Accident Investigation

Accident Investigation - What is it?

Accidents and incidents result from a failure of people, equipment, supplies, or surroundings.

A successful accident investigation determines not only what happened, but also attempts to find out how and why the accident occurred.

Accident investigation is primarily a fact-finding procedure; the facts revealed are used to prevent recurrences of similar accidents and to increase the level of safety and health for employees.

Accident investigations are performed to:

- verify that procedures are written properly and being followed
- verify that all required actions are being taken
- determine if risk factors have been reduced or eliminated to the maximum extent feasible
- determine control measures to be implemented.

Accident Investigation

Employee Responsibilities

- Promptly report incidents or near misses that occur
- Report hazardous conditions to your supervisor
- Participate in incident investigations, as needed or required

Accident Investigation

Hazard Reporting

A system for reporting hazards must be in place or developed for the company.

The person reporting the hazard must:

- notify the department supervisor of the hazard
- perform lockout/tagout, if required, and
- fill out required sections of a report.

The employee's supervisor must:

- notify all affected workers of the hazard
- notify the maintenance department of the hazard, if required
- ensure the hazard is properly marked and controlled until corrected, and
- notify management and the company safety officer of the hazard.

Vehicle-Mounted Elevating and Rotating Work Platforms

Powered Platforms, Manlifts, and Vehicle-Mounted Platforms

- Test the controls each day, or before first use.
- Always secure the boom or ladder before moving the vehicle. This must be verified (rechecked) before movement.
  - No one is allowed in the basket when the vehicle is moving.

- Operators must understand all controls and functions of the equipment.
- Where hand signals are used for assisted positioning, operators and signal people must be trained and understand the signals.
- Employees in the bucket or basket of the boom must wear fall protection equipment at all times.
  - The fall protection must be attached to the basket or boom, not the structure you are working on.
  - Employees must stand firmly on the floor of the basket and may not sit or climb on the edge of the basket, or use planks, ladders, or other devices for a work position.
  - Fall protection with lanyards attached to the boom or basket are required for each person in the lift basket.

Vehicle-Mounted Elevating and Rotating Work Platforms

Specific Requirements

Ladder Trucks and Tower Trucks

Before the truck is moved for highway travel, aerial ladders must be secured in the lower traveling position by the locking device above the truck ca, and the manually operated device at the base of the ladder, or by other equally effective means (such as cradles, which prevent rotation of the ladder, combined with positive acting linear actuators).

Electrical Tests

Electrical tests must be performed to assure compliance with ANSI A92.2, Section 5; however, equivalent DC voltage tests approved by the manufacturer may be used in lieu of the AC voltage test specified.

Bursting Safety Factor

All critical hydraulic and pneumatic components must comply with ANSI A92.2, Section 4.9 Bursting Safety Factor. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All non-critical components must retain a bursting safety factor of at least 2:1.

Welding Standards

All welding shall conform to the following Automotive Welding Society (AWS) Standards, as applicable:

- Standard Qualification Procedure, AWS B3.0
- Recommended Practices for Automotive Welding Design, AWS D8.4
- Standard Qualification of Welding Procedures and Welders for Piping and Tubing, AWS D10.9
- Specifications for Welding Highway and Railway Bridges, AWS D2.0

Vehicle-Mounted Elevating and Rotating Work Platforms

Specific Requirements

Extendible and Articulating Boom Platforms

- Lift controls must be tested daily to ensure safe working conditions.
- Aerial lifts may only be operated by trained persons.
- Belting off to an adjacent pole, structure, or equipment while working from an aerial lift is prohibited.
- Employees must stand firmly on the floor of the basket and may not sit or climb on the edge of the basket, or use planks, ladders, or other devices for a work position.
- Fall protection with lanyards attached to the boom or basket is required for each person in the lift basket.
- Do not exceed boom and basket load limits.
- The brakes must be set, and outriggers, when used, must be positioned on pads or a solid surface. Wheel chocks must be installed before use on an incline.
- Do not move an aerial lift truck when the boom is elevated in a working position with anyone in the basket, except when using specialized equipment.
- Articulating boom and extendible boom platforms primarily designed as personnel carriers must have both platform (upper) and lower controls. Upper controls must be in or beside the platform within easy reach of the operator. Lower controls must provide for overriding the upper controls. Controls must be plainly marked as to their function.
- Climbers may not be worn while performing work from an aerial lift.
- The insulated portion of an aerial lift may not be altered in any manner that might reduce its insulating value.
- Before moving an aerial lift for travel, the boom must be inspected to see that it is properly cradled and outriggers are in stowed position.

Back Safety

Awkward Postures

Potential Hazards

- Bending while lifting forces the back to support the weight of the upper body in addition to the weight you are lifting.
- Bending moves the load away from the body and allows leverage to significantly increase the effective load on the back.
- Reaching moves the weight of the load away from the body, increases the effective load on the back, and places considerable strain on the shoulders.
- Carrying loads on one shoulder, under an arm, or in one hand, creates uneven pressure on the spine.
- Poor housekeeping limits proper access to objects being lifted and forces awkward postures.

Possible Solutions

- Store materials that need to be manually lifted and transported in the employees' "power zone."
- Minimize bending and reaching by placing heavy objects on shelves, tables, or racks.
- Help employees avoid twisting. Have them turn by moving their feet rather than twisting their torso.
- Remind employees to keep the vertical distance of lifts between mid-thigh and shoulder height.
- Remind employees to keep the load close to the body.
- Provide ladders, aerial lifts, or other mechanical means to elevate or move personnel.
- Break down loads into smaller units so employees can carry one in each hand to equalize loads.
- Optimize employee access to heavy items through good housekeeping and preplanning.

Back Safety

Force – Lifting

How much weight a worker can safely lift depends on a number of factors:

- body posture
- lifting factors
- object weight
- how close or far the object is from the body
- how bulky the object is
- how high or low the object is
- how much twisting or bending is required
- how frequent the lifts are
- how far the load must be carried
- how the load is gripped or held

General controls to reduce lifting hazards:

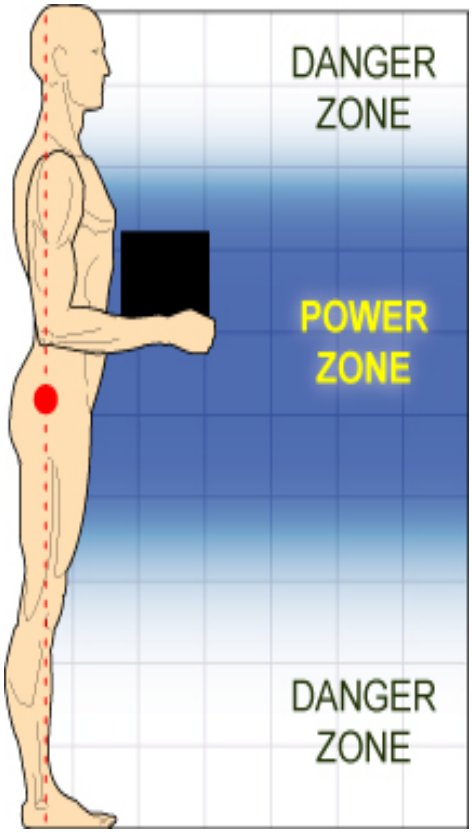
- Use lift assists (such as hand dollies, carts, lift tables, and forklifts).
- Reduce the size of product boxes to lighten the load.
- Arrange the work space so employees can move closer to the load and perform lifts with arms close to the body.
- Use adjustable palletizers that allow loading at waist height.
- Use pallets that can rotate.
- Use tubs with adjustable bottoms to reduce the need to bend over to remove product.
- Put objects to be lifted on a surface above floor level.
- Arrange workstations so lifting is done in front and without twisting.
- Use chutes and slides to move loads across conveyors or in a new direction.
- Put handles or grips on boxes.
- Use gloves that aid in holding slippery objects.

Back Safety

General Information

Assess the tasks and activities to be performed. Remember the benefits of good body mechanics.

- Use good lifting principles, especially when reaching, twisting, and lifting from heights and awkward angles.
- Use the “power zone” (the area between your upper chest and lower thighs) to move loads safely.
- Always ask yourself:
  - What tools can I use?
  - What should I **not** do?
- Stretch and exercise your back regularly.



Back Safety

Good Body Mechanics

- Maintain proper posture.
- Change positions frequently (walk or stretch).
- Minimize the amount of bending and twisting you do.
- Avoid reaching out over an obstruction to lift, hold, pull, or lower an object.
- Store frequently used or heavier items at waist height.
- Push loads – don't pull them.

Make a plan for lifting, carrying, and reaching:

- Test the weight.
- Face the object in a stable stance.
- Don't hold your breath.
- Use your legs, not your back.
- Do not bend and twist at the same time.
- Check your pathway to be sure there are no tripping hazards.

Back Safety

Horizontal Reaches and the Shoulders

Potential Hazards of Horizontal Reaches

- Repetitive or prolonged forward reaching that pulls the elbow away from the body forces the shoulder to support the weight of the arm and any load in the hand.
- Performing horizontal motions, such as pushing materials down a conveyor line with the arms extended, increases the risk of muscle and tendon strain and overexertion.

Possible Solutions

- Redesign work stations so equipment and products can be reached while workers keep the elbows in close to the body.
- Provide conveyors, roller tables, or low-friction surfaces when employees move a load to another area so they don't manually push it across a standard work bench.
- Reduce the width of conveyor belts or use diverters to keep materials close to the employee's body.
- Provide support for the arms or the weight of the object to take the stress off the shoulders.
- Position work areas to keep workers' elbows close to the body. Remove obstructions, such as work tables, bins, or power equipment, so employees can move closer to the task.

Back Safety

Move Safely

- While carrying a load, do not twist or bend.
- When setting the load down, bend at the knees and slide the load down your body.
- Always know how much an item weighs before you lift it.
- Always push a load; do not pull it.

Back Safety

Overhead Reaching and the Shoulders

Potential Hazards of Overhead Reaches

- Working with the elbow above shoulder height for prolonged periods can trap nerves and blood vessels under bone and muscle, leading to numbness and tingling in the hands, and can fatigue the muscles of the shoulder and upper arm.
- Repeatedly lifting or applying force with arms above shoulder level can strain the muscles and tendons of the shoulder and neck, making them more susceptible to tears and fatigue. Bursitis and tendonitis can result from irritation as these tasks are repeatedly performed.

Possible Solutions

- Provide height-adjustable work platforms to elevate employees and reduce the need for elevated or extended reaches.
- Provide stools or ladders to elevate workers so tasks can be performed with the elbows close to the body.
- Provide assist equipment to mechanically lift and hold materials above the head so employees do not maintain awkward postures for extended periods.
- Provide extending tools or handles to prevent employees from working with their arms above shoulder level.

Back Safety

Risk Assessment

Risk assessment can be a big, complex process, but it doesn't have to be. It's really nothing more than a careful examination of your work area to determine what could cause you harm. Use that information to decide whether you have taken enough precautions or you should do more to prevent injury.

Before you lift, think about it:

- How much does it weigh?
- How much can I safely lift?
- Can I get a secure grip?
- Are there loose, falling, or moving objects?
- Are there slip/trip hazards or is my path clear?

It pays to step back and think about material handling jobs. You can prevent injuries in new jobs, and get some fresh insight into the "same old" jobs.

Before you lift, think about it:

- What is the best way?
- Are the objects I am lifting secure?
- Can I raise or lower them properly?
- Do I need help or equipment to lift or carry this?

Risk assessment should be a continual process. Things change. New hazards may be introduced. Improved methods may be discovered or may become available.

PAYCHEX

Back Safety

Safe Lifting Techniques

Use a pushcart or other material-handling device.

Ask a co-worker for help if no device is available.

Don't Pull! **Push!**

If you must lift alone:

- check the entire walkway or path before lifting
- wear good shoes that provide balance and traction, and
- keep loads as close to your body as possible.

General Safety Tips

- Don't lift objects over your head.
- Don't twist your body when lifting or setting an object down.
- Don't reach over an obstacle to lift a load.
- Pace yourself to avoid fatigue.

PAYCHEX®

Back Safety

Situations to Avoid

Lifting or lowering from a high place

If you must do this:

- Stand on a platform instead of a ladder.
- Lift the load in smaller pieces, if possible.
- Slide the load as close to yourself as possible.
- Grip firmly and slide the load down.
- Get help when you need it.

Lifting from hard-to-get-at places

If you must do this:

- Get as close to the load as possible.
- Keep your back straight and stomach muscles tight.
- Bend your knees.
- Lift with your legs, not your back.

Lifting drums, barrels, and cylinders

If you must do this:

- Use mechanical assists.
- Always be aware that loads can shift.
- Get help if the load is too heavy.

Lifting awkward objects

If you must do this:

- Bend your knees with your feet spread apart.
- Grip the top outside and bottom inside corners.
- Use your legs to lift, keeping your back straight.

Shoveling

If you must do this:

- Make sure your grip and balance are solid.
- Tighten your abdomen as you lift.
- Keep the shovel close to your body.
- Use your thighs and legs to bring you upright.
- Keep your lower hand close to the blade to increase leverage.

PAYCHEX

Back Safety

Tips to Remember

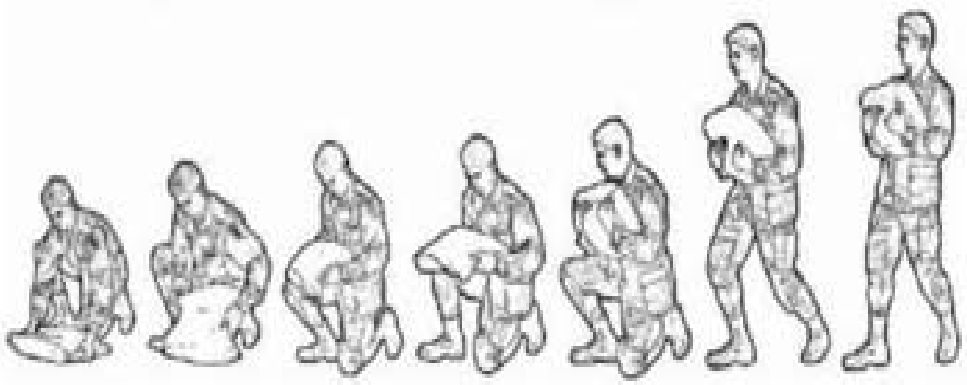
- Always wear shoes or boots with slip-resistant soles that fit comfortably.
- Make sure your path is clear.
- Know where to put the load down.
- Never hurry when carrying a load.
- Organize your work area to reduce unnecessary lifting or moving.
- Check the condition of mechanical lifting aids before use.
- Use proper handholds to make lifting easier and reduce the risk of injury.

Back Safety

Tripod Lift

Tripod Lift[1]

(an alternative for lifting bagged material)



- Less arm strength required
- Not for those with bad knees

- Slide bag to mid-thigh
- Lift onto opposite thigh
- "Hug" bag to stomach and chest
- Lift by extending your legs

Ergonomics

Lifting and Lowering

When unloading, use the same principles as when you lift:

- Keep your back relatively straight.
- Bend your knees.
- Rest the object down before you release your hands.

When carrying, don't twist or turn your back.

- Take a step to turn, or pivot with your feet.
- Set up the lift so twisting is minimized by setting the load farther away from where it is lifted.

Ergonomics

Manual Lifting & Materials Handling

- Manual lifting and materials handling occur in all workplaces.

- Injuries related to manual lifting and materials handling account for at least 25% of all workers' compensation cases.

- Cumulative trauma is probably the main cause of most back injuries.

Ergonomics

Solutions to Lifting Heavy Loads

General controls to reduce lifting hazards:

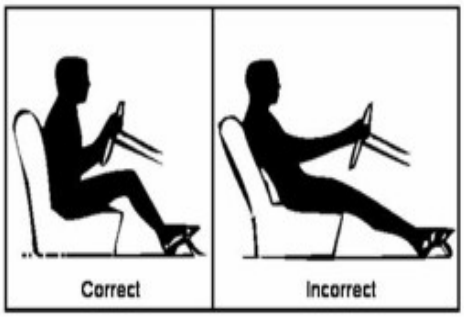
- Use lift assists, such as hand trucks, carts, and forklifts.
- Reduce the size of product boxes to lighten loads.
- Arrange work space so employees can move closer to loads and perform lifts with arms close to the body.

- Use pallets that can rotate.
- Put objects to be lifted at waist level.
- Arrange workstations so lifting is done in front, without twisting.
- Put handles or grips on boxes.
- Use gloves that aid in holding slippery objects.

Ergonomics

Driving (Tips for a Healthy Back)

- **Use proper seat support.**
- **Sit close to the wheel.**
- **Keep your knees bent and higher than your hips.**



- **When driving for long periods, stop occasionally and walk.**

Ergonomics

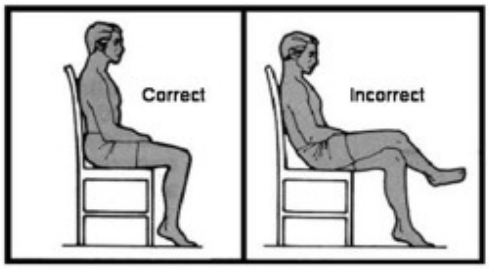
Shoveling (Tips for a Healthy Back)

- **Use a wide base of support.**
- **Keep your knees bent.**
- **Keep your back straight.**
- **Choke down on the shovel.**
- **Lift with your legs.**
- **Pivot instead of twisting.**

Ergonomics

Sitting (Tips for a Healthy Back)

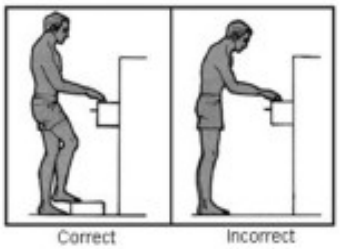
- **Sit all the way back.**
- **Keep the back, head, and shoulders erect.**
- **Don’t slouch!**

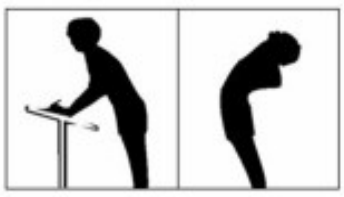


Ergonomics

Standing and Stooping (Tips for a Healthy Back)

- Avoid standing for long periods of time.
- Prop up a foot occasionally.
- Lean on something occasionally.
- Avoid bending forward.
- Bend backwards and stretch regularly.

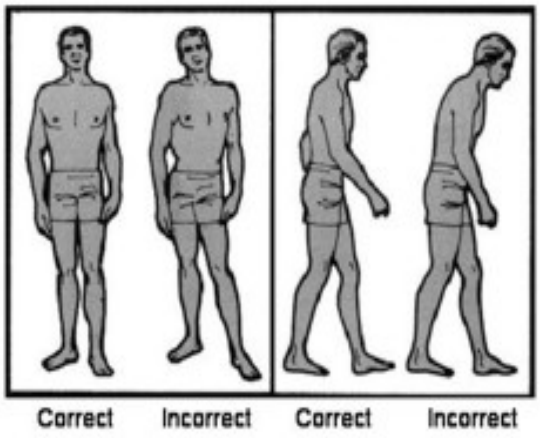




Ergonomics

Standing and Walking (Tips for a Healthy Back)

- **Keep toes straight ahead.**
- **Keep your weight on your heels.**
- **Hold your chest forward.**
- **Stand tall.**



Back Safety On The Job

Back safety and protecting your back benefits your health both at work as well as in your personal life. Back injuries represent 20% of all workplace injuries and are the 2nd most common reason for absence from work next to the common cold. Back injuries can be painful and debilitating, but you can take steps to avoid injury and preserve the long-term health of your back.

THE RISKS

- ***Heavy lifting -*** especially repetitive lifting over a long period of time
- ***Twisting at the waist -*** while lifting or holding a heavy load. (This is a common movement when shoveling)
- ***Reaching and lifting -*** over your head, across a table, or out the back of a truck.
- ***Lifting or carrying objects with awkward or hard to grasp shapes***
- ***Working in awkward, uncomfortable positions -*** kneeling, tasks that require you to bend over for long periods of time, as well as sitting or standing for too long without shifting.

When confronted with these situations, protect yourself by using proper lifting technique, asking for assistance, turning with your feet instead of twisting at the waist, or taking short breaks to stretch and flex your muscles.

PROPER LIFTING TECHNIQUE

The key to reducing **stress on back muscles** and **compressive forces** on the spine is in keeping your back as STRAIGHT as possible when lifting and maintaining the load as close to the body as possible. To accomplish this remember to:

1) Evaluate the load – is it too heavy/can you get a stable grasp?
2) Approach the load squarely w/feet shoulder width apart.
3) Bend at one or both knees, keeping your back as STRAIGHT as possible and firmly grasp the load, keeping it close to your body.
4) Lift the load slowly using your legs/thighs to lift and stand.

Lowering the load should be done with this same technique in reverse.

PREVENTATIVE MEASURES

Place objects up off the floor. Lowering objects from a table or other elevated surface eliminates the need to bend or lift them again; Raise or lower shelves and place heavier objects between shoulder and waist level where there is less risk in lifting; Use cars, dollies or lifting devices and remember that pushing always places less stress on your back than pulling.

BACK BELTS

While back belts can provide support in one-time heavy lifts, there is no scientific evidence that they prevent back injuries, and studies have shown that their improper use can weaken back and other muscles, give a false sense of security, and under some circumstance even increase stress on the back while lifting.

Biomedical Waste

What is Biomedical Waste?

Biomedical waste is any solid waste or liquid that may present a threat of infection to humans.

Liquid wastes:

- human and animal blood or body fluids
- blood products

Solid wastes:

- non-liquid human tissue, blood, blood products, body fluids, and body parts
- solid human, laboratory, and veterinary waste that may contain human disease-causing agents
- discarded sharps (needles, lancets, surgical blades, broken glass or plastic, etc.)
- used, absorbent materials such as bandages, gauze, or sponges, which are saturated (having the potential to drip or splash) with blood or body fluid
- devices that retain visible blood or have body fluids adhering to inner surfaces after use and rinsing, such as:
  - intravenous tubing, hemodialysis filters, blood bags, and catheters
  - urine cups
  - microscope slides

Biomedical Waste

Labeling of Waste

Sharps containers and red bags (inner and outer containers) must be clearly and legibly labeled with the universal biohazard symbol and the words **Biomedical Waste** or **Biohazard**.

Bags of biomedical waste must be labeled at the workplace prior to off-site transport for storage or disposal.

The label must be securely attached or permanently printed on the container.

Indelible ink must be used to print the label, and the label must contain the following information:

- office name and address
- date the waste was generated or packaged, and
- the universal biohazard symbol.

Biomedical Waste

Mixing Wastes

If you mix **biomedical** or **biohazard waste** with any other **ordinary waste**, all of it must be managed as **biomedical waste**.

If you mix **biomedical** or **biohazard waste** with any **hazardous waste**, all of it must be managed as **hazardous waste**.

If you mix **biomedical** or **biohazard waste** with any **radioactive waste**, all of it must be managed as **radioactive waste**.

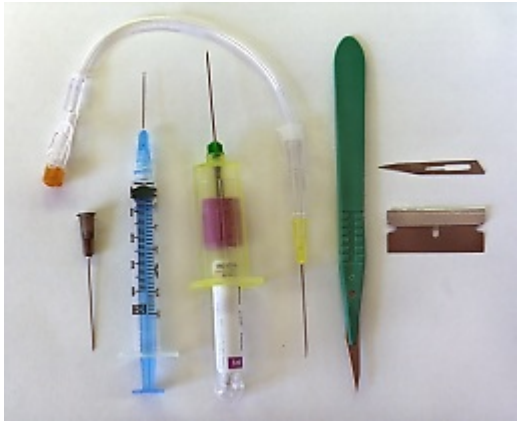
Biomedical Waste

On-site Waste Treatment

- Liquid or semi-liquid waste can be flushed to a sewer system, provided:
  - any water spray does not create an aerosol formation, and
  - protective equipment is worn during disposal.

Options for On-site Disposal:

- System sterilization
- Incineration in an EPA-approved system



Persons transferring or moving biomedical waste must wear impermeable gloves, a lab coat, and safety goggles.

Documentation proving on-site treatment with proper disposal, the types of disposal performed, and the amounts of material disposed of must be maintained for three years and made available to DOH upon request.

Biomedical Waste

Sharps and Non-sharps

"Sharps" are any devices that can puncture, lacerate, or penetrate the skin, including:

- needles
- broken hard plastic
- intact or broken glass containing blood, blood products, or body fluids, and
- needles and lancets (including surgical blades and Pap smear equipment).

For disposal, sharps must be placed directly into the labeled sharps container in the room or area where the sharp was used or created.

- Containers must be leak- and puncture-resistant, rigid, labeled, and designed primarily for sharps.
- Containers must be treated with care to ensure their integrity is maintained, leakage will not occur, and sharps cannot be removed.
- Sharps containers must be disposed of when full.
  - **Sharps containers may not be overfilled.**
  - Many states require sharps containers to be emptied and the contents disposed of every 30 days.

"Non-sharps" biomedical waste includes, but is not limited to:

- devices that retain visible blood or have body fluids adhering to inner surfaces after use and rinsing, such as:
  - urine cups
  - microscope slides
  - intravenous tubing
  - hemodialysis filters
  - blood bags
  - catheters
- used, absorbent materials such as bandages, gauze, or sponges that are saturated (having the potential to drip or splash) with blood or body fluid, and
- non-liquid human tissue, human blood, human blood products, and body fluids.

Non-sharps biomedical waste must be placed directly into red bags in the room or area where it is generated. Filled bags must be sealed, labeled, and enclosed in a rigid-type container meeting OSHA specifications.

- Biomedical waste may not be removed from red bags.
- Red bags must be handled with care to ensure their integrity is maintained.
- Leakage or discharge is not allowed.
- Red bags may not be reused.
- Improperly containerized sharps may not be placed in red bags.

Biomedical Waste

Spills and Contingencies

Any surface that has come in contact with spilled or leaked biomedical waste must be cleaned with industrial strength detergent before being disinfected.

How to Disinfect:

- Rinse with hot water for at least 30 seconds.
- Rinse with bleach or iodine solution (or other EPA-approved product) for at least 3 minutes.

Waste from the disinfection process may be flushed to the sewage system.

IF AN ACCIDENTAL SPILL OCCURS, IT MUST BE CLEANED IMMEDIATELY AND THE AREA MUST BE DISINFECTED.

Biomedical Waste

Waste Storage and Containment

Biomedical waste must be identified, segregated from other solid waste, and placed in a proper disposal container at the point where it was generated.

Full red bags and sharps containers must be stored away from general traffic areas and in areas accessible only to authorized persons.

Storage areas must be:

- constructed of smooth, easily cleanable materials
- impervious to liquids
- regularly maintained in a sanitary condition, and
- vermin/insect free.

If outside, the storage area must be:

- clearly marked with the universal biohazard symbol of appropriate size, and
- made secure from vandalism.

Reusable containers must be disinfected after each use.

Waste for off-site transport must be enclosed in a rigid-type container. Off-site disposal containers may not be reused.

Most states limit on-site storage to 30 days or less.

The 30-day period begins when the first biohazard item is placed in the container.

Bloodborne Pathogens

Communication of Hazards to Employees

Labels

- Labels must:
  - include the universal biohazard symbol: 
  - be predominantly fluorescent orange or orange-red with lettering and symbols in a contrasting color
  - be affixed on the container by adhesive, string, wire, or other method, and
  - not be inadvertently lost or fall off unintentionally.
- Red bags or red containers may be substituted for labels.
- Labels for contaminated equipment must follow these requirements and must also state what portions of the equipment are contaminated.
- Decontaminated materials need not be labeled.
- Warning labels must be affixed to containers and any storage devices used for blood or other potentially infectious material (OPIM).
  - Individual containers inside a labeled container for storage, transport, shipment, or disposal do not need labels.
  - Blood released for clinical medical use does not need biohazard labeling.

Bloodborne Pathogens

Communication of Hazards to Employees

Information and Training

- The training program must explain:
  - the regulatory standard's contents
  - the signs and symptoms of bloodborne diseases
  - how pathogens are transmitted
  - the company's exposure control plan
  - how the employee can obtain a copy of the written plan
  - the appropriate methods for recognizing tasks and other activities that may involve exposures
  - the use and limitations of control methods to prevent or reduce exposure (including protective equipment, devices, and work practices)
  - the selection, types, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment
  - the hepatitis B vaccine series, including its effectiveness, safety, benefits of vaccination, and that it is free to the employee
  - the actions to take and persons to contact in an emergency
  - the procedure to follow if an exposure incident occurs, including how to report the incident and obtain medical follow-up that the company provides, and
  - the signs, labels, and/or color-coding required for containers.
- Training must be appropriate in content and vocabulary to educational level, literacy, and language of employees, and include a copy of (or access to) the regulatory text of the standard.
- The person conducting the training must be knowledgeable in the standard, as it relates to the company, and provide opportunities for questions and answers during the training.
- Employees in HIV and HBV laboratories and production facilities must complete additional initial training resulting in demonstrated knowledge and proficiency in microbiological practices and techniques.
- All employees with occupational exposures must attend training:
  - at the time of initial assignment of exposure tasks
  - at least annually thereafter (within one year of previous training), and
  - when changes or modifications to tasks or procedures affect exposures.

Bloodborne Pathogens

Employee Information

- Wear protective equipment when there is a potential of coming in contact with blood or body fluids.

  - Protective equipment includes gloves, goggles or safety glasses, and protective clothing, such as lab coats.

- Dispose of contaminated materials in the proper containers.

- Attend Bloodborne Pathogens awareness training at least once each year.

- If you are involved with an exposure or injury, notify your supervisor. They have specific records they must keep.

- Clean up spills of blood or body fluids promptly so they do not contaminate the area, equipment or other people.

29CFR1910.1030(d)

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Bloodborne Pathogens

HIV/HBV Research & Production

This information applies to research labs or production facilities doing the following with HIV and HBV:

- Culturing
- Production
- Concentrating
- Experimentation
- Manipulation

These requirements apply in addition to the other requirements of the Bloodborne Pathogens standard.

These requirements do not apply to clinical or diagnostic laboratories engaged solely in the analysis of blood, tissues, or organs.

Containment Equipment

- Certified biological safety cabinets (Class I, II, or III) or other appropriate combinations of personal protection or physical containment devices, such as special protective clothing, respirators, centrifuge safety cups, sealed centrifuge rotors, and containment caging for animals, must be used for all activities with potentially infectious materials that pose a threat of exposure to droplets, splashes, spills, or aerosols.
- Biological safety cabinets must be certified when installed, whenever they are moved, and at least annually.

Bloodborne Pathogens

HIV/HBV Research & Production

HIV/HBV Research laboratories and production facilities must comply with special practices.

- Laboratory doors must remain closed when HIV or HBV work is in progress.
- Access to the work area must be limited to authorized persons. Entry and exit procedures must be strictly adhered to.
- Hypodermic needles and syringes may be used only for parenteral injection and aspiration of fluids from laboratory animals and diaphragm bottles. Only needle-locking syringes or syringe-needle units may be used for the injection or aspiration of other potentially infectious materials. Needles may not be bent, sheared, replaced in the sheath or guard, or removed from the syringe following use. The needle and syringe must be promptly placed in a puncture-resistant container and autoclaved or decontaminated before reuse or disposal.
- Vacuum lines must be protected with liquid disinfectant traps and high-efficiency particulate air (HEPA) filters or the equivalent. Filters must be checked routinely and maintained or replaced as necessary.
- Protective clothing must be used in the work area and animal rooms, and not worn outside these areas. It must be decontaminated before laundering.
- Gloves must be worn when handling infected animals and when making hand contact with other potentially infectious materials is unavoidable.
- Materials for off-site decontamination must be placed in durable, leakproof, labeled or color-coded, closed containers prior to removal.
- Wastes must either be incinerated or decontaminated before disposal by autoclaving or a similar method to effectively destroy pathogens.
- All spills must be immediately contained and cleaned up by people properly trained and equipped to work with infectious materials.
- A spill or accident that results in an exposure incident must be immediately reported to management or supervision.
- When OPIM or infected animals are in the work area, a hazard warning sign with the universal biohazard symbol must be posted on all access doors.
- All activities involving OPIM must be conducted in cabinets or other physical-containment devices within the work area, and never on an open bench.
- A bio-safety manual must be written and reviewed or updated at least annually.
- Personnel must:
    - be advised of potential hazards
    - read instructions on practices and procedures, and
    - follow those procedures.

Bloodborne Pathogens

HIV/HBV Research & Production

In all HIV and HBV research laboratories:

- hand and eye washing facilities must be readily available, and
- an autoclave for decontamination must be available.

In all HIV and HBV research laboratories:

- The work areas must be separated from areas that are open to unrestricted traffic flow within the building.
- Two sets of doors for work area entry are required.
- Self-closing access doors to the work area or containment module are required.
- Doors, walls, floors, and ceilings must be water-resistant and sealed to facilitate cleaning and decontamination.
- Hand-washing facilities and an eye wash facility must be readily available. The sink must be foot, elbow, or automatically operated and located near the exit door.
- An autoclave for decontamination must be available.
- A ducted exhaust-air ventilation system that draws air into the work area through the entry area and discharges it to the outside (away from occupied areas and air intakes) without recirculation must be provided.

Training Requirements

- Proficiency in standard microbiological practices and techniques and in the practices and operations specific to the facility must be demonstrated before employees may work with HIV or HBV.
- Employees must have prior experience with human pathogens or tissue cultures or complete employer-provided progressive training (with demonstrated proficiencies at each level) before being allowed to work with HIV or HBV.

Bloodborne Pathogens

Signs for Research and Production Facilities Only

- Signs must be posted at the entrance to work areas and contain the following:
  - name of infectious agent
  - special requirements for entering the area, and
  - name and telephone number of laboratory director or responsible person.

- Signs must be predominantly fluorescent orange-red, with lettering and symbols in a contrasting color.

Bloodborne Pathogens

BLOODBORNE PATHOGENS: INCIDENTAL EXPOSURE

Bloodborne pathogens are microorganisms like viruses or bacteria that are carried in the blood and other bodily fluids such as saliva, amniotic fluid, and others. They can cause illnesses, such as Malaria, Syphilis, Hepatitis B and HIV.

ALL BODY FLUIDS SHOULD BE TREATED AS IF CONTAMINATED

Workplace transmission can be through:

- Open sores
- Cuts
- Blisters
- Burns, even a bad sunburn
- Puncture with a sharp object (needle, razor, broken glass)
- Eye, nose or mouth

PREVENTION

- Never handle blood or anything contaminated without gloves.
- Wear gloves that fit.
- Wash hand frequently and completely (20 seconds at least).
- Do not handle possible contaminated sharp objects by hand; use a brush and dustpan or tongs to remove them from your work area.
- Maintain good housekeeping at all times.
- Dispose of blood or other bodily fluid stained materials immediately.
- Sanitize equipment or other surfaces that may become contaminated.
- If unsure about anything contact your supervisor for directions.

IF YOU ARE EXPOSED:

- Wash exposed skin thoroughly with antibacterial soap. If exposed through eyes, nose or mouth, flush for 15 minutes.
- Report the exposure to your supervisor immediately.
- Seek medical attention as directed by your employer. The doctor will recommend any treatments or counseling that may be needed, depending on the incident.

Compressed Gas

Inspection

Daily check:

- Cylinder leaks, corrosion, and damage
- Labels (contents and pressure test date)
- Pressure relief valves
- Secure connections or caps

Before-use check:

- Emergency shut-down
- Process leaks

Storage

- Do not store in confined spaces.
- Keep empty cylinders separate from full cylinders.
- Be sure containers are chained or secured to an outside wall.
- Keep full oxygen cylinders separate from other flammable gasses.
- Replace value caps when storing. Do not store with regulators attached.

Transportation and Movement:

- Secure cylinders to a cart or rack when moving. Do not roll them along the floor.
- Do not life or carry cylinders by the regulator or valve.
- Valve caps must be in place during placement on a cart or rack.

Compressed Gas

Storage Requirement for Specific Gases

Oxygen

Store 20 feet from combustible/ flammable materials (including oil and grease) OR behind ½ hour-rated firewall at least 5 feet high.

Ammonia

- Corrosive
- Respirators & PPE required

Acetylene

- Highly explosive
- Tight fittings (connections, caps) required
- Leaks can spontaneously ignite

Chlorine/Fluorine

- Corrosive
- Respirators & PPE required
- Potentially explosive if mixed with acetylene
- Forms hydrochloric/hydrofluoric acid when exposed to water

Hydrogen

- Flammable: Store 25 feet from electrical or ignition sources.
- Cylinder must be bonded before discharge.
- Store in a ventilated area (50 feet from building air intake/circulation).
- Store in a building with a non-combustible foundation and one outside wall with 2-hour fire rating.
- Cylinders must be marked and labeled
- Written procedures must be maintained in the operating area.
- Cylinders must be protected from mechanical or physical damage.
- Safety relief valves must discharge upward and away from people.

Compressed Gas Safety

Inspections Should Include A Daily Check

- Cylinder leaks, corrosion, and damage
- Labels (contents and pressure test date)
- Pressure relief valves
- Secure connections or caps

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- Cylinders must be marked, labeled and written procedures must be maintained in the operating area.
- Cylinders must be protected from mechanical or physical damage and safety relief valves must discharge upward and away from people.

Confined Spaces

A confined space has any one of the following characteristics:

- limited openings for entry and exit
- large enough that you can enter and perform assigned work
- not designed for continuous worker occupancy

Know the hazards and protect yourself!

- Oxygen supply inside the space
- Chemical use hazards
- Energy and equipment hazards

Confined Spaces

Confined Space Entry

Have the hazards of the space been identified?

- Have you been informed of what those hazards are?

What protective equipment do you need to use?

- Have you been trained to use the protective equipment?

Do you have an attendant who remains outside of the confined space in case of emergency?

- Is there a reliable means of communication between you (inside the space) and the attendant (outside the space)?

Confined Spaces

Entering a confined space could put your life at risk.

Know the hazards and protect yourself!

PAYCHEX

Confined Spaces

Planning For Confined Space Entry

Identify the hazards in the confined space.

Hazards could include:

- atmospheric hazards (lack of sufficient oxygen or breathing air)
- energy source controls (electrical, thermal, pressure, gravitational)
- tools/equipment (within the space or brought in by entrants)
- chemical hazards (within the space or brought in by entrants)
- rescue or protective equipment that restricts movement, or
- a shaped or configured space where employees could be trapped (tapered end) or engulfed by materials (a grain silo).

Restrict access to confined spaces and post warning signs.

Employees and any other untrained persons must be restricted from accessing a confined space where undue hazards could injure or harm them. Warning signs of the confined space and its hazards must be posted at the entrance to the space.

Establish requirements for all entrants.

Entrants must know and understand the hazards of the space, the equipment they will be using, chemical exposure hazards, restriction of movement, and any other hazards potentially encountered within the confined space. They must know the measures to take to protect themselves from these hazards and understand the operation of the communications equipment used to summon assistance in an emergency. They must **never** enter a confined space without an attendant present.

Monitor hazards and have protective measures in place.

Air-monitoring equipment in good operating condition must be used before and during any confined space entry, and other hazard-monitoring controls must be established.

Establish a written entry plan or permit.

An entry plan that identifies the space; the hazards involved; the monitoring processes; the protective measures to be taken; the signage; the training required for all entrants, attendants, supervisors, and rescue personnel; the communications equipment to be used; the tasks to be performed; the step-by-step procedures to accomplish the job while in the space; and the emergency rescue procedures must be written and communicated to all parties involved in the entry.

Provide training for entrants, attendants, and supervisors.

Training must include hazard identification, protective measures, protective equipment and its proper use and maintenance (including respiratory protection), chemical hazard awareness, steps to complete the task, use of the communications equipment to summon assistance, process to stop work if work is not performed safely or unintended hazards are encountered, and emergency rescue procedures.

Construction

Heavy Equipment Safety – Backing Up

- Use only equipment for which you are properly trained.
- Physically check the area around the equipment for obstacles, debris, or people before starting or moving equipment.
- Angle rear and side view mirrors to minimize blind spots.
- Even with a restricted access zone, people or other equipment can be in the way, so a “spotter” may be needed to assist in backing up equipment.
- Reverse alarms are mandatory on all heavy equipment. Make sure they are in good working order.
- When equipment is parked, the parking brake must be applied (even on a level surface), and the engine must be shut off. Buckets, shovels, and other equipment, tools, or attachments must be lowered to ground level. Use the handrails and steps to get off. Resist the temptation to jump off the equipment.

Construction

Heavy Equipment Safety – Co-worker and Pedestrian Safety

- Access to construction sites must be restricted to minimize the potential for pedestrian accidents. Barricades must be used where needed.
- Noise may impact a pedestrian's ability to hear a back-up alarm, so keep an eye out for pedestrians and other equipment.
- Check the equipment (brakes, steering, controls, etc.) before use, to ensure equipment is in good operating condition.
- Cranes and hoists should always have a "spotter" on the ground to watch for safety hazards with the load and for pedestrians. People must be kept away from overhead loads.
- Avoid being in or near the path of a unit when it is backing up. If you fall and the driver cannot see you, or if the load shifts, injuries could result.
- Do not ride on the running boards or drawbars of equipment. Loads could shift and cause injuries.
- Portable scaffolds and manlifts could easily tip over on uneven ground. Do not ride on them, even if you are only moving a few feet. Before moving, be sure there is no one nearby who could be injured if the vehicle tipped over.
- Always wear the proper personal protective equipment while at a construction site.
- Hard hats, safety glasses, sturdy shoes/boots, or gloves may be required.
- Pick up debris and materials left on pedestrian walkways and public sidewalks. Pedestrians can sue the construction company for injuries incurred. These lawsuits impact the profitability of the company (and raise worker's compensation or liability insurance costs), which could impact your ability to get a pay raise.

Construction

Heavy Equipment Safety – Co-worker and Pedestrian Safety

- Restrict access to the site.
- Use barricades where needed.
- Watch for other people and equipment, especially if the noise level is high.
- Check your equipment before you use it.
- Cranes and hoists should have a “safe zone” with someone watching to ensure no one goes into the zone during operation.
- Avoid being in or near the path of a vehicle when it is backing up. If you fall and the driver cannot see you, or if the load shifts, injuries could result.
- Do not ride on the running boards or drawbars of vehicles and equipment.
- Portable scaffolds and manlifts could easily tip over on uneven ground. Do not ride on them, even if moving only a few feet.
- Always wear the proper personal protective equipment while at a construction site. Hard hats, safety glasses, sturdy shoes/boots, or gloves may be required.
- Pick up debris and materials left on walkways and public sidewalks. Pedestrians can sue the construction company for injuries incurred. These lawsuits impact the profitability of the company (and raise worker’s compensation or liability insurance costs), which could impact your ability to get a pay raise.

Construction

Heavy Equipment Safety

- Obey speed limits and traffic signs.
- Report leaks, defective parts, broken handholds and steps, and cracked or broken mirrors.
- Be safe when fueling vehicles and equipment. Don't smoke or fuel-up near welding or other ignition sources.
- No more than two people may ride in the bed of a truck at the construction site.
- Arms and legs must stay inside the truck bed.
- No moving around while the truck is in motion.
- Climb in and out carefully. Do not jump off the truck.

- Always drive up and down hills, rather than across laterally; this could cause the vehicle to roll over.
- Avoid being in or near the path of a vehicle when it is backing up. If you fall and the driver cannot see you, or if the load shifts, injuries could result.

Using Contractors

Contractor Prequalification

Did you provide:

- hazard communication and chemical exposure information?
- information on known or potential hazards and hazard areas?

Did you ask for:

- safety performance data?
- training records for specific standards?
- written programs for specific standards?
- a list of unique hazards (or potential hazards) generated by contractor's work?

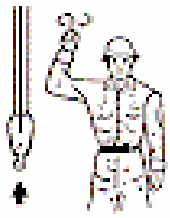
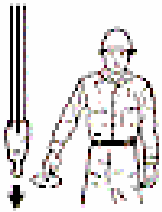
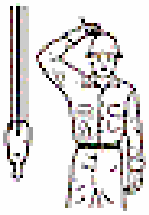
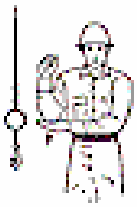
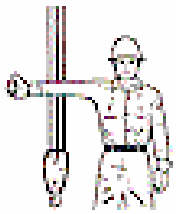
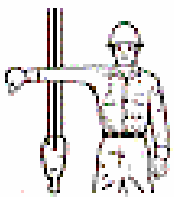
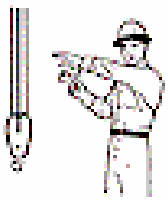
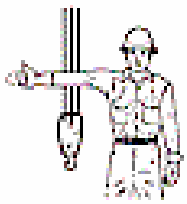
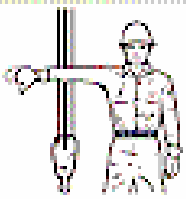
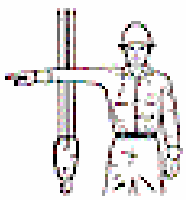
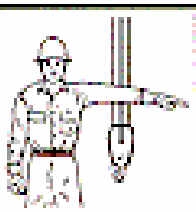
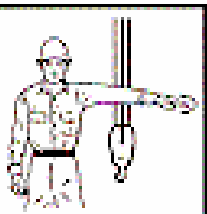
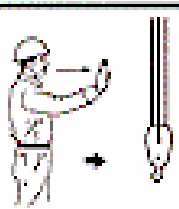
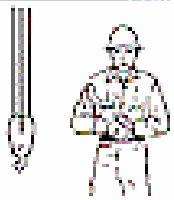
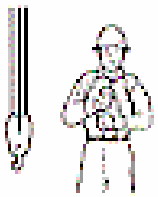
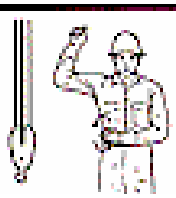
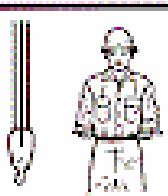
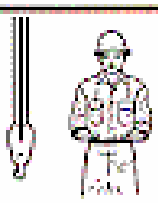
Using Contractors

General

- Be sure contractors are aware of the company's emergency action and fire prevention programs and the actions their employees must take during an emergency situation.
- Inform contractors of the Hazard Communication plan. Make sure they are aware of hazardous chemical exposures (or potential exposures) and the means to protect themselves from those hazards.
- Make sure contractors have the required training and equipment to comply with applicable federal, state, and local safety regulations. Contractors may be required to produce training and equipment maintenance records.
- Perform periodic inspections of contractor work and records to ensure compliance with applicable regulations.
- Designate a company employee to act as the primary liaison between the company and the contractor for safety-related issues.
- Hold regular meetings with contractors or contractor employees to discuss ongoing safety issues.

Overhead Cranes and Hoists

Standard Hand Signals for Crawler, Locomotive, and Truck Cranes

 Hoist	 Lower	 Use Main Hoist	 Use Whip Line	 Raise Boom
 Lower Boom	 Move Slowly	 Raise Boom and Lower Load	 Lower Boom and Raise Load	 Swing
 Stop	 Emergency Stop	 Travel	 Dog Everything	 Travel Both Tracks
 Lock Track Turn Travel Track	 Extend Boom	 Retract Boom	 Extend Boom (one hand)	 Retract Boom (one hand)

Overhead Cranes and Hoists

Operator Information

- You must be specially trained to operate a crane.
- You must perform crane and hoist inspections at the required frequency.
- Operators must:
  - Pay constant attention to hoist/crane while load is suspended
  - Never exceed the rated load
  - Never leave a suspended load unattended
  - Position/center load for balance
  - NOT perform side-pull lifts
  - NOT lift with kinked or damaged chain, cable, or rope
  - NOT lift loads over people, and
  - IMMEDIATELY stop and report any malfunctioning device to supervision.
  - IN THE EVENT OF IMMEDIATE DANGER, lower the load, lock out the crane power source, and immediately contact the site emergency number. If unable to safely lower the load, control the immediate area while others contact emergency responders.

- For cab-operated cranes, access to the cab must remain clear at all times and an inspected fire extinguisher must be in the cab.
- If assisted lifts are used, follow the hand signals given.
- Never allow persons to ride the hook or the load.
- You are responsible for the safety of the load, regardless of who attached it.

Crisis and Disaster Planning

Types of Crises

Power outages: stoppage or shut down of electrical services due to an incident or fire, or direct outages from the utility service provider

Utility shutdowns: gas or other utility service interruptions, either in the plant delivery system or direct outages from the utility service provider

Hazardous material spills: releases of hazardous materials to the ground, air, or water inside the facility or in the community that may impact facility operations

Chemical leaks: seepage or spillage of chemicals from company process lines or tanks that may endanger the health and safety of employees

Terror threats: bomb threats or threats of violence against the company or its employees

Minor fire: in-plant or community fires that may affect all or part of the company's ability to operate for a short duration

Minor explosions: small, contained explosions that cause injury to few employees or property damage to a contained area of the building

Environmental, health, or safety events that may impact the company's ability to operate: a situation imminently dangerous to life and health that causes a regulatory agency to shut down or lock out operations until the situation is appropriately addressed. The most common reasons for this type of regulatory agency action are air quality, hazardous chemical exposures, or serious safety regulatory violations that could jeopardize the life of employees.

Weather storms and phenomenon: ice storm, tornado, flood, or hurricane warnings; blizzards; or torrential rains that impact the public safety and prevent employees from reporting to work safely

Crisis and Disaster Planning

Types of Disasters

Major fire: a fire that affects a large portion of the facility's structure or the company's ability to operate normally

Major explosion: an explosion that affects a large portion of the facility's structure or the company's ability to operate normally

Acts of terrorism: bombs, explosions, fires, disease outbreaks, shootings, or other acts imposed on the company or its employees that affect the facility structure, the company's ability to operate normally, or a large portion of the employee population health and safety (both physically or emotionally)

Serious environmental, health, or safety events that may impact the company's ability to operate for a long period of time: chemical spills or leaks that will take long periods of time to remediate and where it would be unsafe for employees to work, disease outbreaks that affect a large portion of the populace, or public safety issues that prevent employees from reporting to work or the company from operating normally

Tornado: This weather phenomenon appears as funnel-shaped cloud of violently whirling air. Tornadoes that touch down on the ground can travel distances of several miles and "jump" or reappear along the storm-front path in several places, usually destroying everything in their paths while on the ground.

Hurricane: Common in coastal areas, this weather phenomenon is characterized by wind speeds higher than 72 mph. Hurricanes are often accompanied by torrential rains and can cause significant property damage or loss of life.

Earthquake: More common on the West Coast, earthquakes occur where shifting of tectonic plates or volcanic activity takes place. The ground will tremble and shake, sometimes violently, and can disrupt utilities, power systems, or cause structural damage.

Flood: Floods are common in areas where water systems (lakes, rivers, etc.) are close to occupied areas, where significant tidal shifts can occur, or where torrential rains can cause water retention systems to loose their cohesiveness. Water overflows or is directed to a normally drier area that is inundated and overwhelmed by the deluge.

Demolition
(Non-explosives)

Chutes

- No material may be dropped outside the exterior walls of a structure unless the area is effectively protected.
- All chute sections at a greater than 45 degree angle must be fully enclosed.
  - Openings may not exceed 48 inches in height.
  - Openings must be kept closed when not in use.
  - Discharge chute ends must have a substantial gate controlled by a competent employee.
  - Gates and discharge ends must be secured when operations are not in progress.
- Any chute opening must be protected by a 42-inch guardrail system.
  - There may be no uncovered space between the chute and chute hole openings.
  - Where the material is dumped from mechanical equipment or wheelbarrows, a 4-inch toeboard must be securely attached at each chute opening.
- Chutes must be strong enough to withstand the weight and types of materials sent through them.

Demolition
(Non-explosives)

Demolition by Deliberate Collapse

Deliberate collapse requires extensive planning and experienced personnel.

- There must be a clear space of at least 45 degrees on each side of the intended fall line and 1½ times the total height of the chimney for the fall of the structure.
- There may be no sewers or underground services on the line of the fall.
- Onsite lookouts must be posted and warning signals must be arranged.
- The public and other workers at the jobsite must be kept well back from the fall area.

Demolition
(Non-explosives)

Employee Entrances

Employee entrances to multistory structures being demolished must be completely protected by sidewalk sheds, canopies, or both, providing protection from the face of the building for a minimum of 8 feet.

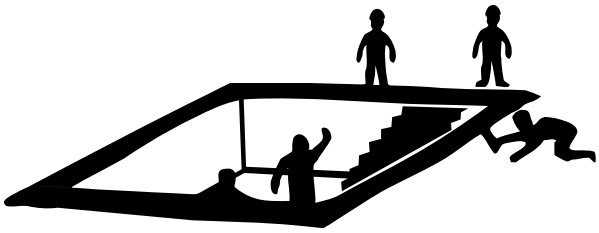
All such canopies must be at least 2 feet wider than the building entrance or opening (1 foot on each side), and must be capable of sustaining a load of 150 pounds per square foot.

Demolition
(Non-explosives)

Floor and Wall Openings

- Where a hazard of employees falling through wall openings exists, the opening must be protected to a height of approximately 42 inches.
- When debris is dropped through holes in the floor without the use of chutes, the area onto which the material is dropped must be completely enclosed with barricades not less than 42 inches high and not less than 6 feet back from the projected edge of the opening above.

- Signs warning of the hazard of falling materials must be posted at each level. The signs must not be removed from lower areas until debris handling above ceases.
- All floor openings not used as material drops must be covered with material substantial enough to support the weight of any load which may be imposed. Such material must be properly secured to prevent accidental movement.
- The demolition of exterior walls and floor construction must begin at the top of the structure and proceed downward, except when cutting holes in floors for chutes, cutting holes through which to drop materials, preparing storage space, and completing similar necessary preparatory work.
- Each story of exterior wall and floor construction must be removed and dropped into the storage space before removing exterior walls and floors in the next story below.



Demolition
(Non-explosives)

Manual Floor Removal

- Floor openings must extend the full span of the arch between supports.
- Before demolishing any floor arch, the surrounding 20-foot area must be clear of material and debris.
- 2 x 10 cross-sectioned planks must be provided as standing surfaces between beams. Planks may not be more than 16 inches apart.
- Safe walkways (at least 18 inches wide) must be used to reach any point. Employees may not walk on exposed beams.
- Stringers, supported by floor beams or girders, must support flooring planks.
- Planks must be laid together over solid bearings with the ends overlapping at least 1 foot.
- Employee access to an area must be prevented when floor arches are being removed.
- Floors and surfaces must be strong enough to support the loads imposed by any mechanical equipment used.
- Floor openings must have curbs or stop-logs to prevent equipment from running over the edge.

Demolition
(Non-explosives)

Mechanical Demolition

- Workers are not allowed in balling or clamming demolition areas.
- The weight of the demolition ball may not exceed 50% of the crane's rated load and may not exceed 25% of the nominal breaking strength of the line by which it is suspended.
- The crane boom and loadline must be as short as possible.
- The ball must be attached with a swivel-type connection to prevent twisting of the loadline and to prevent accidental disconnection.

- When pulling walls over, all steel members must be cut free.
- All roof cornices or ornamental stonework must be removed before walls are pulled over.
- During demolition, an engineer or a similarly qualified person must make ongoing inspections. Employees must be restricted from problem areas until hazards are corrected.

Demolition
(Non-explosives)

Preparation

Before the start of every demolition job, the company must take steps to safeguard the health and safety of workers at the jobsite. This preparation involves the overall planning of the demolition job, including:

- the methods to be used to bring the structure down
- the equipment necessary to do the job, and
- the measures to be taken to perform the work safely.

All planning work must be performed by an engineer or a similarly qualified person experienced in all phases of the demolition work to be performed.

Planning a demolition includes:

- creating an engineering survey
- evaluating medical services and first aid capabilities
- determining safety equipment needs
- determining if hazardous or flammable chemicals or materials have been used in piping, tanks, or equipment
- removing glass that will shatter or fragment
- protecting employee entrances, and
- establishing a fire protection program.

Demolition
(Non-explosives)

Removal of Walls, Masonry Sections, and Chimneys

- Masonry walls and sections that may exceed the floor weight-load capacity must be prevented from falling.
- No wall section taller than one story in height may stand alone at any time without lateral bracing, unless it is designed and constructed to be self-supporting.
- Structural or load-supporting members of any floor may not be removed until all stories above have been demolished and removed.
- No floor openings may be within 10 feet of any wall being demolished.
- Steel framing may remain in place during masonry demolition, provided all structural supports are cleared of loose debris as demolition progresses downward.
- Scaffold wall walkways or ladders must be provided for access and exit.
- Retaining walls may not be demolished until the earth or structure has been properly braced or underpinned.
- Retaining walls must be strong enough to withstand the loads imposed (including additional weight from debris).

- Employees must not be permitted to work on top of a wall when weather conditions create a hazard.

Demolition
(Non-explosives)

Storage (Materials and Debris)

- Floor loading weight limitations may not be exceeded.
- Falling materials may not endanger the stability of the structure.
- Flooring may not be removed to accommodate debris storage.
- Wood floor beams used to brace walls must remain in place until equivalent support is installed.
- Floor arches (25 feet or less) may be removed for debris storage, provided the structural stability remains intact.
- Debris storage areas must be enclosed and storage openings kept closed.

Electrical Safety

Electrical Appliances

Consumer Appliances

Consumer appliances include office equipment, such as laminators, electric staplers, printers, and scanners; food preparation devices, such as microwave ovens and coffee pots; and personal comfort devices, such as fans, space heaters, or air conditioning units.

- Appliances must be “listed” and labeled by a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratory (UL) or Factory Mutual (FM).
- Appliances may be used ONLY for their specific intended use. For example, coffee makers designed for "household use" may not be repeatedly used on multiple shifts. Commercial-grade coffee makers must be purchased for this purpose.
- Portable space heaters must be approved for use to ensure that the electrical circuit can safely carry the additional electrical load that will be placed on the system and so any additional HVAC needs can be addressed.
- Appliances must be regularly checked and inspected.
- Appliances must be kept clean and in good repair.
- Appliances must be turned off at the end of the work-shift or when not in use, unless required to be left on.
- Combustibles must be stored more than 1 foot away from any heat-producing appliance.
- Appliances that generate heat or fumes must have adequate ventilation.
- Cords and plugs must be used properly with direct connections to receptacles. Extension cords and multi-plug adapters are not allowed. Some appliances may require a separate electrical circuit.
- Appliances used for food or drink storage or preparation must be used only in designated areas, kept free from contamination, and cleaned regularly.

Electrical Safety

Electrically Classified Areas
Intrinsically Safe Devices

Classes of Hazardous Locations

Class I

Locations where flammable gases or vapors are or may be present in quantities sufficient to produce vapor or gas/air mixtures above the Lower Explosive Limit (LEL).

Division 1 - Locations where:

- hazardous concentrations of flammable gases or vapors exist at any time during normal operating conditions (for example, coating hoppers, chemical reactor openings, solvent cleaning stations, etc.)
- hazardous concentrations of flammable gases or vapors may exist frequently because of maintenance operations, or because of anticipated discharge through mechanical seals
- failure or faulty operation of equipment or processes may release hazardous concentrations of flammable gases or vapors or cause simultaneous failure of electrical equipment

Division 2 - Locations where:

- flammable liquids or gases are handled, processed, or used, but are normally confined within containers or closed systems (These materials are only released in sufficient quantities as a result of abnormal operations, such as the accidental rupture of containers or the breakdown of a closed system.)
- hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation, but could become hazardous through failure or abnormal operation of the ventilating equipment
- hazardous concentrations of gases or vapors may permeate from an adjacent Class I-Division I location

Division 3 - Areas that border Class I-Division 2 locations

Electrical Safety

Electrically Classified Areas
Intrinsically Safe Devices

Classes of Hazardous Locations

Class II

Locations where certain dusts may be in suspension, or could be put into suspension, in quantities that could produce explosive or flammable mixtures or cause failure of electrical equipment.

Division - Locations where:

- hazardous concentrations of combustible dusts are or may be put into suspension in the air at any time during normal operating conditions
- hazardous concentrations of dust may be caused by mechanical failure or abnormal operation of machinery or equipment that might also provide a simultaneous source of ignition
- combustible electrically-conductive dusts may be present

Division 2 - Locations where:

- hazardous concentrations of combustible dusts are not likely to be in suspension in the air when equipment is operating normally
- accumulated deposits of combustible dusts on electrical equipment could cause overheating
- deposits of combustible dust are adjacent to, or within, electrical equipment that may be ignited by such equipment

Electrical Safety

Electrically Classified Areas
Intrinsically Safe Devices

General Information

There are restrictions on the types of electrical equipment that can be brought into electrically classified areas (areas where flammable materials or combustible dusts are used, stored, or where they can accumulate).

Standard equipment, such as tools or appliances, and communications equipment, such as telephones or pagers, must be specifically approved and designed for use in these areas. This type of equipment can generate enough energy or enough of a spark to ignite vapors or dusts, causing a fire or explosion.

Where intrinsically safe electronic devices are required, the company must evaluate and categorize all devices and restrict their use. Few electrically operated/powered portable devices are specifically designed to operate in hazardous locations. Some devices designed specifically for one type of vapor or dust hazard may still pose an ignition potential with many other types of flammable vapors or combustible dusts.

There are four basic classifications of areas with flammable vapors or combustible dusts: A, B, C, and D (with A being the worst hazard). Be sure any equipment used in these areas are rated for the appropriate hazard level.

Electrical Safety

General Requirements

Equipment must be free from recognized hazards.

- Safety equipment, such as distance caging or shielding, must be provided and used for high-voltage machinery.
- The equipment must bear the appropriate approval mark (UL or FM).
- Disconnects and emergency stops must be easily identifiable.
- Do not store materials in front of electrical shutoffs or panel boxes.
- Panel box covers must remain closed.
- Adequate lighting must be provided for work on electrical panels and circuitry.
- If equipment exceeds 50 volts, you must be trained in the hazards and protective measures required.

Electrical Safety

Selection and Use of Safety-Related Work Practices

Live parts must be de-energized before work is done, and employees must be protected from direct or indirect contact with energized parts.

- Work may only commence on live parts if the energy is critical to the process or other operation.
- Other hazards that may be caused by the de-energization process must be considered (such as fire alarm systems, ventilation systems, or emergency lighting).

Conductors and parts of electric equipment that have been de-energized but have **not** been locked out or tagged must be treated as if they are energized parts.

Electrical Safety

Use of Electrical Equipment

Intrinsically Safe (non-sparking) Equipment

Where flammable materials are used or stored, electric equipment must be restricted, unless specific measures are taken to prevent fires and other hazardous conditions from developing.

Flammable materials include, but are not limited to: flammable gases, vapors, or liquids; combustible dusts; and ignitable fibers or flyings.

Installation of electrical equipment in these areas must comply with specific restrictions to prevent sparks from igniting the flammable materials.

Electrical Safety

Use of Electrical Equipment

Power and Light Circuits

Routine Opening and Closing of Circuits

Switches, circuit breakers, or other specifically designed devices must be used to turn on and off electrical circuits. Fuses, terminal lugs, and cable splice connections may not be used for this purpose, except in an emergency.

Re-closing Circuits after Protective Device Operation

If a circuit breaker flips or a fuse blows out, the power may not be reenergized until the cause has been found. If the situation recurs, unplug the appliances before reenergizing the circuit. The appliance may be causing the overload.

Over-current Protection Modification

Over-current protection (such as surge protection and other similar devices) may not be changed or modified in any way, even on a temporary basis, beyond the installation safety requirements.

Electrical Safety

Use of Electrical Equipment

Testing Instruments and Equipment

Visual Inspection

Test instruments, equipment, and their components (test leads, cables, power cords, probes, and connectors) must be visually inspected for defects and damage before the equipment may be used. Defective equipment must be removed from service until repaired or replaced.

Only **qualified** people who have been trained to understand the magnitude of the hazard and the protective requirements may test electric circuits or equipment.

Rating of Equipment

Test instruments and equipment (and their accessories) must be rated and designed for the loads they may encounter and the area where they are being used.

