleanup and other activities?
2. Different types of burns require different types of first aid treatment. Describe these three types of first aid.
3. Scaffolds should be able to support at least how many times their expected loads?
4. What does a personal fall arrest system include?
5. What three types of ladders can be found at a worksite?
6. How many inches must a guardrail be in height, and how many rails must each one have?
7. When entering a confined space, aside from first blocking piping, checking the atmosphere, and wearing the proper PPE, what must a person also do?
8. List five characteristics of heat stress.

9. What disorder besides frostbite is caused by extreme cold? Hint: If employees experience this, they must immediately be covered with dry blankets.

10. Employees with frostbite must not move or rub the affected area, but must instead warm it slowly to avoid causing what?

Module 3B:

General Safety and Health Provisions

This module provides an overview of the OSHA 29 CFR 1926 Subpart C, General Safety and Health Provisions. Topics covered in this part include safety training and education, first aid, fire protection, and employee emergency action plans.

Key Terms

ANSI: American National Standards Institute

Authorized person: This is an individual assigned by an employer to perform a certain duty or to be present at a particular job site.

Competent person: This individual has authorization to take corrective action and is able to recognize existing and predictable hazards.

Employer: A contractor or subcontractor

Qualified: One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project.

Lesson 1:

General Safety and Health Provisions

Key Points

- In order to decrease the risk of accidents and injuries in the workplace, employers should provide frequent and regular inspections of the job site, materials, and equipment used by employees.

- The use of any machinery, tool, material, or equipment that is not in compliance with OSHA standards is prohibited.
- Unsafe machines, tools, materials, or equipment should be identified by tagging or locking the controls to render them inoperable, or they should be physically removed from the place of operation.
- Employers have responsibilities under OSHA standards to educate and train employees to recognize and avoid unsafe conditions in the workplace and to control and eliminate any hazards or exposures to illness or injury.
- In job site areas where harmful plants or animals are present, employees who have the potential for exposure should be educated about the potential hazards, how to avoid injury, and the first aid procedures to be used in the event of injury.
- Employees required to enter confined or enclosed spaces should be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and the required use of protective and emergency equipment.
- First aid supplies shall be easily accessible when required. The contents of the first aid kit shall be placed in a weatherproof container with individual sealed packages for each type of item, and shall be checked by the employer before being sent out on each job and at least weekly on each job to ensure that the expended items are replaced.
- Another responsibility of the employer is to ensure the availability of fire protection and suppression equipment.
- During the course of construction, combustible scrap and debris shall be removed at regular intervals and safe means provided to facilitate such removal.

- Containers shall be provided for the collection and separation of waste, trash, and other refuse and should be disposed of at frequent and regular intervals.

Study Questions

1. Additional training to work in permit spaces is required when one of what three factors is true?
2. What major program elements comprise a safety program?

Lesson 2: Employee Medical and Exposure Records, Means of Egress, and Employee Emergency Action Plans

Key Points

- Access to employee medical and exposure records must be provided in a reasonable manner and place. If access cannot be provided within 15 days after the employee's request, the employer must state the reason for the delay and the earliest date for when the records will be made available.
- Upon request, the employer must provide the employee, or employee's designated representative, access to employee exposure records. If no records exist, the employer must provide records of other employees with job duties similar to those of the employee.

Access to these records does not require the written consent of other employees. In addition, these records must reasonably indicate the identity, amount, and nature of the toxic substances or harmful physical agents to which the employee has been exposed.

- When appropriate, a physician representing the employer can elect to disclose information on specific diagnoses of terminal illnesses or psychiatric conditions only to an employee's designated representative and not directly to the employee.
- At the time of initial employment and at least annually thereafter, employees must be told of the existence, location, and availability of their medical and exposure records. The employer also must inform each employee of her or his rights under the access standard and make copies of the standard available. Employees must be told who is responsible for maintaining and providing access to records.
- When an employer ceases to do business, that employer is required to provide the successor employer with all employee medical and exposure records. When there is no successor to receive the records for the prescribed period, the employer must inform the current affected employees of their access rights at least three months prior to the cessation of business and must notify the Director of the National Institute for Occupational Safety and Health (NIOSH) in writing at least three months prior to the disposal of records.
- The employer must establish in the emergency action plan the types of evacuation to be used in emergency circumstances.
- The employer should establish an employee alarm system. If the employee alarm system is used for alerting fire brigade members, or for other purposes, a distinctive signal for each purpose shall be used.
- Exits shall be marked by a readily visible sign, and means of egress shall be continually maintained.

Exits for buildings or structures shall be arranged and maintained to provide free and unobstructed egress from all parts of the building or structure at all times when the building is occupied.

- The employer must review with each employee upon initial assignment those parts of the plan that the employee must know to protect him- or herself in the event of an emergency. The written plan must be kept at the workplace and made available for employee review.

Study Questions

1. Employers may withhold the specific chemical identity of a toxic substance if one of what three factors is claimed?
2. How often must an employer review an emergency action plan with each employee covered by it?
3. What basic elements should be included in an employee emergency action plan? Hint: There are seven specified.

Module 4:

HEALTH HAZARDS IN CONSTRUCTION: Hazard Communication

The Hazard Communication Standard (HCS) provides information to workers and employers about various chemical hazards that exist in the workplace, and what protective measures they can take in order to prevent the adverse effects of such hazards.

This part gives you a basic understanding of how to deal with hazardous chemicals and how workers can prevent and protect themselves from chemical hazards.

Key Terms

Chemical: An element or a compound produced by chemical reactions on a large scale for direct industrial and consumer use or for reaction with other chemicals.

Combustible: A material having a flashpoint of 100 degrees Fahrenheit, or above.

Flammable: A material having a flashpoint below 100 degrees Fahrenheit.

HazCom: Hazard Communication Standard

Inhalation: Breathing in an airborne substance that may be in the form of gases, fumes, mists, vapors, dusts, or aerosols.

Training: A course of study in which employees are instructed to identify and work safely with hazardous materials.

Lesson 1:

Introduction to the Hazard Communication Standard

Key Points

- Workers have both a need and a ***right to know*** about the hazards and identities of the chemicals they are exposed to when performing their tasks and duties.
- Exposure (or exposed) means that an employee is subjected, as a condition of employment to a chemical that is a physical or health hazard, including potential (accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (such as inhalation, ingestion, skin contact, absorption, or injection).
- Hazard warning means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which conveys the specific physical and health hazard(s), including target organ effects of the chemical(s) in the container(s).
- Immediate use means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.
- Any hazardous material decanted (pumped from a primary to a secondary container) should have the labeling information transferred to the secondary container also.
- Organic peroxide is any carbon-containing compound with two oxygen atoms joined together.
- Pyrophoric means a chemical will ignite spontaneously in air at a temperature of 130°F (54.4°C) or below.
- Unstable (reactive) means a chemical that in its pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or become self-reactive under conditions of shocks, pressure, or temperature.

- Water-reactive means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

Study Questions

1. Why do flammable materials require more care than combustible materials?
2. Why are organic peroxides of concern?
3. What is an oxidizer?

Lesson 2: Labels, MSDSs, Symbols, Hazards, and Training

Key Points

- Because labels are considered the most immediate source of information about chemicals and their hazard potential, it is obligatory that all hazardous chemical containers be labeled.
- Many manufacturers of chemicals include safe handling procedures on labels. Even so, it is the employer's responsibility to translate the information contained on the MSDS, into any understandable format, and convey that information about the hazards associated with working with any of the hazardous materials in the facility, before an employee is ever exposed to the hazard.
- It is necessary that manufacturers or importers of hazardous chemicals update MSDSs within three months of discovering new important information about chemical hazards.

- Whenever you are working with materials that have a DOT hazard class-shipping label, you should be aware that this represents a specific hazard. Information regarding specific hazards denoted by DOT labels is contained on the material's MSDS.
- It is required, and critical, that employees be trained before working with materials that represent a hazard.
- Water reactive materials react with water and can explode. Furthermore, unstable reactive materials can react or become self-reactive subject to pressure, temperature, or shock.
- Monitor yourself and coworkers for symptoms (such as dizziness, eye or throat irritation, skin rashes) that would indicate that you or your coworkers have been exposed to a hazardous material or chemical. If these or other symptoms appear, report them to your supervisor immediately.
- Always use gloves, aprons, masks, or other PPE whenever called for on a label or MSDS.

Study Questions

1. What information must be included on labels?
2. What hazards do the individual colors of the label created by the Paint and Coatings Association indicate?
3. What two terms are generally used to understand the nature of the health hazards?

Module 5: HEALTH HAZARDS IN CONSTRUCTION: Hazardous Materials

This module is designed for people working in the Construction Industry who are exposed to health hazards and chemicals during the course of their work. Topics include definitions, the Hazard Communication Standard, asbestos standards, MDA, lead, worker protection programs, process safety management of highly hazardous chemicals, and cadmium. This section focuses on the topics covered in OSHA 29 CFR 1926 Subpart D.

This part is intended for a general audience. For more information, please contact your local fire department and consult your fire safety and security maintenance supervisor.

Key Terms

Article: A manufactured item other than a fluid or particle:

- i. Which is formed to a specific shape or design during manufacture
- ii. Which has end use function(s) dependent in whole or in part upon its shape or design during end use and
- iii. Which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical and does not pose a physical hazard or health risk to employees.

Chemical: Any element, compound, or mixture of elements and/or compounds.

Container: Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical.

Explosive: A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

Physical hazard: A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water-reactive.

Trade secret: Any confidential formula, pattern, process, device, information, or compilation of information that is used in an employer's business, and gives the employer an opportunity to obtain an advantage over competitors who do not know or use it.

Workplace: An establishment, job site, or project at one geographical location containing one or more work areas.

Lesson 1: Hazardous Material

Key Points

- Employee exposure to silica dust (breathable quartz) must not exceed 0.1 ug/m(3) averaged over an 8-hour work shift.
- Silicosis can disable a person in many ways, making breathing difficult and painful. Silicosis may also cause death, or turn into lung cancer. Symptoms usually associated with silicosis also include loss of appetite, fevers, and loss of body weight.
- Exposure by inhaling loose asbestos fibers can cause disabling or fatal diseases such as gastrointestinal cancer, cancers of the lung or lung-cavity lining, and the severe lung impairment asbestosis. The symptoms of these diseases generally do not appear for 20 or more years after initial exposure.
- Short-term exposure must also be limited to not more than 1 f/cc, averaged over 30 minutes. Rotation of employees to achieve compliance with either permissible exposure limit (PEL) is prohibited.
- Even workers' families and friends can be at risk, as asbestos can often be carried on clothing. It is important to note that workers are not always told they

are working around asbestos, and even single exposures to very low doses of fibers can result in harm.

- No employee may be exposed to MDA above the permissible exposure limit (PEL) of 10 parts per billion (ppb) as an 8-hour time-weighted average (TWA), or above a short-term exposure limit (STEL) of 100 ppb over a 15-minute sampling period.
- Decontamination areas, located outside of, but as near as practical, to the regulated area, must also be established for decontaminating workers, materials, and equipment contaminated with MDA. The decontamination area must include an equipment storage area, wash area, and clean change area.
- Lead is most commonly taken into the body by inhalation. When workers breathe in lead as a dust, fume, or mist, their lungs and upper respiratory tract absorb the lead into the body. They can also absorb lead through the digestive system if it enters the mouth and is ingested.

Study Questions

1. Describe the two types of silicosis.
2. Describe the four classifications of asbestos.
3. List eight common symptoms of chronic overexposure to lead.

Module 6: Process Safety Management (PSM)

The primary concern of process safety management (PSM) of highly hazardous chemicals is to protect exposed employees from unwanted releases of hazardous chemicals.

Process safety management is basically the proactive identification, evaluation, and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures, or equipment. This part gives you a basic understanding of OSHA standards regarding process safety management (PSM) of highly hazardous chemicals.

Key Terms

Atmospheric tank: A storage tank which has been designed to operate at pressures from atmospheric through 0.5 p.s.i.g. (pounds per square inch gauge).

Catastrophic release: A major uncontrolled emission, fire, or explosion, involving one or more highly hazardous chemicals, that presents serious danger to employees in the workplace.

Facility: The buildings, containers, or equipment that contain a process.

Highly hazardous chemical: A substance possessing toxic, reactive, flammable, or explosive materials/chemicals.

Hot work: Work involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations.

Normally unoccupied remote facility: A facility which is operated, maintained, or serviced by employees who visit the facility only periodically to check its operation and to perform necessary operating or maintenance tasks.

Lesson 1: Introduction to Process Safety Management

Key Points

- A process is any activity involving a highly hazardous chemical, including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or a combination of these activities. Therefore, any activities involving a group of vessels that are interconnected, or activities involving separate vessels located in areas where activities could result in the potential release of a highly hazardous chemical, will be considered a single process.
- If the original technical information is not available, then it may be developed in combination with the process hazard analysis in sufficient detail to support the analysis.
- Employers also have to determine and document that any existing equipment that may have been designed and constructed in accordance with codes or practices that are no longer in standard use are designed and used, maintained, inspected, tested, and operated in a safe manner.
- Process hazard analysis is a systematic approach for identifying and evaluating the hazards of processes involving hazardous chemicals. The employer is required to perform an initial process analysis on all processes covered by this standard. The process hazard analysis must be appropriate to the complexity of the process and should identify, evaluate, and control the hazards involved in the process.
- Initial process hazard analysis must meet the Process Safety Management (PSM) standards requirement and must be completed as soon as possible. The analysis must be updated and revalidated regularly, at least every five years.

- There must be a system in place that addresses the team's findings and recommendations. It is important the employer assure that:
 - The recommendations are resolved in a timely manner.
 - The actions are taken as soon as possible.
 - The resolutions and actions to be taken are documented.
 - A schedule for when these actions are to be completed is drawn up.
 - The actions are communicated to maintenance and other employees who may be affected by the recommended actions.
- Furthermore, employers must keep a copy of the analysis and make it available to OSHA on request. The files must include the process hazard analyses, updates, and revalidation for each process covered by the PSM, along with the documented resolution of recommendations.
- Employers must develop and implement written operating procedures that take the process safety information into consideration and clearly communicate this information to employees, so that workers are as safe as possible when engaged in processes covered by the procedures. According to OSHA, it is vital that tasks and procedures related to the covered process be appropriate, clear, consistent, and most important, well communicated to the employees.
- Any type of change that could affect the process must be reported and updated in the written operating procedures.
- Process safety management requires that each employee who is engaged in operating a process be trained to work safely and that, before being assigned to a new process, employees be trained in an overview and the operating procedures of that process.
- To assure that employees understand and adhere to the current procedure of the process, refresher training is required at least once every three years, or more

frequently if necessary, for each employee engaged in operating a process.

- Employees engaged in operating the process and the employer must mutually decide the appropriate frequency of refresher training.
- Documenting all training is also an important task. It is the responsibility of the employer to assure each employee involved in the operation of a process has received and understands the training, and to prepare and maintain records to that effect.

Study Questions

1. Discuss steps for each operating phase, operating limits, and safety and health concerns.
2. What must process safety management initial training include?
3. What must training documentation records include?

Lesson 2: Contractors, Mechanical Integrity, Management of Change, and Emergency Planning

Key Points

- PSM applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process.
- It is mandatory that a safety review takes place before the introduction of any highly hazardous chemical into

the process. The PSM requires the employer to perform a safety review for new facilities and for modified facilities.

- Procedures that follow recognized and accepted good engineering practices should be used for the inspection and testing of process equipment. Inspections and tests must be scheduled in accordance with the manufacturer's recommendations, good engineering practices, and prior operating experience.
- Equipment deficiencies outside the acceptable limits defined by the process safety information must be corrected before further use. As long as the deficiencies are corrected in a safe and timely manner, they may not necessarily need to be corrected before further use so long as other sufficient, necessary safety measures are in place.
- Emergency pre-planning and training are vital to avoid catastrophes in a workplace; they enable employees to execute proper actions in case of emergencies. An emergency action plan must be developed and implemented in accordance with the OSHA standards for the entire plant.
- The emergency action plan must also include the procedure of handling small releases of hazardous chemicals.

Study Questions

1. PSM mechanical integrity requirements apply to what equipment?
2. What five items must an investigation report include?

Module 7:

Personal Protective Equipment

The life of every human being is precious. Yet due to negligence and improper safety measures, thousands of workers die each year in the construction industry alone. To minimize or eliminate casualties and fatalities, OSHA requires employers to protect their employees from workplace hazards through proper and effective engineering or work practice controls. When these controls are not feasible, the use of personal protective equipment (PPE) is required.

It is the employer's responsibility to assess the workplace hazards. If they are present or are likely to be present and work practice controls alone are not sufficient, then the employer must provide personal protective equipment to the exposed employees. This part provides a basic understanding of OSHA's role in the prevention and elimination of work-related casualties and fatalities.

Key Terms

Contaminant: Any material which by reason of its action upon, within, or to a person is likely to cause physical harm.

dBA: Adjusted decibels

Radiant energy: A kind of energy that travels outward in all directions from its sources.

Lesson 1:

Protecting Employees from Workplace Hazards

Key Points

- To ensure the greatest possible protection for employees in the workplace, the cooperative efforts of both employers and employees will help in establishing and maintaining a safe and healthful work environment.

In general, employers are responsible for:

- Performing a "hazard assessment" of the workplace to identify and control physical and health hazards.
 - Identifying and providing appropriate PPE for employees.
 - Training employees in the use and care of the PPE.
 - Maintaining PPE, including replacing worn or damaged PPE.
 - Periodically reviewing, updating, and evaluating the effectiveness of the PPE program.
- According to the Bureau of Labor Statistics (BLS), three out of every five workers injured at the workplace were not wearing eye protection at the time of their accidents.
 - It is necessary that employers protect employees from various hazards such as falling objects, harmful substances, and noise exposures that can cause injuries. Employers must utilize all feasible engineering and work practice controls to eliminate and reduce workplace hazards. If controls are not sufficient, personal protective equipment is required.
 - A work practice control is a type of administrative control in which the employer modifies the manner/way in which employees perform their tasks and duties.
 - Employees should use PPE according to the instructions provided and inspect/maintain PPE on a daily basis so that it will remain in good working condition.
 - If several different types of PPE are worn together, make sure they are compatible. If PPE does not fit properly, it can make the difference between a worker being safely covered or dangerously exposed. It may

not provide the level of protection desired and may discourage employee use.

- For hand protection, there is no ANSI standard for gloves, but OSHA recommends that selection be based upon the tasks to be performed and the performance and construction characteristics of the glove material. For protection against chemicals, glove selection must be based on the chemicals encountered, the chemical resistance, and the physical properties of the glove material.
- After selecting PPE, proper training should be provided to all those employees who are required to use PPE.
- If an employer believes that a previously trained employee is not demonstrating the proper understanding and skill level in the use of PPE, that employee should receive retraining.
- The employer must document the training of each employee required to wear or use PPE by preparing a certification containing the name of each employee trained, the date of training and a clear identification of the subject of the certification.
- It is essential to determine whether or not employees are trained well enough to use personal protective equipment properly. Furthermore, retraining is important when employees do not have the required skills.

Study Questions

1. In general, employee responsibilities involving PPE are what?
2. It is imperative that employers provide PPE to employees if what is true?
3. Name the basic hazard categories.

4. Name four work practice controls.
5. Employees must know and understand what about PPE?
6. The protective equipment, including personal protective equipment (PPE) shall be provided by the employer at no cost to the employees, except when?

Lesson 2: Head, Eye, Face, Hearing, Foot, Hand, and Body Protection

Key Points

- Bump caps do not meet hard hat requirements.
- The main cause of eye injuries is failure to wear proper eye protection equipment or wearing improper equipment.
- Goggles protect the eyes and the area around the eyes from impact, dust, and splashes. Furthermore, laser (welding) safety goggles must be used when intense concentrations of light produced by lasers are present.
- In one study, only 1% of approximately 770 workers who suffered face injuries were wearing face protection at the time.
- Always use helmets or hand shields during arc welding or arc cutting operations, except during submerged arc

welding. It is obligatory that helpers or attendants use proper eye protection. In addition, goggles or any other suitable eye protection should be used during all gas welding or oxygen cutting operations.

- If employees are exposed to occupational noise at or above 85 dB averaged over an eight-hour period, the employer is required to institute a hearing conservation program that includes regular testing of employees' hearing by qualified professionals.
- Hands are the second most injured body part in the workplace. (Backs are the most injured.)

Study Questions

1. Describe different classes of hard hats.
2. Name and describe the three classes of safety shoes.
3. Name common causes of body injury.

