

SECTION II

JOB SPECIFIC - EQUIPMENT SPECIFIC SAFETY PROCEDURES

Following are general safety procedures that apply to individuals operating the equipment or performing the tasks described.

A2 Carved-N-Stone, Inc

SAFETY PROGRAM

REFERENCE & TRAINING MANUAL

SECTION II

JOB SPECIFIC - EQUIPMENT SPECIFIC SAFETY PROCEDURES

INDEX

<u>PAGE</u>	<u>TOPIC</u>
1	<u>ABRASIVE BLASTING</u>
2	<u>ABRASIVE WHEELS</u>
3	<u>AERIAL LIFTS</u>
3	<u>COMBUSTIBLE & FLAMMABLE LIQUID HANDLING</u>
5	<u>COMPRESSED GAS CYLINDERS</u>
6	<u>CONCRETE AND MASONRY CONSTRUCTION</u>
10	<u>CONCRETE CUTTING</u>
11	<u>CONCRETE PUMPS AND PLACING BOOMS</u>
11	<u>CRANES</u>
13	<u>DISPOSABLE RESPIRATORS</u>
14	<u>EARTH MOVING EQUIPMENT</u>
15	<u>ELECTRICAL WORK - WORKPLACE SAFETY</u>
18	<u>EXCAVATING, TRENCHING & SHORING</u>
21	<u>EXTENSION CORDS</u>
21	<u>GROUND FAULT CIRCUIT INTERRUPTERS</u>
22	<u>HEAVY EQUIPMENT AND ELECTRICAL POWER LINES</u>
22	<u>LIGHTING</u>
23	<u>LP-GAS STORAGE</u>
23	<u>MACHINE GUARDING</u>
24	<u>MACHINERY</u>
25	<u>POST-TENSIONING OPERATIONS</u>
27	<u>SCISSOR-LIFT FALL PROTECTION</u>
28	<u>SIGNS & TAGS</u>
29	<u>SLINGS</u>
31	<u>STAIRS</u>
32	<u>TOOLS: HAND</u>
32	<u>TOOLS: PNEUMATIC POWERED</u>
33	<u>TOOLS: POWDER-ACTUATED</u>
34	<u>VEHICLES</u>
35	<u>VENTILATION</u>
36	<u>WELDING, CUTTING AND BRAZING</u>
37	<u>IDENTIFICATION OF HAZARDOUS JOB SITE MATERIALS</u>

JOB SPECIFIC - EQUIPMENT SPECIFIC SAFETY PROCEDURES

ABRASIVE BLASTING

When performing abrasive blasting operations, from a safety standpoint, there are numerous hazards that must be addressed.

First and foremost are respiratory hazards. During blasting operations, dust hazards are created as the abrasive materials and the surface coatings are shattered and pulverized to particles of respirable size. The composition and toxicity of the abrasive as well as the coating must be known to determine the:

- a. specific respiratory hazards.
- b. appropriate respirator to be selected to negate these hazards.

The many types of abrasive materials have varying degrees of hazard -- silica sand being probably the most hazardous mineral abrasive used. Whenever possible, its use should be limited and, if possible, a substitute material used. Other types of abrasives include: synthetic or natural mineral grains; metallic shot or hard grit (made of steel or chilled cast iron); and organic abrasives such as ground corncobs and walnut shells.

The hazards of steel or cast iron dust are relatively minimal, however, combustible organic abrasives may be pulverized fine enough to be capable of forming explosive mixtures with air.

The coatings that are being blasted may, for example, contain lead (in paints); arsenic (in furnaces); cadmium (plating); and even silica sand (embedded in the surface of castings). All these types of hazards require specific respiratory protection and are serious health hazards.

Surprisingly, construction standards do not address abrasive blasting as an "all-encompassing" topic -- each hazard must be dealt with on its own.

In addition to respiratory hazards, the following safety concerns, depending on the job, may need to be addressed during abrasive blasting operations:

- a. appropriate PPE for eye, hand, skin, foot, head hazards.
- b. fall protection.
- c. scaffold & ladder safety.
- d. release of toxic dust (Environmental (EPA) concern).
- e. high pressure hoses and couplings.
- f. securing the work area to deny unauthorized entry.
- g. working in a permit-required confined space.
- h. hazard communication -- understanding the materials your are working with (lead, arsenic, cadmium, silica, etc.).

ABRASIVE WHEELS

Abrasive wheels and tools. - 1926.303

An abrasive wheel is defined as a cutting tool consisting of abrasive grains held together by organic (resin, rubber, shellac or similar bonding agent) or inorganic bonds. Hazards that present themselves during abrasive wheel operations include physical contact with the rotating wheel; destruction of the wheel, itself; inhalation of the bonding particles; being struck by flying fragments. All these hazards can be eliminated through adherence to appropriate machine guarding principles, appropriate PPE, and/or respiratory protection.

Immediately before mounting, wheels must be inspected and sounded (ring test) to ensure they have not been damaged. Ensure the spindle speed does not exceed the maximum operating speed noted on the wheel.

Ring Test: Wheel to be tested must be dry and free from sawdust. Wheels should be tapped gently with a light nonmetallic implement, such as the handle of a screwdriver, or a wooden mallet for heavier wheels. If they sound cracked (dead), they may not be used. It should be noted that organic bonded wheels do not emit the same clear metallic ring as do vitrified and silicate wheels. Tap the wheels about 45° each side of the vertical centerline and about one or two inches from the periphery. Rotate the wheel about 45° and repeat the test. A sound, undamaged, wheel will give a clear metallic tone.

Guarding: Abrasive Blades in Portable Circular Saws:

It is important to distinguish between a saw and an abrasive blade because they have different guarding requirements. An abrasive wheel, as defined by CFR §1910.211(b)(14) and American National Standards Institute (ANSI) B7.1-1970, as "a cutting tool consisting of abrasive grains held together by organic or inorganic bonds."

If a wheel is, for example, constructed with bonded, steel fragments arranged in intermittent clusters around the periphery of a steel disc, the steel fragments are too large and sharp to be considered abrasive grains. If these fragments remove material primarily by severing rather than by abrasion, then this would be considered a saw blade and the guarding requirements would be found in 29 CFR 1926.300, General Requirements.

If, in fact, cutting is done by the abrasive action of the abrasive grains, guarding requirements are found in 29 CFR 1926.303(b), Abrasive Wheels and Tools.

Additionally, (ANSI) B7.1 only requires the upper half (180°) of the abrasive blade to be guarded when abrasive wheels are installed on portable power driven circular saws.

AERIAL LIFTS

Aerial lifts. - 1926.453

Aerial lifts include the following types of vehicle-mounted aerial devices to elevate personnel to job-sites above the ground:

- a. extensible boom platforms.
- b. aerial ladders.
- c. articulating boom platforms.
- d. vertical towers.
- e. a combination of any of the above.

Only authorized persons may operate an aerial lift.

Lift controls must be tested each day prior to use to determine they are in a safe working condition.

When working from an aerial lift, you must stand firmly on the floor of the basket or cage and be attached by lanyard and safety harness to the boom or basket. You may not sit or climb on the edge; use planks, ladders, or other devices for a work position; or tie off to any adjacent pole, structure, or other equipment.

Load limits set by the manufacturer must never be exceeded.

The brakes must be set and when outriggers are used, they shall be positioned on pads or a solid surface.

Aerial lifts must not be moved with personnel in the basket unless it is designed for this type of operation. Aerial lifts designed as personnel movers must have controls that are clearly marked as to their use and the lower controls must be able to override the upper controls. Except in an emergency, the lower controls shall not be used unless permission has been granted by the persons in the lift.

Extreme care must be exercised to avoid contact with electrical energy.

COMBUSTIBLE & FLAMMABLE LIQUID HANDLING

Flammable and combustible liquids. - 1926.152

Only approved containers and portable tanks will be used for storage and handling of flammable and combustible liquids. Approved safety cans or Department of Transportation approved containers will be used for handling and use of flammable liquids in quantities of 5 gallons or less.

Note 1: The above does not apply to flammable liquid materials which are highly viscous (extremely hard to pour) which may be used and handled in their original shipping containers.

Note 2: For quantities of one gallon or less, the original container may be used for storage, use and handling.

Flammable or combustible liquids may not be stored in areas used for exits, stairways, or normally used for the safe passage of people.