Electrical Safety

Wiring Design and Protection

- **Grounding wires and conductors** must be identifiable and distinguished from other wires and conductors. Connections must be proper; their polarity may not be reversed. Grounding devices may be used ONLY for grounding.
- **Outlets and receptacles** must be rated for their intended amperage loads.
- **Outdoor installations of 600 volts or less** must have conductors on poles that are 30 inches in circumference (24 inches for 300 volts or less) and a minimum height of 10 feet (12 feet over parking lots and 18 feet over public roadways). Conductors must also be at least 3 feet away from any building structure and at least 8 feet above any roof over which they pass. Lamps must be located at a lower height than any live conductors to which they are attached. Over-current protection (in the form of circuit breakers, grounding, arc protection, or via location) must be provided.
- **Services greater than 600 volts** must have high voltage warning sings posted and be guarded and locked so only a qualified person can access the area. Feeders and branches must have short-circuit protection.
- **Each building** must have a master disconnect switch located (and readily accessible) near the entrance point of the electrical conductors and service.
- **Grounding must be in place for** all 3-wire DC systems, most 2-wire DC systems at greater than 50 volts, most overhead AC systems at greater than 50 volts, 240/120 nominally rated systems, or for any system if conductors are uninsulated. Grounding paths must be permanent and continuous.
- **Cord and plug equipment** (hand-held motor operated tools, portable hand lamps, portable X-ray units, refrigerators and similar appliances, or any equipment that operates at greater than 150 volts) must be grounded. Lower voltage equipment must be grounded when used in wet and conductive locations.
- **Some non-electrical equipment or components** of electrical equipment also require grounding, including metal frames and tracks of overhead cranes/hoists, elevator ropes, and high-voltage enclosures.
- **All AC systems for fixed equipment** may use the raceway cable or cord conductor for grounding. DC systems may use a separate grounding conductor. High voltage systems must have the neutral grounded through an impedance using ground fault detectors.

Electrical Safety

Wiring Methods, Components, and Equipment for General Use Greater than 600 Volts Nominal

- **Electrical continuity of raceways/enclosures** must be maintained. Wiring inside HVAC ductwork is prohibited.
- **Temporary wiring** may sometimes be allowed to be of a lower class than that required for the permanent wiring system for up to 90 days, provided that feeders originate from an approved power distribution center, branch circuits originate from an approved outlet or panel-board, receptacles are grounded, there are no bare-earth returns in the system, suitable disconnect switches are installed, and flexible cords are protected from damage. Cable trays must use approved types of cable. Open wiring is only allowable if rigid conductor supports or flexible tubes are used. When run through walls, they must be separated from contact with the wall, preferably with a waterproof sleeve. If they are within 7 feet of the floor, they must be protected from damage.
- **Cabinets, boxes, and fittings** must have any openings effectively filled or closed, and conductors must be protected from abrasion. Covers and canopies on pull boxes, junction boxes, and fittings must be grounded. Knife switches must be connected so when open, the blades are dead. Faceplates for snap switches must be nonconductive. Switchboards and panel boards must be located in a dry area, accessible only by qualified persons, and water- and weatherproof.
- **Conductors and flexible cords** must be of an approved type. Flex cords may not be used as a substitute for fixed wiring, run through walls, ceilings, floors, windows or other openings, and may not be attached to building surfaces or concealed behind building walls, floors, or ceilings. If used in showcases, they must be approved for that use. Flexible cable must be specifically marked when used as grounding cable. Flexible cords may not be spliced or taped, and they must have sufficient slack to prevent strain on joints or terminal screws.
- **Fixture wires** must be capable to handle the intended load at the location and temperature of use. When used for grounding, they must be marked. They may not be used as branch circuit conductors.

Electrical Safety

Wiring Methods, Components, and Equipment for General Use Greater than 600 Volts Nominal

- **Fixtures and receptacles** cannot have exposed live parts. They must be prevented from accepting higher voltage plugs or cords than allowable and must be weatherproof when needed.
- **Hand-lamps** must have molded handles with substantial guards.
- **Lamp-holders** must be used only for their intended purpose.
- **Appliances** must have a means of disconnect, be marked with their rating in volts and either amperes or watts, and have no exposed live parts.
- **Motors and motor controllers** must have a means of disconnect in sight from the controller that removes all power from ungrounded supplies and designed so no pole can be operated independently. The disconnect must be plainly marked to determine if in the open or closed position and be readily accessible. One disconnect must be provided for each motor, or there may be one master for all motors. Motors and controlling devices must be protected from overheating, short-circuiting, and ground-faulting. Stationary motors greater than 50 volts must have all live parts guarded by location (more than 8 feet above ground) or by protection in a locked room or enclosure. If the motor is greater 150 volts, it must be installed so that no person can contact a live part unless he is standing on an insulated mat or platform.

- **Transformers** must be marked with operating voltage and warning signs. Oil transformers that present a fire hazard must be in a vault that is readily opened from the inside and used solely for the transformer.
- **Capacitors** must be provided with an automatic means of discharging stored energy once disconnected from the supply source.
- **Storage batteries** must be diffused and ventilated to prevent the build-up of explosive gas mixtures.

Electrical Safety

Selection and Use of Safety-Related Work Practices - Working On or Near Energized Parts

Working On Overhead Lines

Working on or near exposed energized parts involves either direct contact (or by means of tools or materials) or near enough to them for employees to be exposed to any hazard they present.

Only qualified persons may work on electric circuit parts or equipment that have not been de-energized. Employees or contractors must be capable of working safely on energized circuits and be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.

If work is to be performed near overhead lines, the lines must be de-energized and grounded, or other protective measures must be provided before work starts. If the lines are to be de-energized or grounded, arrangements must to be made with the utility company, person, or organization that operates or controls the electric circuits involved. If protective measures, such as guarding, isolating, or insulating are provided, these precautions must prevent employees from direct contact with the lines with any part of their body, and from indirect contact through conductive materials, tools, or equipment. Unqualified persons are prohibited from performing this type of work.

When an unqualified person is working in an elevated position near overhead lines, he must be located so that his person and the longest conductive object he may contact cannot come closer to any unguarded, energized overhead line than the following distances:

- **For voltages to ground less than or equal to 50kV, 10 feet**
- **For voltages to ground greater than 50kV, 10 feet plus 4 inches for every 10kV over 50kV**

Electrical Safety

Selection and Use of Safety-Related Work Practices - Working On or Near Energized Parts

Working Near Overhead Lines

When an unqualified person is working on the ground in the vicinity of overhead lines, the person may not bring any conductive object closer to unguarded, energized overhead lines than the following distances:

- For voltages to ground less than or equal to 50kV, 10 feet (305 cm)
- For voltages to ground greater than 50kV, 10 feet (305 cm) plus 4 inches (10 cm) for every 10kV over 50kV

(Objects that do not have an insulating rating for the voltages involved are considered conductive.)

When a qualified person is working in the vicinity of overhead lines, whether in an elevated position or on the ground, the person may not approach or take any conductive object closer to exposed energized parts than the distances listed, unless:

- the part has an insulated handle
- the person is insulated from the energized part (with rated gloves and/or sleeves)
- the energized part is insulated both from the person and from all other conductive objects, and
- the person is insulated from the energized part and all conductive objects.

Approach Distances for Qualified Employees

Alternating Current Voltage Range (phase to phase)	Minimum approach distance
300V and less	Avoid Contact
Over 300V, not over 750V	1 ft. 0 in. (30.5 cm)
Over 750V, not over 2kV	1 ft. 6 in. (46 cm)
Over 2kV, not over 15kV	2 ft. 0 in. (61 cm)
Over 15kV, not over 37kV	3 ft. 0 in. (91 cm)
Over 37kV, not over 87.5kV	3 ft. 6 in. (107 cm)
Over 87.5kV, not over 121kV	4 ft. 0 in. (122 cm)
Over 121kV, not over 140kV	4 ft. 6 in. (137 cm)

Electrical Safety

Selection and Use of Safety-Related Work Practices - Working On or Near Energized Parts

Equipment Use Near Overhead Lines

Any vehicle or mechanical equipment capable of having parts of its structure elevated near any energized overhead lines must keep a distance of at least 10 feet. If the voltage is higher than 50kV, the clearance must be increased 4 inches for every additional 10kV; however, under any of the following conditions, the clearance may be reduced:

- If the vehicle is in transit or moving with its structure lowered, the clearance may be reduced to 4 feet. If the voltage is higher than 50kV, the clearance is increased 4 inches for every 10 kV.
- If properly rated insulating barriers are installed to prevent contact with the lines, and as long as they are not a part of or attached to the vehicle or its raised structure, the clearance may be reduced to the distance within the dimensions of the barrier.
- If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the un-insulated portion of the aerial lift and the power line) may be reduced accordingly.

An employee standing on the ground may not contact the vehicle, mechanical equipment, or any of its attachments, unless:

- the employee is using protective equipment rated for the voltage, or
- the equipment is located so that no uninsulated part of its structure (that provides a conductive path to the ground) can come close to the line.

If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of overhead line contact.

Additional precautions, such as the use of barricades, insulation, or safe distance requirements, must be taken to protect employees when needed.

Electrical Safety

Selection and Use of Safety-Related Work Practices - Working On or Near Energized Parts

Illumination/Lighting and Working in Confined Space

Illumination

Employees may not enter spaces containing exposed energized parts unless enough lighting is provided to enable the employees to perform the work safely.

Where lack of light or an obstruction prevents observation of the work to be performed, employees may not perform tasks near exposed energized parts.

Employees may not reach blindly into areas that may contain energized parts.

Confined or Enclosed Work Spaces

When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized parts, the company must provide, and the employee must use, protective shields or barriers or insulating materials to avoid accidental contact with these parts. Doors, hinged panels, and similar equipment must be secured to prevent their swinging into an employee, knocking him over, and causing contact with exposed energized parts.

Electrical Safety

Selection and Use of Safety-Related Work Practices - Working On or Near Energized Parts

Conductive Materials and Equipment

Conductive materials and equipment must not directly contact any part of the employee's body. If an employee must handle long-handled or long-dimensional conductive objects (such as ducts and pipes), safe work practices to minimize hazards (such as the use of insulation, guarding, and material handling techniques) must be put in place.

Portable Ladders

Portable ladders must have nonconductive side-rails if they are used where there is potential contact with exposed energized parts.

Conductive Apparel

Conductive articles of jewelry and clothing (such a watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) may not be worn if it might contact exposed energized parts; however, such articles may be worn if they are rendered nonconductive by covering or wrapping them, or through other insulating means.

Housekeeping Duties

Where live parts present an electrical contact hazard, housekeeping duties must be performed at distances that prevent contact with the electrical hazard. Electrically conductive cleaning materials (including conductive solids, such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) may not be used in proximity to energized parts unless procedures are followed which will prevent electrical contact.

Interlocks

Only a qualified person following the requirements of electrical LOTO may defeat an electrical safety interlock, and then only temporarily while he or she is working on the equipment. The interlock system must be returned to its operable condition when this work is completed.

ELECTRICAL SAFETY.

Electrical accidents can result in shocks, burns and death as well as explosions and fire. To prevent arc flash hazard, shock, damage to equipment and fire remember the following basic electrical safety points:

- Extension cords should only be used for temporary power supply with portable equipment and power strips should be plugged directly into a building outlet.
- Inspect all electric tools and equipment before use for damaged or frayed power cords and remove any defective extension and power cords from the workplace.
- Use insulated hand tools and grounded or double insulated power tools. Portable ladders used for electrical tasks should have non-conductive side rails.
- Remove all metal jewelry, rings, and watches before working on electrical equipment.
- Never work around a source of electricity when you, your surroundings, or your tools are wet.
- Use Ground Fault Interrupters (GFI's) when working outside, near wet areas or when using extension cords.
- Panels and boxes should have a cover on them at all times and remain closed unless they are being serviced, and if a temporary cover is used it should be marked "HOT" to denote live current.
- All live parts operating at 50 volts or greater should be fully guarded against accidental contact.
- De-energize all electrical equipment before beginning service or repairs and verify energy control by following the Lockout/Tagout procedures for the equipment affected.
- When exposed to live energy, wear the proper fire resistant clothing and do NOT wear clothing made from combustible synthetic materials such as acetate, nylon, polyester, or rayon, either alone or in blends with natural fibers, unless that material has been approved for Arc Hazard Protection.
- Always wear appropriate PPE, use insulating and shielding materials, and insulated tools where required.

Understand your employers Electrical Safety program and follow all procedures particularly the Lockout/Tagout program and procedures when working on any electrical equipment.

ARC FLASH – The "Left Hand Rule"

When de-energizing a machine or equipment it is important to turn off ALL motors and energized parts prior to throwing an electrical disconnect to de-energize equipment and affect repairs or service. To protect yourself from Arc Flash when throwing an electrical disconnect, stand to the right side of the disconnect switch, not in front of the disconnect box. Grab the disconnect with your left hand, turn your body/face away from the switch, close your eyes and take a deep breath and hold it, then throw the disconnect lever. This protects you by keeping you out of the direct line of fire as an arc flash explosion can blow the hinged door of a box straight off; and by taking and holding a breath, you won't gasp and breathe in flames should an explosion occur.

Active Shooter

RUN..... HIDE..... FIGHT

RUN - Evacuate: If there is an accessible escape path, attempt to evacuate the premises. Be sure to:

- Have an escape route and plan in mind
- Evacuate regardless of whether others follow or not
- Grab your cell phone, leave other belongings behind
- Call 911 when you are safe
- Do not attempt to move wounded people

HIDE - Shelter-in-Place: If evacuation is not possible, find a place to hide where the active shooter is less likely to find you. Your hiding place should:

- Stay out of the active shooter's view
- Provide protection if shots are fired in your direction to prevent the active shooter from entering your hiding place:
  - Lock the door
  - Blockade the door with heavy furniture
- ***If the active shooter is nearby:***
  - Remain quiet and lock the door
  - Silence your cell phone
  - Hide behind large items (i.e. cabinets, desks)

FIGHT - Protect Yourself: As a last resort:

- Acting as aggressively as possible against him/her
- Yelling/Throwing items and improvising weapons
- Fully committing to your actions

WHEN POLICE ARRIVE

- Put down any items in your hands.
- Keep hands visible.
- Follow all instructions.
- Avoid making quick movements towards officers.

Emergency Action and Fire Prevention Planning

Alarms and Notification

Alarms and Signals to notify employees of an emergency evacuation must be distinctive in sound and consistent throughout the site.

- Alarms may be automatic or verbally provided in person or through a public address system, but all employees must be able to understand them.
- The same sound or wording must be used throughout the site.
- Employees must be trained and informed of the sounds or wording used.

Return to work signals must be provided once it is safe for employees to re-enter the workplace.

Each supervisor or other designated person at each jobsite must be aware of the signal used and watch for it.

Emergency Action and Fire Prevention Planning

Evacuation and Relocation

- Evacuation routes must be established for each area of the building or jobsite.
- Employees must be trained and informed of their evacuation routes and relocation points.

- If an exit sign or route of travel is not immediately apparent to employees, companies must conspicuously place either exit and exit route signs or evacuation route maps.
- Management must establish evacuation routes and relocation points for offsite job locations before employees may be assigned to the jobsites.
- Relocation points must be established where employees must congregate and be accounted for during an evacuation.
- A designated person must account for employees at each relocation point and report the accounting to the emergency response coordinator.
- Where appropriate, severe weather relocation points (shelters or arrangements with neighboring facilities) must be communicated to employees during the training.
- Each designated person at a relocation point must be aware of the return-to-work signal used.

Emergency Action and Fire Prevention Planning

Exits and Exit Paths

- Direct paths to exits must be established.
- All exits, aisles, exit paths, and stairways must be kept clear and unobstructed.
- No storage is allowed that will restrict or block the exit, exit path, stairways, or exit doors.
- All exits and paths must be clearly visible or have visible signs that indicate the location of the exit.
- Exits and paths, emergency lighting, and numbers of exits and exit signs must meet specific codes and regulations.
- Doors that could be mistaken for an exit must be marked “Not an Exit” or labeled with their designated use (such as “closet”).
- Locks or fastening devices that keep exit doors closed or locked from the inside are forbidden.

Emergency Action and Fire Prevention Planning

Fire Alarms and Detection

- Fire alarms are required in buildings where the location of the fire will not provide adequate warning to employees and other occupants (i.e., multi-floor buildings or segregated work spaces).
- Alarms must be loud enough to be heard above the ambient noise level of the work area and activate in time to provide adequate warning for the work area occupants to safely evacuate.

- Alarms and signals must be tested and maintained to ensure they remain in working order.
- Buildings undergoing construction and renovation (where employees are still working and occupying the work areas) must have appropriate (or alternate) alarms and fire prevention systems in place that are at least equal to those required for the occupancy and type of hazards in the area. This includes hazards inherent to the work area and tasks performed, as well as any additional hazards caused by the construction or renovation.

Emergency Action and Fire Prevention Planning

Fire Brigades and Onsite Medical Response Teams

- Fire brigades and medical response teams must be trained to the level or type of emergency they will likely encounter. In most cases, certified training is required, and certifications must be maintained with periodic or annual refresher training.
- Team members must be physically capable of performing their duties (including the use of respiratory protection, where required). Employees with known physical conditions (e.g., heart disease, emphysema, or epilepsy) or known mental or physical disabilities that would impair their ability to perform the expected duties may be required to be certified by a licensed physician before being allowed to participate on the team.

- Teams must be provided with adequate equipment and protective clothing to perform their duties.
- Equipment and clothing must be maintained in good working order. Equipment removed from service must be promptly repaired or replaced, or team members must be informed that the equipment is no longer available.
- Teams must be organized, with elected or appointed leaders, and have specific written procedures that outline their responsibilities (and limitations) with regard to emergency response at the workplace.

Emergency Action and Fire Prevention Planning

Classes and Types of Portable Fire Extinguishers

There are five classes, or types, of fire extinguishers.

Class A extinguishers may be used on ordinary combustibles (wood, paper, cloth, etc.). Extinguishers must be located 75 feet or less from the hazard.

Class B extinguishers may be used for flammable or combustible liquids (gasoline, paint, solvents, propane, etc.). Extinguishers must be located 50 feet or less from the hazard.

Class C extinguishers may be used for electrical equipment, and must be located 50 feet or less from the hazard.

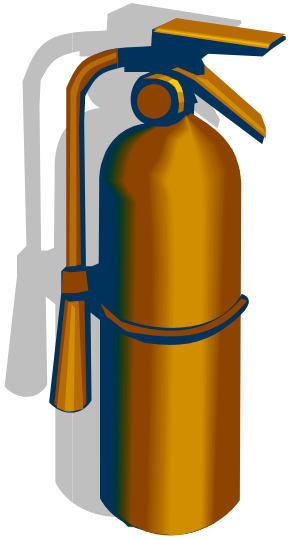
Class D extinguishers may be used for metals (magnesium, potassium, and sodium). Extinguishers must be located 75 feet or less from the hazard.

Class K extinguishers may be used in industrial kitchens.

Emergency Action and Fire Prevention Planning

Portable Fire Extinguishers – General Requirements

Extinguishers must be located so they are clearly visible, readily accessible to the employees or persons designated and trained to use them, and protected from damage by moving equipment.



- Extinguishers must be maintained in a fully charged and operable condition and kept in their designated locations.
- Extinguishers must be appropriate to the type (or class) of fire hazard likely to occur in the work area.
- Standard signs and floor markings may be used to increase visibility.
- Extinguishers must be located along normal paths of travel, but protected from the direct line of traffic to avoid injury to personnel or mechanical damage.
- Extinguishers are not required in workplaces where all employees will be required to evacuate the facility (total evacuation) upon the initial alarm sounding, unless extinguishers are required by a specific regulatory standard (i.e., welding, confined space, and some flammable liquid usages).

Emergency Action and Fire Prevention Planning

Portable Fire Extinguishers – The PASS System

The PASS System

Pull

Pull the pin on the extinguisher.

Aim

Aim the extinguisher at the base of the fire.

Squeeze

Squeeze the trigger.

Sweep

Sweep the extinguisher back and forth along the fire.

Emergency Action and Fire Prevention Planning

The Two Extinguisher Rule

Fire extinguishers are for controlling small, incipient fires. NEVER should more than two extinguishers be used to control a fire. If the fire is not controlled by two extinguishers, it is no longer considered an incipient fire and should ONLY be extinguished by trained firefighters or by fixed fire suppression systems.

Emergency Exits and Egress

Design and Construction of Exits and Exit Routes

Do NOT block the exit door or path.

Do not hold doors open with wedges or ties.

Emergency Exits and Egress

Design and Construction of Exits and Exit Routes

Do not block an exit door or path.

Do not hold doors open with wedges or ties.

An exit route must:

- be permanent and use 1-hour fire resistant materials (two-hour rating for four or more stories). Doors are usually labeled near or on the edge by the hinges.
- have only those doorways necessary to allow access to the exit (or exit discharge) from occupied areas. Such doorways must be protected by an approved, self-closing fire door that remains closed or automatically closes when the alarm sounds.

Number of exit routes required:

- Two exit routes, located apart from one another, must be available.
- More than two exit routes must be available if the occupancy, building size, or space arrangements would prevent all employees from safety evacuating in an emergency.
- In some cases, a single exit route is permitted when all employees would be able to evacuate the space during an emergency.

Note: See NFPA 101, Life Safety Code for more assistance.

The capacity of an exit route must:

- support the maximum permitted occupant load for each floor served, and
- not decrease in size in the direction of exit route travel to the exit discharge.

Note: See NFPA-101, Life Safety Code for more information.

An exit route must meet minimum height and width requirements.

- Ceilings must be at least 7 feet 6 inches high with no projections (such as light fixtures) lower than 6 feet 8 inches.
- Exit access must be at least 28 inches wide at all points (including projections such as handrails).
- The exit discharge must be at least equal to the width of the exit door.
- Exit routes must be sufficient to accommodate the maximum number of people using it.

An outdoor exit route is permitted when:

- guardrails protect unenclosed sides if a fall hazard exists
- exit routes are kept free from ice, snow, or similar slipping hazards, or covered
- the route is reasonably straight and has smooth, solid, level walkways, and
- there are no dead ends longer than 20 feet (6.2 meters).

Emergency Exits and Egress

Design and Construction of Exits and Exit Routes

Exit discharge must:

- lead directly to an outside area or space with access to the outside
- be large enough to accommodate the building occupants likely to use the exit route, and
- have doorways, partitions, or other effective means within any exit stair to prevent employees from progressing past the level of exit discharge (for example, to a basement or below-ground level).

Note: Doorways that do not lead to an exit must be clearly labeled.

Exit door requirements

- Exit doors must be unlocked from the inside.
- Exit doors that lock only from the outside must have panic bars.
- An exit route door may be locked from the inside only in mental, penal, or correctional facilities, if supervisory personnel are continuously on duty and a plan is in place to remove occupants from the facility during an emergency.
- Exit doors must be able to be opened from the inside at all times without keys, tools, or specialized knowledge.
- Exit doors must be kept free of alarms or other devices that would render it inoperable if the device fails.
- Exits must be kept free and clear. Nothing may block the door or path.

A side-hinged exit door must:

- be used to connect any room to an exit route, and
- swing out in the direction of travel when it connects any room to an exit route if:
  - it is designed to be occupied by more than 50 people, or
  - it is a high hazard area (for example, if it contains explosive, flammable, or hazardous materials).

Emergency Exits and Egress

Fire Prevention

Smoke only in designated areas.

Store flammable materials in the right place.

Keep containers closed when not in use.

Good housekeeping lowers the risk.

Emergency Exits and Egress

Plan For An Emergency

- **Know the alarm sounds or codes.**

- **Know how to respond.**
  - **Respond to the scene**
  - **Evacuate the building**
  - **Shelter in Place**

- **Where is the nearest exit to your work area?** ***It may not be the door you use every day!***

- **Know where to go.**

EMERGENCY EVACUATION AND FIRE RESPONSE

In the event of a fire:

- **Alert** people in the area of the need to evacuate
- **Activate** the nearest fire alarm
- **Call** Emergency Response at 911
- **Assist** others in need to safely evacuate

If a building fire alarm is sounding or you receive notification of a fire emergency:

Feel the door or doorknob to the hallway with the back of your hand. If it feels hot, do not open it – the fire may be on the other side of the door. If you are trapped, put a cloth or towel under the door to help prevent the entry of smoke. Dial 911 and tell the emergency dispatcher your location and telephone extension and that you are trapped in the room and need rescue. Stay on the phone until instructed otherwise. **If the door is not hot**, open it slowly. If the hallway is clear of smoke, walk to the nearest fire exit and evacuate via the nearest stairwell to the street/grade level exit. **Close doors behind you. Do not attempt to use elevators**. Elevator controls are normally tied into the fire detection system and are not available to occupants once the alarm sounds.

Assemble at the designated assembly point and remain there until instructed by emergency services or the fire department that it is safe to re-enter the building.

If you have been trained to use a fire extinguisher and feel that you can use it without putting yourself at risk:

- **Alert** people in the area.
- **Activate** the fire alarm.
- **Use** the correct fire extinguisher.
  - ✓ Pull the pin
  - ✓ Aim the nozzle at the base of the fire from a distance of 8’ to 10’
  - ✓ Squeeze the handle/trigger
  - ✓ Sweep the nozzle/discharge from side to side
- **Maintain** an accessible exit.
- **Avoid** smoke and fumes.

Ergonomics

Awkward Postures

Awkward postures occur when employees work with various parts of the body in bent, extended, or flexed positions rather than in straight or neutral positions.

Working in awkward postures increases the exertion and muscle force workers must apply to complete a task, and it compresses tendons, nerves, and blood vessels.

In general, the more extreme the posture, the more force is needed to complete the task. Examples of awkward postures include performing overhead work, bending or twisting to lift an object, typing with bent wrists, and squatting or crouching.

Ergonomics

Bending the Elbow

- **Repetitive elbow bending irritates nerves and tendons in the forearms.**
- **When possible, use machinery or tools to reduce stress on the elbow.**

Ergonomics

Bent Wrists

- **Prevent inflammation in the tendons of the wrist.**
- **Use bent or angled handles and hand-holds that allow work to be done with straight wrists.**

Ergonomics

Contact Stress/Trauma

Contact stress results from the continuous contact or rubbing between hard or sharp objects/surfaces and sensitive body tissue, such as the soft tissue of the fingers, palms, thighs, and feet. This contact creates localized pressure for a small area of the body, which can inhibit blood flow, nerve function, or the movement of tendons and muscles.

Contact stress can be caused by:

- prolonged use of tools that vibrate, which can cause contact trauma in the palms and fingers, and
- standing for long periods of time, which increases the "static load" placed on the legs and back. Circulation is reduced, blood pools, and localized fatigue increases the longer employees must stand. Muscles and tendons become more susceptible to strain as they become fatigued from prolonged standing.

To reduce contact stress:

- use electric or power tools
- attach well-designed handles to tools
- wrap or coat tool handles and grips with cushioning material
- use palm pads
- use sit or stand stools to reduce the static loading on the legs and back, and
- wear shoes with thick or cushioned soles.

Ergonomics

Crouching and Kneeling

Some workers must frequently bend or crouch to reach the workspace or to lift materials. This kind of activity can contribute to poor circulation when a crouched position is maintained. It may injure the knees if workers are maintaining a kneeling position where the knees come in contact with the floor.

Ergonomics

Cumulative Trauma Disorder

Cumulative Trauma Disorders (CTDs) and Repetitive Motion Injuries (RMIs):

- Result of continued stress on specific joints, tendons, and muscles
- Can be controlled

> The earlier CTDs and RMIs are identified and treated, the more likely you are to prevent a serious disability.

Risk Factors

- Frequent repetitive movements
- Great force or intensity used
- Poor posture and body position
- Improper workstation or environment

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Ergonomics

High Hand Force

High hand force (gripping or squeezing) can cause muscle fatigue, tendon inflammation, and contact trauma.

Weight of hand tool – The heavier the tool, the more force is required.

Size of hand tool – Tools with good weight distribution are easier to hold and handle.

Handle or grip size – Tool handles that are too small or too big reduce the employee's grip efficiency, requiring more force and exertion to hold and use the tool.

Tool activation – The way tools are activated can also increase the amount of hand force employees must exert.

- Tools with squeeze triggers, such as scissors and staple guns, may require employees to apply a lot of muscle contraction in the hand and fingers, especially if the object to be cut is thick or dense.
- If the trigger of a tool is too small, the employee may only be able to use one finger to activate it. Where all the force to squeeze the activation trigger must be generated by one finger, the tendons may be overused to the point where fluid builds up, making it difficult to bend the finger to squeeze the tool.

Gloves – Vibration, cold temperatures, glove type, or improperly fitting gloves all contribute to the stresses on the hands and increase the amount of force required to use tools and perform activities.

Tools can be designed to reduce the amount of force required to use them.

Ergonomics

Lighting

Lights that are too dim or too bright can:

- cause eyestrain, headaches, and related vision disorders, and
- make employees perform their job functions more slowly.

Consider the effects of:

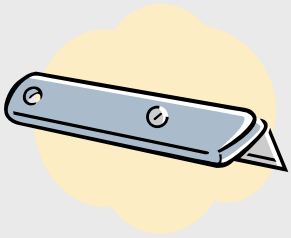
- overhead and task lighting
- glare
- work surface layout
- visual disorders and magnification, and
- bad work habits.

Ergonomics

Opening Boxes

Use safety knives or ergonomic razor-knives that require less wrist bending and have substantial handles that require less finger force for control.

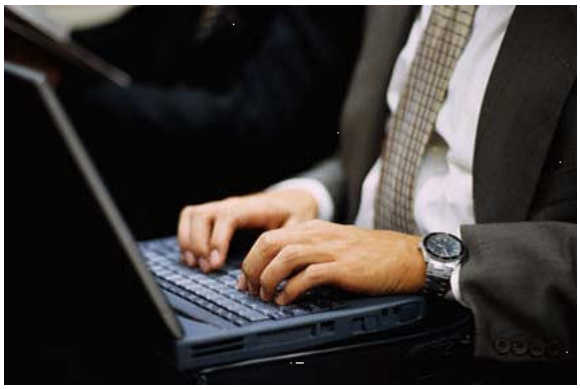
Not an ergonomically correct knife



Ergonomics

Prevent Cumulative Trauma (1 of 2)

- **Stretch arms, hands, legs, and back for 5 minutes each day before starting work.**
- **Change positions frequently during the day.**
- **Take short breaks and do hand exercises frequently.**



Ergonomics

Prevent Cumulative Trauma (2 of 2)

- Stretch arms, hands, legs, and back for 5 minutes each day before starting work.
- Change positions frequently during the day.
- Use adjustable seating.
- Use appropriate work surfaces.
- Ensure appropriate workstation setup and placement of supplies.
- Rest and take exercise breaks frequently.
- Stand and stretch regularly.

Ergonomics

Reaching

A number of tasks require employees to work with their hands above their head or shoulders, their arms extended full length, or their elbows raised out from their body. These kinds of tasks place stress on the shoulders, elbows, and back, and can result in an injury.

Elevated and extended reaches can also contribute to injury.

To reduce reaching hazards:

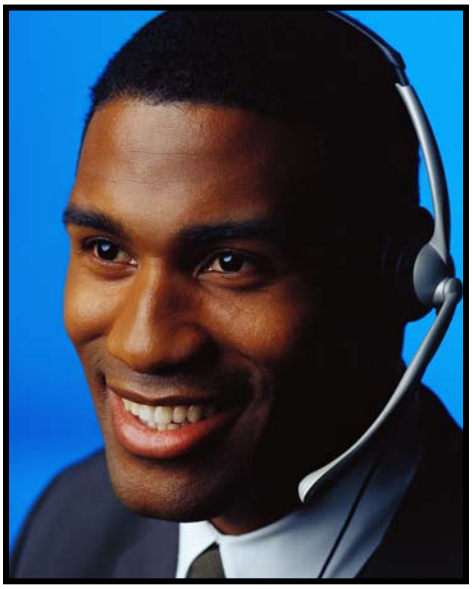
- use ladders and lifts to reduce reaching
- use bent-handled tools that allow straight wrists and elbows to be close to the body, and
- place pallets and other materials on lifts or turntables to enable access to them from the proper height or from the side.

Ergonomics

Telephones

To reduce stress from constant telephone operation, use:

- headsets
- hands-free options, or
- extended handsets.



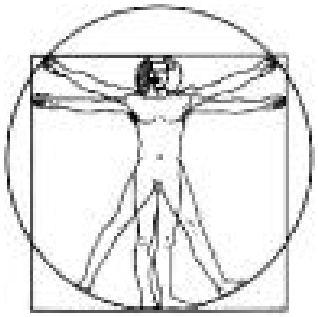
Ergonomics

What is Ergonomics?

- The study of people at work
  - *Ergo* = work
  - *Nomics* = the laws of operation or mechanics
  - *Ergonomics* = the study of the mechanics of the body at work

- Designing the job with the user in mind
  - Consider the interaction of man, machine, and the environment.

- The goal is to provide a comfortable, pain-free work environment.



Ergonomics

What is Force?

Force is performing essentially the same motion or motion pattern over and over again with little variation in task assignment, sometimes with strain on the muscles from pushing or pulling.

Repetitive motion tasks often involve the use of only a few muscles, tendons, and body parts, which can become strained when the same motion is repeated frequently and often (every few seconds) or for prolonged periods (for several hours at a time, the entire work shift, or day after day) without adequate recovery time.

The severity of risk depends on how often the motions are repeated, the speed of the motions, the force required to perform the motions, and the number of muscles involved.

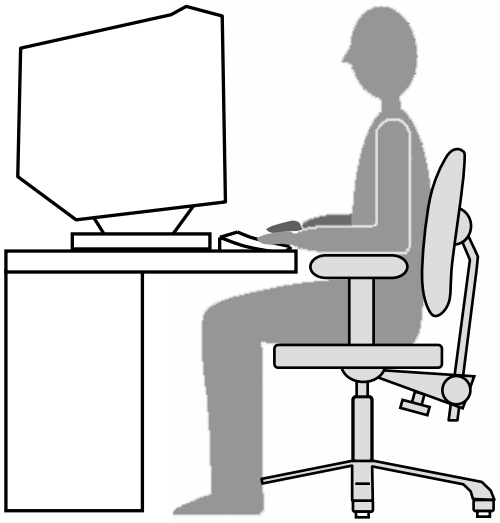
Ergonomics

Work Station Setup

Head and **neck** in upright position, slightly bent

Upper arms close to body with **elbows** bent slightly forward

Shoulders down, relaxed, and even



Forearms parallel to the floor

Wrists and **hands** in a straight line from the third finger to the elbow

Feet resting flat, **thighs** parallel to the floor, and **lower legs** unhindered

Eyewash and Safety Showers

Eyewash Requirements for Employees

- Eyewash must be near where chemicals are used or stored.
- A clear path to the eyewash must be maintained. No materials may be stored in front of or next to the eyewash.
- Eyewash must be checked weekly (and activated, if they are attached to the building water supply).
- Eyewash must be kept clean.
- Eyewash must have enough room for the user to stand and be able to hold his eyes open.

Hold your eyes open under the water stream, rolling your eyeballs, for a full 15 minutes.

Personal eyewash bottles (squeeze bottles) are **NOT** a substitute for a full eyewash station.

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Eyewash and Safety Showers

Emergency Shower Installation Requirements

- Showers must be near where the chemicals are used or stored.
- A clear path to the shower must be maintained. No materials may be stored in front of or next to the shower.
- Showers must be checked either annually or monthly (depending on the type) to be sure they are operating correctly.
- Showers must have enough room for the user to stand under the water stream.
- Water temperature must be controlled, if possible. Extremely cold water must be avoided.

Employees must be sure the skin is washed by the water. Clothing may need to be removed to do this.

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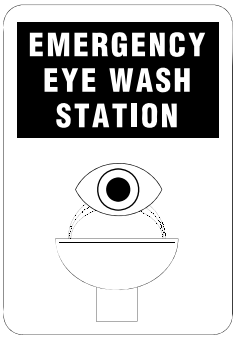
Eyewash and Safety Showers

Using Eyewash

All employees who are likely to be splashed with chemicals that could cause serious eye injuries must be trained in the use of eyewash.

Training includes:

- location of the eyewash
- the hazardous materials/conditions that could require eyewash use
- how to operate the eyewash, and
- how to provide emergency assistance to others.



Eyewash must be near the area where the chemicals are used.

Eyewash must start with one simple motion.

Eyes must be flushed for 15 minutes.

Hold the eyes open and roll the eyeballs under the water stream.

Someone must call 911 immediately.

Eyewash and Safety Showers

Using Safety Showers

All employees who are likely to use a safety shower because of chemical contact must be trained in the use of emergency showers.

Training includes:

- location of the shower
- the hazardous materials/conditions that could require shower use
- how to operate the shower, and
- how to provide emergency assistance to others.

Showers must be located in the area where the chemicals are used.

The shower must start with one simple motion.

Users must remove any contaminated clothing to make sure the water directly washes the skin.

Skin must be flushed for 15 minutes.

Someone must call 911 immediately.

Fall Protection

Assessing the Workplace

The workplace must be assessed for potential fall hazards before each assigned job begins.

- Proper fall arrest equipment must be used when elimination of the hazard is not possible.
- Job sites must be evaluated to determine fall hazards.
- A complete list of fall hazard locations and protective measures and procedures taken must be maintained.

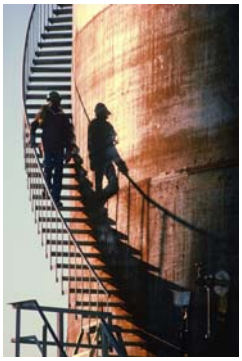
Fall Protection

Common and Dangerous Fall Hazards

- Working from crane booms and tower cranes.
- Working on top of machinery and equipment, such as overhead cranes, furnaces, conveyors, and presses.
- Other work that involves fall hazards, such as “off-chutes” from main piping in duct work or boilers.

- Working on roofs with deteriorating or unsupported sections and framing.

- Working over chemical tanks or open pits.
- Working from fixed or portable ladders, or climbing systems.
- Performing work on water towers, product tanks, silos, pipe racks, presses, and floor pits.



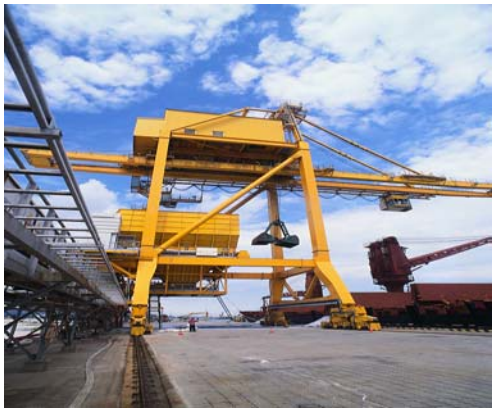
Fall Protection

Types of Systems – Full-body Harness

A full-body harness system consists of a full-body harness, lanyard, energy shock absorber, and self-locking snap hook.

Before using a full-body harness system, you must:

- Inspect all parts of the fall protection system, including the anchor points, lifeline, and harness system.
- Make sure the equipment will protect you, based on the free-fall distance.
- Make sure there are no objects in the fall zone (objects sticking up) or swing zone (objects or structures to either side) that could interfere with the safe use of the equipment.



Fall Protection

Inspection and Maintenance

To ensure fall protection systems are ready and able to perform their required tasks, a program of inspection and maintenance must be implemented and maintained.

Inspection and maintenance includes:

- inspection per manufacturer's instructions
- inspection before use and at least every 6 months
- inspection for mildew, damage, wear, or distortion
- user inspection before each use
- inspection of anchors and mountings before each use
- inspection of hardware for cracks, sharp edges, or burns
- inspection of straps to ensure they are not cut, broken, torn, or scraped
- removal of equipment subjected to a fall or impact load from service until inspected by the manufacturer or qualified engineer
- a detailed inspection policy for equipment stored longer than one month
- considerations for special situations (such as radiation, electrical conductivity, and chemical effects), and
- ensuring damaged equipment is tagged and not stored in the same area as serviceable equipment.

Fall Protection

Types of Systems – Retractable Lifelines

A retractable lifeline is a fall arrest device used in conjunction with other components of a fall arrest system.

Retractable lifelines should be used by one person at a time.

- Retractable lifelines automatically stop a person's descent within a short distance after the onset of an accidental fall.
- A properly inspected and maintained retractable lifeline, when correctly installed and used as part of the fall arrest system, automatically stops a person's descent within a short distance after the onset of an accidental fall.
- Retractable lifelines may be considered when working in areas such as roofs, scaffolds, tanks, towers, vessels, and manholes. Also, retractable lifelines should be considered when climbing such equipment as vertical fixed ladders.
- Considerations for use include:
  - user training
  - use in conjunction with a complete fall arrest system
  - equipment maintenance, and
  - equipment inspection (at least every 6 months).

Fall Protection

Types of Systems – Standard Harness

Standard harnesses used in fall protection systems must be:

- constructed with a sliding back D-ring
- suitable for continuous fall protection while climbing, riding, or working on elevated personnel platforms, and
- suitable for positioning, fall arrest, and rescue and evacuation.

Fall Protection

Employee Requirements

- Attend fall protection training annually.
- Know the type of fall arrest system required for your job.
- Use the fall arrest system properly.
- Inspect fall protection equipment before each use.

First Aid and Emergency Response

Employee Responsibilities – Medical Services and First Aid

Know the emergency response procedures and processes for the company, including:

- how to summon assistance, and
- how to notify your supervisor.

Know the location of any first aid supplies.

Know the location of the eyebath or safety shower station.

If you are a response team member, attend training classes as required. Minimum training requirements include First Aid/CPR and Bloodborne Pathogens Exposure.

First Aid and Emergency Response

Industrial Burns – Types of Burns

Correct assessment of a burn's severity is one of the first critical steps in properly treating and managing the injury. Burns are classified both by their depth and the amount of body surface area injured.

First-Degree Burns

These burns involve only the outer layers of the epidermis. Characterized by redness, itching, and burning, these burns are generally considered minor and don't usually require the attention of a physician. Mild sunburns are typical first-degree burns.

Second-Degree Burns

These burns damage both the epidermis and the dermis (second layer of skin). They cause blisters and are prone to infection, often requiring medical attention. Second-degree burns are also sub-classified as superficial or deep dermal, depending on the extent of injury. Burns are also described by their cause, such as thermal, chemical, electrical, radiation, or flash.

Third-Degree Burns

These burns destroy both the epidermis and the dermis. They are distinguished by their dry surface and pearly white or charred appearance. Third-degree burn patients often experience no pain following their injury because nerve endings are impaired. Third-degree burns always require the attention of a hospital burn center.

First Aid and Emergency Response

Industrial Burns – Types of Burns

- **Thermal (Heat) Burns**
  Thermal burns are caused by contact with substances at temperatures above the boiling point of water. These burns often occur in conjunction with other types of burns.

- **Chemical Burns**
  Chemical burns are caused by contact with materials such as sodium hydroxide, phenol, and sulfuric or hydrochloric acid. These corrosive substances generate heat, creating a thermal burn in addition to a chemical burn.

- **Electrical Burns**
  Electrical burns are common among gas and electrical workers and are also considered thermal burns because heat is created while the current passes through the body. These burns are more treacherous than they first appear because the body conducts the electrical current to the heart, muscular system, and vascular system causing extensive internal damage. Because they may be electrocuted themselves, bystanders are strongly cautioned against touching these types of burn victims until the electrical source has been removed.

- **Radiation Burns**
  Sunburns are the most common type of radiation burns. Other sources of ultraviolet or nuclear radiation can also cause burns.

- **Flash Burns**
  Flash burns, usually minor cornea injuries, are caused by looking directly into an extremely bright light. Welders and those working with high-powered electrical equipment often experience this type of burn. Flash burn symptoms include watery eyes, searing pain, and photophobia (a marked sensitivity to light) occurring four to six hours following the injury. Although flash burns are regarded as more of an annoyance than a serious injury, prolonged exposure to a powerful light source without protective eyewear can result in permanent blindness.

Flammable and Combustible Liquids

Cabinet Requirements

60 gallons maximum of Category 1, 2, or 3

120 gallons maximum of Category 4

Only approved flammable liquid storage cabinets may be used. Cabinets must conform to NFPA (National Fire Protection Agency) requirements.

Cabinets must be clearly labeled with:

Flammable – Keep Fire Away

Cabinets and their contents must be inspected regularly to ensure they are kept clean, stored materials are compatible, and quantity limitations of the cabinet are not exceeded.

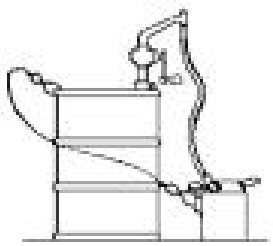
Do not drill holes in the cabinet or otherwise modify the cabinet. Sprinkler protection for cabinet interiors is usually not required.

Flammable and Combustible Liquids

Controlling Sources of Ignition

Adequate precautions must be taken by all employees to prevent the ignition of flammable vapors. Sources of ignition include, but are not limited to, the following:

- open flames
- lightning
- smoking
- cutting and welding
- hot surfaces
- frictional heat
- static
- electrical and mechanical sparks
- spontaneous ignition, including heat-producing chemical reactions
- radiant heat



Grounding

Category 1 or 2, or category 3 with flashpoint below 100 °F liquids may not be dispensed into containers unless the nozzle and container are electrically interconnected or bonded.

Flammable and Combustible Liquids

Dispensing

Only approved, NFPA type containers may be used.

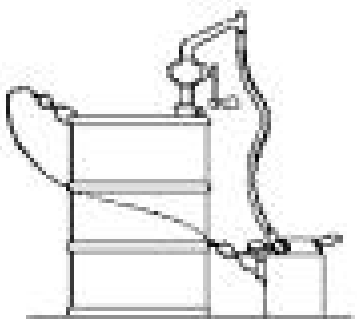
Category 1, 2, 3, and 4 liquids must be drawn from or transferred into vessels, containers, or portable tanks within a building from:

- original shipping containers (5 gallon maximum)
- safety cans
- closed piping systems
- portable tank or container which draws through an opening in the top of the tank or container
- a self-closing valve or faucet, using gravity.

Transferring by air pressure is prohibited.

Cabinets must have the design, construction, and capacity listed on them. Unknown hazardous liquids must be treated as the highest class and listing.

Grounding and bonding of containers is required for all dispensing activities.



Flammable and Combustible Liquids

General Handling Requirements

Containers must be kept covered when not in use.

A closed piping system must be used to transfer liquids, by gravity through a self-closing valve, or by safety cans. All transfers must use appropriate bonding and grounding.

Open flames or ignition sources are not allowed within 20 feet of storage, dispensing, or use areas.

Storage should be limited to the amount required for one day or one shift (maximum 120 gallons).

NO SMOKING signs must be posted in all use or storage locations if smoking is allowed in the building.

Unprotected hot surfaces (steam pipes, etc.) are not allowed if combustible residues may accumulate.

Portable lamps must not be used in any spraying area unless it is specifically designed for a maintenance operation, and must be intrinsically safe (non-sparking).

Areas using Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C) liquids must be ventilated at a rate of not less than one cubic foot per minute per square foot of floor area.

Spray nozzles must be kept closed when not in use.

Flammable and Combustible Liquids

General Handling Requirements

Maintenance operations involving welding or other hot work or the use of spark producing tools, may only be performed if the area has been proven safe and the work is supervised.

Housekeeping, cleaning of spills, and leakage control must be closely monitored. Immediately dispose of leaked or spilled materials.

Waste or residue must be stored in approved covered metal containers.

Flammable liquids must be kept in covered containers when not in use.

Storage Cabinet Specifications:

- Sprinklers are not required.
- There may be a maximum of 3 cabinets per room.
- Cabinets must be stable.
- Ventilation may be required for open containers or potential health risks.
- Grounding is not required unless dispensing operations are present or vapors could build up.

Materials stored on open steel shelving storage must be in approved containers.

Flammable and Combustible Liquids

General Requirements

- Know the safe handling and storage procedures.
- Use personal protective equipment when required.
- Do not dispense or transfer materials into another container, unless that container is grounded and bonded to ensure that vapors are not ignited by electrical equipment or fire sources. Ignition sources must be 20 feet away.
- All containers must have a flammable liquid sticker or emblem on them.

- Attend training as needed or required.
- Use flammable liquid storage cabinets or separate rooms designated for storage of quantities of more than 25 gallons in any one area.
- Know the emergency and spill procedures.
- Keep containers closed when not in use.
- Inspect containers and systems regularly.
- Do not store materials in or near aisles that are used for emergency exit paths.
- Report spills and leaking containers immediately.
- Report rusted or bulging drums or containers immediately to your supervisor.

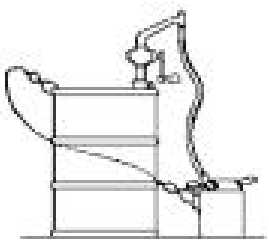
Flammable and Combustible Liquids

General Requirements – Drums (Grounding and Bonding)

Buildup of static electricity charges on containers and people is a dangerous source of sparks that can touch off flash fires wherever flammable liquids are being transferred or used.

Grounding

A readily accessible connection to an earth ground must be installed in all storage and dispensing areas.



Bonding

A readily accessible connection from a grounded drum to a container being filled must be installed on all drums or bulk containers used to dispense flammable or combustible liquids, unless self-bonding containers are used. If it is unclear if the container is self-bonding, use a bonding strap in the dispensing process.

Flammable and Combustible Liquids

Housekeeping Requirements

General

Maintenance and operating practices must control leakage and prevent the accidental escape of flammable or combustible liquids. Spills must be cleaned up promptly.

Access

Adequate aisles must be maintained for unobstructed movement of personnel and fire protection equipment.

Waste and Residue

Combustible waste material and residues in a building or area must be kept to a minimum, stored in covered metal receptacles, and disposed of daily.

Clear Zones

Ground area around buildings and unit operating areas must be kept free of weeds, trash, or other unnecessary combustible materials.

Flammable and Combustible Liquids

Small Container Storage (5 gallons or less)

Static Bonding and Grounding

- Safety cans should be used.
- Containers must be electrically boded and grounded to prevent static spark discharge.
- Electrical bond must be made before any filling holes are opened or the flow started and maintained until flow is complete and filling holes are closed.

Transfer of Flammable/ Combustible Liquids

- Gravity flow or approved pumps only. The use of compressed air in the container is prohibited.

Labeling

- All dedicated safety cans must be labeled with the name of the contents. Adhesive labels or writing are acceptable methods of labeling.
- Safety cans that are filled at a central dispensing area should be labeled with the user's work area location and telephone number.

Storage

- Open shelf storage of safety cans is permissible within quantity limit requirements.
- Flammable liquid storage cabinets, if used, must be NFPA compliant.

Flammable and Combustible Liquids

Small Container Storage (5 gallons or less)

Inspection

Before each filling, inspect the can to determine if it:

- is approved
- has a closure that operates properly (spring, tension, and alignment)
- has a correct content-identification label
- has an appropriate chemical hazard label
- is free of dents or evidence of corrosion
- has all required parts, including flame arrestors. If flame arrestor has been removed, the can must be removed from service.

Inspect waste liquid cans **each time** they are emptied.

Testing for Leaks

After filling a safety can, check for leaks at gaskets and seams by looking for moisture at welded joints.

Defective Equipment

Any can that fails inspection or testing must be immediately removed from service and tagged as defective.

Repairs

You may **not** repair safety cans (including soldering or flattening of dents).

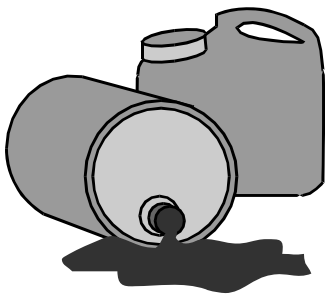
Modifications to any safety can are not allowed.

Flammable and Combustible Liquids

Spill Control

Spill control equipment must be maintained in each area where storage and/or dispensing is conducted. This equipment must include, as a minimum:

- spill control broom
- chemical neutralizers
- personnel protective equipment
- absorbent pads
- shovels, brooms, mops, pails



Employees trained in spill response and control measures are authorized to use spill control equipment, as needed or required, to contain or control and clean up spills of flammable or combustible liquids.

Employees **not** trained in spill response and control measures will summon the appropriate person or agency to provide containment, control, and clean up.

Spilled materials are generally considered waste and may need to be disposed of as a hazardous waste and require special controls, documentation, and procedures.

Flammable and Combustible Liquids

Storage Requirements – Drums (Inspection)

The appropriate procedures for handling drums depend on the drum contents.

Prior to any handling, drums should be visually inspected to gain as much information as possible about their hazards. Things to look for include:

- pictograms, symbols, words, or other marks on the drum indicating that it contains flammable or combustible liquids
- signs of deterioration such as corrosion, rust, and leaks
- signs that the drum is under pressure, such as swelling and bulging

- drum type
- configuration of the drumhead, and
- chemical compatibility with other chemicals in the areas.

Flammable and Combustible Liquids

Storage Room Requirements – Inside Storage

Piles of containers must be stable and separated to prevent stress on container walls.

- Portable tanks stored over one-tier high must nest securely. Material-handling equipment must be available to handle tanks safely at the upper tier level.

Flammable or combustible liquids must not be stored in exit aisles, pathways, or stairways.

- Aisles must be at least 3 feet wide for access to doors, windows, and fire protection equipment.
- No pile or material may be closer than 3 feet to the nearest beam, chord, girder, or other obstruction. Piles and materials must be 3 feet below sprinkler heads or other overhead fire protection systems.

Storage is prohibited in office areas, except where required for maintenance and operation of the building or equipment.

- Such storage must be in closed metal containers in a storage cabinet, in safety cans, or in an approved room that is not accessible to the public.

Leaking containers must be removed to a storage room or taken to a safe location outside the building and the contents transferred to an undamaged container.

Flammable and Combustible Liquids

Storage Room Requirements – Outside Storage

Quantities exceeding 1,100 gallons must be a minimum of 10 feet from the nearest building (50 feet if no barrier is present).

If the storage building is located 50 feet or less from a building, the exposing wall must be a blank wall having a fire-resistance rating of at least 2 hours.

The building or floor must be graded to divert any spills away from buildings or must have leak-tight sills at least 6 inches high.

- When curbs or sills are used, ground water or rainwater accumulation must be accounted for.
- Drains must terminate at a safe location and must be accessible for operation under fire conditions.

The storage area must be protected against tampering or trespassers where necessary and must be kept free of weeds, debris, and any combustible material not necessary to the storage.

Flammable and Combustible Liquids

Types of Safety Cans

Plastic cans and containers must be NFPA approved. Metal containers are recommended over plastic, unless the liquid is corrosive.

Bench-top cans are used for saturating sponges and wiping cloths, cleaning small parts, and for moistening swabs. Use spring mounted flame arrestors and hand-depressed dashers to provide access to the fluid. Upon release, the dasher must return to the normal position and excess fluid must drain back into the can.

- Gloves, compatible with the type of liquid, should be worn.
- Cans without plungers should be covered when not in use to minimize the escape of vapors.

Dispensing cans must have nozzles or faucets for pouring liquids into containers with small fill openings.

Storage cans have only one opening for both filling and pouring, and are used mainly for temporary storage and for pouring liquids into containers with large fill openings.

Viscous-liquid cans are not equipped with a flame arrestor since viscous fluids, such as adhesives, or suspensions, such as emulsions, would clog a flame-arresting screen.

Waste-liquid cans used for accumulation and disposal must be equipped with a bung or latch on the fill cap and must remain closed when not in use to prevent the escape of vapors. Cans used for the disposal of viscous or suspension fluids do not require flame arrestors.

Forklift

Batteries

Battery Charging

- Add acid into water, not water into acid.
- Performed in designated areas only.
- Ventilation provided for battery off-gassing.
- Vent caps function to dissipate heat during charging.
- PIT parked and brake applied before charging.
- Smoking and other ignition sources are prohibited in the area (30 feet recommended).
- Metallic tools must be kept away from the tops of batteries.

Battery Changing

- Hoisting equipment provided for changing batteries.
- PIT parked and brake applied before charging.
- Metallic tools must be kept away from the tops of batteries.

Electrolyte Handling

- Spill Protective Equipment provided for flushing and neutralizing electrolyte.
- Carboy tilter or siphon system provided for handling electrolyte.
- Open flames may not be used to view or check electrolyte levels.

Forklift

Dockboards and Bridgeplates

- All dock-boards and bridge plates must be strong enough to carry the load imposed on them.

- Portable dock-boards will be secured in position, either by being anchored or equipped with devices which will prevent their slipping.
- Powered dock-boards shall be designed and constructed in accordance with US Department of Commerce standards for Commercial Industrial Lifts and Hinged Loading Ramps.

- Handholds, or other effective means, must be provided on portable dock-boards to permit safe handling.
- Positive protection must be provided to prevent trucks, trailers, railroad cars and other vehicles from being moved while dock-boards or bridge plates are in position.

Forklift

Facility Requirements

- Trucks may not be used outside their limitations.
- Workplace rules and procedures should be documented.
- Maintain appropriate aisle spacing; consider the width requirements of the equipment, any approved aisle storage and pedestrian aisle-width requirements.
- Lighting (30 feet visibility) must be available or directional lighting must be provided on the vehicle.
- Where fumes and noxious gas can accumulate from the vehicle exhaust, additional ventilation may be required.
- Chocks used and brakes must be used to prevent movement during loading and unloading for any highway trucks, railcars or similar vehicles.
- Dock-boards and bridge-plates must be provided, as needed.
- Charging and watering stations require spill cleanup equipment to be available when needed, including: neoprene gloves, chemical face shield, neoprene apron and safety glasses with side shields. Spills may need to be reported to management.
- Battery changing areas and electrolyte handling areas require: eye baths, safety showers or another means of washing or rinsing the body, safety glasses, neoprene gloves, apron, chemical face shield and steel toed safety shoes.
- Hoisting equipment must be provided for changing batteries, and spill cleanup equipment must be accessible for spilled electrolyte.

Forklift

Fuel Tanks

- May not be filled while the engine is running.
- Spill must be carefully washed away or completely evaporated before restarting engine.
- Fuel caps must be in place before starting and at all times (except during filling).
- Leaks must be corrected before use; leaking vehicles must be immediately removed from service. Repairs must be made by authorized persons only.
- Liquid fuels such as gasoline and diesel fuel must be handled in accordance with proper procedures.
- Liquefied petroleum gas (LP Gas) storage and handling must be in place and followed.

Forklift

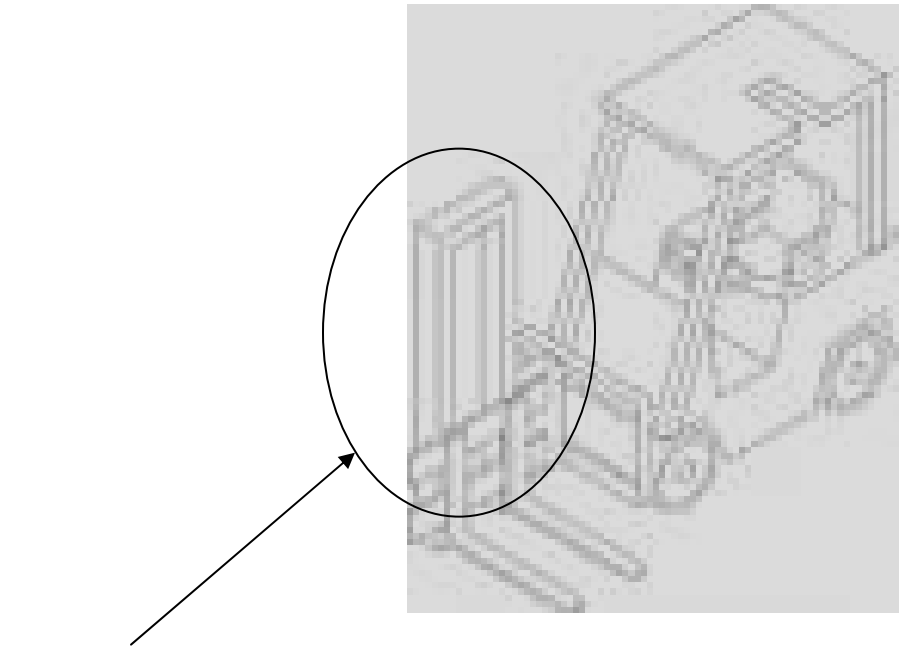
Operator Requirements

- Trucks may not be used outside their limitations.
- Attend training (classroom and practical demonstration)
- If there is not enough aisle spacing, do not attempt to manage materials in the area.
- Ensure you can see clearly in the path of travel for 30 feet or use specialized or directional lighting.
- Do not idle the vehicle engine in an enclosed space (elevator or truck bed).
- Chocks used and brakes must be used to prevent movement during loading and unloading for any highway trucks, railcars or similar vehicles.
- Dock-boards and bridge-plates must be provided, as needed.
- Charge or water a battery or change a fuel tank only in designated locations. Battery Acid spills may need to be reported to management.
- Use protective equipment when changing batteries or handling electrolyte. Equipment includes: safety glasses, neoprene gloves, apron, chemical face shield and steel toed safety shoes. Hoisting equipment must be provided for changing batteries, and spill cleanup equipment must be accessible for spilled electrolyte.
- Always use the seatbelt.
- Inspect forklifts at the beginning of each work-shift.
- Inform your supervisor if you are taking any medications that may impact your ability to use the forklift.

Forklift

Safety and Overhead Guards

- High Lift Rider trucks must be fitted with an overhead guard, unless operating conditions do not permit.

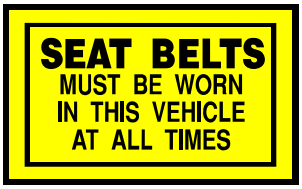


Backrest Extension

- If the type of load presents a hazard, fork trucks will be equipped with a vertical load backrest extension.

Forklift

Vehicle Requirements



- Restraint systems such as seat belts must be worn at all times when vehicles are equipped with them.

- Inspect equipment at the beginning of each user's shift.
- Ensure defective equipment is immediately removed from service (including all electric, mechanical, and hydraulic components) and repaired by authorized personnel before reuse.
- All trucks must be labeled with the truck weight and attachment weight and the maximum elevation allowed. This label should be maintained in a legible and readable condition.

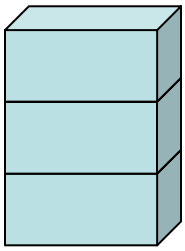
- Modifications to vehicles are not allowed without manufacturer's written approval.
- Where provided on EE or EX rated PITs, the cover of the battery compartment must be closed and locked.

- Platforms attached to the forks for elevating personnel must have guardrail systems on all sides. Fall protection may be required in addition to the guardrail system.

Material Handling

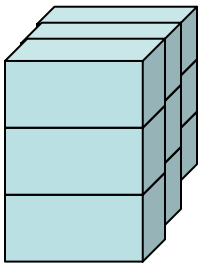
Size, Shape, and Stability of Stacks

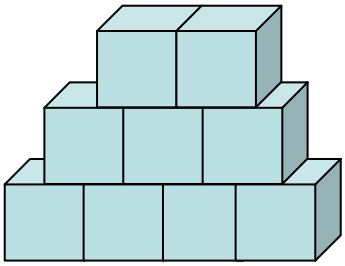
The most common forms are:



Column - single units are placed one above the other

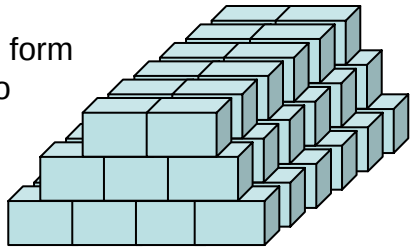
Square or rectangular – several column stacks placed side by side, with all sides vertical





Pyramid – succeeding tiers of material, where the area is reduced with each successive tier

Triangular – stacks in stepped or tiered form on two opposing sides with the other two opposing sides being vertical



Material Handling

Size, Shape, and Stability of Stacks

The most common formations are:

Column – single units placed one above the other

Square or Rectangular – several column stacks placed side by side with all sides flat

Pyramid – tiers of material stacked with the top surface area reducing with each successive tier

Triangular – stacks arranged in stepped or tiered form on two opposing sides with the other two opposing sides being flat

Stability

The stability of the materials depends on:

- the type of containers (boxes, sacks, or bins) or the shape of materials not in containers
- the ratio of the stack height to base (should not exceed 3:1)
- the aggregate weight of the stack in relation to the weight-bearing capability of the lower items in the stack, and
- the placement of materials on the stack (sliding materials on may cause lower tiers to shift).

Increasing Stability

- Materials may be strapped or bonded to prevent overhanging materials from impacting stability.
- Some materials may be interlocked to create “natural bonding,” or nesting.
- Canvas sheeting, battens, or piling sticks may be used to prevent pipe and other rounded material from shifting or to create an artificial bond between layers of differently shaped materials.
- Tarps, if used as coverings, must be secured to independent anchors, rather than to the stacked material or storage device, to reduce the effects of wind sheer.

