

SEALANT, WATERPROOFING & RESTORATION INSTITUTE

SAFETY AND HEALTH

FIELD MANUAL



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Through the OSHA and SWRIInstitute Alliance, the SWRIInstitute developed this Field Manual for informational purposes only. It does not necessarily reflect the official views of OSHA, the U.S. Department of Labor or SWRIInstitute. 09/2009; updated 01/2015

INTRODUCTION

This Safety and Health Field Manual provides brief summaries of some of the key workplace safety and health topics for sealant, waterproofing and restoration contractors. Knowledge of safety and health standards is essential in reducing work-related injuries and illnesses and in maintaining a safe and healthful work environment. Contractors must ensure that their employees are trained in a language and vocabulary that they understand.

This Field Manual is a product of the Alliance between the Occupational Safety and Health Administration (OSHA) and the Sealant, Waterproofing & Restoration Institute (SWRIInstitute). Most of the information covered in this Field Manual has been taken directly from OSHA standards, but does not cover all the requirements in the OSHA standards. The specific subsection of the OSHA standard will be listed following the title of each section in this Field Manual. For a more complete understanding of these topics, please review the OSHA standards in their entirety. They can be found at Title 29 Code of Federal Regulations beginning at Part 1910 or on OSHA's website (www.osha.gov).

The sealant, waterproofing and restoration contractor can use this Safety and Health Field Manual to help identify the key hazards and OSHA requirements in this industry. The work performed by sealant, waterproofing and restoration contractors covers one of the widest ranges of activities in the construction industry.

Contractors can use this Field Manual as part of an overall workplace safety and health program that promotes the culture of safety, where everyone takes personal responsibility for their own safety as well as those around them. For more detail on developing and implementing a workplace safety and health program, see the Safety and Health Manual developed by SWRIInstitute through the OSHA-SWRIInstitute Alliance.

Under the Occupational Safety and Health Act, employers are responsible for providing a safe and healthy workplace and workers have rights. OSHA can help answer questions or concerns from employers and workers. OSHA's On-site Consultation Program offers free and confidential advice to small and medium-sized businesses, with priority given to high-hazard worksites. For more information, contact your regional or area OSHA office, call 1-800-321-OSHA (6742), or visit www.osha.gov.

DISCLAIMER

This Safety & Health Field Manual has been prepared by the Sealant, Waterproofing & Restoration Institute ("SWRIInstitute") for use in the field as a quick reference tool of the basic safety and health topics for the job site. SWRIInstitute has merely compiled information from industry representatives and from the Occupational Safety and Health Administration ("OSHA"). Accordingly, SWRIInstitute, its members, employees and agents expressly disclaim any responsibility whatsoever for the accuracy of the terms, methods, procedures, specifications, views and opinions discussed herein. As there may be other safety and health topics not specifically addressed herein which may apply to a job site, the employer should evaluate all of the factors pertaining to potential hazards at a particular worksite with respect to employee safety and health. This Safety & Health Field Manual should not be considered a substitute for a written Safety & Health Program, as required by OSHA, provisions of the Occupational Safety and Health Act or for any standards issued by OSHA or other federal, state and local agencies. SWRIInstitute, its members, employees and agents expressly disclaim any responsibility whatsoever for damages arising from the use, application or reliance on the recommendations and information contained in this Safety & Health Field Manual.

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COMPETENT PERSON – 1926.32(f)

OSHA defines a competent person as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization by the employer to stop work and take prompt corrective measures to eliminate them. Having a competent person onsite who is familiar and has the authority to take proper action is important to the safety of new or less educated employees that haven't had the proper training. An undertrained employee may make a decision that could be harmful to themselves and others.

This term is used in a number of OSHA's construction standards. For example, the scaffolding standard in section 1926.451(f)(3) requires that "scaffolds and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity." Another example is OSHA's requirement that trenches be inspected by a competent person prior to worker entry to ensure elimination of excavation hazards such as cave in hazards and hazardous atmospheres.

GENERAL DUTY CLAUSE

The General Duty Clause, Section 5(a)(1) of the Occupational Safety and Health Act, covers serious hazards for which no specific OSHA standard applies. OSHA can issue citations for violations of the General Duty Clause covering hazards for which no OSHA standard applies, even if an employer is in compliance with other OSHA standards.

If a jobsite condition looks like a hazard, it probably is a hazard. Ask a designated competent person, safety manager or a supervisor if you think it's a hazard before someone gets injured.

DO:

- Identify all hazards at your worksite, including those that may not be covered by specific OSHA standards.
- Conduct regular safety meetings where employees discuss hazards.
- Implement protocols to prevent accidents as a result of these hazards.
- Monitor all hazards in the workplace and jobsites.

DON'T:

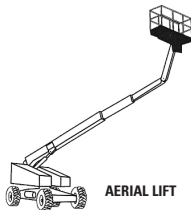
- Do not let employees perform any work they are not trained for.
- Do not use equipment that has not been inspected.

AERIAL LIFTS

AERIAL LIFTS – 1926.453

Aerial lifts include a variety of vehicle mounted devices such as extendible boom platforms, aerial ladders, articulating boom platforms, vertical towers, or any combination, and are used to raise and lower personnel to elevated work areas.

Only authorized persons are allowed to operate aerial lifts. To become authorized you must first receive instruction, and then be able to demonstrate full knowledge of all mechanical functions, equipment limitations, and all safety procedures and practices for that particular piece of equipment. Training information is usually available from the equipment manufacturer.



The importance of a pre-use safety check cannot be over stressed - inspect the unit for any visible damage; leaks; worn, defective or missing parts; unusual odors or noises; fuel and oil levels; tire condition and pressure; plus all electric and hydraulic systems. Confirm that all emergency ground-operated controls and basket controls are functioning properly.

The stability of any equipment is only as good as the ground beneath. Make sure that tires and outriggers are on solid ground. Avoid bearing on underground structures, or poorly compacted, frozen, or otherwise unstable soils.

DO:

- Keep entire body inside the man basket when maneuvering it near other structures. Hazards include pinch points and trapping your body between the man lift and solid objects.
- Always use 100% tie off procedures while working in the man basket
- Always move the man basket to another position instead of over reaching the handrails
- Keep man lift clear of Lines. Getting caught, hooked, or snared could cause the man lift to tip over as it is moved or raised
- Always use the man lift on sound, stable surfaces
- Always avoid soft, muddy ground, sand or unstable gravel
- Always follow manufacturer's restriction recommendations regarding wind speeds

WIND RESTRICTIONS

25 MPH – Swingstages
30 MPH – Manlifts
35 MPH – Lift Platforms

DON'T:





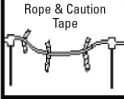

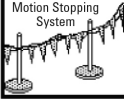

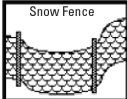
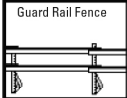

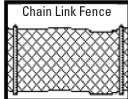
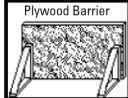

- Do not exceed the rated capacity of any aerial lift, and remember that they are designed to transport workers, tools and limited materials.
- Do not stand on the handrails to reach the work area.
- Do not overload the man lift. This can cause it to topple over.
- Do not exceed the man lift load rating by pulling up grout lines, concrete pump lines or other heavy weighted lines.
- Do not work directly under the man basket or close to the equipment – it could move at any time causing injury.
- Do not move the lift while it is in an extended position.
- Do not attempt to use this equipment as a crane.
- Do not allow workers to tie off to an adjacent pole, structure or equipment while working from an aerial lift.
- Do not put a lateral load on the lift.
- Do not use ladders, planks, boxes or other items inside the basket to extend your reach.

BARRICADES – 1926.202 & SIGNS -1926.200

Barricades for protection of employees must conform to part VI of the Manual on Uniform Traffic Control Devices for Streets and Highways, relating to barricades. One of the first steps in a construction project is the planning of traffic flow through or around the work areas. Sources of injuries involving the public and the workers include accidental contact with construction equipment, falling into open excavation work, and inadvertent entry into a busy construction zone.

Consideration must be taken on each jobsite to ensure public safety from hazards including:

- **Moving Equipment**
- **Dust**
- **Exhaust**
- **Open Holes**
- **Traffic**
- **Debris**
- **Slip Hazards**
- **Fires**
- **Noise**
- **Trip Hazards**
- **Electrical Shocks**
- **Men Working**
- **Vapors/Fumes**
- **Falling Debris**
- **Trenches**

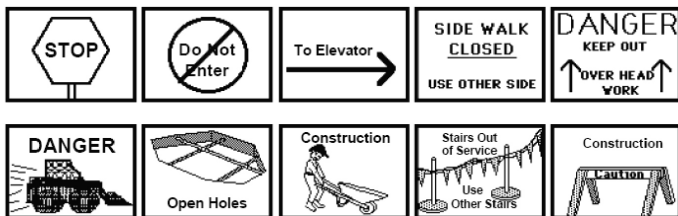
Level 1 Some Protection	Level 2 More Protection	Level 3 Best Protection
<div style="display: grid; grid-template-columns: 1fr 1fr; gap: 5px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Yellow Caution Tape  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Traffic Cones  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Red Caution Tape  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Traffic Barrels  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Rope & Caution Tape  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Flashing Barriers  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Motion Stopping System  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Saw Horse Barrier  </div> </div>	<div style="display: grid; grid-template-columns: 1fr; gap: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Snow Fence  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Guard Rail Fence  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Dust Barrier  </div> </div>	<div style="display: grid; grid-template-columns: 1fr; gap: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Chain Link Fence  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Plywood Barrier  </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Jersey Barrier  </div> </div>

Barricades and other warning devices will reduce the chances of such accidents. One or more of the following types of protection should be used based on the hazards present.

BARRICADES & SIGNS | COMPRESSED GAS CYLINDERS

Signage can play a crucial role in helping the public understand how to avoid jobsite hazards.

Signs shall be visible at all times while work is being performed and shall be promptly removed or covered when the hazards no longer exist.



DO:

- Provide pedestrians with a safe, convenient travel path that replicates as nearly as possible the most desirable characteristics of sidewalks or footpaths.
- Ensure that barricades are properly striped for visibility.
- Equip barricades with lights for night visibility.
- Ensure that signs conform in shape, size and color to the recommended specifications.
- Ensure that signs are used freely to designate work operations, approach to the operation, warnings, speed limits, etc.

DON'T:

- Do not lead pedestrians into direct conflicts with worksite vehicles, equipment, or operations.
- Do not lead pedestrians into direct conflicts with mainline traffic moving through or around the worksite.

COMPRESSED GAS CYLINDERS – 1926.350

Handling and Storing Cylinders

- Oxygen and fuel gas cylinders or other flammable materials must be stored separately. The storage areas should be separated by 20 ft. or by a wall 5 ft. high with a ½ hour burn rating.
- Inert gas (e.g., helium, argon, nitrogen) cylinders should be stored separately, and all cylinders should be stored with protective caps, and in the vertical position.
- Cylinders must be secured with a chain or other device so they cannot be knocked over accidentally.
- Protective caps should be kept in place at all times, (especially during transport) unless the cylinder is in use. Cylinders should never be lifted by the safety cap or the valve.

General Precautions

- Any cylinder that is leaking or damaged should be replaced. The cylinder should be tagged to identify of the potential problem.
- Acetylene cylinders that are transported in the horizontal position should be allowed to set for 15 minutes or more in the vertical position before use.
- Fire is a constant danger to the welder. Combustible materials should be 35 ft. or more away from any welding. A fire watch can be provided by any person who knows how to sound the alarm and use a fire extinguisher. (Dry chemical, Type A, B, C fire extinguishers are best suited and can be used on most fires.)
- Hoses must be used only for the gas or liquid for which they were designed. Green hoses are to be used only for oxygen, and red hoses are to be used only for acetylene or other fuel gases. Hoses should also be kept out of the direct line of sparks. Any leaking or bad joints in gas hoses must be replaced.