Inside a facility, no more than 25 gallons of flammable or combustible liquids may be stored in a room outside of an approved storage cabinet.

GASOLINE: General Information

Because most persons use or indirectly handle gasoline on a regular basis -- from filling up automobiles to lawn mowers -- the hazards presented by this product may have become obscure. Just because you are familiar with gasoline, never lose sight of the lethal hazards that it may contain.

Gasoline is a flammable liquid which means it has a flash point of less than 100°F. The actual flash point -- lowest temperature at which a liquid gives off enough vapor to form a flammable mixture with air -- of gasoline is - 45°F. The autoignition temperature -- the temperature at which, with sufficient oxygen, gasoline will ignite on its own and burn -- is 536°F.

Gasoline has a specific gravity -- the weight of the gasoline compared to the weight of an equal volume of water -- of 0.73. Further, gasoline has a negligible solubility in water. Basically, what the above means is that if water is used to extinguish a gasoline fire, it will only spread it because the gasoline will float on the water and continue to give off a vapor and form a flammable mixture with air. Gasoline fires must be fought with an extinguisher that is rated for Class B Fires such as carbon dioxide, dry chemical, or foam. It should be noted that water spray may be used to cool containers that may be exposed to the heat of the fire to prevent an explosion.

Conditions to avoid: heat, flame, & sources of ignition. Materials to avoid: strong oxidizers.

Health hazard information: routes of entry: inhalation, skin, ingestion.

Signs & symptoms of overexposure: headache, nausea, drowsiness, breathlessness, fatigue, convulsions, loss of conscience, dermatitis.

If there is a spill, notify emergency response personnel, evacuate area, remove ignition sources, build a dike to contain flow, do not flush to sewer or open water. Pick up with inert absorbent and place in closed container for disposal.

Gasoline is a carcinogen -- a cancer causing agent.

General rules: Post "No Smoking" signs around gasoline storage and ensure that it is enforced. Use only approved plastic or metal containers for portable gasoline carriers. They must not contain more than 5 gallons.

Double check with local ordinances for storage requirements.

COMPRESSED GAS CYLINDERS

Gas welding and cutting. - 1926.350

Compressed gas cylinders are used on many job sites -- the most common being oxygen and acetylene for welding and propane for heat and forklifts.

Failure to follow basic safety procedures could result in serious injuries such as:

- a. flash burn - due to explosion.
- b. fragment impalement - due to explosion.
- c. compression of the foot - due to mishandling of tanks.
- d. inhalation of hazardous gases - due to leakage.

Basic safety procedures for gas cylinder use:

- a. Cylinders must remain upright and chained to a substantial support or cart when in use.
- b. Wear appropriate personal protective equipment for the job -- such as steel toed shoes, apron, goggles, gloves, helmet, etc..
- c. Read and understand the MSDS for the gas being used and know the location of the MSDS in case of an emergency.
- d. Have appropriate fire extinguisher readily available.
- e. To release the gas, open the cylinder valve slowly -- standing away from the face and back of the gage -- and leave the opening tools in place (on the valve stem) for quick shut-off in the event of an emergency.
- f. Ensure cylinder valves, regulators, couplings, and hoses are free of oil and grease and ensure all connections are tight.
- g. When using oxygen-fuel systems, use flashback arrestors and reverse-flow check valves to prevent flashback.
- h. Keep cylinders away from open flames and sources of heat.
- i. **Cylinders are never allowed in confined spaces.**
- j. Do not alter or attempt to repair safety devices or valves.
- k. Remove the regulators when: a) moving cylinders; b) work is completed, and/or c) cylinders are empty.

CONCRETE AND MASONRY CONSTRUCTION

General requirements - 1926.701

Requirements for equipment and tools. - 1926.702

Requirements for cast-in-place Concrete. - 1926.703

Requirements for precast concrete. - 1926.704

Requirements for lift-slab operations. - 1926.705

Lift Slab Operations - 1926.705 App

Requirements for masonry construction. - 1926.706

Concrete and masonry construction, more so than most trades, are highly skilled activities that require numerous specialized abilities including, but not limited to, an understanding of chemistry, building techniques, specialized tools, and a unique language. The definitions below are extracted from OSHA standards, however they barely scratch the surface. Words and phrases such as: Adiabatic Curing, Hand Float, and Water-Cement Ratio are peculiar to these trades.

DEFINITIONS

Listed below are terms, with accompanying OSHA notes, which must be understood when dealing with concrete and masonry construction:

- Bull float:** a tool used to spread out and smooth concrete.
[Note: Bull float handles that might contact energized electrical conductors must be constructed of nonconductive materials or insulated with a nonconductive sheath.]
- Formwork:** the total system of support for freshly placed or partially cured concrete, including the mold or sheeting (form) that is in contact with the concrete as well as all supporting members including shores, reshores, hardware, braces, and related hardware.
[Note: 1 Formwork must be designed, fabricated, supported, braced and maintained so that it will be capable of supporting without failure all vertical and lateral loads that may reasonably anticipated to be applied to the formwork.]
[Note: 2 Drawings with all revisions for the jack layout, formwork (including shoring equipment), working decks, and scaffolds must be available at the job site.]
- Lift slab:** a method of concrete construction in which floor and roof slabs are cast on or at ground level and, using jacks, lifted into position.
- Limited access zone:** an area alongside a masonry wall, which is under construction, and which is clearly demarcated to limit access by employees.
- Precast concrete:** concrete members (such as walls, panels, slabs, columns, and beams) which have been formed, cast, and cured prior to final placement in a structure.

Reshoring:

the construction operation in which shoring equipment (also called reshores or reshoring equipment) is placed, as the original forms and shores are removed, in order to support partially cured concrete and construction loads.

- [Note: 1 All Shoring equipment must be inspected prior to erection to determine that the equipment meets the requirements specified in the formwork drawings.]
- [Note: 2 Shoring equipment found to be damaged such that it is not capable of supporting without failure all vertical and lateral loads that may reasonably anticipated to be applied to them must not be used.]
- [Note: 3 Erected shoring equipment shall be inspected immediately prior to, during, and immediately after concrete placement.]
- [Note: 4 Shoring equipment that is found to be damaged or weakened after erection, such that its strength is reduced to the point where it is not capable of supporting without failure all vertical and lateral loads that may reasonably anticipated to be applied to them will be immediately reinforced.
- [Note: 5 The sills for shoring must be sound, rigid, and capable of carrying the maximum intended load.]
- [Note: 6 All base plates, shore heads, extension devices, and adjustment screws must be in firm contact, and secured when necessary, with the foundation and the form.]
- [Note: 7 Eccentric loads on shore heads and similar members shall be prohibited unless these members have been designed for such loading.]
- [Note: 8 Whenever single post shores are used one on top of another (tiered), the below will apply:
 - a. The design of the shoring shall be prepared by a qualified designer and the erected shoring shall be inspected by an engineer qualified in structural design.
 - b. The single post shores shall be vertically aligned.
 - c. The single post shores shall be spliced to prevent misalignment.
 - d. The single post shores shall be adequately braced in two mutually perpendicular directions at the splice level. Each tier shall also be diagonally braced in the same two directions.]
- [Note: 9 Adjustment of single post shores to raise formwork will not be made after the placement of concrete.
- [Note: 10 Reshoring shall be erected, as the original forms and shores are removed, whenever the concrete is required to support loads in excess of its capacity.

Shore:

a supporting member that resists a compressive force imposed by a load.

- Tremie:** a pipe through which concrete may be deposited under water.
- [Note: Sections of tremies and similar concrete conveyances must be secured with wire rope (or equivalent materials) in addition to the regular couplings or connections.]
- Vertical slip forms:** forms which are jacked vertically during the placement of concrete.
- Jacking operation:** the task of lifting a slab (or group of slabs) vertically from one location to another (e.g., from the casting location to a temporary location, or to its final location in the structure), during the construction of a building/structure where the lift-slab process is being used.

MAJOR HAZARDS

Both concrete and masonry construction require skilled, trained personnel to produce quality work performed in a safe manner. Serious accidents, including wall collapse, can happen in an instant due to premature removal or actual failure of the formwork. Additionally, failure to brace masonry walls, failure to support precast panels, overloading, etc., can cause serious mishaps.