Remember: Environmental conditions (heat expansion, cold contraction, and strong winds) must be accounted for when stacking materials outside or in artificial environmental extremes.

Material Handling

Storage Structures and Pallets

Materials Storage and Stacking Structures

Racks, shelving, bins, pallets, and other structures designed to hold materials in storage must be:

- of adequate strength to hold the necessary weight, even if the contents become waterlogged due to fire suppression
- secured from tipping in case of collision with material handling equipment, and
- have protected corners.

Shelving/racks must :

- be approximately 17 inches from walls (Most walls are not of sufficient strength to accommodate the added pressure of abutted stacks and materials; this also accommodates stack integrity inspections.)
- have sufficient aisle width to accommodate material handling equipment and placement/removal of material, and
- be non-combustible and incapable of retaining water.

Pallets

Pallets must be:

- of sound construction
- of adequate strength to accommodate loads and the conditions of use (including outdoor environments), and
- regularly inspected for damage and wear.

Stacked Pallets

- Lower pallets must be capable of withstanding and supporting additional weight and stressors.
- Loads must be stabilized in structures or through bonding, taping, shrink wrapping, or other means.
- No more than 3 tiers of palletized materials may be stacked on top of one another.
- Extra caution must be used to prevent damage to lower materials and pallets.
- Stacked pallets must be placed on top of one another, not slid into place.

Other Information

- Secure materials where vibration could influence the stability of materials.
- Aisles must be clearly marked and maintained.
- Stacked materials must have 18 inches clearance from ceilings or sprinkler heads.
- Materials stacked in storage areas must have 3 feet of clearance between stacks.
- Materials may not be stacked near heating/cooling vents or lighting systems.
- Stacking of equipment near electrical or mechanical apparatus is prohibited.
- Safe access-ways, walkways, ladders, or platforms must be provided for employees who are required to climb or remove materials from stacks, shelves, and fixtures.
- Do not block fire extinguishers or exits.

Housekeeping

Walking and Working Surfaces

- All places of employment, passageways, storerooms, and service rooms must be kept clean, orderly, and in a sanitary condition.

- The floor of every workroom must be maintained in a clean and dry (when possible) condition. Where wet processes are used, drainage must be maintained; and where practical, false floors, platforms, mats, or other dry standing places should be provided.

- To facilitate cleaning, every floor, working place, and passageway must be kept free from protruding nails, splinters, holes, or loose boards.

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Material Handling

Stacking Different Types of Materials

General – Stack containers together that are alike (boxes with boxes, bags with bags). Strap them if needed. Be careful containers do not shift when they are moved.

Glass Bottles and Jars – Place glass bottles and jars inside boxes or cartons, or use spacers or cardboard between rows.

Bags – Stack bags as flat as possible in rows. Use spacers or cardboard between layers, or crisscross the pattern to provide more stability.

Cases and Boxes – Stack cases and boxes upright. Strap or bond them if possible. Upper rows may not hang farther out than the lower rows or they will tip over.

Cartons – Try to stack heavier cartons on the bottom. Use spacers or cardboard between rows if possible.

Bales – Stack bales so they lean into their center.

Coiled Wire – Lay coiled wire flat. Use wedges on the side if needed or tie the stack to prevent spreading.

Piping and Tubular Materials – Piping and tubular material should be placed in special racks with side bars or stakes to prevent shifting, rolling, or collapse. Always remove the material from the top to keep the stack stable.

Sheet Materials – Sheet materials may be stored flat. When flat storage is impossible, side supports or bottom wedges should be used to prevent the stacks from sliding outward.

Drums, Casks, and Cylinders – Drums, casks, and cylinders should be stored and stacked upright, unless a specialized racking system is used.

Ergonomics

Vibration

Exposures:

- Bad power tool design – even new tools can expose employees to excessive vibration if they are not designed with devices that dampen or shield employees from vibration
- Poor power tool maintenance
- Old power tools

Controls:

- Use low vibration tools.
- Use vibration dampeners or shields to isolate the source of vibration.
- Inspect and maintain power tools regularly.
- Limit the duration of tasks that involve vibration, and rotate tasks among employees.

Hand and Portable Power Tools

When using portable powered and hand tools:

- Dress appropriately for the job.
- Do not wear loose clothing or dangling jewelry.
- Confine long hair in a hairnet, cap, or fasten it securely to the back of the head.
- Use care when wearing gloves, as glove fingers can be pulled into spinning tools.
- Wear safety glasses. They are the minimum requirement when using any power tool. Additional PPE requirements may be necessary depending on the tool being used and job application (for example, face shield, side shields, goggles, etc.).
- Use hearing protection, if required.

Use tools according to the manufacturer's guidelines and recommendations.

Do not set down or carry a portable power tool in a way that the starting trigger or button can be accidentally struck and activated and take proper precautions when using tools in a wet location (for example, use electrically insulated gloves where necessary).

Inspect tools prior to use. Tools should undergo a thorough inspection at least annually. Attend training, as needed or required and always use the correct tools for the task and for their intended purpose only.

Tool Maintenance

- Maintain tools in good working order.
- Remove defective tools from use. Tag them or otherwise identify them as defective.
- Do not change or modify tools.
- Do not abuse power cords or hoses. Never carry tools by the cord or hose, or yank on the cord to disconnect it from outlets and receptacles. Protect cords and hoses from heat, oil, and sharp edges.

Cords and hoses should not be allowed to present or create a tripping hazard.

KNIFE SAFETY

Knife use is common in many types of work and everyday life however safe knife handling and use is necessary to avoid what can be severe injuries.

Only use knives for their intended use. Don't use them as screw drivers, bottle openers, for prying things open, etc. This is not the intended use and can cause injuries.

Knife Condition

Inspect knives to make sure they are in good condition including the blades and handles. Sharper is safer. Dull knives need more pressure applied and the risk of injury is increased.

Knife Use

Whether using a box cutter or kitchen cutlery, it is safer if you push the knife away from yourself when cutting. You may pull the knife toward you, if you stand to the side or pull the knife at an angle away from your body. Do not pull a knife directly toward you.

Avoid using excessive force or awkward postures. Keep your hands and/or other body parts away from the point of operation. If you must place your other hand on the container or material being cut, keep your hands and fingers out of the path of the knife, and far enough away from the point of operation so that if the knife does slip, it will not contact your other hand.

When using the knife and the knife falls for whatever reason, never ever try to grab a falling knife. If a knife is falling, jump away from it and let it fall. Make sure you are far away from it. For this same reason don't leave knives lying near edges of tables/shelves or where they can fall easily. Never throw a knife, run or climb with a knife that is not sheathed or guarded..

BE ATTENTIVE

Many injuries from knife use are due to distraction and inattentiveness. Focus on the material you are cutting and how you are cutting it. Rushed or hurried use of a knife increases the likely hood of an accident or injury.

Always store knifes properly after usage – proper storage preserves the condition of the knife and prevents unintended injury.

Self-retracting blades *– Self retracting blades are designed to retract into the knife handle by spring operation. When using a box cutter with a self-retracting blade, DO NOT keep your finger on the sliding button used for pushing the blade out unless that pressure of the material will not keep the blade from retracting on its own. This type of blade is designed to stay in the material it is intended to cut and retract safely back into the handle once the cut has been made. By holding the blade button out while cutting you are defeating the purpose of this safety feature.*

Hand & Portable Power Tools

General Responsibilities

- Inspect tools prior to use. Tools should undergo a thorough inspection at least annually.
- Attend training, as needed or required.
- Use tools for their intended purpose only.
- Use the correct tool for the task.
- Maintain tools. Remove defective tools from use. Tag them or otherwise identify them as defective.
- Use only company provided tools. Employees may not bring tools from home into the workplace.
- Any injury involving tools should be reported to a supervisor immediately.
- Do not change or modify tools.
- Do not abuse power cords or hoses. Never carry tools by the cord or hose, or yank on the cord to disconnect it from outlets and receptacles. Protect cords and hoses from heat, oil, and sharp edges.
- Cords and hoses should not be allowed to present or create a tripping hazard.

Hand & Portable Power Tools

Methods of Guarding Tools

One or more methods of guarding must be provided where required to protect the operator and other employees in the area from hazards such as those created by point of operation, in-running nip points, rotating parts, flying chips, and sparks.

Examples of guarding methods include barrier guards, two-hand tripping devices, or electronic safety devices.

The guard must not be an accident hazard in itself.

Employees must:

- Inspect tools without guards for signs of guard removal. If it is evident that a guard is required, tag-out the tool and obtain a replacement. Tools must not be energized during inspection.
- Inspect tools having guards for proper operation and maintenance prior to use. Tools must not be energized during inspection.
- Never remove a guard during use.

Hand & Portable Power Tools

Pre-Use Inspection

Prior to each use, visually inspect all portable electric tools and accessories for damages or defects. Check the following:

Portable electric tools

- tool general condition
- cord, for damage or deterioration
- cord grip tightness
- plug cap condition (grounding prong integrity)
- extension cords and equipment for loose parts and damaged cords
- portable GFCIs (test per manufacturer's specifications)

Attachment Plug/Connector Body/Cord

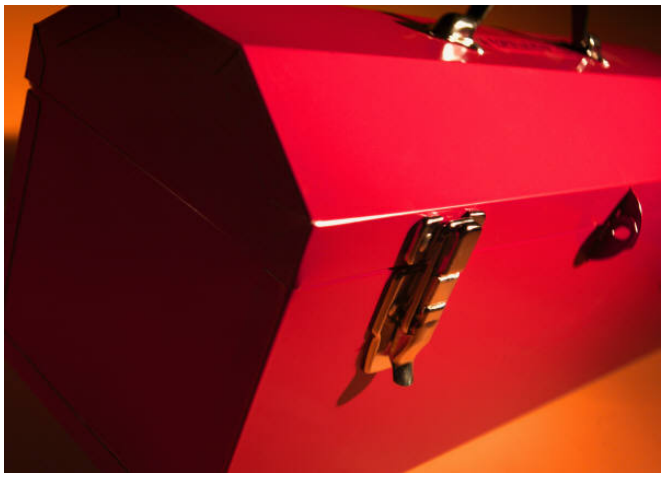
- general condition
- cord grip tightness
- grounding prong integrity
- polarization integrity
- condition of outer cord jacket (cord must not be spliced); must be replaced if outer jacket is damaged
- boot and visible parts of body for damage, loose parts, or deterioration
- portable lights
- handle, guard, and other visible parts for damage, loose parts, or deterioration
- lamp (should be rough-service type)
- low voltage lights (12 volts) to ensure that transformer has not been bypassed
- lamp voltage rating

Before using the tool, check the workplace for hazards such as nails, defects in the surfaces, or similar imperfections.

Hand & Portable Power Tools

Storage and Handling

- Disconnect tools when not in use.
- Never lubricate, clean, repair, or adjust a tool while it is connected to a power source.
- Clean all scrap and debris from the work table and surrounding area after a job is finished.
- Take care of all tools. Keep them sharp and clean. Follow manufacturer's instructions for lubrication, changing accessories, and inspection.
- Store all tools in their proper location.



Hand & Portable Power Tools

Taking Precautions

Power tools can be hazardous when used improperly. There are different types of hazards based on the power source used, such as electric, liquid fuel, hydraulic, pneumatic, and powder-actuated.

- Operate power tools within their design limitations only.
- Use the required eye protection; gloves and safety footwear are recommended during operation.
- Store tools in an appropriate dry location when not in use.
- Work only in well lit locations.
- Do not carry tools by the cord or hose.
- Do not yank on the cords or hoses to disconnect tools from the receptacle.
- Keep cords and hoses away from heat, oils, sharp edges, and any other material that could cause damage.
- Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.
- Keep observers at a safe distance at all times.
- Secure work with clamps or a vice where possible to free both hands to operate tools.
- Do not carry a tool while holding the start button or trigger.
- Maintain tools in a clean manner and in good condition.
- Ensure that proper shoes are worn and that the work area is kept clean to maintain proper footing and good balance.
- Do not wear loose clothing, ties, or jewelry.
- Remove damaged tools from service immediately and label with "Do Not Use." Report them and turn them over to the job site supervisor for repair.
- Remove all cracked saws from service.
- Properly ground all electric power tools.
- Do not use compressed air for cleaning purposes except where reduced to less than 30 p.s.i. and then only with effective chip guarding and safety glasses worn.

Hand & Portable Power Tools

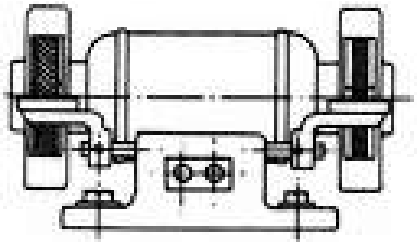
Tool Guarding and Safety Requirements

Abrasive Wheel Grinders

Abrasive wheels should only be used on tools/equipment provided with safety guards. (A safety guard is an enclosure designed to restrain the pieces of the grinding wheel and furnish all possible protection in the event that the wheel is broken in operation.)

note: Wheels 2 inches or smaller in diameter are exempt from the guarding requirements.

Rest plates for resting the work while grinding must be between ⅛ and ¼ inch from the wheel surface.



Guard Covers

Employees must ensure that a safety guard covers any spindle end, nut, and flange projections. The safety guard should be mounted to maintain proper alignment with the wheel, and the strength of the fastenings should exceed the strength of the guard.

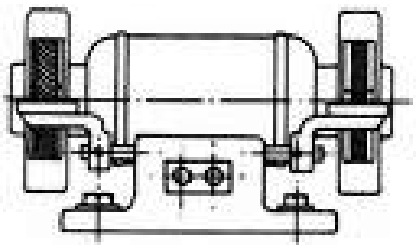
exception: Safety guards on all operations where the work provides a suitable measure of protection to the operator may be constructed so that the spindle end, nut, and outer flange are exposed. Where the nature of the work is such that it entirely covers the side of the wheel, the side covers of the guard may be omitted.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Abrasive Wheel Grinders – General Safety Precautions

- Before being mounted, the wheel should be inspected closely and sound- or ring-tested to be sure that it is free from cracks or defects.
    - To test, wheels should be tapped gently with a light non-metallic instrument. If it sounds cracked or dead, they could fly apart in operation and must not be used. A sound, undamaged wheel will give a clear metallic tone or ring.
- The spindle speed of the machine should be checked before mounting the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel.
- Grinding wheels should fit freely on the spindle and remain free under all grinding conditions.
    - A controlled clearance between the wheel hole and the machine spindle (or wheel sleeves or adaptors) is essential to avoid excessive pressure from mounting and spindle expansion. To accomplish this, the machine spindle must be standard size and the wheel hole should be suitably oversized to assure safety clearance under the conditions of operating heat and pressure.
- Employees should not be directly in front of the wheel as it accelerates to full operating speed.
- Employees must always use eye protection.
- The power must be off when not in use.
- Never place a hand-held grinder in a vise.
- Wheels must be free of foreign material.



Hand & Portable Power Tools

Tool Guarding and Safety Requirements

High Velocity Tools

- In all cases, employees must follow the manufacturer's criteria for pre-use inspections.

- High velocity tools or machines, when used with a load, propel or discharge a stud, pin, or fastener at a velocity that exceeds 300 ft./second measured at 6.5 ft. from the muzzle of the barrel. These tools affix the fastener to another object or material.

- A hammer-operated piston tool, low-velocity type, is a tool which uses a heavy mass hammer supplemented by an explosive charge which moves a captive piston to drive a stud, pin, or fastener into a work surface.

- Always start the fastener at rest and in contact with the work surface.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Jacks

- A jack is an appliance for lifting and lowering a load by application of a pushing force. Jacks may be either lever and ratchet, or screw and hydraulic types.
- Jacks must have a rating sufficient to lift and sustain the load. The rating of a jack is the maximum working design load.
- The rated load of the jack must be legibly and permanently marked in a prominent location on the jack by casting, stamping, or other suitable means.
- In the absence of a firm foundation, the base of the jack should be blocked. If there is a possibility of slippage of the cap, a block should be placed in between the cap and the load.
- The operator should watch the stop indicator, which should be kept clean, in order to determine the limit of travel. The indicated limit must never be overrun.
- After the load has been raised, it must be cribbed, blocked, or otherwise secured at once.
- Hydraulic jacks exposed to freezing temperatures should be supplied with adequate antifreeze liquid.
- All jacks should be properly lubricated at regular intervals.
- Jacks which have been out of the operator's control and used by another person must be inspected prior to use.
- Jacks that have experienced failure must be discarded.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Low Velocity Tools

- In all cases, employees must follow the manufacturer's criteria for pre-use inspections.
- Low velocity piston tools use a piston designed to be captive to drive a stud, pin, or fastener into a work surface. It will not cause such stud, pin, or fastener to exceed velocity greater than 300 ft./second measured at 6.5 ft. from the muzzle of the barrel.

- Fasteners driven by low velocity tools should not be driven directly into materials such as brick or concrete within 2 inches from the edge or corner, or into steel surfaces within ¼ inch from the edge or corner, unless a special guard, fixture, or jig is used.
- Fasteners driven through wood or other materials into concrete may not drive greater than 7/32 inch into the concrete and must be 2 inches or more from the edge.
- If tools are defective, or develop defects during use, fasteners may not be driven through existing holes without a positive guide to secure accurate alignment.
- Fasteners may not be driven into a spalled area.
- Tools may not be used in an explosive or flammable vapor atmosphere.
- All tools should be used with the correct shields or guards attached to the muzzle of the tool.
- All tools must be in good working condition. Defective tools must be removed from service immediately.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Pneumatic Power Tools and Hoses

- Employees must be thoroughly familiar with and use strict work practices in accordance with the manufacturer instructions. Prior to use, the following requirements should be complied with:

- Tool retainers must be installed on each piece of utilization equipment which, without such a retainer, may eject the tool.
- Air hoses and hose connections used for conducting compressed air to utilization equipment should be compatible with the pressure and service to which they are subjected.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Portable Belt Sanding Machines

Safety guards must be provided at each nip point where the sanding belt runs onto a pulley.

These guards will effectively prevent the hands or fingers of the operator from coming in contact with the nip points.

The unused run of the sanding belt must be guarded against accidental contact.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Portable Circular Saws

All portable, power-driven, circular saws having a blade diameter greater than 2 inches must be equipped with guards above and below the base plate or shoe.

The upper guard must cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. (This does not apply to circular saws used in the meat industry for meat cutting purposes.)

For authorized use, the following conditions must be met:

- An upper guard must cover the entire blade of the saw.
- A retractable lower guard must cover the teeth of the saw.
- Except when it makes contact with the work material, the lower guard must automatically return to the covering position when the tool is withdrawn from the work.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Powder or Explosive Actuated Fastening Tools

- Employees must be thoroughly familiar with and adhere to strict work practices.
- Operators and assistants must wear eye protection.
- Head and face protection may be required.
- Before use, employees must inspect tools to determine if they are clean, that moving parts operate freely, and the barrel is free from obstruction.
- If tools are defective, or develop defections during use, they must immediately be removed from service.
- Tools must not be loaded until just prior to the intended firing time.
- Neither loaded nor empty tools should be pointed at any person at any time.
- Loaded tools should never be left unattended.
- Tools must be kept restricted and unavailable to unauthorized persons.
- Do not drive fasteners into very hard or very brittle materials, or materials that are easily penetrated. This may create a missile projection hazard by the fastener.
- In case of a misfire:
  - Know the manufacturer's instructions.
  - Hold the tool in the operating position for 30 seconds.
  - Attempt a second firing.
  - Wait another 30 seconds, holding the tool in the operating position.
  - Remove the explosive load in strict adherence to the manufacturer's instructions.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Power Lawnmowers

- Employees must be thoroughly familiar with, and adhere to, strict work practices during use.
- Power lawnmowers must have power-driven chains, belts, and gears guarded to prevent accidental contact during normal starting, mounting, and operation of the machine.
- A shutoff device should be provided to stop operation of the motor or engine. This device will require manual and intentional reactivation to restart the motor or engine.
- All positions of the operating controls should be clearly identified.
- The words "Caution. Be sure the operating controls are in neutral before starting the engine." should be clearly visible at the engine starting control on self-propelled mowers.
- The mower blade should be enclosed (except on the bottom) at least to the lowest position of the blade.
- Guards, which must be removed to install a catcher assembly, should be affixed to the mower near the opening. A statement must appear on the mower stating that it is not to be used without either the catcher assembly or the guard in place.
- The word "Caution" (or stronger wording) must be placed on the mower at or near each discharge opening.
- Proper precautions must be taken during refueling.
- Mowing equipment should never be left unattended while running.
- The operator should be constantly mindful of people working near the operation of the mower.

Hand & Portable Power Tools

Tool Guarding and Safety Requirements

Vertical Portable Grinders

- Employees must be thoroughly familiar with, and use and adhere to, strict work practices during use.

- Safety guards used on machines known as right angle head or vertical portable grinders must have a maximum exposure angle of 180° and the guard should be located between the operator and the wheel during use. This is to deflect pieces of an accidentally broken wheel away from the operator.

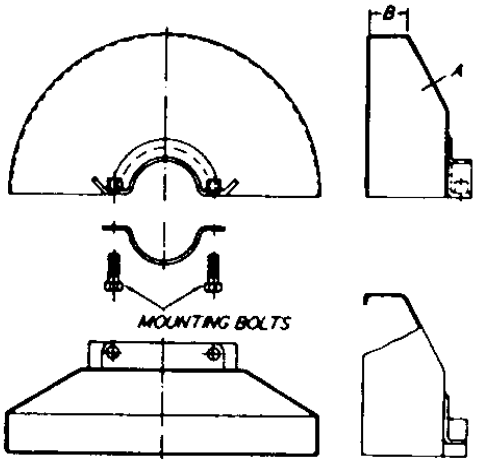


FIGURE NO. P–4

- Other portable grinders. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on other portable grinding machines must not exceed 180°, and the top half of the wheel must be enclosed at all times
- Portable grinding is a grinding operation where the grinding machine is designed to be hand held and may be easily moved from one location to another.

Hand & Portable Power Tools

Tool Repair

- All electric tool repairs must be made by the company-designated repair person.
- Cords, plugs and connector bodies may be replaced by a person with an electrical background.
- No repairs may be made to portable GFCIs.

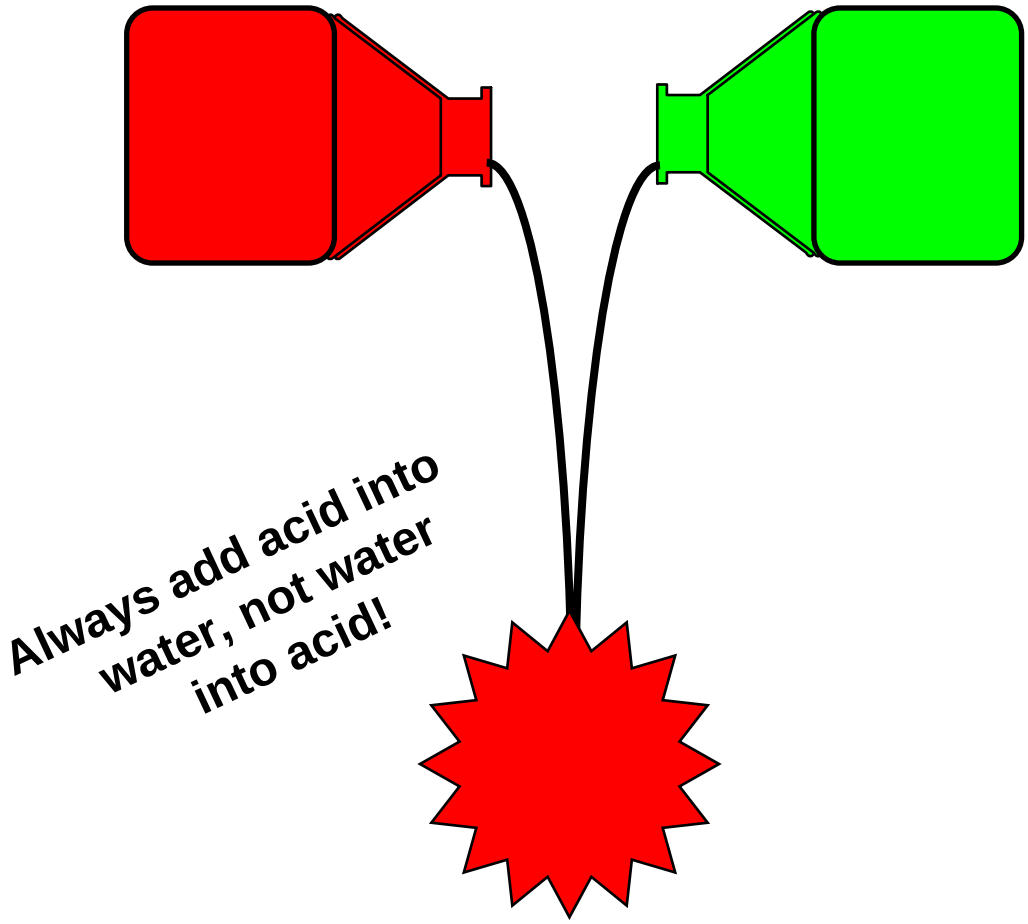
Hand & Portable Power Tools

Using Tools Safely

- Dress appropriately for the job.
  - Do not wear loose clothing or dangling jewelry.
  - Confine long hair in a hairnet, cap, or fasten it securely to the back of the head.
  - Use care when wearing gloves, as glove fingers can be pulled into spinning tools.
  - Wear safety glasses. They are the minimum requirement when using any power tool. Additional PPE requirements may be necessary depending on the tool being used and job application (for example, face shield, side shields, goggles, etc.).
  - Use hearing protection, if required.
- Use all tools according to the manufacturer's guidelines and recommendations.
- Keep cutting tools in good condition. Sharpen or replace them when necessary.
- Never use your fingers to pull or dislodge chips or turnings from tools or parts. Use pliers, rakes, or hooks.
- In some areas, compressed gas lines have been installed for specific uses. Be sure that air powered tools are hooked up only to air lines.
- Do not set down or carry a portable power tool in a way that the starting trigger or button can be accidentally struck and activated.
- Take proper precautions when using tools in a wet location (for example, use electrically insulated gloves).

Handling Corrosive Liquids

Check for Compatibility!



A violent reaction may take place and extreme heat may be released when an acid and a base are mixed together.

Handling Corrosive Liquids

Personal Protective Equipment

What type of equipment is needed and why?

- **Safety glasses with side shields** prevent chemical splashes into the eye. They are the minimum requirement for handling chemicals.

- **Chemical safety goggles** are required when large amounts of chemicals are handled or poured. Goggles provide a full range of protection for the eye area.

- **Face shields** are required when corrosive chemical splashing or spattering could occur. Face shields protect the entire facial area from exposure to the splashing chemicals.

- **Gloves** (preferably longer gloves that provide protection to the forearm) are required to protect the employee's skin (hands and forearms) and clothing from contact with chemicals. Chemicals that contact clothing can soak into the cloth and continue to irritate or damage the skin of the arms or body.

Hazard Communication and SDS

Access to Safety Data Sheets (SDS)

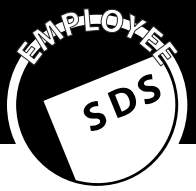
SDSs should be accessible to you at all times in emergency situation. SDSs may be kept at one primary location, if there are multiple locations or job sites.

SDSs may be kept in either hard copy or electronic form, as long as they are accessible.

If you request a copy of an SDS in a non-emergency situation, your company must provide that within 8 working hours.

If you request a copy of an SDS to keep, your company has 15 days to provide it to you.

Hazard Communication and SDS



Employee Information

Employers must provide employees with effective information on hazardous chemicals in their work area.

Information must be provided at the time of initial job assignment and whenever a new physical or health hazard is introduced into the work area.

Information may be designed to cover categories of hazards (such as flammability or carcinogenicity) or specific chemicals.

Chemical-specific information must always be available through labels and safety data sheets.

<u>Information must include</u>:

- the requirements of the standard
- the areas where chemicals are used, and
- the location of the written program, the chemical list, and safety data sheets.

Hazard Communication and SDS

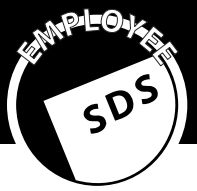
General Applicability

Your Right to Know

You have the right to know about the hazards of any chemicals you work with and how to best protect yourself from those hazards.

You must be trained, your company must maintain a written plan and safety data sheets, and chemical containers must be clearly labeled.

Hazard Communication and SDS



The Parts of an SDS

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*

Section 13, Disposal considerations*

Section 14, Transport information*

Section 15, Regulatory information*

Section 16, Other information, includes the date of preparation or last revision.

*Note: Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15(29 CFR 1910.1200(g)(2)).

Hazard Communication and SDS

What Chemicals are Included?

IF…

you have only “consumer products”
(those you can buy at a grocery store)

AND…

you use them ONLY as they are
intended

THEN…

you do not need to comply with the
hazard communication requirements.

Any other use, handling, or storage of chemicals for production or manufacturing (or any liquid medications used in the medical industry) are covered under the regulation.

Material Handling

Materials Segregation

- Keep flammable liquids, gas cylinders, aerosols separated from other materials.

- Keep reactive materials (such as acids and bases) separate from each other.
- Keep flammable materials out of direct sunlight.
- Separate hazardous materials by type of material (flammable, corrosive, or other designation). Check the labels and symbols on the containers.
- If flammable materials are open to the air, do not use electrical equipment in the same area.

- Always know what type of gloves and other personal protective equipment are needed, and use them.
- Store compressed gas cylinders upright and secured with chains or straps, or store them in a specialized racking system. Keep them away from direct sunlight, if possible.
- Make sure all materials and containers have labels on them. Labels should include the name of the manufacturer, the name of the material, and either numbers or symbols that indicate the hazards of the material.

Communication of Chemical Hazard

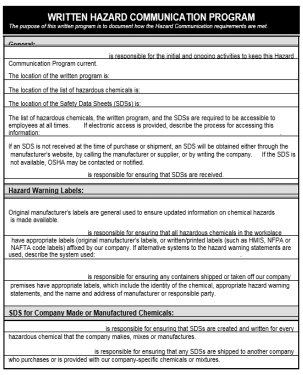
Why chemical safety and the need for Hazard Communication?

Ø Millions of workers are exposed to chemicals on a daily basis.
Ø There are approximately 1 million existing chemical products.

Concern over protecting workers against the harmful effects of chemical exposures prompted OSHA to issue the Hazard Communication Standard. The OSHA hazard communication regulation 29CFR1910.1200 is commonly referred to as the **"Right To Know"** standard.

The standard is based on a simple concept that you have both a need and a right to know the hazards and identities of the chemicals you are exposed to when working.

Chemical exposure may cause or contribute to many serious health effects such as heart ailments, central nervous system, kidney and lung damage, sterility, cancer, burns, and rashes. Some chemicals may also be safety hazards and have the potential to cause fires and explosions and other serious accidents.



WRITTEN HAZARD COMMUNICATION PROGRAM

The purpose of this written program is to document how the Hazard Communication requirements are met.

General:

_____ is responsible for the initial and ongoing activities to keep this Hazard Communication Program current.

The location of the written program is: _____

The location of the list of hazardous chemicals is: _____

The location of the Safety Data Sheets (SDSs) is: _____

The list of hazardous chemicals, the written program, and the SDSs are required to be accessible to employees at all times. If electronic access is provided, describe the process for accessing this information: _____

If an SDS is not received at the time of purchase or shipment, an SDS will be obtained either through the manufacturer's website, by calling the manufacturer or supplier, or by writing the company. If the SDS is not available, OSHA may be contacted or notified.

_____ is responsible for ensuring that SDSs are received.

Hazard Warning Labels:

Original manufacturer's labels are general used to ensure updated information on chemical hazards is made available.

_____ is responsible for ensuring that all hazardous chemicals in the workplace have appropriate labels (original manufacturer's labels, or written/printed labels (such as HMIS, NFPA or NAFTA code labels) affixed by our company. If alternative systems to the hazard warning statements are used, describe the system used: _____

_____ is responsible for ensuring any containers shipped or taken off our company premises have appropriate labels, which include the identity of the chemical, appropriate hazard warning statements, and the name and address of manufacturer or responsible party.

SDS for Company Made or Manufactured Chemicals:

_____ is responsible for ensuring that SDSs are created and written for every hazardous chemical that the company makes, mixes or manufactures.

_____ is responsible for ensuring that any SDSs are shipped to another company who purchases or is provided with our company-specific chemicals or mixtures.

The basic requirements of the Hazard Communication standard are:

- A written hazard communication program maintained by your employer and made available to you
- A list of hazardous chemicals used or stored in your workplace
- A copy of Safety Data Sheets (SDS) for each chemical (obtained from the manufacturer)
- Training for you to include how the program is implemented in your workplace, reading, understanding and how to use labels, SDS, and procedures on how to work safely with and protect yourself from chemical hazards

Chemical Hazard Communication.

YOUR RESPONSIBILITIES FOR CHEMICAL SAFETY AT WORK

Know where your Hazard Communication written program is kept and that you can reviewed it at anytime. The program includes:

- ✓ A list of hazardous chemicals
- ✓ Labeling requirements
- ✓ The use & purpose of SDS
- ✓ A description of your training requirements and process
- ✓ Contractor requirements and non-routine tasks

Before starting any task when working with chemicals, identify the hazards by reading the labels and SDSs for those chemicals. Be familiar with and follow your employers instructions and warnings regarding the chemicals you are working with. SDSs should be accessible to you at all times in an emergency situation and you should be familiar with their location. SDSs may be kept at one primary location, if there are multiple locations or job sites and can be either hard copy or electronic.

KNOW THE HAZARDS

Physical Hazards are sudden violent reactions such as an explosion or fire. Some examples are:
Flammable -flash point 100 f or less
Reactive - mixing chemicals together will result is extreme heat given off, a gas, or explosion
Oxidizer- means a chemical that gives off oxygen in a fire or heat situation, causing the fire to burn harder, stronger and faster
Explosive - is a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature

Health Hazards means the ability of a chemical to affect your health either quickly (acutely) or over a long period of time (chronic). Some examples are:

Corrosives – a substance that destroys or changes skin tissues on contact
Carcinogen is a substance that may cause cancer
Toxic which can cause damage to human organs
Irritant can harm the skin, lungs or eyes at the sight of contact
Sensitizer is an allergic reaction in normal tissue after repeated exposure to the chemical
Target organ effects is a substance that damages a specific body organ or system such as the liver, kidneys, reproductive system or central nervous system

Exposure to chemical hazards can be through various routes of entry including:
Inhalation – absorbed through the lungs into the bloodstream
Absorption - absorbed through the skin or eyes
Ingestion - absorbed through the gastrointestinal tract from eating, drinking or smoking
Injection – can get in your body by broken glass, spray guns, needles, compressed air, knives etc.

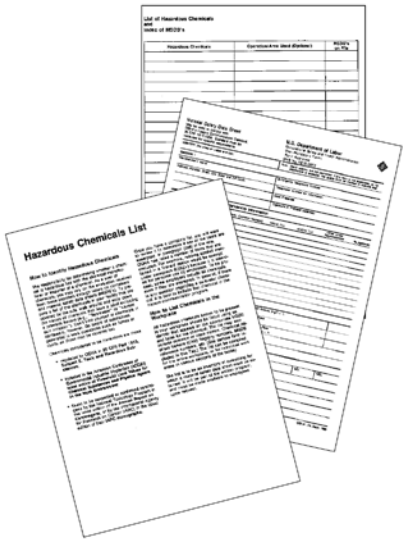
In the event of a release you should know what actions to take to protect yourself as well as clean up the chemical following a release or spill.. A release can be detected by monitoring devices/detectors, can be visible or detected by irritation to your eyes, nose or throat or can be audible as in the sound of pressurized gas leaking.

Chemical Hazard Communication

READING SDSs

SDS can vary in format from one manufacturer to another and contain technical information. Nevertheless it is your responsibility to read the SDS of the chemicals you work with in their entirety. With experience you will become more familiar with locating and understanding information contained in them. They are divided into the following information categories:

1. Identification of the substance or mixture and of the manufacturer or supplier
2. Hazards identification and classification
3. Composition/Information on ingredients
4. First aid measures
5. Firefighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls and Personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information and revision date



Manufacture Label

ToxiFlam (Contains: XYZ)

Danger! Toxic If Swallowed, Flammable Liquid and Vapor

Do not eat, drink or use tobacco when using this product. Wash hands thoroughly after handling. Keep container tightly closed. Keep away from heat/sparks/open flame. - No smoking. Wear protective gloves and eye/face protection. Ground container and receiving equipment. Use explosion-proof electrical equipment. Take precautionary measures against static discharge. Use only non-sparking tools. Store in cool/well-ventilated place.

IF SWALLOWED: Immediately call a POISON CONTROL CENTER or doctor/physician. Rinse mouth.

In case of fire, use water fog, dry chemical, CO2, or "alcohol" foam.

See Safety Data Sheet for further details regarding safe use of this product.

MyCompany, MyStreet, MyTown NJ 00000, Tel: 444 999 9999

The Manufacture label has 6 primary parts:

1. **Product identifier** – chemical name or number used for a hazardous chemical.
2. **Signal word** – a word used to indicate the relative level of severity of hazard. The signal words are Danger (more severe hazards) and Warning (less severe hazards)
3. **Hazard statement(s)** – a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriated the degree of hazard.
4. **Pictograms** – a symbol intended to convey specific information about the hazards of the chemical. *The Pictograms must have a red border.*
5. **Precautionary statement** – a phrase that describes recommended measures to be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling of a hazardous chemical.
6. **The chemical manufacturer's information** - name, address and telephone number or other responsible party's information.

GHS Pictograms

Pictograms alert users of the chemical hazards to which they may be exposed. Each pictogram represents a distinct hazard(s). The pictogram on the label is determined by the chemical hazard classification.

- Oxidizers

- Flammables
- Self Reactives
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Organic Peroxides

- Explosives
- Self Reactives
- Organic Peroxides

- Acute toxicity (severe)

- Corrosives

- Gases Under Pressure

- Carcinogen
- Respiratory Sensitizer
- Reproductive Toxicity
- Target Organ Toxicity
- Mutagenicity
- Aspiration Toxicity

- Environmental Toxicity

- Irritant
- Dermal Sensitizer
- Acute toxicity (harmful)
- Narcotic Effects
- Respiratory Tract
- Irritation

Hazardous Waste

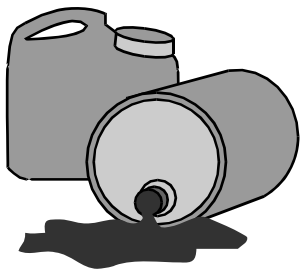
Employee Responsibilities

- Attend training, as needed or required.
- Know the emergency and spill response procedures.
- Know the location of the written plan and procedures for the wastes that are handled or stored.
- Know where the designated storage area is located.
- Ensure containers in storage have closures or bungs on them.
- Participate in medical surveillance processes, as needed or required.
- Know how to operate any control equipment used to prevent exposures (ventilation systems, enclosures, etc.).
- Inspect primary and secondary containment structures, as needed or required.
- Report all leaks, spills, or other potentially dangerous situations.

Hazardous Waste

General Spill Procedure

- **Never place yourself or others in danger during an emergency situation.**
- Determine source and nature of the spill.
- Use the appropriate protective equipment when handling chemicals based on your personal knowledge, technical data, or Safety Data Sheets (SDSs).
- **If you are unsure of the proper procedures, equipment, or general safety actions, do not attempt to remediate or clean-up the spill.**
- Try to stop the spill at the source.



- Contain the spill with absorbent material, if possible.
- Notify your immediate supervisor.
- Your supervisor will notify the Hazardous Materials Response Team.
- Complete a spill report for the company files.

Hazardous Waste

General Waste Storage Requirements

- Hazardous waste must be stored in a designated "Hazardous Waste Storage Area."
- Maintain separate storage areas for flammables, caustics, and toxic waste.
- Store all drums upright with sealed lids and bung caps securely in place.

- Remove hazardous waste for off-site treatment/disposal within 90 days, unless the company is exempted for longer storage times under state or federal small quantity generator requirements.
- Spill control procedures and either spill clean-up equipment or emergency response capabilities must be available in the event of a spill or release.
- Residual waste oils are generally considered non-hazardous, although there are some state exceptions (such as in California). These materials must be collected and disposed of in accordance with federal, state, and local requirements.

Hazardous Waste

Site-specific Program Requirements

The company must develop a Hazardous Waste Operations Safety Program that must be kept on site.

The program must address the safety and health hazards of each phase of site operation and include the requirements and procedures for employee protection.

The program must include the following:

- a risk or hazard analysis for each site task and operation
- employee training assignments and records
- a list of the personal protective equipment used by employees for each site task and operation
- medical surveillance documentation (exam results, etc.)
- a list of the frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation used, including methods of maintenance and calibration of monitoring and sampling equipment used
- site spill and leak control measures
- decontamination procedures
- a written emergency response program, including the necessary PPE and other equipment to use during emergency response
- confined space entry procedures, if applicable
- spill containment requirements
- pre-entry briefing procedures (based on the risk and hazard analysis and characteristics of the hazardous materials) to inform employees of the hazardous waste operations program and the requirements to be followed
- inspection requirements (frequency, etc.) of the operating area and program requirements (Inspections must be performed by a knowledgeable person who is acting on behalf of the company. Any noted deficiencies must be immediately corrected.)

Hazardous Waste

Spill and Leak Prevention

Cutting Oils and Coolants

Cutting oils and coolants are generally considered non-hazardous to employee health, but precautions must still be taken for handling, use, storage, and disposal. For environmental reasons, they must be handled and used with special precautions, as they are generally not allowed to be disposed of in a sewer system.

All machines using cutting, drilling, or machining oils, and coolants must be equipped with steel sumps capable of holding the full content of the machine plus 10%.

Countermeasure

If one of the sumps fails, the contents must be contained using a loose absorbent or similar substance.

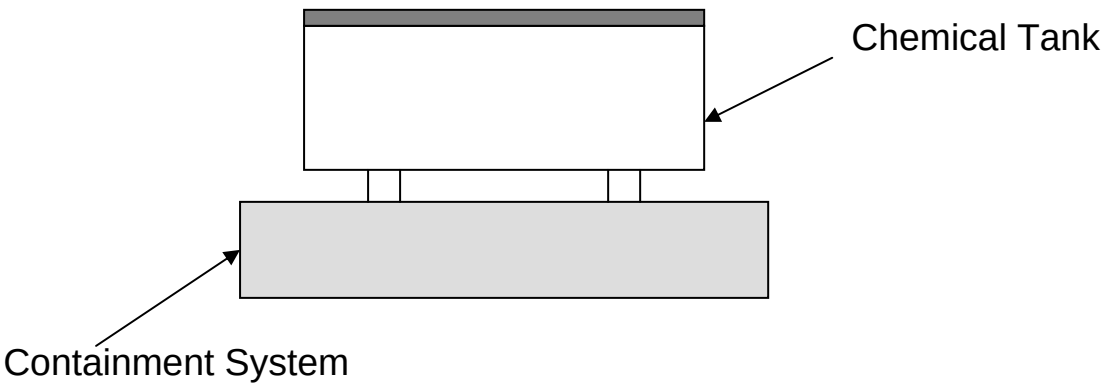
Countermeasure

Machines or storage areas must have a containment system or leak-proof curb to prevent materials from reaching any floor drains that lead to the sewer system. In the event of a spill in quantities exceeding the protection or containment, operators must have materials available to plug these drains to prevent migration to the environment or contamination to the drain.

Spill and Leak Prevention

Dipping Tanks

Each tank must be connected via a complete closed loop system to a series of treatment pits or placed in secondary containment.



Any leakage or rupture of any of these tanks must transfer immediately to the containment, which must be capable of containing the entire volume of these process tanks. This minimizes the potential for release to the environment.

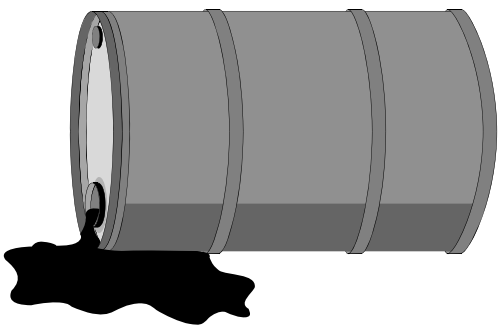
Hazardous Waste

Spill and Leak Prevention

General Requirements

At a minimum, the following materials must have specific written procedures to address spills, leaks, and emergency response:

- cutting oils and coolants
- dipping tanks
- nitrogen tanks
- propane tanks
- ammonium or ammonia tanks
- chemical stores



Most hazardous materials also require additional precautions, such as separation of materials, secondary containment, or ventilation that reduces exposure or the severity of an emergency.

Hazardous Waste

Spill Response for Solid Caustic Materials

- Use protective equipment, including gloves, goggles, and a respirator.
- Stop the leak or spill and prevent it from mixing with other chemicals.
- If the spill is less than 5 lbs. and it has not been contaminated with other chemicals, sweep it up and return it to storage.
- If the spill is more than 5 lbs. and it has not been contaminated with other chemicals, notify the company Emergency Coordinator, and then sweep it up and return it to storage.
- Contaminated materials must be disposed of properly and according to local, state and federal laws.
- Complete a Spill Report and forward it to your supervisor.

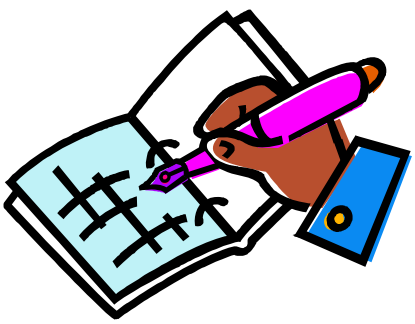
Hazardous Waste

Spill Response for Solvents

1,1,1, Trichloroethane; Methyl Ethyl Ketone; Toluene; and Mineral Spirits Spills

- **KEEP ALL SOURCES OF FLAME, HEAT, OR SPARKS AWAY!!**

- Use protective equipment, including gloves, goggles, boots, an apron, and a respirator or self-contained breathing apparatus.
- Test the explosive limit and oxygen content of air with a meter. **Do not go into an enclosed area without first testing the air!**
- Stop the leak or spill and contain it if possible. Do not take unnecessary risks.
- Notify the company Emergency Coordinator. Complete a Spill Report and forward it to your supervisor.



Job Hazard Analysis

The Process Steps of a JHA

Making Recommendations To Control or Eliminate Hazards

1. Where possible, eliminate the hazard, or substitute a non-hazardous material or condition for the higher hazard.

2. Where hazards cannot be eliminated, provide engineering controls (barriers, interlocks, tools, etc.).

3. Administrative controls (procedures, training, limit the exposure time, etc.) should be applied to the task where elimination and engineering are not feasible.

4. When all the previous controls cannot provide hazard reduction, personal protective equipment (PPE) should be considered (for example, gloves, respirators, specialized clothing, etc.).
    - PPE should be the last control considered. Remember that PPE frequently requires specialized training, cleaning, or maintenance, and records may need to be kept.

5. Make recommendations for every hazard identified, beginning with the first hazard listed.
    - You can make several recommendations for one hazard, keeping in mind that one or more recommendations may not be feasible, cost effective, or timely.
    - Number each recommendation.
    - Recommendations should be specific (what type of gloves, what specific material will be substituted, etc.).
    - Existing controls may already control or eliminate some hazards. Be sure to list these, so they do not get changed and make the hazardous situation worse.
    - Where needed, consider that some regulations require specific types of controls to be put in place. And if they are prescribed, they may not be the most feasible or economical to implement.

Job Hazard Analysis

General Requirements

The JHA Team

A JHA should be a team effort and normally involve more than one person. In a small business setting, two or three people are sufficient.

The **most experienced person** who performs a job should be on the JHA team.

- This person is the most familiar with the job, how it is performed, and the hazards associated with it.
- Other operators who may perform the task differently may also be included, as well as any new operators who can bring a “fresh set of eyes” and a different perspective to the JHA.

Supervisors are usually included, since they may know of potential workplace changes that can affect the job, and they can usually provide any funding needed for JHA recommended changes.

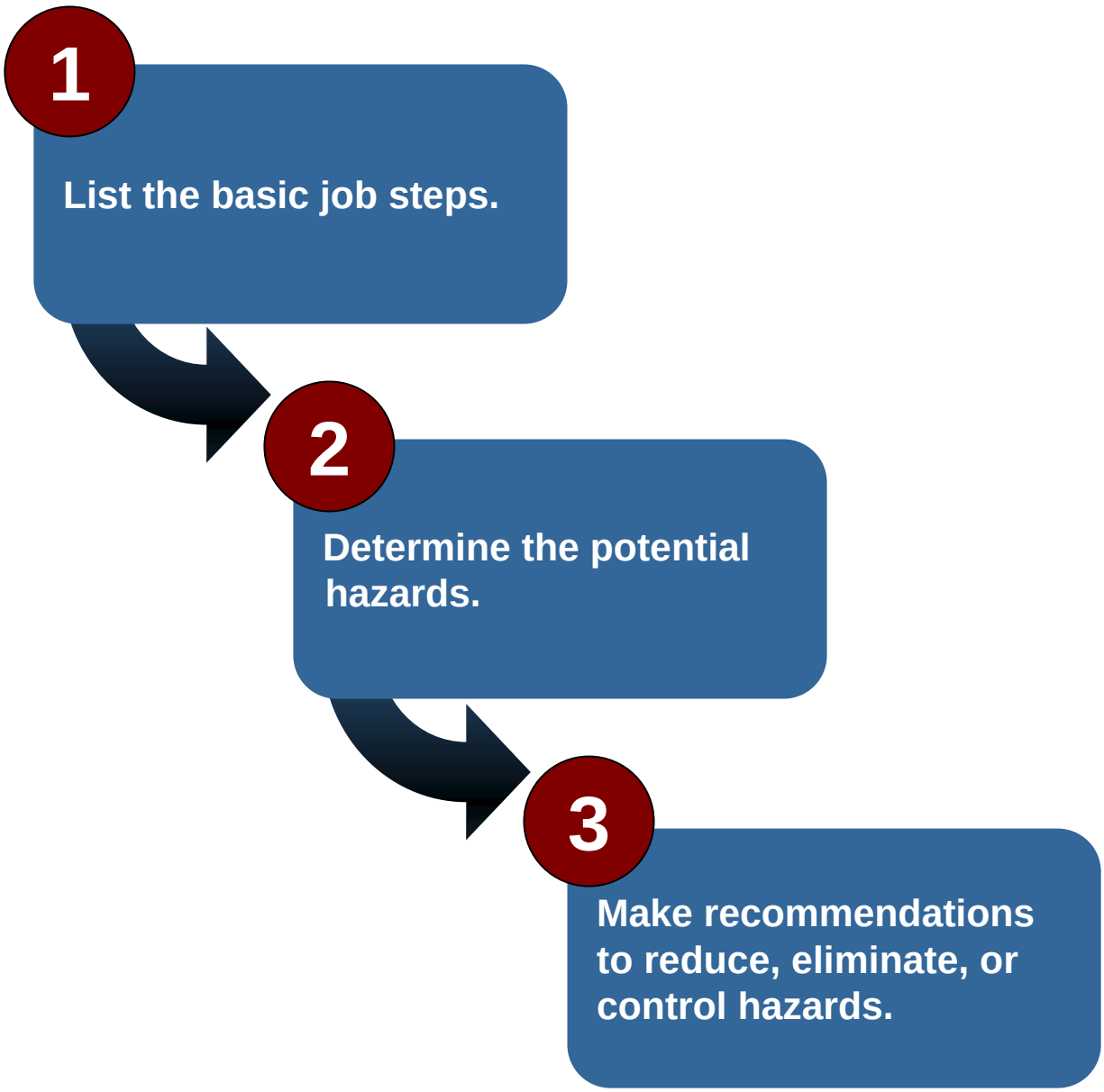
Maintenance staff that service and repair the equipment should be included.

If available, any **technical experts** (safety, engineers, environmental specialists, etc.) may be included, since they generally have an understanding and knowledge of any regulations that may affect the job, and understand how they are implemented.

Job Hazard Analysis

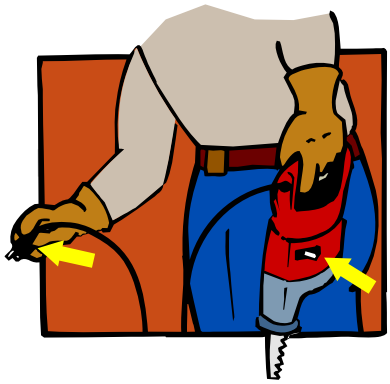
The Process Steps of a JHA

General



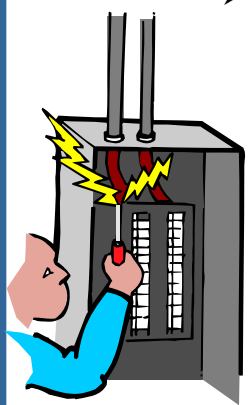
Job Hazard Analysis

The Process Steps of a JHA



Listing the Basic Job Steps

- Nearly every job can be broken down into steps.
- Each step should be observed by the JHA team.
- The steps should be discussed, so that everyone understands them and the reason they are included.
- The steps should be listed in order of performance.
- Action words should be used to describe the steps and they should be numbered sequentially.
- There are typically between 3 and 12 steps in a JHA.
    - If there are fewer steps, the scope of the JHA is too broad and some hazards may be overlooked.
    - If there are more than 12 steps, then the JHA may be too detailed, and the JHA team may get “bogged down” with more detail than they need.

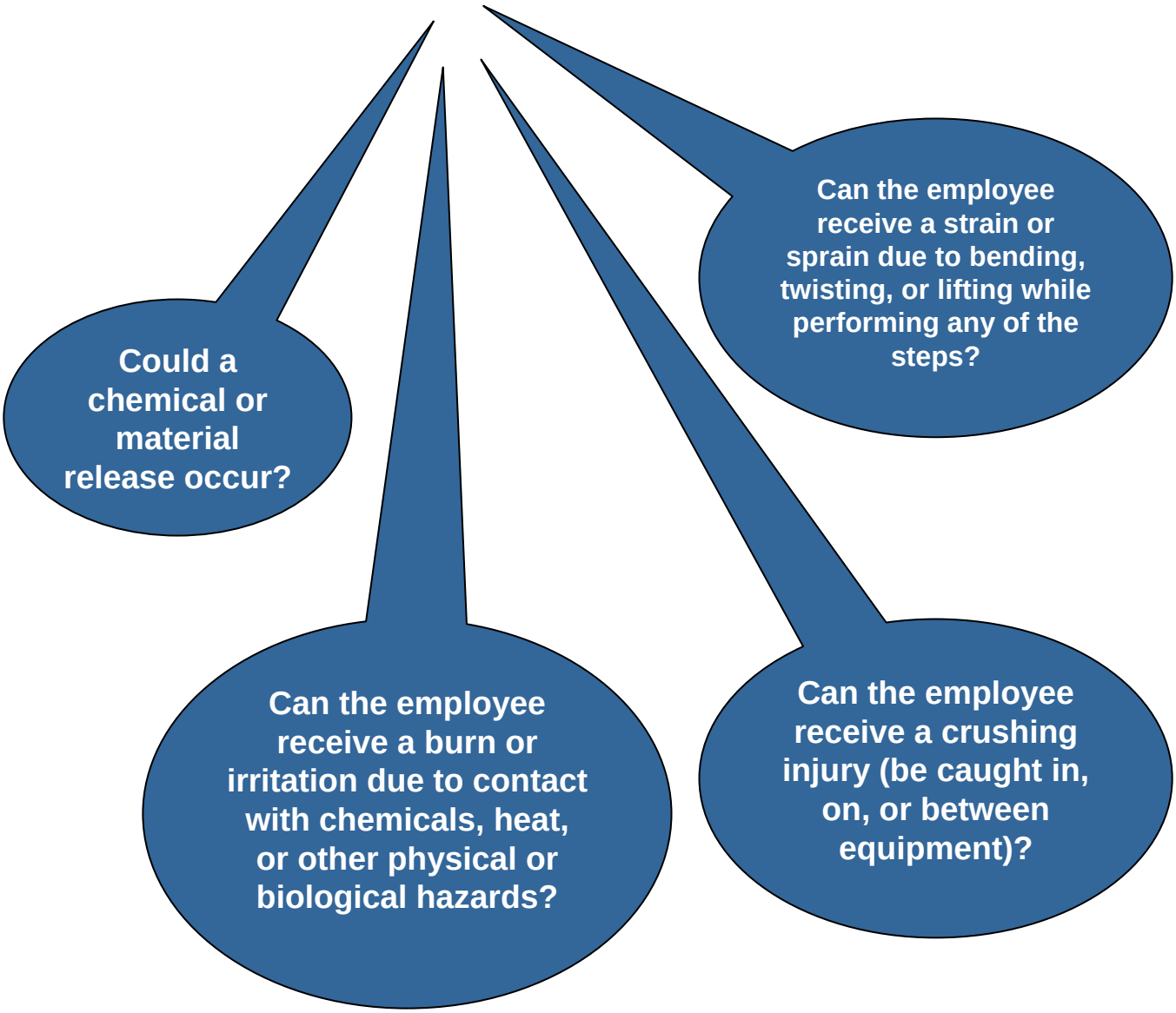


Job Hazard Analysis

The Process Steps of a JHA

Determine the Potential Hazards

Hazards are determined by asking questions such as:



Job Hazard Analysis

The Process Steps of a JHA

Making Recommendations To Control or Eliminate Hazards

1. Where possible, eliminate the hazard, or substitute a non-hazardous material or condition for the higher hazard.

2. Where hazards cannot be eliminated, provide engineering controls (barriers, interlocks, tools, etc.).

3. Administrative controls (procedures, training, limit the exposure time, etc.) should be applied to the task where elimination and engineering are not feasible.

4. When all the previous controls cannot provide hazard reduction, personal protective equipment (PPE) should be considered (for example, gloves, respirators, specialized clothing, etc.).
    - PPE should be the last control considered. Remember that PPE frequently requires specialized training, cleaning, or maintenance, and records may need to be kept.

5. Make recommendations for every hazard identified, beginning with the first hazard listed.
    - You can make several recommendations for one hazard, keeping in mind that one or more recommendations may not be feasible, cost effective, or timely.
    - Number each recommendation.
    - Recommendations should be specific (what type of gloves, what specific material will be substituted, etc.).
    - Existing controls may already control or eliminate some hazards. Be sure to list these, so they do not get changed and make the hazardous situation worse.
    - Where needed, consider that some regulations require specific types of controls to be put in place. And if they are prescribed, they may not be the most feasible or economical to implement.

Job Hazard Analysis

General Requirements

What is a Job Hazard Analysis?

A **Job Hazard Analysis (JHA)** is a method to identify existing and/or potential hazards of a job.

- Each task undergoing a JHA is studied and each step of the job recorded, so that the entire job process is considered.
- Hazards (or potential hazards) are then more easily identified, and the best way to reduce or eliminate those hazards can be determined.

A JHA applies to any area where specific hazard control measures are used by company employees.

- JHAs should be performed in areas where job or task activities may require an evaluation of hazard potential and a determination of protective controls prior to the implementation of personal protective equipment requirements.

Job Hazard Analysis

General Requirements

Where to Perform the JHA

The best place to perform a JHA is at the workplace, where the job is performed.

- By doing the JHA on site, no steps will be overlooked, and the workplace conditions (lighting, noise, layout, etc.) can be assessed.
- Recommendations for changes may be more readily implemented.
- If possible, the team should watch the job being performed so they can understand the sequence of steps and the significance of each step (what is done, in what order, and why).

JHAs can be more limited in scope, and jobs can be reviewed verbally.

- This is usually done only when the job cannot be performed, it is not a “routine” job, if it is one part of a larger job sequence, or the workplace conditions are not conducive to observing the job (for example, in a dark area or a small workspace).

JHAs can also be performed using video.

- By using video, there may be better visibility for team members and the task can be viewed many times, slowed down, or even paused for analyzing hazards. However, there are disadvantages to using video, including:
  - Employees may be uncomfortable being videotaped.
  - Video tape is only from one angle, so some hazards may be overlooked.

Hazard Communication and SDS

For Laboratories

Laboratory: a facility or separate work area where relatively small quantities of chemicals are used on a non-production basis

Laboratory Use

All of the following conditions must be met:

- Chemical manipulations are carried out on a "laboratory scale."
- Multiple chemical procedures or chemicals are used.
- The procedures involved are not part of a production process, nor do they simulate a production process in any way.
- "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Workplaces where laboratories or laboratory use exist must:

- ensure labels on incoming containers of hazardous chemicals are not removed or defaced
- maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees when they are in their work areas during each work shift, and

- ensure laboratory employees are provided information and training in accordance with this standard, except for the location and availability of the written hazard communication program (as they must comply with the requirements of OSHA 1910.1450 Hazardous Chemicals in Laboratories).

Laboratory employers that ship hazardous chemicals are considered to be either chemical manufacturers or distributors under this rule, and must therefore ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with this standard, and that a safety data sheet is provided to distributors and other employers.

Laboratory and Chemical Hygiene

General Precautions – Chemical Handling

Contamination Avoidance

Avoid unnecessary exposure to chemicals.

1. Flush eye or skin contact sites for 15 minutes; appropriate medical attention must be provided.
2. Treat ingestion (swallowing) of chemicals according to the SDS; seek appropriate medical attention.
3. Do not smell or taste chemicals.
4. Do not eat, drink, smoke, chew gum, or apply cosmetics (including lip balm) in laboratories. Wash hands before conducting these activities.
5. Do not store, handle, or consume food or beverages in laboratories or where laboratory equipment is used or stored.
6. Handle and store laboratory glassware with care to avoid damage. Do not use damaged glassware.
7. Do not suction or pipette any chemicals by mouth. Use a mechanical or gravity siphoning system.
8. Seek information and advice about hazards, the safety program, and appropriate protective procedures; plan the process before beginning any new operation.

Laboratory and Chemical Hygiene

General Requirements
Chemical Inventory and Inspection

- Inspect the chemical inventory at least annually. Properly dispose of old and outdated materials.
- Properly stored incoming chemicals upon receipt.
- Storage areas must be well ventilated and illuminated.
- No materials may be stored higher than eye level. Store larger, breakable items close to the floor.
- Segregate materials by their hazard characteristics, classification, and compatibility. Each type must be well defined and labeled.
- Do not prepare or repackage chemicals in the storage area.
- Control accessibility, even during normal working hours.
- Hand transport materials in leak-proof containers.
- Restrict the amount of in-use materials to only what is needed for that work-shift. All containers must be labeled.
- Keep amounts of stored materials to a minimum.
- Storage on bench tops is usually prohibited.
- Ventilated cabinets and specially monitored refrigerators must be designated and used for chemical storage only.
- Store flammable liquids in proper safety-cabinets.
- Transport flammable liquids in safety cans with spring-loaded spouts.
- Store toxic chemicals, including carcinogens, in ventilated storage areas in labeled, unbreakable, chemical-resistant secondary containers.
- Place mineral acids on acid-resistant trays; separate them as far as practical from flammable materials. Separate acid-sensitive materials (such as cyanides and sulfides) and protect them from contact with acids.
- Chain compressed gas cylinders to a wall or bench top, and cap them when not in use. Ignition sources are not allowed in the vicinity of compressed gas cylinders. The area must be maintained free of combustible materials and debris.

Laboratory and Chemical Hygiene

General Requirements
Engineering Controls - Hoods

Use hoods if hazardous vapors, fumes or dusts can be released or emitted.

- Inspect hoods every 3 months.
- Hood velocity must generally be 75-125 ft/min.
- Immediately “lock out” hoods that are not operating properly; do not use them until they are repaired or replaced.
- Employees must be trained in how to operate and use the hood properly.
- The sash of the hood must remain closed.
- A visual or physical device must indicate air flow within the hood (such as streamers or a calibrated meter).
- Minimize chemical storage in the hood.
- Do not store materials near the intake or outflow shafts of the hood.
- Turn off hoods when no materials are in them.
- Do not use hoods to dispose of volatile chemicals.
- Inspect hoods before introducing any new processes or chemicals to verify the hood can handle the materials.
- Maintain an inventory of hoods and similar equipment, and their inspection and use records.