DO:

- Move cylinders by tilting and rolling them on their bottom edges.
- Store compressed gas cylinders in an upright position at all times.
- Use a cradle or cage when hoisting cylinders with a crane.
- Open cylinder valves slowly and carefully.
- Examine compressed gas cylinders regularly for signs of defects, rusting or leakage.
- When using different types of gas, segregate cylinders containing one kind of gas from another.

DON'T:

- Do not use a damaged or defective cylinder.
- Do not use oil, grease, lead or other pipe fitting compounds for any joints or on cylinder valves.
- Do not use full or empty cylinders as rollers or supports.
- Attempt to mix gases in a cylinder.
- Do not plug, remove or tamper with any pressure relief device. Under normal conditions, these containers will periodically vent the product.
- Do not expose cylinders to an open flame or to any temperature above 125 degrees Fahrenheit.
- Do not expose cylinders to continuous dampness or store near salt or other corrosive chemicals or fumes. Corrosion may damage cylinders and cause their valve protection caps to stick.

CONFINED SPACE

CONFINED SPACE – 1926.21(b)(6) and 1910.146(b)

OSHA defines a confined space as an area which:

- Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
- Is not designed for continuous employee occupancy.

OSHA's construction standard for confined spaces requires employees entering confined or enclosed spaces to be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protection and emergency equipment required.

PERMITS

Under OSHA's general industry standard, confined spaces are classified as either "non-permit confined spaces" or "permit-required confined spaces."

The OSHA Standard "Permit-required Confined Spaces" requires that employees be protected from life-threatening hazards associated with entry into confined spaces.

A permit-required confined space contains or has the potential to contain one or more of the following hazards:

- Atmospheric hazards: Oxygen enrichment or deficiency, flammable/explosive vapors or gases, or toxic vapors and gases.
- Engulfment hazards: Materials within the space that could engulf entrant(s).
- Internal configuration hazards: Spaces whose internal configuration (inwardly converging walls) could trap or asphyxiate entrant(s).
- Other recognized serious safety or health hazards.

Entry Permit: Written document developed by the employer that allows authorized entry into permitted spaces when conditions of the confined entry standards are met.

Entry Supervisor: The person (employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space, authorizing entry, overseeing entry operations, and terminating entry when required. Entry supervisors may also serve as attendants or entrants provided they have received the required training.

TRAINING

Employees associated with entry into confined spaces are required to be trained before any entry is performed into a confined space. The training addresses hazards associated with the spaces and specific hazards contained in the workplace.

Each employee working inside and outside the confined space shall be adequately trained in rescue and cardiopulmonary resuscitation.

A qualified attendant shall be posted near the entrance for the duration of the work. The qualified attendant shall be in constant communication with the entrants while the job is in progress. The qualified attendant is responsible for: monitoring atmospheric conditions, personnel entry/exit, potential hazards, sign-in log, and emergency assistance as needed.

INSPECTION

Inspections associated with hazards of confined space entry are required prior to and during entry.

Air quality testing shall be performed:

- Prior to every entry when the space is vacant.
- After a 10-minute ventilation period (if ventilation is necessary).
- At least hourly for permit-required confined spaces.
- More frequently, if conditions or suspicions warrant.

In addition, air monitors shall be worn by all persons entering the confined space.

RESCUE AND EMERGENCY SERVICES

Employers shall develop and implement procedures and provide rescue and emergency equipment needed to reach a victim(s) within an appropriate time frame.

DO:

- Have a rescue plan in place before entering a confined space.
- Have a competent person determine if entry conditions are acceptable to enter a confined space.
- Have a competent person serve as attendant or entrant as long as they have received adequate and required training.
- Have a written document developed by the employer which identifies who is authorized to enter into the confined space.
- Perform air quality testing prior to and during entry into confined space.
- Wear air monitors when entering confined space.
- Have proper harness and retrieval equipment available and be sure employees are trained in its proper use.

DON'T:

- Do not enter a confined space without proper training or proper supervision.
- Do not enter a confined space without proper air quality testing and without wearing air monitors.
- Do not enter a confined space without verifying that all employees working both inside and outside of the confined space have had rescue training and are able to perform CPR (cardiopulmonary resuscitation).
- Do not enter a confined space without reviewing hazard with attendant and signing log that you are entering.

DRINKING WATER

DRINKING WATER – 1926.51

An employer is required to provide an adequate supply of potable water in all places of employment. This applies to offices, field offices and jobsites.

“Potable water” is defined in Section 1926.51: water which meets the quality standards prescribed in the U.S. Public Health Service Drinking Water Standards, published in 42 CFR Part 721, or water which is approved for drinking purposes by the state or local authority having jurisdiction.

Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap. Re-usable containers should be serviced as required so that sanitary conditions are maintained. Water shall not be dipped from an open container

Drinking water often and BEFORE you are thirsty will protect yourself and others from heat stress.

DO:

- Have an adequate supply of potable water in all places of employment; office, field office, jobsites.
- Provide single service (one time use) drinking cups. Common drinking cups are prohibited.
- Provide a sanitary container for unused cups and a receptacle for used cups.
- Clearly mark the container used to distribute drinking water as to the nature of its contents and that it is not to be used for any other purpose.

DON'T:

- Do not use outlets for non-potable water such as water for industrial or firefighting purposes for drinking water.
- Do not allow cross contamination, open or potential, between a system furnishing potable water and a system furnishing non-potable water.



ELECTRICAL SAFETY – 1926.400 to 1926.449

Electric shock can cause serious injuries and death!

General safety precautions:

Safety to personnel and safe operation of machines and tools should be uppermost in all considerations of using electricity on the jobsite. Electrical violations are among the most commonly cited OSHA violations. Electrical safety is governed by several specific standards. These include OSHA standards and standards from the National Fire Protection Association (NFPA), American National Standards Institute (ANSI), and Underwriters Laboratory (UL). OSHA's electrical standards are contained in 29 CFR 1926.400-449 (Subpart K) for construction, and 29 CFR 1910.301-399 (Subpart S) for general industry. Refer to the OSHA regulations for specific applications.

The OSHA Construction standard says:

1926.404(b)(1)(ii) Ground-fault circuit interrupters. All 120-volt, single-phase 15 and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved fault circuit interrupters for personnel protection.

Examples of GFCIs

Ground-Fault Circuit Interrupters. The GFCI is a fast acting device that senses a small current leakage to ground. Within 1/40 of a second, it shuts off the electricity and “interrupts” the current flow. It provides effective protection against shocks and electrocution. GFCIs are required for use on all construction sites and projects. A few variations of GFCIs are shown above.

Extension Cords: Extension cords are convenient ways to provide power to portable equipment. However, they are often misused, resulting in injuries and expensive OSHA fines. Extension cords may only be used for temporary power needs. The thing to remember about extension cords is the word “temporary” - extension cords are never a substitute for permanent wiring.

Electrical Fires: Electrical overload is one cause of fire. On construction sites, an electrical fire may occur when portable tools overload a power source. If an electrical fire occurs, it's best to use a class “C” rated fire extinguisher, or call the local fire department. In the event of an electrical fire, immediately disconnect the tool or power cord from the power source, if it can be done safely, which helps keep an electrical fire contained.

ELECTRICAL SAFETY

DO:

- Provide adequate overload and short-circuit protection for safe operation. The interrupting capacity of all breakers and fuses must be sufficient to clear the fault current rapidly and without damage to itself.
- Provide cord protection for flexible cords and cables temporarily passing through doorways, windows or other similar openings..
- Keep a fire extinguisher rated for the hazards on the worksite at ALL times, and make sure workers know how to operate it and where it's located. The standard procedure for fighting electrical fires is to open (that is, disconnect) the circuit and then apply an approved extinguishing agent. A carbon dioxide (CO2) extinguisher offers the advantage of extinguishing the fire, cooling the apparatus, leaving no residue, and having no adverse effect on the insulation and metal parts; it may be used on live circuits. CO2 should not be used in confined spaces, unless a breathing apparatus is used.

DON'T:

- Do not make or use Shop Made Cords with Receptacle Boxes. One of the most common electrical violations is using a surface-mount type receptacle box, and flexible cord to provide power to various tools or equipment.
- Do not overload extension cords; know the amperage requirements of the electrical tools and equipment used, and what the extension cord is rated to carry.
- Do not splice extension cords with electrical tape. Splices should be made by qualified employees with approved materials.

EXCAVATION AND TRENCHING – 1926.650 – 652



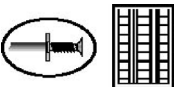

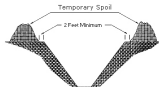
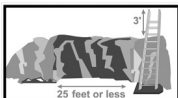
An employer is required to provide an adequate supply of potable water in all places of OSHA standard 29 CFR 1926.650 to 652 regulates the use of support systems, sloping and benching systems, as well as other engineered systems to protect against cave-ins. In addition, it regulates the means of access and exit from excavations, employee exposure to vehicular traffic, falling loads, hazardous atmospheres, water accumulation, and unstable structures located in and adjacent to excavations.

This standard should be thoroughly understood by employers and employees alike.

Each employee in an excavation shall be protected from cave ins by an adequate protective system except when:

- Excavations are made entirely in stable rock; or
- Excavations are less than 5 ft. in depth and examination of the ground by a competent person provides no indication of a potential cave in.

There are different types of protective systems. Some of the protective systems for trenches are:

<ul style="list-style-type: none"> • Sloped for stability; or 	
<ul style="list-style-type: none"> • Cut to create stepped benched grades; or 	
<ul style="list-style-type: none"> • Supported by a system made with posts, beams, shores or planking and hydraulic jacks; or 	
<ul style="list-style-type: none"> • Supported by a trench box to protect workers in a trench. 	
<p>Additionally, excavated or other materials must be at least 2 feet back from the edge of a trench; and</p>	
<p>A safe means of egress shall be provided within 25 feet of workers in a trench.</p>	

EXCAVATION AND TRENCHING

DO:

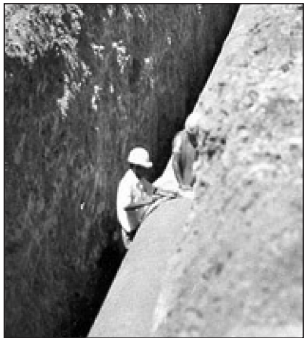
- Provide ladders, stairways, ramps or other means of egress in all trenches that are 4 ft. deep or more.
- Position means of egress within 25 lateral feet of workers.
- Make sure structural ramps used solely for access or egress from trenches are designed by a competent person.
- Use earthen ramps as a means of egress only if a worker can walk them in an upright position, and only if they have been evaluated by a competent person.
- Make sure protective systems for trenches 20 feet deep or greater have been designed by a registered professional engineer.
- Make sure that trenches are inspected by a competent person prior to entry and after any hazard-increasing event such as a rainstorm, vibration or excessive surcharge loads.
- Test for atmospheric hazards such as low oxygen, hazardous fumes and toxic gases when > 4 feet deep.
- Keep heavy equipment away from trench edges.
- Keep excavated soil (spoils) and other materials at least 2 ft. back from the edge of a trench.
- Call the national “Call Before You Dig” number 811 or locally designated number to locate underground utilities.

DON'T:

- Do not work under suspended or raised loads and materials.
- Do not enter an unprotected trench.



These workers are protected from a cave in and have safe access and egress from the trench.



These workers are not protected from a cave in, nor do they have any apparent safe access or egress from the trench.

FALL PROTECTION – 1926.500-503

Proper precaution needs to be taken when there is an unprotected side or edge that presents a fall greater than 6 feet. There is no safe distance to approach the unprotected edge unless you are wearing adequate fall protection equipment or there is a parapet wall or guardrail 42" (plus or minus 3 inches) in height.