No construction loads will be placed on a concrete structure unless our competent person determines, based on information received from a person who is qualified in structural design, that the structure or portion of the structure is capable of supporting the loads.

Prior to construction of a masonry wall, a limited access zone will be established as follows:

- a. it must be equal to the height of the wall to be constructed plus 4 feet and it must run the entire length of the wall.
- b. on the side of the wall that will be unscaffolded, the limited access zone must be:
 1. restricted to entry only by employees actively engaged in constructing the wall, and,
 2. if the wall is 8 feet or less, the limited access zone will be kept in place until the wall is adequately supported to prevent overturning and collapse, or
 3. if the height of the wall is more than 8 feet and unsupported, the wall must be braced. The bracing must remain in place until permanent supporting elements of the structure are in place.

Concrete and masonry work are performed in such a variety of circumstances and conditions -- under ground, over ground, on sides of structures, on top of structures, inside confined spaces, precast and cast

in-place concrete, etc.. Each circumstance presents specific hazards which must be addressed. The competent person on site will point out unusual, specific hazards and means to deal with them.

SAFETY PROCEDURES

The competent person will ensure that all equipment is inspected as required and defective equipment is removed from service.

The competent person will ensure the drawing or plans, with revisions, for all equipment and procedures to be used in concrete or masonry construction are available at the job site.

For the safety of all employees, the following safety rules are established:

- a. Limited or controlled access zones will be restricted to employees who have actual job responsibilities within the established zones.
- b. Employees will not work under concrete buckets while they are being elevated or lowered into position.
- c. Employees, except those required for the job, are not allowed under precast concrete members while they are being lifted or tilted into position.
- d. Personal protective equipment, determined by the competent person on the job site, will be used without fail. It should be noted that when cement is mixed with water, a highly alkaline solution is produced by the dissolution of calcium, sodium, and potassium hydroxides. Gloves should be worn to protect the skin. Hands should be washed after contact. OSHA requires head and face equipment for employees applying a cement, sand, and water mixture through a pneumatic hose.
- e. Employees will not be allowed to perform maintenance on any equipment where the unexpected activation of that equipment could cause harm without following the procedures in our Control of Hazardous Energy Program.
- f. When fastening other materials to a concrete surface (such as a wooden 2" X 4"), only a fastener of 7/32-inch shank diameter or less will be driven in and it may be no closer than 2 inches from the unsupported edge or corner of the work surface.
- g. Fasteners will not be driven directly into brick or concrete closer than 3" from the unsupported edge of corner unless a special guard, fixture, or jig is used.

NOTE: Exception to the above: Low-velocity tools may drive no closer than 2" from an edge in concrete.

- h. Concrete mixers with one cubic yard or larger loading skips will be equipped with a:
 - a. mechanical device to clear the skip of materials.
 - b. guardrail installed on each side of the skip.

Note: Regardless of the size of the skip, point of operation guarding must be utilized.

REBAR PROTECTION

All protruding reinforcing steel onto and into which employees could fall will be guarded to eliminate the hazard of impalement. Protection from impalement on protruding rebar is primarily a function of fall protection when employees are working above rebar or other impalement hazards.

When working at the same grade as rebar protruding 4 to 6 feet, there is not, for all practical purposes, an impalement hazard. In these instances, acceptable rebar caps are appropriate to prevent cuts, abrasions or other minor injuries.

At grade, the lower the rebar sticks up, the greater the impalement hazard due to tripping. If there is any chance for impalement, acceptable rebar caps are mandatory.

CONCRETE CUTTING

Only trained and authorized personnel will operate concrete tile cutting equipment. The following guidelines will be used during all concrete cutting operations.

- a. follow the manufacturer's recommendations for the safe use of the equipment.
- b. use the correct blade (size, type, speed) for the job, properly tightened. Inspect the blade and all equipment before use.
- c. ensure all safety guards are functioning properly.
- d. never operated a hand held saw above shoulder height.
- e. wear proper safety equipment including eye, hand and skin protection. Depending on the job, respiratory protection or dust masks may be required.
- f. establish a control zone and keep others out who are not directly involved with the work at hand.
- g. ensure there is adequate coolant/water when appropriate.
- h. never operate an internal combustion saw in a confined space.

CONCRETE PUMPS AND PLACING BOOMS

OSHA has little to say about concrete pumping systems. Essentially, OSHA says that pumping systems using discharge pipes will be provided with pipe supports designed for 100% overload and compressed air hoses used on concrete pumping systems will be provided with positive fail-safe joint connectors to prevent separation of sections when pressurized.

Concrete pumping systems have the potential for serious mishaps due to the machinery, the weight, the set-up, and the operation. Coordination is required between all persons involved in concrete pumping operations.

Only qualified, authorized, employees may operate concrete pumps and placing booms. The equipment owner/operator manual must be on site and readily available.

Prior to use, the equipment will be inspected per the manufacturer's instructions and defective equipment will be taken out of service.

Appropriate PPE must be worn including hard hats, face protection, and steel toed work boots.

Extreme care must be exercised in keeping the boom clear of electrical power lines. Safety distances from various electrical currents are found in Heavy Equipment and Electrical Power Lines, below.

If maintenance is required, and there is potential stored energy within the system, it will be performed under the provisions of our Control of Hazardous Energy Program found in Section III of this program.

CRANES

Cranes and derricks. - 1926.550

Cranes, like all pieces of heavy equipment, if not properly operated, inspected and maintained have a potential for causing major bodily injury or property damage. Care must be taken in all facets of crane operation.

Not only do cranes require a thorough annual inspection (a record of the dates and results of these inspections must be maintained), they require inspection prior to each use and even during use by a competent person.

All rated load capacities, recommended operating speeds, special hazard warnings or instructions must be readily visible to the operator of the crane.

While cranes easily have the lifting ability to hoist employees on a personnel platform, this is absolutely prohibited except in cases when the erection, use, and dismantling of conventional means of reaching the worksite would be more hazardous or is not possible because of structural design or worksite conditions. A conventional means would include: a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold.

It is absolutely imperative that the possibility of electrocution be totally eliminated. This can be accomplished by adhering to the safe distances from various currents noted in Heavy Equipment and Electrical Power Lines, below.

Dangers associated with cranes include numerous moving parts. These dangers can be minimized or eliminated by ensuring that all guards are in place and not tampered with.

Care must be taken to ensure that areas within the swing radius of the rear of the rotating superstructure of the crane are barricaded to prevent a person from being struck or crushed.

All employees must keep clear of loads that are about to be lifted as well as suspended loads.

When using slings made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and synthetic web (nylon, polyester, and polypropylene), the following safe operating practices will be observed:

- a. Slings shall not be shortened with knots or bolts or other makeshift devices.
- b. Sling legs shall not be kinked.
- c. Slings used in a basket hitch shall have the loads balanced to prevent slippage.
- d. Slings shall be padded or protected from the sharp edges of their loads.
- e. Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.

Hand signals used to guide the crane operator will be consistent with the ANSI standard for the type of crane in use and an illustration of the signals must be posted at the job site.

Care must be taken while actually operating the crane in hoisting applications as well as when relocating the crane superstructure.

The competent person on site will ensure that the flooring on which equipment may be placed is substantial enough to safely hold the weight of the load. If the strength of the floor is unknown and/or cannot be determined, a professional engineer will determine the pounds per square foot required and, if necessary, the appropriate shoring to be installed to sustain the weight.

RIGGING EQUIPMENT

Rigging equipment for material handling must be inspected prior to use on each shift and as necessary to ensure that it is safe. Defective rigging equipment will be removed from service. Further, rigging equipment not in use will be removed from the immediate work area to eliminate the hazards it may create for other employees.

29 CFR 1926.251, *Rigging Equipment for Material Handling*, contains Tables H-1 to H-20 which indicate rated capacities for various types of slings and grommets, safe working loads for shackles, number and spacing of U-Bolt Wire Rope Clips, and maximum allowable wear at any point of link.

Specific requirements for use and inspection of alloy steel chains; wire rope; natural rope and synthetic fiber; synthetic webbing; and shackles are found in this standard.

DISPOSABLE RESPIRATORS

OSHA requires that employees who voluntarily use disposable respirators in situations where respiratory protection is not specifically required by OSHA standard (in atmospheres where exposures are below the permissible exposure limit) essentially for personal comfort or additional, though not required, respiratory protection be informed of 29 CFR 1910.134 Appendix D, printed below.