Lesson 3: Choosing Personal Protective Equipment

Key Points

- Gloves should be replaced periodically, depending on the frequency of use and permeability to the substance(s) handled. Contaminated gloves should be rinsed and then carefully removed after use.
- Gloves should also be worn whenever it is necessary to handle rough or sharp-edged objects and very hot or very cold materials.

- Careful attention must be given to hand protection when working with tools and machinery. Power tools and machinery must have guards installed or incorporated into their design that prevents the hands from contacting the point of operation, power train, or other moving parts.
- When selecting chemical resistance gloves, be sure to consult the manufacturers' recommendations, especially if the gloved hand will be immersed in the chemical.
- Because many substances which are health hazards can become airborne, knowing how to protect one's person is very important.
- A respirator is a protective device that covers the worker's nose and mouth or the entire face and head to keep airborne contaminants out of the worker's respiratory system and provide a safe air supply.
- It should be noted that before an employer would provide any employee with a respirator to use in a workplace, the employer must have created a formal written respiratory protection program and have every employee who will wear a respirator medically evaluated by a licensed healthcare professional.
- Every time an employee uses a respirator, that employee must first inspect it. If he or she finds anything wrong with the respirator, have it repaired or replaced immediately.
- Safety belt lanyard shall be a minimum of 1/2-inch nylon, or equivalent, with a maximum length to provide for a fall of no greater than 6 feet. The rope shall have a nominal breaking strength of 5,400 pounds.
- Safety nets shall be provided when workplaces are more than 25 feet above the ground or water surface, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts is impractical.

- At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water.
- Where safety net protection is required by this part, operations shall not be undertaken until the net is in place and has been tested.
- Nets shall extend 8 feet beyond the edge of the work surface where employees are exposed and shall be installed as close under the work surface as practical but in no case more than 25 feet below such work surface. Nets shall be hung with sufficient clearance to prevent user's contact with the surfaces or structures below. Such clearances shall be determined by impact load testing.
- The mesh size of nets shall not exceed 6 inches by 6 inches. All new nets shall meet accepted performance standards of 17,500 foot-pounds minimum impact resistance as determined and certified by the manufacturers, and shall bear a label of proof test.

Study Questions

1. What type of boots feature quick-release fasteners or elasticized insets to allow speedy removal should any hazardous substances get into the boot itself?
2. Most accidents involving hands and arms can be classified under what four main hazard categories?
3. To protect hands from injury due to contact with moving parts, it is important to do what?
4. Describe four basic methods of controlling breathing hazards.

5. What are the four basic questions one must ask in choosing the proper respirator?

6. List six warning signs to look for when inspecting a respirator.

Module 8: Fire Protection

This module has been designed to deliver firsthand information about fires and fire protection measures. After completing this section, you will be able to identify different types of fires and how safety measures can be taken to avoid a disastrous situation. We will also discuss the different types of fire extinguishers in use and discover how careful planning and precautionary measures can be taken to save lives and property.

This part is intended for the general audience. For more information, please contact your local fire department and consult your fire safety and security maintenance supervisor.

Key Terms

Approved: For the purpose of this part, this means equipment that has been listed or accepted by a nationally recognized testing laboratory or by federal agencies.

Closed container: A container so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures.

Combustible liquids: Any liquid having a flash point between 140°F and 200°F.

Combustion: Burning of a material, i.e., a chemical change accompanied by the production of heat and light.

Flammable: Means capable of being easily ignited, capable of burning intensely, or having a rapid rate of flame spread.

Flammable liquids: Means any liquid having a flash point below 140°F and having a vapor pressure not exceeding 40 pounds per square inch (absolute) at 100°F.

Flash Point: The lowest temperature at which the vapors of a liquid can catch fire.

Liquefied Petroleum Gases (LPG): A material which is composed primarily of any of the following hydrocarbons or their mixtures, such as propane, propylene, butane, and butylenes.

Portable tank: Means a closed container having a liquid capacity of more than 60 U.S. gallons and not intended for fixed installation.

Safety can: Means an approved closed container of not more than five gallons capacity, having a flash-arresting screen, spring-closing lid and spout cover, and so designed that it will safely relieve internal pressure when subjected to fire exposure.

Key Points

- The majority of fire-related deaths (50 to 80 percent) are caused by smoke inhalation. Actual flames and burns are second to smoke inhalation as the cause of deaths in fires.
- Be certain that any fire scene is safe before you enter.
- Although smoke inhalation is the primary cause of deaths in fires, it is second to burns in the cause of injuries. Smoke from a fire may contain poison gases or may be hot enough to burn a victim's throat, resulting in serious breathing problems. Symptoms of heavy smoke inhalation include breathing trouble, coughing, drowsiness, an upset stomach, and vomiting.
- For minor burns (2nd degree burns, or less), flush the area with running water. Apply a clean, water-cooled cloth over the area to relieve pain. Do not apply ointment. Seek medical attention if the pain persists or if the burn appears to worsen.
- Even if there is no visible evidence on the surface of the skin, electrical burns can cause deep tissue damage. Commence CPR/EAR if pulse and breathing are absent, and immediately seek medical attention.

Study Questions

1. What does a fire prevention plan detail?
2. Describe the four types of fires.
3. This class of fire extinguisher does not have a numerical rating because there is no readily measurable quantity for this type of fire, what class of fire extinguisher is this?
4. Why should water never be used to put out automobile fires?
5. Distinguish between ionization and photoelectric smoke alarms.

Lesson 2: Fire Prevention and Safety Measures

Key Points

- Smoking should be strictly prohibited in any area that could pose a potential fire hazard. Such areas should be clearly marked with "no smoking" signs.
- Temporary buildings should not be constructed in any location where the means of an exit could be affected.
- Temporary combustible structures, covering a maximum area of 2,000 square feet, should be constructed at least 10 feet away from any other building and should never be used for storage and handling of flammable or combustible liquids, gases,

explosives, or blasting agents or similar hazardous materials.

- The following information pertains to open yard storage:
 - Combustible materials should be stored in a stable condition and should not be stacked or piled higher than 20 feet.
 - Driveways between combustible storage spaces should be at least 15 feet wide and should be properly maintained for easy access.
 - No combustible material shall be stored outdoors within 10 feet of a building or structure.
 - The maximum travel distance to the nearest fire extinguishing unit should not exceed 100 feet.

- It is essential that an emergency plan be reviewed at least annually and modified as required. All workers must be given a copy of the fire safety plan. Some specific points include the following:
 - Travel distance from any point of the protected area to the nearest fire extinguisher must not exceed 100 feet.
 - One or more fire extinguishers, rated not less than 2A, must be provided on each floor of a multistory building.
 - At least one fire extinguisher should be located adjacent to a stairway.
 - Extinguishers and water drums, which are subject to freezing, should be protected from cold conditions.
 - Carbon tetrachloride and other toxic vaporizing liquid fire extinguishers are prohibited.

Study Questions

1. Material shall not be stored within how many inches of a fire door opening?

2. A clearance of how many inches should be maintained for the path of travel, unless a barricade is provided, in which case no clearance is needed?

3. Proper emergency planning includes what?

Module 9:

Materials Handling

This module introduces the hazards that are involved in the handling and storage of materials. Different methods of handling and storage are discussed, the hazards they pose to workers, and the methods by which these hazards can be reduced or eliminated from the workplace.

Key Terms

Conveyor: A mechanical apparatus for moving articles or bulk material from place to place, like an endless moving belt or a chain of receptacles.

Crane: A large, sometimes mobile machine that is used to transport workers and/or material from one point to another, usually in a vertical direction. These are commonly used in the construction of buildings and ships.

Forklift: A type of powered industrial truck that is used to transport material, clearly identified by the large forks that are capable of vertical motion and are installed at the front.

Powered industrial trucks: Vehicles that are used for the transport of material; they may be modified to operate in hazardous conditions.

Screw conveyor: This is designed to convey flowable solid materials.

Lesson 1:

The Hazards and Methods of Prevention (Manual Handling)

Key Points

- Bending, twisting, and turning are some of the common body movements that lead to back and spinal injuries.

- Another common factor that can potentially cause severe injuries is falling objects. Materials that have been improperly stacked present the greatest danger.
- In the case of loads with sharp and rough edges, workers must wear gloves. It also may be advisable for a worker to be fitted with steel-toed shoes when carrying heavy or bulky loads, so as to minimize the risk of foot injuries in case of accidentally dropping the load or if the worker slips.
- Workers must never overload mechanical moving equipment. All types of material handling equipment have maximum weight specifications that must be adhered to. As such, the type of equipment used to move a load from one point to another must be dictated by the specifications of the load itself.
- Workers must ensure that stored materials are not likely to create hazards. For example, workers must ensure that storage spaces are not left to accumulate flammable materials, cause explosions or tripping hazards, or easily harbor rats and other pests. Additionally, storage containers must have adequate capacity to handle the height and weight of stored items, as well as being accessible and in good condition.
- Maximum safe load limits that have been specified by building inspectors must not be exceeded or otherwise violated, and signs displaying load limits must be posted in all storage areas except for slab on grade.
- Lumber that is manually handled must not be stacked to a height of more than 16 feet; 20 feet if a forklift is being used. Painting stripes on poles and walls is a good way to indicate the maximum height allowed.
- If used lumber is being stacked, workers must ensure that all nails have been removed before stacking it. Furthermore, workers must ensure that the lumber stacks are on level and solidly supported bracing. Lumber must be stacked such that it is stable and self-supporting.

- Loose bricks must not be stacked to heights of more than seven feet. When a stack of loose bricks exceeds four feet, bricks must be tapered back two inches for every foot of height over and above the four-foot level.
- When masonry blocks are stacked to a height of six feet or higher, the stacks must be tapered back one-half block for each tier over the six-foot level.
- Non-compatible materials shall be segregated in storage. Baled paper and rags must be kept at a minimum of 18 inches from walls, sprinklers, and partitions. Finally, it is advised that boxed materials be banded, or at least held in place using crossties or shrink plastic fiber.
 - Drums, barrels, and kegs must be stored symmetrically.
 - However, if they are stored on their sides, the bottom tiers must be blocked accordingly to prevent them from rolling.
 - When barrels are stacked on end, planks must be placed between each tier to make a firm, flat stacking surface.
 - If the stack reaches two or more tiers, the lowest tier must be secured on either side to prevent the barrels from shifting.

Study Questions

1. Name the two major hazards involved in handling and storing materials.
2. If the worker has to manually handle an object, he or she must ask for assistance when a load is considered to be what?

Lesson 2: Materials Handling Equipment

Key Points

- It is very important to note that only qualified, competent persons must be allowed to operate cranes. Operators must know the specifications of all loads they lift, such as what is actually being lifted and its weight.
- Cranes must be inspected frequently by competent persons who are familiar with them. Critical parts such as the operating mechanisms, hooks, and load-carrying components must be checked on a daily basis to ensure that no deterioration or maladjustments have occurred.
- Employers must ensure that slings are visually inspected before and during operation, especially if they are under heavy stress. A damaged or defective sling should be immediately removed from service.
- New powered industrial trucks (P.I.T.s) must have some identifying mark indicating that they have been inspected and accepted by some nationally accepted testing laboratory.
- P.I.T. owners and operators must not make any modifications or additions to the truck without the approval of the manufacturer. If any modifications are made, capacity, operation, and maintenance instruction tags, as well as signs must be changed to reflect the new requirements.
- Under normal circumstances, P.I.T.s must not be used in atmospheres containing high concentrations of metal dust, carbon black, coal, or coke dust. Some other safety precautions include the following:
 - Overhead installations such as lights, pipes, and sprinkler systems must be provided with enough headroom.
 - Personnel working on the loading platform must have means to shut off power to the truck if needed.

- All trucks that are to undergo repairs to their electrical systems must have their batteries disconnected prior to the repairs.
- Any replacement part for the trucks must have the equivalent safety levels as the original parts.
- Only stable and safely arranged loads are to be handled. Caution must be exercised at all times when handling loads.
- When using trucks to load or unload materials onto train boxcars, trucks, trailers, or railroad cars, the trucks must be secured using brakes and wheel blocks to prevent their movement.

Study Questions

1. What risks are associated with using conveyors?
2. There are a number of methods an employer can use to reduce the severity of conveyor-related injuries, name three.

Lesson 3: Ergonomics, Training, and Education

Key Points

- Ergonomics, as such, includes changing workplace conditions to make the job as easy as possible and reducing the stressors that can lead to trauma or injuries from repetitive actions. In the case of material storage and handling, this may include reducing the size or weight of objects lifted, making use of mechanical lifting aids, or changing the height of pallets and shelves to make them more accessible.
- Unfortunately, there is no sure method to completely eliminate back injuries caused by lifting materials. However, there are numerous methods by which a large number of lifting injuries can be prevented

through the implementation of ergonomic systems and the training of employees.

- In addition to the use of ergonomics, there are a number of basic safety precautions that can be employed to reduce the incidence of lifting injuries. These include the use of general fire safety precaution techniques and keeping aisles and passages clear.
- Employees must always keep in mind that flammable and combustible materials must be stored in accordance with their fire characteristics.
- Providing sufficient clearance will prevent the possibility that workers will get pinned down. Also, sufficient clearance will reduce the risk that a load will strike an obstruction and fall on an employee.
- Materials should never be stored in aisles.
- OSHA recommends that all employees undergo training programs on handling and storage hazards. These programs must contain material that will be helpful to employees in reducing material handling and storage hazards.
- It is imperative that your company's management play an active role in the effective implementation of a safety and health program designed for handling and storage.
- Each employee required to engage in work with material stored in silos, hoppers, tanks, and similar storage areas shall be equipped with personal fall arrest equipment meeting the requirements of Subpart M of this part.
- When a difference in road or working levels exists, a means such as ramps, blocking, or grading shall be used to ensure the safe movement of vehicles between the two levels.
- Bagged materials shall be stacked by stepping back the layers and cross-keying the bags at least every 10 bags high. Furthermore, materials shall not be stored

on scaffolds or runways in excess of supplies needed for immediate operations.

- Brick stacks shall not be more than seven feet in height.
- Structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked, shall be stacked and blocked so as to prevent spreading or tilting.
- Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.
- Portable and powered dockboards shall be strong enough to carry the load imposed on them.
- Portable dockboards shall be secured in position, either by being anchored or equipped with devices that will prevent their slipping.
- Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling.

Study Questions

1. What must a training program about handling and storage hazards include?
2. What are four main elements of an effective occupational safety and health program?

Module 10:

Hand and Power Tools

This module gives you a basic understanding about OSHA's role in the prevention and elimination of work-related illnesses and injuries. Hand and power tools are a part of our everyday lives and help us to easily perform tasks that otherwise would be difficult or impossible. However, these simple tools can be hazardous and have the potential for causing severe injuries when used or maintained improperly. Special attention to hand and power tool safety is necessary to reduce or eliminate these hazards.

Key Terms

Hazard: Danger or risk

PPE: Personal Protective Equipment

P.S.I.: Pounds per square inch

Training: Process of teaching or learning a skill, etc.

Lesson 1:

Safe Use of Hand and Power Tools

Key Points

- The employer is responsible for the safe condition of tools and equipment used by employees. Employers shall not issue or permit the use of unsafe hand tools. Employees should be trained in the proper use and handling of tools and equipment.
- Hand tool hazards are usually caused by misuse and improper maintenance.
- Circular saws, chainsaws, and percussion tools without positive accessory holding means must be equipped with a constant pressure switch that will shut off when the pressure is released.

- All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than two inches in diameter, disc sanders, belt sanders, reciprocating saws, and saber saws must be equipped with a momentary contact “off” switch and may have a lock-on provided that they can be turned off by a single motion of the same finger that turned them on. Additionally:
 - Disconnect tools when not in use, before servicing and cleaning, and when changing accessories.
 - Keep people not involved with the work away from the tools.
 - Secure work with clamps or a vice, freeing both hands to operate the tool.
 - Don’t hold the switch button while carrying a plugged-in tool.
 - Keep tools sharp and clean.
 - Consider what you wear, as loose clothing and jewelry can get caught in moving parts.
 - Remove damaged electric tools and tag them: “Do Not Use.”

Study Questions

1. Different types of power tools are determined by their power source, which may take one of which five forms?

2. List four power tool precautions that apply to electric cords.

Lesson 2: Classification of Tools

Key Points

- Never remove guards because it makes it easier to see what you are doing. The removal of guards on

moving parts may cause severe injury or even death to an employee or other persons near them. For example:

- All pneumatic driven nail guns, staplers, and other similar equipment with automatic fastener feeds shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.
 - The manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded. Eye protection should be worn while operating pneumatic tools.
 - Hearing protection should be worn while operating jackhammers.
 - Compressed air hoses with an inside diameter (ID) greater than one-half (1/2) inch must have a safety device in place to reduce pressure in case of hose failure.
-
- With pneumatic devices, ensure tool is fastened securely to the air hose to prevent a disconnection.
 - Use a short wire or positive locking device that attaches the air hose to the tool.

 - Do not use compressed air for cleaning.
Exception: Compressed air may be used for cleaning where it is reduced to less than 30 P.S.I. with effective chip guarding and PPE.

Study Questions

1. Machine guards must protect the operator and others from what?

2. All hazards involved in the use of power tools can be prevented by following five basic safety rules, name these.

Lesson 3:

Mechanical Power-Transmission Apparatus

Key Points

- Never remove guards while in operation. Always use proper lockout/tagout procedures when performing maintenance.
- Any part of the flywheel that extends through the working floor must be completely enclosed or surrounded by a guardrail and toeboard.
- Flywheels that are located above working areas must be guarded by installing guards that have sufficient strength to hold their weight in the event of a shaft or wheel-mounting failure.
- Never place your hands past protective guards or try to remove them. Doing so may result in one or multiple body parts being crushed.
- You must ensure that all metal is free from burrs and sharp edges at all times.
- Each continuous line of shafting must be secured in position against excessive endwise movement. Inclined and vertical shafts, particularly inclined idler shafts, have to be securely held in position against endwise thrust.
- Pulleys that have cracks or pieces broken out of rims must never be used.
- A guide must be provided to prevent the belt from leaving the pulley on the side where there is insufficient clearance, unless the distance to the nearest fixed pulley, clutch, or hanger exceeds the width of the belt used.
- If the upper and lower runs of horizontal belts are located in such a way that passage of persons between them would be possible, the passage must be

completely barred by a guardrail or other barrier. Alternatively, a platform can be provided over the lower run and guarded on either side by a railing completely filled in with wire mesh or other filler, or by a solid barrier. The upper run must be guarded in a way as to prevent contact with either the worker or by objects carried by him.

- Overhead chain and link belt drives follow the same rules as overhead horizontal belts and should be guarded in the same manner.
- All guards for inclined belts have to be arranged in such a manner that a minimum clearance of 7 feet (or 2.128 meters) is maintained between belt and floor at any point outside of a guard.
- It is recommended that no projecting setscrews or oil-cups be used in any revolving pulley or part of machinery.
- All revolving collars, including split collars, must be cylindrical. All screws or bolts used in collars should not project beyond the largest periphery of the collar.
- Protection against falling must be provided in any area where the drive extends over other machines or working areas. However, this does not apply to manually operated sprockets.
- Openings with hinged or sliding, self-closing covers must be present if frequent oiling has to be done. Oil feed tubes must be attached to all points that are not easily accessible to add lubricant while machinery is in motion.
- Where belt shifters are not directly located over a machine or bench, the handles should be cut off 6 feet 6 inches (or 1.976 meters) above floor level.
- Belt perches in the form of brackets, rollers, etc., can be used where loose pulleys or idlers are not practical to keep idle belts away from the shafts.

Study Questions

1. All projecting shaft ends and edges must be smooth and not project more than how much the diameter of the shaft, unless guarded by non-rotating caps or safety sleeves?
2. In power plants, only which part of the belt needs to be guarded?

Module 11:

Welding and Cutting

This module discusses the two most common types of welding and cutting (gas and arc), the dangers that are involved in working with them, and the safety measures that can be undertaken to minimize and prevent the occurrence of their associated hazards. The part presents fire prevention techniques and the danger of preservative coatings when welding or cutting.

Key Terms

Acetylene: Acetylene forms explosive mixtures with oxygen or air. When dissolved in acetone, it is non-explosive and so is stored as such; however, the acetone is under pressure in steel cylinders for commercial use.

Beryllium: A steel-gray, light, strong, brittle, toxic, bivalent metallic element used chiefly as a hardening agent in alloys.

Cadmium: A bluish-white malleable ductile toxic bivalent metallic element used especially in protective plating and in bearing metals.

Chromium: A blue-white metallic element found naturally only in combination and used especially in alloys and electroplating.