There are two types of fall protection; fall restraint and fall arrest.

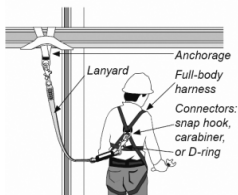
Fall restraint includes such items as a guardrail or parapet wall. It can also consist of a personal fall restraint system which keeps you from reaching an unprotected "fall" point.

Guardrails (on scaffolds, aerial lifts and on the perimeter of buildings) are considered to be a fall restraint type of fall protection. They must have a top rail at least 39" to 45" above a working surface. The top rail must be able to withstand a force of 200 lbs. in any direction. Mid rails must be placed midway between the top rail and the working surface, and be able to withstand a minimum force of 150 lbs. Top and mid rails must be at least 1/4" in diameter so as to prevent cuts and or lacerations. Steel banding and plastic banding cannot be used as top rails or mid rails. .

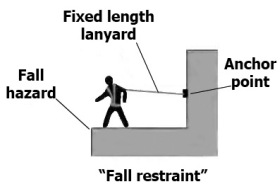
Fall arrest STOPS you if you're falling and keeps you from contacting any lower levels.

If you are at risk of falling 6 feet or more, you must use appropriate fall protection equipment. One type of appropriate fall protection equipment is the personal fall arrest system. The entire personal fall arrest system must be capable of withstanding the tremendous impact forces involved in a fall. A person without protection will free fall 4 feet in 1/2 second and 16 feet in 1 second! A personal fall arrest system includes an anchorage (able to support a load of 5,000 pounds), a full body harness and a connector, such as a lanyard or lifeline, linking the harness to the anchorage. A rip-stitch lanyard, or deceleration device, is typically a part of the system.

A personal fall-arrest system



A personal fall arrest system



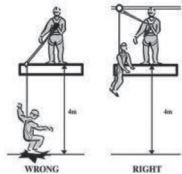
A personal fall restraint system

Note: The first option should be fall prevention, i.e., a guardrail or similar type of fall protection system. The use of personal fall arrest should not be used in lieu of a fixed fall protection guarding system.

FALL PROTECTION

- DO:**
- Use an anchorage point that has been selected by a qualified person and will support 5,000 lbs. per worker (strong enough to support a pick-up truck).
 - Rig fall arrest systems so employees can't free fall more than 6 feet (or contact any lower level).
 - Tie off above your head. A six foot person who ties off at the feet could freefall as much as 12 feet. This must consider the length of the lanyard and its stretch capability.
 - Place your anchorage directly above/behind your work area to avoid potential swing fall hazards.
 - Use the shortest lanyard possible. The shorter the tie-off, the shorter the fall.

- DON'T:**
- Do not tie off to vent pipes or a non-structured non-designated area.
 - Do not tie a knot in lanyard. This will reduce its strength.
 - Do not use pipes, electrical conduits, light fixtures, or guardrails as anchor points.
 - Do not use any lanyards without self-locking snap hooks.
 - Do not join multiple lanyards together to reach an anchorage.
 - Do not allow more than one worker to tie off to the same anchorage unless it is designed and approved by an engineer.
 - Do not use an anchorage that is not independent of any anchorage used to support or suspend platforms.



Spot the difference.

- Checklist:**
- ✓ Inspect your equipment daily.
 - ✓ Look for fraying ropes, webbing, and cracks or other defects in the hardware.
 - ✓ Tag and remove defective equipment from service.
 - ✓ Make sure you are attached to a sound anchorage.
 - ✓ Follow the manufacturer's instruction for product usage.
 - ✓ Make sure the equipment fits properly.






If there is any doubt about the safety of the equipment, do not use it. Remove from service any equipment, including ropes, involved in a fall.

Parts of a Personal Fall Arrest System	Guardrail Systems
1. Anchorage – 5,000 lbs. minimum	1. Top rail must be 39" to 45" and withstand 200 lbs. of force
2. Lanyard or rope grab with vertical lifeline	2. Mid rail midway between the top rail and surface and withstand 150 lbs. of force
3. Full Body Harness	3. Top, mid rails must be a minimum ¼" in diameter
	4. Toe boards (when used) must be 3.5" high and able to withstand 50 lbs. of force

FIRE EXTINGUISHERS – 1926.150**TYPES OF FIRE EXTINGUISHERS:**

- **Water** – Filled with water and pressurized air.
- **Carbon Dioxide** – Contains a non-flammable gas extinguishing agent.
- **Dry Chemical** – Multipurpose, contains a dry powder extinguishing agent.

CHOOSING THE RIGHT FIRE EXTINGUISHER AND THEIR CLASSES:

CLASSES OF FIRES	TYPES OF FIRES	PICTURE SYMBOL
A	Wood, paper, cloth, trash & other ordinary materials.	
B	Gasoline, oil, paint and other flammable liquids.	
C	May be used on fires involving live electrical equipment without danger to the operator.	
D	Combustible metals and combustible metal alloys.	
K	Cooking media (Vegetable or Animal Oils and Fats)	

CLASS A: Class A fires involve common combustibles such as wood, paper, cloth, rubber, trash and plastics. They are common in typical commercial and home settings, but can occur anywhere these types of materials are found.

CLASS B: Class B fires involve flammable liquids, gases, solvents, oil, gasoline, paint, lacquers, tars and other synthetic or oil-based products. Class B fires often spread rapidly and, unless properly secured, can re-flash after the flames are extinguished.

CLASS C: Class C fires involve energized electrical equipment, such as wiring, controls, motors, data processing panels, or appliances. They can be caused by a spark, power surge or short circuit, and typically occur in locations that are difficult to reach and see.

FIRE EXTINGUISHERS

NOTE: Although ABC and BC dry chemical extinguishers can control a fire involving electronic equipment, the National Fire Code (NFPA 75-1999 edition), Section 6-3-2, specifically advises against dry chemical extinguishers for fires involving computers or other delicate electronic equipment due to the potential damage from residues.

CLASS D: Class D fires involve combustible metals such as magnesium and sodium. Combustible metal fires are unique industrial hazards which require special dry powder agents.

CLASS K: Class K fires involve combustible cooking media such as oils and grease commonly found in commercial kitchens. The new cooking media formulations used for commercial food preparation require a special wet chemical extinguishing agent that is especially suited for extinguishing and suppressing these extremely hot fires that have the ability to re-flash.

FIRE EXTINGUISHERS ESSENTIALS:

- All fire extinguishers should be inspected monthly by a responsible person.
- All fire extinguishers should be serviced by a qualified technician on a yearly basis.
- Fire extinguishers have operating instructions listed on the name plate; familiarize yourself with them.
- Fire extinguishers of the proper type and size for the exposure shall be readily available.
- Be familiar with the location of fire extinguishers on the jobsite.
- When fueling equipment, always have a fire extinguisher close by.
- Most fire extinguishers operate using the P.A.S.S. method:
 - P – Pull the locking pin.
 - A – Aim at the base of the flames.
 - S – Squeeze the handle.
 - S – Sweep back and forth over the burning area.

DO:

- Know the locations of extinguishers on the jobsite.

DON'T:

- Do not use water agents on grease and oil fires, or use dry chemical extinguishers on electrical devices or anything with metal because it is corrosive.
- Do not aim at the flames of the fire.
- Do not stand too close to the fire or walk on the extinguished areas.
- Do not put them on areas where fire is most likely to happen making them unreachable.
- Do not leave them on corridors or any anything that is highly magnetic.
- Do not violate the standards because even with their presence you might still be at risk or more prone to the dangers of fire.
- Do not play with the fire extinguisher or its substances because of the possibility of injuring yourself.

FIRST AID – 1926.50

The OSHA standard states:

- The employer shall ensure the availability of medical personnel for advice and consultation on matters of occupational health.
- Provisions shall be made prior to commencement of the project for prompt medical attention in case of serious injury.
- 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.
- 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.
- Proper equipment for prompt transportation of the injured person to a physician or hospital, or a communication system for contacting necessary ambulance service, shall be provided.
- In areas where 911 is not available, the telephone numbers of the physicians, hospitals, or ambulances shall be conspicuously posted.
- Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

DO:

- Make sure emergency numbers are posted by phones.
- Know the location of the closest emergency medical facility.
- Know the location of the nearest first aid kit and know how to use it.
- Try to stop the flow of bleeding until medical help arrives. For deep cuts, elevate the wound while you apply pressure. For more serious wounds, push on the pressure points on the inside of the upper arm and crease of the groin.
- Be aware that a seriously injured person will frequently go into shock. This can be fatal. While you are waiting for help, lay the person down, cover and raise the feet above heart level.
- Place an amputated limb or body part in a bag with ice and send it to the hospital with the victim.
- Keep the person still and wait for emergency help.
- Flush eyes splashed by chemicals for at least 15 minutes. Then close the eyes, cover them and get medical help. If something is embedded in the eye, keep the person calm until help arrives. Note: See Safety Data Sheet (SDS).



FIRST AID | HAZARD COMMUNICATION

- Cool burns with cool (not cold) running water or a cool water compress (wet towel or handkerchief). Elevate burned limbs.

DON'T:

- Do not touch blood or other bodily fluids without protective gloves.
- Do not provide anything to drink to a person in shock.
- Do not move the victim unless absolutely necessary until you are sure what the injury is and first aid has been rendered.
- Do not move a person with broken bones. The wrong move can cause serious injury - even death.
- Do not use ice, lotion or ointment on a burn.



HAZARD COMMUNICATION (HAZ COM) – 1926.59

(identical to 1910.1200)

The purpose of OSHA's hazard communication standard is to ensure that employees understand the hazards of the chemicals they work with, know how to safely use those chemicals, and know what protective measures are available to prevent adverse effects from occurring. All workers are covered by this standard.

The Standard requires employers to:

- Develop a written program.
- Identify the hazardous chemicals found in the workplace.
- Maintain labels on incoming containers of hazardous chemicals and label other workplace containers, such as gasoline or diesel fuel cans, to identify the chemical and provide hazard warning.
- Obtain Safety Data Sheets (SDSs) for all hazardous materials found in the workplace.
- Train employees to use hazardous chemicals safely.

A Safety Data Sheet (SDS) provides information the manufacturer of a product considers necessary for you to determine what chemicals are in it and what steps to take to protect yourself when using the product.

SDSs must be readily accessible to employees at all applicable work locations. SDSs provide the following information:

Identification. This section includes product identifier, manufacturer or distributor name, address, phone number, recommended use, and restrictions on use.

Hazard(s) Identification. This section includes all hazards regarding the chemical, and required label elements.

Composition/Information on Ingredients. This section includes information on chemical ingredients and trade secret claims.

First-Aid Measures. This section includes important symptoms/effects, acute, delayed and required treatment.

Fire-Fighting Measures. This section lists suitable extinguishing techniques, equipment, and chemicals hazards from fire.

Accidental Release Measures. This section lists emergency procedures, protective equipment and proper methods of containment and cleanup.

Handling and Storage. This section lists precautions for safe handling and storage, including incompatibilities.

Exposure Controls/Personal Protection. This section lists OSHA's Permissible Exposure Limits (PELs), Threshold Limit Values (TLVs), and appropriate engineering controls, and personal protective equipment (PPE).

Physical and Chemical Properties. This section lists the chemical's characteristics.

Stability and Reactivity. This section lists chemical stability and possibility of hazardous reactions.

Toxicological Information. This section includes routes of exposure, related symptoms, acute and chronic effects, and numerous measures of toxicity.

HAZ COM SIGNS TO LOOK FOR



DO:

- Use and handle all chemicals in accordance with manufacturer's label and within federal, state and local regulations.
- Discontinue use of chemicals if wind speeds or weather conditions affect the safety of workers or the public.
- Use SDSs for any chemical being used.
- Use adequate personal protective equipment.
- Remember that employees have both a need and a right to know the hazards and the identities of the chemicals they are exposed to when working.
- Make sure you are properly trained in each chemical that you use.
- Make sure all containers are labeled and properly disposed of.