By insisting that these employees sign the tear-off employee handbook acknowledgement form, you can protect your company from OSHA citation for violating this requirement.

All disposable respirators, such as Moldex, 3M, Willson, North Safety, etc. must be marked with the manufacturer's name, the part number, the protection provided by the filter, and "NIOSH".

Disposable filters are particulate respirators. They are also known as "air-purifying respirators" because they protect by filtering particles out of the air you breathe.

The below outlines the types of approved disposable respirators and their description.

N95	Filters at least 95% of airborne particles.	Not resistant to oil.
N99	Filters at least 99% of airborne particles.	Not resistant to oil.
N100	Filters at least 99.7% of airborne particles.	Not resistant to oil.
R95	Filters at least 95% of airborne particles.	Somewhat resistant to oil.
P95	Filters at least 95% of airborne particles.	Strongly resistant to oil.
P100	Filters at least 99.7% of airborne particles.	Strongly resistant to oil.

Though disposable filters cannot be fit-tested in the traditional sense, they must be fit-tested in accordance with the manufacturer's instructions.

Under no circumstances may any respirator other than the above disposable respirators be used without compliance with a respiratory protection program.

Standard Number: 1910.134 App D

**Standard Title: (Mandatory) Information for Employees Using
Respirators When not Required Under Standard.**

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard. You should do the following: 1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations. 2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you. 3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke. 4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998]

EARTH MOVING EQUIPMENT

Equipment. - 1926.600

All heavy equipment must be inspected prior to use and operated only by authorized personnel.

Bi-directional machines such as front-end loaders and bulldozers will have an audible alarm, distinguishable from the surround noise level which will be used if the operator does not have a clear, unobstructed view or a ground guide indicating that the line of travel is safe.

Scissors points on all front-end loaders which may harm the operator will be guarded as well as all parts exposed to employees such as belts, gears, pulleys, sprockets, spindles, drums, flywheels, chains and other moving parts.

Equipment that is operated from the seated position and has roll over protection will have seat belts and their use is required. If there is no roll over protection, seat belts will not be used.

All trucks into which earth is dumped will have protection for the driver of that vehicle or the driver must exit the vehicle before loading.

Vehicle operators will not operate heavy equipment on any access roadway or grade that is not suitable for the vehicle.

Bulldozer blades, loader buckets, dump bodies and similar equipment will be fully lowered or blocked to prevent movement during maintenance or when not in use.

When equipment is parked, the parking brake will be set. Additionally, on inclines, wheeled vehicles will be chocked. Equipment left unattended at night, adjacent to either a highway or construction area in use, will be clearly visible with reflectors, lights, or illuminated (with reflectors or lights) barricades.

ELECTRICAL WORK - WORKPLACE SAFETY

Applicability. - 1926.402

General requirements. - 1926.403

Wiring design and protection. - 1926.404

Special systems. - 1926.408

General requirements. - 1926.416

Definitions applicable to this subpart. - 1926.449

If one were to wire a facility with 16 gauge aluminum wire, and, a week after the job was completed, the facility burnt to the ground, this would not be an OSHA problem -- it would be a serious, possibly criminal, professional problem. If one were standing in water operating an electrical power tool connected to a bare spliced extension cord laying in that water, this would be an OSHA problem. These extreme examples are presented to point out that this safety program applies to employee safety while performing work. OSHA standards do not provide any guidance in any profession, they merely provide guidance in doing your professional work safely.

All electrical work will be done according to the latest adopted National Electrical Code as well as established local codes.

ELECTRICAL SAFETY MEASURES

- a. Daily, prior to use, all electrical equipment -- including extension cords -- will be inspected and defective items will be tagged out of service and not used.
- b. With the exception of double insulated tools (with UL approval), all electrical tools and equipment will be grounded.
- c. Tools will not be hoisted by their flexible electrical cords.
- d. Except in an emergency, load rated switches and circuit breakers will be used for the opening and closing of circuits under load conditions as opposed to fuses and splice connections.
- e. While working on electrical equipment, unauthorized persons will be kept clear by barriers or other means of guarding.

- f. Temporary wiring and extension cords will be kept off of walking working surfaces and vehicle traffic areas or covered to prevent tripping and vehicle damage.
 - 1. Electrical cords will not be suspended with staples, hung from nails, or suspended by wire.
 - 2. Worn or frayed electric cords or cables will not be used.
- g. Hands will be dry when working on electrical equipment including plugging in extension cords.
- h. Areas in which electrical work is to be done must be adequately illuminated and temporary lighting must:
 - 1. have guards in place.
 - 2. not be suspended by its cords unless specifically designed for such installation.
- i. A competent person, before work commences, will inform all employees in the work area of both exposed and concealed electrical hazards. If appropriate, warning tags will be used to prevent accidental contact with electrical energy.
- j. When working around any electrical power circuit, employees will:
 - 1. protect themselves by deenergizing the circuit and grounding it or by establishing insulation between themselves and the current.**
 - 2. ensure that any conductive materials and equipment that are in contact with any part of their body will be handled in a manner that will preclude contact with exposed energized conductors or circuit parts.
 - 3. use portable ladders that have non-conductive siderails.
 - 4. remove or insulate conductive articles of jewelry and clothing that might contact exposed energized parts.
- k. All 15, 20, or 30 amp receptacle outlets that are not part of the permanent wiring of the building or structure and that are used by personnel shall have ground-fault circuit interrupter protection for personnel. GFCI pigtails may be used to meet this requirement if properly sized. Remember, extension cords are considered temporary wiring.
 - 1. Ground fault circuit interrupters will be tested before use.
- l. Only qualified persons may perform testing work on electric circuits or equipment.

- m. Sufficient access and working space must be maintained about all electric equipment to permit ready and safe operation and maintenance. This space must be kept clear, i.e., it can not be used for storage.
- n. The dimension of the working space in the direction of access to live parts likely to required examination, adjustment, service, or maintenance must not be less that noted below:

Working Clearances

Minimum clear distance for conditions¹

<u>Nominal voltage to ground</u>	(a) <u>Feet²</u>	(b) <u>Feet²</u>	(c) <u>Feet²</u>
0-150	3	3	3
151-600	3	3 ½	4

Footnote¹ Conditions (a), (b), and (c) are as follows:

- {a} Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by insulating material. Insulated wire or insulated busbars operating at not over 300 volts are not considered live parts.
- {b} Exposed live parts on one side and grounded parts on the other side.
- {c} Exposed live parts on both sides of the workplace [not guarded as provided in Condition (a)] with the operator between.

Minimum Depth of Clear Working Space in Front of Electric Equipment

Conditions¹

<u>Nominal voltage to ground</u>	(a) <u>Feet²</u>	(b) <u>Feet²</u>	(c) <u>Feet²</u>
601 to 2,500	3	4	5
2,501 to 9,000	4	5	6
9,001 to 25,000	5	6	9
25,001 to 75 kV	6	8	10
Above 75kV	8	10	12

Footnote¹ Conditions (a), (b), and (c) are as follows:

- {a} Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by insulating materials. Insulated wire or insulated busbars operating at not over 300 volts are not considered live parts.
- {b} Exposed live parts on one side and grounded parts on the other side. Walls constructed of concrete, brick, or tile are considered to be grounded surfaces.
- {c} Exposed live parts on both sides of the workspace [not guarded as provided in Condition (a)] with the operator between.

1. The importance of working clearances cannot be overstated. At any time, when working with live electrical systems, there is the

possibility of an arcing fault causing an arc flash where the current explosively flows through ionized air at 35,000°F causing incurable burns, hearing loss, collapsed lungs, or even death from the electricity of flying metal shrapnel.

2. As a contractor working in an area where the possibility of arc flash exists, check to see if an arc flash assessment has been performed on electrical equipment on which you will be working. If it has, follow that specific guidance. If it has not, perform (or have a qualified vendor perform) the arc flash assessment. Refer to NFPA 70E for specific guidance appropriate to the facility's specific electrical equipment.

Note: NFPA 70E is a National Consensus Standard which is incorporated by reference within the OSHA standards; specifically, Appendix A to Subpart S, 29 CFR 1910. Failure to comply with NFPA 70E is citable under the general duty clause.