Grounding: To connect electrically with the ground.

Ultraviolet rays: Situated beyond the visible spectrum at its violet end; used to describe radiation having a wavelength shorter than those of visible light and longer than those of x-rays.

Valve: Device for controlling the flow of fluids (liquids and gases).

Lesson 1:

Gas Welding and Cutting

Key Points

- In minimizing chances of injury when transporting, moving, and storing compressed gas cylinders:
 - Should the cylinder be frozen, warm (not boiling) water should be used to thaw it. Bars should not be used under the valve protection caps to pry them loose.
 - Unless cylinders have been properly secured using special carriers that are intended for that purpose, valve protection caps must be placed on the cylinders.
 - Cylinders should never be lifted by valve protection caps.
 - When a cylinder is being transported, the valve should be closed, regardless of whether the cylinder is empty.
 - Compressed gas cylinders must always be placed and/or secured in an upright position at all times, except when they are being hoisted or carried. This is necessary due to some cylinders being partially filled with Acetone. If they were horizontal, the acetone could be introduced into the combustion mixture.
 - Cylinders should also be secured in a vertical position before being transported by powered vehicle.

- Due to the flammable nature of the contents in a cylinder, they must be kept at an appreciable distance from an actual cutting operation. This is to ensure that any hot slag or flames do not reach them. In cases where this proves to be impractical, fire resistant shields must be used. Similarly, cylinders should be placed in areas where they will not become part of an electric circuit. Cylinders that contain oxygen, acetylene, or other fuel gas must not be taken into confined spaces.

- Only the owner of the cylinder or any person authorized by the owner shall be allowed to refill the cylinder; no one will be allowed to use the cylinder for any purpose other than that intended by the supplier.

- The person cracking the fuel gas valve must ensure that he or she is standing to one side of the valve and not directly in front of it. Furthermore, the worker must ensure that while cracking the valve, no gas will reach sparks, flames, or other source of ignition.
- Cylinder valves must always be opened slowly to prevent damage to the regulator. Furthermore, valves should not be opened more than one and a half turns to enable workers to quickly close the valve if need be.
- Before a regulator is removed from the cylinder, the worker must ensure that the valve is closed and that all the gas has been released from the regulator.
- When the valve has been opened and a leak is discovered in the valve stem, the valve must be closed immediately and the gland nut tightened. If this does not stop the leak, the cylinder must be tagged and its use discontinued. The cylinder should then be removed from the work area.
- In the case that the leak is found to originate from the valve rather than the valve stem, the cylinder will be tagged and its use discontinued. The cylinder must then be removed from the work area. However, should a regulator effectively halt the leak, the cylinder does not have to be removed.
- If leaks develop around any safety devices, such as a fuse plug, the cylinder should be removed from the work area.
- Workers must ensure that the fuel gas and oxygen hoses are not interchanged.
- Any and all hoses that are used to carry oxygen, acetylene, or any other substance that will ignite, combust, or otherwise pose a threat to employees must be inspected prior to each work shift. Any defective hoses must be removed from service immediately.

- Any hoses that have been subject to flashback or are displaying signs of wear and tear must be tested at twice their normal pressure.
- Stored gas hoses must be well-ventilated, and hoses, cables, and other equipment must be kept away from any passageways, ladders, and stairs.
- Any clogged torch tip openings must be cleaned using cleaning wires, drills, or any other devices that have been deemed suitable. Workers must inspect torches before each working shift to ensure that there are no leaks. Defective torches are to be discarded immediately.

Study Questions

1. Fuel gas from cylinders shall not be used through torches or other devices equipped with shutoff valves without first reducing the pressure through what item that attaches to the cylinder valve or manifold?
2. Fuel and oxygen manifolds must clearly display the substance they contain in letters that are at least how high?

Lesson 2: Welding Safety: Prevention, Ventilation, and Protection

Key Points

- Any current-carrying parts coming into contact with the holders must be fully insulated against the maximum voltage.
- Pipelines containing gases, flammable liquids, or conduits that are used for electrical circuits must not be used as ground returns.

- All ground connections must be routinely inspected to ensure that they are mechanically strong and electrically adequate for the required current.
- When the arc welder leaves work, stops work for a prolonged period of time, or the arc welding or cutting machine is moved, the arc welder must ensure that the power supply switch is kept open. Workers must also ensure that any faulty or defective equipment is reported to the appropriate supervisor(s).
- If while welding or cutting, it is determined that conventional fire prevention methods are not sufficient, additional personnel must be assigned to guard against the possibility of fire.
- Because of its high toxicity, any work involving beryllium base or filler metals should be done with both air-line respirators and local exhaust ventilation.
- Chlorinated solvents, unless shielded, must be kept 200 feet away from the exposed arc. Surfaces prepared with chlorinated solvents must be thoroughly dry before any welding is permitted on the surface.
- Should a coating be determined highly flammable, precautions must be taken to prevent ignition. For example, the coating will be stripped off the area being heated to prevent the risk of ignition.

Study Questions

1. When welding work is being done on stainless steel, workers should be protected with either local ventilation or an air-line respirator to protect from dangerous concentrations of what?
2. When in an enclosed space, all surfaces that contain a toxic preservative must be stripped of all coating for up to a distance of how much from the area of heat application?

Lesson 3: Operating and Using Cylinders, Welding Cables, and Connectors

Key Points

- Although a gas cylinder is made from solid metal, there exists the possibility that a gas cylinder could explode if exposed to electricity or heat. Therefore, extra care is required when dealing with gas cylinders.
- When not in use, manifold and header hose connections shall be capped.
- When taping parallel sections of fuel gas and oxygen together, one should make sure that no more than 4 out of 12 inches are covered by tape.
- If connections are affected by cable lugs, they should be fastened or joined together to provide good contact.
- Do not dip hot electrode holders in water, as this may expose the arc cutter or welder to an electric shock.
- Never forget to completely insulate the exposed metal parts of the lugs.

Study Questions

1. When placing or storing cylinders inside buildings, make sure the cylinders are stored in a well-ventilated, well-protected, dry location, and are at least how far away from highly combustible materials, such as oils and excelsior?
2. Connections of hoses should be kept free of what at all times?

Module 12:

FOCUS FOUR: Electrical Safety

This module provides you with a basic understanding of OSHA's role in the prevention and elimination of work-related illnesses and injuries. It emphasizes hazard identification, avoidance, control, and standards.

OSHA's 1926 Subpart K—Electrical is all about the safe operation of electricity. Electricity is accepted as a source of power without much thought given to the hazards encountered. Some employees work with electricity directly during construction. This is the case with engineers, electronic technicians, and power line workers. Others, such as office workers and salespeople, work with electricity indirectly.

Key Terms

Amperes or Amps: The volume of the current flow.

AWG: American wire gauge (AWG), which is one measurement standard used to size wire.

Circuit: Completion of the path of the current; including a voltage source, conductors, and the load (such as a lamp, tool, or heater).

Conductors: Materials that contain free electrons that allow current to flow through the material.

Current: Electron flow (measured in amperes).

Electric shock: The physical effect nerve stimulation and/or muscle contraction caused by the flow of current through the body.

Electrocution: Death caused by electrical shock.

GFCI: Ground-Fault Circuit Interrupter, a device that detects current imbalance between the circuit conductors and reference to the grounding conductor. If an imbalance or "leak" occurs as small as 5 milliamps (.005 amps) for as little

as 1/40th of a second this device will interrupt the circuit, preventing a shock which most people would not feel.

Grounding: An intentional conductive connection to the earth that provides a path back to the source from any conductive portion of the load device or equipment for any fault current that may occur in a circuit.

Insulators: Materials with few free electrons. Current does not easily flow through insulators, if at all.

Resistance: Opposition to current flow.

Volts: The electrical pressure (measure of electrical force).

Watts: Measurement work produced by the electrical circuit.

Wire gauge: System used to measure the physical size of wire.

Lesson 1: Introduction to Electrical Hazards and Control

Key Points

- The following are some of the dangers associated with electricity:
 - More than five workers are electrocuted every week.
 - Electricity causes 12 percent of young worker deaths in the workplace.
 - It takes very little current flow to cause harm to a person who comes in direct contact with an electrical circuit.
 - There is a significant risk of fires due to electrical malfunctions.
- LOW VOLTAGE DOES NOT MEAN LOW HAZARD!
- Burns are the most common shock-related injury. Approximately 10 persons per day receive electrical

burns severe enough to require treatment at special burn hospitals.

- Many burns occur as a result of arc flash. Burns typically occur on the hands, although other parts of the body may be affected and are very serious injuries that require immediate attention.
- In the case of arc flash, additional internal injuries may occur with the burns as a result of the concussion force produced by the explosion from the arc flash.
- The heat produced by an arc flash is four times hotter than the surface of the sun.
- Electric shock can also cause indirect injuries. Workers in elevated locations who experience a shock can fall, resulting in serious injury or death.
- Conductors entering boxes, cabinets, or fittings must be protected from abrasion.
- Overhead and buried power lines are especially hazardous because they carry extremely high voltage. Fatal electrocution is the main risk, but burns and falls from elevation are also hazards. Using tools and equipment that can contact power lines increases the risk.
- A wire that is too small for the current is a hazard.
- 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, although you are more likely to receive a shock if the tool is not grounded or double-insulated.
- Improper use of cords also can cause shocks, burns, or fire.
- In an arc flash incident, a large amount of concentrated radiant energy explodes outward from electrical equipment, creating pressure waves that can damage a person's hearing, a high-intensity flash that can

damage eyesight and a superheated ball of gas that can severely burn a worker's body and melt metal.

- A difference of potential (voltage reading) exists between any two phase conductors, or any phase conductor and a grounded part (grounded systems only).

Study Questions

1. The amount of incident energy that is exerted outward at the point of an arc fault is primarily dependent on what two factors?
2. You will get an electrical shock if parts of your body complete an electrical circuit by doing one of what two things?
3. The severity of a shock depends on what?
4. Electrical accidents are caused by a combination of what three factors?
5. Power lines hazards can be avoided if what five precautions are taken?
6. If a portable tool with an extension cord has a wire too small for the tool, what may happen and what is the reason for this happening?
7. Cords can be damaged as a result of what five factors?

8. Flexible cords must not be used in any of what three ways?

Lesson 2: Electrical Hazards—Other Preventive Measures

Key Points

- Grounding creates a low-resistance path from a tool to the earth to disperse unwanted current.
- An employer must use *either ground fault circuit interrupters* or an assured equipment grounding conductor to protect employees on construction sites.
- Flexible cords must be connected to devices and fittings so that strain relief is provided which will prevent pull from being directly transmitted to joints or terminal screws.
- Equipment or circuits that are de-energized must be rendered inoperative and must have tags attached at all points where the equipment or circuits could be energized.
- As appropriate, the employer shall ensure that all wiring components and utilization equipment in hazardous locations are maintained in a dust-tight, dust-ignition-proof, or explosion-proof condition.
- Wet clothing, high humidity, and perspiration increase your chances of being electrocuted.
- Safety shoes should be used with other insulating equipment and in connection with active precautions to reduce or eliminate the potential for providing a path for hazardous electrical energy.

- Wearing a hard hat will protect your head up to 20,000 volts.

Study Questions

1. What three functions does a GFCI perform?
2. The AEGCP on construction sites must cover what three items?
3. When batteries are being charged, the vent caps shall be kept in place to avoid what from occurring?

Module 13:

FOCUS FOUR: Struck-By and Caught In Between Hazards

This module provides an overview of construction-related incidents of workers who have been struck by and caught in between hazards. It identifies the types of operations that most often cause these hazards. Additionally, it discusses the engineering controls that should be followed and lists the personal protective equipment (PPE) that should be used to limit or eliminate injuries resulting from being struck by and caught in between hazards.

Key Terms

Audible backup alarms: These devices must be installed on heavy construction vehicles and maintained in proper working order. They sound an alarm to nearby workers that a dangerous vehicle is backing up.

Chock: A wedge or block used to keep a vehicle parked from rolling on an incline.

Excavation work: Excavation-related work is a major cause of caught in between hazards. In 2005, the vast majority of caught in between hazard citations were related to excavation operations.

Limited access zone: The area adjacent to masonry wall construction that clearly limits access by all but essential employees.

PSI: Pressure per square inch; used to measure compressed air.

Shoring: A structure like a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and is used to prevent cave-ins.

Toeboards: A type of guard installed along the lower edge of scaffold platforms and overhead walkways that is designed to keep tools and other objects from falling and injuring workers

below. Installing toeboards is considered an engineering control.

Lesson 1: Struck-By Hazards

Key Points

- When working near a public roadway, workers are exposed to being struck by trucks, cars, or other vehicles. Some workers face similar dangers in their everyday workplaces.
- Important engineering controls to consider follow:
 - Always install, use, and maintain vehicle back-up alarms.
 - Station flaggers behind vehicles that have obstructed rear views.
 - Keep non-essential workers away from areas of vehicle use.
 - Keep workers away from temporary overhead activities.
 - Place barriers and warning signs around hazardous operations and public roadways.
- Two important general rules to follow are:
 - **Never** put yourself between moving or fixed objects.
 - **Always** wear bright, highly visible clothing when working near equipment and vehicles.
- Don't allow workers to drive equipment in reverse without an alarm or flagger.
- Proper maintenance of vehicles and the surfaces on which they operate will eliminate many struck-by injuries.
- Depending on the situation, injuries from being struck by flying or falling objects range from minor ones like bruises to severe ones like concussions, blindness, and death.

- Always follow these safe practices while working around cranes and hoists:
 - Never allow employees to work underneath loads being moved.
 - Barricade areas and post warning signs to keep non-essential employees and outsiders away from overhead equipment.
 - Inspect cranes and hoists before each use to ensure components are in good working condition.
 - Never exceed the lifting capacity of cranes and hoists.

- Secure unrolled wire mesh so it cannot recoil.

Study Questions

1. According to OSHA estimates, how many struck-by fatalities involve heavy equipment like trucks or cranes?

2. With what three things are struck-by accidents usually associated?

Lesson 2: Caught in Between Hazards

Key Points

- It is bad enough if a worker is struck by a vehicle, but if he or she is also pinned or caught in between another stationary surface, almost certainly life or limb will be lost.

- Always properly stack building materials so they are clear of work areas and so they do not suddenly shift or slide onto a worker.

- Operational plans must always allow for adequate work areas in which to move suspended loads.
- Always allow enough space around stacks of materials or wide walkways to allow workers to quickly move out of the way in case materials slide or are accidentally pushed over.

Study Questions

1. OSHA's Web site states that the top four causes of construction fatalities are a result of what?
2. Never allow workers to enter an unprotected trench (or excavation) that is this deep or deeper unless an adequate protective system is in place. How many feet is this?

Module 14:

FOCUS FOUR: Fall Protection

This module gives you a basic understanding about OSHA's role in prevention and elimination of work-related illnesses and injuries. The OSHA standard identifies areas or activities where fall protection is needed.

It clarifies what an employer must do to provide fall protection for employees, such as identifying and evaluating fall hazards and providing training. Under the standard, employers are able to select fall protection measures compatible with the type of work being performed.

OSHA places its rules for fall protection in several different subparts in the construction standards, depending primarily on the nature of the work. The standard covers most construction workers, except those inspecting, investigating, or assessing workplace conditions prior to the actual start of work or after all work has been completed.

Key Terms

Anchorage: A secure point of attachment for lifelines, lanyards, or deceleration devices.

Body belt: A strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

Body harness: Straps that may be secured about the person in a manner that distributes the fall-arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with a means for attaching the harness to other components of a personal fall arrest system.

Connector: A device that is used to couple (connect) parts of a personal fall arrest system or positioning device system together.

Controlled access zone: A work area designated and clearly marked in which certain types of work (such as overhand bricklaying) may take place without the use of conventional

fall protection systems—guardrail, personal arrest or safety net—to protect employees working in the zone.

Deceleration device: Any mechanism, such as rope, grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, which serve to dissipate a substantial amount of energy during a fall arrest, or otherwise limits the energy imposed on an employee during fall arrest.

Guardrail system: A barrier erected to prevent employees from falling to lower levels.

Hole: A void or gap 2 inches (5.1 cm) or more in the least dimension in a floor, roof, or other walking/working surface.

Lanyard: A flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

Leading edge: The edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed.

Lifeline: A component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorage at both ends to stretch horizontally (horizontal lifeline), and that serves as a means for connecting other components of a personal fall arrest system to the anchorage.

Low-slope roof: A roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

Opening: A gap or void 30 inches (76 cm) or more high and 18 inches (46 cm) or more wide, in a wall or partition, through which employees can fall to a lower level.

Personal fall arrest system: A system including, but not limited to, an anchorage, connectors, and a body harness used to arrest an employee in a fall from a working level. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

Positioning device system: A body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning backwards.

Rope grab: A deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks to arrest a fall.

Safety-monitoring system: A safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

Self-retracting lifeline/lanyard: A deceleration device containing a drum-wound line that can be slowly extracted from, or retracted onto, the drum under minimal tension during normal employee movement and which, after onset of a fall, automatically locks the drum and arrests the fall.

Snap-hook: A connector consisting of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object.

Steep roof: A roof having a slope greater than 4 in 12 (vertical to horizontal).

Unprotected sides and edges: Any side or edge (except at entrances to points of access) of a walking/working surface (e.g., floor, roof, ramp, or runway) where there is no wall or guardrail system at least 39 inches (1 meter) high.

Walking/working surface: Any surface, whether horizontal or vertical, on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork, and concrete reinforcing steel. Does not include ladders, vehicles, or trailers on which employees must be located to perform their work duties.

Warning line system: A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing

work may take place without the use of guardrail, body belt, or safety net systems to protect employees in the area.

Lesson 1: Fall Protection

Key Points

- Falls are the leading cause of fatalities in the construction industry.
- If an employee is exposed to falling 6 feet (1.8 meters) or more from an unprotected side or edge, the employer must provide a guardrail system, safety net system, or personal fall arrest system to protect the worker.
- Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 6 feet or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches (1.0 meter) above the walking/working surface must be protected from falling by the use of a guardrail system, a safety net system, or a personal fall arrest system.
- A safety net must have a border rope with a minimum breaking strength of 5,000 pounds.
- All components of a fall arrest system must be inspected before each use and after impact. Defective components must be removed from service.

Study Questions

1. What are the distinguish characteristics of a safety monitoring system and a warning line system?

2. If safety nets are connected together, the connection must be as strong as the individual nets and not more than how far apart?
3. When stopping a fall, a PFAS must be attached to an anchor point capable of withstanding how many pounds of force?
4. When stopping a fall, a PFAS must bring an employee to a complete stop and limit maximum deceleration distance an employee travels to how many feet?
5. When stopping a fall, a PFAS must have sufficient strength to withstand how much of the potential impact energy of an employee free falling a distance of six feet?

Lesson 2: Inspection and Safety Monitoring Systems

Key Points

- Body belts cannot be used for fall arrest.
- Lanyards and vertical lifelines must have a minimum breaking strength of 5000 pounds.
- Lanyards should be attached to a D ring between the shoulder blades above the employee.
- Snap hooks and D rings must have tensile strength of 5000 pounds and be proof tested to 3600 pounds.

- When using snap hooks, use only one snap hook per D ring to prevent rollout.
- All snap hooks must have a locking mechanism.
- A positioning device system is a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and to work with both hands free while leaning.
- A positioning device system is not a fall arrest system!
- The employer must designate a competent person to monitor the safety of other employees; this person must among other things:
 - Be on the same walking/working surface and within visual sighting range of the employee being monitored.
 - Be close enough to communicate orally with the employee.
 - Not have other responsibilities, which could take attention away from his or her monitoring function.
- The fall protection plan option is available only to employees (engaged in leading edge work, precast concrete erection work, or residential construction work) who can demonstrate that it is infeasible or that it creates a greater hazard to use conventional fall protection equipment.

Study Questions

1. Of the several types of lanyards, what are four and their given characteristics?
2. Describe the two different forms of life lines.
3. What is a warning line system?

4. A Controlled Access Zone (CAZ) must be erected how far away from an unprotected edge?

5.

Module 15: Cranes and Rigging

This module is intended for workers who want to learn more about cranes, derricks, hoists, elevators, and/or conveyors. Topics include cranes and derricks, helicopters, base-mounted drum hoists, overhead hoists, conveyors, and aerial lifts. This part covers topics included in OSHA 29 CFR 1926.55 Subpart N.

Key Terms

Accident: Harmful event that is unexpected or without apparent cause.

Act: Such as a statute, decree, or enactment resulting from a decision by a legislative body.