DON'T:

- Do not have any eye or skin contact with chemicals.
- Do not use or store chemicals that are not labeled.
- Do not use chemicals without proper training and protection.

HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE – 1926.65

(identical to 1910.120)

OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) standard covers cleanup operations or emergency response operations for releases of hazardous substances. A hazardous substance means, by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating or otherwise harmful, is likely to cause death or injury. Hazardous materials are regulated by several government agencies including the Environmental Protection Agency, the Department of Transportation and OSHA.

Additional information about hazardous materials is covered under the Hazard Communication (HAZ COM) section of this handbook. Methods for protection against exposure to hazardous materials are covered under the personal protective equipment (PPE) section of this handbook. The transportation of hazardous materials is not covered in this handbook.

The cleanup and disposal of hazardous materials requires special training and is strictly regulated.

DO:

- Assure that general site workers engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of HAZWOPER training.
- Develop a written safety and health program for their employees involved in hazardous waste operations. The requirements of the safety and health program are extensive. Refer to 29 CFR 1926.65 for specific HAZWOPER requirements.
- Always have the Safety Data Sheet (SDS) available for materials you are using. They may be required in case of an emergency.
- Follow emergency procedures or call 911 in case of an accidental release.

DON'T:

- Do not use any hazardous material without proper training.
- Do not attempt to clean up hazardous materials without proper training.

HEARING PROTECTION/OCCUPATIONAL NOISE EXPOSURE – 1926.52

- Exposure to high noise levels can cause hearing loss or impairment.
- There is no cure for noise-induced hearing loss.
- Specifically designed protection is required.
- Waxed cotton, foam, or fiberglass wool earplugs are self-forming and work as well as most molded earplugs when inserted properly.
- Plain cotton is ineffective as protection against hazardous noise.
- Earmuffs need to make a perfect seal around the ear to be effective.
- Noise levels of many construction operations frequently exceed 90 dBA.
- When workers are subjected to sound levels listed in the below table, they must wear hearing protection:

Allowable Exposure Levels to Sound

Sound level (dBA)	Time per day (hours)
90	8
95	4
100	2
Sound level (dBA)	Time per day (hours)
105	1
110	½
115	¼ or less



Properly inserted foam ear plugs



Disposable foam ear plugs; coins to show scale

Kinds of Hearing Loss:

- Temporary threshold shift, temporary loss of hearing, noticeable in the higher frequencies, perceived as muffling of sounds.
- Tinnitus, a ringing or buzzing in the ears, usually within first two hours of exposure.
- Permanent threshold shift, repeated exposure causes this permanent, irreversible hearing loss.

Hearing Conservation Program:

A Hearing Conservation Program has been developed to help you learn to protect your hearing when working on noisy tasks. If the eight-hour average exposure level is above 90 decibels (dBA), a program is established.

Hearing Conservation Program consists of:

- Workplace testing to measure noise levels of tasks.
- Hearing protection devices selected and properly fitted to each employee.
- Hearing testing to determine if hearing loss has occurred.
- Information and training about the effects of noise on hearing.
- Hearing protection provided for off-the-job tasks.

DO:

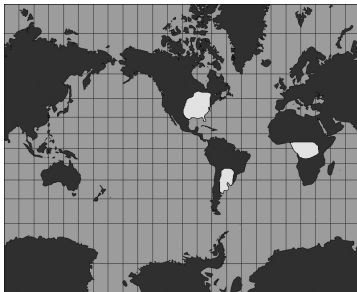
- Wear hearing protection when sound levels exceed 90 dBA.
- Train workers to properly use hearing protection devices.

DON'T:

- Do not reuse disposable earplugs.
- Do not use earmuffs as hearing protection if glasses, sideburns, long hair, or facial movements prevent a perfect seal.

HISTOPLASMOSIS

Histoplasmosis [his-toh-plaz-MOH-sis] is a fungal infection that varies in symptoms and seriousness. Histoplasmosis is caused by *Histoplasma capsulatum*, a fungus. This fungus comes from the droppings of birds and bats. The fungus can become airborne when disturbed by a variety of construction activities. This health risk can be significant, and therefore it is important to prevent exposure to histoplasmosis.



The distribution of histoplasmosis throughout the world (marked white).

- The fungus produces spores that can be inhaled when they get into the air. Spores are hardy forms of the fungus that can live in the environment for a long time.
- Histoplasmosis usually affects the lungs and causes a short-term, treatable lung infection. When it affects other parts of the body, it is called disseminated histoplasmosis, and can be fatal. Acute histoplasmosis can also spread from the lungs and lead to the disseminated form, especially in persons with weakened immune systems.



Chest X-ray of a patient with acute pulmonary histoplasmosis

- The histoplasmosis fungus lives in soil, especially soil that is enriched with bat or bird droppings.
- People get histoplasmosis when they breathe in dust that contains the fungus.

HISTOPLASMOSIS

- Symptoms of acute disease usually appear in 5 to 18 days after exposure and include tiredness, fever, chills, chest pains, and a dry cough. The chronic lung infection is like tuberculosis and occurs mostly in persons who already have lung disease.
- Histoplasmosis is treatable with fungus-killing medicines.
- The disease does not spread from person to person.
- To prevent histoplasmosis:
 - Avoid exposure to dust from soil that may be contaminated.
 - Avoid disturbing accumulations of bat or bird droppings, as often found in open air clock and bell towers.
 - Have contaminated areas abated prior to working in vicinity.
 - Wear proper personal protective equipment and disposable clothing when working in high-risk areas.

DO:

- Consult the "Histoplasmosis: Protecting Workers at Risk" document prepared by the National Institute for Occupational Safety and Health/National Center for Infectious Diseases* for more information on work practices and personal protective equipment that will reduce the risk of infection.
- Have contaminated areas abated to create a safe work atmosphere.

DON'T:

- Do not work in an area with visible accumulation of bird or bat droppings without proper training and protection.

Additional Information:

- <http://icwdm.org/publications/pdf/Diseases/HistoCDC2004.pdf>

HOUSEKEEPING – 1926.25**The OSHA standard states:**

- During the course of construction, alteration, or repairs, form and scrap lumber with protruding nails, and all other debris, shall be kept cleared from work areas, passageways, and stairs, in and around buildings or other structures.
- Combustible scrap and debris shall be removed at regular intervals during the course of construction. Safe means shall be provided to facilitate such removal.
- Containers shall be provided for the collection and separation of waste, trash, oily and used rags, and other refuse. Containers used for garbage and other oily, flammable, or hazardous wastes, such as caustics, acids, harmful dusts, etc. shall be equipped with covers. Garbage and other waste shall be disposed of at frequent and regular intervals.

DO:

- Keep all tools in their space when not being used.
- Regularly inspect the jobsite for hazards in material storage, debris build-up, tripping hazards or other workplace dangers.
- Identify the employees who will pick up waste and debris and define cleanup intervals.
- Ensure the site has good lighting.
- Clear scrap lumber with protruding nails from work areas, passageways and stairs in and around buildings or other structures.
- Store materials so there is always a clean path around and between work areas and in and out of the jobsite.
- Remove tripping hazards.

DON'T:

- Do not store materials such that they will obstruct exits.
- Do not allow debris, trash, ice, snow, slippery or other materials to build up on scaffold decks or swing stage platforms.
- Do not allow stacked material to slide, fall or collapse.
- Do not store excess material or equipment on-site if avoidable.
- Do not walk past a hazard. Correct it immediately or notify a qualified person to correct it.
- Do not drop material outside the exterior walls of the building or structure.

ILLUMINATION (LIGHTING)

ILLUMINATION (LIGHTING) – 1926.26

Poor lighting on construction sites creates a hazard to employees and civilians and increases the potential for accidents. All means of access and walkways leading to working areas in addition to the working areas themselves must be adequately illuminated.



Halogen Standup Light



String Light



Wobble Light

Temporary lights shall meet the following requirements:

- Lights shall be equipped with guards to prevent accidental contact with the bulb (excludes guards that are not required when the construction of the reflector is such that the bulb is deeply recessed).
- Temporary lights shall be equipped with heavy duty electric cords with connections and insulation maintained in safe condition. Temporary lights shall not be suspended by their electric cords. String lights are designed for this means and suspension.
- Splices which have insulation equal to that of the cable are permitted.
- Cords shall be kept clear of working spaces and walkways or other locations in which they are readily exposed to damage or wear.
- Exposed non-current-carrying metal parts of temporary lights furnished by the employer shall be grounded either through a third wire in the cable containing the circuit conductors or through a separate wire which is grounded at the source of the current.

DO:

- Arrange temporary lighting stringers in a way that does not overload branch circuits. Each branch current must be equipped with over current protection of capacity not exceeding the rated current carrying capacity of the cord used.

DON'T:

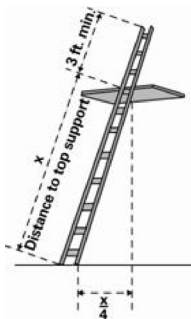
- Do not permit employees to enter dark holds, compartments, decks or other spaces without a flashlight or other portable light.
- Do not use matches or open flames.

LADDERS – 1926.1053

The following requirements apply to all ladders:

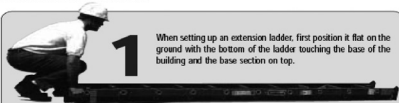
- A double-cleated ladder or two or more ladders must be provided when ladders are the only way to enter or exit a work area having 25 or more employees, or when a ladder serves simultaneous two-way traffic.
- Ladder rungs, cleats, and steps must be parallel, level, and uniformly spaced when the ladder is in position for use.
- A ladder must have nonconductive side rails if they are used where the worker or the ladder could contact energized electrical equipment.
- Portable and fixed ladders with structural defects such as broken or missing rungs, cleats or steps, broken or split rails, or corroded components shall be withdrawn from service immediately. They must be tagged “Do Not Use” or identified as defective. Repairs must restore ladder to its original design criteria.
- The ladder must be capable of supporting your weight and the weight of any material you will be using.

The following diagrams illustrate the proper ways to set up a ladder & choose the correct ladder for the job:



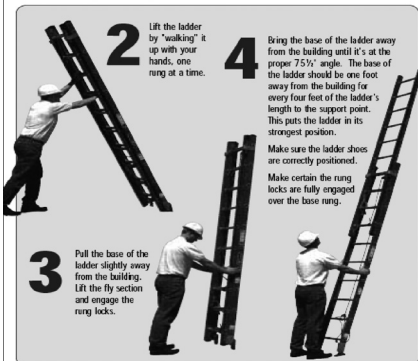
Ladder should extend 3 feet from above landing.

RAISING EXTENSION LADDERS



1

When setting up an extension ladder, first position it flat on the ground with the bottom of the ladder touching the base of the building and the base section on top.



2

Lift the ladder by “walking” it up with your hands, one rung at a time.

4

Bring the base of the ladder away from the building until it's at the proper 75½° angle. The base of the ladder should be one foot away from the building for every four feet of the ladder's length to the support point. This puts the ladder in its strongest position.






Make sure the ladder shoes are correctly positioned.

Make certain the rung locks are fully engaged over the base rung.

3

Pull the base of the ladder slightly away from the building. Lift the fly section and engage the rung locks.