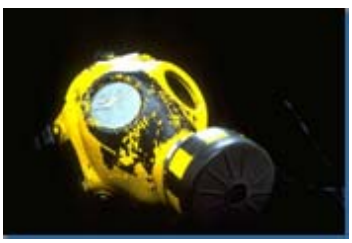
Laboratory and Chemical Hygiene

General Precautions – PPE Specific

If there is a potential for eye, nose, or mouth contamination, eye and face protection (mask or chin-length face shields) must be worn to prevent splashes or sprays of blood, infectious materials, or hazardous chemicals.

- Lab coats must be worn in the laboratory area only and must be buttoned to protect the employee's clothing.
- Aprons must be worn in areas where there is a reasonable probability of chemical splashes, blood exposure, or similar hazards.

Respiratory protections, where necessary to maintain exposure below permissible exposure limits, are provided based on the hazards present and at no cost.



Sandals, perforated shoes, sneakers, and bare feet are prohibited. Full shoes are required at all times.

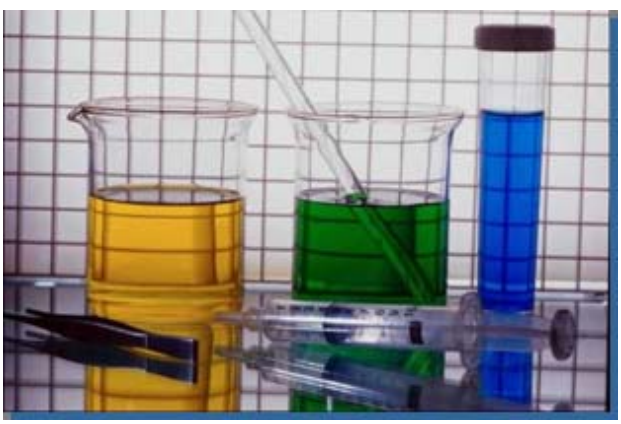
Hand protection and chemical-resistant gloves must be worn as appropriate. Consult the SDS and chemical manufacturer to determine the appropriate type of glove for a given chemical. All PPE must be replaced when damaged or deteriorated.

Laboratory and Chemical Hygiene

General Requirements

All laboratories must develop, implement, and maintain programs to protect employees from chemical hazards and exposures.

- Know who your laboratory's Chemical Hygiene Officer (CHO) is.
- Know where your written Chemical Hygiene Plan is located.
- Know where your chemical inventory list and Safety Data Sheets (SDSs) are kept.
- Ensure containers and vials are labeled.
- Know where your protective equipment is and how to use it.
- Attend training, as needed or required.
- Participate in required medical surveillance questionnaires and testing, as needed or required.
- Clean up spills immediately.
- Use proper waste disposal methods.



Laboratory and Chemical Hygiene

General Requirements – Spills

The company must provide spill containment kits in the laboratory area, where required or needed.

Use the **Think C.L.E.A.N.E.R.** principle:

Contain the spill

Leave the area

Emergency Decontamination:
eye wash, shower, and medical care

Access SDS for follow-on emergency procedures

Notify supervisory staff of incident

Emergency response notification (911)

Report: Gather information for spill report

Laboratory and Chemical Hygiene

General Precautions – Housekeeping

- Keep the work area clean and uncluttered; label and properly store chemicals and equipment.

- Clean up the work area at the end of an operation or at the end of each day.

- Avoid wearing contact lenses in the laboratory, unless necessary. If they are used, inform the laboratory supervisor or manager, as special precautions may need to be taken.

Laboratory and Chemical Hygiene

General Precautions – PPE Specific

If there is a potential for eye, nose, or mouth contamination, eye and face protection (mask or chin-length face shields) must be worn to prevent splashes or sprays of blood, infectious materials, or hazardous chemicals.

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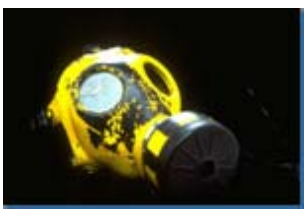

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Laboratory and Chemical Hygiene

General Precautions – Ventilation Systems

- Apparatus that can discharge toxic chemicals (vacuum pumps, distillation columns, etc.) must be vented into local exhaust devices.
- Ventilation systems may be rated only for specific substances, and only those chemicals may be used with the system.
- Do not allow release of toxic substances in cold or warm rooms because they may contain re-circulated atmospheres.
- Use a hood for operations that might result in the release of toxic chemical vapors or dust. As a rule, use a hood or another local ventilation device when working with any appreciably volatile substance with a TLV of less than 50 ppm.

WARNING

- Confirm adequate hood performance before use.
- Keep hood closed at all times.
- Keep materials stored in hoods to a minimum.
- Do not allow materials to block vents or air flow.
- Leave the hood "on" when it is not in active use if materials are stored inside.

Laser Safety

Working with lasers?

Get your eyes examined!

Laser Safety

General Safety Requirements

- Class 3b and 4 lasers must receive a preliminary safety review and an additional one after installation. The final review must cover user qualifications and safe operations, including electrical safety, area controls, and written procedures.
- Each laser (except Class 1) must be registered with the company's Laser Safety Officer and carry a laser identification tag or sticker with its unique laser registration number (assigned by the company). The tag or sticker must be installed so that it does not interfere in any way with the operation of the laser.
- All lasers must have a warning label that describes the laser type and classification.
- Class 3b or 4 lasers should only be used in controlled areas with restricted access to trained and authorized personnel.
- Each controlled laser area must have signs posted.
- Each operator of a Class 2, 3a, 3b, or 4 laser must undergo training and baseline vision testing.
- Each Class 3b or 4 laser operator must wear protective eyewear and any other required equipment.
- Written safety program requirements must be met.

Lead Safety

Determining Exposures

Every company where lead is used or processed must maintain:

- a list of job classifications where there is exposure.
- a list of job classifications where there is potential exposure.
- a list of all tasks and procedures where exposures can occur.
- the schedule and method of:
  - exposure controls, and their implementation
  - methods of compliance
  - employee hazard awareness training, and
  - air monitoring and sampling.
- the incident evaluation procedure.
- any environmental sampling or health examination results.

Lead Safety

Housekeeping

All floors and surfaces must be maintained as lead-free as practical.

Cleaning Floors

- Floors and other surfaces where lead accumulates may not be cleaned by the use of compressed air or heavy sweeping. Lead particles must not be allowed to become airborne.
- Use wet methods such as mopping, wiping or wet-sweeping when vacuuming cannot be done without creating airborne dust.

Vacuuming

Vacuuming methods must use only a vacuum with an absolute filter; the residue collected must be treated and disposed of as hazardous waste.

Lead Safety

Permissible Exposures and Limits

Permissible Exposure Limit

(maximum)

No employee may be exposed to lead at concentrations greater than 50 micrograms per cubic meter of air (50 ug/m^3) averaged over an 8-hour period.

Action Level

(the point where the company must take action to protect employees)

No employee may work without protective equipment or adequate ventilation systems in areas where airborne lead levels are higher than 30 ug/m^3 averaged over an 8-hour period.

Lead Safety

Personal Hygiene and Cleanliness

- In work areas where lead is used:
  - food/beverages cannot be **present** or **consumed**.
  - tobacco products cannot be present or **used**.
  - cosmetics cannot be applied.
- Where airborne lead is present, changing areas with washing or showering facilities must be provided and have:
  - closable containers for contaminated clothing, and
  - a protected space or container for street clothing.
- Contaminated clothing may not be worn home.
- Break and lunch areas must be:
  - separate from the work area
  - readily accessible, and
  - located near hand-washing facilities.

- Employees using lunch or break areas:
  - must wash their hands and face prior to eating, drinking, smoking, or applying cosmetics.
  - **may not enter the area** with protective work clothing or equipment, unless surface lead dust has been removed by vacuuming or other approved cleaning methods.

Lead Safety

Protective Equipment and Clothing – Cleaning and Replacement

- Clean protective clothing must be supplied at least weekly if lead levels are at or above the action level. Clothing must be supplied daily if levels are over 200 ug/m^3 based on an 8-hour TWA.
- A designated changing area must be supplied and street clothes protected from cross contamination. Lockers or closable bins must be provided.
- Contaminated clothing must be placed in a closed container in the changing area.
- Any person who cleans or launders protective clothing or equipment must be informed, in writing, of the potentially harmful effect of exposure to lead.
- Containers must be labeled with:

CAUTION:

CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD-CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.

- Do not remove lead from protective clothing or equipment by blowing, shaking, or any other means which disperses lead into the air.

Lead Safety

Protective Equipment and Clothing – General Information

The following personal protective equipment (PPE) may be required when working with lead:

- Coveralls or similar full-body work clothing
- Face shields, vented goggles, and welders gloves
- Shoes or disposable shoe coverlets, gloves, and hats

Lead Safety

Safe Work Practices

- Written procedures must be developed for operations where lead is used, cut, or sanded.
- Protective equipment or other control measures may need to be used to prevent exposure to airborne lead.
- Where lead-exposure monitoring occurs, employees may observe the monitoring process.
- Signs must be posted in each work area where safe levels of lead are exceeded. Signs must state:

Lead Safety

Types of Work Operations Where Lead Exposure Can Occur

Lead exposures can occur during the following activities:

- Welding
- Burning
- Cutting
- Brazing
- Grinding
- Abrasive blasting

Lockout/Tagout Hazardous Energy Control

Application and Purpose

LO/TO (Lockout/Tagout) must be performed during the servicing and maintenance of machines and equipment whenever they could be accidentally started while you are working on them.

LO/TO devices (locks, tags, blocks, or wedges) must be used to control the energy or motion of the equipment.

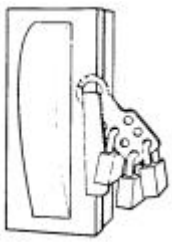
During “normal production operation,” LO/TO applies only if:

- you must remove a machine guard, or
- you must place your hands or body into the “point of operation” or a danger zone.

If you could get caught in the equipment and be injured if the equipment starts running, LO/TO is required.

Lockout/Tagout Hazardous Energy Control

Energy Control - Procedures



Employers must maintain written procedures for all machinery and equipment requiring LO/TO to control energy hazards. One procedure should be in place for each type or piece of machinery.

The procedures must clearly outline:

- what the procedure is intended to do
- specific steps of the LO/TO process
- specific steps for the placement and removal of the locks and tags, and
- specific requirements for testing a machine or equipment to determine and verify the lockout is effective.

Lockout/Tagout Hazardous Energy Control

Protective Materials and Hardware

Employers must provide locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware.

Devices must be:

- identified as LO/TO devices
- all the same type (color, size, shape, markings)
- used only for LO/TO
- durable – capable of withstanding the environment (weather, chemical splashes) and stressors
- substantial and not accidentally removable
- labeled with the name of the person who put it on, and
- able to withstand 50 lbs. of force or more. You should not be able to pull on it and have it come off.

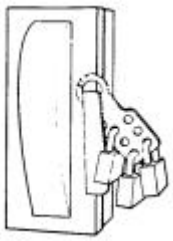
Tags, such as one-piece units with nylon cable ties, must not accidentally fall off or be inadvertently removed, and must withstand 50 lbs. of force or more.

Tagout devices must provide a written warning, such as:

- Do Not Start
- Do Not Open
- Do Not Close
- Do Not Energize, or
- Do Not Operate.

Lockout/Tagout Hazardous Energy Control

Energy Control - Program



- Written Procedures
- Training
- Periodic Inspections

Lockout/Tagout (LO/TO)

- All energy sources must be locked or blocked.
- If locks cannot be used, a tag must be used with a supplemental device (such as removing a circuit breaker) to provide an equal level of safety.
- New equipment must be LO/TO compatible.
- Major modifications to existing equipment must provide for LO/TO compatibility.

Full Employee Protection

- Tags must be attached to locks or to the place where a lock would normally be.
- Energy isolation must be able to be demonstrated.
- With tags only, circuit breakers must be removed or control switches blocked or some other action must be taken to give you an equal level of safety.

Lockout/Tagout Hazardous Energy Control

Energy Control - Communication

Energy Isolation

LO/TO may only be performed by someone **authorized** to service or maintain the equipment or machinery.

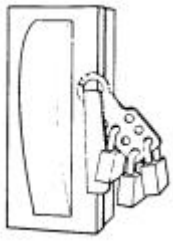
Employees in the area must be kept clear and informed when locks are applied to the machines or equipment.

Notification of Employees

Employees must be notified before LO/TO is performed and when it is completed.

Lockout/Tagout Hazardous Energy Control

Group Lockouts



- Employers must provide written procedures.
- One person is primarily responsible for the whole group.
- The responsible (“vested”) person makes sure he knows who is working on a job with locks, tags, or under LO/TO (including crew members and contractors).
- Each **authorized** person must place his lock into a scissors lock or strongbox and remove it when his portion of the work is completed.
- The responsible person can give that responsibility to another person on the next shift, but only one person at a time can be the responsible person for the job.

Lockout/Tagout Hazardous Energy Control

Periodic Inspection of Procedures

Procedures that are used often must be reviewed at least once each year.

- Inspections must be performed by at least two people. One must demonstrate the LO/TO and the other must review the procedure to be sure they match. Any differences must be corrected. Either rewrite the procedure or re-train the employees who do the lockout.
- The responsibilities of the employees doing the lockout and specific steps of the lockout process must be written in the procedure.

The inspectors must sign the inspection form. This form must include:

- the identification of the machine or equipment
- the date of the inspection
- the employees included in the inspection, and
- the person performing the inspection.

Lockout/Tagout Hazardous Energy Control

Release From Lockout/Tagout

Before locks, tags, or blocks may be removed and the machine re-started, the authorized employee who put the lockout device on the machine must:

- inspect the machine, equipment, and work to make sure everything is put back together and all tools are accounted for
- be sure employees are at a safe distance and told about the removal and restart, and
- remove the locks and tags.

Locks and tags may only be removed by the person who put them on the machine or equipment. If that person is not there, notify your supervisor.

Lockout/Tagout Hazardous Energy Control

Application of Controls

1. **Prepare**
2. **Shutdown**
3. **Isolate**
4. **Lock**
5. **Energy Release**
6. **Verify**

The application of controls must be performed in the following sequence:

1. **Preparation for shutdown**
   Find out the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means for controlling the energy.

2. **Machine or equipment shutdown**
   Turn off or shut down the machine or equipment using the established written procedures.

3. **Machine or equipment isolation**
   Physically locate and operate all energy isolating devices to effectively isolate the energy source.

4. **Lockout or tagout device application**
   The authorized employee must affix devices so energy is held in a "safe" or "off" position. Tags must state that movement or operation is prohibited.
   a. Tags must be fastened with the lock or where the lock should be.
   b. Tags must be located so it is readily apparent to any user or operator that the machine or equipment is not operable.

5. **Stored energy**
   Stored energy must be relieved, disconnected, restrained, and otherwise rendered safe. This must be verified before service or maintenance is performed.

6. **Verification of isolation**
   The authorized employee must verify energy isolation and de-energizing. Verification of isolation may be continually or periodically required when re-accumulation of energy is possible.

Lockout/Tagout Hazardous Energy Control

Additional Requirements

Testing of Machines, Equipment, or Components

When equipment testing is required and the equipment must be "live," or energized, to do the testing, follow these procedures:

1. Clear the machine or equipment of tools and materials.
2. Keep other people at a safe distance.
3. Remove the locks and tags (if any have been applied).
4. Start the equipment and test it.
5. If needed, shut down the equipment, apply or re-apply energy control measures, and continue the service or maintenance.

Outside Personnel (Contractors)

- Contractors must tell you if their lockout tags or locks look different than the ones you use.
- You must tell a contractor if your lockout tags or locks look different from the ones they use.
- Employers and contractors must communicate with each other to ensure everyone is aware of program and equipment differences.

Lockout/Tagout Hazardous Energy Control

When Does Lockout/Tagout NOT Apply?

LO/TO does **NOT** apply to the following:

- normal production operations when machine guards are in place
- work on cord and plug-connected electric equipment when it is unplugged

- hot tap (welding) operations for pipelines, only when all three of the following apply:
  - continuity of service is essential
  - shutdown of the system is impractical, and
  - documented procedures are followed and special equipment is used, which will provide proven effective protection
- farming, agriculture, and maritime industries
- oil and gas well drilling and servicing
- electric utility service companies, only for:
  - power generation, transmission, and distribution, including related equipment for communication or metering, and
  - exposures due to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations

Machine Guarding

Abrasive Wheel – General Requirements

Automatic Snagging Machines

The maximum exposure angle of safety guards for the outside and sides of the grinding wheel may not exceed 180o. The top half of the wheel must be enclosed at all times.

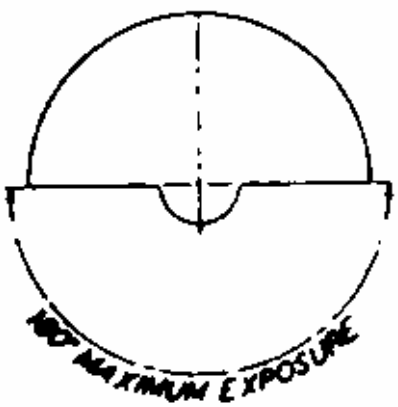


FIGURE NO. O–14

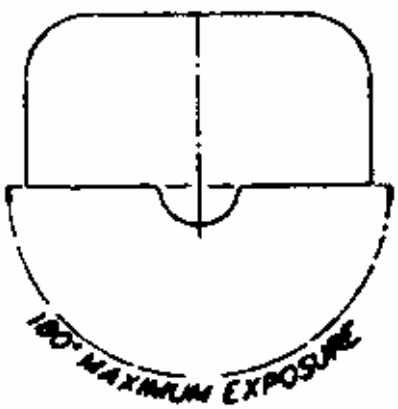


FIGURE NO. O–15

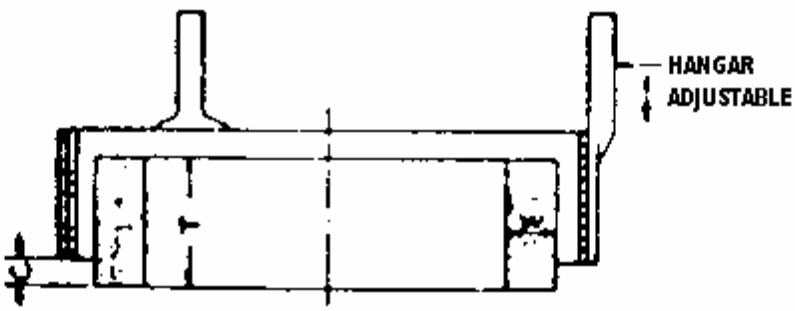
Machine Guarding

Abrasive Wheel – General Requirements

Band Guards

Guards must:

- be made from steel plate or materials of similar strength
- be continuous across the wheel
- have ends riveted, bolted, or welded so there are no projections on the inside facing the wheel
- be mounted concentrically to the wheel with the band 1 inch larger than the wheel, and
- adjusted so the wheel does not protrude beyond the band.



DIMENSION B NOT TO EXCEED 1/4 " (QUARTER OF AN INCH)

FIGURE NO. 0-29

Machine Guarding

Abrasive Wheel – General Requirements

Bench and Floor Stands

The exposure angle of the outside of the grinding wheel and sides may not exceed 90°, or one quarter of the periphery. Exposure may begin at a point not more than 65° above the spindle's horizontal plane.

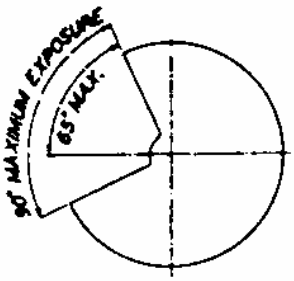


FIGURE NO. O–6

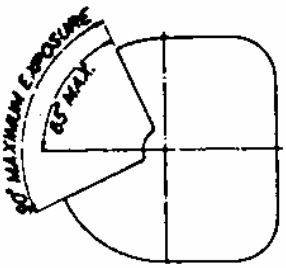


FIGURE NO. O–7

Where the work must contact the wheel below the horizontal plane, exposure may not exceed 125°.

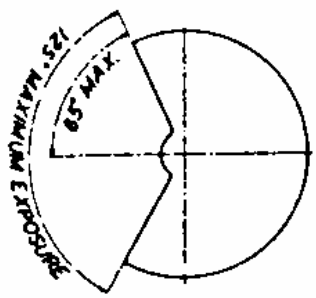


FIGURE NO. O–8

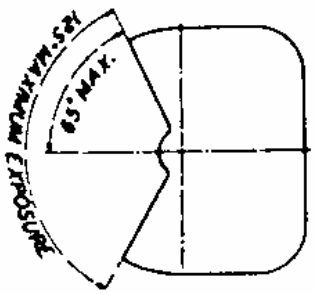


FIGURE NO. O–9

Machine Guarding

Abrasive Wheel – General Requirements

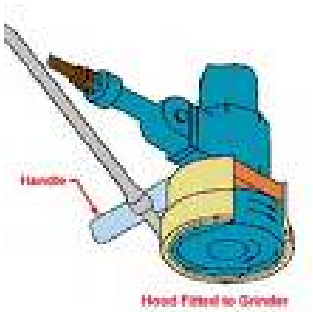
Cup Wheels

Cup wheels (types 6 and 11) require:

- safety guards
- band type guards, or
- special “revolving cup guards" that mount behind the wheel and turn with it.

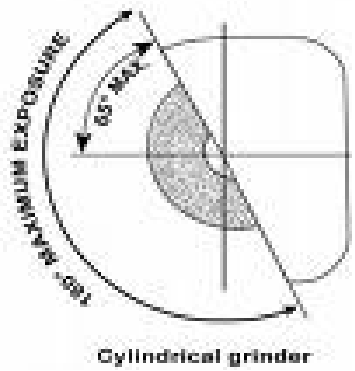
Revolving cup guards must:

- be made of steel or other material of adequate strength
- enclose the wheel sides to at least 1/3 the wheel thickness
- be securely mounted, and
- have 1/16-inch clearance between the wheel side and the guard.



Machine Guarding

Abrasive Wheel – General Requirements



Cylindrical grinder

Cylindrical Grinders

The maximum exposure angle of safety guards for the outside and sides of the grinding wheel may not exceed 180°. The exposure point must begin at a point less than 65° above the horizontal plane of the wheel spindle.

Machine Guarding

Abrasive Wheel – General Requirements

Exposure Adjustments

Where the operator stands in front of an opening, safety guards may require constant adjustment so the guard, rest plate, and wheels meet the proper distance requirements.

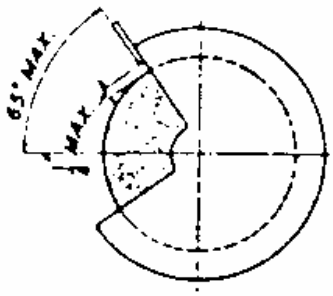


FIGURE NO. O–18

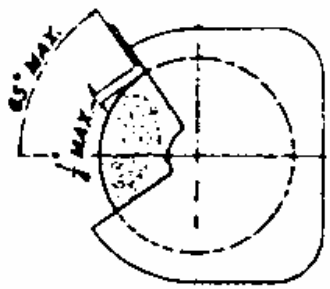


FIGURE NO. O–19

The distance between the sides of the wheel and the adjustable rest plate may not exceed 1/4-inch.

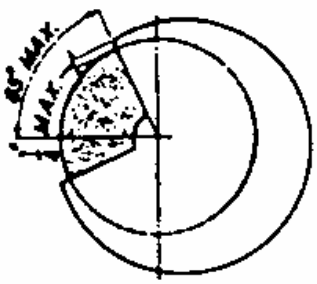


FIGURE NO. O–20

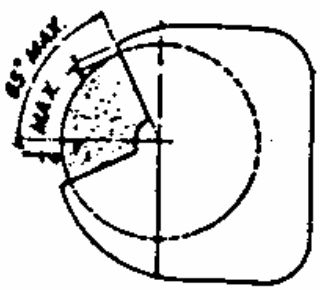


FIGURE NO. O–21

CORRECT

Machine Guarding

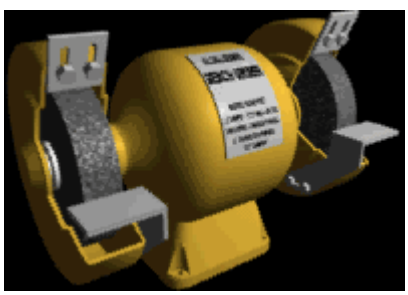
Abrasive Wheel – General Requirements

Guards must cover the spindle end, nut, and flange projections unless the machine is designed to be used as a portable saw or the work operation provides a suitable measure of protection (such as when the work covers the entire side of the wheel).

Guards must be aligned with the wheel.

Guard fastenings must be made of materials that are stronger than the guard itself.

Grinding machines must be equipped with flanges.



Work rests must:

–support the work

–be rigid and securely affixed to the equipment

–be adjusted with the wheel fully stopped and the power in the off position, and

–be adjustable to wheel wear. (Rest plates must be kept 1/8 inch from the wheel to prevent the work or fingers from being jammed into the wheel.)

Machine Guarding

Abrasive Wheel – General Requirements

Surface Grinders and Cutting-Off Machines

The maximum exposure angle of safety guards for the outside and sides of the grinding wheel may not exceed 150°. The exposure point must begin at a point less than 15° above the horizontal plane of the wheel spindle.

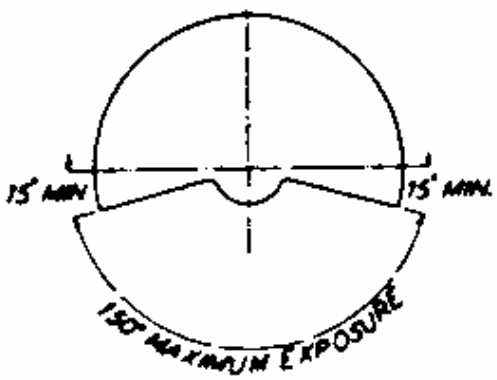


FIGURE NO. O–12

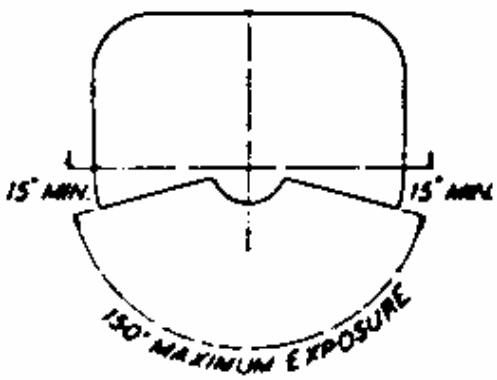


FIGURE NO. O–13

Machine Guarding

Abrasive Wheel – General Requirements

Swing Frame Grinders

The maximum exposure angle of safety guards for the outside and sides of the grinding wheel may not exceed 180°. The top half of the wheel must be enclosed at all times.

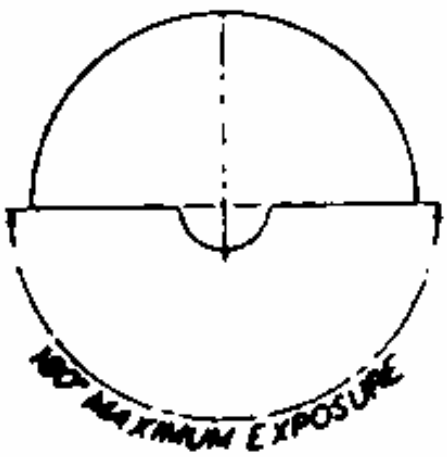


FIGURE NO. O–14

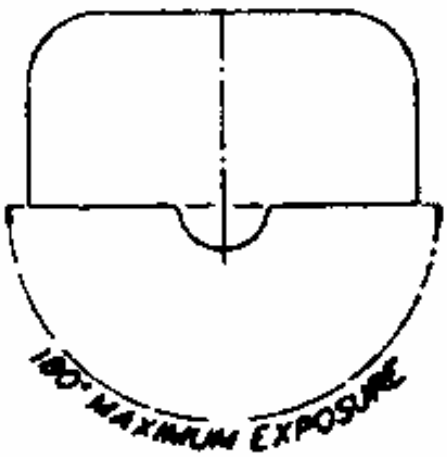


FIGURE NO. O–15

Machine Guarding

Abrasive Wheel – General Requirements

Top Grinders

When work is ground above the horizontal centerline, the opening and wheel exposure must be as small as possible and may not be more than 60°.

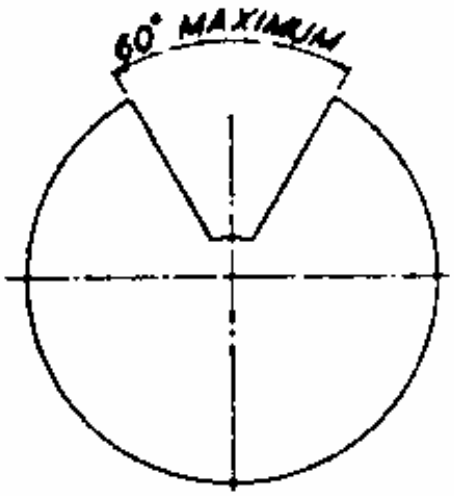


FIGURE NO. O–16

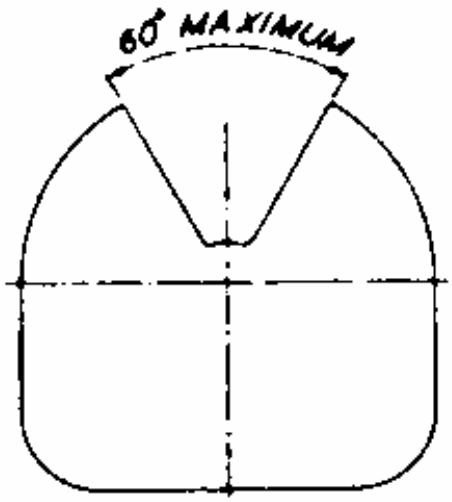


FIGURE NO. O–17

Machine Guarding

Abrasive Wheels

Bushings

When a bushing is used in the wheel hole, it must be equal to or narrower than the wheel width.

Bushings may not contact the flanges.

All contact surfaces of wheels, blotters, and flanges must be flat and free of foreign matter.

Machine Guarding

Abrasive Wheels – Flanges

Blotters

Blotters (compressible washers) must always be used between flanges and abrasive wheel surfaces to ensure uniform distribution of flange pressure.

Exceptions:

- mounted wheels
- abrasive discs (inserted nut, inserted washer, and projecting stud type)
- plate-mounted wheels
- cylinders or cup/segmental wheels that are mounted in chucks
- wheel types 27 and 28
- certain type 1 and 27A cutting-off wheels
- certain internal wheels
- type 4 tapered wheels
- diamond wheels, except certain vitrified diamond wheels
- modified types 6 and 11 wheel (terrazzo) blotters applied to the flat side of the wheel only

Machine Guarding

Abrasive Wheels – Flanges

Dimensions

The minimum dimensions for straight relieved and unrelieved flanges for wheel holes of small dimension which fit directly on the machine spindle are shown in Figure O-32.

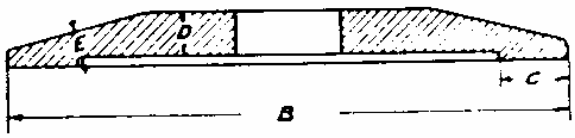


FIGURE NO. O-32

Driving flange secured to spindle.

The minimum dimensions for straight adaptor flanges for wheel holes that are larger than the spindle are shown in Figures O-33 and O-34.

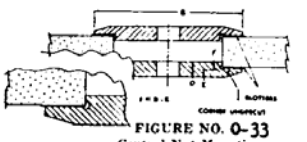


FIGURE NO. O-33
Central Nut Mounting
Driving flange secured to spindle.

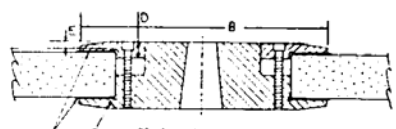


FIGURE NO. O-34
Multiple Screw Mounting
Driving flange secured to spindle.

The minimum dimensions for straight flanges integral to wheel sleeves (used in precision grinding) are shown in Figure O-35.

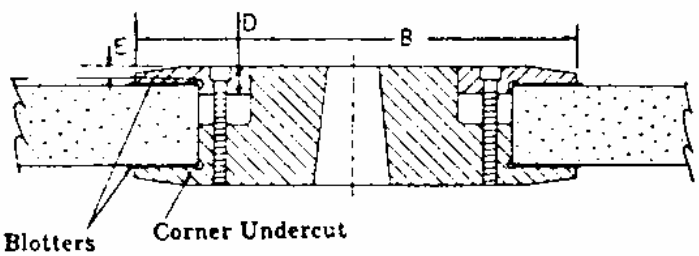


FIGURE NO. O-35

Driving flange secured to spindle.

Machine Guarding

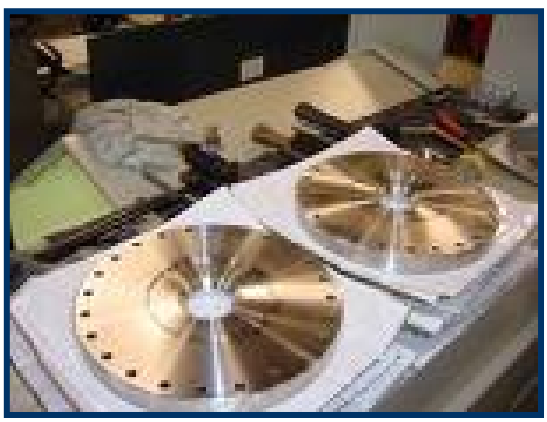
Abrasive Wheels – Flanges

Driving Flange

The driving flange must be securely fastened to the spindle so the bearing surface can run true.

When more than one wheel is mounted between a single set of flanges, wheels may be cemented together or separated by specially designed spacers.

Spacers must be equal in diameter to the mounting flanges and have equal bearing surfaces.



Machine Guarding

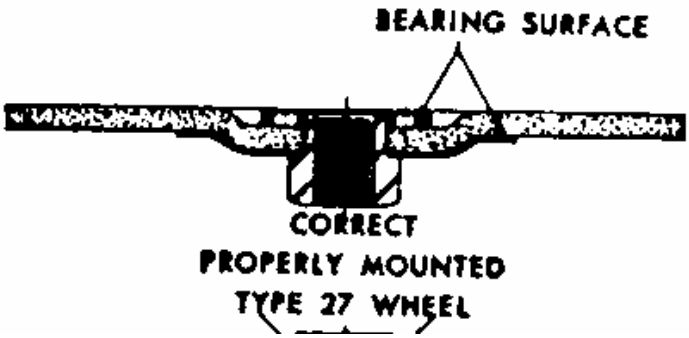
Abrasive Wheels – Flanges

General Requirements (1 of 2)

All abrasive wheels require mounting between flanges. The flanges must be at least 1/3 the diameter of the wheel.

Exceptions:

- portable wheels with threaded inserts or projecting studs
- abrasive discs (inserted nut or washer and projecting stud type)
- plate-mounted wheels
- cylinders or cup/segmental wheels that are mounted in chucks
- wheel types 27 and 28
- certain internal wheels
- modified wheel types 6 and 11 (terrazzo)



Type 1 cutting-off wheels must have relieved flanges and matching bearing surfaces. These flanges must be at least 1/4 the wheel diameter.

Type 27A cutting-off wheels are designed to be mounted by means of flat, non-relieved flanges with matching bearing surfaces. These flanges must be between 1/3 and 1/4 the wheel diameter.

Regardless of flange type used, the wheel must always be guarded and blotters used.

Flanges must be dimensionally accurate and in good balance. There may be no rough surfaces or sharp edges.

Machine Guarding

Abrasive Wheels – Flanges

General Requirements (2 of 2)

There are three general types of flanges:

1. Straight Relieved Flanges

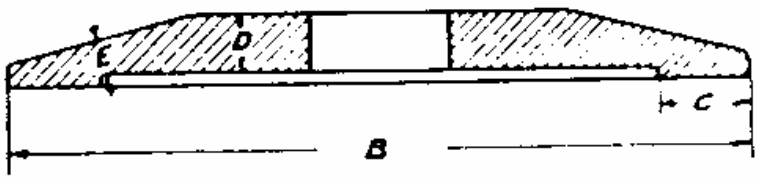


FIGURE NO. 0-32

Driving flange secured to spindle.

2. Straight Unrelieved Flanges

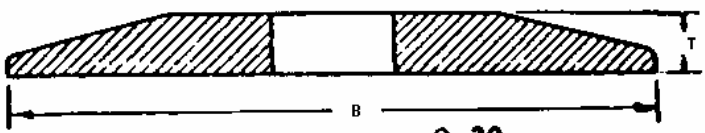


FIGURE NO. 0-30

Driving flange secured to spindle for use only on portable wheels with threaded inserts or projecting studs.

3. Adaptor Flanges

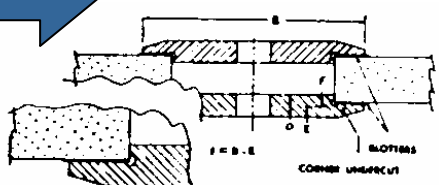


FIGURE NO. 0-33

Central Nut Mounting

Driving flange secured to spindle.

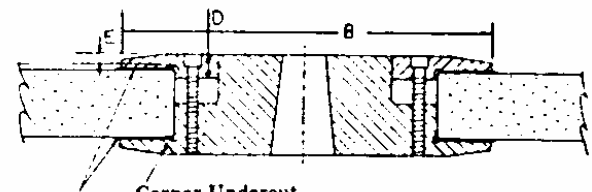


FIGURE NO. 0-34

Multiple Screw Mounting

Driving flange secured to spindle.

Machine Guarding

Abrasive Wheels – Flanges

Recess and Undercut

Straight relieved flanges must be recessed at least 1/16-inch on the side next to the wheel.

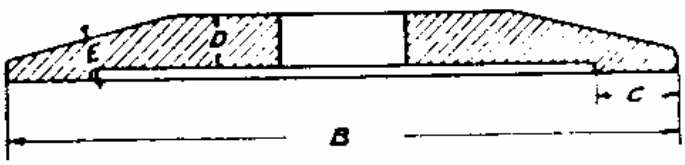


FIGURE NO. 0-32
Driving flange secured to spindle.

Straight adaptor or sleeve-type flanges must be undercut so there will be no bearing on the sides of the wheel within 1/8-inch of the arbor hole.

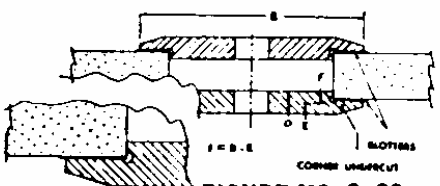


FIGURE NO. 0-33
Central Nut Mounting
Driving flange secured to spindle.

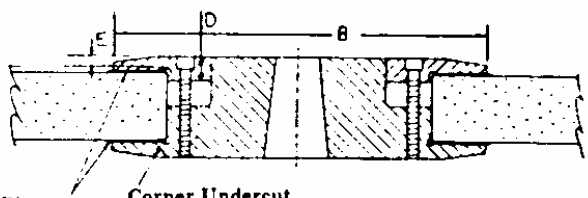


FIGURE NO. 0-34
Multiple Screw Mounting
Driving flange secured to spindle.

Machine Guarding

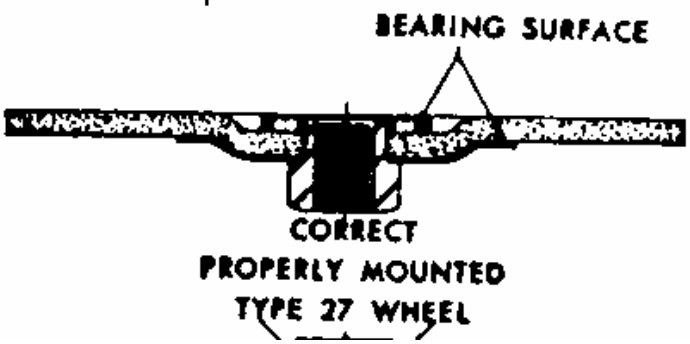
Abrasive Wheels – Flanges

Uniformity of Diameter

Any type of flanges between which a wheel is mounted must be of the same diameter and have equal bearing surface.

Because of their shape and usage, type 27 and 28 wheels require specially designed adaptors.

- The back flange must extend beyond the central hub or raised portion and contact the wheel to counteract the side pressure on the wheel during use.
- The adaptor nut (which is less than the minimum 1/3 diameter of wheel) must fit in the depressed side of wheel to prevent interference in side grinding. It serves to drive the wheel by its clamping force against the depressed portion of the back flange. This limits the use to reinforced organic bonded wheels.
- Affixed mounts, once removed, may not be reused.
- During use, type 27 and 28 wheels must have a safety guard located between the wheel and operator.



Machine Guarding

Abrasive Wheels

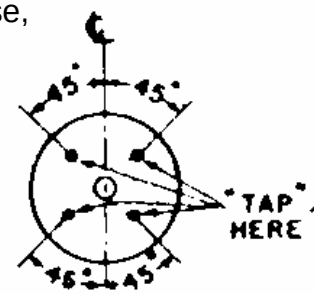
Mounting and Inspecting

Immediately before mounting, all wheels must be closely inspected and sounded by the user (ring test) to make sure they have not been damaged in transit, storage, or otherwise.

The spindle speed of the machine must be checked before mounting the wheel to ensure it does not exceed the maximum operating speed marked on the wheel.

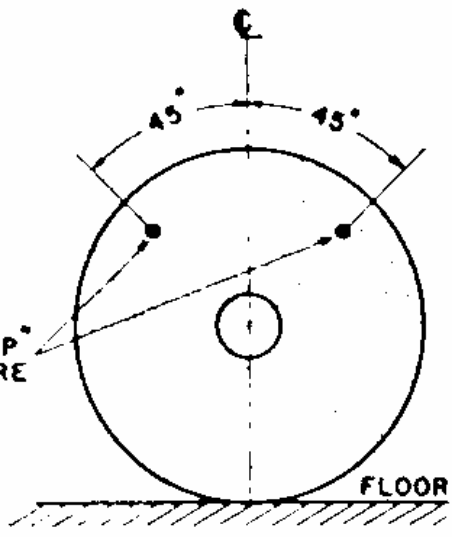
Gently tap wheels with a light, nonmetallic implement, such as the handle of a screwdriver for light wheels or a wooden mallet for heavier wheels. If they sound cracked (dead), they may not be used. This is known as the "ring test."

- Wheels must be dry and free from sawdust when applying the ring test; otherwise, the sound will be deadened.
- Note that organic bonded wheels do not emit the same clear metallic ring as do vitrified and silicate wheels.
- Tap wheels at about 45° on each side of the vertical centerline and about 1 or 2 inches from the periphery as indicated by the spots shown in Figures O-25 and O-26. Then rotate the wheel 45° and repeat the test.



Light Wheels
Suspend from hole by small pin or finger

FIGURE NO. O-25



Heavy Wheels
Support on clean hard floor

FIGURE NO. O-26

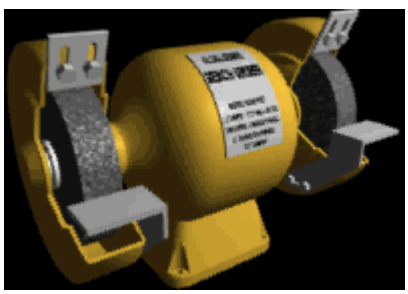
Machine Guarding

Abrasive Wheels

Multiple Wheel Mounting

When more than one wheel is mounted between a single set of flanges, wheels may be cemented together, separated by specially designed spacers, or be specially manufactured for this purpose.

Spacers must be equal in diameter to the mounting flanges and have equal bearing surfaces.



Machine Guarding

General Guarding Requirements

The point of operation where an employee is exposed to injury requires guarding.

- Different machines have different requirements based on the hazard and size of the equipment.
- Guards must protect employees from entering the “danger zone” or “point of operation” on the machinery.
- Special hand tools for placing and removing material can be used to permit easy handling of material but do not replace machine guarding to protect employees.

Guards must be affixed to the machine whenever possible or otherwise secured. Guards must be positioned and shaped so that they do not present a greater hazard themselves.

Revolving equipment (such as drums and barrels) requires interlocked enclosures to stop revolution when the guard is not in place.

Equipment with blades, such as fans, must be guarded (unless they are fixed in place and higher than 7 feet from the floor surface). Guards cannot have openings larger than ½ inch.

Fixed machinery must be anchored and secured to prevent walking or movement during operation.

Written operating procedures must be in place that include the type of machine, type of guard, uses and reasoning for guards, inspection requirements, and preventive and specific steps for maintenance and service.

Non-routine tasks (tasks that are not normally performed at the company) must have specific procedures written and implemented before the activity takes place. Procedures will include emergency shut down processes, general hazard evaluation, guarding requirements, and protective tools or equipment to be used.

Machine Guarding

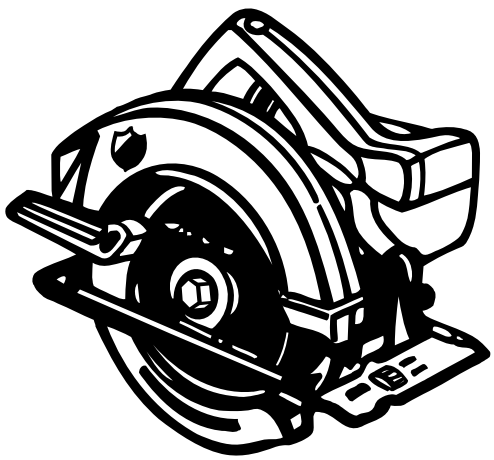
General Requirements

A process must be in place to ensure that machines and equipment are provided with guarding systems to eliminate or control employee exposure to hazards.

Guarding systems must be regularly inspected at the start of the work shift or before use.

- Hazards include pinch-points, point-of-operation, in-running nip points, rotating parts, flying chips and sparks, blades, chains, moving parts, and accidental activation of equipment.

- Examples of machine guards include barriers, two-handed tripping devices, interlocks and electronic devices, or specialized tools.



Equipment and machines include saws and similar large powered tools, mechanical equipment, conveyor systems, heat producing machines, and stationary grinders that have hard-surface wheels more than 2 inches in diameter.

- Welding equipment, portable powered tools, and mechanical presses have their own separate programs and regulatory requirements.

Machine Guarding

Maintenance and Service Personnel

Employees who perform service or maintenance (including repair, lubrication, clearing jammed parts or materials, and tool changes) must be trained and knowledgeable about the equipment, the guards, and the hazards of the maintenance tasks, including lockout or tag out requirements.

Appropriate protective equipment and tools, including dogs, tongs, and placement boards, and training must be provided to maintenance personnel.

Equipment and machinery must be maintained in good operating condition.

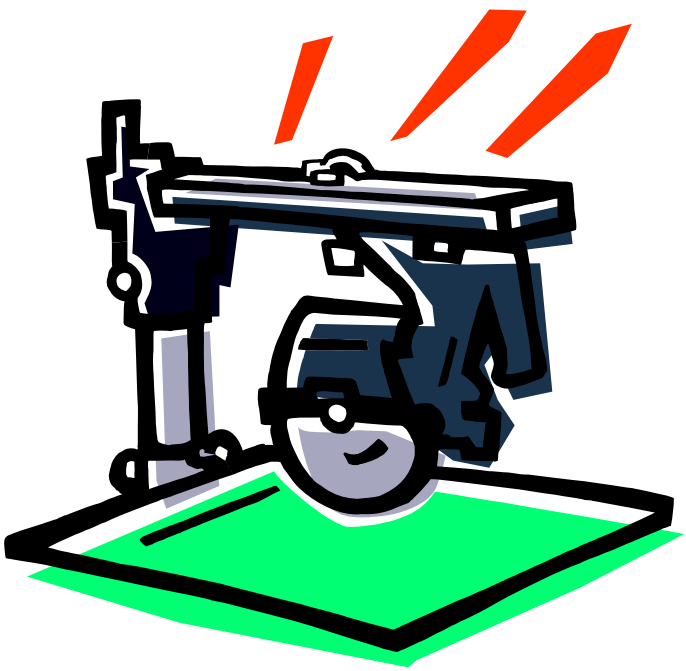
Machinery that requires regular maintenance and service must be tracked and performed at the required intervals.

Machine Guarding

New or Changes to Existing Equipment

Each piece of machinery or equipment must be reviewed for safeguarding requirements when they are purchased, installed, or when they undergo significant changes to their structure or use.

Reviews must be documented and this documentation must be maintained for the life of the equipment.



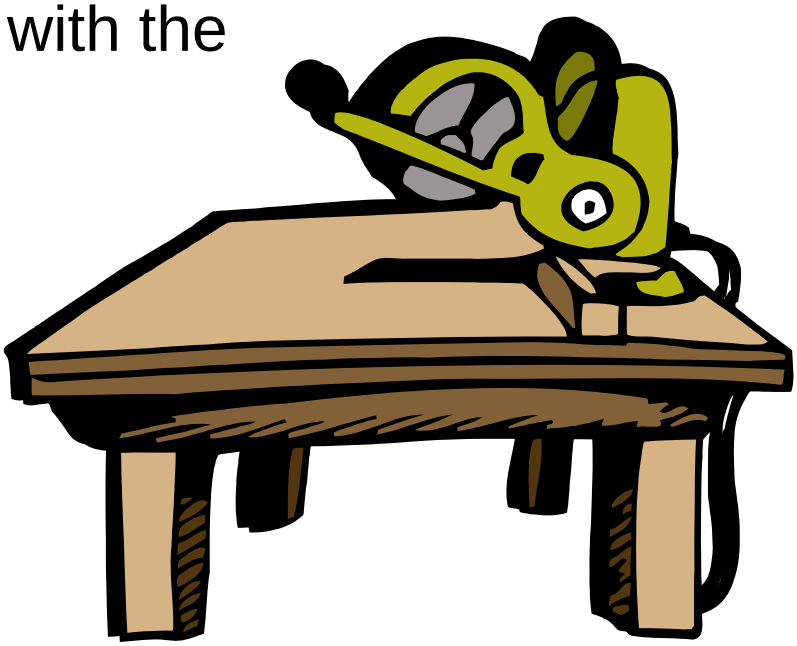
Machine Guarding

Stationary Saws (Not Portable)

Guarding must protect operators from entering the “danger zone” with any part of their body.

Guarding must be constructed to prevent undue vibration.

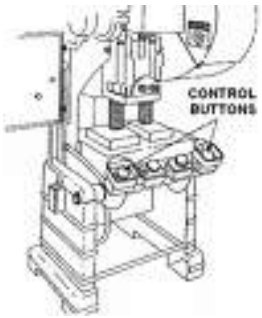
Guarding must be secure and where needed attached so that the operator can utilize the tool with the materials without undue risk.



Machine Guarding

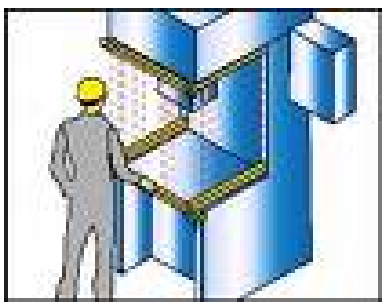
Types of Guards

Interlocks break or open a power circuit when the guard is not in place to prevent the machine or equipment from activating, such as in a copier.



One- or two-hand tripping devices are location devices that rely on the activation controls being at a safe distance from the point of operation. They require the operator to remove their hands from the hazard area to press a button or otherwise activate the machine cycle.

Point of operation guards restrict the area on machines where materials are being processed through shielding, covering, or blocking the hazard area.



Light curtains and other Presence Sensing Devices (PSDs) have electronic sensors to detect objects or other obstructions and prevent the machine or equipment from activating or cycling while any object or material is in the path of the sensor. PSDs have very specific regulatory requirements.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Belt, Rope, and Chain Drives - Horizontal

- Horizontal belts and chain drives
  - Belts and chains less than 7 feet from the floor or working surface must have guards in place that are at least 15 inches above (or below) the belt.
  - Belts and chains at eye or face level (approximately 42 inches or more from the floor) must be guarded for the entire length.
  - Guardrails can be used instead of guarding systems only if the belt or chain is located in a special room for such equipment.
  - If 7 feet or more from the floor or working surface, belts generally do not require guarding unless:
    - they are located over passageways or work places and traveling 1,800 feet or more per minute
    - the center to center distance between pulleys is 10 feet or more, and
    - belts are more than 8 inches wide.

- Passageways between exposed (even guarded) belts must:
  - be completely barred by a guardrail or other barrier. The barrier sides must be completely filled in or have wire mesh throughout the entire length; or
  - have a platform over the lower run of the belt with a guardrail that is filled in. This platform must be solid, wire mesh or other filler.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Belt, Rope, and Chain Drives - Vertical

- Vertical and inclined belts must be enclosed by a guard along any point that is less than 7 feet from the floor or working surface or where contact with material or people is likely.
- Cone-pulley belts
  - Belt shifters must be installed to guard the nip point of the belt and pulley.
  - Nip points must also have a vertical guard in front of the pulley that extends to the top of the cone.
    - Endless or rawhide-laced belts and their pulleys can be guarded (without a belt shifter) by a formed and contoured nip point guard in front of the cone extending to the top of the largest step of the cone.
  - Cone pulleys and belts must be guarded to a height of 3 feet from the floor or working surface, regardless of the type of belt.
  - Suspended or hanging counterbalanced tighteners and their parts must be substantial and securely fastened, with all bearings capped. If the belt should break, the tightener must be prevented from falling.
  - Where suspended or hanging counterweights are used, they must be enclosed or placed so they do not cause an accident if they fall or fail.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Collars and Couplings

- All revolving collars, including split collars, must be cylindrical, and screws or bolts used in collars cannot project beyond the largest periphery of the collar.
- Shaft couplings, bolts, nuts, setscrews, or revolving surfaces cannot project or cause a hazard.
  - They can be covered with safety sleeves, counter sunk, or located so they do not project beyond the flange.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Equipment Care Requirements

- Inspections must occur at least every 60 days.
- Equipment must be maintained in good working order at all times or be immediately removed from service when discovered to be defective.
- Shafting must be kept in alignment and free from rust, excessive oil, and grease.
- Static sparks must be prevented from contact with explosive dusts, flammable vapors, or flammable liquids
- Bearings must be kept in alignment and adjusted.
- Hangers must be regularly inspected to ensure that all supporting bolts and screws are tight and that supports of hanger boxes are adjusted properly.
- Pulleys must be properly aligned to prevent belts from running off.
- Belts, lacings, and fasteners must be regularly inspected and kept in good repair.
- Whenever possible, lubrication and oiling will be done wearing tight-fitting clothing and performed when equipment is not in motion.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Friction Device Guarding

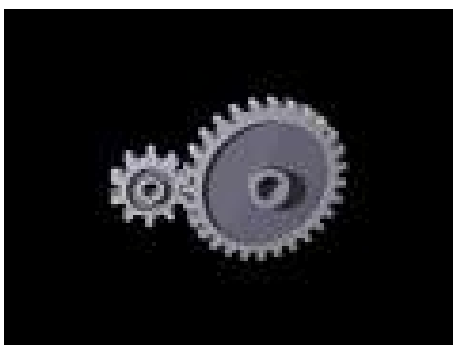
- All contact from the driving point must be guarded.
- Arm or spoke drives and web drives with holes in the web must be totally enclosed.
- All contact points for projecting belts must have guards.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Gears, Sprockets, and Chains

- Gears (mechanically operated) must be guarded:
  - by a complete enclosure at any point less than 6 feet from the floor
  - by a standard guard at least 7 feet high extending 6 inches above the mesh point of the gears
  - by a band guard covering the face of the gear.
  - The guard must be flanged inward and cover any exposed teeth or have flanges extended inward beyond the root of the teeth on the exposed side or sides. Where any portion of the train of gears guarded by a band guard is less than 6 feet from the floor, a disk guard or a complete enclosure to the height of six 6 feet is required.
- Gears (hand operated) used ONLY for adjusting machine parts are not required (but are recommended) to be guarded.
- Sprockets and chains must be enclosed if they are less than 7 feet from the floor or working surface. Drives must be protected from falling onto or into other equipment or working areas.
- Openings for oiling must have hinged or sliding self-closing covers. Oil feed tubes must be provided if machinery must be running during lubrication.



Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

General Applicability and Exceptions

- Applicable to machine belts that:
  - run at 250 feet per minute or more
  - are more than 1-inch wide flat belts
  - do not have metal lacings or fasteners
  - are 1/2 inch or more diameter round belts, and
  - are single strand “V” belts 13/32 inch or more.

- Applicable to machine belts that:
  - are vertical or inclined, run at 1,000 feet per minute, and are less than 2 1/2 inches wide.

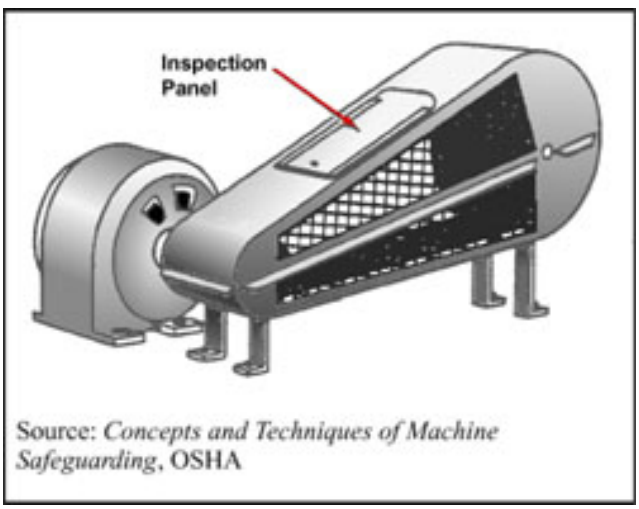
- Textile industry equipment where lint can build up require only the sides and face sections of nip points to be guarded, due to potential fire hazard.
  - Guards must extend 6 inches beyond the pulley rim.
  - Guards must be 2 inches from the rim and pulley face.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Materials of Construction for Guards

- Guards must be made of expanded metal, perforated or solid sheet metal, wire mesh on a frame of angle iron, or iron pipe that is securely fastened to the floor or to the frame of the machine.
  - All metal should be free from burrs and sharp edges.
  - Guards must be rigidly braced every 3 feet or less.
- Wood guards can only be used in the woodworking industry, in chemical industries where metal guards will rapidly degrade, or in construction areas where extreme temperatures are likely.
- Ceiling rafters, supports, or overhead floor beams may require reinforcement to sustain the weight and stresses placed on them.
- Guardrails must conform to the standard OSHA requirements for guardrail systems.



Source: *Concepts and Techniques of Machine Safeguarding*, OSHA

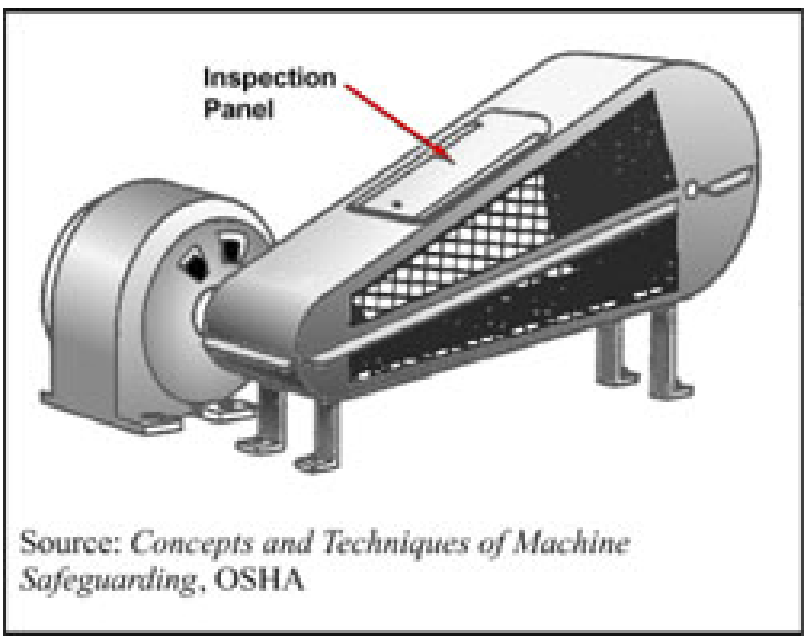
Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Keys, Setscrews, and Projections

- All projecting keys, setscrews, and other projections in revolving parts greater than 20 inches in diameter must be removed, ground flush, or guarded by metal cover.

- It is recommended that no projecting setscrews or oil cups be used in any revolving pulley or part of machinery.



Source: *Concepts and Techniques of Machine Safeguarding*, OSHA

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Prime Mover Guards - Flywheels

- Flywheels located 7 feet or less from the floor or working surface must be enclosed by sheet, perforated, or expanded metal or woven wire that can withstand the weight of the flywheel and any stresses imposed on the guard. In addition, flywheels must:
  - have guardrails 15-20 inches from the rim
  - have toe boards if the flywheel extends into a pit or is within 12 inches from the floor, and
  - have upper rim totally enclosed or a guardrail and toe board if it projects through the floor.

- Flywheels with smooth rims (which are not solid web center wheels) and which are 5 feet or less in diameter may substitute the above guarding methods with the following:
  - A disk attached to the flywheel which covers the spokes of the wheel on the exposed side and presents a smooth surface and edge. It must facilitate inspection and have any keys or other dangerous projections either cut off or covered and at the same time provide a method for periodic inspection.
  - An open space not exceeding 4 inches in width can be left between the outside edge of the disk and the rim of the wheel, if desired, to facilitate turning the wheel over. Where a disk is used, the keys or other dangerous projections not covered by the disk must be cut off or covered.

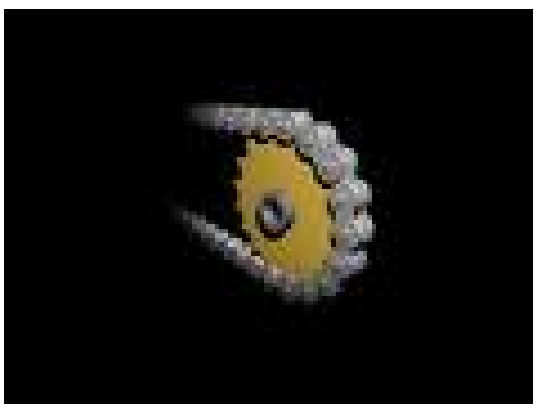
- An adjustable guard can be used for engine starting or for running adjustments.
- A slot opening for a jack bar is permitted.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Pulleys

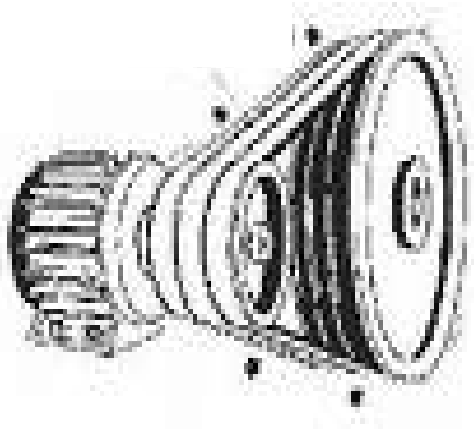
- Pulleys less than 7 feet from the floor or working surface must be guarded.
- Guides or guards must be provided for pulleys that are located less than one belt width away, to prevent the belt from leaving the pulley.
- Pulleys should be inspected frequently to ensure that there are no cracks, broken rims, or other defects. Defective equipment must not be used and should be tagged as “out of service” until repaired or replaced.
- Pulleys must be balanced and not operated at greater speeds than they are designed for.



Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Shafts and Shafting



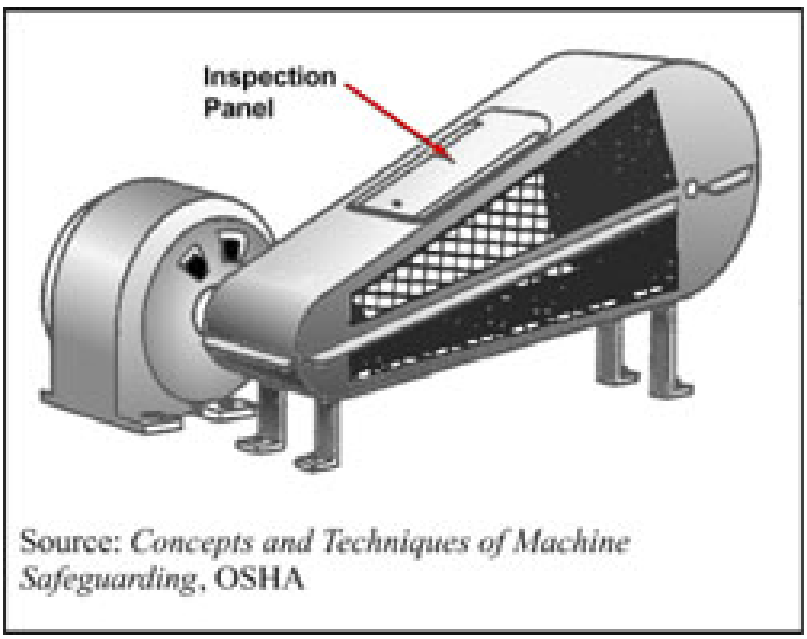
- Shafts must be secured so that they have no excessive movement or thrust.
- Horizontal shafting less than 7 feet from the floor or working surface must be enclosed completely or on the exposed sides and ends.
- Vertical and inclined shafting must be completely enclosed if it is less than 7 feet from the floor or working surface.
- Projecting Shaft Ends
  - Projecting shaft ends must be guarded or have smooth edges and ends.
  - Ends cannot project more than one-half the shaft diameter, unless fully guarded by non-rotating caps or safety sleeves.
  - Unused keyways must be filled or covered.
- Power transmission apparatus located in basements, towers, or specialized rooms do not require belts, pulleys, and shafting to be guarded if all of the following apply:
  - The area is locked against unauthorized entrance.
  - There is at least 5 feet 6 inches of vertical clearance in passageways between the floor and the equipment.
  - There is sufficient lighting.
  - The route followed by the maintenance person is protected from accidental contact with the equipment.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Guarding Clutches, Cutoff Couplings, and Pulleys

- Clutches, cutoff couplings, or clutch pulleys must be enclosed with a stationary or “U” type guard if they are less than 7 feet from the floor or working surface.



Source: *Concepts and Techniques of Machine Safeguarding*, OSHA

- Engine rooms can use a guardrail instead of standard guarding, provided that the room is occupied only by engine room attendants.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Belt Shifters, Clutches, Shippers, Poles, Perches and Fastners

- Belt shifters prevent belts from creeping loose from a pulley or roller.
  - Mechanical shifters must be permanent and provided on any equipment built or modified after 1970.
  - Belt shifter and clutch handles must be accessible to the operator but far enough so that accidental contact is prevented.
  - Shifter handles cannot project more than 6 feet 6 inches from the floor or working surface.
- Belt shippers and shipper poles cannot be substituted for mechanical shifters.
- Belt perches (brackets or rollers) can be used to keep idle belts away from shafts if idlers are not practical.
- Belt fasteners which must be shifted by hand cannot be metal or materials that will wear and become an accident hazard.

Machine Guarding

Mechanical Power Transmission (Belt Driven Equipment)

Overhead Belts, Cranks, and Connecting Rods

- Guarding of Overhead Belts, Guarding Cranks, and Connecting Rods
  - Overhead equipment more than 7 feet from the floor does not require guarding unless contact is likely.
  - Overhead belt guards must run the entire length of the belt and along the pulley to the ceiling or nearest wall. The entire belt must be enclosed (top and bottom runs and along pulley faces).
  - Belt side guard faces must be smooth and free of projections. Only shallow roundhead rivets can be used.
  - Guards must be at least 1/4 of the belt width (6-inch maximum) away on each side from contact with the belt.
  - Rope and block-and-roller-chain drive guards must be at least 6 inches wider on each side than the drive.
  - Silent chain drive guards with sprockets 20 inches on center require guard clearances of 1/4 inch from the nearest moving chain part (1/2 inch for drives more than 20 inches).
- Tail rods or extension piston rods can substitute a guardrail on the sides and ends with 15-20 inches of clearance when the rod is fully extended.

Machine Guarding

Mills and Calenders in the Rubber and Plastics Industry

Calender Safety Controls

A safety trip rod, cable, or wire center cord must be installed that runs across each pair of in-running rolls and that extends the length of the roll-face. It must be accessible and within reach at all times. It must operate at any time when activated, whether pushed or pulled. It cannot automatically reset itself. (Manual system reset is required.)

On both sides of the calender and near each end of the roll face, a cable must be installed that is connected to the safety trip. This cable must operate at any time when activated, whether pushed or pulled.

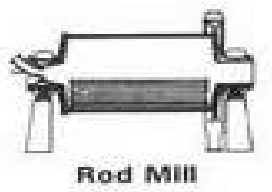
Safety controls are not required on mills and calenders where the operation is totally enclosed (such as a CNC machine with interlocked doors) and where operators cannot normally reach through, over, under, or around to come into contact with the roll or operation.

Machine Guarding

Mills and Calenders in the Rubber and Plastics Industry

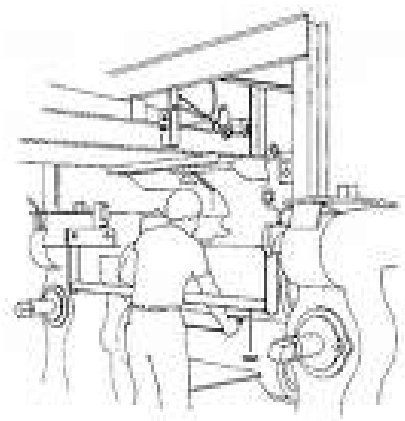
Mill Safety Controls

Mill rolls must be at least 50 inches above the floor or working surface.



Safety trip controls must be located at both the front and back of each mill, readily accessible to operators, and operate immediately on contact. Controls can be one of three types:

- Pressure-sensitive body bars for 46 inch (or more) roll heights.
- Safety trip rods for heights of 72 inches or less from the working surface or floor. Rods must activate whether pushed or pulled and be located within 2 inches of the rolls.
- Safety tripwire cable or wire center cords for heights of 72 inches or less from the working surface or floor. Cables and cords must activate when pushed or pulled and be located within 2 inches of the rolls.



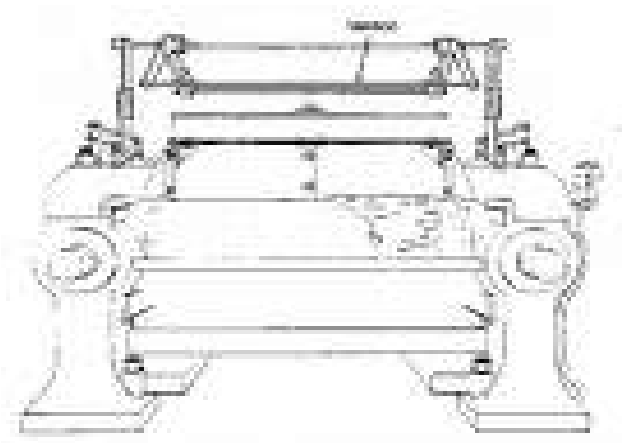
Machine Guarding

Mills and Calenders in the Rubber and Plastics Industry

Stopping Limits

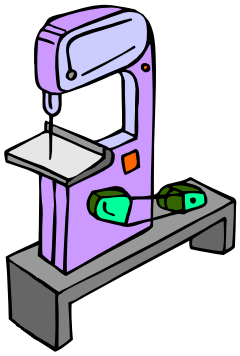
Stopping limits must be initially determined and checked periodically to ensure the stop limit time has not increased as the machine is used or as it ages.

Stop limits must be measured with the rolls empty and running at maximum speed. The stopping distance must be 1.5 percent of the roll speed for mills and .75 percent of the roll speed for calenders.



Machine Guarding

Woodworking – Band Saws and Band Resaws



- All portions of the saw blade are enclosed or guarded between the bottom of the guide rolls and the table, except for the working portion of the blade.
  - Band saw wheels are fully encased.
  - The enclosure must be solid.
  - The front and back of the wheels are enclosed by 20 gauge (3/8 inch maximum openings) wire mesh or perforated metal, or a solid material of equivalent strength.

- The guard for the portion of the blade between the sliding guide and the upper-saw-wheel guard protects the blade at the front and outer side and must adjust with the position of the guide.
- The upper-wheel guard conforms to the travel of the saw on the wheel.

- Each band saw machine has a working tension control device.
- Feed rolls of band resaws have a guard (preferably metal) to prevent the operator's hands from contacting the in-running rolls. The edge must come to within 3/8 inch of the inside face of the feed roll that is in contact with the material being cut.

Machine Guarding

Woodworking – Boring and Mortising Machines

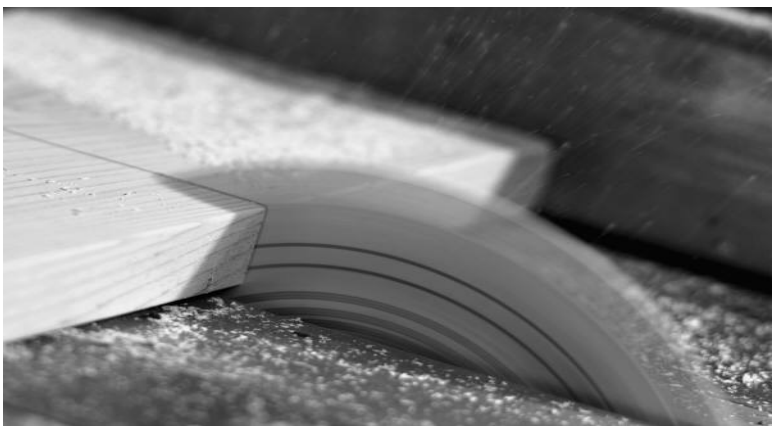
- Safety-bit chucks (no projecting set screws) are the only types allowed.
- Boring bits have guards that enclose all portions of the bit and chuck above the material being worked.
- The top of the cutting chain and driving mechanism must be enclosed.
- If there is a counterweight, they must be prevented from dropping by:
  - being bolted to the bar (bolt passes through bar and counterweight)
  - placing bolts through the extreme end of the bar
  - using safety chains (if counterweights that do not encircle the bar), and
  - being enclosed in a pipe or similar material and suspended by chain or wire rope.
- Universal joints on spindles of boring machines are completely enclosed.
- Operating treadles must have inverted U-shaped metal guards fastened to the floor to prevent accidental tripping.

Machine Guarding

Woodworking – Circular Resaws and Self-Feed Circular Saws

Circular Resaws

- Have hoods or metal shields above the saw to guard against danger from flying splinters or broken saw teeth.
- Spreaders must be fastened securely behind the saw and be slightly thinner than the saw kerf (and slightly thicker than the saw disk).



Self-feed Circular Saws

- Feed rolls and saws have a hood or guard to prevent the operator's hands from contacting the in-running rolls at any point. Guards must be substantial and the bottom must come down to within 3/8 inch of the lower portion of the feed rolls.
- Sectional non-kickback fingers must be located at the front of the saw, and they must remain in continual contact with the wood being fed.

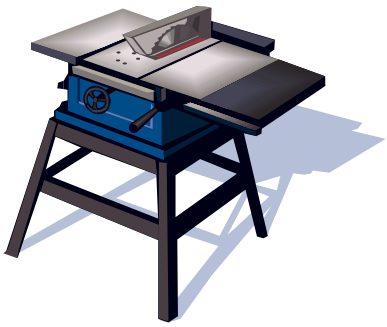
Machine Guarding

Woodworking – General

- All equipment must be free from vibration when run idle at full speed.
- All belts, pulleys, gears, shafts, and moving parts must be guarded.
- Disconnect switches are strongly recommended.
- Frames and exposed parts must be grounded with a separate grounding wire and polarized plug connector if the machine operates at more than 90 volts. Arbors and mandrels have firm and secure bearing and are free from play.
- Saw frames or tables must be capable of limiting the size of the saw blade that can be mounted based on the manufacturer's recommendations for blade size.
- Circular saw fences must be firmly secured without changing the saw alignment.
- Tilting tables or arbors must remain in a line parallel with the saw, regardless of the angle.
- Circular saw gages must slide in grooves or tracks in exact alignment with the saw at all guide positions.
- Hinged tables must be in true alignment with the saw.
- Automatic cutoff saws must enable the operator to control each stroke.
- Circular saws that extend beneath or behind the table must have guards to prevent accidental contact.
- Revolving double arbor saws must be fully guarded.
- Arbor saws require machined and shaped blades, cutter heads, or tool collars that accurately fit the arbor.
- Combs (feather boards) or jigs can be used if standard guards are infeasible when dadoing, grooving, jointing, molding, and rabbeting.

Machine Guarding

Woodworking – Hand-Fed Cross-Cut Table Saws



- Hand-fed cross-cut table saws are guarded by a hood that completely encloses the saw above the table to protect operators from flying particles and broken saw teeth.
- Hood guards must be automatically adjustable to the material being cut and cannot offer resistance to the material being sawed.
- Hood guards must be durable and capable of withstanding the stresses normally encountered during operation.
- Hood guards and spreaders must remain in true alignment with the saw and be able to resist reasonable thrust or forces that tend to throw them out of alignment.
- Spreaders are required to prevent materials from squeezing the saw or being thrown back to the operator.
- Spreaders must be made of hard tempered steel and be thinner than the saw kerf.
- Spreaders must be immediately reattached if removed during grooving, dadoing, or rabbeting.
- Non-kickback fingers or dogs must be provided and used to offset the tendency of the saw to throw materials back to the operator. Adequate holds must be provided for all thicknesses of materials to be cut.

Machine Guarding

Woodworking – Hand-Fed Ripsaws

- Circular hand-fed ripsaws must be guarded by a hood that completely encloses the saw above the table to protect operators from flying particles and broken saw teeth.
- Hood guards must automatically adjust to the material being cut and cannot offer resistance to the material being sawed.
- Hood guards must be durable and capable of withstanding the stresses normally encountered during operation.
- Hood guards and spreaders must remain in true alignment with the saw and be able to resist reasonable thrust or forces that tend to throw them out of alignment.
- Spreaders are required to prevent materials from squeezing the saw or being thrown back to the operator.
- Spreaders must be made of hard tempered steel and be thinner than the saw kerf.
- Spreaders must be immediately reattached if removed during grooving, dadoing, or rabbeting.
- Non-kickback fingers or dogs must be provided and used to offset the tendency of the saw to throw materials back to the operator. Adequate holds must be provided for all thicknesses of materials to be cut.

Machine Guarding

Woodworking – Jointers

- Hand fed horizontal planers and jointers have cylindrical cutting heads.
  - The knife projections cannot exceed 1/8 inch beyond the cylindrical body of the head.
  - Push sticks or blocks in varying sizes and types must be available, based on the type of work performed.
  - Table openings must be kept as small as possible.
  - One-eighth inch clearance (maximum) is allowed between the rear of the table and the cutter head.
  - Table throat openings must be 2 1/2 inches or less when the table is aligned for a zero cut.
  - Automatic guards must be installed to cover all sections of the head on the working side to keep the operator's hands from contacting the revolving knives. This guard must automatically adjust to cover the unused portion of the head and must remain in contact with the material at all times.
  - A guard must cover the section of the head back of the fence.

- Wood jointers with vertical heads must have an exhaust hood or other guard to completely enclose the revolving head. A slot is allowed for the material to be jointed.

Machine Guarding

Woodworking – Machine Controls

- Emergency stops and normal stopping controls are located within easy reach of the operator at all times.
- Power controls and operating controls are located within easy reach of the operator without having to reach over the cutter to make adjustments.
- On machines driven by belts and shafting, a locking-type belt shifter or an equivalent device must be used.
- Automatic restart capability after power failure is prohibited. Manual restarting is required.
- Each machine must be capable of being locked out or rendered inoperative during repair or adjustment.
- Each operating treadle (foot pedal or activation switch) is protected against unexpected or accidental tripping.
- Feeder attachments have the feed rolls or other moving parts covered or guarded to protect the operator from contacting them.

Machine Guarding

Woodworking – Machine Inspection and Maintenance

- Dull, badly set, improperly filed, or improperly tensioned saws must be immediately removed from service, before they begin to cause the material to stick, jam, or kick back when it is fed to the saw at normal speed.
- Saws to which gum has adhered on the sides must be immediately cleaned.
- All knives and cutting heads of woodworking machines must be kept sharp, properly adjusted, and firmly secured. Where two or more knives are used in one head, they must be properly balanced.
- Bearings must be kept free from lost motion and be well lubricated.
- Arbors of all circular saws must be free from play.
- Sharpening or tensioning of saw blades or cutters must be done only by experienced persons.
- Housekeeping and cleanliness must be maintained to prevent malfunction of the guard and to prevent fires.
- All cracked saws must be removed from service.
- The practice of inserting wedges between the saw disk and the collar to form what is commonly known as a "wobble saw" is prohibited.
- Push sticks or push blocks must be provided at the work place in the sizes and types suitable for the work to be done.

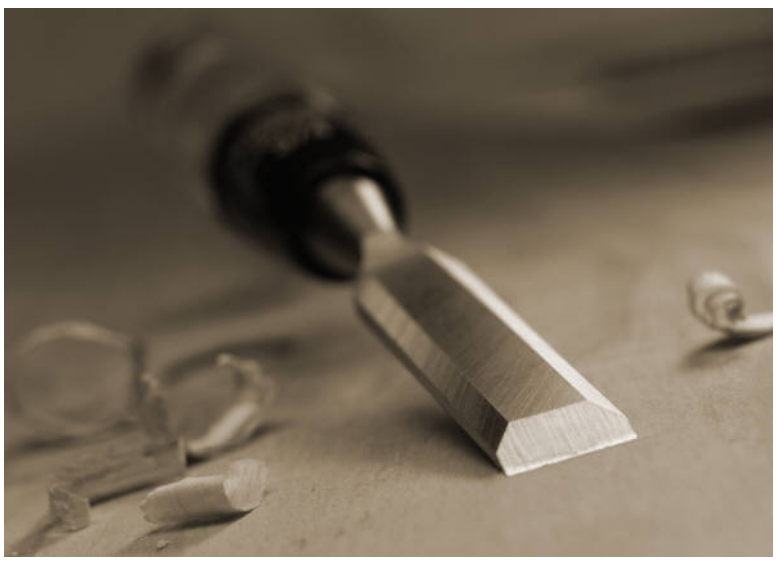
Machine Guarding

Woodworking – Miscellaneous Woodworking Machinery

- All points of operation, where the operator's hands or fingers could contact the tool or the cutting or abrading area, must be guarded.

- Glue spreaders – feed rolls must have semi-cylindrical guards. The bottom of the guard must come within 3/8 inch of the material.

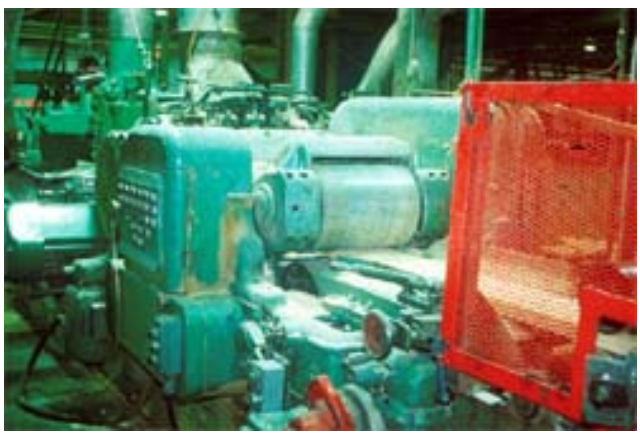
- Drag saws must be enclosed or have at least a 4-foot clearance from the extreme end of the saw stroke.



Machine Guarding

Woodworking – Planing, Molding, Sticking, and Matching Machines

- All cutting heads and saws must be completely enclosed by a metal guard (1/16 inch sheet metal, 3/16 cast iron, or equivalent material).
- Exhaust systems, if used, must be metal (1/16 inch sheet metal, 3/16 cast iron, or equivalent material).
- Feed rolls must be guarded to prevent the operator's hands from contact with in-running rolls at any point. Guards must be fastened to the frame carrying the rolls and automatically adjust to the thickness of the material.
- Surfacers or planers using multiple pieces of material simultaneously must have either sectional infeed rolls to provide constant contact pressure on the material or suitable section kickback finger devices at the infeed end.



Machine Guarding

Woodworking – Radial Saws

- The upper hood encloses the upper portion of the blade down to the end of the saw arbor.
    - It must protect the operator from flying splinters and broken saw teeth.
    - It must deflect sawdust away from the operator.
- The sides of the lower exposed portion of the blade are guarded to the full diameter of the blade that adjusts to the thickness of the stock.
    - It must remain in contact with stock being cut to give the maximum possible protection.
- Ripsaws must use non-kickback fingers or dogs to oppose the thrust of the saw and the tendency for the saw to throw materials back toward the operator.
    - They must provide adequate holding power for the material being cut.
- An adjustable stop must be in place to prevent the blade from traveling beyond the necessary position for repetitive cuts.
- The saw must be tilted to the back to cause the cutting head to return gently to the starting position when released.
- Ripping and ploughing is done against the direction in which the saw turns.
    - The direction of the saw rotation must be visible on the hood.
    - A label (at least 1½ x ¾ inch) that reads: "Danger: Do Not Rip or Plough From This End“ must be affixed to the rear of the guard.

Machine Guarding

Woodworking – Sanding Machines

- Sanding rollers must have a guard (usually semi-cylindrical) to prevent the operator's hands from contact with the in-running rolls.
  - Guards must be metal.
  - Guards must be secured or integral to the equipment.
  - Guards must adjust to the thickness of the material.
  - Guards must come to within 3/8 inch of the material.
- Drum and disk sanders must have exhaust hoods or guards that enclose the revolving portion of the drum or disk.
- Belt sanders must be guarded at each nip point where the sanding belt runs on a pulley.
  - Guards prevent the operator's hands or fingers from coming into contact with the nip points.
  - Guards must cover the unused run of the sanding belt.

Machine Guarding

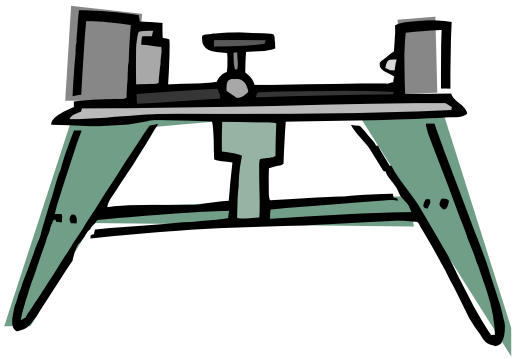
Woodworking – Swing Cutoff Saws

- Each swing cutoff saw must be provided with a hood that will completely enclose the upper half of the saw, the arbor end, and the point of operation at all positions of the saw.
- The hood must be constructed in such a manner and of such material that it will protect the operator from flying splinters and broken saw teeth.
- The hood must be designed to automatically cover the lower portion of the blade. When the saw is returned to the back of the table, the hood rises on top of the fence, and when the saw is moved forward, the hood drops on top of and remains in contact with the table or material.
- Each swing cutoff saw is required to have devices that return the saw automatically to the back of the table when released at any point of its travel. Devices must be counterweighted using safety chain or bolted bars and cotter pins (not ropes, springs, or cords).
- Limit chains must prevent the saw from swinging up to the front or beyond back edges of the table.
- Inverted saws must be guarded at all points above the top of the table or material being cut. Guards must automatically adjust to the thickness of and remain in contact with the material being cut.

Machine Guarding

Woodworking – Swing-Head Lathes and Wood Heel Turning Machines

- All cutting heads must be covered by a metal guard (1/16 inch sheet metal, 3/16 cast iron, or equivalent material).
- Cutting heads on wood-turning lathes, whether rotating or not, are covered as completely as possible by hoods or shields.



- Automatic wood turning lathes with rotating knives (such as shoe last and spoke lathes, doweling machines, and wood heel turning machines) must have hoods that completely enclose the cutter blades (except at the point of contact with the material).
- Lathes used for turning long pieces of wood stock held only between the two centers must have long curved guards extending over the top of the lathe to prevent the work pieces from being thrown out of the machines if they should become loose.
- Exhaust systems, if used, must be made of metal (1/16 inch sheet metal, 3/16 cast iron, or equivalent material).

Machine Guarding

Woodworking – Tenoning Machines

- Feed chains and sprockets must be completely enclosed (except at feed area).
- Rear frames are guarded on the sides by plates that project beyond the sprockets and ends of lugs.
- Cutting heads and saws must have metal guards that cover the unused part of the cutting head (1/16 inch sheet metal, 3/16 inch cast iron, or equivalent).
- Exhaust systems, if used, must be constructed of metal (1/16 inch sheet metal, 3/16 inch cast iron, or equivalent).

Machine Guarding

Woodworking – Veneer Cutters, Slicers, and Wringers

- Veneer slicer knives must be guarded at the front and rear.
- Veneer clippers must be automatic feed or have the knives guarded to prevent the operator's fingers from contact.
- Sprockets on chain or slat-belt conveyors are enclosed.
- Hand and foot-power guillotine veneer cutters must have rods or plates on the feeding side to prevent contact with the cutting edge of the knife.
- Power-driven guillotine veneer cutters, except continuous feed trimmers, must be equipped with one of the following:
  - two hand trips or starting devices (per operator) with at least one hand on controls during the complete stroke of the knife
  - pull back devices that activate as the blade descends and a one hand trip that requires two distinct motions to start the cutting motion (This device must return to the non-starting position after each stroke of the knife.)
  - a brake or stopping mechanism with additional emergency stops that are accessible to each operator in any operating position, or
  - emergency devices that prevent the machine from operating in the event of a brake failure at any point in the cut.
- Shutdowns for inserting logs or making adjustments require operators to ensure machines are clear and all persons are in a safe position before restarting.
- Operators cannot ride the carriage of a veneer slicer.

Machine Guarding

Woodworking – Wood Shapers

- Cutting heads (manually fed) must be enclosed or have an adjustable guard to prevent the operator's hands from contacting the cutting edge.

- Guards cannot be larger than the diameter of the cutter
- Warning devices attached to the spindle (leather or other material) are prohibited.

- All double-spindle shapers must have a starting and stopping device for each spindle.

Marking Industrial Hazards

Types of Accident Prevention Tags

- **Danger** tags indicate major hazard situations where an immediate hazard presents a threat of death or serious injury to employees.

- **Caution** tags are used for minor hazard situations where a non-immediate or potential hazard or unsafe practice presents a lesser threat of employee injury.

- **Warning** tags represent a hazard level between "Caution" and "Danger" but must contain the word “Warning."

- **Biological hazard** tags identify the actual or potential presence of a biological hazard (such as contaminated blood or body fluids) and identify equipment, containers, rooms, experimental animals, or combinations thereof that contain or are contaminated with hazardous biological agents.

- **Other** tags may be used in addition to the above types or in other situations where tags are not normally required (provided that they do not detract from the impact or visibility of the signal word and major message of any *required* tag).

Marking Industrial Hazards

Colors of Signs and Wording

Red

- Fire Protection Equipment
- Danger
- Flammable materials containers
- Emergency stop bars and buttons

Red or Yellow

- Barricade lighting (hazard dependent)

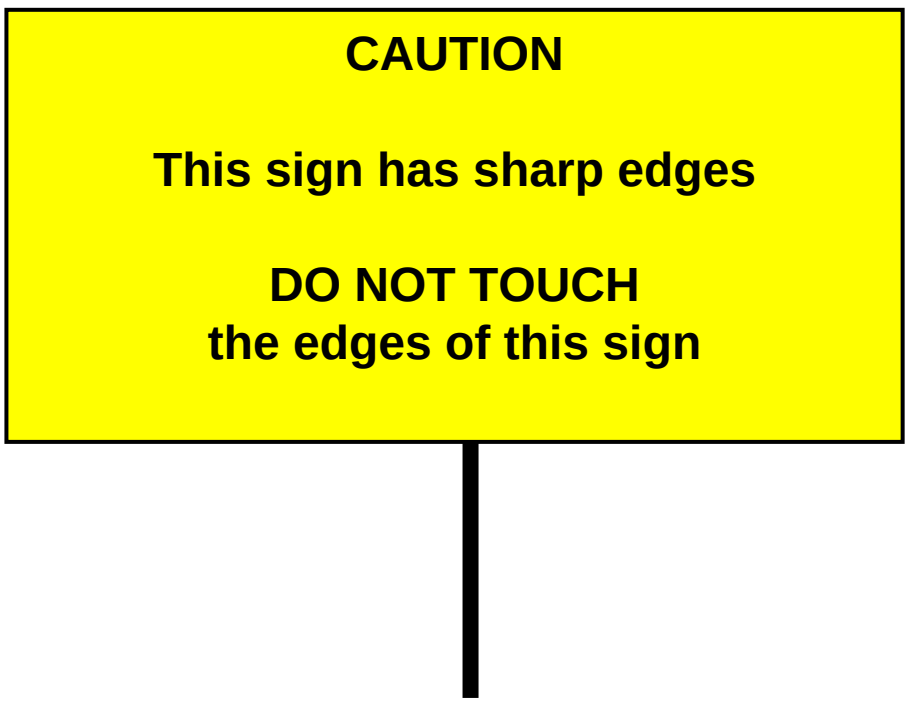
Yellow

- Caution signs
- Physical hazard markings (such as caution tape)

Marking Industrial Hazards

Design and Features

All signs must have rounded or blunt corners and must be free from sharp edges, burrs, splinters, or other sharp projections, including bolts or other fasteners.



Marking Industrial Hazards

Types of Signs

Danger, Caution, and Safety Instructions

- **Danger signs** indicate immediate danger and that special precautions are necessary. The word "Danger" and the color of the danger emblem (red, black, and white) may not be changed or altered.

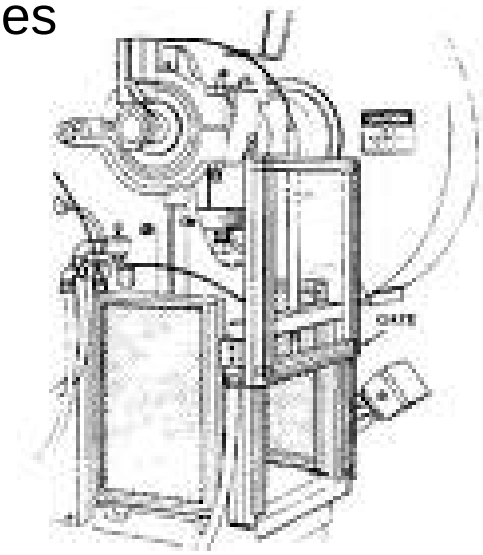
- **Caution signs** warn against potential hazards or warn against unsafe practices. The word "Caution" and the color of the caution sign and panel (yellow background with a black panel and yellow lettering) may not be changed or altered.

- **Safety instruction signs** are used where there is a need for general instructions and suggestions relative to safety measures. The color of the background (white) and the lettering (in green, black, or white letters on a green panel) may not be changed or altered.

Mechanical Power Presses

General Requirements

- Do not move, remove, or tamper with press guards or protective systems, unless authorized to do so.
- Adjust systems for your height and size, as needed.
- Attend training, when required or needed, to ensure you understand the operation of the press and the protective system used.
- Report any unsafe conditions immediately.
- Inspect equipment at the beginning of each work shift and frequently throughout use.
- Immediately report any injuries that occur, even minor cuts and scrapes.



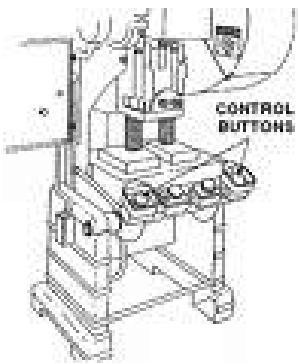
Mechanical Power Presses

Point-of-operation Guarding

Types of Systems

Point-of-operation guards (where the opening is ¼ inch or more) must be properly applied, adjusted, and maintained for every operation performed on a mechanical power press. Types of guarding systems include:

- point-of-operation devices
- gates or movable barriers
- presence-sensing point-of-operation devices
- safety distances
- safety guards
- pull-out devices
- holdout or restraint devices
- two-hand control devices
- two-hand trip devices, and
- hand-feeding tools.



Mechanical Power Presses

Injury Reporting

The company must report any point-of-operation injury that involved the use of a mechanical power press to the area or state OSHA office within 30 days of the incident.

The following information must be reported:

- company name and address
- employee name, type and extent of injury, and the task being performed, such as operation, set-up, or maintenance
- type of clutch used on the press (full revolution, part revolution, or direct drive)
- type of safeguards being used, such as two-hand control or trip devices, restraint systems, or light curtains
- cause of the accident (repeat of press, safeguard failure, removing stuck part or scrap, no safeguard provided, no safeguard in use, or other)
- type of feeding (manual, semi-automatic, or automatic)
- resources used to actuate press stroke (foot-trip or control, hand-trip or control, or other), and
- number of operators required for press operation, and whether each operator had safeguards and controls.

Mechanical Power Presses

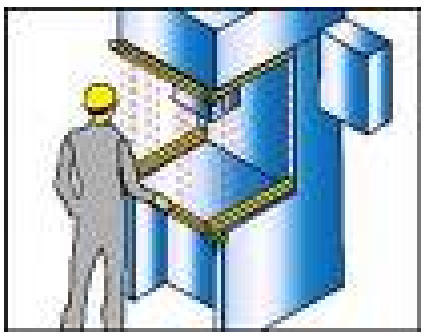
Safety Guards

Light Curtains (PSDIs)

Light curtains detect the presence of any material, tool, or part of the body that crosses the light field and stops the revolution of the press.

Operators must understand:

- safe distance requirements
- testing processes
- the operation and function of the system
- tools that must be used for press operation, and
- the consequences of bypassing or defeating the protective system.



Mechanical Power Presses

Overloading

Do not overload or overstress presses.

The tonnage limits of the press and the attachment weight ratings are specified by the manufacturer and may not be exceeded.

Mechanical Power Presses

Protective Equipment and Clothing

Company policy and general safety requirements may restrict loose clothing, hair, or jewelry that may interfere with the operation or activity of the press.

One or more of the following may be required:

- caps
- hair nets
- face shields
- safety goggles
- glasses
- hearing protection
- foot guards
- gloves
- other protection

All protective equipment requirements must be followed.

Mechanical Power Presses

Safe Distance Requirements

The safety distance from the sensing field or activation controls to the point of operation is based on the regulations and the manufacturer's literature. A machine safety assessment must be conducted for each required machine.

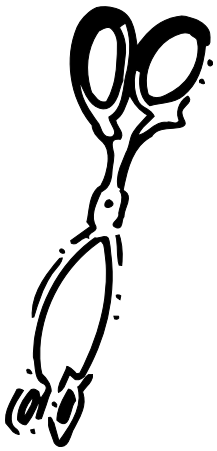
Safe distance (in inches) is calculated by the time it takes (in seconds) for the die to close after it has been activated, multiplied by 63. (For full revolution clutches with only one engaging point, the die closure time is the same as the time it takes for one and one-half revolutions of the crankshaft.)

Mechanical Power Presses

Safety Guards

Hand-feeding Tools

Hand-feeding tools are intended for placing materials in and removing materials from the press.



Hand-feeding tools are an **additional** safety device and are not considered a point-of-operation guard. They may not be used instead of proper guarding systems.

Mechanical Power Presses

Safety Guards

Pull-out Devices

- Pull-out devices protect the operator and include connections to the slide or die for each of the operator's hands. They may not be connected to the sweep device.
- Hand connections must be visually inspected and adjusted to the user at the start of each shift, following a new die setup, and if the press operator changes.
- There must be one device in place for each operator.
- Connections must physically withdraw the hands before the die closes.
- Maintenance, repair, and inspection records must be kept.

Mechanical Power Presses

Safety Guards

Holdout or Restraint Devices

- A holdout or restraint device includes attachments for each of the operator's hands.
- Attachments are securely anchored and adjusted so the operator is restrained from reaching into the point of operation.
- A separate set of restraints must be provided for each operator who works on a press.

Mechanical Power Presses

Safety Guards

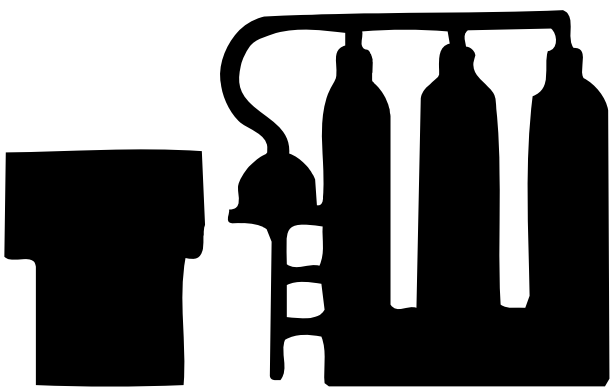
Two-hand Trip Devices

- One set of controls must be provided for each operator, and both sets must be activated at the same time to start the press slide.
- If any one hand is removed, the controls must stop the slide action.
- Safe distances from the slide must be properly calculated by management or another competent person to determine where controls must be placed.
- Controls must be fixed in place and must not be relocated without consulting the manufacturer, a safety engineer, or a similarly qualified person.

Mechanical Power Presses

Work Area Clearances

- You must maintain enough space around the machine for you, your work pieces, and any other operators.
- There must be enough space around the machine for cleaning, maintenance, and storing materials.
- All surrounding floors must be kept in good condition and free from obstructions, grease, oil, and water.



Noise And Hearing Conservation

Hearing Tests (Audiograms)

Occupational Noise Exposure

If you are required to wear protective equipment, you must receive a hearing test (audiogram) at least once each year.

- Tests must be at no cost to you (paid for by your insurance or your company).
- Tests must be at a reasonable time and place.
- Tests must be performed by a licensed physician or a licensed audiologist.
- You may not be exposed to loud noise for 14 hours before the test.
- Your company must be notified of the results of this hearing test.

Noise And Hearing Conservation

Choosing the Right Protection

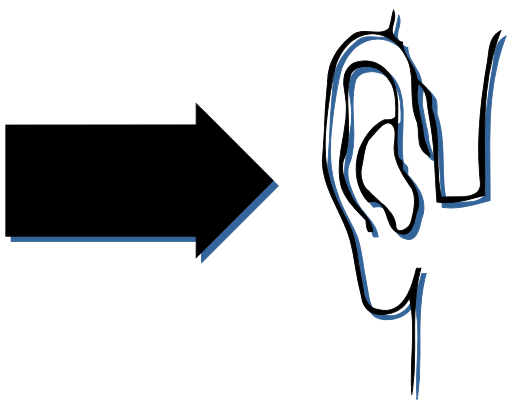
Occupational Noise Exposure

- Choose protection based on noise-level exposure.
- Equipment must fit properly and securely.
  - It must accommodate the use of other protective equipment, if required.
- Equipment must be used where and when required.
- Equipment must be kept clean and sanitary.
  - Medical conditions (such as ear infections or ear deformities) should be taken into consideration.

Noise And Hearing Conservation

Controls

- Engineering controls are required as the first step to noise reduction.
  - Sound proofing
  - Sound absorption
  - Machinery or equipment upgrades
- Administrative controls should then be implemented.
  - Procedures
  - Written plans
  - Time rotation
- Personal Protective Equipment (PPE) should be the last control implemented.
  - Hearing protection (earplugs, earmuffs, other)



Noise And Hearing Conservation

Determining the Adequacy of Hearing Protective Equipment

- Hearing protection must reduce noise levels to under 85 dBa over an 8-hour TWA.
- Use the Noise Reduction Rating (NRR) listed on the packaging of the protective equipment.
- Use the A-weighted scale found on most noise monitoring equipment (dosimeters or audiometers) to determine which type of hearing protective equipment is acceptable to reduce noise levels to below 85 dBa.
  - To do this, obtain the A-weighted 8-hour TWA. Subtract 7 from the NRR listed, and then subtract the remainder from the TWA.
- Example 1 (90 dBa constant noise):
  - 8-hour TWA is at 90 dBa; the NRR of the earplugs is 29.
  - 90 – (29 – 7) = 68
  - These earplugs will reduce noise levels to below the 85 decibel limit.
- Example 2 (high-impact noise zone):
  - Impact noise levels are 130 dBa; the NRR of the earplugs is 29.
  - 130 – (29 – 7) = 108
  - These earplugs would NOT be sufficient to reduce noise levels to 85 dBa. A different type of protective equipment is required.

Noise And Hearing Conservation

Ear Muffs

Occupational Noise Exposure

Earmuffs:

- Earmuffs consist of sound-deadening material, soft ear cushions that fit around the ear, and hard outer cups. They are held together by a headband.
- **Advantages:**
  - More comfortable for most people
  - Effective to reduce noise by 20-60%
  - More effective at reducing intermittent noise
  - Less variable between users
  - Will not irritate the ears
  - Easily seen to monitor usage

- **Disadvantages:**
  - Expensive (comparatively)
  - Can fall off if improperly fit
  - Heavier and less portable
  - Can interfere with other personal protective equipment use
  - Can irritate the back of the ear when used with prescription eyewear or safety glasses

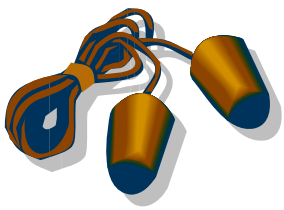
Noise And Hearing Conservation

Earplugs

Occupational Noise Exposure

Earplugs:

- Earplugs are inserted into the ear canal by the user. They may be pre-molded (preformed) or moldable (foam). They can even be custom molded for your specific ear shape.
- **Advantages:**
  - Disposable
  - Inexpensive
  - Effective in reducing noise by 20-30%
  - More effective for constant noise levels than intermittent noise
  - More comfortable than earmuffs in hot or damp areas



- **Disadvantages:**
  - Easy to loose
  - Less comfortable
  - Should not be used at >105 decibel noise zones
  - Require cleaning or frequent disposal as they can transfer dirt or bacteria into the ear canal

Noise And Hearing Conservation

Noise Level Determination Table

Duration per day, in hours	Sound level dBa, slow response (or A scale) measurement
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

Noise And Hearing Conservation

Employee Information

Occupational Noise Exposure

- Attend training.
- Use protective equipment (for example, earplugs or earmuffs).
- If desired, make the opportunity to observe any noise monitoring and sampling that takes place.
- You will be notified if the workplace noise levels require you to wear hearing protection.
- If you are required to wear protective equipment, you must receive a hearing test (audiogram) at least once each year. Your company must be notified of the results of this hearing test.
- If there is a significant change in your ability to hear (as compared to your previous hearing tests) you will be notified in writing.

Noise And Hearing Conservation

Purpose of Audiometric Testing

Audiometric testing checks and verifies hearing ability.

- Testing must take place in a sound-proof room.
- A pulse or tone is heard through a headset.
- A written report usually accompanies the audiogram.
- Results for each test must be compared to previous results, if available.

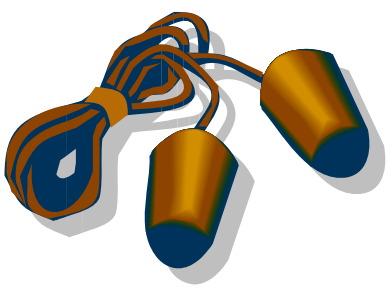
Noise And Hearing Conservation

Semi-Insert Earplugs

Occupational Noise Exposure

Semi-insert earplugs:

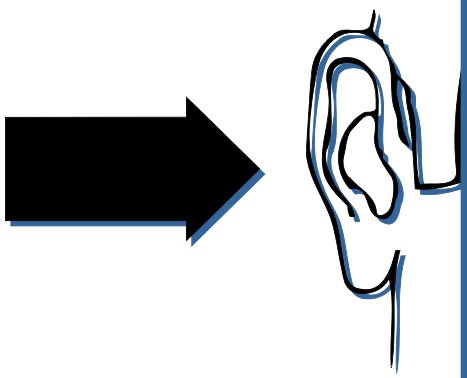
- Semi-insert earplugs consist of two earplugs held over the ends of the ear canal by a rigid headband.
- **Advantages:**
  - Effective to reduce noise by 20-30%
  - Easier to keep track of than regular plugs
  - Less expensive than earmuffs
- **Disadvantages:**
  - More expensive than standard earplugs
  - Less comfortable than standard earplugs, especially if frequent head movements are required
  - Must be kept clean or they will irritate the ear canal
  - Require more time to fit and to take them in or out of the ears



Noise And Hearing Conservation

The Effects of Noise On Hearing

Occupational Noise Exposure



The effects of noise on hearing:

- Hearing loss usually occurs gradually.
- Exposure today may not show up for 5 or 10 years.
- Decreased hearing is usually noticeable to you and to others.
- Hearing loss usually occurs in the “treble,” or language frequencies first.
- As you get older, your ability to hear naturally decreases.
- Temporary hearing shifts do not *fully* recover.

Warning signs:

- Ringing or buzzing in the ears after exposure to a loud noise
- Sound is “muffled” for a time

Potential health effects:

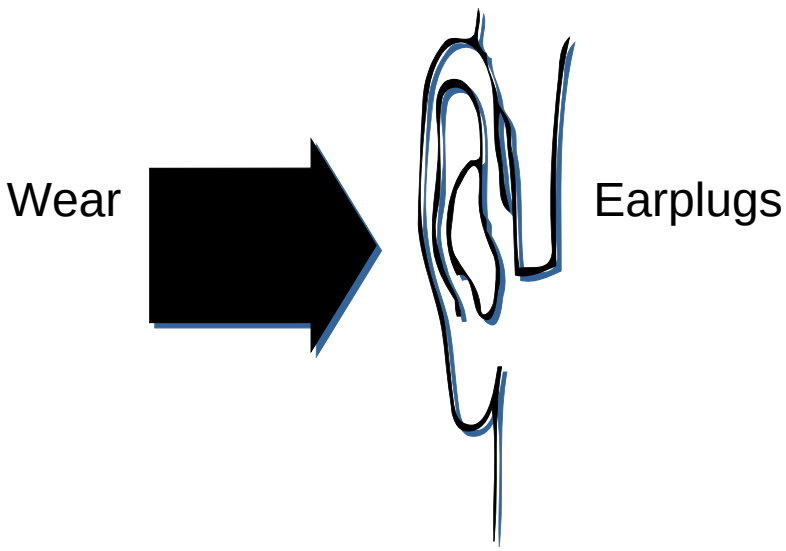
- Added stress from straining to listen
- Anxiety, which could result in elevated blood pressure
- Depression or isolation

Noise And Hearing Conservation

Wear Hearing Protection

Occupational Noise Exposure

Protect Your Hearing Today



So You Don’t Have Problems Later!

Noise exposure today may not show up on your hearing test for 10 years.

Noise And Hearing Conservation

When is Protection Required?

Occupational Noise Exposure

Hearing protective equipment is required when noise levels exceed established limits and when engineering controls (such as sound absorbers) can not adequately reduce noise levels.

- The noise limit is 85 decibels over a time-weighted average of an 8-hour work day.
- Rule of Thumb: If you have to shout or yell to be heard, the levels are more than 85 decibels.

Changing and Updating

If the information on the log changes after the calendar year closes (for example if someone is still out on lost time or they subsequently experience lost time from a previous incident), the log must be updated within six working days.

Number of Lost Days __42__

Example: Joan Smith has carpal tunnel syndrome that is diagnosed in November 2004. She is scheduled for surgery on January 15, 2005, and is out of work for six weeks. When she returns to work at the end of March, the 300 log must be updated to reflect the 42 days of lost time.

Once the summary log (or 300A form) is signed and posted, your company does not need to re-post the log. The posted copy should be as current as practical when it is signed and must reflect all recordable cases for the previous calendar year that have been reported.

Recordkeeping

Completing the 300 Log

Case number should be entered in column A and is usually sequential (1,2,3,4,5…).

Employee Name should be entered in column B, unless it is a "privacy case."

Job Title should be entered in column C (welder, electrician, laborer).

Date of Injury should be entered in column D (month and day).

Where the event occurred should be entered in column E (basement, fan room, parts line #2).

Description of the injury or illness should include the part of the body affected and object or substance that directly caused the injury. It should be entered in column F (for example, welding flash burn to left forearm, laceration of right index finger from fan blade, or back strain from lifting boxes).

Classification of the case should be entered in column G-J. Pick the *best answer* based on the seriousness of the case. For example, lost time is more serious than restricted time, or restricted time is more serious than an "other" recordable case (a case with no lost or restricted time).

Days Away or Days of Transfer or Restriction should be entered in column K and L. Remember, you do not count the day of the injury. Weekend days are included and the *maximum* total for the two columns should be 180 days.

Injury or Illness Type is checked off in column M (1-6). Check column M-1 if the incident was an injury, or check the appropriate column for M-2 through M-6 if the incident was a work-related illness.

Recordkeeping

Filling Out the 300A Summary Log

Number of Cases: Total the number of each classification that displays on the 300 log (columns G-J). Enter these numbers in the appropriate spaces on the form.

Number of Days: Total the number of days away from work (column K on the 300 log) and the number of days of job transfer or restriction (column L on the 300 log). Enter these numbers in the appropriate space.

Injury and Illness Types: Total the number of each type of injury or illness (columns M1 through M6 on the 300 log). Enter these numbers in the appropriate spaces.

Enter a zero in any spaces where there is no applicable information.

Establishment Information: Enter company name, street address, city, state, and zip code. Write a brief description of your business (for example, graphic arts and printing). Enter a SIC (Standard Industrial Classification) code or NAICS (North American Industrial Classification System) code for your business type, if known.

Employment Information: Enter the average number of employees who worked at your company during the calendar year. (Full-time, part-time, seasonal, and temporary employees count individually.) Enter the total number of hours worked by all employees during the calendar year. (Your Paychex payroll specialist or payroll reports should have this information.)

Signature information: The company executive must sign and date this document, including his title at the company and telephone number.

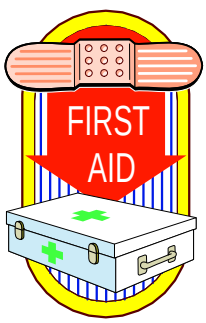
The signed summary must be posted from

February 1 - April 30

First-Aid Treatment

First-aid treatment **is** considered the following and **is not recordable**:

- non-prescription medication at non-prescription strength
- tetanus immunizations
- cleaning, flushing, or soaking wounds on the skin surface
- using wound coverings (bandages, gauze pads, or butterfly bandages)
- heat or cold therapy
- use of non-rigid support (such as elastic wraps and back belts), and
- temporary immobilization devices when used only for transporting (splints, slings, neck collars, or back boards).



First-Aid Treatment

First-aid treatment **is** considered the following and **is not recordable**:

- drilling of a finger or toe nail to relieve pressure or draining fluids from a blister
- eye patches
- simple irrigation or swabbing of the eye to remove a foreign body that is *NOT* embedded or adhered to the eye
- use of irrigation, tweezers, or cotton swabs (or similar items) to remove splinters of foreign materials from areas other than the eye
- use of finger guards
- massages, and
- drinking of fluids to relieve heat stress.

How to Count the Number of Lost Days

The day of the event or exposure is not counted.

The count stops after 180 days.

In general, weekends are counted. An exception occurs if the employee reported back to a scheduled work shift. For example, an employee is injured on Thursday, lost time on Friday, and returned to work for his regularly scheduled shift on Monday. In this case, only one day of lost time would be recorded.

A total of 180 days is the maximum. Lost workdays and any restricted workdays are added together (although they are recorded in separate columns on the log). Once the 180-day limit is reached, further recording of lost or restricted time is not required.

Recordkeeping

Posting and Notification Requirements

The summary of the OSHA log (Form 300A) must be posted from **February 1 - April 30** for the previous calendar year.

It must be posted in an area that is accessible to employees and in a place where employees would normally go to look for similar information.

If your company has several locations, one copy must be posted at each location. If you have employees who normally travel or work from a satellite location or home office, each employee must receive a copy.

Your company does **NOT** have to send the log or the summary to OSHA unless specifically requested to do so.

Pre-Existing Conditions

A pre-existing injury or illness has been significantly aggravated when an event or exposure in the workplace causes any of the following to occur if any of these outcomes would not have occurred except for the work event or exposure:

- death or loss of consciousness
- one or more days away from work, days of restricted work, or days of job transfer, or
- medical treatment in a case or a change in medical treatment that was necessitated by the workplace event or exposure.

Electrical Safety

Safeguards for Personal Protection

Use of Personal Protective Equipment

Electrical protective equipment appropriate for the work must be provided and used to protect employees.

Protective equipment must be maintained in a safe, reliable condition, and be periodically inspected or tested. If the equipment is insulated, the insulation must be frequently inspected to ensure it remains capable of providing adequate protection (for example, an outer covering of leather is sometimes used for the protection of rubber insulating material).

Specialized hard-hats, eye or face protection, and gloves may be required if there is a danger of head injury from electric shock or burns due to contact with exposed energized parts, from arc flashes, or from flying particles due to an electrical explosion.

Tools and handling equipment must be insulated if it is likely they will be in contact with live parts. Specialized equipment and tools may be required to remove or install fuses. Any rope or hand-lines must be made of non-conductive materials.

Protective shields, protective barriers, or insulating materials may be required to protect employees from shocks, burns, or other electrically related injuries while working near exposed energized parts or where dangerous electric heating or arcing might occur. When live parts or circuitry that are normally enclosed are exposed for any reason, they must be guarded by barriers or shielding to prevent employee contact.

- Safety signs, safety symbols, or special tags may be necessary to warn employees about electrical hazards that may endanger them.
- Barricades (non-conductive) may also be required in conjunction with safety signs to prevent employees from being exposed to live electrical hazards.
- Attendants may need to be stationed to warn employees where signs and barricades do not provide sufficient warning and protection.

Eye Safety

Each day more than 2000 people injure their eyes at work and 10-20% of those will have temporary or permanent vision loss. It is estimated that 90% of these eye injuries could have been prevented.

Common Causes Of Eye Injury Include:

- Flying objects
- Chemicals
- Dust
- Bright light
- Tools

Safety Glasses, Goggles Or Face Shields Should Be Used:

- When using chemicals for any splash hazard
- When using hand or power tools
- For welding, grinding or cutting

Using The Appropriate Protection:

- Safety Glasses: Provide the least amount of protection of all eyewear; they have impact resistant lenses and should have side shields
- Safety Goggles will protect from dust, splashes and impact.
- Face Shields are normally used for chemical splash protection but do not provide adequate eye protection from impact. Must be used with either glasses or goggles to protect the eyes.
- Welding shields: Must be used when welding, brazing, soldering or cutting

Remember:

- All eye protection equipment should be inspected daily and fit properly. If there are cracks or breaks anywhere do not use them.
- KEEP THEM CLEAN
- Never look at welding without proper protection
- Don't use tinted safety glasses inside
- Normal street glasses are not Safety Glasses. Tell your optometrist you need industrial safety glass lenses.

If you have something in your eye:

- Do not try to remove something from your eye, seek medical attention.
- Chemicals in the eye require flushing with water for at least 15 minutes and then get medical attention.

Foot Protection

While proper footwear is important for all employees, regardless of their job, some jobs require specific protection. When working in areas where there is a danger of foot injuries due to falling or rolling objects, objects piercing the sole or where employees feet are exposed to electrical or chemical hazards, proper footwear is required.

We are all aware of safety shoes, but there are other protective items that might be needed such as leggings, metatarsal guards, toe guards, and even more specialized protection for those working around electricity. In some cases the only protection required is a slip resistant sole. Your supervisor or manager will tell you which is required for your job.

Sometimes employees may question the need for safety shoes. "If my foot gets run over by a forklift, the shoe won't do any good," said one worker. This is true. However, they are being used to protect against other hazards, such as heavy boxes falling off of storage racks. Actually, OSHA says that the typical foot injury is caused by objects falling from heights of less than four feet.

Once you have the right protective foot-wear it is important: to conduct a pre-use safety check each day to include:

- No holes or tears
- No separation between the sole and upper part of shoe
- Shoes are not wet or damp
- Shoes have good tread
- Laces are not too long, or frayed

Other things to consider:

- Keep your socks dry
- Keep feet away from rolling equipment
- Select footwear with good ankle support
- If working in wet areas, wear slip resistant boots

HAND SAFETY

HAND PROTECTION

Dressing, eating, driving, reading, writing, helping your child….all these require the use of your hands. They are one of your most valuable possession and need protection.

Hazards include:

- Sharp objects
- Chemicals
- Extreme heat or cold
- Electricity
- Machines
- Vibration

Hazard controls include:

- Gloves
- Machine Guards
- Proper Tool Handling
- Lockout/Tagout

A smart worker will:

- Look for hand hazards before performing a task
- Never use a machine or tool without its guards in place
- Check gloves before use and replace as necessary
- Wear gloves that fit properly
- Use the correct glove
- Wash their hands after using any chemical
- Use push sticks or shut down machine and lock out before un-jamming or cleaning machinery
- Store sharp tools properly

Never put your hands where you cannot see them without checking for hidden hazards.

Get immediate first aid for all cuts and bruises.

HEARING SAFETY

HEARING PROTECTION

Someone says “I Love You”, someone says “Look Out!”. Did you hear them? Will you hear them in 5 years? Hearing loss is something you can never regain once it is lost, and hearing loss creeps up slowly. As a normal part of aging you will probably lose half your hearing by your 65th birthday, but what about if you are exposed to high noise levels repeatedly when you are younger? The loss will be quicker and more severe if you don’t take action now. Even temporary hearing shifts do not totally recover.

High Noise Exposures:

The rule of thumb is if you have to shout or yell to be heard, the noise is too loud. Some example of high noise exposures are machinery, loud music, lawn mowers, power tools, firearms. Hearing loss depends on how loud the noise is and how long you are exposed.

Safe Workers:

- Obey rules regarding hearing protection at work
- Wear hearing protection when working with power equipment at home
- Use the appropriate protection (plugs, ear muffs or a combination)
- Keep the protection clean and replace as needed
- Participate in their company’s hearing protection program

Warning Signs:

•Ringing or buzzing in the ears after exposure to loud noise

•Sound is “ muffled” for a time

To be effective hearing protection must be used when needed, used properly, clean and in good condition.

Personal Protective Equipment (PPE)

Equipment Access and Maintenance

Supplies, storage, and access to PPE must be available to you when it is required for a specific work area or operation.

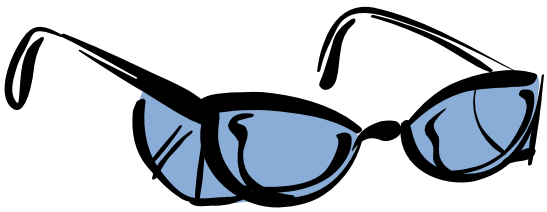
PPE must be maintained in a sanitary and reliable condition. Damaged or defective PPE must be taken out of service and not used. Contaminated clothing and PPE must be disposed of or cleaned properly.

Personal Protective Equipment (PPE)

Equipment Access and Maintenance

Wear your eye protection!

You only have one set of eyes.



Protect them!

Personal Protective Equipment (PPE)

Equipment Access and Maintenance

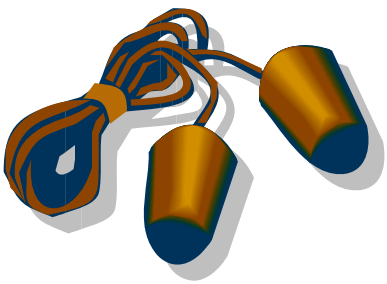
Protect your hands!

Use the correct type of gloves.

Personal Protective Equipment (PPE)

Equipment Access and Maintenance

Use your hearing protection!



Noise you are exposed to today,

if it does not have an immediate effect, may not be noticed for up to ten years.

Personal Protective Equipment (PPE)

General Information

- Personal Protective Equipment (PPE) must be used in areas where there is potential exposure to hazards that cannot be adequately controlled.

- PPE is considered the last line of defense against exposure to chemical hazards, radiation hazards, biological agents, temperature extremes, noise, electrical energy, mechanical forces, irritants, or projectiles that can produce injury or illness.

Gloves and Hand Protection

Gloves, gauntlets, and protective sleeves are designed to protect the hands and arms of individuals who may be exposed to skin hazards from chemical or biological agents, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns, or harmful temperature extremes.

- Chemical-resistant gloves must be appropriate for the type chemical used.
- Barrier creams cannot be used as protection against chemical contact unless specifically approved by a medical professional.
- Laundering of gloves used for chemical or biological protection is prohibited.
- Jewelry should not be worn with gloves.
- Gloves must be removed properly to ensure an unprotected hand or part of the arm is not exposed.
- After removing gloves, hands must be thoroughly washed with soap and water.
- When sharing gloves, use disposable gloves as a liner.
- Cuff the ends of gloves when feasible.
- At a minimum, disposable gloves used for splash protection must be disposed of at the end of each working day. Chemical contact, signs of physical wear, or loss of glove integrity requires more frequent disposal.
- Gloves should be properly stored away from sunlight, direct artificial light, and electrical equipment.
- Lay the gloves flat and avoid temperature and humidity extremes during glove storage.
- Employees with allergies may require powder-free gloves or gloves made of non-latex materials.

Hard Hats and Head Protection

Hard hats are designed to provide protection against impact and penetration from falling objects. The type and classification of required hard hats must be documented, and all equipment must comply with ANSI-Z89.1.

- **Bump Caps** provide protection from impact against stationary objects but do NOT protect against impact or penetration from falling objects or electrical shock hazards.
- **Hard Hats** provide protection from impact against stationary objects and against penetration from most falling objects. Some specially rated hard hats also protect against electrical shock hazards.
- **Welding Helmets** provide protection against ultraviolet, infrared, and visible radiation sources during welding operations.
- **Fire Fighting Helmets** provide protection from extreme heat encountered during a fire or similar conditions.
- **Hair Nets or Hats** protect employees from entanglement hazards, such as equipment with moving parts.

Head protection must be kept clean and maintained according to the manufacturer's instructions.

Protective Clothing

Clothing such as suits, aprons, coveralls, coats, and pants must be made available to protect the torso and body of individuals who may be exposed to skin absorption from chemical or biological agents, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns, or harmful temperature extremes.

- Materials used in the manufacture of such clothing must be matched in resistance to the chemicals or materials being handled.
- Laundering of company-issued work clothing must be provided whenever there is a potential for chemical contamination, such as asbestos, lead, cadmium, arsenic, sensitizers, or biological hazards, so employees will not need to launder clothing at home.

Signs and Warning Devices

Signs must be posted

to warn employees and other personnel

when protective equipment is required.

Ventilation

Abrasive Blasting Personal Protective Equipment

NIOSH-approved abrasive-blasting respirators are required:

- when working inside of blast-cleaning rooms
- when using silica sand in manual blasting operations where the nozzle and blast are not physically separated from the operator in a ventilated enclosure, or
- where concentrations of toxic dust dispersed by the abrasive blasting may exceed the 5 mg/m^3 limits and the nozzle and blast are not physically separated from the operator in an exhaust-ventilated enclosure.

Properly fitted particulate filter respirators may be used for short, intermittent, or occasional dust exposures (such as cleanup, dumping of dust collectors, or unloading shipments of sand at a receiving point) when it is not feasible to control the dust by enclosure, exhaust ventilation, or other means. The respirators used must be approved by NIOSH for protection against the specific type of dust encountered.

Dust-filter respirators may be used to protect the operator of outside abrasive-blasting operations where non-silica abrasives are used on materials having low toxicities.

Operators who must enter an abrasive blasting area must be equipped with heavy canvas or leather gloves and aprons or equivalent protection to protect them from the impact of abrasives. Safety shoes must be worn to protect against foot injury where heavy pieces of work are handled.

Equipment for protection of the eyes and face must be supplied to the operator and to any other personnel working in the vicinity of abrasive blasting operations when the respirator design does not provide such protection.

Portable Ladder Safety.

Portable Ladders

When using portable ladders it is important to obtain the appropriate type of ladders for the work you are doing. Falls from ladders can be fatal and the proper selection and use of a ladder (extension or step ladder) is crucial for your safety.

When using portable ladders you should:

- Inspect ladders daily (or before each use if ladders are not used daily).
- Promptly tag defective ladders with a "DANGER –DO NOT USE" sign and remove them from service.

Ladder Use

When using an *extension ladder*:

- The pitch or angle should be one-fourth the working length of the ladder – the length from where the ladder touches the ground and where the ladder touches the vertical surface or object that supports it (and never leaned at more than a 30^{o} angle).
- At least 3 feet of the ladder must be above the surface onto which you will step.
- Ladders must be placed or tied off so they will not slip.

When using a *step ladder*:

- Hinge must be fully open.
- You may not lean step ladders, unopened, against a wall or surface.

Only one person is allowed on the ladder at a time, unless it especially designed for more than one person.

Portable Ladders

General Responsibilities

- Obtain the appropriate type of portable ladders.
- Ensure employees are trained in the safe use of ladders (proper pitch, angle, and hazard awareness).
- Inspect ladders daily (or before each use if ladders are not used daily).
- Promptly tag defective ladders with a “DANGER – DO NOT USE” sign and remove them from service.
- Ensure defective ladders are properly repaired or properly disposed of.