Block: Sheaves or grooved pulleys in a frame with a hook, eye, and strap.

Boom: An inclined spar, strut, or other long member supporting the hoisting tackle.

Boom angle indicator: An accessory device that measures the angle of the boom base section centerline to horizontal load and the weight of the object being lifted which includes load blocks and hooks, wire ropes, rigging, boom attachments, and ancillary attachments.

Boom stops: A device used to limit the angle of the boom at its highest position.

Brake: To slow or stop motion by friction or power.

Counterweight: Weights used for balancing loads and the weight of the crane in providing stability.

Crane: Consists of a rotating structure on rubber tires or crawler treads used for lifting and lowering horizontally.

Deck: The revolving superstructure or turntable bed.

Drum: The spool or cylindrical member around which cables are wound for raising and lowering loads.

Hoist: Used to lift and lower load.

Jib: Extension attached to the boom point to provide added boom length for lifting specified loads.

Outriggers: Support members attached to the crane's carrier frame that are used to level and stabilize the crane.

PCSA: Power Crane and Shovel Association

Pendants: Stationary wire ropes used to support the boom.

Radius: The horizontal distance from the axis of the rotation of the crane's superstructure to the center of the suspended load.

Standards: Measure of comparison for quantitative or qualitative value; a criterion.

Superstructure: The rotating frame, gantry, and boom or other operating equipment.

Lesson 1: General Standards

Key Points

- The employer should designate a competent person to inspect all of the machinery and equipment before and during use to ensure that they are within safe working parameters. All deficiencies must be promptly repaired and defective parts replaced before the machine can be used.
- OSHA's analysis of crane accidents in general industry and construction identified an average of 71 fatalities per year. A study conducted by OSHA

showed that nearly 30 percent of work-related electrocutions involved cranes.

- Although mechanical failures represent only 11 percent of the causes of crane accidents, they usually result in major accidents involving injuries, fatalities, substantial material costs, and negative media coverage.
- Studies and analyses often show that mechanical failures are frequently due to the result of a lack of preventive maintenance or adequate training, and/or experience on the part of the personnel involved.

Study Questions

1. Name six crane hazards.
2. What has OSHA identified as eight major causes of crane accidents?

Lesson 2: Cranes

Key Points

- Crane operators must know the load limits of the crane and the approximate weight of the load about to be lifted.
- Once the load weight is known, the operator must verify lift calculations and determine if the load is within the load rating of the crane.
- It is advised that all employees stay out of the swing radius of the crane. OSHA determined that the preferred way to protect employees in these situations

is to completely barricade the entire swing radius of the equipment and prevent employee access to the area.

- A boom angle indicator must be located on the crane in a position where it will be clearly visible to the operator.
- The crane must be uniformly level within one percent of level grade and located on firm footing.
- A thorough documented inspection of hoisting machinery must be carried out by a competent person on an annual basis.
- In addition to the annual documented inspection, the OSHA standard requires a visual inspection before and during each shift, and an additional inspection at least once a month.
- Wire ropes should not be used in any of the following conditions:
 - In running ropes, with six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.
 - Wear of one-third the original diameter of outside individual wires with kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure.
 - Evidence of any heat damage from any cause.
 - In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.
- All operators must be certifiably qualified to operate a specific type of crane before they are allowed to do so. Furthermore, all operators must undergo a period of on-the-job training, so as to familiarize themselves with any conditions specific to the workplace.

Study Questions

1. For what reasons are load or load-moment indicators not reliable?

2. The operator must take into consideration what six conditions that may limit the load rating of a crane?
3. List seven items/parts of a crane that must be inspected on a regular basis.

Lesson 3: Cranes, the Personnel Platform, and Rigging

Key Points

- Always make sure that the rated load of the crane does not exceed the original capacity specified by the crane's manufacturer. To avoid accidents, a load rating chart with clearly visible letters and figures shall be provided with each crane, and should be fixed at a location where the chart can easily be read by the operator of the crane.
- When installing cranes and derricks permanently on a barge, make sure their capacity and limitations of use are in compliance with current design criteria.
- Cranes and derricks that have variable angle booms should be equipped with a boom angle indicator. The indicators must be placed where they can be easily seen by operators.
- It is important that the suspension system and the personnel platform be designed by a qualified engineer or by a competent person qualified in structural design.
- If access gates are installed in the area, make sure that they do not swing outward during hoisting. In

addition, to prevent accidents, the gates must be equipped with a restraining device.

- Only a qualified welder who is familiar with the weld types, material, and grades is allowed to perform the welding of the personnel platform.
- When bridles and associated rigging are not hoisting personnel, they should not be used for other purposes.
- When the crane engine is running and the platform is occupied, the crane or derrick operator should remain at the controls at all times.
- Do not hoist employees if weather conditions are bad, or if any other indication of impending danger exists. If employees are hoisted and a dangerous situation arises, they should be grounded immediately and safely.

Study Questions

1. Always make sure that the total weight of the loaded personnel platform and related rigging does not exceed how much of the manufacturer's rated capacity for the configuration and radius of the crane or derrick?
2. Cranes having telescoping booms must be equipped with what?

Module 16: Motor Vehicles

This module is intended for workers who need to know about motor vehicles, mechanized equipment, marine operations, rollover protective structures, overhead protection, signs, signals, and/or barricades.

Topics include motor vehicles, mechanized equipment, marine operations, rollover protective structures, overhead protection, signs, signals, and/or barricades.

This part covers the topics included in OSHA 29 CFR 1926 Subparts O–Motor Vehicles; W–Rollover Protection; and G–Signs, Signals, and Barricades.

Key Terms

Barricade: An obstruction to deter the passage of persons or vehicles.

ROPS: Rollover protective structures

Signals: Moving signs provided by workers, such as flagmen, or by devices, such as flashing lights, to warn of possible or existing hazards.

Signs: Visual warnings of hazard, temporarily or permanently affixed to, or placed at locations where hazards exist.

Tags: Temporary signs, usually attached to pieces of equipment or structures to warn of existing or immediate hazards.

Lesson 1: Subpart O–Motor Vehicles

Key Points

- Motor vehicles covered by Subpart O of the OSHA regulations are those vehicles that operate within an off-highway jobsite which is not open to public traffic.
- Whenever visibility conditions warrant additional light, all vehicles or combinations of vehicles in use, must be equipped with at least two operable headlights and taillights.
- All vehicles, or combinations of vehicles, must have brake lights in operable condition regardless of light conditions.

- All vehicles must be equipped with adequate audible warning devices at the operator's station. These devices must be kept operational.
- No employer shall 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 levels.
 - The vehicle is backed up only when an observer signals that it is safe to do so.
- Cracked and broken glass must be replaced.
- Vehicles operating in areas, or under conditions, that cause windshields to fog or frost must be equipped with operable defogging and defrosting devices.
- All haulage vehicles with pay loads loaded by cranes, power shovels, loaders, or similar equipment, must have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.
- Vehicles used to transport employees must have seats firmly secured and adequate for the number of employees to be carried.
- Operating levers controlling hoisting or dumping devices on haulage units must be equipped with latches or other devices that will prevent accidental startup or tripping of the mechanism.
- Trip handles for dump truck tailgates must be installed so the operator can stay clear during dumping.
- Seat belts need not be provided for equipment that is designed only for standup operation.
- No employer must move or cause construction equipment or vehicles to be moved on any access roadway or grade, unless the access roadway or grade is constructed and maintained to safely accommodate such movement.

- All earth-moving equipment must have a service braking system capable of stopping and holding the fully loaded equipment.

Study Questions

1. Scrapers, loaders, crawler or wheel tractors, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment must be equipped with what?
2. Every emergency access ramp and beam used by an employer must be constructed so as to do what?

Lesson 2: Subpart W—Rollover Protective Structures for Material Handling (ROPS)

Key Points

- All rubber-tired, self-propelled scrapers; rubber-tired front-end loaders; rubber-tired dozers; wheel-type agricultural and industrial tractors; crawler tractors; crawler-type loaders; and motor graders, with or without attachments that are used in construction work, must have rollover protective structures (ROPS).
- Rollover protective structures and supporting attachments must be designed, fabricated, and installed in a manner that supports, based on the ultimate strength of the metal, at least two times the weight of the prime mover applied at the point of impact.
- The design objective must be to minimize the likelihood of a complete overturn and, thereby,

minimize the possibility of the operator being crushed as a result of a rollover or upset.

Study Questions

1. Each ROPS must have what information permanently affixed to the structure?
2. The design must provide a vertical clearance of at least how much from the work deck to the ROPS?

Lesson 3: Subpart G—Signs, Signals, and Barricades

Key Points

- Signs and symbols shall be visible at all times when work is being performed and must be removed or covered promptly when the hazards no longer exist.
- A danger sign must be used only where an immediate hazard exists.
- Accident prevention tags must be used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc. They must not be used in place of, or as a substitute for, accident prevention signs.

Study Questions

1. Caution signs must be used only to warn against potential hazards or to caution against what?
2. Describe directional signs.

Module 17:

Excavations

Cave-ins are considered the most dangerous trench and excavation hazard. Other potentially fatal hazards also exist in excavations, such as asphyxiation due to lack of oxygen in a confined space, inhalation of toxic fumes, flammable gases, falls, and water accumulation that can cause drowning. The OSHA standards operate to protect workers in trenches and excavations.

This part gives you a basic understanding of how to work safely in excavations and what important points and requirements must be considered when working in an excavation.

Key Terms

Confined space: A space that, by design and/or configuration, has limited openings for entry and exit, unfavorable natural ventilation, may contain or produce hazardous substances, and is not intended for continuous employee occupancy.

Excavation: A man-made cut, cavity, trench or depression formed by earth removal.

Hazardous atmosphere: An atmosphere that may cause death, illness or injury to persons exposed to it because it may be explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen-deficient, toxic, or otherwise harmful.

Shield: Structure able to withstand a cave-in and protect employees.

Sloping: This is a technique that employs a specific angle of incline on the sides of an excavation.

Trench: A narrow excavation made below the surface of the ground in which the depth is greater than the width and the width does not exceed 15 feet.

Lesson 1:

Standards and Protection

Key Points

- Excavating is considered the most hazardous operation in the field of construction.
- Excavations near adjacent structures may create surcharges, changes in soil conditions or other disruptions that could lead to an excavation accident.
- Employers must protect employees from accidents related to cave-ins by designing, implementing, and enforcing the use of excavation protective systems.
- A well-designed protective system is one that works for the type of soil, depth of cut, and the type of construction being performed in the trench.
- The excavated area between the outside of the trench box and the face of the trench should be as small as possible.
- The space between the trench box and the excavation side may be backfilled (or other means may be used) to prevent lateral movement of the box.
- Excavations 20 feet and greater in depth must have a protective system that is planned and designed by a professional engineer. The plan must be stamped by the registered professional engineer and kept on the project site.
- Never overload members of support systems.
- The grade should slope away from the excavation, if possible.

Study Questions

1. The dangers of excavations come from the possibility of cave-ins, in addition to the possibility of what six factors?
2. Exceptions to the requirement for excavation protective systems include circumstances where what is true?

Lesson 2: Essentials of Excavations

Key Points

- Employers are responsible for ensuring that materials and equipment are in good working condition, since damaged and defective materials and equipment could cause excavation accidents.
- Employees must be protected from material or equipment that could fall or roll into excavations.
- Spoils must be placed in such a way that water (rain, ruptured pipes, etc.) is diverted away from the excavation.
- Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation.
- When workers are in the trench and water removal equipment is being used, a competent person must monitor any excavation project until it is completed.
- A competent person must inspect excavations after heavy rains.
- Before an employee enters, a competent person must test excavations greater than four feet deep for water accumulations and possible concentrations of combustible gas, oxygen deficiency, or any other hazard that might exist.
- If a hazardous condition is present in an excavation, controls such as ventilation or proper respirators must be provided.

- Easily accessible emergency rescue equipment must be provided by the employer in the event that adverse atmospheric conditions exist or may reasonably be expected to develop during work in an excavation.

Study Questions

1. Never place spoils within what distance of an excavation's edge?
2. Employees must not be allowed to work in what three hazardous or toxic atmospheres?
3. During the planning stage of an excavation, what must be done?
4. When must inspections of the worksite take place?
5. When must employees be evacuated from a job site?

Lesson 3: Soil Classification Systems

Key Points

- Observe soil as it is dug up.
- Inspect the sides of the opened excavation and the surface area adjacent to the digging.
- Crack-like openings such as tension cracks could point toward fissured material. If clods of soil spall (spall is the flaking or otherwise breaking off from the main

portion) off a vertical side, the soil could be fissured. Small spalls indicate moving ground and can pose potentially dangerous situations.

- Observe the opened side of the digging to identify layered systems. Examine layered systems to identify whether the layers slope toward the dig up. Estimate the degree of slope of the layers.
- Inspect the area next to the excavation and the sides of the opened excavation for traces of surface water, water seeping from the sides, or the indication of the water table level.

Observe the area adjacent to the excavation and the area within the digging for sources of vibration that may affect the strength of the excavation face.

- If no water shows up in a pat test, then the soil is mostly cohesive clay.
- If the dry soil breaks into clumps that cannot be further broken into smaller pieces then the soil may be classified as un-fissured.

Study Questions

1. Examples of Type A soils include what five?
2. Previously disturbed soil, except those types that fall under what category, can also be classified as Type B?
3. What may be classified as Type C soils?

Module 18:

Concrete and Masonry

This module is designed for construction workers who want to learn about safely working with concrete and masonry projects and addresses the requirements necessary to protect all construction employees from the hazards associated with concrete and masonry construction operations performed in workplaces covered under OSHA 29 CFR Part 1926.7. In addition to the requirements in Subpart Q, other relevant provisions in Parts 1910 and 1926 apply to concrete and masonry construction operations. Topics include general requirements for formwork and masonry construction.

Key Terms

Concrete: A mixture of cement, sand, aggregate, and water in specific proportions that hardens to a strong stony consistency over varying lengths of time.

Jack: A portable device that uses a mechanical or hydraulic lifting system to raise heavy objects, especially cars, a short distance.

Masonry: Stonework—the stone or brick parts of a building or other structure.

Reinforcing: Strengthen something; to make something stronger by providing additional external support or internal stiffening for it.

Sills—Building bottom of frame: The horizontal part at the bottom of a window or door frame.

Sills—Building window ledge: A ledge below a window, especially one on the inside of a building.

Slab: Architecture stone base for something; a flat rectangular base or foundation of concrete or stone.

Lesson 1:

Concrete and Masonry Construction (Part 1)

Key Points

- Employers must not place construction loads on a concrete structure or portion of a concrete structure unless the employer determines, based on information received from a person who is qualified in structural design, that the structure or portion of the structure is capable of supporting the intended loads.
- Employees (except those essential to the post-tensioning operations) must not be permitted to be behind the jack during tensioning operations.
- Employees must not be permitted to ride or work under concrete buckets while the buckets are being elevated or lowered into position.
- To the extent practicable, elevated concrete buckets must be routed so that no employee or the fewest employees possible are exposed to the hazards associated with falling concrete buckets.
- Employees must not be permitted to apply a cement, sand, and water mixture through a pneumatic hose unless they are wearing protective head and face equipment.
- Employees must not be permitted to enter storage facilities unless the ejection system has been shut down, locked out, and tagged to indicate that the ejection system is not to be operated.
- Compressed air hoses used on a concrete pumping system shall be provided with positive fail-safe joint connectors to prevent separation of sections when pressurized.
- Powered and rotating type concrete troweling machines that are manually guided shall be equipped with a control switch that will automatically shut off the

power whenever the hands of the operator are removed from the equipment handles.

Study Questions

1. All protruding reinforcing steel must be guarded to eliminate what hazard?
2. A method for retaining what must be incorporated in the design of the semicircular masonry saw enclosure?

Lesson 2: Concrete and Masonry Construction (Part 2)

Key Points

- Lifting inserts for other precast members, excluding tilt-up members, must be capable of supporting four times the load.
- Lift-slab operations must be designed and planned by a registered professional engineer who has experience in lift-slab construction. Such plans and designs must be implemented by the employer, and must include detailed instructions and sketches indicating the prescribed method of erection.
- Jacks or lifting units must be marked to indicate their rated capacity and must not be loaded beyond this capacity.
- Under no circumstances must any employee who is not essential to the jacking operation be permitted immediately beneath a slab while it is being lifted.
- Whenever a masonry wall is being constructed, employers must establish a limited access zone prior to the start of construction.

Study Questions

1. Lifting inserts that are embedded or otherwise attached to tilt-up wall panels must be capable of supporting at least how much the maximum intended load applied or transmitted to them?
2. Lifting hardware members must be capable of supporting how much the maximum intended load applied to the lifting hardware?
3. What are the characteristics of a limited access zone?

Lesson 3: Formwork

Key Points

- Formwork must be strong enough to support the considerable weight and pressure of wet concrete without deflection.
- Remember to constantly monitor the braces while concrete is being poured since it increases pressure within the forms.
- Oils used on wood forms may not be suitable for steel forms, so specially compounded petroleum oils must be used.
- If form oil is not available, water may be used to prevent sticking, but as an emergency measure only.
- Concrete itself has a high compressive strength (resistance to being crushed) but has very little tensile strength (resistance to being pulled). This is why

reinforcing steel, which has high tensile strength, is embedded in "reinforced" concrete.

- Defective areas such as rock pockets or honeycombs must be chipped out until only solid concrete remains.
- The edges of the hole should be at right angles to the surface, or slightly undercut to provide a hold at the edge of the patch.
- Forms must not be removed before the concrete is strong enough to carry its own weight and any other loads that may be placed on it during construction.

Study Questions

1. Describe the two classes formwork is divided into.
2. The best kind to use for tilt-up panels is what type of back-lift?

Module 19:

Stairways and Ladders

Stairways and ladders are major sources of workplace injuries and fatalities for construction workers. According to OSHA estimates, there are 24,882 injuries and 36 fatalities per year due to falls from stairways and ladders used for construction purposes in various industries. Almost half of these injuries are serious in nature and may result in time away from the job.

This part gives you a basic understanding of OSHA standards and the role they play in the prevention and elimination of work-related injuries and fatalities due to stairways and ladders at workplaces.

Key Terms

Double-cleat ladder: A ladder with a center rail to allow simultaneous two-way traffic for employees ascending or descending.

Failure: Load refusal, breakage, or separation of components.

Fixed ladder: This is one that cannot be readily moved or carried because it is an integral part of a building or structure.

Handrail: A rail used to provide employees with a handhold for support.

Job-made ladder: A ladder that is fabricated by employees, typically at the construction site and not commercially manufactured.

Point of access: All areas used by employees for work-related passage from one area or level to another.

Portable ladder: A ladder that can be readily moved or carried.

Single-cleat ladder: A ladder consisting of a pair of side rails connected together by cleats, rungs, or steps.

Stair rail system: A vertical barrier erected along the unprotected sides and edges of a stairway to prevent employees from falling to lower levels.

Tread depth: The horizontal distance from front to back of a tread, excluding nosing, if any.

Lesson 1: OSHA Standards and Stairways

Key Points

- It is mandatory for employers to provide a stairway or ladder at points of access where the elevation between two steps is 19 inches or more.
- In those places where doors or gates open directly to a stairway, a platform must be provided that is at least 20 inches in width beyond the swing of the door.
- Stairway landings at least 30 inches deep and 22 inches wide, at every 12 feet or less of vertical rise, are essential for stairways that are not a permanent part of the structure.
- Remember that a guardrail system may also be needed on a platform with a swinging door to protect from potential falls of six feet or more.
- Handrails must be provided to all stairways that have four or more risers, or are higher than 30 inches. If there is a fall hazard of six feet or more on an exposed side of the stairs, then a stair rail system must be provided to prevent workers from falling off the side.
- Handrails and top rails must be capable of withstanding a load/force of 200 pounds.
- If the top edge of a stair rail system is serving as a handrail, it cannot be less than 36 inches, nor more than 37 inches, from the upper surface of the rail to the tread.

- In grandfathered stairwells, stair rails may be between 34 to 30 inches from the upper surface of the stair rail system to the surface of the tread.

Study Questions

1. Variations in riser height or tread depth shall not be over how much in any stairway system?
2. The clearance of temporary handrails must be at least how far between handrail and walls, stair rail systems, and other objects?