The above electrical safety measures are not all inclusive, however they cover many normal job site events. A complete list is found in the cited references and they are incorporated into this safety manual. If in doubt about any safety procedure, contact your supervisor or the competent person for clarification.

EXCAVATING, TRENCHING & SHORING

Scope, application, and definitions applicable to this subpart. - 1926.650

Specific Excavation Requirements. - 1926.651

Requirements for protective systems. - 1926.652

Soil Classification - 1926 Subpart P App A

Sloping and Benching - 1926 Subpart P App B

Timber Shoring for Trenches - 1926 Subpart P App C

Aluminum Hydraulic Shoring for Trenches - 1926 Subpart P App D

Alternatives to Timber Shoring - 1926 Subpart P App E

Selection of Protective Systems - 1926 Subpart P App F

Excavating involves any earth removal which creates a cut, cavity, trench, or depression in the earth's surface. A trench is a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Prior to excavating, obstructions that may create a hazard to employees will be removed or supported and utility companies will be contacted, advised of the proposed work, and asked to establish the location of underground installations.

If the utility company cannot respond to this request within 24 hours and/or the exact location of the underground installations cannot be determined, actual work may begin provided that:

- a. extreme caution is observed.
- b. detection equipment or other acceptable means are used to locate the approximate location of the utility installation.
- c. as the approximate location is approached, the exact location will be determined by safe and acceptable means before proceeding.

In open excavations, underground installations will be protected, supported or removed as necessary to protect employees.

To ensure employee safety, the competent person will ensure that during excavating work in trenches there is:

- a. appropriate access and egress for personnel and/or equipment such as stairs, ramps and ladders so as to require no more than 25 feet of lateral travel for employees in trenches four (4) feet or more deep.
- b. employee protection for head injury. All employees must wear hard hats.
- c. no spoil pile or equipment within two (2) feet of the edge of the excavation.
- d. employee protection from vehicular traffic such as barricades, ground guides for operators of equipment with a limited view, away sloping grades, etc..
- e. no exposure to falling loads.
- f. no danger to employees from water accumulation.
- g. no danger from cave-in. Shoring, a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation, will prevent cave-ins.
 - 1. Shoring is not required for trenches less than five (5) feet deep if an examination by a competent person determines the soil has no potential for a cave-in. In this situation, vertical sides are allowed.
 - 2. Once a trench is over 20 feet deep, protective systems, which may include shoring, must be designed by a registered professional engineer.
 - 3. There are other methods of protection from cave-ins such as sloping or benching the adjacent ground according to specific criteria dependent on the soil conditions, weather, and adjacent structures.

4. The total number of cave-in accidents is relatively small, however, the accidents which do occur are generally very serious and are much more likely to be fatal than other types of accidents in the construction industry.
- h. a method to prevent mobile equipment from falling into the excavation such as barricades. Ground guides will be used if the equipment operator does not have a clear view of the edge. If possible, the grade should slope away from the excavation.

If the atmosphere is dangerous or likely to be dangerous, testing will be done as often as needed and emergency rescue equipment -- such as breathing apparatus, safety harness and line, or a basket stretcher -- must be available.

When a hazardous atmosphere does exist, appropriate respiratory protection will be used and a rescue plan developed which includes having an attendant outside the hazardous area with appropriate equipment and training.

PROTECTIVE SYSTEMS

Except when an excavation is made entirely in stable rock or it is less than 5 feet in depth and a competent person finds no indication of potential cave-in, employees in an excavation will be protected from cave-in by protective systems designed in accordance with paragraphs (b) or (c) of 26 CFR 1926.652.

All employees involved with excavating are to review these standards and understand, in general terms:

- a. The extensive degree of basic data, design, and knowledge that goes into employee protection during excavating projects.
- b. The types of soils and how to identify them on the job site.
- c. The soil condition -- specifically moisture content -- and how that impacts on stability during excavations.
- d. The absolute need for a competent person to be on site at all times during excavating work to visually and manually test soil conditions as work progresses and to maintain a safe site.

DAILY INSPECTIONS

Prior to work and as needed throughout the shift, a competent person will conduct daily inspections of excavations, adjacent areas and protective systems to find evidence of a developing cave-in situation; failure of protective systems; hazardous atmosphere; or other hazardous conditions.

After every rainstorm or event which would affect the safety of employees within an excavation, an inspection will be made by a competent person.

FALL PROTECTION

Walkways must be provided where employees or equipment are required or permitted to cross over excavations. If these walkways are 6 feet or more above a lower level, guardrails must be used. Specific criteria for guardrails is found in 29 CFR 1926.502(b), a copy of which is found in our Fall Protection Program located in Section III of this safety program.

EXTENSION CORDS

Wiring methods, components, and equipment for general use. - 1926.405
General requirements. - 1926.416

Extension cords shall not replace permanent wiring and the following safety precautions will be adhered to:

- a. Inspect the cord for cracks and cuts.
- b. Cord must have a three prong plug for grounding.
- c. Use the shortest continuous length of cord possible. Cords may not be spliced together.
- d. Make certain the cord does not lay in water.
- e. Ensure cord is properly rated for the job.
- f. Secure and route cords out of the traffic flow to prevent tripping.
- g. Defective cords will be tagged and removed from service.
- h. Most importantly, an extension cord used on a job site **MUST** be used with a ground fault circuit interrupter (GFCI).

GROUND FAULT CIRCUIT INTERRUPTERS

Wiring design and protection. - 1926.404

A ground fault circuit interrupter (GFCI) provides protection for all 120-volt, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring by detecting lost current resulting from a short, overheating, and/or ground fault. It should be noted that an extension cord into which electrical devices are plugged are not part of the permanent wiring; therefore, GFCI's are required.

A GFCI will "trip" when the amount of current amperes going to an electrical device in the hot conductor and the amount of current returning from an electrical device differs by approximately 5 milliamps. The GFCI can interrupt the current within as little as 1/40th of a second.

The current that is missing is being lost through a ground fault, whether it is in the actual grounding, a short in the equipment or electricity going through the employee to the ground.

A GFCI will not protect an employee who comes in contact with two hot wires or a hot wire and a neutral wire. A GFCI will provide protection against fires, overheating, damage to insulation, and, the most common form of electrical shock hazard -- the ground fault. GFCI's must be tested before use.

HEAVY EQUIPMENT AND ELECTRICAL POWER LINES

Cranes and derricks. - 1926.550

Except where electrical distribution and transmissions lines have been deenergized and visibly grounded at point of work or where insulating barriers (not attached to the vehicle) have been erected to prevent physical contact with the lines, the following clearance -- between any part of the vehicle and the line -- will be observed:

<u>Line Rating</u>	<u>Minimum Clearance</u>
50 kV. or below	10 feet
Over 50 kV.	10 feet plus .04 inch for each 1 kV. over 50 kV, or twice the length of the line insulator, but never less than 10 feet.

In transit, equipment clearance must be a minimum of:

<u>Line Rating</u>	<u>Minimum Clearance</u>
50 kV. or below	4 feet
Over 50 kV. to 345 kV.	10 feet
Over 345 kV. to 750 kV.	16 feet

A ground guide will be designated to observe clearance of the equipment and give warning to the equipment operator in situations where it is difficult for the equipment operator to maintain the desired clearances by visual means.

An overhead wire will be considered energized unless the owner of the line or the electrical utility authorities indicate that it is not energized and it has been visibly grounded.

LIGHTING

Illumination. - 1926.56

A competent person will ensure that all work areas have adequate lighting. Adequate lighting serves a two-fold purpose -- allowing tasks to be more readily performed as well as providing the additional safety factor of being seen by persons not involved with the work -- especially vehicular traffic.

If generators are used for auxiliary lighting, they will be operated and maintained by authorized persons who are competent by training or experience.

LP-GAS STORAGE

Liquefied petroleum gas (LP-Gas). - 1926.153

Liquefied petroleum gas (LP-Gas) is sometimes used on job sites to provide fuel for temporary heating devices.

LP-Gas systems must have containers, valves, connectors, manifold valve assemblies, and regulators of an approved type. All cylinders must be DOT approved.