LADDERS

TYPE:	TYPE IAA	TYPE IA	TYPE I	TYPE II	TYPE III
LOAD CAPACITY:	375 pounds	300 pounds	250 pounds	225 pounds	200 pounds
RELATED USE:	Special Duty Professional Use	Extra Heavy Duty Industrial Use	Heavy Duty Industrial Use	Medium Duty Commercial Use	Light Duty Household Use
					

- DO:**
- Set up the ladder on the ground floor, or other level stable surface.
 - Take your time and climb one rung at a time while using 3 points of contact. 2 feet and 1 hand at all times, or 2 hands and 1 foot when climbing.
 - Climb down and move the ladder to get proper access to the work area. Keep your belt buckle between the rails.
 - Climb all ladders facing the rungs. Use a bucket or other means to lift objects to the work area.
 - Look overhead before placing a ladder. Pay special attention to power lines and other electrical hazards.
 - Block off or lock the area around the ladder to warn others of your presence.
 - Make sure straight ladders are long enough so that the side rails extend above the top support point by 36" at least.
 - Place the base of straight ladders out away from the wall or edge of the upper level about one foot for every four feet of vertical height.

- DON'T:**
- Do not place a ladder on unstable surfaces such as boxes, carts, tables, etc.
 - Do not hurry up a ladder to complete a task.
 - Do not overreach beyond the side rails to conduct work.
 - Do not turn your back to the ladder at any time.
 - Do not carry heavy objects up the ladder.
 - Do not assume that the area above the ladder is clear of hazards.
 - Do not tie or fasten ladders together to create longer sections unless they are specifically designed for such use.
 - Do not try to use a stepladder as a straight ladder.
 - Do not use ladders as a platform, runway or scaffold.

LEAD – 1926.62

Lead is hazardous when it gets into the bloodstream where it can move around the body. High exposures over a short period of time or lower exposures spread out over longer time periods can cause lead poisoning. Lead can damage the brain and nervous system, kidneys, and reproductive systems. Lead also contributes to high blood pressure. Most of the absorbed lead is eventually stored in the bones where it may stay for decades. Under certain conditions, the lead stored in the bone may leak slowly into the bloodstream. The early effects of lead poisoning are not specific and resemble the flu symptoms. Lead poisoning is preventable. Many of the health problems caused are reversible if exposure is eliminated or reduced.



Engineering and work practice controls are required to minimize lead exposure. Always follow the compliance program set in place by the employer with regards to preventing prolonged lead exposure.

DO:

- After working around lead, wash hands and face with soap and water before eating or drinking.
- Use showers if provided by employer before leaving a jobsite. If showers are not provided, wash hands, arms and face before returning to street clothes.
- Change into clean clothes and shoes at the jobsite in designated area before leaving jobsite. Keep dirty work clothes and shoes separate from clean street clothes.
- Do what you can to lower the amount of lead you breathe in. Use wet cleaning methods. Wet wipe surfaces and wet clean or HEPA vacuum the work area daily.
- Use a respirator if instructed by employer to minimize lead inhalation.
- Contact employer if symptoms of lead poisoning exist.

DON'T:

- Do not eat, drink, or smoke in the work area. Move to an employer-designated clean area for lunch or breaks.
- Do not forget to cover work area to keep dust particles/paint chips from settling on surfaces or seeping into ground water.

MULTI-COMPONENT CHEMICAL PRODUCTS IN CONSTRUCTION

Hazards and Safe Use

Introduction

Chemicals can present serious hazards to worker health and safety. Some products used in construction have more than one chemical substance or mixture that is used to ensure the product performs as expected. This type of product is a "multi-component chemical product" and can present additional hazards. The Safety Data Sheet (SDS) (formerly known as Material Safety Data Sheet or MSDS) provides information that the manufacturer is required to disclose in order to handle the product safely. This includes safe storage, transport and disposal. All SDSs should include a description of the chemicals that are in a product and what steps to take to protect yourself when using the product. An SDS is required for each component of a multi-component product. Manufacturers or importers of chemicals are required to assess the hazards of these chemicals. This includes hazards that are known to be present in the workplace and that employees may be exposed to under normal conditions of use or in a foreseeable emergency.

Additional hazards may be created when the individual chemicals of a multi-component product are mixed together that may not be addressed on the SDS of the individual components.

The product created by the mixing of multi-component chemicals may require different personal protective equipment, engineering controls, handling procedures, emergency procedures, and disposal requirements. Prior to the use or mixing of multi-component chemical products, employees should be properly trained on the hazards and safe use of these products.

Material Identification

Multi-component materials are often identified on the SDS by having a part A, B, C, etc., after the product name. Multi-component material types include epoxies, polyurethanes, polyureas, polyisocyanates, polyaspartics, as well as others.

While all potential hazards should be listed on the individual SDS if the components are sold to be mixed together (since mixing would be under normal conditions of use), that may not always be the case.

Health Hazards

In addition to the health hazards listed on each of the individual components, there may be health hazards that are created by the mixture that are not listed on the SDS. The manufacturer should be consulted about these additional hazards. The mixture of the individual components of some multi-component products can produce exothermic reactions (high heat) or produce dangerous respiratory hazards and require additional measures to protect workers, such as engineering controls and

personal protective equipment. The most common health hazards created by the mixture of multi-component products include:

- Flammability and/or combustibility - products can auto-ignite
- Extreme heat - causing burns to skin, eyes, mouth and lungs
- Inhalation hazard - fumes may require respiratory protection
- Allergic reactions/occupational asthma - most common with latex, formaldehydes, isocyanates

First Aid

First aid treatment for exposure to mixed multi-component products may be different than for the unmixed components. It is important that medical personnel have information about these products prior to treatment. First aid information for a mixed multi-component product may not be clearly stated on the SDS. Emergency contact information should be on the SDS.

Explosion and Fire Information

Extra care should be taken when using multi-component products, especially in confined spaces or areas of poor ventilation. Some of these mixtures are more flammable and/or explosive when combined than they are prior to mixing. Ambient conditions may affect and/or accelerate reactions of multi-component chemicals. Special equipment and control measures may be required in order to maintain a safe work environment. The manufacturer should be consulted to determine the proper

equipment. Employers should always have the appropriate fire extinguisher(s) ready at the work location, and SDS and emergency contact information available. An emergency action plan is recommended when using products that can generate heat or explosion hazards.

Personal Protective Equipment

The personal protective equipment for multi-component products must address the additional risks posed by the products once they are combined. This may include heat and chemical resistant gloves, goggles and face shield, additional or alternate respiratory protection, and body-covering clothing. In addition to complying with recommendations of the SDS for the individual components, the product manufacturer should be consulted about the proper PPE required for safe handling of the mixed and unmixed products.

Disposal Information

Disposal requirements for properly blended multi-component products are often different from that of their individual single components. Many of these multi-component liquids are hazardous waste as liquids, but may be disposed of as non-hazardous waste when solid. Disposal of waste products are regulated by federal, state and local authorities.

OSHA Standards

The following are some of the OSHA standards that may apply when using multi-component products.

- Confined Space - 29 CFR 1926.21(b)(6)
- Fire Extinguishers - 29 CFR 1926.150
- First Aid 29 - CFR 1926.50
- Hazard Communication - 29 CFR 1926.59 (refers to 29 CFR 1910.1200)
- Personal Protective Equipment - 29 CFR 1926.28, 29; CFR 1926.95-107

Additional Information:

Evacuations Plans and Procedures: Portable Fire Extinguishers: OSHA eTools:
<http://www.osha.gov/SLTC/etools/evacuation/portable.html>

Hazard Communication: OSHA Safety and Health Topics Page:
<http://www.osha.gov/dsg/hazcom/index.html>

Medical and First Aid: OSHA Safety and Health Topics Page:
<http://www.osha.gov/SLTC/medicalfirstaid/index.html>

Occupational Asthma: OSHA Safety and Health Topics Page:
<http://www.osha.gov/SLTC/occupationalasthma/index.html>

Personal Protective Equipment: OSHA Safety and Health Topics Page:
<http://www.osha.gov/SLTC/personalprotectiveequipment/index.html>

PPE: PERSONAL PROTECTIVE EQUIPMENT

PPE: PERSONAL PROTECTIVE EQUIPMENT – 1926.28, 1926.95 to 1926.107

The OSHA standard states that the employer is responsible for requiring the wearing of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions or where this part indicates the need for using such equipment to reduce the hazards to the employees.

Head Protection: The hardhat must be used in any work operations, and must meet American National Standards Institute (ANSI) Z89.1 1986 specifications for protection. Face shields that attach to hardhats provide added protection. A combination that leaves no gap between the shield and the brim of the cap is best. The face shield must also meet ANSI Z87.1 1989 specifications.

Eye Protection: Safety glasses should be standard safety gear when no face shield is worn, and must meet ANSI Z87.1 1989 specifications. Both safety glasses/goggles and a face shield are advisable.

Foot Protection: Footwear worn during site activities are to include leather work boots and rubber boots (or must meet the specific site requirements). Protection against liquid hazardous chemicals requires a boot of neoprene, PVC, butyl rubber, to some other chemical resistant material. With chemical resistant boots, the pant leg should be outside and over the boots to prevent liquids from entering.

Protective footwear should comply with the American Society of Testing Materials (ASTM) Standards: F2412-05 (Standard Test Methods for Foot Protection) and F2413-05 (Standard Specification for Performance Requirements for Foot Protection) in order to provide both impact and compression protection.

Ear Protection: Hearing protection is required starting at 90 decibels, regardless of the duration. If a decibel meter is not available, use hearing protection when you have to raise your voice to talk to someone at a normal talking distance. Common forms of hearing protection are earplugs and earmuffs.

Hand Protection – Gloves: Gloves must resist puncturing and tearing as well as provide the necessary chemical resistance. The type of glove used should be appropriately suited for the specific task.

Body Protection: Clothing to protect the body should consist at a minimum of long work pants and a sleeved shirt. When hazardous liquids, gases, vapors or debris are present, the level of protection needed increases. This may include garments of Tyvek, Nomex, or PVC.

DO:

- Maintain personal protective equipment (PPE) in a clean, serviceable condition.
- Make sure to have PPE meet applicable recognized performance standards, such as ANSI, National Institute for Occupational Safety and Health, Mine Safety and Health Administration, etc.



DON'T:

- Do not use PPE in lieu of sound engineering and manufacturing practices.
- Do not use PPE without proper training in its use and limitations.
- Do not use damaged or inferior equipment.

POWDER ACTUATED TOOLS – 1926.302(e)

Before employees are permitted to use powder actuated tools, they shall have been thoroughly trained in the operation of the particular tool. Only employees that have been trained in the operation of the particular tool in use shall be allowed to operate a powder actuated tool.

**DO:**

- Familiarize yourself with all the sections of the Operator's Manual for each tool. Valuable information, including Tool Safety, Performance, Maintenance, Troubleshooting and Fastener Selection guides, can be found in the manuals.
- Test powder actuated tools each day before loading to ensure that the safety devices are in proper working condition. Any tool found not to be in proper working order shall be immediately removed from service until repairs are made.
- Use tools with the type of shield or muzzle guard appropriate for a particular use.
- Wear personal protective equipment (PPE), such as eye and hearing protection, when using powder actuated fastening tools.
- Before using a tool, inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions.
- Follow the misfire procedure: Continue to hold the depressed tool against the work surface for at least 30 seconds. Then carefully lower the tool, remove the strip load and put it in a can of water or other non-flammable liquid. If the tool becomes stuck or jammed with a live powder load, keep the tool pointed in a safe direction, and immediately tag it, "Danger-defective-do not use". Lock the tool in a tool box and have it serviced or replaced.

DON'T:

- Do not point the tool, whether loaded or not, at anyone.
- Do not load the tool until just prior to the intended firing time.
- Do not leave tools or powder charges unattended in places where they would be available to unauthorized persons.
- Do not use a powder actuated tool in an explosive or flammable atmosphere.
- Do not drive fasteners into very hard or brittle materials such as cast iron, glazed tile, surfaced hardened steel, glass block, live rock, face brick or hollow tile.
- Do not drive fasteners into soft materials unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the opposite side.
- Do not drive fasteners into an existing hole unless a positive guide is used to secure accurate alignment.
- Do not attempt to drive a fastener into a spalled area caused by an unsatisfactory fastening.
- Do not discard a strip with live loads into a trash container.