Lesson 2: Ladders and Training

Key Points

- Always use ladders only for their designed purposes. Do not lash ladders together to make a long ladder, unless they are designed for that purpose. Never try to overload ladders beyond their capacities; the manufacturer's rated capacity must be taken into consideration.
- Before using portable ladders always inspect for cracks, dents, and missing rungs.
- Side rails of portable ladders must be at least 11.5 inches apart.
- Never try to use the top or top step of a stepladder as a step; otherwise, it could lead to a severe accident.
- If a defective ladder is found, immediately mark it defective or tag it "**Do Not Use.**"
- Ladders must be constructed with nonconductive side rails if they are used in places where the employee or

the ladder could contact exposed energized electrical equipment.

- Always use double-cleated ladders when ladders are the only way to enter and exit a working area with 25 or more employees and when ladders are used for two-way simultaneous traffic.
- Non-self-supporting ladders must be placed or positioned at an angle where the horizontal distance from the top support to the foot of the ladder is $\frac{1}{4}$ the working length of the ladder—working length of a ladder is the distance along the ladder between foot and top support.
- When portable ladders are used to access an upper landing surface, the side rails must extend at least three feet above the upper landing surface. When such an extension is not possible, the ladder must be secured, and a grasping device such as a grab rail must be provided to assist workers in mounting and dismounting the ladder.
- Fixed ladders must be able to support at least two loads of 250 pounds each, concentrated between any two consecutive attachments. They must also support added anticipated loads caused by ice buildup, winds, rigging and impact loads resulting from using ladder safety devices.

Study Questions

1. Portable ladders must be able to withstand how much their maximum load?
2. It is mandatory to equip fixed ladders of 24 feet or more in height by using at least one of what three methods of protection?

Lesson 3:

Safety Measures

Key Points

- Each non-self-supporting ladder shall support at least four times the maximum intended load applied or transmitted to the ladder in a downward and vertical direction when the ladder is placed at a 75.5 degree angle from horizontal.
- Fixed ladders shall be capable of supporting at least two loads of at least 250 pounds each, concentrated between any two consecutive attachments, plus anticipated loads caused by ice buildup, winds, rigging, and impact loads resulting from the use of ladder safety devices.
- The minimum toe clearance between the centerline of ladder rungs and steps and any obstructions behind the ladder shall be seven inches. Toe clearances of no less than four and one-half inches are acceptable when a specific work operation renders a seven inch clearance infeasible.
- When unavoidable obstructions are encountered, the minimum perpendicular clearance between the centerline of fixed ladder rungs and steps and the obstruction on the climbing side of the ladder may be reduced to 24 inches, provided that a deflection device is installed to guide employees around the obstruction.
- Fixed ladders shall be equipped with personal fall protection systems or with cages or wells, wherever the length of any climb on any fixed ladder exceeds 24 feet, or wherever the top of the ladder is at a distance greater than 24 feet above lower levels.
- Fixed ladders with continuous lengths of climb greater than 150 feet shall be provided with rest platforms at least every 150 feet. The rest platforms shall provide a horizontal surface of at least 18 inches by 24 inches and have at least the same strength as required for the fixed ladder.

Study Questions

1. The minimum perpendicular clearance between the centerline of fixed ladder rungs and steps and any obstruction on the climbing side of the ladder shall be how much?
2. The length of continuous climb for any fixed ladder equipped only with a cage or well shall not exceed how many feet?

Module 20:

Confined Spaces

This module encapsulates the safety regulation of the workers working in permit required confined spaces. It instructs about the hazards that may occur during the work in confined spaces.

OSHA is striving to provide safety to the workers in all required disciplines; therefore, this section is one of them. It helps the worker to learn about industry hazards especially in confined spaces.

Key Terms

Acceptable entry conditions: Conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required, confined space entry can safely enter into, and work within, the space.

Attendant: An individual, stationed outside one or more permit spaces, who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

Authorized entrant: This is an employee who is authorized by the employer to enter a permit space.

Emergency: Any occurrence (including any failure of hazard control or monitoring equipment), or event, internal or external to the permit space that could endanger entrants.

Entry permit: A written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in section (f) of the standard.

Hot work permit: The employer's written authorization to perform operations—for example: riveting, welding, cutting, burning, and heating—capable of providing a source of ignition.

Inerting: The displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Non-permit confined space: A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Oxygen enriched atmosphere: An atmosphere containing more than 23.5 percent oxygen by volume.

Permit-required confined space program (permit space program): The employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

Retrieval system: The equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Testing: For our purposes, this is the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

Lesson 1: Overview of Confined Spaces

Key Points

- Oxygen deficiency can result from bacterial action in excavations and manholes which are near garbage dumps, landfills, or swampy areas.
- Between the oxygen concentrations of 14 percent and 16 percent, the physiologic effects consist of:
 - Increased breathing volume
 - An accelerated heartbeat
 - Poor muscular coordination
 - Rapid fatigue

- Intermittent respiration
- Between the oxygen levels of 6 percent and 10 percent, the physiological effects are:
 - Nausea
 - Vomiting
 - Inability to perform
 - Unconsciousness
- At concentrations of less than 6 percent, there is a rapid loss of consciousness and death within minutes.
- A simple asphyxiating atmosphere contains a gas, or gases, that are physiologically inert and which do not produce any ill effects on the body. However, in sufficient quantity, a simple asphyxiant will displace oxygen and may result in an atmosphere unable to support respiration.
- Some examples of simple asphyxiants that have claimed lives in confined spaces include carbon dioxide, argon, and helium.
- Welding can liberate oxides of nitrogen, ozone, and carbon monoxide.
- The following elements are recommended as a guide in developing a confined space program:
 - Identification of all confined spaces at the facility/operation
 - Posting a warning sign at the entrance of all confined spaces
 - Evaluation of hazards associated with each type of confined space
 - Performing a job safety analysis for each task to be performed in the confined space

Study Questions

1. What is meant by obstructed space?

2. Describe the two major factors leading to fatal injuries in confined spaces.
3. Describe the two types of confined spaces.
4. What determines hazards of any confined space?
5. The OSHA standard specifies what ordering for atmospheric condition testing?
6. What three components are necessary for an atmosphere to be considered flammable?

Lesson 2: Safety and Training Education

Key Points

- All employees required to enter into confined or enclosed spaces must be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required.
- The employer must:
 - Inform each rescue team or service of the hazards they may confront when called on to perform rescue operations at the site.
 - Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

- An employer whose employees have been designated to provide permit space rescue and emergency services shall take the following measures:
 - Provide affected employees with the personal protective equipment (PPE) needed to conduct permit space rescues safely, and train affected employees so they are proficient in the use of that PPE, at no cost to those employees.
 - Train affected employees to perform assigned rescue duties. The employer must ensure that such employees successfully complete the training required to establish proficiency as authorized entrants.
 - Train affected employees in basic first-aid and cardiopulmonary resuscitation (CPR). The employer shall ensure that at least one member of the rescue team or service holding a current certification in first aid and CPR is available.
 - Ensure that affected employees practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, mannequins, or actual persons from the actual permit spaces or from representative permit spaces.

Study Questions

1. Name six duties of attendants.

2. An authorized entrant must alert the attendant whenever one of what two occurrences is true?

Module 21:

Lead Safety in the Workplace

Lead is a very toxic substance. People who are exposed to lead or lead compounds may become ill or even die due to lead poisoning. Our bodies remove lead from our systems at a slow rate, so inhaling even small doses of lead for a long period of time can result in lead poisoning. Workers who are required to work at or near sites that are contaminated with lead are at a greater risk of lead poisoning.

This part is designed for workers who work in areas where the hazard of lead contamination exists. The section focuses on the health risks associated with exposure to lead and how workers can protect themselves against it.

Key Terms

Action level: The level of lead particulates present in the air that signifies close monitoring is required so that the PEL is not approached. The action level for lead is 30 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for eight hours.

Permissible Exposure Limit (PEL): The maximum level of lead particles in air that can be considered acceptable for normal workplace exposure. The PEL for lead is 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Toxic substance: A substance that can affect the proper functioning of an organism, resulting in a change in physiology through a chemical process.

Lesson 1:

Lead in the Workplace

Key Points

- Lead is a very toxic substance and can cause severe adverse health effects if there is long-term overexposure.

- Lead can severely damage your nervous, urinary, blood-forming, and reproductive systems.
- If a pregnant woman is exposed to lead, the lead particles can pass from the mother to the infant through the placenta.
- Exposure to lead may affect each person differently. Lead can cause severe damage to the body even before symptoms appear.
- If you work in the construction industry and are exposed to lead at or above the action level, initial medical surveillance is required.
- Your employer is required to perform medical monitoring every six months. If you have a blood lead level of 40 ug/100g, you must be tested at least every other month until your blood lead level goes below 40 ug/100g permanently. Your employer is required to notify you in writing within 5 days of the test if your blood lead level exceeds 40 ug/100g.
- A company is required to perform monitoring at least every six months if the exposure level is at or above the action level, but at or below the PEL. Monitoring must be continued until at least two consecutive measurements, that have been taken at least seven days apart, are below the action level.
- Your employer is required to perform additional monitoring if there is a change in the equipment, control, process, or personnel. Additional monitoring is also required when a new task has been started that can increase the risk of exposure to lead.
- Your employer is required to inform all employees about the assessment results within five working days after they have been received.

Study Questions

1. Early signs of lead poisoning can be overlooked as everyday medical complaints. Name five.

2. Name five associated medical problems.

3. The results of all assessments that indicate the exposure level of employees to lead must include what information?

Lesson 2: Exposure Reduction and Employee Protection

Key Points

- The permissible exposure level of lead is 50 ug/m^3 . Your employer must make sure that exposure does not increase above this level for more than an eight-hour period.

- Some control measures that can be adopted to reduce your exposure to lead include exhaust ventilation, encapsulation, substitution, process modification, and isolation.

- To clean up the work area, you must only use HEPA vacuums in order to prevent lead particles from becoming airborne.

- You can avoid using lead-containing materials by selecting other materials. Epoxy-covered, zinc-containing primers can be used instead of lead-containing coatings. Also, you can use equipment that decreases the risk of lead emission.

- You can avoid using lead-containing materials by selecting other materials. Epoxy-covered, zinc-containing primers can be used instead of lead-

containing coatings. Also, you can use equipment that decreases the risk of lead emission.

- All accumulations of lead and lead debris must be removed every day or after every work shift. At the end of each shift you must either use a high-efficiency particulate air (HEPA) vacuum to clean lead dust, or wet it with water before sweeping it. All workers performing clean up tasks must wear proper protective equipment and clothing, including suitable respirators, in order to prevent contact and inhalation of lead particles.
- Employees must NEVER wear work clothes away from the work site. They should not be taken home for washing under any circumstances. They should only be laundered by professionals. Disposable clothing must be properly disposed of according to federal, state, and local laws.
- If there are no laundering services available, your employer should provide you with disposable clothes and shoe covers. You must change into clean non-disposable coveralls every day. Before you take off your work clothes and respirator, you must clean all loose particles on your clothing by using high-efficiency particulate air (HEPA) filter vacuum equipment.
- If your employer stops doing business, all records and documents regarding employee monitoring and assessment must be handed over to the successor.

Study Questions

1. A large amount of dust is produced while performing abrasive blasting. Less dusty techniques should be used in order to minimize the dust being produced. These techniques can include what two?

Describe these techniques.

2. Distinguish between air-purifying respirators and atmosphere-supplying respirators.

Module 22:

Use of Explosives in the Workplace

Explosives are used in many industrial operations, particularly in construction and mining. If handled properly by experienced personnel, the use of explosives can be very beneficial. However, if explosives are used by untrained workers, there is a great potential for both fire and unwanted explosions.

The main objective of this part is to provide fundamental information about construction-related explosives and how to safely use and secure them. This section will also enable you to identify and manage risks associated with tasks involving explosives.

Key Terms

Blast area: This is the location where explosives are loaded and blasting operations are carried out.

Blasting agent: Any material or mixture that consists of a fuel and oxidizer used for blasting, but is not considered an explosive. The ingredients in the blasting agent are also not classified as explosives.

Blasting cap: A metallic tube that is closed at one end and contains a charge of detonating compounds that can be detonated from the flame of a safety fuse placed into the open end of the tube.

Detonating cord: This is a flexible cable that is filled with high explosives. When detonated, these explosives have enough strength to detonate other explosives they contact.

Detonator: Blasting caps, electric blasting caps, delay electric blasting caps, and non-electric delay blasting caps.

Electric blasting cap: A blasting cap designed for and capable of detonation by means of an electric current.

Magazine: Any building or structure, other than an explosives manufacturing building, used for the storage of explosives.

Primary blasting: The blasting operation by which an original rock formation is dislodged from its natural location.

Safety fuse: A flexible cord that contains combustible matter that is used to convey fire to blasting caps.

Lesson:

Control Measures

Key Points

- Explosives are regularly used in almost every phase of heavy construction, especially in the construction of highways, dams, and pipelines. Excavations also require a significant amount of explosive material.
- Safety, economy, and controllability are important factors in all projects involving explosives.
- Even though all construction projects are different, most of them require the removal of a considerable amount of material.
- Some explosives can be toxic if inhaled or ingested, or if they come in contact with the skin. Although most explosives are not highly toxic, if handled improperly they can cause systemic poisoning, which usually affects the bone marrow and the liver.
- Contact with explosives can cause low blood pressure, headaches, chest pains, and even heart attacks.
- The employer must inform all employees not to smoke, use firearms, light matches, or use any other heat or fire-producing device near explosive materials, or when the explosives are being handled, used, or transported.
- If there are any explosives missing, the employer must immediately inform the concerned authorities.

- If a fire breaks out anywhere near explosives you should notify your employer or supervisor. They must then immediately remove all employees to a safe location and enclose the area.
- The current produced by radio transmitters, radar, lightning, nearby power lines, or any other electrical source may cause accidental discharge of electric blasting caps. You must take special precautions to prevent this accidental discharge.
- A fully charged fire extinguisher must be placed in each vehicle used for transporting explosives. Employers must train drivers in the use of these extinguishers. They must also inform the drivers never to take any vehicle carrying explosives inside a garage or shop for repairs or servicing.
- No one may ride with a powder car while it is being used to hoist or lower explosives or blasting agents through a shaft.
- If detonators and explosives have to be transported in the same car, their compartments must be located at least 24 inches apart or they must be separated by a 6-inch thick solid partition. Detonators and other explosives must never be transported in the same shaft conveyance.
- You must never deepen any drill holes that previously contained explosives or blasting agents.
- You must not drill within 50 feet of a hole, which has been loaded with explosives that have not detonated.
- You must not carry out any blasting operations without first ensuring that there is a safety switch present in the permanent firing line of the power circuit.
- When testing circuits in charged holes, blasters may only use instruments that are specially designed for the purpose, such as blasting galvanometers.

- Safety fuses are only to be used when it is too dangerous to use electric blasting caps due to extraneous electricity.
- You must never use a safety fuse that has been hammered or is broken.
- You must cut a short length from the end of the supply reel before capping the safety fuse in order to ensure that each blasting cap contains a fresh cut end.
- All detonators that have not been used must be removed from the work area and destroyed immediately.
- The line of detonating cord extending out of a bore hole must be cut off from the supply spool before loading the remainder of the bore hole or placing additional charges.
- After firing the blast, the blaster must immediately detach the firing line from the blasting machine. If power switches were used, the blaster must lock them or switch them to the “off” position.
- Only qualified employees may enter the danger zone to eliminate misfire hazards. If the misfired hole is under water, the explosives should be blown out using air.

Study Questions

1. What are the responsibilities of the blaster?
2. What precautions must be taken to prevent accidental discharge?
3. Blasting caps must only be attached to the safety fuse using what?

4. The safety fuse that is used for blasting must not be less than how many inches long?

5. In tunnels and other underground areas, at least how many minutes must be allowed for the smoke to leave the blasted area?

Module 23: Scaffolds

This part provides a general overview of the safety measures that are required when working on a scaffold. It begins with an introduction into the various types of scaffolds, and goes on to outline the OSHA safety requirements and safety measures that can be taken to ensure that employees working on scaffolds are at little risk of injury or death.

Key Terms

Bearer (Putlog): A horizontal transverse scaffold member (which may be supported by ledgers or runners) upon which the scaffold platform rests and which joins scaffold uprights, posts, poles, and similar members.

Boatswains' chair: A single-point adjustable suspension scaffold consisting of a seat or sling designed to support one employee in a sitting position.

Body harness: A design of straps which may be secured about the employee in a manner to distribute the fall arrest forces over at least the thighs, pelvis, waist, chest, and shoulders, with means for attaching the harness to other components of a personal fall arrest system.

Brace: A rigid connection that holds one scaffold member in a fixed position with respect to another member or to a building or structure.

Chimney hoist: A multi-point adjustable suspension scaffold used to provide access to work inside chimneys.

Coupler: A device for locking together the tubes of a tube and coupler scaffold.

Crawling board (Chicken ladder): A supported scaffold consisting of a plank with cleats spaced and secured to provide footing for use on sloped surfaces such as roofs.

Maximum intended load: The total load of all persons, equipment, tools, materials, transmitted loads, and other

loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

Outrigger: The structural member of a supported scaffold used to increase the base width of a scaffold in order to provide support for and increased stability to the scaffold.

Outrigger beam (Thrustout): The structural member of a suspension scaffold or outrigger scaffold which provides support for the scaffold by extending the scaffold point of attachment to a point out and away from the structure or building.

Lesson 1: Introduction to Scaffolds

Key Points

- The main purpose behind the use of scaffolds is to provide support and balance to an employee and his or her materials as the employee conducts tasks in inaccessible or otherwise difficult-to-reach areas.
- The prime advantage of a tube and coupler scaffold, for instance, lies in the fact that it can be built in several directions and combinations that cater to any structure; however, this also makes it hard to build.

Study Questions

1. This type of scaffold consists of a platform supported by two bearers and is hung from a fixed overhead support with ropes. What is the name for this type?
2. There are a large number of scaffolds that are not widely used but are employed only in specific jobs; name five.

Lesson 2: Overview of OSHA Directives for the Construction of Scaffolds

Key Points

- The regulations presented for the two-point scaffold are applicable to all other types of suspension scaffolds, unless stated otherwise.
- Both fall arrest systems and guardrails should be provided on any scaffold that is expected to be elevated to more than six feet above the ground.
- A minimum clearance to maintain from all electrical lines up to 50 kv is 10 feet, unless the line is insulated and carrying less than 300 volts, in which case the minimum clearance to maintain is 3 feet.
- Catenary scaffolds should not have more than two interconnected platforms at any one time. Furthermore, because catenary scaffolds do not usually have guardrails, all employees on a scaffold must be protected with personal fall arrest systems.
- Catenary scaffolds have a maximum weight load of 500 pounds; therefore, it is safe to assume that no more than two people should be on the scaffold at any one time.
- The platform should be fully planked, and the gaps between the planks should not exceed one inch. The platform should not be more than 14 inches from the structure being worked on.
- Unless they have been designed for that specific purpose, scaffolds should not be moved horizontally while employees are on them.
- If wood is used on a pump jack, it must be straight-grained and free of shakes, dead knots, and other defects.

- The maximum height at which a platform can be placed is 20 feet from the supported base.

Study Questions

1. The platform for a two-point scaffold should be no more than how many inches wide?
2. The support rope must be maintained in a vertical position unless what four conditions are met?

Lesson 3: Scaffold Safety Measures

Key Points

- One out of every three deaths in construction results from fatal falls.
- If you have scaffolds from two or more manufacturers, do not under any circumstances try to mix and match the components.
- Do not use different metals for the components of the scaffold.
- Any systems that have been involved in a fall impact (that is, have been involved in arresting a falling worker) should be removed immediately and not used again until they have been inspected to ensure that they are undamaged.

Study Questions

1. When stopping a fall, personal fall arrest systems should limit the maximum arresting force to no more than how many pounds?

2. The fall arrest system must have sufficient strength to withstand how much the potential impact energy of a worker freefalling for six feet?

Supplements

Weekly Fatality/Catastrophe Report

Address: http://www.osha.gov/dep/fatcat/fatcat_weekly_rpt_12252009.html


UNITED STATES DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

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Weekly Fatality/Catastrophe Report

SAMPLE of Actual Report

This table contains the weekly summaries of fatalities and catastrophes resulting in the hospitalization of three or more workers. Employers must report these incidents to OSHA within eight hours. The summaries below include only preliminary information, as reported to OSHA Area Offices or to States which operate OSHA-approved State Plans. The fatalities listed here include only those that initially appear to be work-related, but excludes fatalities that do not appear to be work-related, such as an apparent heart attack of a sedentary worker. OSHA investigates all work-related fatalities and catastrophes. After OSHA's investigation is complete, these reports will be updated with inspection results and citation information.