Rules for inside storage (under construction standards) are simple -- **it is not allowed!**

NOTE: Under industry standards, up to 300 pounds of LP-Gas may be stored, with adherence to specific safety procedures, is allowed

Rules for outside storage require that containers be in a suitable ventilated enclosure or otherwise protected against tampering. At least one approved portable fire extinguisher having a rating of not less than 20-B:C must be readily available.

The distance from buildings or groups of buildings that containers must be stored are as follows:

<u>Quantity of LP-Gas Stored</u>	<u>Distance in Feet</u>
500 lbs or less	0
501 to 6,000 lbs	10
6,001 to 10,000 lbs	20
over 10,000 lbs	25

Storage must not be near building openings or vehicular traffic.

MACHINE GUARDING

Mechanical power-transmission apparatus. - 1926.307

Most injuries that occur when operating a machine happen at the point of operation -- the point on a machine where the actual work (cutting, bending, spinning) occurs. This is also the point where guards can protect fingers and hands exposed to that danger. Machine guarding also protects employees from other dangers such as flying pieces of metal, sparks, gears, belts, and rotating parts.

The most common types of machines on job sites are power tools which often have guards to prevent injury.

Accident prevention in this area is a function of machine design -- engineering controls -- and operator training. Types of machine guarding are almost as numerous as types of machines -- the most common being a physical barrier to prevent accidental insertion of body parts. Guards are

vital for safety reasons and machine guards designed into a machine should never be altered or removed. The speed and tremendous forces involved in modern machines are such that severe injury or even death could occur without warning and without even slowing the machine down.

Training and proper work methods go a long way toward reducing machine accidents. Like all safeguards, there is generally a way to bypass safety features that are engineered into machines. This is sometimes done to increase speed or just to make one's job easier. This could result in a tragic, avoidable accident. The few seconds saved could cause a lifetime of grief. Do not bypass safety systems.

Operate all machines according to the instructor's manual and follow all safety procedures.

MACHINERY

Spinning, pounding, moving -- gears, pulleys, levers -- electricity, fuel, hydraulics -- action, reaction, force: danger! Machinery takes energy and performs a task or a multitude of tasks. Machinery, from a safety standpoint, is a collection of individual simple machines (pulleys, gears, etc.) combined to work in harmony to accomplish a specific job.

The danger is obvious: the power, speed, movement, and momentum of machinery is not going to be altered by something as insignificant as an employee's finger, hand, or even body.

How does one deal with the dangers of machinery? First, **never** operate any machinery until you have received proper training and you thoroughly understand safety procedures as well as procedures to follow for adjustments, power interruption, jamming, lubrication, and inspection.

Secondly, ensure the guarding systems are in place, functioning properly, and have not been altered or removed.

Thirdly, if a hazard assessment of the machinery operation dictates specific personal protective equipment (PPE), wear it!

Lastly, again from purely a safety standpoint, think of any power operated item with moving parts as machinery. This would include items as diverse as a small electric drill to an 80,000 pound tractor-trailer.

POST-TENSIONING OPERATIONS

General requirements - 1926.701

OSHA has little to say about post-tensioning operations other than that which is found in CFR 1926.701(c) which states that:

- a. No employee (except those essential to the post-tensioning operations) shall be permitted to be behind the jack during tensioning operations.
- b. Signs and barriers shall be erected to limit employee access to the post-tensioning area during tensioning operations.

However, by following the below guidelines and procedures, the hazards of post-tensioning operations can be controlled.

1. Concrete pre-stressing and post-tensioning operations should be done according to the specifications and instructions of a professional engineer, and a copy of these plans and instructions will be available on site while the work is being done if required by the Safety Manager or General Contractor..
2. Stressing operations must be carried out under the direction of a competent person.
3. Employees involved in pre-stressing or post-tensioning must be instructed in and follow safe work procedures.
4. Appropriate eye protection must be worn by all employees involved in grouting, stressing and cable trimming operations.
5. Tendons, including bars, strands and wires, used for tensioning purposes must be protected against physical damage and corrosion during handling, transportation and storage.
6. Strand couplers must not be reused until they have been inspected by a qualified person and determined to be safe for reuse.
7. Welding, burning or other work is not permitted on any surface where strands have been strung or tensioned unless proper care is taken to protect the strands from sparks or other heat sources and from stray electric currents.
8. Visual or audible signaling devices must be provided and used in the area of tensioning operations to warn approaching employees.
9. Employees not directly involved in tensioning or de-tensioning operations must be kept clear of the danger area and must remain clear until operations are completed and the visual and/or audible warning signals are turned off or removed.

10. Strand elongation and strand deflection must be measured in a way that does not expose the employee to a risk of injury.
11. During pre-stressing operations employees must be protected by guards or other suitable devices at the tensioning ends and anchoring points to contain the flying strands and the strand vises in the event of strand failure.
12. Guards must be fabricated from mild steel plate, not less than $\frac{1}{4}$ " thick, or $\frac{3}{4}$ " thick or better plywood that provides at least equivalent strength.
13. Deflecting devices must be designed to prevent slipout and to allow backing off of strands from the deflected position.
14. Written de-tensioning procedures should be prepared by a professional engineer and followed so that employees are not exposed to danger from equipment or strand failure or structural failure. These procedures would include methods to safeguard the operator and other employees from hazards while cutting strands.
15. Strand vises and hydraulic equipment and components must be used and maintained in accordance with the manufacturer's instructions.
16. Strand vises must not be reused until they have been inspected by a competent person and determined to be safe for reuse.
17. Damaged or worn vises and hydraulic equipment will be removed from service.
18. The supervisor or competent person must ensure that operators are given the maximum allowable values for both stretch of the tendon and hydraulic pressure at the pump.
19. If there is a significant difference between the expected value and the measured value for either stretch of a tendon or hydraulic pressure at the pump, the employees must stop operations on that particular tendon and consult with the professional engineer in charge to obtain instructions on how to proceed.
20. Each jack pressure gauge must be checked at frequent intervals against a master gauge, and the site engineer must be furnished with a calibration chart.
21. Only hydraulic pressure hoses with self-seating couplings should be used, and care must be taken to ensure that end connections are not subjected to bending stresses at any time.

22. Hydraulic equipment must have a bypass valve which is adjusted and maintained to limit the hydraulic pressure so that the tension exerted by the jack on the tendon does not exceed 90% of the minimum specified ultimate strength of the tendon.
23. Hydraulic hoses must be inspected for flaws, leaks or bubbles after each stressing operation, and any damaged hoses immediately removed from service.
24. The hydraulic system must be regularly inspected for oil leaks and other damage and necessary corrective action taken.
25. Where adequate clearance exists, the platform width at jacking locations must be at least 32”.
26. Each blowout must be reported to the structural design engineer, investigated and logged.
27. A copy of the logged entry must be available on site for reference purposes.
28. If there is risk of injury from handling coiled post-tensioning tendons a suitable coil handling device must be used.
29. All jacks must be secured to suitable anchors before they are installed on a cable for tensioning, and must not be unsecured before they are removed from the cable, if a falling jack could endanger employees.

SCISSOR-LIFT FALL PROTECTION

What type of fall protection is required for scissor-lifts? This apparently simple question has a relatively simple answer. However, how it is derived is somewhat complicated because OSHA does not have a standard to deal with this issue.

Clearly, there is a hazard -- falling from height -- however, fall protection while using a scissor-lift is not covered in the fall protection, scaffold and ladder fall protection, nor aerial lift fall protection standards.

Section 5(a)(1) of the Occupational Safety and Health Act, commonly referred to as the General Duty Clause is a “catch all clause” which states: "Each employer shall furnish to each of its employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."

In the absence of a specific standard relating to a safety or health risk, the above is the reference OSHA will cite.

When assessing compliance efforts, OSHA considers the requirements of pertinent national consensus standards. In the case of scissor-lifts, ANSI/SIA A92.6-1990, *Self-propelled Elevated Work Platforms*, and ANSI/SIA A92.3, *Manually Propelled Elevating Aerial Platforms*, are used.

Fall protection is provided by employees maintaining firm footing on the lift and using guardrails. Under no circumstances are employees to place ladders or other items on the lift to extend their reach. Per ANSI/SIA standards, with which OSHA concurs, "Use of planks, ladders, or any other device on the aerial platform for achieving additional height or reach shall be prohibited." Use of these items negates the value of the guardrail system and may possibly exceed the scissor-lift's design limits for stability.