Portable Ladders

Ladder Maintenance

Ladders must be maintained in good condition at all times. The joint between the steps and side rails must be tight, all hardware and fittings must be securely attached, and the movable parts must operate freely without binding or undue play.

- Lubricate metal bearings frequently.
- Frayed or badly worn rope must be replaced.
- Safety feet and other auxiliary equipment must be kept in good condition to ensure proper performance.
- Inspect ladders frequently. Ladders with defects must be withdrawn from service for repair or destruction and tagged or marked, "Danger – Do Not Use."
- Keep rungs free of grease and oil.

Portable Ladders

Ladder Use

- Pitch should be one-fourth the length of the ladder (never more than a 30º angle).
- Ladders must be placed or tied off so they will not slip. The side rails must have a secure footing.
- Only one person is allowed on the ladder at a time, unless it is specially designed for more than one person.
- The top resting surface must be reasonably rigid and have ample strength to support the applied load.
- Ladders may not be used as a platform, runway, or part of a scaffolding system.
- Ladders must not be placed in front of doors opening toward the ladder, unless the door is locked or guarded.
- Ladders must not be placed on boxes, barrels, or other unstable bases to obtain additional height.
- Ladders with broken or missing steps, rungs, or cleats, broken side rails, or other faulty equipment may not be used and must be disposed of (not repaired).
- Short ladders may not be spliced together.
- Single-rail ladders may not be made or used.
- Ladders must not be used as guys, braces, or skids.
- Tops of ordinary stepladders must not be used as steps.

Portable Ladders

Metal Ladders – General

- Ladders must be maintained in good usable condition at all times.
- If a ladder is involved in a fall or accident, immediate inspection is necessary.
- Ladders should be inspected at least quarterly. If ladder tips or parts are defective, further inspection should be performed for:
  - side rail dents or bends
  - excessively dented rungs
  - all rung-to-side-rail connections
  - hardware connections, and
  - rivets for shear.

- If a ladder is exposed to oil and grease, it must be cleaned. This can easily be done with a solvent or using steam cleaning.
- Defective ladders must be marked or tagged “Dangerous – Do Not Use” until repaired by either the maintenance department or the manufacturer.
- When ascending or descending, the climber must face the ladder.
- A three-point stance is recommended at all times (3 points of contact: 2 hands and one foot or 2 feet and one hand).

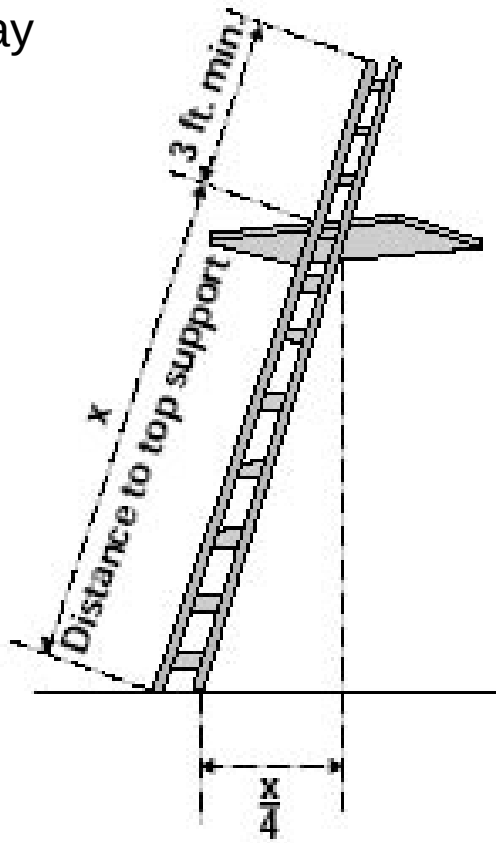
Portable Ladders

Pitch and Angle of Ladders

- Recommended pitch and angle is one-fourth of the length of the ladder.

  Example: If the ladder is 16 feet long, the base should be 4 feet away from the face of the building or support structure.

- If the user will be stepping off onto another surface, at least three feet of the ladder must extend above the surface on which he will step.

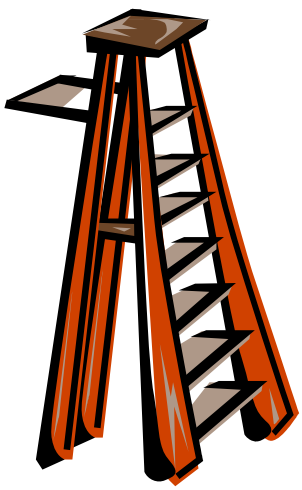


Portable Ladders

Portable Step Ladders

Portable stepladders longer than 20 feet may not be used. The following types of stepladders must be used:

- **Type I – Industrial stepladder**, 3 - 20 feet, for heavy duty (utility, contractor, and industrial) use
- **Type II – Commercial stepladder**, 3 - 12 feet, for medium duty (painter, office, and light industrial) use
- **Type III – Household stepladder**, 3 - 6 feet, for light duty (light household) use

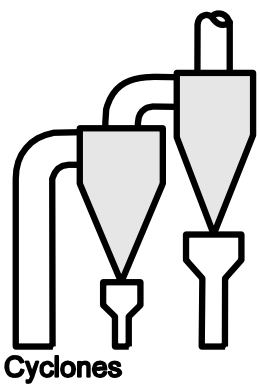


Process Safety

Employee Requirements

- Know who is in charge of the process.
- Know what chemicals you are working with.
- Know the hazards and protective measures to keep yourself safe.
- Know the emergency plan and standard operating procedures.

- Participate in discussions about the hazardous chemicals and the processes in which these chemicals are used, including any drills or accident discussions.



- Attend training when needed or required.
- If desired, become a member of the process safety committee.
- Report any problems with the process, operators, or nearby employees and contractors.

Process Safety

General Procedure

Each process must be evaluated as a separate entity.

The various lines of defense that have been incorporated into the design and operation of the process to prevent or minimize the release of hazardous chemicals will be evaluated and strengthened where required to ensure their effectiveness at each level.

Those lines of defense include engineering controls, such as ventilation systems, or redundant safety measures, such as interlocking safe guards.

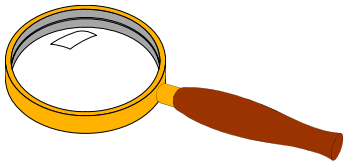
The following elements must be used in the evaluation process:

- process design
- process technology
- operational and maintenance activities or procedures
- non-routine tasks, activities, and procedures
- emergency preparedness safety programs and procedures
- training programs, and
- other elements which impact the process.

Process Safety

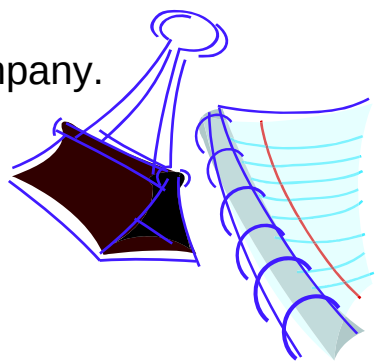
Investigations, Inspections & Audits

Routine process safety investigations must be conducted on all company processes designated and prioritized by the Process Safety Committee.



The investigation must be conducted to discover process conditions and work practices that could lead to toxic releases, accidents, and illnesses.

- Routine inspections must be coordinated and scheduled.
- Hazards and deficiencies must be rated and noted.
- Recommendations for corrective or preventive actions must be made (where needed or required) and management informed.
- Action items (including corrective and preventive actions) must be tracked to completion and have estimated time frames established.
- Records, reports, meeting notes, and other appropriate documentation must be retained until all action items are completed.
- Final reports must be maintained by the company.



Process Safety

New or Changed Processes

For new processes:

- A Process Hazard Analysis (PHA) must be conducted to improve the reliability, quality, design, and construction of the process.
- Recommendations must be implemented to enhance the safety of the process.
- Piping and Instrumentation Drawings (P&IDs), procedures, and training must be in place before startup.
- Initial startup procedures, if different than normal operating procedures, must be fully evaluated before startup.

For existing processes that have been shutdown for turnaround or modification:

- A PHA must be conducted to ensure that any changes other than replacement-in-kind are documented and safely implemented.
- P&IDs, procedures, and training must be updated.
- Any previous incident investigation recommendations, compliance audits, or PHA recommendations must be reviewed to determine any process impacts before startup.

Process Safety

Non-Routine Work

Non-routine work conducted in process areas must be controlled, and any known hazards involved must be communicated to any person whose actions could affect the safety of the process. Controls include procedures for:

- pre-start coordination, including lock-out or tag-out, pipe or line repair, confined space entry, and welding processes
- non-routine work authorizations that use a permit system (limitations of the permit must be followed), and
- notifying affected employees that a job is completed and operations have returned to normal.

Written procedures and permits must be documented and retained. Permits must be posted during work and may be discarded one year after the work is completed. Permits identify:

- specific acceptable work conditions
- isolation of the work area, if required
- requirements for purging, neutralizing, flushing, or venting the air
- pedestrian, vehicle, or other barriers
- communication methods and frequency with supervisors and employees
- proper notification of and coordination with supervisors affected by the non-routine work, and
- proper signature of the Process Safety Person.

Violations of the permit requirements require shutdown of the work and process until fixed. Violations will be noted and considered in future operations.

Prioritizing Process Hazard Analysis (PHA)

Processes must be ranked according to priority.

First priority are those processes with the potential of adversely affecting the largest number of employees and or people in the community. These are the most serious type of unsafe process safety condition or unsafe work practice that *are likely to* cause a toxic release resulting in loss of life or permanent disability or extensive loss of structure, equipment, or material.

Second priority is based on the operating history of the process, such as the frequency of past chemical releases. These are an unsafe process safety condition or work practice that *could* cause a toxic release resulting in serious injury, industrial illness, or disruptive property damage.

Third priority is given based on the age of the process and any other relevant factors, such as redundant safety equipment and controls. These may be an unsafe process safety condition or work practice that *might* cause a recordable injury or industrial illness or non-disruptive property damage.

Fourth priority would be a minor condition, a housekeeping item, or unsafe work practice infraction with *little likelihood* of injury or illness other than a possible first-aid case.

Process Safety

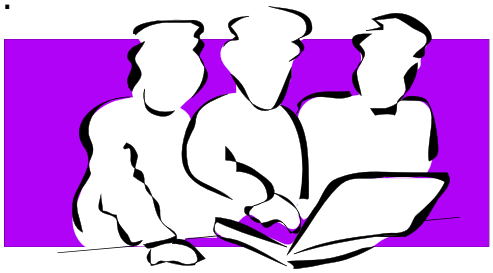
Process Operating Procedures

1. Operating procedures must be reviewed by the Process Hazard Analysis (PHA) team, engineering staff, and operating personnel to ensure that they are accurate and provide practical instructions on how to actually perform job duties safely.
2. Procedures must include specific instructions or steps for carrying out the stated procedures. All affected employees require a full understanding of these procedures.
3. Procedures must include the safety precautions and resultant situations should they not be followed for the following:
    - pressure limits
    - temperature ranges
    - flow rates
    - procedures to follow when an upset condition occurs
    - pertinent alarms and instruments
    - startup or shut-down procedures
    - distinctions between startup and normal operations, and
    - computerized process control systems, including logic criteria.
4. Procedures must be maintained in English, but additional languages may also be used where needed.
5. Procedures must be updated to reflect any changes in the process and these changes integrated into the procedures and actions required. Procedures must be updated during any shutdown to reflect new process activities. Retraining may need to occur.
6. Emergency procedures and upset conditions must be considered for any change to a process or activity.
7. Communication in the work process area must be maintained at all times. Personnel must be familiar with pre-work, work, emergency, and closure procedures.

Process Safety Committee

The Process Safety Committee must be comprised of members of management or supervisors and hourly personnel. Recommended members include:

- president, general manager, or operations manager
- safety officer
- plant manager, and
- human resources manager.



- Responsibilities of the committee include:
  - conducting process safety evaluations, inspections, and reviews
  - reviewing incident documentation to determine process safety deficiencies and corrective actions
  - ensuring employee training occurs, and
  - maintaining meeting notes that include activities, timelines, and any corrective and preventive actions.
- All items must be tracked to completion and documented.

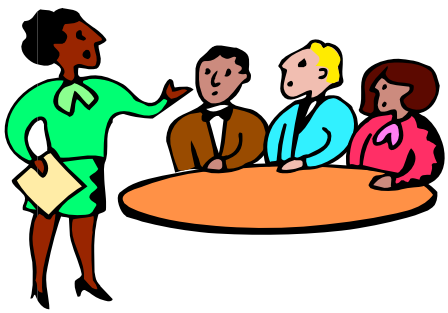
Process Safety

Qualifications of the Process Hazard Analysis (PHA) Team

Team members must provide expertise in areas such as:

- process technology
- process design
- process operating procedures and practices
- how the work is actually performed
- alarms
- emergency procedures
- instrumentation
- maintenance procedures
- routine and non-routine tasks affecting the process
- procurement of parts and supplies, and
- environmental health and safety.

- The process safety person or chairperson of the team must ensure that all participants understand their role and what must be accomplished during the PHA.
- Team size can vary depending on the operational and technical background of the participants.
- Team members can participate through the entire process or only a small portion.



Quality Assurance

A quality assurance system must be used to ensure that the proper materials of construction are used, that fabrication and inspection procedures are proper, and that installation procedures recognize field installation concerns.

Drawings

All as-built drawings, together with certifications of coded vessels and other equipment and materials of construction, must be reviewed for verification and retained.

Installation

Equipment installation jobs must be properly inspected in the field for use of proper materials and procedures and to ensure that qualified workers are used to do the jobs. The use of appropriate gaskets, packing, bolts, valves, lubricants, and welding rods must be verified. Procedures for installation of safety devices, such as proper torque on bolts and proper pump seals, must be verified.

Equipment Supplier Audits

If the quality of parts is in question, an audit of the respective supplier must be conducted. Any changes in equipment must be documented.

Process Safety

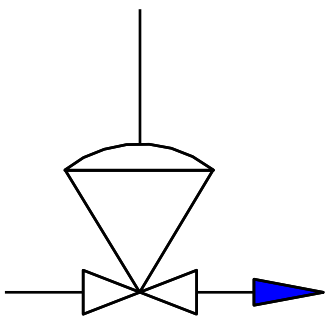
What is Process Safety?

Process safety management is the proactive identification, evaluation, and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures, or equipment.

The major objective of process safety management of highly hazardous chemicals is to prevent unwanted releases of hazardous chemicals especially into locations which could expose the employees and or community to serious hazards.

Process safety must use a systematic approach to evaluating the whole process.

Process safety applies to chemical processes at the companies that use “highly hazardous” or “regulated” chemicals.



Control Valve

Respiratory Protection

Breathing Air Quality - SCBA

When using atmosphere-supplying respirators (supplied-air and SCBA), breathing gases of high purity must be provided for use.

Guidelines for Compressed Air, Compressed Oxygen, Liquid Air, and Liquid Oxygen

- Compressed and liquid oxygen must meet requirements for medical or breathing oxygen.
- Compressed breathing air must be Grade D or better, which includes:
  - oxygen content of 19.5-23.5%
  - hydrocarbon content of 5 milligrams or less
  - carbon monoxide content of 10 parts per million or less
  - carbon dioxide content of 1,000 parts per million or less, and
  - lack of noticeable odor.
- Compressed oxygen cannot be used in respirators that previously used compressed air.
- Oxygen concentrations >23.5% can **only** be used in equipment designed for oxygen service or distribution.

Respiratory Protection

Breathing Air Quality

Cylinders, Compressors, and Fittings

Breathing air cylinders must:

- be tested and maintained according to DOT requirements
- have a certificate of analysis from the supplier that the contents meet the requirements for Grade D breathing air
- not exceed moisture content limits
- be marked in accordance with NIOSH requirements, and
- be constructed so as to:
  - prevent entry of contaminated air into the air-supply system
  - minimize moisture content
  - have suitable in-line air-purifying sorbent beds and filters, and
  - have a tag containing the most recent change date and the signature of the person who was authorized to perform the change. The tag must be maintained at the compressor.

Compressors:

- may not exceed carbon monoxide levels of 10 parts per million, and
- must have a high-temp or carbon monoxide alarm if oil lubricated.

Also:

- Couplings must be incompatible with outlets for non-respirable worksite air or other gas systems.
- No asphyxiating substance must be introduced into breathing air lines.

Respiratory Protection

Cleaning Procedures

Respirator Cleaning Procedures

Respirators must be properly cleaned and disinfected to prevent damage to the equipment and harm to the user.

Procedures for Cleaning Respirators (for most equipment)

A. Remove filters, cartridges, or canisters. Disassemble face pieces. Discard or repair any defective parts.

B. Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush can be used to facilitate dirt removal.

C. Rinse components thoroughly in clean, warm, preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components must be immersed for two minutes in either:

   1. hypochlorite solution (1 milliliter laundry bleach to one liter of water)
   2. iodine solution (0.8 milliliters of tincture of iodine to one liter of water), or
   3. other commercially available cleansers of equivalent disinfectant quality when used as directed if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm, preferably running water. Drain. (Rinsing is important. Re-rinse if necessary.)

F. Air dry or hand dry components with a clean, lint-free cloth.

G. Reassemble face piece, replacing filters, cartridges, and canisters where necessary.

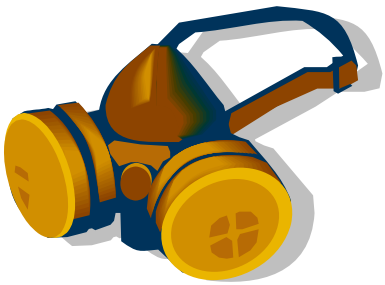
H. Test the respirator to ensure that all components work properly.

Respiratory Protection

Equipment Repair

Respirators that fail an inspection or are otherwise found to be defective must be removed from service.

- This defective equipment must be repaired or adjusted before being placed back into service or must be discarded.



Repairs or adjustments must be:

- made only by persons appropriately trained to perform such operations
- completed using only the respirator manufacturer's NIOSH-approved parts designed for the respirator
- made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed, and
- performed only by the manufacturer or a technician trained by the manufacturer if adjusting or repairing reducing and admission valves, regulators, or alarms.

Respiratory Protection

Fit Testing

General Requirements

Fit testing is required:

- for a negative or positive pressure tight-fitting facepiece
- at least annually, and
- when changes occur in the employee's physical condition, such as:
    - facial scarring
    - dental changes
    - cosmetic surgery, and
    - an obvious change in body weight.

Fit testing must use the same make, model, style, and size of respirator to be used by the employee in the workplace (retests are required if a change in type or size occurs)

Fit tests must be either
Qualitative Fit Tests (QLFT) or
Quantitative Fit Tests (QNFT).

Respiratory Protection

IDLH Requirements

For all IDLH atmospheres, the company must have:

- one or more employees stationed outside the space
- visual, voice, or signal line communication maintained
- attendants trained and equipped to provide effective emergency rescue
- notification provided before employees enter the area for emergency rescue, and
- necessary assistance appropriate to the situation.

Persons outside the IDLH atmospheres must have:

- pressure demand or other positive pressure SCBAs or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA, and
- appropriate retrieval equipment or a rescue team available on-call.

Interior structural firefighting procedures state:

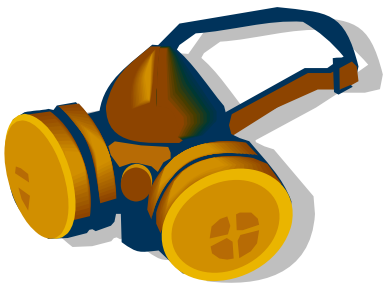
- at least two employees enter and remain in communication at all times
- at least two employees are located outside the IDLH atmosphere, and
- all employees engaged in interior structural firefighting use SCBAs.

The entire rescue team does not need to be assembled before entry, provided the rescue tasks listed on the rescue procedure are covered.

Respiratory Protection

Labeling of Cartridges and Canisters

All filters, cartridges, and canisters used in the workplace must be labeled and color-coded with the NIOSH-approval label.



The label must be affixed to the filter, cartridge, or canister and must remain legible and readable at all times.

Protection Factors

Assigned Protection Factors (APFs) and Maximum Use Concentration (MUC)

The respirator selected must be appropriate for the chemical state and physical form of the contaminant.

Gases and Vapors

- atmosphere-supplying respirator
- air-purifying respirator, provided that:
  - the respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant
  - the written program documents a change schedule for canisters and cartridges that ensures change before their end of service life

Particulates

- atmosphere-supplying respirator
- air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter
- air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR part 84

Large particulates (MMAD of at least two micrometers)

- air-purifying respirator equipped with any filter certified for particulates by NIOSH

Respiratory Protection

Required Areas – Equipment Use

- Cartridges or filters for respirators must be changed frequently. Cartridges must be changed after a maximum of 40 hours of use.
- Before each use, a seal check must be performed when you place the respirator to your face.
- You must leave the respirator use area:
    - to wash your face and respirator if your skin becomes irritated
    - if you detect vapor or gas breakthrough (the seal leaks) or if there are changes in your breathing, and
    - to replace the respirator or the filter, cartridge, or canister elements.
- Before each use, you must inspect your respirator and all of its components, such as face piece, straps, tubes, and valves.

Respiratory Protection

Required Areas – Selection and Use

- Respirators are selected based on the type of hazard. There are different types of respirators.
- Respirators help control diseases caused by contaminated breathing air, such as harmful dusts, fogs, fumes, mists, gases, smoke, sprays, or vapors.
- Equipment must be kept clean and properly maintained.
- You must know how to access written procedures.
- You cannot have facial hair that interferes with the seal of the respirator to the skin. If you have a beard, you must use a full face piece or hood-type respirator.
- You cannot repair a respirator. Only a specifically trained person can do so. If needed, you can replace parts.
- Labels must be readable at all times and affixed to the respirator and its associated pieces, such as cartridges.

Respiratory Protection

Respirator Inspection

Inspection of equipment must occur before each use and when cleaned.

Inspection includes checking the:

- respirator function
- tightness of connections, and
- condition of the various parts including:
  - face piece
  - head straps
  - valves
  - connecting tube
  - cartridges, canisters, or filters, and
  - elastomeric parts for pliability and signs of deterioration.

Respiratory Protection

Seal Check Procedures

Seal checks must be performed each time a tight-fitting respirator is put on. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and Negative Pressure Checks

A. Positive pressure check

1) Close off the exhalation valve and exhale gently into the face piece.
2) The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal.
3) For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. Negative pressure check

1) Close off the inlet opening of the canister or cartridge by covering with the palm of the hand or by replacing the filter seal. Inhale gently so that the face piece collapses slightly and hold your breath for ten seconds.
2) The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand.
3) The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove.
4) If the face piece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended Seal Check Procedures

A. Must be demonstrated to be equally effective, if used

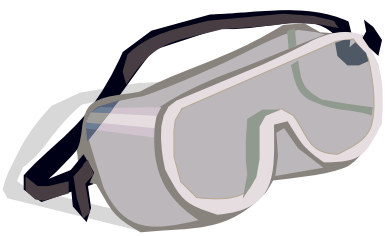
Respiratory Protection

User Restrictions

Tight-fitting facepiece respirators may not be worn if there is:

- facial hair that comes between the sealing surface of the face piece and the face or that interferes with valve function, or
- any condition that interferes with the face-to-face piece seal or valve function.

Prescription eyewear, safety glasses, or other personal protective equipment may not interfere with the use of the respirator.



Respiratory Protection

Voluntary Use Requirements

If employees request to use respirators when they are not required, the company can:

- permit employees to use their own equipment, or
- supply company-owned equipment

Voluntary respirator use requirements state:

- the equipment cannot create a hazard
- the company must maintain a written program
- provided the information contained in Appendix D to the Respiratory Protection Standard, "Information for Employees Using Respirators When Not Required Under the Standard"

- medical evaluations must occur before employees can use any respirator

Program exemption:
Voluntary Dust Mask Usage

- provided the information contained in Appendix D to the Respiratory Protection Standard, "Information for Employees Using Respirators When Not Required Under the Standard"
- medical clearance and written program is not required

Respiratory Protection

Voluntary Use

Employee Requirements

When using respirators in a voluntary capacity, employees should do the following:

1. Read and observe all instructions provided by the manufacturer on use, maintenance, cleaning and care, and all warnings regarding the respirator's 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 must display on the respirator or respirator packaging. It will indicate what the respirator is designed for and to what extent it will protect the employee.

3. Do not wear respirators in atmospheres containing contaminants against which the respirator is not designed to protect. For example, a respirator designed to filter dust particles will not protect against gases, vapors, or very small solid particles of fumes or smoke.

4. Keep track of respiratory equipment so that one person does not mistakenly use someone else's respirator.

Rim Wheel Servicing

Multi-piece Rim Wheels
Safe Operating Procedures
Servicing Multi-piece and Single-piece Rim Wheels

- Tires must be completely deflated by removing the valve core before a rim wheel is removed from the axle when:
  - the tire has been driven under-inflated at 80% or less of its recommended pressure, and
  - there is potential for damage to the tire or wheel components.
- Rubber lubricant must be applied to the rim mating surfaces during assembly of the wheel and inflation of the tire.
- Under-inflated tires (with more than 80% recommended pressure) may be re-inflated with the tire on the vehicle, if remote control equipment is used and employees are not in the trajectory path.
- Inflation outside a restraining device is limited to 80% of the recommended pressure level.
- Employees must not rest or lean any part of their bodies on or place equipment against the restraining device.
- After tire inflation, the tire and wheel components must be inspected while still within the restraining device to make sure they are properly seated and locked. If further adjustment to the tire or wheel components is necessary, the tire must be deflated by removing the valve core before adjustment.
- No attempt may be made to correct the seating of side and lock rings by hammering, striking, or forcing the components while the tire is pressurized.
- Cracked, broken, bent, or otherwise damaged rim components may not be reworked, welded, brazed, or otherwise heated.
- Heat may not be applied to a wheel or component.

Rim Wheel Servicing

Responsibilities

Servicing Multi-piece and Single-piece Rim Wheels

- Know the risks associated with servicing single- and multi-piece wheels for large vehicles.
- Remove any defective wheels from service.
- Attend training on how and when to use cages for tire maintenance.
- Follow all written procedures during service.

Rim Wheel Servicing

Single-piece Rim Wheels
Safe Operating Procedures
Servicing Multi-piece and Single-piece Rim Wheels

- Tires must be completely deflated by removing the valve core before demounting.
- Mounting and demounting of the tire must be done only from the narrow ledge side of the wheel. Avoid damaging the tire beads while mounting. Tires must be mounted only on compatible wheels of matching bead diameter and width.
- An application of nonflammable rubber lubricant is usually required on both the bead and wheel mating surfaces before assembly.
- If a tire changing machine is used, the tire must be inflated only to the minimum pressure necessary to force the tire bead on the rim ledge (approximately 80% inflation).
- If a bead expander is used, it must be removed before the valve core is installed and as soon as the rim wheel becomes airtight (the tire bead slips onto the bead seat).
- Tires may be inflated only when contained within a restraining device, positioned behind a barrier, or bolted on the vehicle with the lug nuts fully tightened.
- Tires must not be inflated when any flat, solid surface is in the trajectory and within one foot of the sidewall.
- Employees must stay out of the trajectory when inflating a tire.
- Tires may not be over inflated.
- Heat may not be applied to a single-piece wheel.
- Cracked, broken, bent, or otherwise damaged wheels may not be reworked, welded, brazed, or otherwise heated.

Rim Wheel Servicing

Tire Servicing Equipment

Servicing Multi-piece and Single-piece Rim Wheels

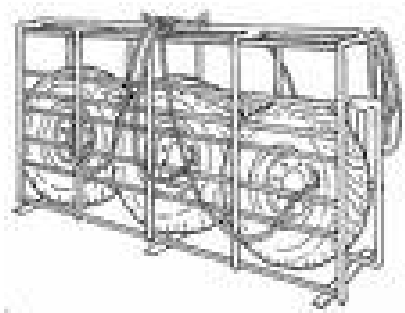
Restraining devices must be used for tire inflation unless the wheel is bolted to the vehicle.

Restraining devices and barriers must:

- withstand the rated maximum force plus 50%
- prevent the components from being thrown outside the device or barrier
- be visually inspected prior to each day's use and after any separation of the rim wheel components or sudden release of contained air, and
- removed from service if damaged until repaired or replaced. Repairs must be certified by the manufacturer or a professional engineer. Damage includes:
  - cracks at welds
  - cracked or broken components
  - bent or sprung components caused by mishandling, abuse, and tire explosion
  - pitting of components from corrosion, and
  - other structural damage that would decrease its effectiveness.

Airline assemblies for tire inflation must have:

- a clip-on chuck
- an in-line valve with a pressure gauge or a pre-settable regulator, and
- a sufficient length of hose between the clip-on chuck and the in-line valve to enable the employee to stand outside the trajectory.



Current charts or rim manuals must be available in the service area.

Only approved tools and components may be used.

Rim Wheel Servicing

Wheel Component Acceptability

Servicing Multi-piece and Single-piece Rim Wheels

- Multi-piece wheel components may not be interchanged unless approved by the manufacturer.

- Multi-piece wheel components and single-piece wheels must be inspected prior to assembly.
- Any wheel or wheel component that is bent out of shape, pitted from corrosion, broken, or cracked must not be used. It must be marked or tagged unserviceable and removed from the service area.
- Damaged or leaky valves must be replaced.
- Rim flanges, rim gutters, rings, bead seating surfaces, and the bead areas of tires must be free of any dirt, surface rust, scale, or loose or flaked rubber build-up prior to mounting and inflation.
- The size (bead diameter and tire or wheel widths) and type of both the tire and the wheel must be checked for compatibility prior to assembly of the rim wheel.

Driving Safety

Driving conditions contribute to accidents.

Light – day vs night, dusk, sunrise/sundown, headlights and glare
Weather – rain, snow, hail, ice, bright sun, extreme heat are conditions that affect how you drive
Road – conditions of road, potholes, type of road, width number of lanes, hills
Traffic – who is around you. There is a difference between traffic and congested traffic
Vehicle – condition of the vehicle
Driver – your mood and physical condition can affect your judgment and reactions

1. Expand your Look-Ahead Capacity – Focus on more than the car ahead of you. Increasing your visual lead time in the same way you gauge following distance. Measure by looking ahead at a stationary object and counting the seconds before you pass it – you should strive for more than 10 or 12 seconds visual lead time

2. Size Up the Whole Scene – Know hazards ahead, to the sides and behind you. This involves 360 degree awareness by checking mirrors frequently (at least every 10 seconds) glancing left right and ahead. Avoid visual barriers i.e. large trucks or vehicles that reduce your 360 degree awareness. Following distance should be at least 4 seconds.

3. Plan an Escape Route – Traffic tends to travel in clusters. Plan an escape route by maintaining a "safety cushion" from other vehicles traveling near you – slow down, or change lanes. ***CONTROL TAILGATERS – reduce speed, move to the right or wave them around and allow them to pass.***

4. Signal Your Intentions Early –Give others enough time to prepare to adjust what they are doing to accommodate the change that you will be making.

5. Take Decisive Action – Know what you are going to do before you do it with an awareness of other vehicles and sufficient space and opportunity to make decisions.

BACKING – Accidents while backing up represent ¼ of all accidents. Adjust and use your mirrors but also turn your head to see blind spots. Avoid the need to backup whenever possible when parking.

PASSING – Read the road ahead prior to pulling out to pass, move to the right to allow others to pass

CELL PHONE USE AND TEXTING – These are distractions that continually lead to tragic accidents. Remain focused on the road and the task of driving safely, pull off the road if you must use these devices

Safe Driving

Causes of Accidents

The three most common causes of expressway accidents are:

- Tailgating
- Lane changes, and
- Merging on or off.

Speed adds severity to any accident but is usually not the primary cause.

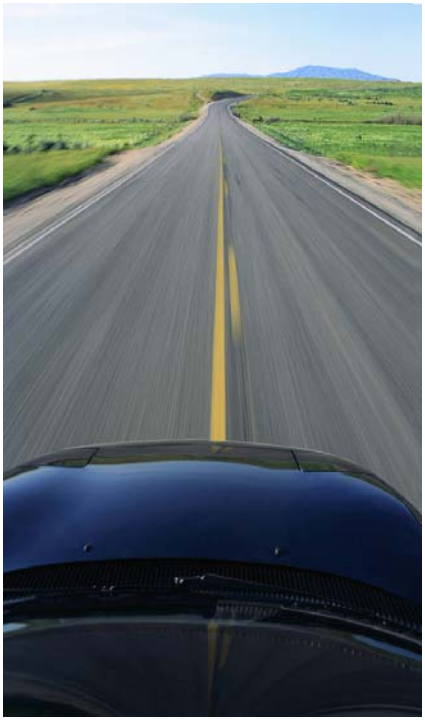
Safe Driving

Controlling Tailgating

- Reduce your speed without putting on the brakes: decelerate.
- Move to the right of your lane or move into the right lane if there is one.
- Indicate to them by waving your hand that it is okay for them to pass you.
- If unsuccessful, exit or turn on to a side street to let them go by.

Safe Driving

The Five Steps to Decision Driving

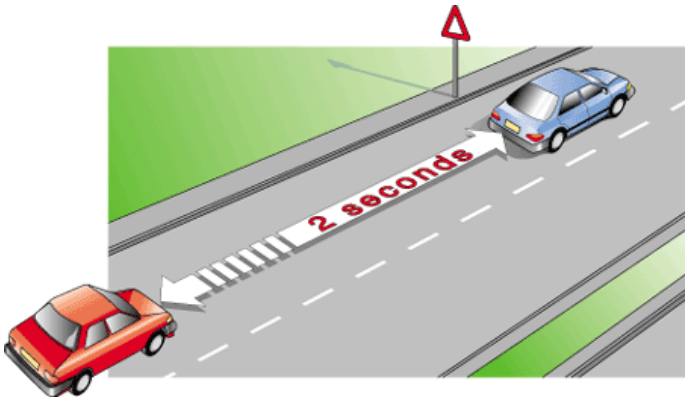


- **Expand your look-ahead capacity.**
  What is ahead of the car in front of you?
- **Size up the whole scene.**
  What other hazards are around you and what are your options?
- **Indicate your intentions early.**
  Try to give others enough time to react to what you are doing.
- **Plan an escape route.**
  What is behind you if you stop or to the side of you if you swerve?
- **Take decisive action.**
  Know what you are going to do and then do it!

Safe Driving

A Combination of Four Factors

- **Physical ability**
  - The general state of your overall health
  - Physical limitations
  - Coordination
  - Reflexes (reaction time)
  - Attention span
  - Impairment (drugs, alcohol, fatigue, stress, medications)
- **Driving skills** (yours and theirs)
- **Attitude** (yours and theirs)
- **The vehicle** (brakes or safety checks)



Safe Driving

Passing Safety

- If you must exceed the posted speed limit, you should not pass.
- You must have the time and the space to pass.
- You must have enough space to re-enter your lane after passing.

Safe Driving

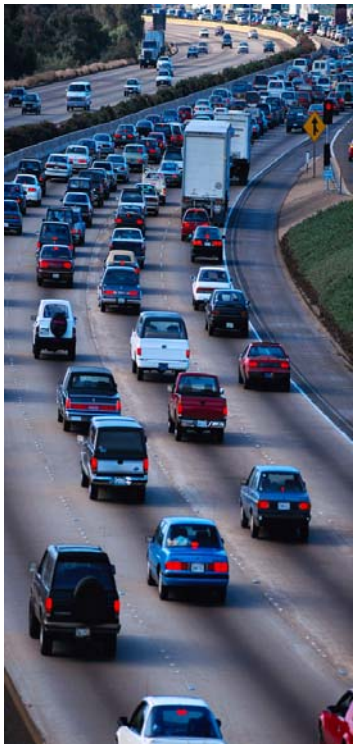
Right of Way

- No one has the right of way. It must be given to you by the other driver.
- The law identifies who should yield the right of way to another driver.

Safe Driving

The Six Driving Conditions

According to the National Safety Council, there are six conditions that affect driving. They are:



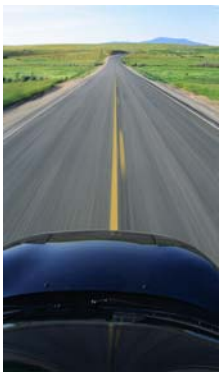
- the amount of light and glare
- the weather
- the road conditions
- the traffic conditions
- the condition of your vehicle, and
- your ability, as the driver.

Safe Driving

Stopping Distance

The required vehicle stopping distance depends on:

- the speed of the vehicle,
- the reaction time of the driver (are you distracted?)
- the time it takes the brakes to stop the vehicle (are the brake pads in good shape?), and
- weather conditions.



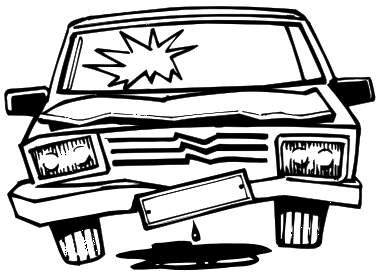
Tailgating accidents occur because the distance between you and the car ahead of you is less than your reaction time. Your perception of a dangerous situation and your ability to react to it is variable based on both your age and your driving experience level. (Younger people react more quickly than older people. More experienced drivers react or perceive the danger more quickly than younger, more inexperienced drivers).

Speed	Time to React	Braking	Total Stopping Distance
20 mph	22 feet	22 feet	44 feet
40 mph	44 feet	80 feet	124 feet
55 mph	60 feet	165 feet	225 feet
65 mph	75 feet	224 feet	300 feet

Safe Driving

Preventing a Head-on Collision: The Four R's

Read	Read the road ahead. (Don't pull out to pass if conditions are unsafe.)
Right	If someone else is passing, move to the right of your lane.
Reduce	Lower your speed. (Allow for an escape route if you need one.)
Ride	Leave the road to your right if doing so presents a lower risk. (Is grazing the tree or entering the ditch to the right a better option than a head-on collision with another vehicle? Try to leave yourself enough time and space to make your decision.)



Safe Driving

Types of Stopping

Normal stopping provides plenty of time and space to stop. This occurs 95% of the time.

Controlled stopping provides less space for stopping in a more confined area, but the car can stop at a faster rate without weaving. Controlled stopping may encompass shifting weight loads or have an elevated anxiety compared to a normal stop.

Emergency stops require that you take decisive action but remain in control. It is an immediate stop with the full braking capacity of the vehicle. You could lock up the brakes but still control the car.

In a **panic stop**, you are in an environment beyond your control. You are at the mercy of others to drive defensively and use their driving skills to avoid an accident.

Safety Committees

Activities of the Safety Committee

- Discuss safety issues and concerns.
- Help implement the company safety program.
- Arrange group or departmental safety meetings.
- Provide safety training.
- Conduct or facilitate inspections.
- Evaluate corrective action for injury prevention.

Safety Committees

Purpose of a Safety Committee

- To assist management in recognizing and addressing safety hazards
- To bring safety concerns to management's attention

- To track and follow up on safety incidents
- To assist in safety audits and inspections
- To monitor safety performance throughout the company

Safety Committees

Volunteers Needed

The Safety Committee is a volunteer group.

The committee should represent every department or work area.

Safety Committees

Who Should Be A Member?

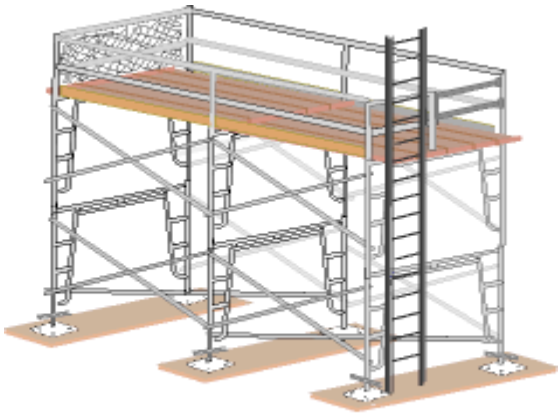
The safety committee is primarily voluntary.

- Rotate membership.
- Include at least three employees, one supervisor, and the safety officer.
- Each department or work area must be represented.
- One person takes notes or minutes.
- A chairperson must be elected from the employee representatives (not management).

Scaffolds

Dismantling Scaffolding

- Manufacturer's or engineer's dismantling instructions must be followed and supervised by a competent person.
- Relocation planning must be considered during the dismantling process.

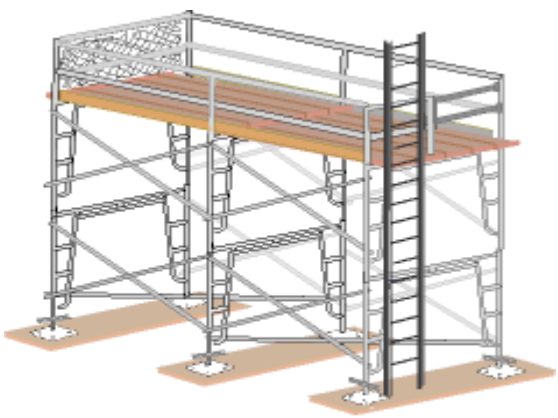


- Each component must be visually inspected after use. Defective or unserviceable materials must be immediately tagged as defective and may not be stored with serviceable materials.
- Avoid dropping or throwing the components, as this could result in damage to the equipment.
- Consult with the project manager when any instructions are unclear.

Scaffolds

Employee Information

- You must attend training before working on a scaffold.
- You may not put up or take down scaffolding unless you are specifically trained and qualified.
- Scaffolding must be inspected each day before use. Do not use a scaffold that has not been inspected that day.
- If guardrails are not part of the scaffold, you must wear a fall protection harness and lanyard that is attached to an anchor point.
- Store materials you will not be using each work shift. Do not leave them or store them on the scaffold.
- If the weather is poor, check with your supervisor or the “scaffolding competent person” to determine if it is safe to use a scaffold.
- Even if the scaffold is designed to be mobile, you may not be on a scaffold while it is being moved.
- You may not climb on the guardrail or toeboard, or lean out over the scaffold to perform any work, unless you are wearing fall protection equipment.



Scaffolds

Final Inspection of Scaffolding

- Check for proper support under every leg of every frame.
- If outside, check for wash out of the supporting surface because of rain.
- Check frames for plumb and square in both directions.
- Check to ensure all base plates or adjustment screws are in firm contact with supports.
- Check serviceability and correctness of all cross braces.
- Check to ensure that all planking and accessories are properly installed.
- Check to ensure that all guard rails are in place.
- Recheck periodically during use to ensure conditions remain safe.

Scaffolds

Fixed Scaffolding

General Responsibilities

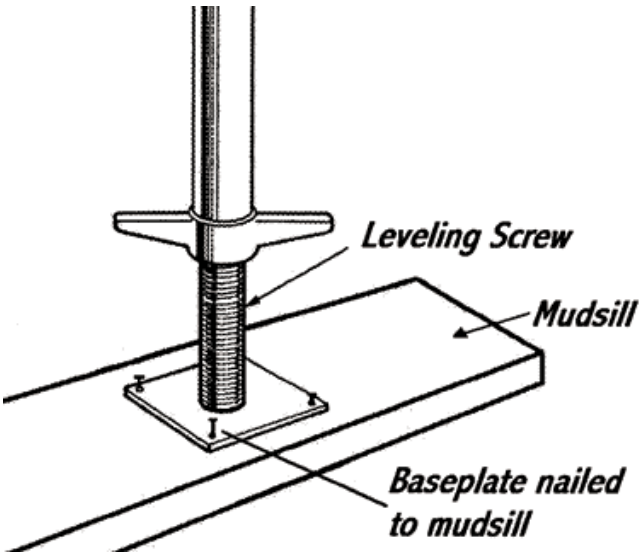
- Footing and anchorages for scaffolds must be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects, such as barrels, boxes, loose brick, or concrete blocks, may not be used to support scaffolds or planks.
- Scaffolds must be secured to permanent structures with anchor bolts, reveal bolts, or other equivalent means. Window cleaners' anchor bolts may not be used.
- The poles, legs, or uprights must be plumb and secured or braced to prevent swaying and displacement.
- Scaffolds must be maintained in a safe condition with safe access at all times.
- Fixed scaffolds may not be altered or moved horizontally while people are on the scaffold.
- Any scaffold damaged or weakened must immediately be removed from service until repaired.
- Scaffolds must support at least four times the expected weight load.
- All load-carrying timber must be a minimum of “stress grade” lumber, and all planking must be “scaffold grade” lumber.
- Hoisted materials must have a tag line.
- Overhead protection must be provided when required. Scaffolds with personnel access underneath must have screens to prevent objects from falling off the scaffold.
- Tools, materials, and debris may not accumulate.
- Shore-scaffolds and lean-tos may not be used.

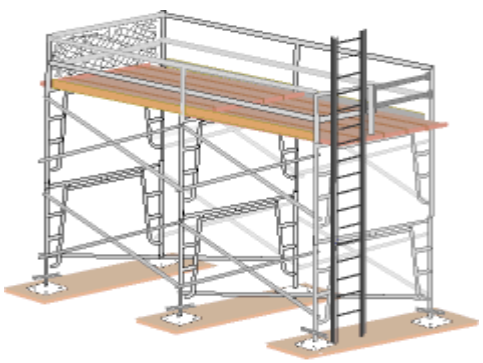
Scaffolds

Fixed Scaffolding

Planking, Nails, and Ropes

- All load-carrying timber must be a minimum of “stress grade” lumber and all planking must be “scaffold grade” lumber.
- Nails or bolts must be driven full length and of sufficient size and numbers to accommodate the design.
- All planking or platforms must overlap by 12 inches or secured from movement and extend over the end supports between 6 and 18 inches.





- Scaffold planking must be slip resistant in all weather. Ice and snow must be removed; planks must be sanded.
- All suspension rope must be capable of supporting at least six times the expected weight load and must be treated or protected if corrosive chemicals or heat processes such as welding are used.

Walking & Working Surfaces

Scaffolding (General Requirements)

Scaffolds must:

- designed by a professional engineer
- be constructed in accordance with the design criteria (plumb, secure, and braced against swaying)
- have sound footing, and
- have all components capable of carrying at least 4 times the intended load (with ropes capable of holding 6 times the intended load).

Scaffolds must be secured to permanent structures by anchor bolts, reveal bolts, or other equivalent means. Window cleaners' anchor bolts may not be used.

Scaffolds may not be moved while occupied.

Any damaged parts or components must be immediately removed from service until repaired or replaced. Load-carrying timbers must be of stress-grade wood. All planking must be Scaffold Grade as recognized by grading rules for the species of wood used. Planking must be overlapped or secured from movement, and ends must extend beyond the end-supports.

- Nails or bolts must be correctly sized and of sufficient strength. They must be driven in full length.
- An access ladder or equivalent safe access must be provided.
- Materials being hoisted onto a scaffold must have a tag line.
- Where overhead hazards exist, overhead protection is required. Where people may pass underneath scaffolding, ½-inch wire-mesh screening must be provided for the entire length between the toeboard and the guardrail.
- No work is allowed from scaffolds during storms or high winds, or if ice/snow has accumulated. Planking must remain slip resistant.
- Tools, materials, and debris must not be allowed to accumulate in quantities to cause a hazard.
- Components and ropes must be protected from corroding chemicals, and heat producing activities.

Scaffolds

Mobile (Rolling) Scaffolding

General Requirements

Scaffolds are classified into three categories:

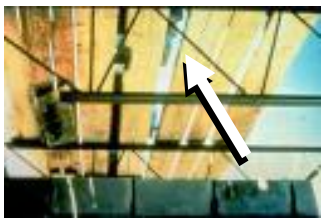
- Light – Designed and constructed to carry a working load of 25 pounds per square foot
- Medium – Designed and constructed to carry a working load of 50 pounds per square foot
- Heavy – Designed and constructed to carry a working load of 75 pounds per square foot

- Scaffold “picks,” or working levels, may not exceed four times the base width. Outrigger frames may be used, or additional bracing may be provided under special circumstances.
- Wheels or casters must be inspected, lockable, and support four times the designed weight load.
- Nails, bolts, or other fasteners must be of adequate size and in sufficient numbers at each connection to develop the designed strength of the unit. Nails must be driven full length. (All nails should be immediately withdrawn from dismantled lumber.)
- Employees may not ride rolling scaffolds during relocation.
- When moving scaffolds, never pull from the top. Always push at the base level, ensuring all equipment and materials are secured, there are no overhead obstructions, and there are no cords or materials in the path of travel.
- Employees may only work from the platform area, never extending work beyond the guard or railing.

Walking & Working Surfaces

Scaffolding – Wood and Pole
Planking and Guardrails

Platform planks must be laid with their edges close together so the platform will be tight with no spaces through which tools or fragments of material can fall.


No Spaces Allowed

Where **planking** is lapped, each plank must lap its end supports by at least 12 inches. Where the ends of planks abut each other to form a flush floor, the butt joints must be at the centerline of a pole. The abutted ends must rest on separate bearers. Intermediate beams must be provided to prevent dislodgment of planks due to deflection, and the ends must be nailed or cleated to prevent their dislodgment.

When a **scaffold** turns a corner, the platform planks must be laid to prevent tipping. The planks that meet the corner putlog at an angle must be laid first, so they extend over the diagonally placed putlog far enough to have a good safe bearing (but not far enough to involve any danger from tipping). The planking running in the opposite direction at right angles must be laid so as to extend over and rest on the first layer of planking.

When moving **platforms** to the next level, the old platforms must be left undisturbed until the new putlogs or bearers have been set in place and are ready to receive the platform planks.

Guardrails must be not less than 2 x 4 inches thick, not less than 36 inches long or more than 42 inches high, with a mid-rail of 1 x 4 inches and toeboards. Guardrails must be installed at all open sides for scaffolds more than 10 feet above the ground or floor. Toeboards must be at least 4 inches tall.

Scaffolds

Pre-Inspection of Scaffolding

Trained inspectors must inspect every scaffold for rust, straightness, and welds.

- Heavily rusted scaffolding equipment is a possible sign of abuse or neglect. Rusted components must pass a documented inspection.
- All parts of steel scaffolding components must be straight and free of bends, kinks, or dents. Mishandling, trucking, and storing could damage scaffolding.
- Welds must be checked for damage. (Pre-manufactured scaffolding may not be re-welded.)
- Locking devices for rolling scaffolds, such as wheels and castor brakes, must work.
- Coupling pins and braces must be aligned.

Scaffolds

Putting Up Scaffolding

- Only trained and authorized employees may supervise the erection of scaffolding.
- Follow manufacturer's erection instructions for pre-manufactured scaffolding.
- Engineering approval and direct supervision is required for specific-purpose scaffolding built at the job site.
- The process must be planned in advance.
- Each component must be visually inspected before use. Do not use defective or unserviceable materials.
- Consult with the project manager when any instructions are unclear.

Fixed Metal Ladders – General

- Ladders must be maintained in good usable condition at all times (clean and free from grease and oil and sturdy).

- Ladders must be checked before each use for the following:
  - side rails, for dents or bends
  - rungs, for excessive dents
  - all rung-to-side-rail connections
  - hardware connections
  - rivets, for shear

- When ascending or descending, you must face the ladder.

- A three-point stance is recommended at all times (three points of contact: two hands and one foot or two feet and one hand).

Fixed Stairs – Requirements

- Stairways must be kept clean, dry, orderly, and free of hazards.
- Where wet processes are used, drainage and dry standing places must be provided, if possible.
- Stairways must be well lit.

- Stairways must be kept free of protruding nails, splinters, holes, loose boards, or other hazards that affect efficient maintenance and cleaning.
- Emergency exits must be kept clear at all times, and exit signs must be maintained.

Stairways and Fixed Ladders

General Responsibilities

Ensure fixed ladders, stairs, and the areas around them are maintained in good, useable condition.

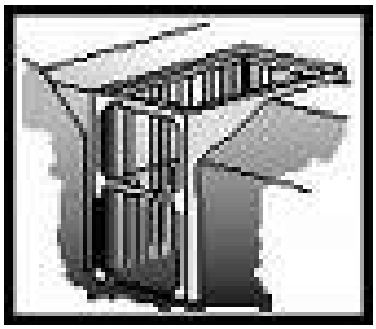
Ensure stairways are maintained free of obstacles, storage, and debris.

Ensure any new stairways or fixed ladders meet building code requirements.

Provide equipment for lifting or lowering materials and equipment to ensure safe use of fixed ladders.

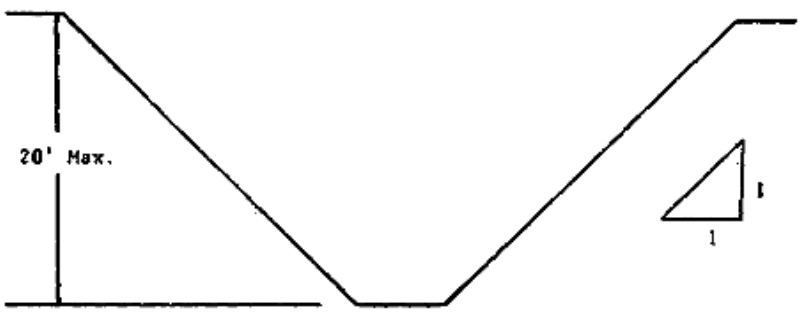
Trenching and Shoring

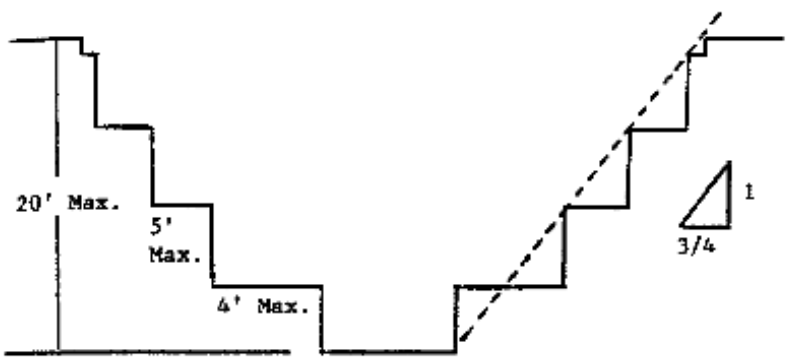
Employee Protection



Each employee in an excavation will be protected from cave-ins by an adequately designed protective system.

Without fail, protective systems must resist all reasonably expected loads.





Trenching and Shoring

Entry and Exit (Access and Egress)

A competent person qualified in structural design must design structural ramps used for access or egress of equipment (or to cross over an excavation), and the ramps must be built according to that design.

Employee access ramps must be designed so that they are strong enough to accommodate their use. Standard guardrail systems must be used when falls greater than 6 feet may occur.

Trenches that are 4 feet or more deep must have a stairway, ladder, ramp, or other safe means of egress in a location where there is never more than 25 feet of travel distance to reach it. Platforms must be provided every 20 feet on stairs, ladders, or other means of egress.

Trenching and Shoring

- Do not enter any trench or excavation area if there is water in the bottom.
- All trenches or excavation areas must have the sides sloped or benched or have some sort of trench box or shielding in place to protect against caving in.
- Obey barricades and other sign restrictions.
- Wear appropriate personal protective equipment, as required. Protective equipment may include:
  - respirators
  - gloves, hardhats, or shoes
  - fall protection equipment, or
  - reflective vests.

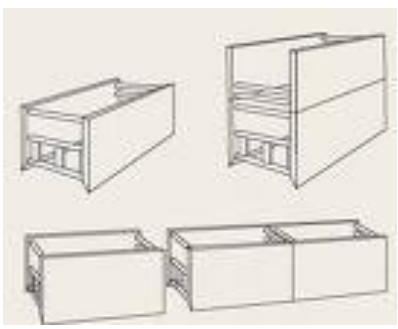
- Attend training, as required.
- Never pass underneath equipment or suspended loads.
- Stay clear of vehicles being loaded or unloaded, unless you are required to be there.
- Keep materials and equipment at least 2 feet from the edge.

Know the hazards of the trench or excavation area!

Trenching and Shoring

Installing and Removing Protective Systems

- All parts of the shielding system must be securely connected together to prevent sliding, falling, kick outs, lateral movement, or failure.
- Support systems and shields must be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by its components.
- The loading on individual components must not exceed their design capacity.
- Before removal of any components, additional precautions must be taken, such as installing other additional bracing for the support system, to ensure the safety of employees.
- Removal starts from the bottom of the excavation and progresses slowly, with backfilling operations, to determine any possible failure of the structural members and prevent cave-in.
- Excavation of material is permitted up to 2 feet below the system, but only if the bottom of the system is capable of supporting the load at the full depth of the trench, and the soil from behind or below the system will not be lost or cave in.
- Support system installation must be coordinated with the excavation process.
- Employees are not allowed in the system during installation, removal, or movement.

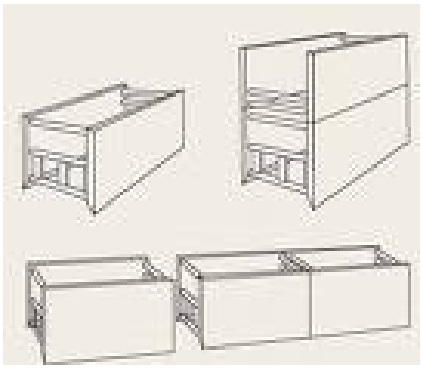


Trenching and Shoring

Loose Rock or Soil Protection

Loose rock or soil can pose a cave-in hazard in a trench.

Scaling to remove loose materials, barricades, retaining devices such as trench boxes), or other protection must be provided.



Materials and equipment must be kept at least 2 feet (0.61 meters) from the edge of any excavation to provide adequate levels of protection.

Trenching and Shoring

Site Inspection

Daily inspections of excavations, the adjacent areas, and protective systems must be made by a professional engineer or other certified competent person when employees could be at risk.

Inspections will look for situations that could result in possible cave-ns, failure of protective systems, hazardous atmospheres, or other hazardous conditions.

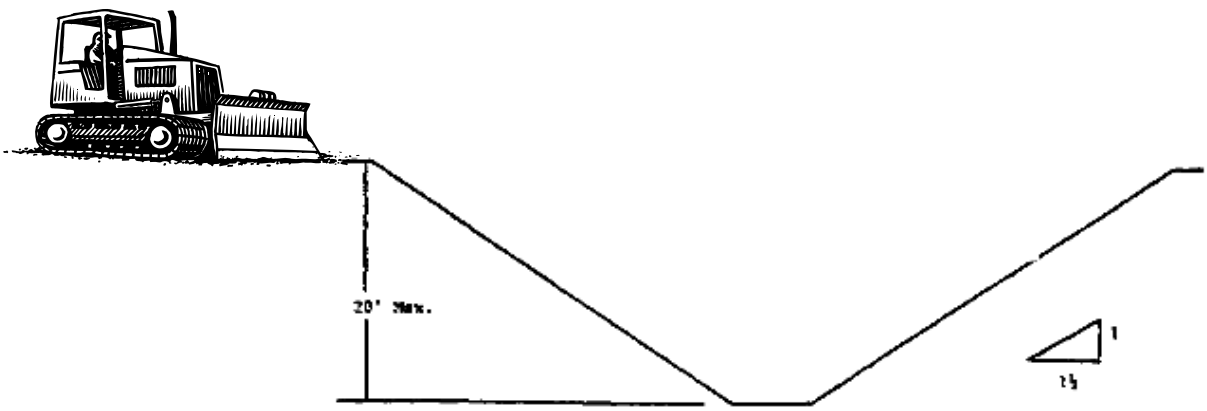
Inspections may be required more frequently throughout the work shift depending on work progress, rain or wind storms, or changing weather conditions at the site.

Where sites or protective systems fail inspection, employees will be prohibited from continuing work until the necessary precautions have been taken to ensure their safety.

Trenching and Shoring

Sloping and Benching Systems

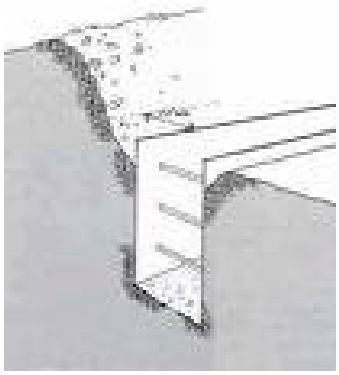
Employees are not permitted to work on the face of sloped or benched excavations above other employees unless the lower levels are protected from the hazards of falling, rolling, or loose dirt, soil, materials, or equipment.



Trenching and Shoring

Stability of Adjacent Structures

Where excavation may cause a collapse to adjoining buildings, walls, or other structures, shoring, bracing, or underpinning must be used.



DANGER

THIS WALL MAY BE UNSTABLE IN WINDY CONDITIONS AND MAY COLLAPSE

Structures must be stabilized before excavating below the level of the base or footing of its foundation, unless a registered engineer approves and determines that the stability of the structure does not pose a hazard.

Sidewalks, pavement, and similar structures must not be undermined without a support system to protect employees from their possible collapse.

Trenching and Shoring

Surface Encumbrances and Underground Installations

Trees, poles, utilities, buildings, and other objects that could create a hazard during trenching operations must be supported, as necessary (or removed if required), to safeguard employees and the structure of the trench.

The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, must be determined prior to opening an excavation site and must be protected as much as possible during excavation.

Without exception, prior to the start of all actual excavation, contact must be made with all utility and service companies to advise them of the excavation. A list of the utility firms and contact numbers must be maintained by the job site supervisor or project manager for the site.

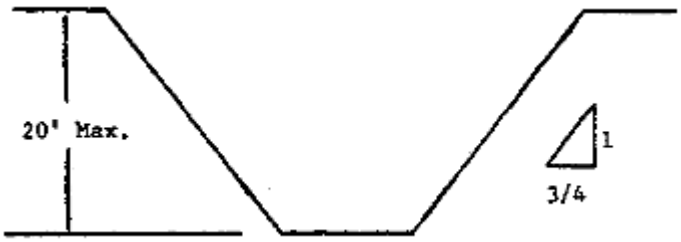
Before beginning the excavation, appropriate time must be allotted to utility companies to locate and mark the installations.

Trenching and Shoring

Type A Soil

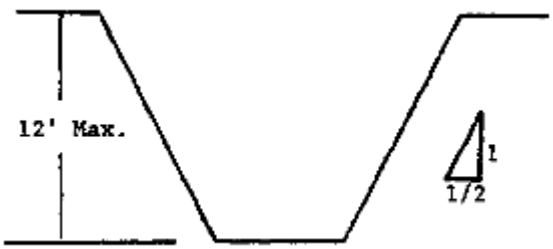
Note: All slopes are in the horizontal to vertical ratio.

1. All simple slope excavation 20 feet or less in depth must have a maximum allowable slope of 3/4:1.



Simple Slope – General

Exception: Simple slope excavations that are open 24 hours or less (short term) and are 12 feet or less in depth must have a maximum allowable slope of 1/2:1.

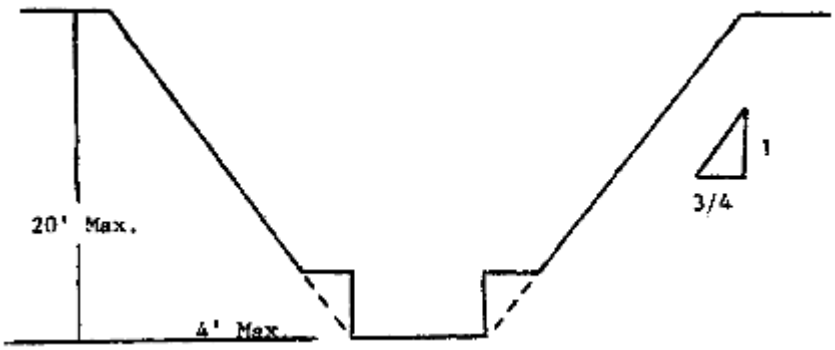


Simple Slope – Short Term

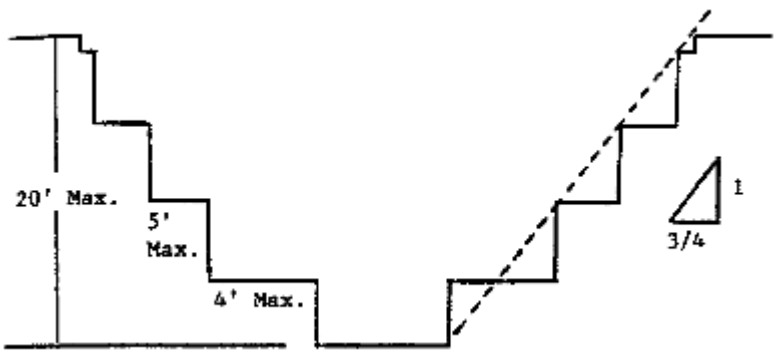
Trenching and Shoring

Type A Soil

2. All benched excavations 20 feet or less in depth must have a maximum allowable slope of 3/4:1 and maximum bench dimensions as follows.