POWER TOOLS

POWER TOOLS – 1926.302

Power tools include electric, fuel-powered, hydraulic, pneumatic, and powder actuated tools. Always follow the manufacturer's instructions on proper use, safety precautions, inspection and troubleshooting procedures. Maintain power tools in a safe condition.



Proper Use:

- Only trained employees are allowed to operate power tools.
- All power tools must be tested daily before use and all defects must be corrected, or tool placed out of service.
- Employees exposed to the hazard of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors or gases must wear the particular personal protective equipment necessary to protect them from the hazard.
- Never carry a tool by the cord.
- Never yank the cord to disconnect it from the receptacle.
- Keep cords away from heat, oil and sharp edges (including the cutting surface of a power saw or drill).
- Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits, etc.
- Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.
- Use gloves and appropriate personal protective equipment when using electric tools.
- Store electric tools in a dry place when not in use.
- Keep work areas well lit when operating electric tools.
- Ensure that cords from electric tools do not present a tripping hazard.
- Remove all damaged portable electric tools from use and tag them: "Do Not Use."
- Use double-insulated tools.
- Be aware of what setting the tool is on, if applicable.

DO:

- Use Ground-Fault Circuit Interrupters (GFCI) on all electrical outlets that are not part of the permanent building or structure's electrical circuits, or an Assured Equipment Grounding Conductor Program (AEGP).
- Use tools with the correct shield, guard or attachment recommended by the manufacturer.
- Follow manufacturer's instructions for proper voltage or safe operating pressure.
- Remove from service any tool found not in proper working order, or that develops a defect during use.
- Inspect tools at regular intervals and repair them in accordance with the manufacturer's specifications.
- Keep labels showing safe use instructions and safety warnings properly affixed to tools, and ensure they are legible.

DON'T:

- Do not use electric tools in damp or wet locations unless they are approved for that purpose.
- Do not use tools in explosive or flammable environments.
- Do not override, damage or disable operating switches or safety devices.
- Do not lower or hoist tools using hoses or electrical cord.
- Do not use defective equipment until properly repaired.

POWERED PLATFORMS – 1910.66

This section covers powered platform installations permanently dedicated to interior or exterior building maintenance of a specific structure or group of structures. This section does not apply to suspended scaffolds (swinging scaffolds) used to service buildings on a temporary basis or to suspended scaffolds used for construction work.

The following are some of the key requirements from the OSHA standard:

- Building owners are required to provide a letter informing that the installation meets the requirements for design, installation, inspections and maintenance.
- Related building supporting structures (davit pedestals and tiebacks) shall undergo periodic inspection by a competent person at intervals not exceeding 12 months.
- The building owner shall keep a certification record of each periodic inspection and test required. The certification record shall include the date of the inspection, the signature of the person who performed the inspection, and the number, or other identifier, of the building support structure and equipment which was inspected. This certification record shall be kept readily available for review by the Assistant Secretary of Labor or the Assistant Secretary's representative and by the employer.
- Working platforms and their components shall be inspected by the employer for visible defects before every use and after each occurrence which could affect the platform's structural integrity.
- "Maintenance inspections and tests." A maintenance inspection and, where necessary, a test shall be made of each platform installation every 30 days, or where the work cycle is less than 30 days such inspection and/or test shall be made prior to each work cycle. This inspection and test shall follow procedures recommended by the manufacturer, and shall be made by a competent person.
- The building owner shall keep a certification record of each maintenance inspection and test performed. The certification record shall include the date of the inspection and test, the signature of the person who performed the inspection and/or test, and an identifier for the platform installation which was inspected. The certification record shall be kept readily available for review by the Assistant Secretary of Labor or the Assistant Secretary's representative and by the employer.

DO:

- Prior to using the house rig, obtain a letter from the owner assuring system compliance for design, installation, inspection and maintenance.
- Make sure the house rig has been inspected in the last thirty (30) days and every thirty (30) days during the work.

- Make sure any davit systems have been inspected, and where necessary tested within the last twelve (12) months.

DON'T:

- Do not use a house rig without the proper certifications, inspections and maintenance.
- Do not use davits and without assurance that the system has passed an inspection or test within the last twelve (12) months.

RESPIRATORY PROTECTION – 1926.103

(identical to 1910.134)

When work has potential to create harmful dusts, fog, fumes, mists, gases, smokes, spray, or vapors, the primary objective is to reduce or eliminate the atmospheric contamination by use of engineering control measures. When engineering controls are not feasible, appropriate respiratory protection must be used.

Where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, the employer must establish and implement a written respiratory protection program with worksite-specific procedures. The written program must include the following:

- Procedures for selecting respirators for use in the workplace;
- Medical evaluation of employees required to use respirators;
- Fit-testing procedures for tight-fitting respirators;
- Procedures for proper use in routine and emergency situations;
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, and otherwise maintaining respirators;
- Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators;
- Training of employees in the respiratory hazards to which they are potentially exposed;
- Training of employees in the proper use and limitations of respirators;
- Determination of contaminants present and appropriate protection required;
- Cartridge-type respirators require specific cartridges depending on atmospheric conditions present;
- Procedures for regularly evaluating the effectiveness of the program.



DO:

- Use proper respirator for hazard that is relative to hazard present.
- Be fit tested.
- Inspect prior to use.

DON'T:

- Do not use someone else's mask.
- Do not use if not properly trained.

SAFETY NETTING – 1926.502(c)

Safety nets are one of several acceptable means of providing fall protection.

Proper Use:

- Safety nets must be installed as close as practicable under the surface on which employees are working, but in no case more than 30 ft. below.
- When nets are used on bridges, the potential fall area must be unobstructed.
- Safety nets must extend outward from the outermost projection of the work surface as follows:

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet
5 to 10 feet	10 feet
More than 10 feet	13 feet

DO:

- Install safety nets with sufficient clearance to prevent contact with the surface or structures under them when subjected to an impact force equal to the required drop test.
- Verify that the maximum mesh size must not exceed 6 inches by 6 inches. All mesh crossings must be secured to prevent enlargement of the mesh opening, which must be no longer than 6 inches, measured center-to-center.
- Use safety nets or sections thereof that have a border rope for webbing with a minimum breaking strength of 5,000 pounds.
- Use connections between safety net panels that are as strong as integral net components and spaced not more than 6 inches apart.
- Use safety nets that when installed are capable of absorbing an impact force equal to the drop test described in OSHA 1926.502(c)(4)(i).
- Perform the drop test at the jobsite after initial installation and before being used, whenever nets are relocated, after major repairs, and at 6-month intervals if left in one place.
- Certify the net if it is unreasonable to perform the drop test. The employer or a designated competent person must certify that the net and net installation have sufficient clearance and impact absorption by preparing a certification record prior to the net being used as a fall protection system. The certification must include:
- Identification of the net and net installation.

SAFETY NETTING

- Date that it was determined that the net and net installation were in compliance.
- Signature of the person making the determination and certification.
- The most recent certification record for each net and net installation must be available at the jobsite for inspection.
- Inspect safety nets for wear, damage, and other deterioration at least once a week, and after any occurrence which could affect the integrity of the system.
- Remove objects such as scrap pieces, equipment, and tools which have fallen into the safety net as soon as possible and at least before the next work shift.
- Instruct crane operators on net locations to reduce the hazard of entangling a moving load in net hardware, cables or safety nets.

DON'T:

- Do not use defective nets. Remove defective components from service.
- Do not guess at safety net strength – consult the net manufacturer or fall protection professional if in doubt.



SCAFFOLDS – 1926.451 to 1926.454

Scaffold types and requirements vary greatly from adjustable suspension scaffolds to window jack scaffolds. Consult sections 1926.451 and 1926.452 for exact requirements of each type. Two of the most common types of scaffold are supported scaffolds (built-up) and suspended scaffolds (swing stage).

General Requirements:

- Scaffolds and their components must be capable of supporting at least 4 times the maximum rated load without failure.
- Scaffolds must be designed by a qualified person and constructed and loaded according to that design.
- Every work shift should have a competent person who can identify existing and potential hazards and has the authority to take prompt corrective action to eliminate or control the hazard.
- Scaffolds and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity.
- Scaffolds shall be erected, moved, dismantled or altered only under the supervision and direction of a competent person qualified in scaffold erection, moving, dismantling or alteration. Such activities shall be performed only by experienced and trained employees selected for such work by the competent person.
- Each employee on a scaffold more than 10 ft. (3.1 m) above a lower level shall be protected from falling to a lower level by the use of personal fall arrest systems or guardrail systems.
- Each employee who performs work while on a scaffold shall be trained by a qualified person to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards.
- When scaffold platforms are more than 2 ft. above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers), stairway-type ladders (such as ladder stands), ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface shall be used. Cross braces shall not be used as a means of access.

SUSPENDED SCAFFOLDS

Two-point adjustable suspension scaffolds, also known as swing stage scaffolds, are perhaps the most common type of suspended scaffold. Hung by ropes or cables connected to stirrups at each end of the platform, they play a prominent role in high-rise construction as well.

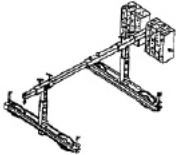
A suspended scaffold is made up of three main components.

1. Support System
2. Suspension System
3. Fall Arrest System

SCAFFOLDS

The following points are general safety procedures that should always be followed.

1. Only the equipment designed specifically for suspending workers and providing fall protection are to be used.
2. Suspended scaffolds are to be assembled according to the manufacturer's specifications and according to federal, state and local regulations. All instructions provided by a rental firm shall be read and understood before using the equipment.
3. All components of a suspended scaffold are to be inspected before and after each use. Any damaged or excessively worn components shall be reported immediately and shall not be used until repairs have been made. Any component shall be replaced according to the manufacturer's specifications.
 - If bolts need to be replaced, they must be of the proper grade and type per manufacturer's recommendations.
 - Be the proper diameter and length.
 - Be used with washers and locking nuts.
 - Here is how to tell the grade of the bolt, grade 5 has 3 hash marks on it, and grade 8 has 6 hash marks. The higher the grade, the stronger the bolt. Never use any bolt except grade 5 or 8.



Grade 5



Grade 8

4. Any portable support equipment must be tied back in line to a sound anchor. The strength of the building where it supports this equipment must be verified by the safety manager.
5. All components shall be stored properly so as to prevent them from damage.
6. Any employee working on a suspended scaffold shall be trained in both self rescue and partner rescue techniques.
7. Safe rigging is the responsible of the Contractor and their designated competent person. Users shall be trained in the proper use of equipment. When rigging equipment on the roof, employees are to engage fall protection equipment if the parapet wall is less than 42 inches in height.
8. Any roof hooks, parapet clamps or outrigger beams must provide a support factor of four (4) to one (1) when rigged.



Do not use open ended hooks that have an aluminum gate that can fail.