Further, personnel are not to tie off to items adjacent to the lift -- the most obvious reasons are: the anchorage point may not be sufficient and movement of the lift would pull the employee out of and off of the lift.

If, for some reason, guardrails are not being provided for a specific operational reason, then a personal fall protection system may be used which would include an anchorage point, lanyard and safety harness. However, this option is severely limited because its design would have to be approved by a registered engineer or the scissor-lift manufacturer would have to approve the use of the lift as an anchorage.

Under ideal conditions, rarely found on a construction site, scissor-lifts may be moved with the lift extended. However, should obstacles, debris, drop-offs, holes, depressions, ramps or other hazards be present, the lift must be lowered prior to movement.

Finally, if the employee leaves the safety of the scissor-lift platform while working at height, some sort of approved fall protection system must be employed.

SIGNS & TAGS

Accident prevention signs and tags. - 1926.200

When appropriate, signs and tags will be used to warn of specific hazards. Types of signs are classified according to their use, and their design is regulated by OSHA standard. All personnel will be instructed in the meaning of the various types of signs. Sign usage includes:

- a. **Danger Signs (Red, Black & White):** indicates immediate danger and denotes that special precautions are necessary.
- b. **Caution Signs (Yellow Background):** warns of a potential hazard or cautions against an unsafe practice.
- c. **Safety Instruction Signs (White Background):** used to provide general instructions and suggestions relative to safety measures.

The wording on signs must be positive, clear, concise, and easy to understand or the sign loses its value.

Accident prevention tags are to warn of hazardous or potentially hazardous conditions that are out of the ordinary, unexpected, or not readily apparent. They are not used where signs, guarding or other positive means of protection are used.

All tags must have:

- a. a signal word: "Danger"; "Caution"; "Warning"; BIOHAZARD (or its symbol) and a major message, and
- b. a major message such as: "High Voltage" or "Do not start".
[Major messages indicate the specific hazardous condition.]

The color scheme is basically the same as for signs:

red = danger
yellow = caution
orange = warning
fluorescent orange = biological hazard.

- a. Danger Tags: indicate an immediate hazard that presents a threat of death or serious injury.
- b. Caution Tags: indicate a non-immediate hazard or unsafe practice that presents a lesser threat of injury.
- c. Warning Tags: indicate a hazard between "Danger" and "Caution".
- d. BIOHAZARD Tags: indicate the actual or potential presence of a biological hazard and identify equipment, rooms, containers, etc., that may be contaminated.

Pay attention to signs and tags and realize that they are in place for only one reason -- your safety.

SLINGS

Rigging equipment for material handling. - 1926.251

A sling is the assembly which connects a load to the material handling equipment. There are many types of slings including, but not limited to:

- a. bridle wire rope sling
- b. cable laid endless sling-mechanical joint sling
- c. cable laid grommet-hand tucked sling
- d. cable laid rope sling-mechanical joint sling

- e. strand laid endless sling-mechanical joint sling
- f. strand laid grommet-hand-tucked sling

Additionally, slings are made of various materials such as alloy steel chain; wire rope; and natural and synthetic fiber rope. Each of these material have their own operating limits which include not only capacity, but temperature, kinks, cuts, and specific conditions.

Refer to 29 CFR 1926.251, *Rigging Equipment for Material Handling*, for detailed instructions on the use of each type of sling.

All slings, regardless of type, must be inspected each day before use and all fastenings and attachments must be inspected for damage or defects by a competent person. Depending on work conditions, additional inspections may be required. Damaged or defective slings will be immediately removed from service. Below are safe operating practices which must be followed:

- a. slings may not be shortened with knots or bolts or other makeshift devices.
- b. sling legs may not be kinked.
- c. slings may not be loaded in excess of their rated capacities.
- d. slings used in a basket hitch must have the load balanced to prevent slippage.
- e. slings must be securely attached to their loads.
- f. slings must be padded or protected from the sharp edges of their loads.
- g. suspended loads must be kept clear of all obstructions.
- h. all employees must be kept clear of loads about to be lifted and of suspended loads.
- i. hands or fingers may not be placed between the sling and its load while the sling is being tightened around the load.
- j. shock loading is prohibited.
- k. a sling may not be pulled from under a load when the load is resting on it.

STAIRS

Stairways. - 1926.1052

Stairways that are not a permanent part of the structure on which construction work is being performed must have landings of at least 30 inches in the direction of travel and extend at least 22 inches in width at every 12 feet or less of vertical rise. Additionally,

- a. riser height and tread depth must be uniform within each flight of stairs.
- b. where doors or gates open directly on a stairway, a platform will be provided, and the swing of the door must not reduce the effective width of the platform to less than 20 inches.
- c. metal pan landings and metal pan treads, when used, must be secured in place before filling with concrete or other material.
- d. all parts of stairways will be free of hazardous projections, such as protruding nails.
- e. slippery conditions on stairways will be eliminated before use.
- f. except during stairway construction:
 - 1. foot traffic is prohibited on stairways with pan stairs where the treads and/or landings are to be filled at a later date, unless the stairs are temporarily fitted with solid material at least to the top edge of each pan. Temporary treads and landings will be replaced when worn below the level of the top edge of the pan.
 - 2. foot traffic is prohibited on skeleton metal stairs where permanent treads and/or landings are to be installed at a later date unless the stairs are fitted with secured temporary treads and landings long enough to cover the entire tread and/or landing area.

Treads for temporary service will be made of wood or other solid material and installed the full width and depth of the stair.

Stairways having four or more risers or rising more than 30 inches will be equipped with:

- a. at least one handrail; and
- b. one stairrail system along each unprotected side or edge.

TOOLS: HAND
General requirements. - 1926.300
Hand tools. - 1926.301

Hand tools shall be used only for the purpose for which they are designed.

Hand tools will be kept clean and, where appropriate, oiled.

Hand tools which are damaged will not be used.

Hand held cutting tools will be kept sharp and will be sheathed or retracted when not in use.

When using a striking tool such as a hammer or chisel, safety glasses or safety goggles will be used.

Do not force tools.

If you are unfamiliar with the proper procedure for using a tool, ask your Supervisor for instruction.

Power tools may be operated only by those persons who are qualified by training or experience.

Do not alter guards on power tools; wear appropriate PPE.

Electrical tools must be grounded and, in the absence of permanent wiring, a Ground Fault Circuit Interrupter must be used.

Electric tools will not be lifted by their cords and pneumatic tools will not be lifted by their hoses.

TOOLS: PNEUMATIC POWERED
Eye and face protection. - 1926.102
General requirements. - 1926.300
Power-operated hand tools. - 1926.302

Pneumatic powered tools must be safeguarded whenever there are hazardous employee exposures. This is especially important for point of operation guarding.

Three specific hazards associated with pneumatic powered tools which are unique to their use are noise levels, tool retention, and air hose pressure.

Care must be taken to assure that noise levels are within acceptable limits (noise monitoring may be necessary) and, if required, engineering controls and/or ear protection will be employed.

If there is a possibility of tool ejection during use, a tool retainer must be installed.

Safety will dictate that hose and hose connections be designed for the pressure and service to which they are subjected.

Eye protection will be worn when using pneumatic powered tools in accordance with the owner/operator's manual.

When using a jackhammer, care must be taken to ensure that the employee is not exposed to unsafe levels of respirable dust or crystalline silica.

The PEL for particles not otherwise regulated is 5.0 mg/m³. The PEL for respirable dust containing crystalline silica is determined by the below formula:

PEL = 10 mg/m³ ÷ (%SiO₂+2), where %SiO₂+2 refers to the amount of crystalline silica measured in the sample.

Our operations would not exceed these PEL's and respiratory protection is not required.

TOOLS: POWDER-ACTUATED

Eye and face protection. - 1926.102

General requirements. - 1926.300

Power-operated hand tools. - 1926.302

A powder-actuated fastening tool propels a nail, pin, or fastener through an object to fasten it to another object. These tools, if misused, are extremely dangerous because essentially, they are similar to a pistol or rifle.

The speed of the projectile may range from 300 ft/second to 1290 ft/second.

Only trained and authorized persons may operate a powder actuated tool and, for safety, these tools should be kept secured when not in use.

Prior to use, the tool must be inspected and tested according to the manufacturer's instruction manual which should be kept with the tool.