Simple Bench

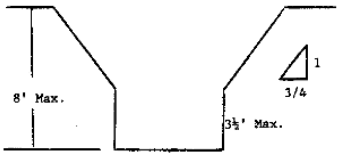


Multiple Bench

Trenching and Shoring

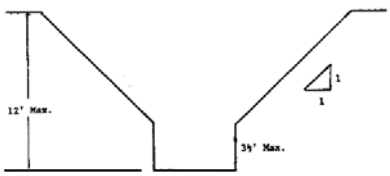
Type A Soil
(page 3 of 3)

3. All excavations 8 feet or less in depth which have unsupported vertically-sided lower portions must have a maximum vertical side of 3 1/2 feet.



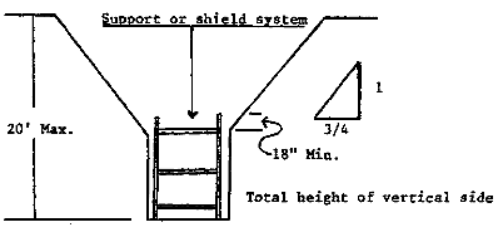
Unsupported Vertically-sided Lower Portion – Maximum 8 Feet in Depth

All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically-sided lower portions must have a maximum allowable slope of 1:1 and a maximum vertical side of 3 1/2 feet.



Unsupported Vertically-sided Lower Portion – Maximum 12 Feet in Depth

All excavations 20 feet or less in depth which have vertically-sided lower portions that are supported or shielded must have a maximum allowable slope of 3/4:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

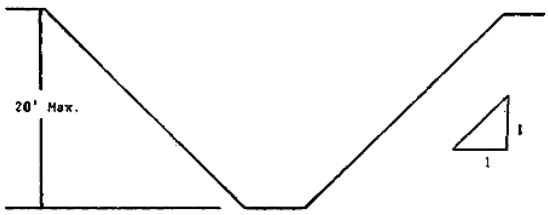


Supported or Shielded Vertically-sided Lower Portion

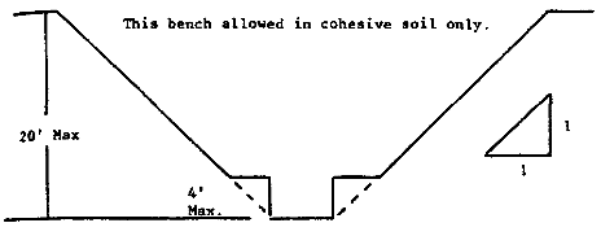
Trenching and Shoring

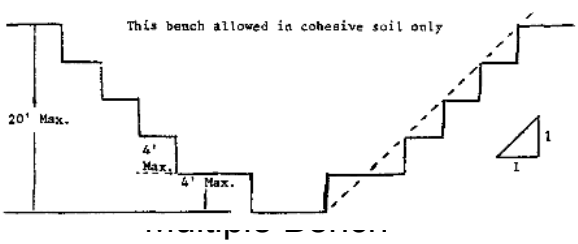
Type B Soil

1. All simple slope excavations 20 feet or less in depth must have a maximum allowable slope of 1:1.



2. All benched excavations 20 feet or less in depth must have a maximum allowable slope of 1:1 and maximum bench dimensions as follows.



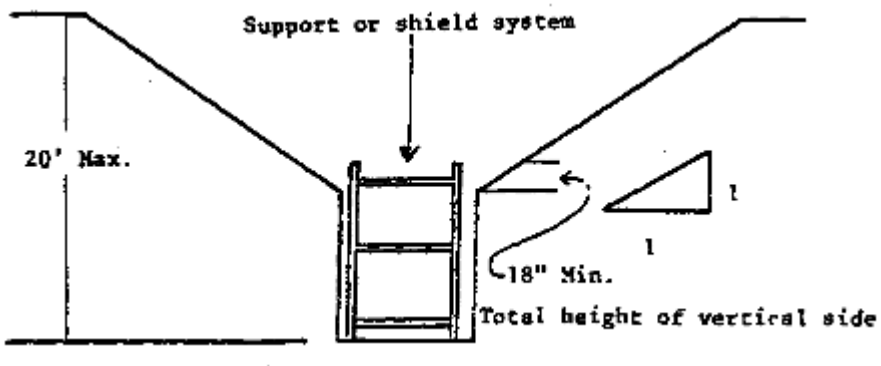


Multiple Bench

Trenching and Shoring

Type B Soil
(page 2 of 2)

3. All excavations 20 feet or less in depth which have vertically-sided lower portions must be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations must have a maximum allowable slope of 1:1.



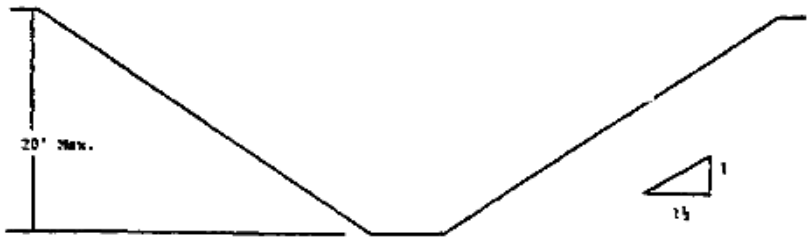
Vertically-sided Lower Portion

4. All other sloped excavations must be in accordance with the other options permitted in §1926.652(b).

Trenching and Shoring

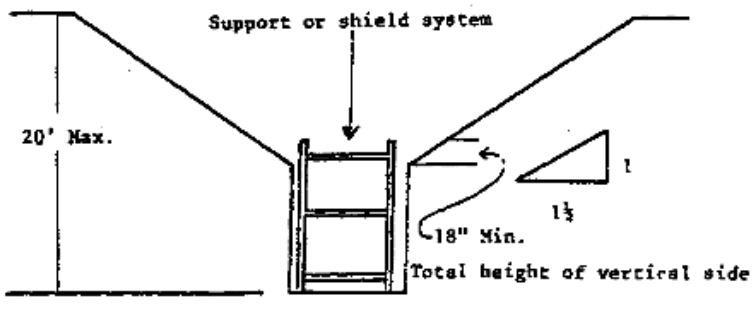
Type C Soil

1. All simple slope excavations 20 feet or less in depth must have a maximum allowable slope of 1 ½ :1.



Simple Slope

2. All excavations 20 feet or less in depth which have vertically-sided lower portions must be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations must have a maximum allowable slope of 1 ½ :1.



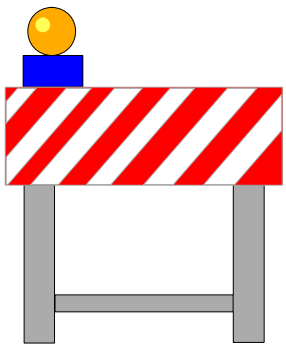
Vertically-sided Lower Portion

3. All other sloped excavations must be in accordance with the other options permitted in §1926.652(b).

Trenching and Shoring

Warning Systems and Alarms

When mobile equipment is operated near the edge of an excavation and the operator does not have a clear and direct view of the edge, a warning system, such as barricades, hand or mechanical signals, or stop logs, must be used. If possible, the grade must be away from the excavation.



Trenching and Shoring

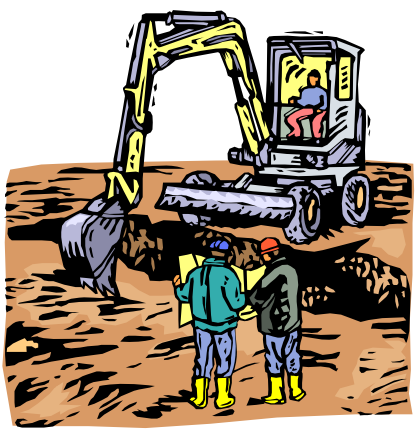
Water Accumulation Hazards

Employees must not work in excavations where water has accumulated or in excavations where water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed. Precautions include:

- special support or shield systems to protect from cave-ins
- water removal to control the level of accumulating water, **or**
- use of a safety harness and lifeline system.

After any rainfall (or other occurrence that may produce water or water run-off), all excavations must be inspected by the site engineer or competent person to determine if any change to the soil resistance capacity has occurred.

If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation.



Slips, Trips & Falls

Slips and falls are quite common, and so these incidents are often dismissed as “part of doing business” or thought to be just clumsiness. But resulting injuries can be very serious, so it is important to understand what causes them and how to prevent them.

Poor housekeeping is the main cause of these accidents. This can include:

- Wet, slippery floor surfaces
- Improper use of office or other equipment (chairs, file cabinets, cords, etc.)
- Items on the floor
- Damaged furnishings or equipment (carpet tears, damaged ladders, etc)
- Insufficient lighting caused by burned out bulbs

Then, there are the actions of individuals:

- Not using approved walkways
- Improper footwear
- Inattention
- Not using handrails
- Horseplay or running

Prevention of slips, trips and falls is everyone’s responsibility. The following items should be priorities for all of us:

- Keep floors clean and dry, and walkways clear.
- Keep items off of the floor. A pencil can be a real hazard if you step on it.
- Watch the cords. Keep them out of walkways.
- Report damaged tiles, carpet tears or other items which can catch your feet.
- Report burned out lights.
- Keep file drawers closed and sit straight on your chair.
- Watch where you are going and if you need to carry something , walk the path first to make sure there are no hazards in your way.
- Always use handrails on stairways.
- Use step ladders properly.
- Horseplay is for kids on playgrounds, not adults at work.
- Wear appropriate footwear, and if unsure, check with your supervisor.

Slips, Trips, and Falls

A Place for Everything

A place for everything!

Everything in its place!

Slips, Trips, and Falls

Causes

- Using a chair as a stepladder
- Walking where you don’t belong
- Carrying large or heavy materials
- Using ladders unsafely
- Being distracted or not paying attention
- Slippery floors (wet or highly polished)
- Cords or other materials in the walking path

Slips, Trips, and Falls

Everyone's Responsibility

Housekeeping
is

everyone's responsibility.

Slips, Trips, and Falls

Falls and Stairways

Almost half of all fatal falls occur on stairways or steps.

Tips for Safety:

- Always use the handrail.
- Have good lighting.
- Make sure the steps are free of stored materials.
- Check for loose boards or carpeting.
- Use anti-slip coatings on steps.
- Ensure the edge of each step is visible.
- Paint the floor surface at the bottom a different color, or use a non-slip mat.
- Avoid carrying large amounts of materials up/down stairs. Better to make two trips safely than one trip and fall.
- Paint single steps bright yellow to call attention to them.

Slips, Trips, and Falls

Floor Surfaces

Clean and shiny floors are nice to look at, but they may cause slip hazards if they get wet or dirty.

Anti-slip flooring systems should be used in areas where hazards are likely to be created.

Slips, Trips, and Falls

Footwear

The shoes you wear play an important part in slip and fall prevention.

- Wear shoes that fit well.
- Shoes should have good traction/soles.
- Heels should not be too high.

Specialized shoes may be needed in certain situations.

- Construction areas require work-boots.
- Electricians require specially insulated shoes.
- Waterproof shoes
- Protection from rolling or falling objects
- Warehouse and production areas usually require closed-toed shoes.

Inspect shoes and footwear frequently for holes and deterioration.

Slips, Trips, and Falls

Good Work Practices

Report spills immediately.

Clean up spills, if you are trained and authorized.

Use non-skid surfaces in slippery areas, such as bathrooms and showers.

Use waterproof footgear to decrease slip/fall hazards where floors can be slippery.

Mop or clean only one side of an aisle at a time, allowing the other side to dry and providing a slip-free surface to walk on.

Slips, Trips, and Falls

Good Work Practices

Use ladders and stepstools to reach items.

Do not use chairs or boxes as substitutes for ladders.

Prevent tripping hazards by re-laying or stretching carpets that bulge or have become bunched. Eliminate uneven floor surfaces.

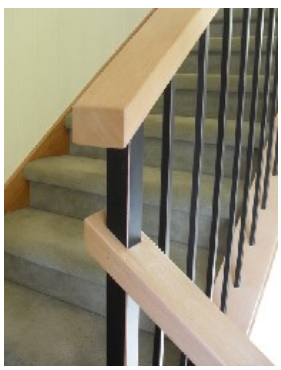
Temporary electrical cords that cross aisles should be taped or anchored to the floor.

Maintain housekeeping practices. Eliminate cluttered or obstructed work areas. Keep aisles and passageways clear at all times.

Tables, carts, and counters should be free of sharp edges and corners.

Provide adequate lighting, especially during night hours.

Always use handrails on staircases. Maintain a clear view of the stairs ahead, and request help when carrying bulky loads.



Slips, Trips, and Falls

Housekeeping

Good housekeeping is not a “minor” issue.

- More people are injured from slips, trips, and falls than from any other work-related injury.
- Housekeeping is an ongoing procedure.
- Make housekeeping routine.
- Assign responsibility to everyone for their individual work areas.
- Clean up spills and waste materials immediately.
- Plan ahead – know what needs to be done.

Slips, Trips, and Falls

Housekeeping and Safety

Good housekeeping is important.

Safety and housekeeping
go hand-in-hand.

Slips, Trips, and Falls

Keep Exit Paths Clear

Do not store materials in front of exits, paths to exits, or stairways.

In a fire or another emergency, these areas must be clear for evacuation.

Slips, Trips, and Falls

Lighting

- Replace broken or burned-out bulbs as soon as possible.
- Keep all areas well lit and clean.
- Be sure light switches are accessible (or use motion sensor lights).
- Move slowly in dim or shadowy areas.
- Use only bulbs with watts designed for the fixture – using a higher watt bulb is a fire hazard.
- Remember: extension cords are temporary devices only.
- Reduce glare by ensuring proper and consistent area lighting.
- Use task lamps or additional indirect lighting as needed.
- Use window shades as needed.

Slips, Trips, and Falls

Obstacles in Walkways

Problem areas in shop and work areas:

- Materials in walkway paths
- Equipment pieces jutting into aisles
- Improperly stored materials
- Temporary cords across aisles

Problem areas in offices:

- File cabinet drawers left open
- Materials stacked improperly
- Carpet areas in need of repair
- Wet tiles or floors
- Doorways

Slips, Trips, and Falls

Oil and Grease Spills

1. **Wipe up the excess material.**
   - DON'T STOP HERE! There may be a slippery residue that can cause someone to slip or fall.

2. **Get a powder cleaner or grease-cutting liquid cleaner and READ THE LABEL.**
   - Make sure the cleaner is OK to use with your type of spill. (Some cleaners are incompatible with certain types of greases and oils, and toxic fumes may be given off if the wrong type is used.)

3. **Pour or sprinkle the cleaner over the spill.**
   - Allow it to soak in – it needs a minute or two to break down the grease or oil.

4. **Clean the remaining spill according to the directions on the cleaning agent.**

Wiping a spill with a mop doesn't always make the surface clean.

Slips, Trips, and Falls

Outdoor Hazards

Ø Look for wet or slippery spots on ramps and walkways.

Ø Clean up spills, if you are trained and authorized.

Ø When walking on grass or dirt be on the lookout for holes, rocks, and depressions.

Ø Tools and hoses can hide in the grass, be on the lookout.

Ø Use caution on slopes.

Ø When close to dusk or dawn be sure you have adequate light for what you're doing.

Slips, Trips, and Falls

Pay Attention

Be aware of:

- where you are walking
- what you are doing
- slippery floor surfaces
- blocked or cluttered workspaces
- traffic areas (other people, vehicles)

Slips, Trips, and Falls

Take the Initiative

If you see a spill,

clean it up or **report it**.

If you see a slip and fall hazard,

fix it or **report it**.

Slips, Trips, and Falls

Things You Can Do

- Keep your work area clean and neat.
- Report lighting fixtures that need repair.
- Do not carry large boxes or items that obstruct your vision.
- Inspect ladders and steps, and use them properly.
- Clean up or report spills immediately.
- Wear proper footwear.
- Hold the handrails on staircases.
- Keep stairs and doorways clear.

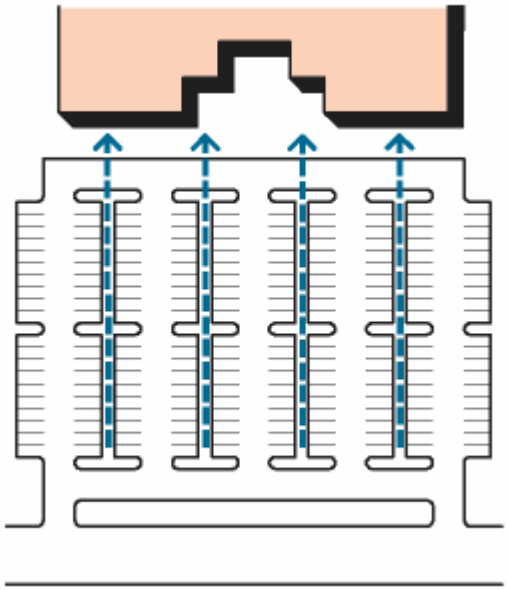
Walking & Working Surfaces

Aisles and Passageways

Where mechanical handling equipment is used, safe clearances must be provided in aisles, at loading docks, through doorways, and wherever turns or passage must be made. Aisles and passageways must be kept clear and in good repair with no obstruction across or in aisles that could create a hazard.

Forklifts are approximately the width and length of a small car. Could you drive your car through the aisle safely?

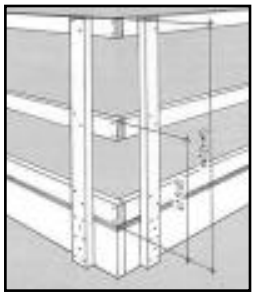
Permanent aisles and passageways must be appropriately marked.



Walking & Working Surfaces

Railings, Toeboards, and Covers

All railings must be able to withstand a load of at least 200 lbs. applied in any direction at any point on the top rail.



Standard (Barrier) Railings must have a top rail, intermediate rail, and posts, and allow 42 inches from the top rail to the floor or platform. Top rails must have smooth surfaces. The intermediate rail must be spaced halfway between the top rail and the floor. The ends of the rails must not overhang the posts and create a projection hazard.

Stair railings are similar to standard railings, but the height of the railing can be lowered to 30-34 inches from the step or riser.

- For wood railings, the posts and railings must be at least 2 x 4 inch stock and posts must be spaced 6 feet or less apart.
- For pipe railings, posts and railings must be at least 1½ inches in diameter with posts spaced not more than 8 feet apart.
- For structural steel railings, posts and rails must be 2 x 2 x ⅜-inch angles (or other metal shapes) with posts spaced not more than 8 feet apart.

Handrails must be smooth and securely mounted between 30 and 34 inches from the floor or step and of sufficient size and strength (2 to 3 inches in diameter with 200 lb. load capacity) to grasp during a fall. Brackets must be spaced at least every 8 feet and maintain a 3-inch clearance from the wall. Handrails may not project out at the ends to create an additional hazard.

Toeboards must be 4 inches high and have not more than a ¼-inch clearance from the floor or step. If made of mesh-like material, the hole openings can not be more than 1 inch in diameter. Where toeboards will not prevent material from falling off the sides of the steps or platforms, railings must be fully paneled.

Walking & Working Surfaces

Stairway Railings and Guards

Flights of stairs with more than four steps must have railings.

- Stairways less than 44 inches wide with both sides enclosed must have at least one handrail, preferably on the right side descending.
- Stairways less than 44 inches wide with one side open must have at least one stair railing on the open side.
- Stairways less than 44 inches wide with both sides open must have one stair railing on each side.
- Stairways more than 44 inches wide but less than 88 inches wide must have one handrail on each enclosed side and one stair railing on each open side.
- Stairways 88 or more inches wide must have one handrail on each enclosed side, one stair railing on each open side, and one intermediate stair railing located approximately midway between.

Winding stairs must be equipped with a handrail offset to prevent walking on all portions of the treads less than 6 inches wide.

Welding, Cutting, and Brazing

Authorization to Weld and Area Requirements

Authorization

Areas must be inspected for fire hazards before welding begins. A permit system may be used for hazardous areas where welding-in-place operations are performed.

Floors

Floor areas must be swept and kept clean from dust, combustible materials, and other fire hazards for a radius of 35 feet from the welding operation. If floors are wooden or made of combustible material, they must be kept damp, and the welder must take additional precautions to be protected from electrical shock.

Prohibited Areas

Cutting or welding is not permitted:

- in unauthorized areas
- when sprinkler systems (if installed) are not functioning
- if explosive materials, dusts, or vapors that can be ignited by heat or sparks are in the area
- within 35 feet of unshielded combustible materials
- near open ducts or conveyor systems
- near walls, partitions, ceilings, or roofs, unless dampened or shielded, or
- on metal walls, objects, or structures without ensuring that the heat (through conduction or radiation) will not ignite materials or objects on the adjacent sides.

Welding, Cutting, and Brazing

Confined Space Welding

Work in Confined Spaces

General

A confined space is a relatively small or restricted space, such as a tank, boiler, pressure vessel, or small compartment.

Ventilation

Ventilation sufficient to withdraw any fumes is required.

Securing Cylinders and Machinery

Gas cylinders must be left on the outside of the space. Any equipment mounted on wheels must be secured or locked to prevent accidental movement.

Lifelines

Where the opening for access and exit is small, welders must wear lifelines or similar equipment to remove them quickly in an emergency. These lines must be attached so the person will not be jammed in the exit opening. An outside attendant must be on duty at all times to summon rescue personnel if needed.

Welding, Cutting, and Brazing

Enclosures and Employee Protection

In gas welding or oxygen cutting where the torch produces a high yellow light, it is best to use a filter or lens that absorbs the visible range of the yellow or sodium line. All filter lenses and plates must meet ANSI standards for the type, color, and grade of lens.

Protection from Arc Welding Rays

Where the work permits, the welder must be:

- enclosed in an individual booth painted with a low reflectivity finish to absorb the UV rays, or
- screened off or shielded by curtains or structures that are non-combustible and painted or dyed to absorb UV light rays.

Booths and screens must allow for air circulation at the floor.

Protective Clothing:

Personal protective equipment and clothing that fits the welder must be worn to protect from heat, sparks, flame, and UV light generated from welding, cutting, or brazing operations.

Welding, Cutting, and Brazing

Eye and Lens Shading Requirements

Eye Protection Rating Guidance for Face Shading Requirements

The following is a guide for the selection of the proper shade numbers. These recommendations may be varied to suit the individual's needs.

Welding Operation	Shade Number
Shielded metal arc welding – 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	10
Gas-shielded arc welding (nonferrous) – 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	11
Gas-shielded arc welding (ferrous) – 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	12
Shielded metal arc welding – 3/16-, 7/32-, 1/4-inch electrodes	12
Shielded metal arc welding – 5/16-, 3/8-inch electrodes	14
Atomic hydrogen welding	10-14
Carbon arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 inch to 6 inches	4 or 5
Heavy cutting, 6 inches and over	5 or 6
Gas welding (light) up to 1/8 inch	4 or 5
Gas welding (medium) 1/8 inch to 1/2 inch	5 or 6
Gas welding (heavy) 1/2 inch and over	6 or 8

Welding, Cutting, and Brazing

Welding on Containers and Piping

Fire Prevention Precautions

Cutting or welding is only allowed in areas that are or have been made fire safe. When welding work cannot be moved, the combustibles must be moved or shielded from welding heat and sparks.

Welding or Cutting Containers

Used Containers: No welding, cutting, or other hot work may be performed on used drums, barrels, tanks, or other containers until they have been cleaned thoroughly and it is absolutely certain that there are no flammable materials present or any substances, such as greases, tars, or acids, which might produce flammable or toxic vapors.

Venting and Purging: All hollow spaces, cavities, or containers must be vented to permit the escape of air or gases before preheating, cutting, or welding. Purging containers with inert gas is recommended.

Electrodes: Arc welding electrodes must be placed in holders and the machine must be disconnected from the power source whenever welding is stopped for more than a few minutes (breaks or overnight). Holders and electrodes must be prevented from contacting combustible materials.

Torch Valve: Even in times when the torch will only be idle for a few minutes, it must be shut down. Valves must be closed and the gas shut off whenever the torch is not in use.

Protection of Personnel

Railings: Welders or helpers must use fall protection (guardrail systems, personal fall arrest equipment, or other similar means).

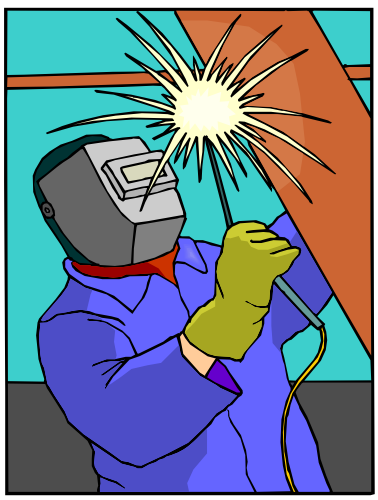
Welding Cable: Welders must take adequate care to place welding cables and other equipment so that it is clear of passageways, ladders, and stairways.

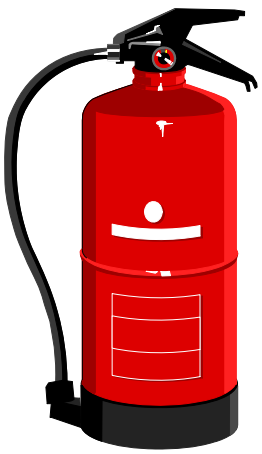
Welding, Cutting, and Brazing

Fire Watch

A fire watch must be maintained at the welding location for at least 30 minutes after welding stops. This is to make sure that sparks and slag have not accidentally ignited any materials that may be in the area.

The person who performs the fire watch must remain alert and be trained in the use of a portable fire extinguisher (or other fire extinguishing equipment).





Fire extinguishing equipment must be located at the site of the welding and/or fire watch.

Welding, Cutting, and Brazing
General Fire Protection Requirements

Fire Prevention and Protection

If the object to be welded or cut cannot readily be moved to a safer location, move any combustibles or fire hazards in the area to a safe distance (35 feet), or shield them from contact with the heat and sparks.

Wherever there are openings or cracks in the floor or walls that cannot be closed (including doors and windows), cover or shield them so the floor below will not be exposed to sparks that might drop through the opening.

Fire extinguishers

Suitable fire extinguishing equipment must be ready and available. Portable extinguishers, pails of water, or buckets of sand may be used.

Fire watchers are required whenever welding or cutting may contribute to a fire. Fire watchers must be aware of:

- combustible materials within 35 feet
- combustible materials farther away than 35 feet, but which are easily ignited
- wall or floor openings within 35 feet (10.7 m) that can ignite materials in other areas, and
- materials next to metal partitions, walls, ceilings, or roofs that can catch fire through heat (conduction or radiation).

Fire watchers must have fire extinguishers available and be trained to use them. They must know how to sound an alarm and/or call for assistance in the event of a fire.

A fire watch must be maintained for at least a half-hour after welding or cutting operations have been completed to detect and extinguish possible smoldering fires.

Welding, Cutting, and Brazing

Labeling of Welding Materials

Precautionary Labels

Fluxes, coatings, coverings, and filler metals used in welding and cutting must be labeled and describe any specific hazards and protective equipment requirements. The boxes or containers must be labeled with the following statement:

CAUTION: Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation.

Brazing (welding) filler metals that contain cadmium must state:

WARNING: CONTAINS CADMIUM –
POISONOUS FUMES MAY BE FORMED ON HEATING.

Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1.

If chest pain, cough, or fever develops after use, call physician immediately.

Brazing and gas welding fluxes containing fluorine must be labeled with:

CAUTION: CONTAINS FLUORIDES.

This flux, when heated, gives off fumes that may irritate eyes, nose and throat.

1. Avoid fumes – use only in well-ventilated areas.
2. Avoid contact of flux with eyes or skin.
3. Do not take internally.

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

Acetylene Generators

Approval and Markings

- Generators must be of approved construction and plainly marked with:
  - the maximum rate of acetylene in ft^3/hr for which they are designed
  - the weight and size of carbide necessary for a single charge
  - the manufacturer's name and address, and
  - the name or number of the type of generator.
- Carbides must be the size marked on the generator nameplate.

Rating and Pressure Limitations

- The total hourly output of a generator may not be exceeded. Generally, carbide-feed generators are rated at 1 ft^3 per hour per pound for a single complete charge.
- Relief valves must be regularly tested to ensure they operate properly. Valves for generating chambers must open at less than 15 psig. Hydraulic back-pressure valves must open at less than 20 psig.
- Non-automatic acetylene generators are limited to 1 psig, and all water overflows must remain visible.
- The space around the generator must be unobstructed and accessible.
- Stationary acetylene generators must be kept:
  - level and grounded
  - from freezing (the use of salt or corrosive chemicals is prohibited), and
  - in areas where there are no ignition sources.
- Continuous connections may not be used for water supplies unless there is an open overflow or automatic shutoff device. Non-continuous connections must end at a point higher than 2 inches above the filling opening.
- Generator drain connections must discharge through an open connection into a vented pit or receptacle that may then lead to a sewer discharge.
- Each generator must have a vent pipe.
- Escape or relief pipes must be rigid and may not have condensation traps.
- Escape or relief pipes may not taper in width. They must end with a hood or bend at least 12 feet above the ground (preferably above the roof). Ends must be at least 3 feet from any combustible materials (wooden roofing, etc.) and at least 20 feet from any ignition sources (chimneys, etc.). Discharge should be as far away as practical from windows or other building openings.
- Pipes must individually lead to the outside air. Hoods or bends require protection from obstruction by rain, snow, ice, insects, or birds.

Acetylene Generators

Gas Holders

- Gas holders must have guided bells. The bell must move freely and not bind. It must be at least 2 inches from the shell.
- A compressor or booster cutoff must be provided 12 inches or more above the bell landing point to prevent the collapse of the bell or air infiltration should the gas suddenly cool off and cause a vacuum.
- Gas holder seals must be protected from freezing.
- The generator-feeding mechanism must automatically stop before the gas holder reaches the upper limit of its travel.
- When the gas holder is connected to only one generator, the gas capacity of the holder must be at least ⅓ of the hourly rating of the generator.
- All discharge outlets (and acetylene compressors or booster pumps) require piping protective devices installed on each supply line at the appropriate location on the line (pressure dependant) to prevent:
  - backflow of oxygen into the fuel-gas supply system
  - passage of a flashback into the fuel-gas supply system, and
  - excessive back-pressure of oxygen in the fuel-gas supply system.
- Wiring and electrical equipment must be at least Class 1 Division 2.
- Compressors and booster pump equipment must be located in well-ventilated areas, away from open flames, sparks, and ignition sources.
- Compressor or booster pumps require pressure relief valves that activate at 15 psig and must either discharge to a safe outdoor location or return the gas to the inlet side or supply source.
- Compressor or booster-pump discharge outlets must use approved protective equipment.

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

Acetylene Generators

Portable acetylene generators:

- must be approved for portable use
- may not be used within 10 feet of combustible materials or storage
- may not be used in rooms where the ceiling height is less than 10 feet high
  Note: The square footage of the room may not be less than 35 times the total gas generating capacity all generators in the room. (Capacity = lbs. of carbide charge x 4.5)
- must be protected against freezing (the use of salt to prevent freezing is prohibited)
- require cleaning and recharging outside of the building
- may not be moved by crane or derrick when charged with carbide
- must be stored in well ventilated rooms, free from open flames
- must be turned off and secured during movement or transport, charging, and cleaning, and
- must be located a safe distance from welding to prevent exposure to sparks, slag, or misdirection of the torch flame, or overheating from hot materials or processes.

Maintenance and Operation

- Operating instructions must be available at all times.
- Follow manufacturer's instructions for recharging generators.
- Batch-type generators must be flushed with clean water each time before carbide is added.
- Only clear water can be directly discharged to the sewer. Carbide water residues must be contained and may not be stored near open flames.
- When adding carbide, do not jam or ram carbide into the space; do not use metal tools for this.
- Generator water chambers must be kept filled to the proper levels.
- Remove the carbide charge and feed mechanism during repairs. Completely discharge the acetylene after disconnecting the piping system and flood the generator shell with water.
- Welding repairs to equipment may not be performed in areas with other generators unless those generators and piping lines have been purged.

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

Acetylene Generators

Outside generator houses and inside generator rooms for stationary acetylene generators must have:

- no opening within 5 feet of any opening in another building
- walls, floors, and roofs made of noncombustible construction
- separate rooms for oxygen storage, if necessary (gas-tight full walls, without openings)
- readily accessible exit doors in case of emergency
- explosion vents that are at least 1 ft^2 for every 50 ft^3 of room area and located at the floor and ceiling level
- explosion-proof exterior walls and roofs with:
    - walls of light, noncombustible material, single-strength glass, or
    - lightly fastened hatch covers, or
    - lightly fastened swinging doors in exterior walls opening outward, or
    - lightly fastened walls or roof designed to relieve at a maximum pressure of 25 pounds per square foot
- buildings that are one floor only or that are located on the roof or top floor of the building
- generators (if inside) enclosed in a separate room
- construction of 1-hour fire rated non-combustible materials with walls or partitions that are continuous from floor to ceiling (at least one must be an exterior wall)
- swinging, self-closing fire doors (Class B,1-hour fire rating)
- metal framed windows with wired glass and a fixed sash
- heating by steam, hot water, enclosed electrically heated elements, or other indirect means (flames are prohibited)
- natural light during daylight hours (Where artificial lighting is necessary it is restricted to break-resistant electric lamps of non-combustible materials. Lighting must be fixed with rigid conduit and threaded connections.)
- electric switches, telephones, and other electrical apparatus that is intrinsically safe (or non-sparking) and that is located outside the room or area, and
- electrical equipment that complies with Electrical Class I, Division 2.

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

Cylinder Operation and Handling

Cylinder Operating Procedures

- Cylinders and all components must be kept clean and free from oil or grease.
- Oxygen cylinders may not be handled with oily hands or gloves.
- A jet of oxygen must never be allowed to strike an oily surface, greasy clothes, or enter a fuel oil or other storage tank.
- When transporting cylinders by a crane or derrick, a cradle, boat, or suitable platform must be used. Slings or electric magnets may not be used. Valve-protection caps must be in place.
- Cylinders may not be dropped or struck, or strike each other.
- Valve-protection caps may not be used to lift cylinders under any circumstances.
- If cylinders are frozen to the ground, use slightly warm water to thaw the area before removing the cylinder.
- Regulators must be removed and valves closed and capped when moving cylinders, unless the cylinders are secured on a special truck.
- In-service cylinders must have keys or handles on the valve stems. One key per manifold is required for multiple cylinder installations.
- Close all valves when cylinders are not in use or work is finished.
- Valves of empty cylinders must remain closed.
- Cylinders must be shielded or kept distant from welding or cutting operations to prevent heat, sparks, slag, and flames from contact.
- Cylinders may not be placed near radiators, piping systems, layout tables, or electrical circuits.
- Cylinders may not be used to strike an arc for an electrode.
- Cylinders may never be used as rollers or supports, whether full or empty.
- The numbers and markings stamped onto cylinders may not be tampered with.
- Only the gas supplier or similarly qualified person may mix gases inside a cylinder.
- Only the owner or an authorized person may refill a cylinder.
- No one may tamper with safety devices in cylinders or valves.

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

Cylinder Operating Procedures

- Cylinders may not be dropped or otherwise roughly handled.
- Unless connected to a manifold, oxygen cylinders must have regulators attached to the valves when in use.
- Standing to one side, open the valve for an instant and securely close it before attaching the regulator. Be sure this occurs well away from sparks, flame, or ignition sources.
- Never use tools to open a cylinder (unless the tool is specialized for the valve stem).
    - In general, if valves cannot be opened by hand, do not use the cylinder.
    - Where a specialized wrench is required, it must remain on the stem of the valve while the cylinder is in use.
- Never tamper with or attempt to repair regulators, valves, or safety devices. Notify the supplier immediately if there is a problem.
- Do not remove the stem from a diaphragm-type cylinder. Contact the supplier for instructions.
- Fuel-gas cylinders must be valve-end up during use.
- LP gases (such as propane) must be stored and shipped with the valve end up.
- Before removing the regulator, close the valve and release any gas in the regulator.
- Never place anything on top of an acetylene cylinder when in use.
- Cylinders with leaking valves or fittings must be taken outside, away from ignition sources, and slowly emptied. Place warning signs to keep ignition sources away. Cylinders must then be tagged and the supplier notified.
- Fuel-gas cylinders used with torches or other devices equipped with shutoff valves must have the pressure reduced through a regulator attached to the valve or manifold.
- Always open cylinder valves slowly. Acetylene valves should not be opened more than ¾ of a spindle turn and never more than 1½ turns of the spindle.

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

General Requirements

Flammable Mixture
Mixtures of fuel gases and air or oxygen may be explosive; appropriate precautions must be taken. The mixture of air or oxygen with flammable gases is only allowable at the burner.

Maximum Pressure
Acetylene must be regulated to a maximum of 15 psig (30 psi). Take into consideration the environment in which it is used (pressurized chambers, tunnels, underground areas, etc.).

Apparatus
Only ANSI approved components (torches, regulators, valves, acetylene generators, connections, and manifolds) may be used.

Personnel
Workers in charge of the oxygen or fuel-gas supply equipment, including generators and oxygen or fuel-gas distribution piping systems, must be trained and competent to handle the responsibilities. Written instructions and procedures must be readily available.

Cylinders and Containers

Approval and Marking
All portable cylinders must be DOT approved and maintained properly. Cylinders must be marked (preferably on the shoulder of the cylinder) with the type of gas. Labels may not be removed, defaced, or allowed to become illegible.

All cylinders 30 lbs. or more must have a valve protection cap or with a collar to protect the valve.

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

General Requirements

General Cylinder Storage

- Store away from heat sources or flames.
- Store in areas where they will not be knocked into or damaged.
- Store upright and chained to a wall.
- Separate empty cylinders from full cylinders.
- Store 20 feet from highly combustible materials (oil, grease, etc.).
- Store in well ventilated areas.
- Close valves when in storage (even empty cylinders).
- Store with valve caps in place, if capacity is over 30 lbs.

Fuel-gas Cylinder Storage

- Limited to 2,000 cubic feet (or 300 lbs.) for inside storage areas, unless it is a separate room that meets fire and explosion criteria
- Must be stored valve end-up

Oxygen Storage

- Store 20 feet from all other flammable gases or separate with a ½-hour rated fire wall at least 5 feet high.
- Store 20 feet from all highly combustible materials (oil, grease, etc.) or separate with a ½-hour rated fire wall at least 5 feet high.
- When stored in an outside generator house, separate from carbide storage with a 1-hour fire resistant gastight partition.

Note: Liquid oxygen systems and storage must comply with additional (NFPA) requirements.

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

Manifolding Cylinders

All Manifolds

- Only use approved manifolds and components.
- High-pressure manifolds must have approved pressure regulators.
- There may only be one manifold per room, unless they are either 50 feet apart or separated by a ½-hour rated fire wall at least 5 feet high.
- Storage buildings or rooms may not have open flames (for heating or lighting) and must be well-ventilated.

High-pressure Oxygen Manifolds (>200 psig)

- Oxygen manifolds may not be used or stored where acetylene is generated.
- Oxygen manifolds must be separated from fuel-gas cylinders or combustible materials (especially oil or grease) by 20 feet or a ½-hour rated fire wall at least 5 feet high.
- Oxygen cylinders are limited to 6,000 ft^3 per manifold.
- Bulk systems more than 13,000 ft^3 must meet NFPA requirements for bulk oxygen systems.

Low-pressure Oxygen Manifolds (<200 psig)

- Manifolds and hoses used at or above 250 psig must have a minimum bursting pressure of 1,000 psig and be protected by a safety relief device that activates at 500 psig.
- When oxygen and acetylene hoses are taped together to prevent tangling, no more than 4 out of every 12 inches of hose may be covered by tape.
- Hose connections must be capable of withstanding at least 300 psi, or twice the in-use pressure, whichever is greater. Any on-site testing of connections and clamps must use oil-free air or oil-free inert gas.
- Hose showing leaks, burns, worn places, or other defects must be repaired or replaced.
- Manifolds and leads must be proven gas-tight at a pressure of 300 psig. The testing fluid must be oil-free and not combustible.
- Oxygen manifolds may not be located in an acetylene generator room.
- The following sign must be conspicuously posted at each manifold:

Low-Pressure Manifold. Do Not Connect High-Pressure Cylinders.
Maximum Pressure – 250 psig (1.7 MPa)

Welding, Cutting, and Brazing

Oxygen-fuel Gas Welding and Cutting

Manifolding Cylinders

Fuel-gas Manifolds

- Fuel-gas cylinders in use inside a building are limited to 300 lbs. of capacity per manifold (unless they are specifically rated as part of a high-pressure manifold system).
- Storage buildings or rooms may not have open flames (for heating or lighting) and must be well-ventilated.

Portable Outlet Headers

- Portable outlet headers may not be used indoors.
- Outlets must have readily accessible shutoff valves.
- Master shutoff valves must be located at the entry end of the header.
- Headers for fuel-gas service must have an approved hydraulic back-pressure valve (or check valve) installed between the inlet and service outlet, or they must have an approved pressure-reducing regulator at each outlet.
- Oxygen service may have a direct hose connection.
- Each service outlet must have a detachable outlet seal cap that is chained or otherwise attached to the body of the valve.
- Header frames must support the equipment securely in the correct operating position and protect the frame from damage during handling and operation.

Manifold Operating Procedures

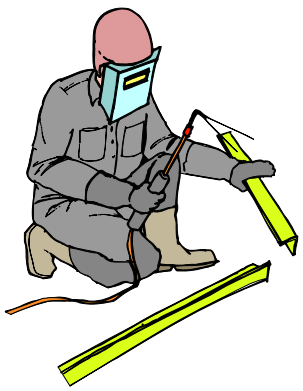
- Cylinder manifolds must be installed by a competent person who is familiar with the installation. Reference materials must be available.
- All manifolds and parts must be specific to the gas used.
- If multiple acetylene cylinders are used together, flash arrestors must be placed between each cylinder and the coupler block. One flash arrestor between three cylinders is acceptable for outdoor use only.
- The maximum capacity of all portable manifolds is 3000 ft^3.
- Acetylene and any liquefied fuel gas must be manifolded vertically.
- When connected and discharged through the same manifold, pressure in the cylinders must remain approximately equal.

Welding, Cutting, and Brazing

Personal Protective Equipment

Welders must wear:

- welding helmets (with appropriate lens shading)
- protective gloves, and
- full shoes.



It is recommended that welders wear:

- long sleeves, and
- full pants.

Some welding may also require the use of:

- additional ventilation or respirators, and
- noise and hearing protection.

Area requirements include:

- the use of light curtains or other blockage to protect the vision of other employees, and
- adequate ventilation to disperse or exhaust welding fumes from the area.

Welding, Cutting, and Brazing

Special Metals Welding

Fluorine Compounds

Additional ventilation is not usually required when welding on stainless steels. Air studies show than fluorine and fluorides released during welding are normally below the regulatory limits.

Fluxes, coverings, or other materials that contain fluorine compounds are allowed in confined spaces, as fluorine is contained as a solid, not as a gas.

Zinc Compounds

Welding or cutting involving zinc-bearing base or filler metals, or metals coated with zinc is allowed in confined spaces and indoors, if adequate ventilation is provided.

Lead

Welding involving lead-based metals (erroneously called lead-burning) is allowed in confined spaces and indoors.

Local ventilation must be used when welding or cutting lead-based metals (where lead is a major component of the metal), or on lead-coated materials. Either local exhaust ventilation or a respirator is required.

Beryllium

Welding or cutting involving beryllium-containing base or filler metals must use local exhaust ventilation or airline respirators. Testing may be performed to ensure that levels do not exceed the required limits and to minimize the requirement for other area workers to be protected by respiratory protective equipment or ventilation systems.

Welding, Cutting, and Brazing

Special Metals Welding

Cadmium
Local exhaust ventilation or respirators are required for all welding of cadmium-containing materials or coatings. Both may be required in confined spaces.

Mercury
Local exhaust ventilation or respirators are required for all welding of mercury-containing materials or coatings. Both may be required in confined spaces.

Cleaning Compounds
Follow the manufacturer's instructions in the use of cleaning materials because of possible toxicity or flammability. Degreasing and other cleaning operations involving chlorinated hydrocarbons must use preventive measures to stop vapors from being drawn into the welding area. Trichloroethylene and perchloroethylene must be protected from any UV light or radiation from gas-shielded welding.

Cutting of Stainless Steels
Oxygen cutting (with either a chemical flux or iron powder) and any gas-shielded arc cutting of stainless steel must use exhaust ventilation to remove any fumes that are generated.

First-Aid Equipment
First-aid equipment must be available at all times. All injuries must be reported as soon as possible. For burns or other serious injuries, first aid must be provided until medical attention is provided.

Ergonomics

Temperature

Both extreme heat and extreme cold can adversely affect an employee's thought processes and body functions.

- The optimal work environment temperature is 62ºF to 78ºF.
- Employees may work in an environment that is colder than 50º F or warmer than 87ºF for a maximum of 4 hours before being given a rest break.
- Employees may work in an environment that is colder than 33ºF or warmer than 101ºF for a maximum of 30 minutes before being given a rest break.

At 87ºF: only 4 hours of unimpaired mental performance without rest breaks (dependant upon the physical tasks required)

At 101ºF: only 30 minutes of unimpaired mental performance without rest breaks (dependant upon the physical task required)

Working in Temperature Extremes

Cold Work Area Signs

Warning signs may be required at entrances to work areas where it is likely that cold stress or similar conditions may occur (for example, refrigerated warehouses and freezers).

COLD HAZARD AREA

Cold weather protective clothing or equipment required.
Excessive exposure to cold may cause
hypothermia, frostbite, and trench foot.

Warning signs and instructions must be in English but may include other languages in addition to English.

Where emergency situations are likely, first-aid instructions should be posted with the warning sign and at strategic locations throughout the area.

Working in Temperature Extremes

Cold Work Areas
General Information

- Four major conditions cause cold-related stress:
  - low temperatures
  - wind chill
  - dampness or humidity, and
  - cold water.
- Inadequate or wet clothing increases the effects.
- Medication, alcohol, nicotine, and caffeine may speed up the effects.
- Certain diseases (diabetes, heart disease, or thyroid conditions) may increase the severity of the condition.
- Exhaustion, tiredness, falling asleep, or becoming immobilized will speed up the effects.
- The older you are, the more susceptible you are to cold.

Working in Temperature Extremes

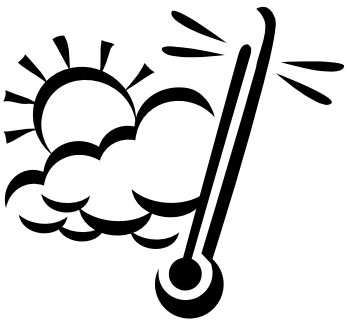
Cold Stress (Frostbite) Signs and Symptoms

- Skin color is pale and waxy.
- Skin becomes hard or numb.

- Skin or tissue freezes.
- Fingers, toes, feet, ears, or nose are usually the first affected.
- Exposed body parts can turn black and be permanently damaged if not treated immediately.

Working in Temperature Extremes

General Requirements



Extreme heat or cold can reduce your awareness of your surroundings, your dexterity, and your body's ability to function normally.

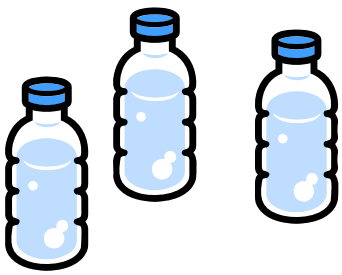
Extreme Temperature Situations:

- Working for more than an hour in an area above 90ºF or below 62ºF
- Short-duration (15 minutes or less) exposures to temperatures below 45ºF (including wind chill factors) or above 100ºF

Working in Temperature Extremes

Heat Stress or Heat Stroke Treatment

- Call for emergency assistance.
- Move to a cool, shaded area.
- Stay with the person.
- Loosen or remove heavy clothing.
- Drink cool (not cold) water.
- Fan the skin.
- Mist the skin with water.



Heat Stress – Signs and Symptoms

Heat Stress

- Weakness
- Headache
- Dizziness or feeling lightheaded
- Mood swings
- Irritability or confusion
- Upset stomach or vomiting
- Moist skin, sweating

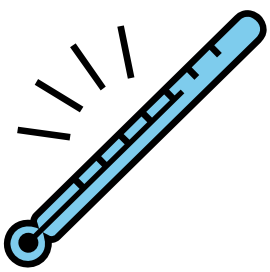
Heat **stroke** (a very serious condition) can be prevented when heat **stress** is recognized and treated appropriately.

Heat Stroke – Signs and Symptoms

- Chills with hot, dry skin

  - Mental confusion
- Dizziness or fainting, possible convulsions
  - Fast, strong pulse

- Body temperature of 105º or more



Working in Temperature Extremes

Hot Work Area Signs

Warning signs may be required at entrances to work areas where it is likely that heat stress or similar conditions may occur (for example, ovens, kilns, and forges).

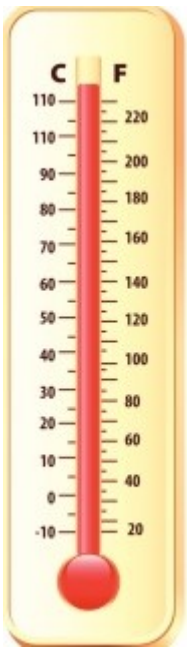
Warning signs and instructions must be in English but may include other languages in addition to English.

Where emergency situations are likely, first-aid instructions should be posted with the warning sign and at strategic locations throughout the area.

Working in Temperature Extremes

Hot Work Areas
General Information

- Four major conditions cause heat-related stress:
  - High temperatures
  - Lack of cooling breeze
  - Humidity
  - Ovens, kilns or other high temperature equipment usage
- Improper clothing increases the effects.
- Medication, alcohol, nicotine, and caffeine may speed up the effects.
- Certain diseases (diabetes, heart disease, or thyroid conditions) may increase the severity of the condition.
- Exhaustion, tiredness, falling asleep, or becoming immobilized will speed up the effects.
- The older you are, the more susceptible you are to heat stress.



Working in Temperature Extremes

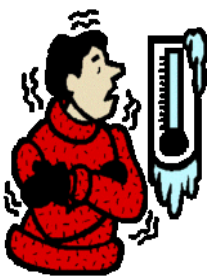
Cold Stress Treatment
Hypothermia & Frostbite

- Call for emergency assistance.
- Move to a warm, dry area.
- Stay with the person.
- Do NOT rub the skin or affected area.
- Drink warm water or sports drinks (no caffeine).

Hypothermia: Move arms, legs, and body to generate muscle heat and blood flow, or place warm packs on armpits, neck, and groin area.

Frostbite: If the affected area is likely to become cold again, do **NOT** warm the area.

To warm a frostbite area:



- GENTLY place the affected area in slightly warm water, if possible. Do NOT rub or pour water over the skin or area.
- If color and feeling begin to return, gently wrap the affected area in warm dry material and seek medical assistance.

Cold Stress (Hypothermia) Signs and Symptoms

Cold Stress (Hypothermia)

- Weakness, fatigue, feeling sleepy
- Irritability or confusion
- Clumsiness
- Uncontrollable shivering
- Blue skin
- Slurred speech
- Drop in body temperature

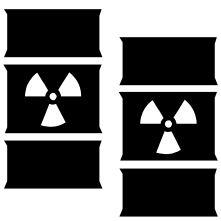
Frostbite (a very serious condition) can be prevented when **hypothermia** is recognized and treated appropriately.

X-Ray and Radiation Safety

Containers

Each container with any quantity of radioactive material that, if released or spilled, could generate radiation that exceeds the regulatory exposure limits (5 rems whole body or 50 rems to any organ or tissue) must be labeled.

- The label must contain the radiation symbol and the words **CAUTION RADIOACTIVE MATERIALS**.



Storage containers must also indicate the quantities and kinds of materials contained and the most recent access date.

A label is not required:

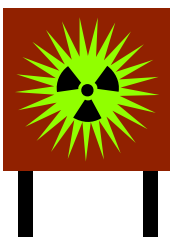
- if the container is for shipment and conforms to the DOT requirements, and
- for laboratory containers, such as beakers, flasks, and test tubes when the user is present.

X-Ray and Radiation Safety

Exposure Limitation – Airborne Radiation

Exposed means that the individual is present in an airborne concentration of radiation, regardless of protective equipment (PPE) or clothing used to prevent exposure.

Maximum exposure dosage for employees **over 18 years** of age is 5 rems to the whole body or 50 rems to a specific organ or tissue.



Maximum exposure dosage for employees **18 years and younger** is .05 rems (50 millirems or .5 millisieverts).

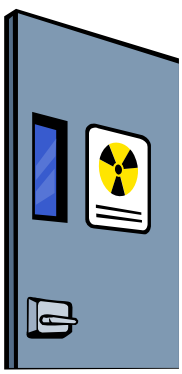
Companies are prohibited from using or transporting any devices capable of causing exposures at or above these limits.

X-Ray and Radiation Safety

Exposure Limitations

No employees over 18 years of age may be exposed in any calendar quarter to radiation doses greater than the following:

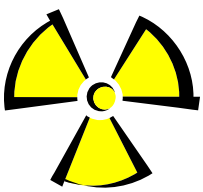
	Rems each calendar quarter	Maximum rems each year	Maximum rems for lifetime work-related exposure
Whole body (head and trunk, active blood-forming organs, lenses of eyes, or reproductive organs)	1 1/4	3	5 * (age 18) - records must be kept for past and current exposure levels
Hands and forearms, feet and ankles	18 3/4		
Skin of whole body	7 2/3		

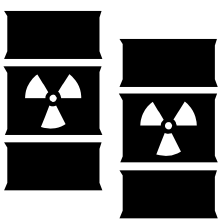


No employee under 18 may receive more than 10% of limits for any calendar quarter.

X-ray and Radiation Safety

- Know who your radiation safety officer is.
- Be aware of radiation uses in your work area.
- Attend training, as needed or required, to understand the health impacts of working near or with radioactive devices.
- Understand all controls and safety measures.
- Report any malfunctioning devices or concerns to the radiation safety officer immediately.
- Know where to find your company's written procedures.





- Know where any monitoring devices are required.
- Report any health concerns that may be associated with radiation to the radiation safety officer.
- Know the radiation signs and what they mean.
- Know the emergency radiation-alarm signal and evacuate the area immediately when it sounds.
- Ensure any storage containers or areas are labeled with the radiation symbol, when required.

X-Ray and Radiation Safety

Incident and Accident Notification

Immediate notification to OSHA or the state NRC by telephone is required for radiation incidents that have (or threaten to cause):

- a release that, if averaged over 24 hours, would exceed 250 rems, or
- exposures at the following levels:
  - whole body – 25 rems or more
  - skin – 150 rems or more
  - feet, ankles, hands, forearms – 375 rems or more

24-hour notification to OSHA or the state NRC by telephone is required for radiation incidents that have (or threaten to cause):

- exposures at the following levels:
  - whole body – 5 rems or more
  - skin – 30 rems or more
  - feet, ankles, hands, forearms – 75 rems or more

Written reports must be filed with OSHA or the state NRC within 30 days for any of the above situations. Reports must include:

- levels of radiation and concentration of radioactive material involved
- the extent of exposure
- the cause of the exposure, and
- corrective steps taken or planned to ensure against a recurrence.

Written notification must also be given to any employees on the nature and extent of their exposure. The notice must contain the statement, “You should preserve this report for future reference."

X-Ray and Radiation Safety

Signs

Radiation areas must have a sign with the radiation symbol and the words **CAUTION RADIATION AREA**.

High radiation areas must have a sign with the radiation symbol and the words **CAUTION HIGH RADIATION AREA**.

Airborne radioactivity areas must have a sign with the radiation symbol and the words **CAUTION AIRBORNE RADIOACTIVITY AREA**.

An airborne radioactivity area is an enclosed place where airborne radiation can exist in excess of 5 rems whole-body, 50 rems to any organ or tissue, or where it is possible to exceed 25% of these levels over the course of any one week.

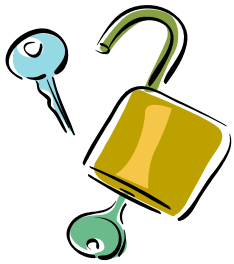
Use or storage areas that have radioactive material (other than uranium or thorium) that if released could deliver over 50 rems whole-body or 500 rems to any organ or tissue, must have a sign with the radiation symbol and the words **CAUTION RADIOACTIVE MATERIALS**.

Uranium or thorium use or storage areas where if a release occurred could deliver over 500 rems whole-body or 5,000 rems to any organ or tissue, must have a sign with the radiation symbol and the words **CAUTION RADIOACTIVE MATERIALS**.

X-Ray and Radiation Safety

Storage and Disposal

Storage of radioactive materials must be in a secure location. Unauthorized removal must be prevented.



Waste disposal must be by an authorized facility that is licensed to accept radioactive waste.

Some material may be disposed of in a municipal sewer system provided the rems do not exceed .05 each year. Check with your local or municipal sewer district before using this method of disposal.

ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

RELEASE OF MEDICAL OR EXPOSURE RECORDS
From Physician to Physician

Originating Physician or Office/Company Name and Address:

_____

_____

_____

Contact Name: _____

Contact Phone number: _____

The above office requires the records of the following patient with relation to blood analysis for disease screening. This requirement is based on an employee exposure from our office to your patient's blood or bodily fluid. This information will be kept confidentially within the confines of both the Bloodborne Pathogens standard and the Access to Exposure and Medical Exposure Records regulations under OSHA and information will be disclosed only to the persons involved with this case who require this information.

Patient's Name: _____

Date of Blood Screening (if known): _____

Physician of Record for the above patient: _____

Patient's Physician or Office/Company Name and Address:

_____

_____

_____

_____

Signature of Originating Physician or the designated representative.

Date of Signature: _____

EXPOSURE INCIDENT PROCESS FLOW

Should an exposure incident occur, the following steps should be taken:

1) Fill out the exposure incident report form.
    a. Note that this document must be kept confidentially, according to HIPAA requirements.

2) Make a copy and provide the copy to the employee to give to the evaluating physician

3) Provide the physician with a copy of the physician evaluations statement form.

4) Within 24 hours of the incident, have the exposed employee go to their physician, or other hospital or clinic to have an initial (baseline) blood draw, urine sample evaluation, or other exposure evaluation.
    a. Note that the type of evaluation is dependant on the exposure contaminant.
    b. Note that any cost for this exposure evaluation is paid by the employer not the exposed employee.

5) At a 6 month interval (or at a frequency determined by the primary physician, or at a frequency determined by specific chemical exposure regulations), have the exposed employee return for a follow-up evaluation.
    a. Note that the type of evaluation is dependant on the exposure contaminant.
    b. Note that any cost for this exposure evaluation is paid by the employer not the exposed employee.

6) Ensure the evaluating physician fills out and returns to your company the physician evaluation statement after the follow-up evaluation.
    a. Note that this document must be kept confidentially, according to HIPAA requirements.

EXPOSURE INCIDENT:
PHYSICIAN (PLHCP) EVALUATION STATEMENT

_____ has been evaluated for resulting health effects from a
(Employee Name)

workplace biological, chemical or hazardous agent exposure. This individual has been informed of the results of any testing that has been undertaken and of the treatment options available to them should any health effect have occurred from the workplace exposure.

_____
(Physician Signature)

Physician Name and Office Address:

_____

_____

_____

_____

EXPOSURE INCIDENT REPORT

(Routes and Circumstances of Exposure to Bloodborne Pathogens or Chemical Agent)

Form To Be Completed By Supervisory Personnel

Report # _____

Facility:	**Supervisors Name:**

Date Reported:	**Related Operating Procedures Reviewed:** Yes ☐ No ☐	**All Affected Employees Notified:** Yes ☐ No ☐

Employee Information:

Employee's Name	Date	Date of Birth
SS#	Job Title	
Telephone (Business)	(Home)	
Date of Exposure	Time of Exposure	AM PM
Hepatitis B Vaccination Status		
Location of Incident		

Bodily Exposure Information:

Part of body to which exposure occurred (describe fully):

_____

_____

_____

___

Decontamination:

Describe the method(s) of decontamination used

☐ Soap & water	☐ Disinfectant	☐ Towelettes	☐ 10% Bleach solution

Other (describe):

Describe what job duties were performed when the exposure incident occurred.

Describe the circumstances under which the potential exposure incident occurred.

What body fluid(s) or specific chemicals were involved in the exposure incident?
Describe route of exposure (e.g., skin contact, inhalation, ingestion).
Describe any Personal Protective Equipment (PPE) in use at time of exposure incident.
Did PPE fail? No ☐ Yes ☐ If yes, describe how.
(For Bloodborne Pathogen Exposure) Identification of source individual(s) (Names)

ACKNOWLEDGMENT	
Employee Name: Signature:	Supervisor Name: Supervisor Signature:
Date:	Time:

REPORT FORM RETENTION INFORMATION		**ATTACHMENTS**	
Permanent Retention File:	**Location:**	***Yes** ☐	**No** ☐
Date Filed:	**Filed By:**		

AERIAL LIFT OPERATOR PERFORMANCE REQUIREMENTS

POLICY
All Aerial Lift operators are required to sign this document to indicate understanding and compliance with these requirements. Signed copies of this form are to be kept in the personnel files of active employees as long as the employee may operate an aerial lift.

PERFORMANCE REQUIREMENTS

Aerial Lift operators shall:

- Immediately inform supervision of any change, or suspected change, in medical condition which may affect the ability to safely operate an aerial lift (e.g., vision problems, vertigo, etc.).
- Immediately inform supervision of the use of prescription or over-the-counter drugs which may impair ability to safely operate aerial lift.
- Not, under any circumstances, attempt to operate an aerial lift while under the influence of alcohol or illegal drugs.
- Perform vehicle safety inspections at the start of each shift of operation.
- Perform a worksite inspection prior to starting job.
- Remove defective equipment from service and report to supervision.
- Wear required personal protective equipment.
- Read and be familiar with contents of manufacturer's manual for the particular aerial lift being operated.
- Never tamper with the equipment or equipment components.
- Obey manufacturer’s limitations and specifications for aerial lift.
- Never sit or climb on the edge of the basket.
- Do not attach single lanyard to an adjacent pole, structure or equipment, or to the railings of the basket while working.
- Close entry gates or chains before operating.
- Never position yourself between overhead hazards and rails of the basket.
- Always treat power lines, wires and other conductors as energized.
- At no time position the bucket closer than 10’ from any live overhead electrical power lines, conductors, or bus bars.