Weekly Summary (Federal and State data tabulated week ending Dec 25, 2009)		
FATALITIES		
Date of Incident	Company and Location	Preliminary Description of Incident
12/17/2009	Manion & Associates, Inc., Brandenburg, KY 40108	Two workers were doing road surveying each on either side of the road. A civilian driver came over the hill and suddenly applied his brakes, even though no person, equipment, or car was in the road. This caused his car to spin off the road, running over one of the workers.
12/17/2009	TBM, Inc., Visalia, CA 93277	Worker fell from a ladder while working inside an airplane.
12/18/2009	Pro-Tech Contracting of Georgia LLC, Lawrenceville, GA	Worker was securing tarp on a roof (not wearing fall protection, although it was available) and fell 35 feet to lower level.
12/18/2009	Sonoma Compost Company, LLC, Petaluma, CA 94952	Worker was on ground when he was run over by a front loader.
12/19/2009	Auto Zone Store, Oakland, CA 94603	Security guard worker was shot three times during robbery. The assailants took his weapon.
12/20/2009	Gateco, Newbery Park, CA 91360	Worker, who is the owner, was doing electrical work and fell through the skylight. (No inspection planned)
12/20/2009	Premier Asphalt and Masonry, Inc., Coram, NY 11727	Worker was found in vehicle with engine running; carbon monoxide over exposure.
12/21/2009	County of Los Angeles - Office of Education, Downey, CA 90242	Worker was found unconscious in her cubicle by a janitor. (Inspection planned)
12/21/2009	Country Club Auto Repair, Inc., Lake Charles, LA 70305	Worker was repairing a roof insulation and fell 14 feet to the ground.
12/21/2009	Estes Express Lines, Seekonk, MA 02771	Worker was crushed between the forklift he was operating and a concrete bollard next to the loading dock door after stepped off the forklift.
12/21/2009	Kenvelm, Inc. dba KE Beal Company, Cape Coral, FL 33919	Worker was part of a four man tree trimming crew and was in the process of cutting down a 25-foot palm tree. Worker walked into the path of the falling tree and was struck by the tree.
12/22/2009	3 ML Construction Company, Inc., Methuen, MA	Worker was installing shingles and moving planks on a roof and fell 20' 6" from the roof to a driveway below.



OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses for most any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Find the four text boxes for single cases if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you do not care whether an injury or illness is recordable, call your local OSHA office for help.

Year **2009**

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

Establishment name
ABC Co.

City **Anywhere** State **USA**

Identify the person			Describe the case				Classify the case				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:					
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and objective/subjective that directly injured or made person ill (e.g., Second degree burns on right forearm from acetylene torch)	Death	Days away from work	Job transfer or restriction	Remained at work	Away From Work (days)	On job transfer or restriction (days)	(1) Injury	(2) Skin Disorder	(3) Respiratory Condition	(4) Poisoning	(5) Hearing Loss	(6) All other illnesses	
1	Tammy Newcomer	Chemist	2/5	Lab	Breathing difficulty-inhaled chlorine gas		X			13				X				
2	Pat James	Electrician	3/4	Maintenance Dept.	Gunshot wound left shoulder from ex-wife on 3rd shift		X			25	28	X						
3	Jose Ortega	CNA	5/30	3rd Fl, South wing	Hernia, lower right abdomen from lifting resident			X			5	X						
4	Georgina Gonzella	Welder	6/29	Welding Area	Welder flash, both eyes from TIG welder				X								X	
5	William Handwerk	Temp Help	8/7	Shipping Department	Broke left wrist from fall to dock floor		X			5	15	X						
6	Privacy Case	Janitor	10/4	Rm 6, 2nd Fl, North Wing	Needlestick from used syringe				X								X	
7	Ellen Bass	Press Opr	12/5	Sheet Metal Dept.	Hearing loss, right ear				X								X	
Page totals						0	3	1	3	43	48	4	0	1	0	1	1	

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including the time to review the instruction, search existing data sources, gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about this burden estimate or any aspect of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Job Safety and Health

It's the law!

OSHA
Occupational Safety
and Health Administration
U.S. Department of Labor

EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –
The Best Resource for Safety and Health

[Print Note: Check "Print Scaling" setting, original is 8.5"x11.4"]



Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA
www.osha.gov

OSHA 2965-12-001



Navigating the OSHA Website

<http://www.osha.gov>

The elements of this valuable source of occupational safety and health information are featured:

The image shows a computer monitor displaying the OSHA website. Several callout boxes are overlaid on the screen to highlight specific features:

- Top Navigation Bar:** A red bar at the top contains the OSHA logo, the text "UNITED STATES DEPARTMENT OF LABOR Occupational Safety & Health Administration", a search bar, and navigation links: "A to Z Index | En Español | Contact Us | What's New | About OSHA".
- Search Bar:** A blue bar below the top navigation contains an "A-Z Index" dropdown menu, a search input field with "Search OSHA", and a "GO" button.
- Highlights:** A box on the left titled "Highlights" features a "Combustible Dust" graphic and text: "Graphic slideshow of OSHA highlights. Graphics are linked to the respective websites."
- Latest News:** A box on the right titled "Latest News" contains a list of news items and a link: "Links to the most current OSHA news and information."
- Worker Fatalities:** A box on the right titled "Worker Fatalities" features a headline: "Connecticut Power Plant Explosion, 10en Energy Systems, Middletown CT, Sunday, Feb 7. At least 5 workers were killed and at least 12 injured." and text: "Recent incidents, as well as weekly summaries are posted."
- Top Links:** A box on the left titled "Top Links" lists various navigation options:
 - >Regulations/Standards >Enforcement
 - >Laws & Rulemaking >Offices >S&H Topics
 - >Training >How to File a Complaint >MORE
 - Compliance Assistance
 - Newsroom
 - Offices
 - Construction
 - Maritime
 - Laws & Rulemaking
 - Interpretations
- Featured Videos:** A box at the bottom right titled "Featured Videos" includes a search bar for "Earthquake Response" and a list of video thumbnails.

Refusing to Work because Conditions are Dangerous

Workers have the right to refuse to do a job if they believe in good faith that they are exposed to an imminent danger. "Good faith" means that even if an imminent danger is not found to exist, the worker had reasonable grounds to believe that it did exist.

The United States Supreme Court, in the Whirlpool case, issued the landmark ruling which more clearly defined a worker's right to refuse work where an employee has reasonable apprehension that death or serious injury or illness might occur as a result of performing the work. **However, as a general rule, you do not have the right to walk off the job because of unsafe conditions.**

REFUSING WORK IS PROTECTED IF:

Your right to refuse to do a task is protected if **ALL** of the following conditions are met:

- ✓ Where possible, you have asked the employer to eliminate the danger, and the employer failed to do so; **and**
- ✓ You refused to work in "good faith." This means that you must genuinely believe that an imminent danger exists. Your refusal cannot be a disguised attempt to harass your employer or disrupt business; **and**
- ✓ A reasonable person would agree that there is a real danger of death or serious injury; **and**
- ✓ There isn't enough time, due to the urgency of the hazard, to get it corrected through regular enforcement channels, such as requesting an OSHA inspection.

CONDITIONS ARE MET, NEXT STEPS:

When all of these conditions are met, you take the following steps:

- ✓ Ask your employer to correct the hazard;
- ✓ Ask your employer for other work;
- ✓ Tell your employer that you won't perform the work unless and until the hazard is corrected; **and**
- ✓ Remain at the worksite until ordered to leave by your employer.

The table below offers a few "IF/THEN" scenarios to follow.

IF	THEN
You believe working conditions are unsafe or unhealthful.	Call your employer's attention to the problem.
Your employer does not correct the hazard or disagrees with you about the extent of the hazard.	You may file a complaint with OSHA.
Your employer discriminates against you for refusing to perform the dangerous work.	Contact OSHA immediately.

Source: <http://www.osha.gov/as/opa/worker/refuse.html>

Filing an OSHA Complaint – Tips for Completing the OSHA-7 Form

INSTRUCTIONS Provided on the Form:

Open the form and complete the front page as accurately and completely as possible. Describe each hazard you think exists in as much detail as you can. If the hazards described in your complaint are not all in the same area, please identify where each hazard can be found at the worksite. If there is any particular evidence that supports your suspicion that a hazard exists (for instance, a recent accident or physical symptoms of employees at your site) include the information in your description. If you need more space than is provided on the form, continue on any other sheet of paper. After you have completed the form, return it to your local OSHA office.

Here are tips for completing the form:

1. Be specific and include appropriate details: The information on the complaint form may be the only description of the hazard that the inspector will see before the inspection. The inspector will base his or her research and planning on this information.
2. Establishment Name, Address, & Type of Business: Be thorough and specific. The inspector's research on the company and the industry's hazards will be based on this information.
3. Hazard Description/Location: The hazard description is the most important part of the form. Your answer should explain the hazards clearly. If your complaint is about chemicals, identify them whenever possible and attach copies of labels or MSDSs if you can. Identify the location so the inspector will know where to look.
4. Has this condition been brought to the attention of the employer or another government agency? You should indicate on the form if you have tried to get the employer to fix the hazard before filing the complaint. Also, if another agency, such as a local fire or building department, has been notified of these hazards, OSHA may want to consult with them.
5. Do NOT reveal my name: OSHA will keep your name off the complaint, if you wish. Remember that discrimination for health and safety activity is illegal. If you are a union representative, you may wish to have your name on the complaint.
6. Signature and address: It is important to sign the complaint if you want OSHA to conduct an onsite inspection. Also, your address will allow OSHA to send copies of inspection related materials to you.

U. S. Department of Labor Occupational Safety and Health Administration			
Notice of Alleged Safety or Health Hazards			
		Complaint Number	
Establishment Name			
Site Address			
Site Phone		Site FAX	
Mailing Address			
Mail Phone		Mail FAX	
Management Official		Telephone	
Type of Business			
HAZARD DESCRIPTION/LOCATION: Describe briefly the hazard(s) which you believe exist. Include the approximate number of employees exposed to or threatened by each hazard. Specify the particular location or locations where the alleged violation exists.			
Has this condition been brought to the attention of		<input type="checkbox"/> Employer <input type="checkbox"/> Other Government Agency (specify)	
Please Indicate Your Desire:		<input type="checkbox"/> Do NOT reveal my name to any Employer <input type="checkbox"/> My name may be revealed to the Employer	
The Undersigned 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.		<input type="checkbox"/> Employee <input type="checkbox"/> Federal Safety and Health Committee <input type="checkbox"/> Representative of Employees <input type="checkbox"/> Other (specify)	
Complainant Name		Telephone	
Address (Street, City, State, Zip)			
Signature		Date	
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	

U.S. Department of Labor
Occupational Safety and Health Administration

Notice of Alleged Safety or Health Hazards

For the General Public:

This form is provided for the assistance of any complainant and is not intended to constitute the exclusive means by which a complaint may be registered with the U.S. Department of Labor.

Sec 8(f)(1) of the Williams-Steiger Occupational Safety and Health Act, 29 U.S.C. 651, provides as follows: Any employees or representative of employees who believe that a violation of a safety or health standard exists that threatens physical harm, or that an imminent danger exists, may request an inspection by giving notice to the Secretary or his authorized representative of such violation or danger. Any such notice shall be reduced to writing, shall set forth with reasonable particularity the grounds for the notice, and shall be signed by the employee or representative of employees, and a copy shall be provided the employer or his agent no later than at the time of inspection, except that, upon request of the person giving such notice, his name and the names of individual employees referred to therein shall not appear in such copy or on any record published, released, or made available pursuant to subsection (g) of this section. If upon receipt of such notification the Secretary determines there are reasonable grounds to believe that such violation or danger exists, he shall make a special inspection in accordance with the provisions of this section as soon as practicable to determine if such violation or danger exists. If the Secretary determines there are no reasonable grounds to believe that a violation or danger exists, he shall notify the employees or representative of the employees in writing of such determination.

NOTE: Section 11(c) of the Act provides explicit protection for employees exercising their rights, including making safety and health complaints.

For Federal Employees:

This report format is provided to assist Federal employees or authorized representatives in registering a report of unsafe or unhealthful working conditions with the U.S. Department of Labor.

The Secretary of Labor may conduct unannounced inspection of agency workplaces when deemed necessary if an agency does not have occupational safety and health committees established in accordance with Subpart F, 29 CFR 1960; or in response to the reports of unsafe or unhealthful working conditions upon request of such agency committees under Sec. 1-3, Executive Order 12196; or in the case of a report of imminent danger when such a committee has not responded to the report as required in Sec. 1-201(h).

INSTRUCTIONS:

Open the form and complete the front page as accurately and completely as possible. Describe each hazard you think exists in as much detail as you can. If the hazards described in your complaint are not all in the same area, please identify where each hazard can be found at the worksite. If there is any particular evidence that supports your suspicion that a hazard exists (for instance, a recent accident or physical symptoms of employees at your site) include the information in your description. If you need more space than is provided on the form, continue on any other sheet of paper.

After you have completed the form, return it to your local OSHA office.

NOTE: It is unlawful to make any false statement, representation or certification in any document filed pursuant to the Occupational Safety and Health Act of 1970. Violations can be punished by a fine of not more than \$10,000, or by imprisonment of not more than six months, or by both. (Section 17(g))

Public reporting burden for this voluntary collection of information is estimated to vary from 15 to 25 minutes per response with an average of 17 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An Agency may not conduct or sponsor, and persons are not required to respond to the collection of information unless it displays a valid OMB Control Number. Send comment regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to the Directorate of Enforcement Programs, Department of Labor, Room N-3119, 200 Constitution Ave., NW, Washington, DC; 20210.

OMB Approval# 1218-0064; Expires: 03-31-2011

Do not send the completed form to this Office.

OSHA-7(Rev. 9/93)

Filing an OSHA Complaint – Tips for Completing the OSHA-7 Form

INSTRUCTIONS Provided on the Form:

Open the form and complete the front page as accurately and completely as possible. Describe each hazard you think exists in as much detail as you can. If the hazards described in your complaint are not all in the same area, please identify where each hazard can be found at the worksite. If there is any particular evidence that supports your suspicion that a hazard exists (for instance, a recent accident or physical symptoms of employees at your site) include the information in your description. If you need more space than is provided on the form, continue on any other sheet of paper. After you have completed the form, return it to your local OSHA office.

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U. S. Department of Labor Occupational Safety and Health Administration		1	
Notice of Alleged Safety or Health Hazards			
		Complaint Number	
Establishment Name			
Site Address			
	Site Phone	2	Site FAX
Mailing Address			
	Mail Phone		Mail FAX
			Telephone
Type of Business			
HAZARD DESCRIPTION/LOCATION Describe briefly the hazard(s) which you believe exist. Include the approximate number of employees exposed to or treated by such hazard. Specify the particular building or work area where the alleged violation exists.			
3			
Has this condition been brought to the attention of		<input type="checkbox"/> Employer <input type="checkbox"/> Other Government Agency (specify)	
Please Indicate Your Desire		<input type="checkbox"/> Do NOT reveal my name to my Employer <input type="checkbox"/> My name may be revealed to the Employer	
The Underlined below is a violation of an Occupational Safety or Health standard which is a job safety or health hazard at the establishment named on this form.		(Mark "X" in ONE box) <input type="checkbox"/> Employee <input type="checkbox"/> Federal Safety and Health Committee <input type="checkbox"/> Representative of Employees <input type="checkbox"/> Other (specify)	
Complainant Name		Telephone	
Address (Street, City, State, Zip)			
Signature		Date	
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	

U.S. Department of Labor
Occupational Safety and Health Administration

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Public reporting burden for this voluntary collection of information is estimated to vary from 15 to 25 minutes per response with an average of 17 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An Agency may not conduct or sponsor, and persons are not required to respond to the collection of information unless it displays a valid OMB Control Number. Send comment regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to the Directorate of Enforcement Programs, Department of Labor, Room N-3119, 200 Constitution Ave., NW, Washington, DC; 20210.

OMB Approval# 1218-0064; Expires: 03-31-2011

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OSHA-7(Rev. 9/93)

Filing an OSHA Complaint – Tips for Completing the OSHA-7 Form

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U. S. Department of Labor Occupational Safety and Health Administration		1	
Notice of Alleged Safety or Health Hazards			
Complainant Name		Complainant Address	
Establishment Name		Complainant Telephone	
Site Address		Site Phone	Site FAX
Mailing Address		Mail Phone	Mail FAX
Management Official		Telephone	
Type of Business			
HAZARD DESCRIPTION/LOCATION: Describe briefly the hazard(s) which you believe exist. Indicate the approximate number of employees exposed to or affected by each hazard. Specify the particular building or work site where the alleged violation exists.			
3			
Has this condition been brought to the attention of:	<input type="checkbox"/> Employer	<input type="checkbox"/> Other Government Agency (specify)	4
Please Indicate Your Desire:	<input type="checkbox"/> Do NOT reveal my name to my Employer		
	<input type="checkbox"/> My name may be revealed to the Employer		
The Underigned 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.	(Mark "X" in ONE box)		
	<input type="checkbox"/> Employee	<input type="checkbox"/> Federal Safety and Health Committee	
	<input type="checkbox"/> Representative of Employees	<input type="checkbox"/> Other (specify)	
Complainant Name	Address (Street, City, State, Zip)		Telephone
Signature	Date		
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.			
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U.S. Department of Labor
Occupational Safety and Health Administration

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OSHA-7(Rev. 9/93)

OSHA FactSheet

Your Rights as a Whistleblower

You may file a complaint with OSHA if your employer retaliates against you by taking unfavorable personnel action because you engaged in protected activity relating to workplace safety and health, commercial motor carrier safety, pipeline safety, air carrier safety, nuclear safety, the environment, asbestos in schools, corporate fraud, SEC rules or regulations, railroad carrier safety or security, or public transportation agency safety or security.

Whistleblower Laws Enforced by OSHA

Each law requires that complaints be filed within a certain number of days after the alleged retaliation.

You may file complaints by telephone or in writing under the:

- *Occupational Safety and Health Act* (30 days)
- *Surface Transportation Assistance Act* (180 days)
- *Asbestos Hazard Emergency Response Act* (90 days)
- *International Safe Container Act* (60 days)
- *Federal Rail Safety Act* (180 days)
- *National Transit Systems Security Act* (180 days)

Under the following laws, complaints must be filed in writing:

- *Clean Air Act* (30 days)
- *Comprehensive Environmental Response, Compensation and Liability Act* (30 days)
- *Energy Reorganization Act* (180 days)
- *Federal Water Pollution Control Act* (30 days)
- *Pipeline Safety Improvement Act* (180 days)
- *Safe Drinking Water Act* (30 days)
- *Sarbanes-Oxley Act* (90 days)
- *Solid Waste Disposal Act* (30 days)
- *Toxic Substances Control Act* (30 days)
- *Wendell H. Ford Aviation Investment and Reform Act for the 21st Century* (90 days)

Unfavorable Personnel Actions

Your employer may be found to have retaliated against you if your protected activity was a contributing or motivating factor in its decision to take unfavorable personnel action against you.

Such actions may include:

- Firing or laying off
- Blacklisting
- Demoting
- Denying overtime or promotion
- Disciplining

- Denying benefits
- Failing to hire or rehire
- Intimidation
- Reassignment affecting promotion prospects
- Reducing pay or hours

Filing a Complaint

If you believe that your employer retaliated against you because you exercised your legal rights as an employee, contact your local OSHA office *as soon as possible*, because you must file your complaint within the legal time limits. OSHA conducts an in-depth interview with each complainant to determine whether to conduct an investigation. For more information, call your closest OSHA Regional Office:

- *Boston* (617) 565-9860
- *New York* (212) 337-2378
- *Philadelphia* (215) 861-4900
- *Atlanta* (404) 562-2300
- *Chicago* (312) 353-2220
- *Dallas* (972) 850-4145
- *Kansas City* (816) 283-8745
- *Denver* (720) 264-6550
- *San Francisco* (415) 625-2547
- *Seattle* (206) 553-5930

Addresses, fax numbers and other contact information for these offices can be found on OSHA's website, www.osha.gov, and in local directories. Some complaints must be filed in writing and some may be filed verbally (call your local OSHA office for assistance). Written complaints may be filed by mail (we recommend certified mail), fax, or hand-delivered during business hours. The date postmarked, faxed or hand-delivered is considered the date filed.

If retaliation for protected activity relating to occupational safety and health issues takes place in a state that operates an OSHA-approved state plan, the complaint should be filed with the state agency, although persons in those states may file with Federal OSHA at the same time. Although the *Occupational Safety and*

Health Act covers only private sector employees, state plans also cover state and local government employees. For details, see <http://www.osha.gov/fso/osp/index.html>.