Defective tools must not be used and they must be taken out of service.

Use of appropriate personal protective equipment - including, at least, eye/face and ear protection -- is required not only for the operator, but also those employees in the vicinity. PPE will be in accordance with the owner/operator's manual.

On the job site, each tool should be accompanied by: 1) its container; 2.) the operator's instruction & service manuals; 3) the tool inspection record; and 4) service tools & accessories.

Tools must not be loaded until just before firing and, under no circumstances, are they to be pointed at any person. Hands must be kept clear of the open barrel end. A powder activated tool must never be left unattended -- loaded or empty -- for safety and security reasons.

Fasteners must not be driven into very hard or brittle materials such as cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick or hollow tile; easily penetrated materials unless these materials are backed by a substance; nor a damaged area caused by an unsatisfactory fastening. Of course, these tools must never be used in an explosive or flammable atmosphere.

Before fastening questionable material, the operator can determine its suitability by using a fastener as a center punch. If the fastener point does not easily penetrate, is not blunted, and does not fracture the material, initial test fastenings will be made in accordance with the manufacturer's instructions.

The tool must be held perpendicular to the work surface and in the event of a misfire, the operator must hold the tool firmly against the work surface and follow, exactly, the manufacturer's instructions.

Tools must be used with the correct shield, guard, or attachments recommended by the manufacturer.

Because the case and load are color coded, it is imperative that the operator can distinguish the colors of brass and nickel as well as gray, brown, green, yellow and red and purple.

VEHICLES

Only authorized persons may operate a company vehicle. This authorization will not be granted until operating knowledge and ability has been successfully demonstrated to the Safety Director.

Before operation, a safety check will be made ensuring fluid levels are correct, obvious bolts are tight, lights and horn are functioning, tire pressures are correct, fire extinguisher is present and charged, and damage is noted.

Seat belts will be worn and all traffic laws, including speed limits, will be observed. During fueling, vehicles must be turned off and all fluid levels checked.

Before backing up any vehicle, check behind and blow horn for the safety of others.

When hauling a load, the cargo should be strapped or blocked to prevent shift.

VENTILATION

Ventilation. - 1926.57

There may be times in the course of our work such as grinding, cutting, sawing, sanding, etc. that hazardous dusts are released into the atmosphere that exceed the concentrations specified in the "Threshold Limit Values of Airborne Contaminants for 1970" of the American Conference of Governmental Industrial Hygienists, listed below:

MINERAL DUSTS	
Substance	(a)mppcf
SILICA Crystalline Quarts Threshold Limited calculated from the formula $(b)(250) \div (\%SiO_2+5)$ Cristobalite. Amorphous, including natural diatomaceous earth	20
SILICATES (Less than 1% crystalline silica) Mica Portland Cement Soapstone Talc (non-abestiform) Talc (fibrous), use asbestos limit	20 20 20 20
GRAPHITE (Natural)	15
INERT OR NUISANCE PARTICULATES Note 1 Covers all organic and inorganic particulates not otherwise regulated. Same as Particulates Not Otherwise Regulated. Note 2 Inert or Nuisance Dusts includes all mineral, inorganic, and organic dusts as indicated by examples in TLV's Appendix D.	50 (or 15 mg/m ³ whichever is the smaller) of total dust <1% SiO Note 1 See Table above

a. Millions of particles per cubic foot of air, based on impinger samples counted by lightfield techniques.

b. The percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods have been shown to be applicable.

Below the above threshold limits, no action is required, however, employees may wear dust masks for personal comfort.

As always, engineering controls are preferred to personal protective equipment to deal with job site hazards. Therefore, local exhaust ventilation is a preferred method of maintaining atmospheres that have dust levels below the concentrations noted in the Dust Table, above.

Local exhaust ventilation must be designed so that they prevent dispersions of dust in concentrations causing harmful exposure and that dusts are not drawn through the work area of employees.

The dust collected by an exhaust or ventilating system will be discharged to the outside atmosphere.

If concentrations are so great that a dust separator is used, the dust and refuse will be disposed of in such a manner as to not harm employees. The exhaust will still be discharged to the outside atmosphere.

Of course, if the above ventilation procedures do not reduce the dust levels to acceptable limits, respirators will be used.

WELDING, CUTTING AND BRAZING

Gas welding and cutting. - 1926.350

Arc welding and cutting. - 1926.351

Fire prevention. - 1926.352 Ventilation and protection in welding, cutting, and heating. - 1926.353

Welding, cutting, and heating in way of preservative coatings. - 1926.354

Only authorized and trained personnel are permitted to use welding, cutting, and/or brazing equipment. Appropriate PPE must be worn by all welders.

An appropriate fire extinguisher will be readily available for immediate use.

Compressed gas cylinders will:

- a. have valve protectors in place when not in use or connected for use.
- b. be legibly marked to identify the gas contained therein.
- c. have the valves closed before the cylinder is moved, when the cylinder is empty, and at the completion of each job.
- d. be stored in areas away from intense heat, electric arcs, and high temperature lines.
- e. be secured (chained in portable dolly), in storage or transportation, from tipping, falling, rolling, and damage from passing or falling objects.
- f. be marked "EMPTY" when appropriate.
- g. be removed from service if the regulators or gauges are defective.
- h. be used only for the purpose for which they are designed -- for example, cylinders will not be used as rollers or supports.
- i. be kept away from stairs.

Regulators and gauges will be inspected daily.

All cylinders, cylinder valves, couplings, regulators, hoses and apparatus will be kept free of oily or greasy substances.

Electric welders will be inspected daily before use with emphasis on the cables. All splicing of cables must maintain the insulated protection with no exposed metal parts. Cables in need of repair will not be used.

The competent person will ensure that ventilation within a confined space is adequate to negate the possibility of a respiratory or explosion hazard.

A fire watch will be assigned when there is potential a fire might develop. When welding, cutting, or brazing near a fire hazard and the fire hazard cannot be isolated, shields will be used to confine the sparks, heat, and slag.

When performing operations capable of producing heat at chemical plants, refineries, or other facilities which have a higher degree of hazard than normal work sites, a hot work permit is generally required. Included in these types of operations are burning, cutting, heating, and welding.

On the back of the Hot Work Permit is found fire safety instructions which must be read and understood by the persons identified on the permit.

IDENTIFICATION OF HAZARDOUS JOB SITE MATERIALS

The presence of asbestos, crystalline silica, lead, and even mercury is possible on many job sites. Before work begins, the appropriate PPE and respiratory protection requirements will be discussed with employees.

Because of the chronic (long term) nature of these hazards, detrimental health effects due to exposure would not be immediately noticed.

The competent person on site will prevent exposures to these materials.

Areas that contain the below materials will be cordoned off or protected with appropriate warning signs. Do not enter any restricted area unless dictated by job assignment and only after specific training for dealing with these hazards. The training would include PPE, respiratory protection, work procedures, medical surveillance, containment, hygiene, handling, testing, and labeling.

These materials may be “discovered” as work progresses and employees will be protected from these hazards by:

- a. identification of these items by the competent person.
- b. informing the owner, project designer, or engineer of the hazards.
- c. securing the area in question until testing proves samples to be negative.

Subcontractors who deal with these hazards will have specific programs that address the above issues.

ASBESTOS

Substance Technical Information for Asbestos - Non-Mandatory - 1926.1101 App H

Asbestos can be found in pipe, wall, and boiler insulation; exterior sheeting; and flooring. Friable or crumbling asbestos presents the most hazard as it can float in the air and be inhaled into the respiratory system. Without respiratory protection, the microscopic asbestos fibers can enter the deepest portion of the lung, causing scar tissue to develop and stiffen the lung. The net result is a

reduction of gas exchange -- a condition called asbestosis. High levels of exposure to asbestos greatly increase one's chance of lung cancer.

CRYSTALLINE SILICA

Silica, Crystalline (Respirable Size), National Institute of Health

Crystalline Silica can be readily found on many job sites in rocks as well as many concrete and masonry products. Crystalline Silica can be released in the air when employees are performing such tasks as:

- a. chipping, hammering, drilling, crushing, or hauling rock.
- b. abrasive blasting.
- c. sawing, hammering, drilling, or sweeping concrete or masonry.

Unprotected respiratory exposure to crystalline silica may cause a lung disease called silicosis as well as cancer and death.