9. The amount of counterweights used on an outrigger beam must provide a 4 to 1 ratio against the maximum hoist load. The weights will be non-flow able and secured to the beam.
 - Non-flow able means: “DO NOT USE” a bucket of water or sand to counter weight your beam or anything similar. These substances are examples of “flow able” materials and are NOT allowed as a counterweight.
 - Most counterweights are steel and can be tied or affixed to the beam so they will not fall off.
10. The spacing of the suspension points from the beams is vital. The spacing from motor-to-motor and motor to the workface must be in line.
 - If the space between your beams is 30 feet, then the space between the motors on the scaffold must be 30 feet.
11. The number of fist grips on each support cable shall be at least 3 and spaced evenly. They shall be checked regularly to ensure that they are secure.
 - Wire ropes that come with a thimble and hook should also be visually inspected every day.
 - Make sure the safety gate is working properly on the rigging hook.
 - Make sure shackles are tight and secure because the scaffold’s vibrations can loosen them.
12. The length of steel cable used should be enough to enter and exit the motor, reach the ground, and have a tail end of no less than twelve (12) feet.
13. Handle steel cable with care. Coil and uncoil correctly. Any exposure to chemicals, extreme heat or other abuse should be reported immediately.
14. Exposure of any suspended scaffolding components to chemicals or other abuse shall be reported immediately.
15. Any employee working on a suspended scaffold shall wear a body harness, lanyard, and rope grab attached to a lifeline.
16. Lifelines shall be attached to a sound anchorage independent from the anchorage of the suspension lines. Lines shall be long enough to reach the ground and padded wherever they may contact the building. The tieback must be within 15 degrees of the work area, if unable to do so the tieback must be redirected. Only approved knots should be used to tie back safety lines (see notes).
17. All workers on suspended scaffolding shall have a descent device attached to their body harness with a locking D-ring to affect their rescue in the event of a malfunction or power loss.
18. At no time shall the suspended scaffolding be loaded beyond its recommended load.
 - Most scaffolds are rated for 500 lbs., which is only 2 men including their equipment.
 - Most hoists are rated for 1,000 lbs. this does not mean the work platform can handle the load. Always check recommended load of work platform.
 - The recommended load should be posted on the scaffold.



SCAFFOLDS

19. It is prohibited to tie the control lever back while in operation.
20. All electrical lines shall be padded wherever they contact the building, and they shall be disconnected when they are not in use. If the scaffolding is not to be used for more than one day, electrical lines should be removed and stored.
21. At no time will an employee step off or go beyond the stirrups or hangers to perform their work.
22. Scaffolding shall not remain suspended when not in use.
23. Extreme care shall be taken when using suspended scaffolding around electrical supplies or devices.
24. Use of suspended scaffolding shall be discontinued if wind speeds or other weather conditions may affect the safety of the workers or public.
 - Buildings with PIs usually provide intermittent or continuous stabilization.
 - When stabilization is provided, IT MUST BE USED.

Example of Intermittent Stabilization Continuous Stabilization



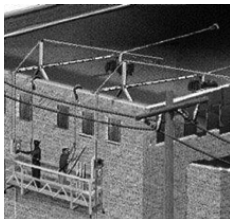
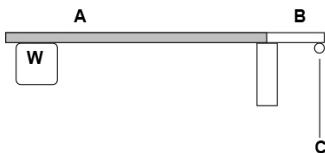
25. Before, during and after the operation of suspended scaffolding, proper danger signs and barricades shall be in place.
26. NOTE: These guidelines shall be applied to any jobsite that has a permanently installed powered platform. It shall be the responsibility of the safety manager, supervisor or competent person to ensure that the permanent installation has been inspected before use. Any variations of the previous guidelines in order to safely and effectively utilize a permanent installation shall only be given by the safety manager, supervisor or competent person.

DO:

- Always double check all connection points to make sure pins and or bolts are secure.
- Double check your partners work and have them check yours.
- Take the time to check the load and always double check all components which may become loose from normal use.
- Be sure to report any damaged or worn components immediately to the safety manager, supervisor and competent person before using them.
- Pay attention when ascending and descending the workface of the building. Avoid obstructions or any building structure that may snag the equipment.

DON'T:

- Do not be distracted when rigging your equipment, like talking on the phone.
- Do not listen to an iPod or MP3 player.
- Don't rig a suspended scaffold if you are not trained nor familiar with the system.
- Do not assume things are safe when using suspended equipment. If something doesn't look right, it probably isn't. Take the time to inspect and double check before each use.

FORMULA FOR DETERMINING HOW MANY COUNTERWEIGHTS ARE REQUIRED FOR A PORTABLE OUTRIGGER BEAM.


$$W = \frac{B \times C \times 4}{A}$$

W = Amount of counterweight

A = Distance inboard from fulcrum (front end of beam where it rests) to the point on the beam where the counterweights hang

B = Distance outboard from the fulcrum point to the suspension point

C = Load rating of the hoist

x 4 = OSHA's requirement of a 4 to 1 safety factor against the hoist load

Since C is always at least 1,000 pounds, the formula might look like this in a typical situation.
1,000 lb. hoist load

A 12-foot beam, with 2 feet extended outboard from the fulcrum.

W=? A = 10 B = 2 C = 1,000 hoist 4/1 safety factor

$$\text{Therefore, } W = \frac{2 \times 1,000 \times 4}{10}$$

W = 800 lbs. of counterweights per beam

SCAFFOLDS

SUPPORTED SCAFFOLDS

A support scaffold is a temporary platform constructed for reaching heights above arm's reach for the purpose of building construction, maintenance or repair. It is usually a modular system of metal pipes although it can be made out of other materials. Scaffolding is generally made of lumber and steel which can range from simple to complex in design, depending on its use and purpose. Millions of construction workers, painters and building maintenance crews work on scaffolding every day, and due to the nature of its use, scaffolding must be properly constructed and used to ensure the safety of those who use it.

Tower Scaffold



Mobile Access Towers

Mobile access towers (also known as tower scaffolds or towers) are widely used and can provide an effective and safe means of gaining access to work at heights. However, inappropriate erection and misuse of towers are the cause of numerous accidents each year. Aluminum and thin-wall steel towers are light and can easily overturn if used incorrectly. Towers rely on all parts being in place to ensure adequate strength. They can collapse if sections are left out.

Erecting a Tower

Many types of mobile access towers are available. The manufacturer or supplier has a duty to provide an instruction manual which explains the erection sequence, including any bracing requirements. If the tower has been hired, the hirer has a duty to provide this information. This information must be passed on to the person erecting the tower.



Towers should only be erected by trained and competent people. There are a number of organizations that provide training for the safe erection and use of tower scaffolds following the methods described above.

Stability

Make sure the tower is resting on firm, level ground with the locked castors or base plates properly supported. Never use bricks or building blocks to take the weight of any part of the tower.

Always check the safe working height by referring to the instruction manual. Towers should never be erected to heights above those recommended by the manufacturer.

Always install stabilizers or outriggers when advised to do so in the instruction manual.

Remember, the stability of any tower is easily affected. Unless the tower has been specifically designed for such use, activities such as those listed below should never be carried out:

- Sheeting or exposure to strong winds;
- Loading with heavy equipment; and
- Using the tower to hoist materials or support rubbish chutes.

Using a Tower

There must be a safe way to get to and from the work platform. This must be on the inside of the tower by an appropriately designed built-in ladder. It is not safe to climb up the rungs on the end frames unless the rungs have been specifically designed for the purpose of getting to and from the working platform – these have rung spacing's of 10 inches and an anti-slip surface. If you are in doubt, consult the instruction manual.

Falls must be prevented where there is a risk that a fall could result in personal injury. The working platform must be provided with suitable edge protection and toe boards. Guardrails should be at least 42 inches high and an intermediate guardrail should be provided

DO:

- Reduce the height when moving;
- Check that there are no power lines or other obstructions overhead;
- Check that the ground is firm, level and free from potholes;
- Push or pull using manual effort from the base only – never use powered vehicles; and never move it in windy conditions.

DON'T:

- Do not use as a support for ladders, trestles or other access equipment;
- Do not use in weather conditions which are likely to make it unstable;
- Do not use with broken or missing parts;
- Do not use with incompatible components; and
- Do not move tower while there are people or materials on the tower.

Inspection

To prevent the use of incorrectly erected or damaged mobile access towers, they must be inspected by a competent person. This is someone with the experience, knowledge and appropriate qualifications to enable them to identify any risks that are present and decide upon the measures required to control the risks.

Dismantling a Tower

To dismantle a tower using the advance guardrail method, the operator starts from the top and reinstates the advance guardrail unit before removing the permanent guardrails and toe boards and descending to the lower level. The advance guardrail units are then relocated to the level below and the process is repeated with collective fall prevention measures being maintained throughout.

DO:

- Consult the Codes of Safe Practice published by the Scaffold & Access Industry Association (www.saiaonline.org) and Scaffolding, Shoring and Forming Institute (www.SSFI.org) for guidelines on erection of and safe use of various scaffold types.
- Follow all manufacturer's instructions and take particular care when combining equipment from multiple manufacturers.
- Inspect the equipment before each use. Do consult your scaffold supplier if in doubt about the equipment.
- Survey the jobsite for hazards such as exposed electrical wires, obstructions that can overload a suspended scaffold, or inadequate or missing tiebacks on rigging devices. Correct these hazards prior to installing or using suspended scaffolds.
- Always wear fall protection.

DON'T:

- Do not misuse or abuse scaffold equipment.
- Do not overload scaffold equipment.
- Do not disable, destroy, modify or remove safety devices.
- Do not erect, dismantle or alter scaffold systems unless under the supervision of a competent person.
- Do not take chances. Always wear fall protection equipment and consult your scaffold supplier if unsure about scaffold use.

SILICA – 1926.55

Silicosis is caused by exposure to respirable crystalline silica dust. Crystalline silica is a basic component of soil, sand, granite and most other types of rock, and it is used as an abrasive blasting agent. Silicosis is a progressive, disabling and often fatal lung disease. Cigarette smoking adds to the lung damage caused by silica.



Effects of Silicosis

- Lung cancer – Silica has been classified as a human lung carcinogen.
- Bronchitis/Chronic Obstructive Pulmonary Disorder.
- Tuberculosis – Silicosis makes an individual more susceptible to tuberculosis (TB).
- Scleroderma – a disease affecting skin, blood vessels, joints and skeletal muscles.
- Possible renal disease.

Symptoms of Silicosis

- Shortness of breath; possible fever.
- Fatigue; loss of appetite.
- Chest pain; dry, nonproductive cough.
- Respiratory failure, which may eventually lead to death.

Sources of Exposure

- Sandblasting for surface preparation.
- Crushing and drilling rock and concrete.
- Masonry and concrete work (e.g., building and road construction and repair).
- Mining / tunneling; demolition work.
- Cement and asphalt pavement manufacturing.

Permissible Exposure Limit (PEL) - This is the airborne concentration of silica above which employees cannot be exposed.

Prevention of Silicosis

DO:

- Evaluate engineering controls such as dust collection and wet methods to limit the concentrations and exposure to crystalline silica in order to meet the PEL.
- Use water sprays, wet methods for cutting, chipping, drilling, sawing, grinding, etc.
- Substitute non-crystalline silica for blasting material.
- Use respirators approved for protection against silica; if sandblasting, use abrasive blasting respirators.
- Wash hands and face before eating, drinking or smoking away from exposure area.

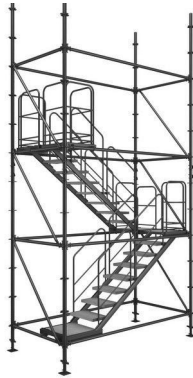
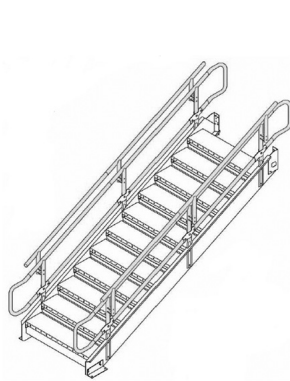
DON'T:

- Do not eat, drink or smoke near crystalline silica dust.
- Do not use compressed air for cleaning surfaces.
- Do not start removing, cutting, sanding, grinding or disturbing in any fashion a location that has been determined to contain any level of exposure to crystalline silica without a proper assessment, engineering control measures, and proper personal protection to meet the PEL.
- Do not rely only on visible dust to assess the extent of the silica hazard.

STAIRS

STAIRS – 1926.1052

Stairs are a leading source of injuries and fatalities among construction workers each year. Work on and around stairways is hazardous. The following general requirements apply to all stairways used in construction, alteration, repair (including painting and decorating), and demolition of worksites.