How OSHA Determines Whether Retaliation Took Place

The investigation must reveal that:

- The employee engaged in protected activity;
- The employer knew about the protected activity;
- The employer took an adverse action; and
- The protected activity was the motivating factor (or under some laws, a contributing factor) in the decision to take the adverse action against the employee.

If the evidence supports the employee's allegation and a settlement cannot be reached, OSHA will issue an order requiring the employer to reinstate the employee, pay back wages, restore benefits, and other possible remedies to make the employee whole.

Limited Protections for Employees Who Refuse to Work

You have a limited right under the OSH Act to refuse to do a job because conditions are hazardous. You may do so under the OSH Act only when (1) you believe that you face *death or serious injury* (and the situation is so clearly hazardous that any reasonable person would believe the same thing); (2) you have tried to get your employer to correct the condition, and there is no other way to do the job safely; and (3) the situation is so urgent that you do not have time to eliminate the hazard through regulatory channels such as calling OSHA.

Regardless of the unsafe condition, you are not protected if you simply walk off the job. For details, see <http://www.osha.gov/as/opa/worker/refuse.html>. OSHA cannot enforce union contracts or state laws that give employees the right to refuse to work.

Whistleblower Protections in the Transportation Industry

Employees whose jobs directly affect commercial motor vehicle safety are protected from retaliation by their employers for refusing to violate or for reporting

violations of Department of Transportation (DOT) motor carrier safety standards or regulations, or refusing to operate a vehicle because of such violations or because they have a reasonable apprehension of death or serious injury.

Similarly, employees of air carriers, their contractors or subcontractors who raise safety concerns or report violations of FAA rules and regulations are protected from retaliation, as are employees of owners and operators of pipelines, their contractors and subcontractors who report violations of pipeline safety rules and regulations. Employees involved in international shipping who report unsafe shipping containers are also protected. In addition, employees of railroad carriers or public transportation agencies, their contractors or subcontractors who report safety or security conditions or violations of federal rules and regulations relating to railroad or public transportation safety or security are protected from retaliation.

Whistleblower Protections for Voicing Environmental Concerns

A number of laws protect employees who report violations of environmental laws related to drinking water and water pollution, toxic substances, solid waste disposal, air quality and air pollution, asbestos in schools, and hazardous waste disposal sites. *The Energy Reorganization Act* protects employees who raise safety concerns in the nuclear power industry and in nuclear medicine.

Whistleblower Protections When Reporting Corporate Fraud

Employees who work for publicly traded companies or companies required to file certain reports with the Securities and Exchange Commission are protected from retaliation for reporting alleged mail, wire, or bank fraud; violations of rules or regulations of the SEC, or federal laws relating to fraud against shareholders.

More Information

To obtain more information on whistleblower laws, go to www.osha.gov, and click on the link for "Whistleblower Protection."

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:



U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

DEP 11/2007
2



Employers Must Provide and Pay for PPE



Personal Protective Equipment (PPE)

The Occupational Safety and Health Administration (OSHA) requires that employers protect you from workplace hazards that can cause injury or illness. Controlling a hazard at its source is the best way to protect workers. However, when engineering, work practice and administrative controls are not feasible or do not provide sufficient protection, employers must provide personal protective equipment (PPE) to you and ensure its use.

PPE is equipment worn to minimize exposure to a variety of hazards. Examples include items such as gloves, foot and eye protection, protective hearing protection (earplugs, muffs), hard hats and respirators.

Employer Obligations	Workers should:
✓ Performing a "hazard assessment" of the workplace to identify and control physical and health hazards.	✓ Properly wear PPE
✓ Identifying and providing appropriate PPE for employees.	✓ Attend training sessions on PPE
✓ Training employees in the use and care of the PPE.	✓ Care for, clean and maintain PPE, and
✓ Maintaining PPE, including replacing worn or damaged PPE.	✓ Inform a supervisor of the need to repair or replace PPE.
✓ Periodically reviewing, updating and evaluating the effectiveness of the PPE program.	

Employers Must Pay for Personal Protective Equipment (PPE)

On May 15, 2008, a new OSHA rule about employer payment for PPE went into effect. With few exceptions, OSHA now requires employers to pay for personal protective equipment used to comply with OSHA standards. The final rule does not create new requirements regarding what PPE employers must provide.

The standard makes clear that employers cannot require workers to provide their own PPE and the worker's use of PPE they already own must be completely voluntary. Even when a worker provides his or her own PPE, the employer must ensure that the equipment is adequate to protect the worker from hazards at the workplace.



Examples of PPE that Employers Must Pay for Include:

- Metatarsal foot protection
- Rubber boots with steel toes
- Non-prescription eye protection
- Prescription eyewear inserts/lenses for full face respirators
- Goggles and face shields
- Fire fighting PPE (helmet, gloves, boots, proximity suits, full gear)
- Hard hats
- Hearing protection
- Welding PPE



Employers Must Provide and Pay for PPE



Payment Exceptions under the OSHA Rule

Employers are not required to pay for some PPE in certain circumstances:

- Non-specialty safety-toe protective footwear (including steel-toe shoes or boots) and non-specialty prescription safety eyewear provided that the employer permits such items to be worn off the job site. (OSHA based this decision on the fact that this type of equipment is very personal, is often used outside the workplace, and that it is taken by workers from jobsite to jobsite and employer to employer.)
- Everyday clothing, such as long-sleeve shirts, long pants, street shoes, and normal work boots.
- Ordinary clothing, skin creams, or other items, used solely for protection from weather, such as winter coats, jackets, gloves, parkas, rubber boots, hats, raincoats, ordinary sunglasses, and sunscreen
- Items such as hair nets and gloves worn by food workers for consumer safety.
- Lifting belts because their value in protecting the back is questionable.
- When the employee has lost or intentionally damaged the PPE and it must be replaced.

OSHA Standards that Apply

OSHA General Industry PPE Standards

- 1910.132: General requirements and payment
- 1910.133: Eye and face protection
- 1910.134: Respiratory protection
- 1910.135: Head protection
- 1910.136: Foot protection
- 1910.137: Electrical protective devices
- 1910.138: Hand protection

OSHA Construction PPE Standards

- 1926.28: Personal protective equipment
- 1926.95: Criteria for personal protective equipment
- 1926.96: Occupational foot protection
- 1926.100: Head protection
- 1926.101: Hearing protection
- 1926.102: Eye and face protection
- 1926.103: Respiratory protection

There are also PPE requirements in shipyards and marine terminals and many standards on specific hazards, such as 1910.1030: Bloodborne pathogens and 1910.146: Permit-required confined spaces.

OSHA standards are online at www.osha.gov.

Sources:

- *Employers Must Provide and Pay for PPE, New Jersey Work Environment Council (WEC) Fact Sheet*
- *OSHA Standards, 1910.132(h) and 1926.95(d)*
- *Employer Payment for Personal Protective Equipment Final Rule, Federal Register: November 15, 2007 (Volume 72, Number 220)*

How to Read the OSHA Standards 29 CFR 1910 – General Industry

UNDER TITLE 29, CHAPTER XVII, THE OSHA REGULATIONS ARE BROKEN DOWN INTO PARTS. PART 1910, FOR EXAMPLE, IS COMMONLY KNOWN AS THE OSHA GENERAL INDUSTRY STANDARDS. PART 1926 COVERS OSHA CONSTRUCTION STANDARDS AND PARTS 1915, 1917 AND 1918 INCLUDE THE OSHA STANDARDS FOR THE MARITIME INDUSTRY.

SUBPARTS

Under each part, such as Part 1910, major blocks of information are further broken into subparts. The major subparts in 1910 standards include:

Subpart D	Walking-Working Surfaces
Subpart E	Means of Egress
Subpart F	Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms
Subpart G	Occupational Health and Environmental Control
Subpart H	Hazardous Materials
Subpart I	Personal Protective Equipment
Subpart J	General Environmental Controls
Subpart K	Medical and First Aid
Subpart L	Fire Protection
Subpart M	Compressed Gas and Compressed Air Equipment
Subpart N	Materials Handling and Storage
Subpart O	Machinery and Machine Guarding
Subpart P	Hand and Portable Powered Tools
Subpart Q	Welding, Cutting and Brazing
Subpart R	Special Industries
Subpart S	Electrical
Subpart Z	Toxic and Hazardous Substances

SECTIONS

Each Subpart is further broken down into sections. For example, Subpart D – Walking-Working Surfaces has sections 1910.21 through 1910.30.

- 1910.21 – Definitions.
- 1910.22 – General requirements.
- 1910.23 – Guarding floor and wall openings and holes.
- 1910.24 – Fixed industrial stairs.
- 1910.25 – Portable wood ladders.
- 1910.26 – Portable metal ladders.
- 1910.27 – Fixed ladders.
- 1910.28 – Safety requirements for scaffolding.
- 1910.29 – Manually propelled mobile ladder stands and scaffolds (towers).
- 1910.30 – Other working surfaces.

NOTES:

EXAMPLE: READING OSHA STANDARDS –BREAKING DOWN THE NUMBERS

STANDARD: 29 CFR 1910.110(b)(13)(ii)(b)(7)(iii)

Portable containers shall not be taken into buildings except as provided in paragraph (b)(6)(i) of this section.

NUMBERS:

TITLE	FED. REG.	PART	SECTION	LOWER CASE ALPHA	ARABIC NUMBER	LOWER CASE ROMAN	ITALICIZED*
29	CFR	1910	.110	(b)	(13)	(ii)	(b)(7)(iii)

*FOR STANDARDS PROMULGATED PRIOR TO 1979, ITALICS ARE USED TO LIST THE FOURTH SET OF PARENTHESES. AFTER 1979, A CAPITAL/UPPER CASE LETTER IS USED IN THIS SPACE.

How to Read the OSHA Standards 29 CFR 1926 – Construction

UNDER TITLE 29, CHAPTER XVII, THE OSHA REGULATIONS ARE BROKEN DOWN INTO PARTS. PART 1926, FOR EXAMPLE, IS COMMONLY KNOWN AS THE OSHA CONSTRUCTION STANDARDS. PART 1910 COVERS OSHA GENERAL INDUSTRY STANDARDS AND PARTS 1915, 1917 AND 1918 INCLUDE THE OSHA STANDARDS FOR THE MARITIME INDUSTRY.

SUBPARTS

UNDER EACH PART, SUCH AS PART 1926, MAJOR BLOCKS OF INFORMATION ARE FURTHER BROKEN INTO SUBPARTS. THE MAJOR SUBPARTS IN 1926 STANDARDS INCLUDE:

Subpart C	General Safety and Health Provisions
Subpart D	Occupational Health and Environmental Controls
Subpart E	Personal Protective and Life Saving Equipment
Subpart F	Fire Protection and Prevention
Subpart G	Signs, Signals and Barricades
Subpart H	Materials Handling, Storage, Use, and Disposal
Subpart I	Tools – Hand and Power
Subpart J	Welding and Cutting
Subpart K	Electrical
Subpart L	Scaffolds
Subpart M	Fall Protection
Subpart N	Cranes, Derricks, Hoists, Elevators, and Conveyors
Subpart O	Motor Vehicles, Mechanized Equipment, and Marine Operations
Subpart P	Excavations
Subpart Q	Concrete and Masonry Construction
Subpart R	Steel Erection
Subpart S	Underground Construction, Caissons, Cofferdams, and Compressed Air
Subpart T	Demolition
Subpart U	Blasting and the Use of Explosives
Subpart V	Power Transmission and Distribution
Subpart W	Rollover Protective Structures; Overhead Protection
Subpart X	Ladders
Subpart Y	Commercial Diving
Subpart Z	Toxic and Hazardous Substances

SECTIONS

EACH SUBPART IS FURTHER BROKEN DOWN INTO SECTIONS. FOR EXAMPLE, SUBPART C – GENERAL SAFETY AND HEALTH PROVISIONS, HAS SECTIONS 1926.20 THROUGH 1926.35.

- 1926.20 – General safety and health provisions.
- 1926.21 – Safety training and education.
- 1926.22 – Recording and reporting of injuries.
- 1926.23 – First aid and medical attention.
- 1926.24 – Fire protection and prevention.
- 1926.25 – Housekeeping.
- 1926.26 – Illumination.
- 1926.27 – Sanitation.
- 1926.28 – Personal protective equipment.
- 1926.29 – Acceptable certifications.
- 1926.30 – Shipbuilding and ship repairing
- 1926.31 – Incorporation by reference.
- 1926.32 – Definitions.
- 1926.33 – Access to employee exposure and medical records.
- 1926.34 – Means of egress.
- 1926.35 – Employee emergency action plans.

NOTES:

EXAMPLE: READING OSHA STANDARD NUMBERS

STANDARD: 29 CFR 1926.152(i)(1)(i)(C)

Tanks built of materials other than steel shall be designed to specifications embodying principles recognized as good engineering design for the material used.

BREAKING DOWN THE NUMBER:

TITLE	FED. REG.	PART	SECTION	LOWER CASE ALPHA	ARABIC NUMBER	LOWER CASE ROMAN	CAPITAL/UPPER CASE ALPHA*
29	CFR	1926	.152	(i)	(1)	(i)	(C)

*FOR STANDARDS PROMULGATED AFTER 1979, A CAPITAL/UPPER CASE LETTER IS USED IN THE FOURTH SET OF PARENTHESES. PRIOR TO 1979, THE FOURTH SET OF PARENTHESES ARE ITALICIZED.

How to Read the OSHA Standards 29 CFR 1915, 29 CFR 1917, 29 CFR 1918 – Maritime Industry

UNDER TITLE 29, CHAPTER XVII, THE OSHA REGULATIONS ARE BROKEN DOWN INTO PARTS. PARTS 1915, 1917 AND 1918 INCLUDE THE OSHA STANDARDS FOR THE MARITIME INDUSTRY. PART 1910 COVERS OSHA GENERAL INDUSTRY STANDARDS AND PART 1926 IS COMMONLY KNOWN AS THE OSHA CONSTRUCTION STANDARDS.

SUBPARTS OF 29 CFR 1915

UNDER EACH PART, SUCH AS PART 1915 OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR SHIPYARD EMPLOYMENT, MAJOR BLOCKS OF INFORMATION ARE FURTHER BROKEN INTO SUBPARTS. THE MAJOR SUBPARTS IN 1915 STANDARDS INCLUDE:

Subpart A	General Provisions
Subpart B	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
Subpart C	Surface Preparation and Preservation
Subpart D	Welding, Cutting and Heating
Subpart E	Scaffolds, Ladders and Other Working Surfaces
Subpart F	General Working Conditions
Subpart G	Gear and Equipment for Rigging and Materials Handling
Subpart H	Tools and Related Equipment
Subpart I	Personal Protective Equipment
Subpart J	Ship's Machinery and Piping Systems
Subpart K	Portable, Unfired Pressure Vessels, Drums and Containers, Other Than Ship's Equipment
Subpart L	Electrical Machinery
Subpart M, N, O	[Reserved]
Subpart P	Fire Protection in Shipyard Employment
Subpart Q, R, S, T, U, V, W, X, Y	[Reserved]
Subpart Z	Toxic and Hazardous Substances

SECTIONS

EACH SUBPART IS FURTHER BROKEN DOWN INTO SECTIONS. FOR EXAMPLE, SUBPART B – CONFINED AND ENCLOSED SPACES AND OTHER DANGEROUS ATMOSPHERES IN SHIPYARD EMPLOYMENT, HAS SECTIONS 1915.11 THROUGH 1915.16 WITH APPENDICES.

- 1915.11 – Scope, application, and definitions applicable to this subpart.
- 1915.12 – Precautions and the order of testing before entering confined and enclosed spaces and other dangerous atmospheres.
- 1915.13 – Cleaning and other cold work.
- 1915.14 – Hot work.
- 1915.15 – Maintenance of safe conditions.
- 1915.16 – Warning signs and labels.
- 1915 Subpart B App A – Compliance Assistance Guidelines for Confined and Enclosed Spaces and Other Dangerous Atmospheres
- 1915 Subpart B App B – Reprint of U.S. Coast Guard Regulations Referenced in Subpart B, for Determination of Coast Guard Authorized Persons.

NOTES:

EXAMPLE: READING OSHA STANDARD NUMBERS

STANDARD:	BREAKING DOWN THE NUMBER:							
	TITLE	CODE OF FED. REG.	PART	SECTION	LOWER CASE ALPHA	ARABIC NUMBER	LOWER CASE ROMAN	CAPITAL/ UPPER CASE ALPHA*
1915.7(b)(2)(iii)(B) THE ROSTER SHALL CONTAIN, AS A MINIMUM, THE DATE THE EMPLOYEE WAS TRAINED AS A COMPETENT PERSON.	29	CFR	1915	.7	(b)	(2)	(iii)	(B)

*FOR STANDARDS PROMULGATED AFTER 1979, A CAPITAL/UPPER CASE LETTER IS USED IN THE FOURTH SET OF PARENTHESES. PRIOR TO 1979, THE FOURTH SET OF PARENTHESES ARE ITALICIZED.

How to Read the OSHA Standards 29 CFR 1915, 29 CFR 1917, 29 CFR 1918 – Maritime Industry

SUBPARTS OF 29 CFR 1917

UNDER EACH PART, SUCH AS PART 1917 MARINE TERMINALS, MAJOR BLOCKS OF INFORMATION ARE FURTHER BROKEN INTO SUBPARTS. THE MAJOR SUBPARTS IN 1917 STANDARDS INCLUDE:

Subpart A	Scope and Definitions
Subpart B	Marine Terminal Operations
Subpart C	Cargo Handling Gear and Equipment
Subpart D	Specialized Terminals
Subpart E	Personal Protection
Subpart F	Terminal Facilities
Subpart G	Related Terminal Operations and Equipment

SECTIONS

EACH SUBPART IS FURTHER BROKEN DOWN INTO SECTIONS. FOR EXAMPLE, SUBPART G – RELATED TERMINAL OPERATIONS AND EQUIPMENT, HAS SECTIONS 1917.151 THROUGH 1917.158.

- 1917.151 – Machine guarding.
- 1917.152 – Welding, cutting and heating (hot work)
- 1917.153 – Spray painting
- 1917.154 – Compressed air.
- 1917.155 – Air receivers.
- 1917.156 – Fuel handling and storage.
- 1917.157 – Battery charging and changing.
- 1917.158 – Prohibited operations.

NOTES:

SUBPARTS OF 29 CFR 1918

UNDER EACH PART, SUCH AS PART 1918 SAFETY AND HEALTH REGULATIONS FOR LONGSHORING, MAJOR BLOCKS OF INFORMATION ARE FURTHER BROKEN INTO SUBPARTS. THE MAJOR SUBPARTS IN 1918 STANDARDS INCLUDE:

Subpart A	Scope and Definitions
Subpart B	Gear Certification
Subpart C	Gangways and Other Means of Access
Subpart D	Working Surfaces
Subpart E	Opening and Closing Hatches
Subpart F	Vessel's Cargo Handling Gear
Subpart G	Cargo Handling Gear and Equipment Other Than Ship's Gear
Subpart H	Handling Cargo
Subpart I	General Working Conditions
Subpart J	Personal Protective Equipment

SECTIONS

EACH SUBPART IS FURTHER BROKEN DOWN INTO SECTIONS. FOR EXAMPLE, SUBPART D – WORKING SURFACES, HAS SECTIONS 1918.31 THROUGH 1918.37.

- 1918.31 – Hatch coverings.
- 1918.32 – Stowed cargo and temporary landing surfaces.
- 1918.33 – Deck loads.
- 1918.34 – Other decks.
- 1918.35 – Open hatches.
- 1918.36 – Weather deck rails.
- 1918.37 – Barges.

EXAMPLE: READING OSHA STANDARD NUMBERS

STANDARD:	BREAKING DOWN THE NUMBER:							
	TITLE	CODE OF FED. REG.	PART	SECTION	LOWER CASE ALPHA	ARABIC NUMBER	LOWER CASE ROMAN	CAPITAL/ UPPER CASE ALPHA*
29 CFR 1917.43(q)(2)(i)(C) THE DRIVE CHAIN SHALL BE ENCLOSED TO A HEIGHT OF EIGHT FEET (2.44 M) EXCEPT FOR THAT PORTION AT THE LOWER HALF OF THE LOWER SPROCKET.	29	CFR	1917	.43	(q)	(2)	(i)	(C)
STANDARD:	BREAKING DOWN THE NUMBER:							
TITLE	CODE OF FED. REG.	PART	SECTION	LOWER CASE ALPHA	ARABIC NUMBER	LOWER CASE ROMAN	CAPITAL/ UPPER CASE ALPHA*	
1918.66(a)(14)(iii)(A) [HOLDING BRAKES TORQUE]125 PERCENT WHEN USED WITH AN OTHER THAN MECHANICALLY CONTROLLED BRAKING MEANS;	29	CFR	1918	.66	(a)	(14)	(iii)	(A)

*FOR STANDARDS PROMULGATED AFTER 1979, A CAPITAL/UPPER CASE LETTER IS USED IN THE FOURTH SET OF PARENTHESES. PRIOR TO 1979, THE FOURTH SET OF PARENTHESES ARE ITALICIZED.



Safety & Health Resources



Government Resources

OSHA: <http://www.osha.gov/>
Contact the OSHA Office nearest you or
contact the toll free number:
1-800-321-OSHA (6742)

NIOSH: <http://www.cdc.gov/niosh/>
Phone NIOSH at
1-800-CDC-INFO (1-800-232-4636)
or Email at: cdcinfo@cdc.gov

NIOSH is a part of the Centers for Disease
Control and Prevention
(<http://www.cdc.gov/>).
CDC has extensive information on
health and safety topics.

Universities

CORNELL UNIVERSITY
School of Industrial and Labor Relations:
<http://www.ilr.cornell.edu/healthSafety/>

**LABOR OCCUPATIONAL HEALTH
PROGRAM**, University of California at
Berkeley: <http://www.lohp.org/>

NATIONAL LABOR COLLEGE, George
Meany Center: <http://www.nlc.edu/>

UCLA, Labor Occupational Safety and
Health (UCLA-LOSH):
<http://www.losh.ucla.edu/>

COSH GROUPS

COSH groups are private, non-profit coalitions
of labor unions, health and technical
professionals, and others interested in
promoting and advocating for worker health and
safety. *If you don't see a COSH group in your
area, check the NATIONAL COSH website for
local COSH groups.*

**NATIONAL COUNCIL FOR OCCUPATIONAL
SAFETY & HEALTH** National COSH is a federation
of local and statewide "COSH" groups:
<http://www.coshnetwork.org/>

CACOSH – Chicago Area Committee on
Occupational Safety and Health:
<http://www.cacosh.org/>

MASSCOSH –Massachusetts Coalition on
Occupational Safety and Health:
<http://www.masscosh.org/>

NYCOSH – New York Committee for
Occupational Safety and Health:
<http://www.nycosh.org/>

PHILAPOSH – Philadelphia Area Project for
Occupational Safety and Health:
<http://www.philaposh.org/>
Prevention (<http://www.cdc.gov/>).

Unions

The following is a sample list of unions with links to useful health and safety information.

AFL-CIO: <http://www.aflcio.org/issues/safety/>

AFSCME: <http://www.afscme.org/issues/73.cfm>

eLCOSH – The Electronic Library of Construction Safety and Health is a collection of information
on construction safety and health developed by CPWR – Center for Construction Research and
Training, with funding by NIOSH: <http://www.elcosh.org/>

SEIU (Service Employees International Union) Health and Safety Department:
<http://www.seiu.org/a/members/safety-and-health.php>

UAW Health and Safety Department: <http://www.uaw.org/hs/>

Section 1 – PRODUCT AND COMPANY INFORMATION

Manufacturer	IMS Company 10373 Stafford Road Chagrin Falls, OH 44023-5296 WEB imscompany.com	Emergency Phone Prepared by Prepared/Revised E-mail	800-424-9300 Product Safety Advisor April 19, 2006 sales@imscompany.com
Item Number	Size	Former Item Number	
107320	2 ounce jar	SAG1-OB500-2	
107439	14 ounce cartridge	SAG1-OB500-14C	
105998	16 ounce jar	SAG1-OB500-16	
107526	8 pounds, 1 gallon pail	SAG1-OB500-1G	
107433	42 pounds, 5 gallon pail	SAG1-OB500-5G	

Hazardous Material Information System

Health 1	Flammability 1	Reactivity 1	Protection X
0 Normal use Material	0 Will Not Burn	0 Stable	X = Consult the
1 Slight Hazard (temporary)	1 Possible to Burn	1 Unstable if Heated	MSDS and
2 Health Affected (lengthy)	2 Burns if Heated	2 Violent Chemical Change	your supervisor
3 Extreme Danger	3 Easily Burns	3 Shock and Heat Sensitive	for your special
4 Severe or Fatal	4 Very Easily Burns	4 May Explode	workplace need
* Chronic (Accumulates)			

NOTE The HMIS may not be enough hazard information for this chemical in all workplaces. The HMIS system requires employee training about the system and about information in this MSDS.

Section 2 – INGREDIENTS INFORMATION

#	Chemical/Common Name	CAS-Number	%	PEL-OSHA	TLV-ACGIH
1	1-Decene homopolymer	68037-01-4	70 to 90	5mg/m ³	5mg/m ³
2	Organophillic clay	68953-58-2	5 to 25	10 mg/m ³ (4)	0.1 mg/m ³ (4)
3	Polytetrafluoroethylene	9002-84-0	0.1 to 10	(1) (3)	(1) (3)
4	Methylene bis dithiocarbonate	10254-57-6	0.1 to 10	(1)	5 mg/m ³
5	Zinc oxide (2)	1314-13-2	0.1 to 10	5mg/m ³	5mg/m ³

(1) Not Established

(2) Subject to SARA Title III Section 313 reporting requirements.

(3) Manufacturer's exposure level is 5mg/m³ for respirable dust.

(4) As respirable quartz.

This product Does Not Contain carcinogens according to NTP, IARC, or OSHA.

Section 3 – HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW Small amount (very thick material) is not expected to cause any emergency condition.

HEALTH EFFECTS (Acute and Chronic)

Nose No vapors expected. Vapors from elevated temperatures may cause respiratory irritation, harmful if aspirated into lungs. Vapors from over 400° F (204° C) may cause "Fume Fever."

Mouth May be harmful if swallowed. Possible irritation, nausea, or diarrhea.

Eyes Minimal irritation, tearing, reddening, or swelling. Avoid prolonged contact.

Skin May irritate skin. Avoid long-term contact. Prolonged contact may result in defatting, drying which may lead to irritation, dermatitis, allergic reaction. If injected under skin (with a high pressure grease gun), necrosis could result.

Chronic Not available

PRIMARY ROUTES OF ENTRY Skin, Eye

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE Preexisting skin, and eye disorders could be aggravated by exposure to this type of product.

Section 4 – FIRST AID MEASURES

NOTE If irritation persists after any kind of body exposure, get medical help.

Breathing Vapors are not likely to injure, unless the product is heated. Get to fresh air if symptoms appear. If breathing has stopped, administer artificial respiration and get medical attention.

Eating ****Get Medical Help at once**** Do not induce vomiting.

Eye Contact Immediately flush eyes thoroughly with plenty of water for at least 15 minutes. Remove contact lenses. Hold eyelids open to irrigate fully. Get medical attention if irritation persists.

Skin Contact Remove contaminated clothing. Wash exposed area with soap and water. Wash contaminated clothing before re-use. If irritation persists, or if contact has been prolonged, get medical attention.

Medical Notes Treat symptomatically

Section 5 – FIRE FIGHTING MEASURES

Flash Point (estimated)420° F(215° C) Flammable LimitsLEL = NA ...UEL = NA
Autoignition temperature590° F(310° C)

Extinguishing Media Water spray, alcohol-type foam, or all-purpose-type foam, for large fires. Carbon dioxide or dry chemical for small fires.

Special Fire Fighting Procedures Material will not burn unless preheated. Cool exposed containers with water. Do not direct a solid stream of water or foam into hot, burning pools; this may cause frothing and increase fire intensity. Firefighters should wear full bunker gear, self-contained, positive-pressure breathing apparatus, and protective clothing.

Unusual Fire and Explosion Hazards Streams of water are likely to spread fire. Use water spray only to cool containers. Will not flash spontaneously. Stable at ambient temperatures and pressures. Toxic fumes may be evolved on burning or exposure to heat.

Hazardous Combustion/Decomposition Products Hydrogen fluoride (HF), carbonyl fluoride, perfluoroolefin, carbon anoxide, fluorocarbons, carbon monoxide, carbon dioxide, and unidentified organic compounds.

Section 6 – ACCIDENTAL RELEASE MEASURES

Steps to be Taken in Case Material is Released or Spilled May burn, although not readily ignitable. Wear appropriate personal protective equipment according to the conditions, such as respirator and protective clothing. Small spills can be collected or absorbed with appropriate absorbing materials. Soak up residue with an absorbent such as clay, sand, or other suitable material. Dispose of properly. Flush area with water to remove trace residues, but do not let product or contaminated water get to drains, sewers, or rainfall. All spill response should be carried out in accordance with Federal, State, County/Provincial, and local requirements.

Section 7 – HANDLING AND STORAGE

Precautions to be Taken in Storage Product will burn. Eliminate open flames, strong oxidizers, and other sources of ignition from the storage area. Keep containers closed to avoid contamination from airborne dust and moisture. Observe applicable fire codes. Store in accordance with good industrial practices. These include store in cool, dry area out of direct sunlight (below 120° F, 49° C). Do not puncture or burn containers.

Handling Thoroughly wash after handling and before eating, drinking, or using tobacco products.

Maintenance Precautions Do not remove or deface label. Keep container closed.

Other Precautions As per any petroleum-based products, read and follow directions and cautions on the container label.

Section 8 – EXPOSURE CONTROLS – PERSONAL PROTECTION

Ventilation Usually not specifically required. No local exhaust required. General (mechanical) room ventilation may be adequate to maintain product and its components below TLV/PEL, if handled at ambient temperatures or in covered equipment. Local exhaust ventilation or other engineering controls may be required, if ambient temperatures are exceeded or if used in operations that may produce mist, aerosol, or vapor.

Respiratory Protection Usually none. If personnel exposure exceeds exposure limit at any time, select respiratory protection equipment in accordance with 29 CFR 1910.134. NIOSH approved atmosphere-supplying respirator or a NIOSH approved air-purifying respirator with organic vapor cartridge and dust/mist pre-filter is recommended.

Section 8 – EXPOSURE CONTROLS – PERSONAL PROTECTION (cont)

Protective Gloves If needed to avoid long-term or repeated contact, natural rubber, neoprene, nitrile (NBR), and butyl are recommended materials.

Other Protective Equipment Safety glasses or goggles, and face shield, as appropriate for exposure.

Other Engineering Controls To determine exposure levels, monitoring should be performed. Eye bath and safety shower station should be available.

Work Practices Avoid long-term or repeated contact. Stained clothing should be removed and laundered before re-use. Sudden release of hot vapor or mist from process equipment operating at elevated temperature and pressure, or sudden ingress of air into hot equipment under vacuum, may result in ignition without the presence of obvious ignition sources. Autoignition temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product in elevated-temperature processes must be thoroughly evaluated to establish and maintain safe operating conditions.

Avoid contact with eyes. Wear chemical goggles if there is likelihood of contact. Avoid prolonged or repeated contact with skin. Wear chemical resistant gloves and other clothing as required to minimize contact.

Ventilation should maintain the concentration of the components below their TLV/PEL values.

Hygienic Practices Avoid contact with skin and avoid breathing vapors. Do not eat, drink, or smoke in work area. Wash hands before eating, drinking, or using restroom after using this or any chemical product. Launder contaminated clothing before reuse. Product can contaminate tobacco, causing flu-like sickness (from inhaling product's polytetrafluoroethylene component heated in tobacco smoke or ingested from handling tobacco and/or food products). After using this, or any chemical product, wash thoroughly before eating or smoking.

Section 9 – PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point.....	NA	Specific Gravity (Water=1).....	0.87
Vapor Pressure at 68° F (20° C).....	NIL	Percent Volatile by Volume (%).....	NIL
Vapor Density (Air=1).....	NIL	Evaporation Rate (butyl acetate=1) ..	NIL
VOC.....	NIL	Pour point.....	NA
Solubility in Water.....	NIL	pH.....	NA
Melting point.....	NA		

Appearance and Odor Information Light tan to off-white paste, sticky, almost odorless.

Section 10 – STABILITY AND REACTIVITY

Incompatibility (Materials to Avoid) Strong oxidizers

Will Hazardous Polymerization Occur? No

Conditions to Avoid for Polymerization See Incompatibility

Is the Product Stable? Yes

Conditions to Avoid for Stability Temperatures above 392° F (200° C), See Incompatibility

Section 11 – TOXICOLOGICAL INFORMATION

COMPONENT #	COMMENTS
1	Not listed in NTP, IARC, OSHA, Prop 65, and SARA 313. Is listed as a component of non-food article intended for use in contact with food or as a lubricant added to food directly as a result of incidental contact with container or equipment.
2	AKA Di (tallow alkyl) dimethyl ammonium bentonite, a quaternary compound
3, 4, 5	Not listed in NTP, IARC, OSHA, Prop 65, and SARA 313.

Section 12 – ECOLOGICAL INFORMATION

COMPONENT #	COMMENTS
1, 2, 3, 5	No ecological or environmental effects known
4	Considered toxic to aquatic life

Section 13 – DISPOSAL CONSIDERATIONS

Waste Disposal Methods Consult Federal, State, County/Provincial, and Local regulations. Product is readily reclaimed from many applications; reclamation from spent fluids is encouraged where possible. At low concentrations in water, this product is biodegradable in a biological wastewater treatment plant. Where reclamation is not practical, this product may be incinerated where permitted under Federal, State, County/Provincial, and Local regulations, but only if the facility is capable of scrubbing out HF and other acidic products. Never dispose by means of public sewers or drainage. Empty containers should be recycled or disposed of through an approved waste management facility.

Section 14 – TRANSPORT INFORMATION

COMPONENT # COMMENTS
 1, 2, 3, 4, 5Not regulated

Section 15 – REGULATORY INFORMATION

	Component 1	Component 2	Component 3	Component 4	Component 5
ACGIH	N	N	N	N	N
AIHA	N	N	N	N	N
ANSI	N	N	N	N	N
Canada - DSL	Y	Y	Y	Y	Y
CFC	N	N	N	N	N
DOT listed	N	N	N	N	N
EINECS listed	Y	Y	Y	Y	Y
EPA - CAA, CAW	N	N	N	N	N
EU rating #'s	N	N	N	N	N
HCFC	N	N	N	N	N
OSHA listed	Y	Y	N	N	N
PROP 65 listed	N	N	N	N	N
RCRA listed	N	N	N	N	N
SARA 313 list	N	N	N	N	Y
TSCA listed	Y	Y	Y	Y	Y
WHMIS-other	N	N	N	N	N

Section 16 – OTHER INFORMATION

CAUTION Intentional misuse of this chemical product, as with any industrial chemical in contact with the body, can be harmful or fatal. This includes such things as deliberately breathing, placing in mouth, swallowing, placing on skin, or any other body contact, or repeated, or continuous contact.

IMS provides this information in good faith, but makes no representation as to its comprehensiveness or its accuracy. This document is offered as a guide to a trained person, for appropriate precautionary handling. Persons using the product and receiving the information must exercise independent judgment in determining the appropriateness of the use and the safety information for their particular purpose. **IMS MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THIS INFORMATION OR TO THE PRODUCT. ACCORDINGLY, IMS WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE ON THIS INFORMATION.**

ACGIH American Conference of Governmental Hygienists
 AKA Also Known As, Synonym
 CAS Chemical Abstract Service
 IARC International Agency for Research of Cancer
 mg/m³ milligrams per Cubic Meter
 N No, None, Not listed
 NA Not Applicable, Not Available
 ND Not Determined
 NIL Not measurable, significant, noticeable, or an affect
 NTP National Toxicology Program
 OSHA Occupational Safety and Health Administration
 ppm parts per million
 Y Yes, Does Exist, Is Listed.

Identifying Safety and Health Problems in the Workplace

Identifying health and safety problems can be as easy as answering basic questions. To determine if there are health and safety problems that need to be addressed in your workplace, use these questions:

- Do you or your co-workers have injuries or health complaints? If so, what types?
- Who has been hurt or is having symptoms?
- When do you or your co-workers feel these symptoms?
- Where in the workplace are safety or health problems occurring?
- What are the conditions that are causing problems?

HEALTH HAZARDS	SAFETY HAZARDS
<p>Common types of health hazards in the workplace are:</p> <ul style="list-style-type: none"> ○ Chemical (asbestos, solvents, chlorine) ○ Biological (tuberculosis, HIV, hepatitis, molds) ○ Physical (noise, heat and cold, radiation, vibration) ○ Ergonomics or Repetitive Strain Injuries (carpal tunnel syndrome, back injuries) ○ Psychological (stress) 	<p>Common types of safety hazards in the workplace are:</p> <ul style="list-style-type: none"> ○ Slips, trips and falls ○ Being caught in or struck by moving machinery or other objects ○ Fire and explosions ○ Transportation and vehicle-related accidents ○ Confined spaces ○ Violence
<p>How health hazards enter your body:</p> <ul style="list-style-type: none"> ○ Breathing (inhalation) ○ Swallowing (ingestion) ○ Skin (absorption) ○ Cuts (injection) 	<p>Slips, Trips and Falls</p> <ul style="list-style-type: none"> ○ Bad housekeeping and poor drainage can make floors and other walking surfaces wet and slippery. ○ Electrical wires along the floor pose a tripping hazard. ○ You can fall if you are not provided with fall protection equipment, guardrails, and safe ladders.
<p>The harm caused by health hazards depends on:</p> <ul style="list-style-type: none"> ○ Strength, or potency, of the agent. ○ Amount of the agent that is present. ○ How long you are exposed to the agent. ○ Part of your body that is exposed. 	<p>Caught In or Struck By Moving Machinery/Objects Machinery can cause injuries in different ways:</p> <ul style="list-style-type: none"> ○ You can get parts of your body caught in or struck by exposed moving parts if machines are not properly guarded, or not locked out when being repaired. ○ You can be struck by flying objects from machines without protective guards.
<p>Types of health effects:</p> <ul style="list-style-type: none"> ○ Acute: the effect shows up right away. ○ Chronic: problems show up after a long period of exposure and/or long after the exposure ends. ○ Local: only the part of the body that was exposed is affected. ○ Systemic: an agent enters the body and affects other parts of the body. 	<p>Fire and Explosions</p> <ul style="list-style-type: none"> ○ Improper labeling, handling or storage of certain materials can pose a risk of fire or explosion. ○ Every workplace should have an evacuation plan for getting people out of a building in case of fire and an alarm or alert system to quickly inform employees of an emergency. ○ Every worker should be trained on what to do in case of an emergency.
<p>Cancer</p> <ul style="list-style-type: none"> ○ Cancer is a term for many diseases in different parts of the body. ○ Carcinogens are agents that cause cancer. ○ There is no totally safe level of exposure to something that causes cancer. ○ Cancer from a workplace exposure may develop 10, 20 or more years after the exposure. 	<p>Transportation and Vehicle-Related Accidents</p> <ul style="list-style-type: none"> ○ Operators of vehicles and equipment can be injured or cause injury to pedestrians if equipment is unsafe or if adequate training has not been provided. ○ You can be seriously injured or killed after being hit by a vehicle while repairing roads or doing other work in traffic zones. This danger exists when traffic is not properly routed and/or adequate barriers are not placed between the workers and the traffic.
<p>Reproductive effects</p> <ul style="list-style-type: none"> ○ Both men and women can be affected by reproductive hazards at work. ○ Reproductive hazards cause miscarriages and birth defects. 	<p>Confined Spaces</p> <ul style="list-style-type: none"> ○ A confined space is an area with small openings for a worker to enter and exit and is not designed for regular work. Examples of confined spaces include manholes, sewer digestors and silos. There are many hazards in confined spaces. ○ Workers can become unconscious and die from a lack of oxygen. ○ There may be too much oxygen, or other chemicals that can catch fire or explode. ○ Poisonous gases and vapors, such as hydrogen sulfide or carbon monoxide, may also build up in a confined space. ○ Confined spaces can also pose physical hazards. They can be very hot or cold, very loud, or slippery and wet. ○ Grain, sand or gravel can bury a worker.
<p>Sensitization</p> <ul style="list-style-type: none"> ○ You may become allergic or sensitive to some agents you work with. Sensitization can develop over time. ○ For example, a health care worker may develop a serious allergic reaction to latex used in gloves. 	<p>Violence</p> <ul style="list-style-type: none"> ○ Violence on the job is a growing problem. ○ Homicides are the second leading cause of workplace fatalities. Workplace violence includes physical assault as well as near misses, verbal abuse and sexual harassment.

Excerpted from Safe Jobs Now: An AFSCME Guide to Health and Safety in the Workplace.