Temporary Staircase

Stair Tower

- A stairway or ladder must be provided at all worker points of access where there is a break in elevation of 19 inches (48 cm) or more and no ramp, runway, embankment, or personnel hoist is provided.
- When there is only a single point of access between levels, it must be kept clear to permit free passage by workers. If free passage becomes restricted, a second point of access must be provided and used.
- Where there are more than two points of access between levels, at least one point of access must be kept clear.
- All stairway systems required by these rules must be installed, and all duties required by the stairway must be performed before employees begin work that requires them to use the stairway.
- Stairways that will not be a permanent part of the structure where construction work is being performed must have landings at least 30 inches deep and 22 inches wide at every 12 ft. or less vertical rise.
- Stairways must be installed at least 30 degrees, and no more than 50 degrees, from the horizontal.

- Variations in riser height or stair tread depth must not exceed $\frac{1}{4}$ inch in any stairway system, including any foundation structure used as one or more treads.
- Where doors or gates open directly into a stairway, a platform must be provided that is a minimum of 20 inches in width beyond the swing of the door.
- Metal pan landings and metal pan treads must be secured in place before filling.
- Temporary handrails must have a minimum clearance of 3 inches (7.62 centimeters) between the handrail and walls, stairrail systems, and other objects.
- Unprotected sides and edges of stairway landings must be provided with a standard 42-inch (106.68 cm) guardrail system.

DO:

- Make sure all stairway parts are free of dangerous projections such as protruding nails.
- Correct slippery conditions on stairways.

DON'T:

- Do not obstruct stairways with construction debris, tools, materials, etc.
- Do not use stairways that are under construction (i.e., in a repair or build condition).

WELDING, CUTTING, & HEATING – 1926.350 to 1926.354

The employer shall thoroughly instruct employees in the safe use of fuel gas, appropriate use of shielding, personal protective equipment, and proper insulating precautions for scaffolds.

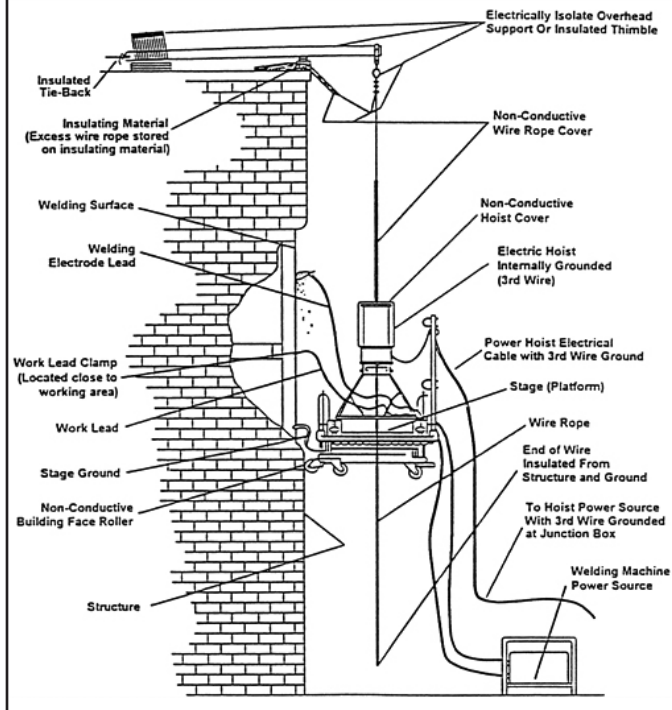
Proper Use:

- Proper precautions (isolating welding and cutting, removing fire hazards from the vicinity, providing a fire watch) for fire prevention shall be taken in areas where welding or other hot work is being done. No welding, cutting or heating shall be done where the application of flammable paints or the presence of other flammable compounds or heavy dust concentrations create a fire hazard.
- Fuel gas and oxygen hoses shall be easily distinguishable and cannot be interchangeable.
- General mechanical ventilation, local exhaust ventilation, air-line respirators and other protection must be provided when welding, cutting or heating:
- Zinc, lead, cadmium, chromium, mercury or materials bearing, based or coated with beryllium in enclosed spaces;
 - Stainless steel and inert gas equipment;
 - In confined spaces (see section on confined spaces for further information on working safely in these areas); and
 - Where an unusual condition can cause an unsafe accumulation of contaminants.

When welding from suspended platforms:

- Be sure the platform is grounded to the structure using a conductor at least the same size as the welding machine ground lead.
- Verify the grounding conductor is not attached in series with the welding process or the work piece.
- Insulate wire rope at least 4 ft. above and below the platform to protect from damage by the welding torch or electrode.
- Insulate wire rope at the suspension point and be sure it does not contact the structure along its entire length.
- Guide and / or retain the tail line of the suspension wire rope so that it does not become grounded.
- Use insulated protective covers for the hoists.
- Take care to prevent contact of the weld lead to the platform and its wire ropes.

SUSPENDED SCAFFOLD PLATFORM WELDING PRECAUTIONS



WELDING, CUTTING, & HEATING

DO:

- Shield all welding and cutting operations by noncombustible or flameproof screens to protect from direct arc rays.
- Remove electrodes from unattended electrode holders and protect the holder so it cannot make electrical contact with people or conducting objects.
- Use arc welding and cutting cables which are completely insulated, flexible type, capable of handling the maximum current requirements of the job. There shall be no repairs of splices within 10 ft. of the electrode holder, except where splices are insulated equal to the insulation of the cable.
- Inspect hoses at the beginning of each shift.
- Use proper eye protective equipment to prevent exposure of personnel.

DON'T:

- Do not use defective cable. Repair it or replace it with new.
- Do not fail to ground the suspended platform; insulate the wire ropes and hoists.
- Do not guess at how to weld safely from scaffold or swing stage components. Consult the manufacturer or a reputable scaffold supplier for assistance.

Don't leave any skin exposed as shown below.

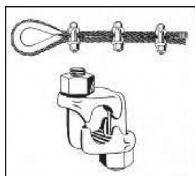
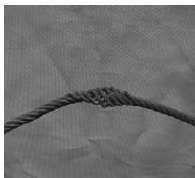
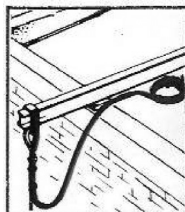


WIRE ROPES – 1926.451, 1926.452, 1926.500, 1926.502, 1926.552, and 1926.1413

Wire rope is a mechanical system of moving parts intended to support a load. It requires lubrication to operate correctly, and begins to deteriorate from the time it is first put in service.

Proper Use:

- Choose the proper wire rope for the job.
- Make appropriate connections to the structure.
- Inspect the wire rope and its termination point.
- Re-torque J-clamp terminations under load, if using, on suspension wire ropes.
- Handle the wire rope carefully to retain the rope's strength.
- Suspended scaffold hoists are designed to work only with wire rope of the specified size and construction. Do not make substitutions.
- Wire ropes used with traction hoists must have prepared ends in accordance with the manufacturer's recommendations.
- Refer to the hoist manufacturer's operator's manual for specifications on acceptable terminations.
- Inspect the wire rope prior to use on each shift or as needed during use to ensure safety.

**J-clamp****Birdchaged Wire Rope
Do Not Use.****Store excess wire on roof****DO:**

- Inspect wire ropes for deterioration and remove them from service if damaged.
- Use approved wire rope terminations as specified by the equipment manufacturer.
- Use eye splicing or equivalent means such as J-clamps or swaged fittings.
- Space the J-clamps at approximately 3 to 4 fingers in width.
- Do ensure eye splices and swaged terminations are made by a qualified person.
- Preload wire rope and equipment with the maximum working load, then retighten J-clamps or rigging clamps to manufacturer's recommendations at initial loading and at the beginning of each work shift.
- Use thimbles at all wire rope suspension terminations.
- Clean, lubricate and handle wire rope in accordance with the wire rope or hoist manufacturer's recommendations.

WIRE ROPES

- Coil and uncoil wire rope in accordance with the wire rope or hoist manufacturer's recommendations to avoid kinks and damage.
- Coil extra wire rope at the top of the structure to avoid traffic damage to the free-hanging end.
- Be sure wire rope is long enough to reach the lowest possible landing. If it is not, secure the tail line to prevent the platform from running off the suspension rope.

DON'T:

- Do not use job shop hooks or makeshift fasteners or links.
- Do not use U-bolts on a swing stage wire rope.
- Do not loop two wire rope tails together to make a longer suspension wire rope.
- Do not expose wire rope to fire, temperatures above 200°, the passage of electrical current, corrosive atmospheres or chemicals, or damage from tools or handling.
- Do not bend or kink the wire rope over a sharp edge.
- Do not use wire rope that is kinked, birdcaged, corroded, undersized or damaged in any way. If in doubt, throw it out.

For more detailed information refer to the OSHA website, www.osha.gov or call 1-800-321-OSHA (6742)

• Competent Person – www.osha.gov	1926.451(f)(3)
• General Duty Clause – www.osha.gov Section 5(a)(1) of the Occupational Safety and Health Act	
• Aerial Lifts – www.osha.gov	1926.453
• Barricades & Signs – www.osha.gov	1926.202 & Signs -1926.200
• Compressed Gas Cylinders – www.osha.gov	1926.350
• Confined Space – www.osha.gov	1926.21(b)(6) and 1910.146(b)
• Drinking Water – www.osha.gov	1926.51
• Electrical Safety – www.osha.gov	1926.400 to 1926.449
• Excavation and Trenching – www.osha.gov	1926.650 - 652
• Fall Protection – www.osha.gov	1926.500-503
• Fire Extinguishers – www.osha.gov	1926.150
• First Aid – www.osha.gov	1926.50
• Hazard Communication (Haz Com) – www.osha.gov	1926.59 (identical to 1910.1200)
• Hazardous Waste Operations – www.osha.gov	1926.65 (identical to 1910.120)
• Hearing Protection – www.osha.gov	1926.52
• Histoplasmosis – http://www.dhpe.org/infect/histo.html	
• Housekeeping – www.osha.gov	1926.25
• Illumination – www.osha.gov	1926.26
• Ladders – www.osha.gov	1926.1053
• Lead – www.osha.gov	1926.62
• PPE – Personal Protective Equipment – www.osha.gov	1926.28, 1926.95 to 1926.107
• Powder Actuated Tools – www.osha.gov	1926.302(e)
• Power Tools – www.osha.gov	1926.302
• Powered Platforms – www.osha.gov	1910.66
• Respiratory Protection – www.osha.gov	1926.103 (identical to 1910.134)
• Safety Netting – www.osha.gov	1926.502(c)
• Scaffolds – Supported & Suspended – www.osha.gov	1926.451 to 1926.454
• Silica – www.osha.gov	1926.55
• Stairs – www.osha.gov	1926.1052
• Welding, Cutting, and Heating – www.osha.gov	1926.350 to 1926.354
• Wire Ropes – www.osha.gov	1926.451, 1926.452, 1926.500, 1926.502, 1926.552

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SAFETY AND HEALTH

FIELD MANUAL

CONFIRMATION OF RECEIPT OF SAFETY AND HEALTH FIELD MANUAL

I acknowledge that I have received a copy of the Safety and Health Field Manual (Field Manual). I acknowledge that I have read and understand the safety and health practices discussed in the Field Manual. I have had an opportunity to ask any questions that I have concerning the information discussed in the Field Manual. I agree to abide by the safety and health practices set forth in the Field Manual.

I understand that the company reserves the right to revise, supplement or rescind any of the safety and health practices outlined in the Field Manual, any portion of the Field Manual, or the entire Field Manual, from time to time, as it deems appropriate in its sole discretion

Witness

Employee's Signature

Employee's Name – Typed or Printed

Date

A copy of this confirmation sheet will be kept in the employee's personnel file



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