Employee Name:	Employee Signature:	Date:
Supervisor Name:	Supervisor Signature:	Date:

COMPRESSED GAS PROGRAM ASSESSMENT

Facility or Area:	Assessor:	Date:

Description of Requirement	Compliant?
HSE Review	
Has an HSE review (e.g. Job or Task Hazard Analysis) been performed to verify the need for compressed gas?	☐ Yes ☐ No
Have the materials of construction and design specifications for the process using the compressed gas been considered?	☐ Yes ☐ No
Have the materials of construction and design specifications for storage of compressed gas tanks or cylinders been considered?	☐ Yes ☐ No
Are physical protection and system controls present to reduce or eliminate the hazards of leaking containers?	☐ Yes ☐ No
Have emergency response requirements been established and provided for?	☐ Yes ☐ No
Are maintenance and inspection procedures established and implemented?	☐ Yes ☐ No
Has a pre-use review been performed that establishes the system schematics and process installation is build as designed and that content identification and flow labels are correct?	☐ Yes ☐ No
Are design and system drawings maintained?	☐ Yes ☐ No
Process Operating Procedures	
Are procedures established for inspection?	☐ Yes ☐ No
Are procedures established for usage (including PPE requirements and SDS/Hazard Communication)?	☐ Yes ☐ No
Are procedures established for tank and cylinder handling?	☐ Yes ☐ No
Are procedures established for tank and cylinder storage?	☐ Yes ☐ No
Are procedures established for tank and cylinder transportation requirements (both OSHA for internal movement and DOT for over-the-road transport)?	☐ Yes ☐ No
Are procedures established for the disposal of or return of empty tanks and cylinder(s) to supplier?	☐ Yes ☐ No
Are procedures established for the disposal of or return of defective tanks and cylinder(s) to supplier?	☐ Yes ☐ No
Are procedures established for emergency response in the event of a release or unintended emission?	☐ Yes ☐ No
Are procedures established for contacting the supplier in the event of questions or concerns?	☐ Yes ☐ No
Are procedures established for the process shutdown in case of failure?	☐ Yes ☐ No
Are welding applications audited using the welding standard's auditing protocol?	☐ Yes ☐ No

Description of Requirement	Compliant?
Maintenance	
Are process maintenance procedures established and implemented?	☐ **YES** ☐ **NO**
Are mechanics/maintenance personnel experienced and trained in the process and material hazards?	☐ **YES** ☐ **NO**
Are manifold systems, if present, installed, modified and/or maintained by experienced personnel who are knowledgeable about and who have experience with the specific requirements and hazards of the compressed gas system?	☐ **YES** ☐ **NO**
Emergency Response Personnel	
Are emergency response personnel familiar with the controls to shut down the process in an emergency?	☐ **YES** ☐ **NO**
Operator Training	
Are operators trained in the hazards presented by the system, process and/or the compressed gas used?	☐ **YES** ☐ **NO**
Are operators training in the controls used to reduce the hazards presented by compressed gas usage?	☐ **YES** ☐ **NO**
Are operators trained in the standard operating procedures for the process?	☐ **YES** ☐ **NO**
Inspections	
Are daily process checks performed to assess leaks, corrosion or damage to compressed gas systems?	☐ **YES** ☐ **NO**
Is a self-assessment or process audit performed at least annually to assure compliance with the regulatory and company standards? ➢ **Note:** Some states or local regulations may require more frequent inspections of processes utilizing compressed gases.	☐ **YES** ☐ **NO**
Is a corrective action process in place to address any deficiencies found during the inspection/audit?	☐ **YES** ☐ **NO**
Does the inspection process visually verify the process and look for impending physical problems?	☐ **YES** ☐ **NO**
Does the inspection process contain a physical inspection of emergency shutdown systems?	☐ **YES** ☐ **NO**
Does the inspection process contain a physical inspection of the system into a fail-safe mode?	☐ **YES** ☐ **NO**

CONFINED SPACE ENTRY PROGRAM ASSESSMENT

Unit Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
Entry Requirements	
Have all confined spaces at the facility been identified?	☐ Yes ☐ No
Where work is required in a confined space, have the hazards been identified and evaluated?	☐ Yes ☐ No
Are entry requirements for all members established (see individual requirements, below)?	☐ Yes ☐ No
Is access to confined spaces restricted via training, signage, or physical barriers?	☐ Yes ☐ No
Is the health and safety of entrants the primary concern for the company?	☐ Yes ☐ No
Have items such as atmospheric monitoring, PPE, isolation of energy sources (LOTO), emergency rescue plans and communications been accounted for in a written confined space entry plan?	☐ Yes ☐ No
If a permit process is applicable, has a permit been issued and all items on the permit filled in (including signatures)?	☐ Yes ☐ No
Are appropriate warning signs (including confined space signs, LOTO signs and permits) posted at the entry site?	☐ Yes ☐ No
Have all persons involved in the entry been appropriately trained?	☐ Yes ☐ No
Does training include awareness of the duties and requirements of safe entry?	☐ Yes ☐ No
Does training include information on the hazards they may encounter and the necessary precautions to eliminate or control those hazards?	☐ Yes ☐ No
Does training include the requirement of the plan (or permit, if applicable)?	☐ Yes ☐ No
Does training include familiarization with any extraction/rescue procedures and equipment?	☐ Yes ☐ No
Is the confined space process audited at least annually (or when implemented if less frequent than once/year)?	☐ Yes ☐ No
Are plans and permits retained for at least one year following closure of the entry work?	☐ Yes ☐ No
Supervisor of Entry Team Members	
Is the entry team supervisor involved in the planning process for the confined space entry?	☐ Yes ☐ No
Does the supervisor of entry team leader and entrant(s) sign the written plan or (if applicable) the permit?	☐ Yes ☐ No
Is the supervisor familiar with ALL the hazards associated with the entry?	☐ Yes ☐ No
Does the supervisor perform or ensure that all entrants, attendants and others associated with the entry have the required training that is commensurate with their level of involvement in the entry process and associated work?	☐ Yes ☐ No
Has the supervisor accounted for all LOTO applications in the entry process, if applicable?	☐ Yes ☐ No
Has the supervisor ensured that all team members who are required to wear respiratory protection are appropriately evaluated, fit tested and trained?	☐ Yes ☐ No
Has the supervisor designated an entry team leader?	☐ Yes ☐ No

Description of Requirement	Compliant?
Entry Team Leader	
Has the entry team leader read and understood the entry plan, and signed the plan or (if applicable) the permit?	☐ Yes ☐ No
Does the leader remain at the entry location at all times during the entry process (leader can be an entrant)?	☐ Yes ☐ No
Does the leader have the authority and responsibility to stop the space entry, or evacuate the space if conditions are considered to be unsafe?	☐ Yes ☐ No
Does the leader perform field checks to ensure prescribed entry procedure and PPE requirements are being met?	☐ Yes ☐ No
Does the leader verify that emergency/rescue services are available and that a means for summoning them is operable?	☐ Yes ☐ No
Does the leader terminate or cancel the permit when the job is finished?	☐ Yes ☐ No
Entrant(s)	
Do the entrants know and understand the hazards of the confined space?	☐ Yes ☐ No
Are entrants equipped and trained in measures to be taken to protect themselves from those hazards?	☐ Yes ☐ No
Have the entrants read, understood and signed the entry plan or (if applicable) the entry permit?	☐ Yes ☐ No
Are entrants provided with the authority and responsibility to stop an entry if they feel that entry work is not performed safely or that additional hazards may exist that are not accounted for in the plan/permit?	☐ Yes ☐ No
Attendant	
Does a trained attendant remain on duty at all times during a confined space entry?	☐ Yes ☐ No
Is the attendant trained to understand and recognize the signs and symptoms of exposure to the specific hazards of the confined space entry?	☐ Yes ☐ No
Does the attendant monitor the area for unauthorized persons in addition to the activities inside the space?	☐ Yes ☐ No
Is constant communication available and maintained between entry team and attendant?	☐ Yes ☐ No
If communication is lost, does the attendant have means to notify the entrant(s) of their need to evacuate the space?	☐ Yes ☐ No
Is a means constantly available for the attendant to summon emergency/rescue service providers?	☐ Yes ☐ No
Is the attendant trained to conduct continuous atmospheric monitoring, if applicable?	☐ Yes ☐ No
Is the attendant familiar with the telephone, fire alarm, fire extinguisher, eyebath, safety shower or other system(s) indicated either in the entry plan or (as applicable) on the permit?	☐ Yes ☐ No
If applicable, has the attendant signed the entry permit?	☐ Yes ☐ No

Description of Requirement	Compliant?
Safety Representative	
Is the Safety Representative involved in identifying and evaluating confined spaces and their associated hazards?	☐ Yes ☐ No
Do they assist in the pre-planning of entry processes?	☐ Yes ☐ No
Are they available to assist operating areas with the confined space permit process, if applicable?	☐ Yes ☐ No
Do they verify that all safety procedures are met?	☐ Yes ☐ No
Do they verify that safety equipment has been checked and is located at the entry site?	☐ Yes ☐ No
Do they ensure that atmospheric monitoring is performed at the required intervals by qualified persons?	☐ Yes ☐ No
Do they assist in determining the level of personal protective equipment and measures to be taken at the entry site?	☐ Yes ☐ No
Do they designate and notify appropriate emergency/rescue service providers of entry plans?	☐ Yes ☐ No
If applicable, do they sign the entry permit?	☐ Yes ☐ No
Emergency/Rescue Services Provider	
Are service emergency/rescue service providers trained to use the appropriate PPE and rescue equipment needed for confined space rescue?	☐ Yes ☐ No
Do service providers attend annual training that covers confined space rescue operations?	☐ Yes ☐ No
Are service providers trained in both first-aid and CPR?	☐ Yes ☐ No
Contractors	
Do contractors who enter confined spaces at the company site(s) comply with all the elements of the company's confined space procedures, as well as regulatory requirements?	☐ Yes ☐ No

APPLIANCE SAFETY (Cord and Plug Equipment)

Consumer products that are commercially available (such as laminators, electric staplers, printers, scanners, food preparation devices, and other such cord and plug devices) are limited at ABC Company to those that have been approved by a Nationally Recognized Testing Laboratory (NRTL) such as Underwriters Laboratory (UL). Their use is limited to the intention of the manufacturer, and is not exceeded.

- ***Portable Space Heaters*** must be reviewed for use by the building owner or manager and must be UL listed. Review is needed so that HVAC and electrical-loading concerns for the area are addressed.
- Portable Electronic Devices utilized in ***hazardous areas*** will comply with requirements for intrinsically safe devices.

Definitions Specific to this Section:

Consumer Product or ***Commercially Available*** – a product that is normally available at stores and is intended for use by consumers

HVAC – Heating, Ventilation and Air Conditioning

NRTL – Nationally Recognized Testing Laboratory – such as UL (Underwriters Laboratory).

Relocatable Power Taps (STRIPS) – A factory supplied multi-receptacle device, which may be switched, have an indicating light, fuses, circuit-breaker or other over-current protection

Procedure:

Management:

- Ensures appliances are turned off when not required **or** at the end of the shift. Where appliances are ***required*** to be left on, exceptions must be *noted on the appliance* via sticker or other means.
- It is recommended that companies inspect appliances for defects and damage at least annually. As deficiencies are noted, remove the appliance from service and either discard, replace or repair the equipment.

General:

- Appliances:
  - All appliances/equipment covered by this policy shall be listed by a Nationally Recognized Testing Laboratory (NRTL).
  - Appliances/equipment should only be operated within the limitations of their intended use (e.g. coffee makers designed for “house-hold use” should not be repeatedly used on multiple shifts, commercial grade coffee makers should be purchased; laminators should be turned off when not in use, to prevent overheating.) Such intentions of use must be considered when purchasing equipment and industrial-grade equipment may need to be utilized instead of consumer-grade equipment.
  - Manufacturer’s instructions and limitations shall be followed. Modifications to appliances are not allowed, including splicing of flexible cords.
  - All appliances having exposed metal parts which may become energized shall be grounded. Grounding shall be accomplished by a separate conductor within the supply cord. Double Insulated appliances do not require grounding.

- o Electrically classified areas are strictly prohibited for small appliance usage. Only equipment specifically rated for use in hazardous areas shall be permitted in the presence of flammable or combustible materials or atmospheres.
- o Combustibles shall not be stored within 1 foot (12 inches) of any heat producing appliance and flammables must be at least 5 feet (60 inches) away.
- o Appliances shall not be installed in enclosures, when ventilation is required to prevent overheating.
- o Branch circuits and cords shall be used appropriately to prevent electrical overloading; some appliances may require a separate electrical circuit.
- o Appliances shall be plugged directly into a permanently installed receptacle only. Multiple plug adapters and extension cords are prohibited for use with appliances, unless supplied by the appliance manufacturer specifically for use with that appliance.
- o Appliances intended for food/drink storage shall only be installed in areas safe for food consumption and free from exposures to contamination. Food preparation appliances will comply with FDA regulations.

- Portable space heater use must be reviewed by the building owner for HVAC and electrical loading concerns.
- Power Strips or Multi-plug adapter devices:
  - o Shall be plugged directly into a permanently installed receptacle.
  - o Shall be used for low amperage appliances only and not be used for “high wattage” appliances (high wattage examples include: coffee makers, microwave ovens, portable space heaters, etc.)
  - o Shall not be “daisy chained” or linked one to another.
  - o Shall not be permanently attached.
  - o Shall not be placed on the floor where they present a tripping hazard.
  - o Shall be permitted in dry locations only and may not be subject to chips, oil, solvents, liquids, etc.
  - o Are not permitted on construction sites or for construction equipment.
- Extension Cords:
  - o Three (3) conductor 16 AWG extension cord sets are the minimum size permitted.
  - o Extension cords are visually inspected for defects or damage prior to using the cord.
  - o Extension cords are not allowed to replace the fixed wiring of a building or structure.
  - o All extension cords used during construction, remodeling, maintenance repair or demolition shall be protected by Ground Fault Circuit Interrupters (GFCI) or an Assured Equipment Grounding Conductor Program.

ELECTRICAL SAFETY (COMPREHENSIVE) PROGRAM ASSESSMENT

Completed by: _____ Date:

Requirement Explanation	Elements to Verify	Evidence and Comments
An Electrical Safety Program has been developed and implemented to ensure that employees working on or near >50 Volts to ground or design work are "qualified" to do such work. This program must also contain elements to protect the "non-qualified" from inadvertent contact with any energized components. The program consists of the following: • Clear statement for handling: o Design safety standards for electrical systems o Safety related work practices o Safety related maintenance requirements o Safety requirements for special equipment (e.g. X-ray) • Selection and determination of qualified employees • Work practices appropriate to the hazards, voltage energy level encountered and circuit conditions. • Use of PPE and devices with WI or SOP's • Training associated with risks where employees are exposed and energy cannot be reduced to the safe level of zero volts.	Do you have a documented Electrical Safety Program?	
Operational units will have a process in place to insure that employees performing electrical tasks are qualified and trained. The qualified person assigned by the company (usually an experience, licensed professional) will act as the advisor to the company concerning electrical issues. They will advise who is qualified to perform tasks with in the company based on work exposures that correspond to the type of electrical equipment and risk of exposure.	Do you have a qualified-person responsible for assisting in the development and implementation of the Electrical Safety Program?	
Design/Product Safety - ensure electrical products and devices are designed, maintained and utilized safely. This may be accomplished through NRTL or AHJ approvals, inspections or via design standards	Has electrical equipment been designed or tested to ensure safety?	
Routine Tasks – Written work instructions or Standard Operating Procedures must be in place to insure electrical wiring and testing methods are performed safely. Such SOPs should be based on, but not limited to Hazard/Risk analysis, the company's work practices, controls, etc. Employees receive training on such tasks at regular intervals (i.e. at meetings or prior to tasks being performed). Employees are provided with and trained in the usage of any required Personal Protective Equipment and instrumentation.	Are SOPs or written work instructions followed for routine (regularly conducted) tasks with electrical exposures?	

Requirement Explanation	Elements to Verify	Evidence and Comments
Non-Routine Tasks - such as working on energized equipment. Procedures must clearly specify the scope, purpose, authorization, rules, and techniques to minimize exposure to hazard/risk and your means of enforcing compliance as evidenced by (but not limited to) the following: • Specific statement of intended use • Management authorization • Specific statement for not de-energizing, due to equipment design, or introduction of additional or increased hazards • Conduct a Hazard/Risk analysis and develop techniques or procedures that would minimize the risks. • Selected PPE and training • Specific requirements and job plan	How did you address non-routine task (e.g. working on **energized** equipment) in your Electrical Safety Program?	
Only the employees who are "qualified" are permitted to work on or near energized electrical equipment. Only qualified persons are permitted to verify the absence of voltages using test instruments for electrical LO/TO. Only employees who are considered competent with knowledge and training in codes and standards shall perform electrical design work.	Can you identify those "qualified" to perform the servicing, maintenance or design of electrical equipment?	
All "non-qualified" employees are to be trained and understand their limitations to working near exposed electrical hazards. Be familiar with safe work practices that are necessary for their safety.	Is documented training provided for non-qualified employees?	
All "Qualified" employees shall receive safety training (safety related work practices and procedural requirements) at least every 5 years. This training should include: • Emergency Procedures • Recognition and avoiding electrical hazards • Knowledge of the construction and operation of equipment or a specific work method • Proper use of precautionary techniques, PPE, insulating and shielding materials and insulated tools and test equipment. o Skills necessary to distinguish exposed energized parts from other parts of electric equipment o Skills necessary to determine nominal voltage of exposed energized parts o Approach distances and corresponding voltages to which a qualified person will be exposed. o Decision making process necessary to determine degree of the hazard and the PPE and job planning necessary to perform the task safely.	Is training provided and are documented records maintained for all employees involved in electrical work?	

Requirement Explanation	Elements to Verify	Evidence and Comments
Retraining on specific hazards and knowledge of the construction and operation of equipment or work method for "qualified" employees shall occur on job assignment, change in equipment, machine, or processes that present a new hazard, or when there is a change in the energy-control procedures.	Is documented retraining provided for both "qualified" and "non-qualified" employees?	
All other employees including engineers, technicians, supervisors, electrical assemblers and others that are listed in the OSHA Table S-4 (see below) shall be trained in relation to their job and risk presented to the employee **OSHA Table S-4** Persons in the following groups and their first line supervisors who encounter >50volts to ground: Electrical and Electronic Engineers Electrical and Electronic Equipment Assemblers Electrical and Electronic Technicians Electricians Industrial Machine Operators Material Handling Equipment Operators Mechanics and Repairers Painters Riggers and roustabouts Stationary Engineers Welders must be trained, regardless of the voltage they may encounter.	Are all employees trained in electrical safety as appropriate to their job function and documented records maintained for these employees?	
The dept. and outside employer (contractor) shall only have "Qualified" personnel working on or near energized electrical equipment.	Do you have a system to ensure that when contractors are engaged in electrical work that they are "qualified" to perform the tasks?	
Servicing and maintenance of electrical equipment may require lockout and tagout procedures. The requirements for locking, tagging and verifying may differ from your routine energy isolation procedures. See *LOTO for Electrical Applications* for more information	If "electrical" lockout/tagout applies, does your process include the requirements for electrical applications and verification?	

ELECTRICAL SAFETY (GENERAL) PROGRAM ASSESSMENT

Completed by: _____ Date:

Requirement Explanation	Yes	No
Equipment that is "hard wired" into the building power supply is maintained, fixed or repaired only by "qualified" individuals who have undergone specific training in electrical hazards and who understand the protective measures and controls needed to perform their tasks safely. • The dept. and outside employer (contractor) shall only have "Qualified" personnel working on or near energized electrical equipment. • Servicing and maintenance of electrical equipment may require lockout and tagout procedures. The requirements for locking, tagging and verifying may differ from routine energy isolation procedures.		
Design/Product Safety – new equipment or major modifications to existing equipment are evaluated for electrical safety hazards and issues prior to purchase and installation.		
Routine Tasks – Employees routinely use cord and plug equipment. Electrical exposure is not commonplace for other reasons in this company. Employees are instructed to notify their supervisor if electrical issues or hazards exist.		
Non-Routine Tasks - such as working on energized equipment. Procedures and training clearly specify that employees are not to undergo this type of task or activity with regard to building or equipment maintenance or repair. • Only the employees who are "qualified" are permitted to work on or near energized electrical equipment. Only qualified persons are permitted to verify the absence of voltages using test instruments for electrical LO/TO. • All "non-qualified" employees are to be trained and understand their limitations to working near exposed electrical hazards. Be familiar with safe work practices that are necessary for their safety.		
Electrical service panel boxes (circuit breakers or fuse boxes) have covers that remain in the closed position when not immediately in use. • Boxes must have clear and unobstructed access at all times. (no storage in front of panels or to 3 feet of either side)		
Electrical service outlets and receptacles have cover plates to protect wiring.		
Electrical outlets and receptacles within 3 feet of any water source (tap, faucet or spigot) are GFCI protected.		

EQUIPMENT GROUNDING CHECKLIST

Checklist Item	
GROUNDING ASSURANCE	**Compliant**
Are grounding methods sufficient when working in wet conditions?	☐ Yes ☐ No
Is the grounding terminal present on the plug?	☐ Yes ☐ No
Is the polarity of connections correct? [No grounded conductor can be attached to any terminal or lead which results in a reversed designated polarity.]	☐ Yes ☐ No
Are grounding terminals or grounding-type devices on receptacles, cord connectors, or attachment plugs used for the intended purpose?	☐ Yes ☐ No
Are grounding terminals or grounding-type devices on receptacles, cord connectors, or attachment plugs defeated in any way?	☐ Yes ☐ No
Are all receptacles and attachment caps or plugs tested for correct attachment of the equipment-grounding conductor? [The equipment-grounding conductor must be connected to its proper terminal.]	☐ Yes ☐ No
Are grounding terminals or grounding type devices on receptacles, cord connectors, or attachment plugs defeated in any way?	☐ Yes ☐ No
Are all 12 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 equipped with approved ground-fault circuit interrupters for personnel protection?	☐ Yes ☐ No
Are conductors used as a grounded conductor identifiable and distinguishable from all other conductors?	☐ Yes ☐ No
Are employees training in the grounding requirements for tools and associated site electrical equipment.	☐ Yes ☐ No
TESTING	**Compliant**
All required tests are performed: • Before first use • Before equipment is returned to service following repairs • Before equipment is used after any incident which can be reasonably suspected to have caused damage (for example, when a cord set is run over • At intervals not to exceed 3 months, except that cord sets and receptacles which are fixed and not exposed to damage must be tested at intervals not to exceed 6 months	☐ Yes ☐ No
All required tests are documented, maintained and include the following: • Identity of all equipment having passed the test? • The last date tested or the testing interval?	☐ Yes ☐ No
Is the test documentation maintained until replaced by a more current record?	☐ Yes ☐ No

EQUIPMENT GROUNDING TEST RECORD

SITE LOCATION INFORMATION

Location or Project Name:		
Person Responsible for Grounding Program:		
Department:	Phone:	Title:

EQUIPMENT TESTING RECORD

Nomen-clature	Serial/ID #	Date Tested Interval	Passed Test	Removed from Service	Inspector
			☐ Yes ☐ No	☐ Yes - Date:	
			☐ Yes ☐ No	☐ Yes - Date:	
			☐ Yes ☐ No	☐ Yes - Date:	
			☐ Yes ☐ No	☐ Yes - Date:	
			☐ Yes ☐ No	☐ Yes - Date:	
			☐ Yes ☐ No	☐ Yes - Date:	

TEST RECORD FORM RETENTION INFORMATION		ATTACHMENTS
Permanent Retention File:	Location:	*Yes ☐ No ☐
Date Filed:	Filed By:	

EXIT AND EGRESS (LIFE SAFETY) REQUIREMENTS

This document defines and outlines the minimum requirements for safe means of egress from fire and other emergency situations as outlined in Federal Regulations (29CFR1910.36-38 and associated Appendix B, and the Life Safety Code - NFPA101), additional Federal, State or Local codes may need to be considered. Elements of means of egress must be included in any written Emergency Action or Fire Prevention Plan. Provisions for accommodations for special needs individuals should also be given consideration and provided for.

Responsibilities:

	Exits/Exit Paths Clear and Unobstructed	*Exit Markings*	*Fire Doors and Hardware*	*Occupancy and Exit Capacity*	*Written Plan*	*Training*
Employees	**X**					**X***(receive)*
Area Management	**X**	**X**	**X**		**X**	**X***(provide)*
Landlords	**X**	**X**		**X**	**X**	
Safety	**X**					**X***(provide)*

General - Life Safety exits and exit paths shall comply with OSHA, NFPA Life Safety and State and Local codes.

- Assure that exits and paths are clear and unobstructed at all times. Materials are not to be placed or stored in exit paths, stairwells or hallways.
- Fire, exit, stair and smoke-stop doors and dampers will be kept closed at all times, except for those equipped with approved automatic releasing hold-open devices installed and maintained in accordance with regulatory requirements and guidelines.
- ALL penetration through fire rated walls and other enclosures will be sealed with a material that will maintain the integrity and rating of the wall.
- Assure that furnishings and/or decorations do not obstruct exits, access to exits, paths to exits, or the visibility of an exit. Flammable decorations and furnishings are prohibited in, on or near exits (and along egress routes).
- Mirrors are prohibited on or near exit doors, to prevent confusion in an emergency.
- Assure aisles are appropriately marked or designated.

Occupancy Changes

- Notify the building owner, building manager and/or landlord if operations or personnel occupancy or classifications change to assure the capacity for safe discharge from exits is maintained. The number and capacity of exits, based on building or floor occupancy must be sufficient to allow safe egress from the building.

Exit Arrangement and Discharge

- Exits must have a clear direction of travel and discharge to safe, clear spaces, not encumbered by traffic or other hazards. These areas of refuge must be of adequate size to accommodate the maximum personnel occupancy.
- External exit paths must be maintained free of ice and snow, and any other obstructions.
- Exits and egress routes shall be arranged to prevent travel through an area of higher hazard without fire-rated corridors or other protective barriers in place.
- Exits may not be through an area with locking mechanisms, unless the exit serves only that room i.e. bathrooms or kitchens).

Doors and Hardware

- Report any broken or defective doors or hardware to the area management, building management and/or landlord for immediate repair. Doors and hardware must be permanently affixed or integral to the building, and constructed of approved components.
- Doors, passageways or stairways that are not exits, but could be mistaken for exits, shall be marked “Not an Exit” or with some other sign or indication of use.
- Alarmed doors, not normally used as exits during normal operations, but may be useable as exits during an emergency, shall be marked “*Do Not Block, Door to be Used in an Emergency*”, or an equivalent statement.
- Exit doors will swing in the direction of exit travel
- Rated doors shall be constructed of approved components and not modified or altered in any fashion.
- Repairs and modifications to fire rated doors must be made with hardware that will not compromise the integrity of the fire rating. Holes will not be drilled for such purposes as hanging signs. Holes shall be plugged in an appropriate manner.

Hazardous Material Storage

- No flammable or explosive material (or other high hazard chemicals or substances) will be brought into an area not normally classified for those substances without adequate safety precautions and specific safeguards. (For example, compressed gas cylinders, gaylords of combustible material, etc.) A safety review will be conducted prior to any of these materials being brought on-site.

Exit Signs and Lighting

- Report faulty, inadequate or broken exit lighting to area management, the building manager and/or landlord. Adequate and reliable illuminated exit lighting must be maintained at all times. Emergency lighting must be provided for all components of egress (with battery backup, as required). Where reduction of normal lighting is permitted (i.e. darkrooms) alternative measures may be used.
- E X I T letters shall be legible and not less than 6" high, with each letter not less the ¾" wide and contrast with existing decorations and furnishings. Arrows indicating the direction of travel will be included when the path of travel is not readily apparent.

Exit Enclosures (Stairwells, lobbies, etc.)

- Exit enclosures will have an approved fire rated door, will comply with approved fire resistance ratings and will have guards or railings on open sides.
- Enclosures will have level surface floors with stairs or ramps provided when not substantially level. Enclosures will have a permanent, straight path of travel with no dead ends in excess of 20 feet.
- Enclosures will comply with OSHA, Life Safety Code, State or Local codes and regulations, including height and headroom requirements.

Alarms and Fire Protection Systems

- Emergency Evacuation Alarm, Fire Alarm and Sprinkler systems will be maintained in good operating condition. Maintenance would include, but not be limited to: testing frequency, inspection, maintaining an 18 inch clearance around and below all sprinkler heads, and assurance that ceiling tiles remain in place.
- Alarms will be less than 100dB but greater than the ambient noise levels in the area so they can be adequately heard.

Emergency Evacuation and Fire Prevention Plans

- All employees, occupants, tenants and visitors will review their written plans upon initial assignment, whenever there are changes to the plan or when their responsibilities under the plan are changed. It is recommended that the plan be reviewed by all occupants at least annually.
- Paths of egress will be included in the site or building's written plans, or be posted throughout the building where they are accessible to employees throughout the building. Floor plans or workplace maps, if used, should clearly show the route of egress. Color codes these maps as applicable.
- Operating areas, in conjunction with the building's owner, manager or landlord, will establish specific types of evacuations, if applicable (i.e. partial building evacuations).
- Training will be provided to all persons who have additional duties or responsibilities under the Emergency Evacuation and Fire Prevention plans.
- All employees and occupants should participate in evacuation drills at least annually

Other

- Conference rooms, Auditoriums and other areas of assembly with a capacity of greater than 50 people will have posted occupancy signs.
- Fire Retarding Paints and Coverings, if used, will be renewed at intervals sufficient to maintain the retarding properties.

Safety Signs and Aisle Markings - The marking of interior aisles to provide unrestricted movement of personnel and material handling equipment in open manufacturing or storage areas is required. It is the responsibility of each area to assure aisles are properly marked and markings are readily visible. Consult with safety professionals for any deviations from this information.

Marking Requirements

- All aisles will be marked with painted lines, tape or other acceptable markers.
- All aisle widths will be dimensioned from the outside edges of the lines or markers
- The type of aisle-marking system used depends on the floor finish, type of traffic, anticipated length of service and exposure to water, chemicals, etc.
- PAINTED LINES are recommended for rough surfaces and areas of abrasive traffic. The lines will be between 3 and 4 inches in width.
- MARKERS are recommended on smooth-surfaced floors subject to foot traffic and trucking. In areas subject to chemical exposure (e.g. solvents, acids and heavy abrasive traffic) different types of markers may be tried until the most suitable one is identified. Use 3 inch diameter pressure sensitive (vinyl is recommended) dots spaced at 12 ½ inch centers. Dots may be applied by hand, or may also be ordered in rolls for application by automatic dispensing machines.
- TAPE is recommended for lines on smooth-surfaced floors for temporary or small marking jobs. Use 2 inch wide pressure-sensitive white (or other appropriate color). Vinyl is recommended.
- Where white lines do not give enough contrast, black-and-white lines (or markers of contrasting colors) may be substituted.
- At no time shall any materials be allowed to protrude onto or over the outside of the aisle lines.

Aisle, Door and Stairway Width Requirements:

Type of Aisle	Aisle Width
Pedestrian Side Aisle	1.1 m (44")
Pedestrian Main Aisle	1.5 m (6')
Truck - Ride-on Counterbalance	3.2 m (10'-6") to 3.7 m (12') depending upon truck capacity
Truck - Ride-on Straddle	2.4 m (8')
Truck - Walkie Counterbalance	2.9 m (9'-6") - 3.2 m (10'-6") depending upon truck capacity
Truck - Walkie Straddle	2.1 m (7')
Truck - Walkie Pallet/Platform	2.1 m (7')
NOTE: Aisle widths are dependent upon the configuration of the truck. The above widths are given only as a general guide. Consult with regulatory guidelines (NFPA-101) for more details.	
Exit doors	81 cm (32”) each door – minimum or as wide as any staircase that serves the exit.
Stairs	112 cm (44”) - minimum

Definitions:

- **Area Management -** Persons responsible for supervision or management of employees
- **Written Plan** - Building Emergency Action or Fire Prevention Plans.
- **CFR** - Code of Federal Regulations (OSHA regulations)
- **Egress** - A continuous and unobstructed way of exit travel from any point in a building or structure to a public way (or safe area of refuge), and consists of three distinct parts: the way of exit access, the exit, and the way of exit discharge.

FIRE PREVENTION PLAN

COMPANY NAME:		
SITE ADDRESS OR LOCATION:		
ASSESSMENT DATE:		**Completed by:**

List all major fire hazards in the building or facility (>25 gallons of flammable liquids, large amounts of combustibles, etc.):
Describe the type of fire protection equipment necessary to control each major hazard (sprinkler systems, extinguishers, etc.):
Reference specific written procedures for the proper handling and storage of hazardous materials:
Ignition sources within 30 feet of flammable materials require control measures (list control measures):
Reference specific written procedures to control accumulation of flammable and combustible waste materials:
Reference specific written procedures for regular maintenance of any heat-producing equipment and their safeguards to prevent accidental fires:
Identify the job title of employees who are responsible for maintaining heat-producing equipment to prevent or control sources of ignition or fires:
Identify the job title of employees who are responsible for controlling any fuel source hazards (flammable liquid, fuel or propane tanks, etc.)

MONTHLY FIRE EXTINGUISHER REVIEW

Person Conducting Review or Inspection:	Date of Inspection:

Extinguisher location	Circle type extinguisher	Sign Present at Location?	Extinguisher OK?	Defects Noted (pin missing, not mounted, housing damaged, etc.)
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
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	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	
	A B C D H	□ YES □ NO	□ YES □ NO	

ERGONOMIC AND MSD PROGRAM ASSESSMENT TOOL

Organization/Department:	Assessor:	Date:

This organization implements:	☐ Manufacturing
	☐ Computer/Office or Field Service

Requirement Explanation	Elements To Verify
A program has been developed and implemented to ensure that musculoskeletal disorders are effectively managed. This program must address the following at a minimum: • Long term and annual improvement goals and metrics of the program; • Defined roles and responsibilities and names of assigned personnel; • Local procedures for managing MSDs, such as job improvement procedures, if different than corporate procedures. • Locations of program activity records such as training, job analysis records, etc.	Do you have a documented Musculoskeletal Disorder Management Program and is the appropriate program selected for the work conditions?
An ergonomics coordinator is the local contact for ergonomics services. Functions include authoring the written program, monitoring program activities, conducting prioritization of existing jobs, etc. A minimum of one coordinator is recommended per company. The total number of persons assigned to this role shall be appropriate for the goals and deliverables of the program.	Are an adequate number of ergonomics coordinators assigned?
• General awareness information is given to new employees on initial assignment • General awareness information is given to current employees at a minimum of once every three years. • In-depth training is provided to ergonomic coordinators and other as appropriate on initial assignment. • Training is given to new and current engineers and designers.	Is MSD training provided to appropriate personnel at the intervals specified and are records being maintained?
• Existing jobs are ranked and prioritized based on physical stress and risk of experiencing an MSD. • An action plan to implement control measures to improve existing, high-priority jobs is followed and updated on a regular basis.	Is a prioritized list of existing jobs maintained and an action plan developed which targets selected high priority jobs to be improved? *Not required for Field Service.*
• New designs and planned modifications to existing jobs, equipment, workplaces and processes are screened, and if appropriate, analyzed relative to MSDs. • Appropriate design changes are incorporated to eliminate or reduce any MSD risk factors of concern prior to installation of the new or modified design. • If no risk factors are significant, no further activity is necessary.	Are proactive reviews of job designs conducted and are records maintained? *Not required for Field Service.*

Requirement Explanation	Elements To Verify
• Employees report MSD incidents or MSD signs and symptoms or conditions of concern. • MSD incidents and condition of concern are screened, and if appropriate, analyzed as soon as possible after an employee report. • If none of the risk factors are significant, the job should be placed into the prioritized list of jobs.	Are MSD incidents and employee concerns consistently screened and, if appropriate, evaluated as soon as possible after an employee reports them and are records maintained?
• Detailed analysis of jobs identified with risk factors are conducted where a quick fix is not practical or ineffective. • Appropriate analysis tools are used during job analysis. Root causes are associated with each identified risk factor. Control recommendations are associated with each root cause analysis. • Employees participate in the job analysis, control selection and implementation.	Are analysis of jobs consistently conducted in appropriate situations and are job analysis records maintained?
• Quick fixes are satisfactory if they can be implemented within 30 days of the screening. • Feasible controls are implemented to eliminate or reduce risk factors or exposures to significant risk factors identified. Controls are appropriate to the root causes identified. • The hierarchy of controls (eliminate, job and work place redesign, administrative, or work practices) is to be used. • Controls are implemented as soon as possible after the analysis of the job. The infeasibility of implementing controls is documented. • Progress is tracked on control implementation and verified that they are working as intended and have not created any new risk factors of concern.	Are appropriate controls consistently implemented and are records maintained? Is the infeasibility of implementing controls documented? Are implemented controls consistently followed up on, to determine if they are working as intended and are records being maintained?
Affected employees are trained on the purpose and proper usage of the implemented control.	Are employees consistently trained on the use of the controls and are records being maintained?
Does the company periodically evaluate their program against their goals?	Does the company establish performance metrics and periodically evaluate their program against their goals?

PROGRAM ASSESSMENT
EYE WASH STATION

Completed by: _____ Date:

ITEM	ACCEPTABLE?
Eyebath Station Access and Signage	
Are signs in place to indicate the location of the equipment?	☐ **YES** ☐ **NO**
Are floor markings in place to prevent storage near the station?	☐ **YES** ☐ **NO**
The inside of the unit is marked where the eyes should be held, or where the spray pattern will fall?	☐ **YES** ☐ **NO**
Is the path or aisle way to reach the station clear and unobstructed (10 second/100 feet distance from hazards, or direct vicinity for corrosives)?	☐ **YES** ☐ **NO**
Are operating instructions posted at the station?	☐ **YES** ☐ **NO**
Is a sign or logbook available to document station inspections and tests?	☐ **YES** ☐ **NO**
Plumbed Units	
Is the unit activated weekly?	☐ **YES** ☐ **NO**
Units are free from any sharp projections?	☐ **YES** ☐ **NO**
Nozzle area is clean and uncontaminated?	☐ **YES** ☐ **NO**
Flow is between three and six inches from the nozzle	☐ **YES** ☐ **NO**
Valve actuators (used to activate or turn on the unit) are large enough to be easily located by the user?	☐ **YES** ☐ **NO**
Units activate in one second or less when turned on?	☐ **YES** ☐ **NO**
Units remain active until intentionally turned off?	☐ **YES** ☐ **NO**
Units are protected from freezing?	☐ **YES** ☐ **NO**
Units are made of materials that will not corrode or rust?	☐ **YES** ☐ **NO**
Units are fully tested annually (for temperature, spray pattern and volume)?	☐ **YES** ☐ **NO**
Water temperature from the unit does not exceed 100^{o}F	☐ **YES** ☐ **NO**
Spray pattern is four inches across (3-6 inches from each nozzle) with the fluid dispersed throughout the pattern (spray pattern is full and constant)?	☐ **YES** ☐ **NO**
Units deliver 0.4 gallons per minute for a minimum of 15 minutes?	☐ **YES** ☐ **NO**
If connected to an emergency notification system, is this system tested at the same time the unit activation occurs?	☐ **YES** ☐ **NO**
Portable or Wall-Mounted Units	
Units are tested, in accordance with the manufacturer's recommendations?	☐ **YES** ☐ **NO**

PROGRAM ASSESSMENT
SAFETY SHOWER

Completed by: _____ Date: _____

ITEM	ACCEPTABLE?
Safety Shower Access and Signage	
Are signs in place to indicate the location of the equipment?	☐ **YES** ☐ **NO**
Are floor markings in place to prevent storage near the station?	☐ **YES** ☐ **NO**
Is the path or aisle way to reach the station clear and unobstructed (10 second/100 feet distance from hazards, or direct vicinity for corrosives)?	☐ **YES** ☐ **NO**
Are operating instructions posted at the station?	☐ **YES** ☐ **NO**
Is a sign or logbook available to document station inspections and tests?	☐ **YES** ☐ **NO**
Plumbed Units	
Is the unit activated monthly (if no automatic alarm system)?	☐ **YES** ☐ **NO**
Is the unit activated at least once per year? (if automatic alarm system)	☐ **YES** ☐ **NO**
Units are free from any projections or obstructions within 16 inches?	☐ **YES** ☐ **NO**
Nozzle area is clean and uncontaminated?	☐ **YES** ☐ **NO**
Is the valve actuator located 69 inches or less from the floor surface?	☐ **YES** ☐ **NO**
Valve actuators (used to activate or turn on the unit) are large enough to be easily located by the user?	☐ **YES** ☐ **NO**
Units activate in one second or less when turned on?	☐ **YES** ☐ **NO**
Units remain active until intentionally turned off?	☐ **YES** ☐ **NO**
Units are protected from freezing?	☐ **YES** ☐ **NO**
Units are made of materials that will not corrode or rust?	☐ **YES** ☐ **NO**
Units are tested yearly (for water temperature, spray pattern and volume)?	☐ **YES** ☐ **NO**
Water temperature from the unit does not exceed 100^{o}F	☐ **YES** ☐ **NO**
Spray pattern is twenty inches in diameter with the fluid dispersed throughout the pattern (spray pattern is full and constant)?	☐ **YES** ☐ **NO**
Units deliver 20 gallons per minute for a minimum of 15 minutes?	☐ **YES** ☐ **NO**
If connected to an emergency notification system, is this system tested at the same time the unit activation occurs?	☐ **YES** ☐ **NO**
Stand Alone Units	
Units are tested, in accordance with the manufacturer's recommendations?	☐ **YES** ☐ **NO**

FALL PROTECTION PROGRAM ASSESSMENT

Area or Job Site Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
Fall Protection - General	
Are locations that require the use of fall protection equipment readily identified via facility survey or a Job Hazard Analysis?	☐ Yes ☐ No
Have appropriate fall protection devices and systems been determined for each operation by the competent or qualified person?	☐ Yes ☐ No
Have employees been medically cleared to perform the required duties with regard to the fall protection systems and equipment?	☐ Yes ☐ No
Are emergency procedures in place?	☐ Yes ☐ No
Are any employees working above dangerous equipment protected from fall hazards by guardrail systems, PFAS or safety net systems?	☐ Yes ☐ No
Fall Protection – Equipment and Devices	
Have fall protection devices been authorized by the Competent/Qualified person?	☐ Yes ☐ No
Have all issued safety harnesses and lanyards been appropriately inspected?	☐ Yes ☐ No
Is an inventory of fall protection equipment available, and can this equipment be accessed in a timely manner?	☐ Yes ☐ No
Is there a written record of inspection and or maintenance for all fall protection equipment?	☐ Yes ☐ No
Are procedures in place and followed that ensure the fall protection system or equipment is utilized throughout the operation?	☐ Yes ☐ No
Fall Protection – Procedures and Training	
Have written fall protection procedures been developed and reviewed (initially and upon any changes within the procedure or process) by the company's competent/qualified person?	☐ Yes ☐ No
Have these written fall protection procedures been reviewed with applicable employees at the start of each new operational task (and at periodically for on-going tasks)?	☐ Yes ☐ No
Are these written procedures available and accessible by employees who require them?	☐ Yes ☐ No
Can employees demonstrate the donning, doffing, and adjustment of fall protection equipment?	☐ Yes ☐ No
Have all applicable employees received formal fall protection training prior to commencing operations?	☐ Yes ☐ No
Has training been documented appropriately?	☐ Yes ☐ No
Does training include elevated platforms, protection systems, review of Federal, State and Local regulations, the written procedures and the inspection procedures for fall protection systems and equipment?	☐ Yes ☐ No

Description of Requirement	Compliant?
Fall Protection – Materials Handling	
Are separate lines used for personnel fall protection and hoisting of equipment and materials.	☐ YES ☐ NO
Are PFAS components such as harnesses used for personnel only and not used to hoist or lower materials?	☐ YES ☐ NO
Fall Protection – Emergency and Rescue	
Are appropriate rescue personnel readily available to respond in an emergency?	☐ YES ☐ NO
Are these rescue personnel appropriately trained in the techniques needed for operations with regard to heights and fall protection equipment and/or confined spaces?	☐ YES ☐ NO
Are rescue drills that include fall protection systems conducted at least annually by the rescue personnel?	☐ YES ☐ NO
Fall Protection – Safe Use	
Is each person utilizing a PFAS attached to individual or separate lifelines?	☐ YES ☐ NO
Is each individual component of any personal fall arrest system properly inspected by the individual utilizing the equipment prior to use?	☐ YES ☐ NO
Is any fall arrest system component that has been subjected to impact loading been removed from service until the competent/qualified person can inspect the device?	☐ YES ☐ NO
Are all fall arrest system components tested to their rated capacity and frequently inspected to assure their functionality?	☐ YES ☐ NO
Fall Protection - Contractors	
Do contractors have a fall protection plan or program in place that has been reviewed by the designated company representative?	☐ YES ☐ NO
Is a “competent/qualified person” on site to monitor the work area and ensure proper use of the equipment?	☐ YES ☐ NO
Have contractors conducted a fall hazard analysis at the start of the operation by reviewing movement and number of workers in the work area, frequency of operation, obstructions, emergency plan and environmental conditions?	☐ YES ☐ NO
Has this analysis been reviewed with the company representative?	☐ YES ☐ NO
Is a mechanism in place to report any difficulties or problems to the company representative?	☐ YES ☐ NO
Do contract employees have the necessary equipment, skills and training to safely conduct the operation?	☐ YES ☐ NO
Is all fall protection system equipment utilized safely and properly?	☐ YES ☐ NO
Fall Protection - Communications	
A mechanism is in place that enables and encourages employees involved with fall protection systems and procedures to report any difficulties, concerns or problems with the equipment, process or devices.	☐ YES ☐ NO
Any reported concerns, difficulties or problems are handled and properly managed or remediated before work is continued.	☐ YES ☐ NO

Fall Protection Wallet Card

THIS IS TO VERIFY THAT _____
HAS SUCCESSFULLY COMPLETED TRAINING IN THE USE OF **FALL PROTECTION-PERSONAL FALL ARREST SYSTEMS**.

_____

COMPANY NAME DATE

FALL PROTECTION WRITTEN PROCEDURE

The company is dedicated to the protection of employees from potential falls. All employees have the responsibility to work safely on the job. The purpose of this program is to:

- Identify specific fall protection methods for this project where conventional methods pose greater hazards to the individual;
- Supplement standard safety operating procedures by providing safety requirements specifically designed to cover fall protection on this job, and;
- Ensure that each employee is trained and made aware of the safety provisions which are to be implemented by this program prior to job-start.

Program Specifics:

Location of Job:			
Date of Job Start:		**Program Prepared By:**	
Program Approved By:		**Program Supervised By:**	
Specific Activity:			
Fall Protection System(s) to be Used:			
Approved By:			

Verification:

I hereby acknowledge that I have review this completed Fall Protection Program and agree that the Fall Protection System(s) to be used are appropriate for the activity being conducted.

Signed:	**Title:**	**Date:**

The below signed individuals working on this job acknowledge that they have been trained in fall protection equipment usage and procedures and have reviewed and agree to comply with the requirements of this Fall Protection Program:

Name:	**Date:**
Name:	**Date:**
Name:	**Date:**
Name:	**Date:**

FLAMMABLE LIQUID STORAGE PROGRAM ASSESSMENT

Unit Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
General	
Are flammable liquid storage tanks (greater than 55 gallons) in conformance with OSHA 1910.106 and EPA requirements?	☐ Yes ☐ No
Are liquids appropriately classified in accordance with NFPA guidelines? Flammable Liquids • Class 1A = FP<73 & BP<100 • Class 1B = FP<73 & BP 100+ • Class 1C = FP 73-100 Combustible Liquids • Class II = FP 100-139 • Class IIIA = FP 140-199 • Class IIIB = FP 200+	☐ Yes ☐ No
Are storage and dispensing areas frequently inspected to ensure that materials are properly stored and dispensed, materials are compatible, and quantities are not exceeded?	☐ Yes ☐ No
Are flammable liquids stored in the appropriate type of container and within restricted amounts? Glass: • Glass…1A=1pt; 1B=1qt; 1C&II=1gal; III=5 gal • Safety Can…1A = 2 gal; all others = 5gal • DOT Metal Drum…60 gallon for all classes • Metal Tanks---660 gallon for all classes	☐ Yes ☐ No
Are flammable liquid storage quantities limited, based on the liquid's Class? • Class 1A - 25gal incidental and 60gal per cabinet • Class 1B and 1C - 120gal incidental and 60gal per cabinet • Class II and IIIA - 120gal incidental and 60gal per cabinet • Class IIIB - 120gal incidental and 120gal per cabinet • Storage Rooms <150 square feet = 5gal per sq. ft. • Storage Rooms >150<500 sq. ft. = 10gal per sq.ft. • Storage Rooms >500 sq. ft. = contact FES/ins. carrier	☐ Yes ☐ No
Storage Amounts	
Are safety cans limited to 5 gallons or less of a Class 1A liquid?	☐ Yes ☐ No
Are safety cans located on open steel shelving in a sprinkler-protected areas limited to 5 cans of 5 gallons (25 gallon maximum) of a Class 1A liquid?	☐ Yes ☐ No
Are safety cans (full or partially full) prohibited from being stored in areas not protected by sprinkler systems or other equivalent automatic fire protection?	☐ Yes ☐ No
Are flammable storage cabinets limited to 60 gallons or less of a Class 1A liquid?	☐ Yes ☐ No
Are flammable liquid storage cabinets limited to a maximum of three per fire area?	☐ Yes ☐ No
For flammable liquid storage rooms, has the insurance carrier set and agreed upon the limits for amounts and types of materials stored?	☐ Yes ☐ No
Are flammable liquid storage limits for cans, cabinets and rooms enforced by the company?	☐ Yes ☐ No

Description of Requirement	Compliant?
Does the FES (Fire and Emergency Services) provider and the insurance carrier agree upon any deviations from these set limits?	☐ YES ☐ NO
Are SDS's immediately available for any flammable liquid that is stored, dispensed or used?	☐ YES ☐ NO
Are amounts in excess of 25 gallons of Class IA liquids or 120 gallons of Class IB, IC, II or III liquids stored in a flammable storage cabinet?	☐ YES ☐ NO
Flammable Cabinet Requirements	
Are flammable storage cabinets limited to 60 gallons or less of a Class 1A liquid? (120 gallons max per cabinet of class I, II and IIIA liquids, of this not more than 60 gallons can be Class I and II.)	☐ YES ☐ NO
Are flammable liquid storage cabinets limited to a maximum of three per fire area? (Additional group of 3 may be stored in the same area if separated by 100+ feet.)	☐ YES ☐ NO
Are flammable liquid storage limits for cans, cabinets and rooms enforced by the company?	☐ YES ☐ NO
Does the FES (Fire and Emergency Services) provider and the insurance carrier agree upon any deviations from these set limits?	☐ YES ☐ NO
Sprinklers are not generally required in approved, listed flammable cabinets, however, based on the amounts and types of storage, when required, are the activation systems and components in good working order?	☐ YES ☐ NO
Are cabinets stable and pose no potential for overturning?	☐ YES ☐ NO
Where cabinet venting is not required, are vent openings tightly closed and capped with the metal bungs provided with the cabinet?	☐ YES ☐ NO
Where cabinet venting is required to maintain an LEL (Lower Explosive Limit), does the cabinet venting system conform to the requirements of NFPA-30?	☐ YES ☐ NO
Is design, construction and capacity requirements posted on the cabinet?	☐ YES ☐ NO
Are all cabinets of the approved type? Approval being from UL, FM or other NRTL (nationally recognized testing laboratory).	☐ YES ☐ NO
Are all cabinets without modifications or holes drilled in them? (Modifications without NRTL approval may nullify the effectiveness of the cabinet, and render it as an inappropriate storage cabinet.)	☐ YES ☐ NO
Safety Can Requirements	
Are all safety cans inspected prior to filling or dispensing to ensure they: • Are of the approved type (UL/FM/NRTL) • Have closures that operate properly (spring, tension, alignment) • Have correct labeling information (contents and hazard rating codes) • Have all the required parts, including flame arrestors. (Without flame arrestors, the can is no longer listed and approved for flammable liquid storage or handling) • Are free of dents or corrosion that could interfere with the safe and proper use of the can.	☐ YES ☐ NO
Are all safety cans labeled with the name of the contents (by adhesive sticker or paint)?	☐ YES ☐ NO
Is the can label maintained in legible condition?	☐ YES ☐ NO
Are NFPA, HMIS or other equivalent hazard rating system labels affixed to the container?	☐ YES ☐ NO
Are cans which are not used in the immediate area labeled with the user's name and contact information? (recommended not required)	☐ YES ☐ NO
After initial dispensing and prior to transportation to the user work area, is the can checked for leaks at seams (potentially indicated by accumulation of moisture along welded joints) and leaks at the gaskets?	☐ YES ☐ NO

Description of Requirement	Compliant?
Are cans inspected each time they are emptied?	☐ YES ☐ NO
Are defective cans immediately tagged and removed from service until repaired or destroyed? (Note most repairs are prohibited, including soldering or flattening of dents, and will result in loss of the can's listing approval)	☐ YES ☐ NO
Are plastic cans restricted to corrosive substances or for quantities of 2.5 gallons or less?	☐ YES ☐ NO
Are bench-top cans used only for saturating sponges, cloths or similar products, or for small parts cleaning?	☐ YES ☐ NO
Are bench top cans equipped with a spring mounted flame arrestors and hand-pressable dasher that provides access to the liquid?	☐ YES ☐ NO
Do bench top can dashers automatically return to normal position allowing excess fluid to drain back into the can, once the liquid is dispensed?	☐ YES ☐ NO
When bench-top cans are used, are gloves (compatible with the liquid dispensed) used to protect the user's skin?	☐ YES ☐ NO
Are bench-top cans covered when not in use to prevent or minimize escaping vapors?	☐ YES ☐ NO
Are cans equipped with only one opening that is used for both filling and pouring?	☐ YES ☐ NO
Are safety cans primarily limited to temporary storage of flammable liquids, and not used as permanent storage devices?	☐ YES ☐ NO
Are special viscous-liquid cans used for storing and dispensing viscous-liquids or suspension fluids? (These do NOT have flame arrestors, as the liquid is too thick and would clog the arresting screen)	☐ YES ☐ NO
Are waste liquid cans (equipped with a latch to keep the fill cap open while adding waste material) used only for the accumulation and disposal of flammable or combustible liquid wastes?	☐ YES ☐ NO
Are latches on waste liquid cans immediately closed once waste materials are added, to prevent the escape of vapors?	☐ YES ☐ NO
Are flame arrestors present on all waste liquid cans (except viscous liquid waste cans where the arrestor may become clogged)?	☐ YES ☐ NO
Laboratory and Other Specialized Environments	
Does laboratory storage of flammable liquids conform to the requirements of NFPA-45?	☐ YES ☐ NO
Where the presence of hazardous vapors or combustible dusts requires, are electronic portable devices restricted or prohibited in areas?	☐ YES ☐ NO
Where the presence of hazardous vapors, combustible dusts or large amounts of flammable liquid requires, are flame producing devices restricted or prohibited in areas?	☐ YES ☐ NO
Dispensing into Safety Cans or Other Approved Containers	
Are Class I and II liquids only dispensed from: • 5 gal original shipping containers • safety cans • closed piping systems • portable tanks/containers provide it is drawn through the top • tanks or containers with a self-closing valve or faucet (by gravity or approved pump)	☐ YES ☐ NO
Is air-pressure transfer prohibited?	☐ YES ☐ NO
Is grounding and electrically bonding of containers required for all dispensing activities to prevent static spark discharge during transfer?	☐ YES ☐ NO

Description of Requirement	Compliant?
Is electrical bond made prior to opening any filling holes and starting flow, and is bond maintained until filling holes are closed?	☐ YES ☐ NO
Are all dispensing cans equipped with nozzles or faucets to facilitate pouring liquids into containers with small fill-openings?	☐ YES ☐ NO
TANKS SECTION	
Structure and Materials of Construction	
Are tanks made of steel (exception for when the liquids properties prohibit the use of steel)? [1910.106b1i]	☐ YES ☐ NO
Are tanks designed to meet the specifications of good engineering practice?	☐ YES ☐ NO
Are steel tanks constructed via welding, rivets, caulking, brazing (non-ferrous filler metal), bolts or combinations therein?	☐ YES ☐ NO
Are any atmospheric tanks built to UL-142 (limited to 2.5psig emergency venting and 1psig normal operating pressures), or built to APIS-12A, B or F standards?	☐ YES ☐ NO
Are any low-pressure tanks built to APIS-620 or ASME Boiler and Pressure Vessel codes?	☐ YES ☐ NO
Is suitable corrosion protection provided either by design, materials of construction or additional measures?	☐ YES ☐ NO
Tank Operating Pressures AST's	
Is it ensured that any atmospheric tanks do not store liquids at temperatures/pressures above their boiling point?	☐ YES ☐ NO
For low pressure tanks and vessels, is a system in place to ensure that the operating pressure does not exceed tank limits?	☐ YES ☐ NO
For pressure vessels, is a system in place to ensure that the operating pressure does not exceed design limits?	☐ YES ☐ NO
Tank Distances AST's	
For Above-Ground Storage Tanks (AST's) is a distance of at least three feet maintained between tanks or 1/6th the sum of the tank diameters (1/2 the sum for unstable liquids),whichever is greater?	☐ YES ☐ NO
In all cases, is enough space between tanks to assure adequate fire protection?	☐ YES ☐ NO
Is the distance between any LP-gas container and flammable liquid storage at least 20 feet?	☐ YES ☐ NO
Are flammable liquids prevented from accumulating underneath LP-gas vessels?	☐ YES ☐ NO
Tank Venting and Gauge Openings AST's	
Are AST's adequately vented to prevent vacuum or pressure increases that may distort the tank or exceed design-pressure specifications?	☐ YES ☐ NO
Are AST vents sized in accordance with APIS-2000 or an equivalent standard?	☐ YES ☐ NO
Are AST vents at least 1 ¼ inch inside diameter or as large as the filling/withdrawal connection (whichever is larger)?	☐ YES ☐ NO
Are tanks with multiple withdrawal/filling connections vented adequately to allow for simultaneous flow?	☐ YES ☐ NO
Are low-pressure tanks adequately vented to prevent the development of a pressure or vacuum that exceeds design-pressure specifications?	☐ YES ☐ NO

Description of Requirement	Compliant?
Are low-pressure tanks that use dispensing pumps protected from overpressure of the pump into the tank?	☐ YES ☐ NO
Are vents for tanks and pressure vessels that contain any class I liquid normally kept closed?	☐ YES ☐ NO
Are flame arrestors installed on tanks and pressure vessels that contain Class 1A liquids? (Class 1B and 1C liquids may have them omitted in cases where they obstruct and potentially cause damage to the tank)	☐ YES ☐ NO
Do all AST's have emergency devices to relieve excessive internal pressure from an internal fire? (Vertical AST's may have roof construction/attachment to facilitate the emergency venting)	☐ YES ☐ NO
Are all AST emergency venting devices of sufficient capacity to prevent tank shell rupture from the side(s) or bottom during an internal fire? [see 29CFR1910.106(b)2v(c,d,e) and Table H-10 for calculation formulas and limits]	☐ YES ☐ NO
Do tank vents s have the required airflow rate? [29CFR1910.106(b)2v(f)]	☐ YES ☐ NO
Are all tank vent outlets designed to relieve pressure at levels greater than 2.5psig, and arranged so that the discharge prevents tank overheating should the vented vapors be ignited?	☐ YES ☐ NO
Do all tank vents have the opening pressure, full-open pressure, flow capacity stamped on them?	☐ YES ☐ NO
Do gauge openings have a vapor-tight cap or cover?	☐ YES ☐ NO
Are fill pipes designed and installed to minimize static electricity generation?	☐ YES ☐ NO
Do fill pipes terminate within 6 inches of the bottom of the tank and are installed to minimize vibration?	☐ YES ☐ NO
Are filling and emptying connections located at least 5 feet away from buildings, and in areas free from ignition sources?	☐ YES ☐ NO
Are filling and emptying connections closed and liquid-tight when not in use?	☐ YES ☐ NO
Tank Vent Piping, and Drainage AST's	
Do AST tanks that have class 1A liquids have vents at least 12 feet in height and a safe distance from any public access way, and at least 5 feet from any building?	☐ YES ☐ NO
Are vent pipes of adequate size to handle the capacity of discharge?	☐ YES ☐ NO
Are flammable liquids prevented from accumulating underneath LP-gas vessels?	☐ YES ☐ NO
Is any tank drainage system capable of preventing leaks or discharges from reaching adjoining property or waterways?	☐ YES ☐ NO
Is secondary containment (natural drainage or dike, or manmade containment) capable of handling at least the volume of the largest tank?	☐ YES ☐ NO
Is secondary containment so located so that if the discharge was to ignite, that any fire will not seriously expose tanks or adjoining property?	☐ YES ☐ NO
For Dike Containment, are walls made of earth, steel concrete or solid masonry?	☐ YES ☐ NO
For Dike Containment, are walls liquid tight and able to withstand a full hydrostatic head?	☐ YES ☐ NO
For Dike Containment with Earthen Walls, are walls at least 3 feet in height have a flat section at the top at least 2 feet wide and less than 6 feet high from the interior grade?	☐ YES ☐ NO
For Dike Containment with Earthen Walls, do walls have appropriate slope based on the soil classification of the earthen material? NOTE: For classifications see 29CFR1926 Subpart P Appendix A.	☐ YES ☐ NO

Description of Requirement	Compliant?
Installation UST's	
For any new or replacement tank installation is: • Care taken not to undermine the foundation/structure of the building • Engineering ensured (and in writing) that the load of the building can not be transmitted to the tank • The tank at least 1 foot outside any building and at least 3 feet from a property line for Class 1 liquids, and 1 foot for Class II and III liquids?	☐ **YES** ☐ **NO**
Are tanks set on firm foundations and surrounded by well-tamped inert materials?	☐ **YES** ☐ **NO**
Are tanks lowered with care so as not to roll them, break welds, puncture or damage the tank or its coatings?	☐ **YES** ☐ **NO**
Are tanks covered with at least 2 feet of earth (or 1 foot of earth covered by 4 inches of reinforced concrete?	☐ **YES** ☐ **NO**
Are tanks located over roadways or access roads covered with at least 3 feet of earth or 18 inches of well-tamped earth plus 6 inches of reinforced concrete (or 8 inches of asphaltic concrete)?	☐ **YES** ☐ **NO**
If asphaltic concrete is used, does the asphalt extend at least 1 foot horizontally beyond the outline of the tank in all directions?	☐ **YES** ☐ **NO**
Is corrosion protection provided by applied coating, cathodic protection or corrosion resistant materials of construction?	☐ **YES** ☐ **NO**
Venting UST's	
Are vents of adequate size to prevent backflow during filling and at least 1 ¼ inch nominal inside diameter?	☐ **YES** ☐ **NO**
For Class 1 liquids vents must be located so the discharge pipes: • Are outside of buildings • Are higher than the pipe fill opening • Are at least 12 feet in height above ground level • Vent only upward to disperse vapors • Remain unobstructed by back flow prevention devices • Prevent vapors from entering building openings • Prevent vapors from being trapped under eaves and obstructions • Have flame arrestors or vacuum and pressure relief devices (if they are <10 ft in length or >2 inches in diameter)	☐ **YES** ☐ **NO**
Do vents for Class II and III liquids terminate outside buildings and at a point higher than the fill opening?	☐ **YES** ☐ **NO**
Are vent opening higher than snow levels?	☐ **YES** ☐ **NO**
Are vents covered with screens, bends or other devices to minimize ingress of foreign materials? (Recommended, not required)	☐ **YES** ☐ **NO**
Is vent piping so located so that liquid drains toward the tank?	☐ **YES** ☐ **NO**
Is vent piping so located to prevent accumulation of liquid in a sag, bend or trap?	☐ **YES** ☐ **NO**
Is vent piping located to minimize physical or environmental damage?	☐ **YES** ☐ **NO**
Does the tank end of the vent piping enter through the top of the tank?	☐ **YES** ☐ **NO**
If manifolded, are pipe sizes adequate to discharge the vapors if tanks are filled simultaneously?	☐ **YES** ☐ **NO**

Description of Requirement	Compliant?
Tank Openings (Other than vents) UST's	
Are openings vapor or liquid tight?	☐ **YES** ☐ **NO**
If manually gauged and independent of the fill pipe, is the opening provided with a liquid-tight cap or cover?	☐ **YES** ☐ **NO**
If manually gauged and independent of the fill pipe AND located inside a building, is the opening protected against overflow and vapor release via a spring-loaded check valve or other approved equivalent device?	☐ **YES** ☐ **NO**
Do fill and discharge lines enter the tank only at the top?	☐ **YES** ☐ **NO**
Are all fill lines sloped toward the tank?	☐ **YES** ☐ **NO**
For Class 1B and 1C liquids, is the pipe designed and installed to minimize static electricity (i.e. terminates w/in 6 inches of the bottom of the tank)?	☐ **YES** ☐ **NO**
Are all filling and emptying connections located at least 5 feet from the outside of any building opening and free from contact with any potential ignition sources?	☐ **YES** ☐ **NO**
Are filling and emptying connections kept closed and liquid tight when not in use?	☐ **YES** ☐ **NO**
Are all filling and emptying connections properly identified?	☐ **YES** ☐ **NO**
Inside Building UST's	
Are emergency vents constructed with strong roof seams (weak roof seams are not permitted on inside UST's)?	☐ **YES** ☐ **NO**

FORKLIFT OR PALLET-JACK OPERATOR CERTIFICATION LOG

Current listing of licensed operators for forklifts and pallet jacks.
Ensure each type or model of equipment is listed for each operator.

OPERATOR NAME	DATE TRAINED/CERTIFIED	TYPE OF EQUIPMENT

FORKLIFT
PROGRAM ASSESSMENT

Completed by: _____ Date: _____

Description of Requirement	
PIT Program Requirements	**Compliant**
Are all operators appropriately trained for the type of PIT they are using?	☐ Yes ☐ No
Have all operators (including contractors) been evaluated in the local work area prior to being allowed to operate a PIT unsupervised?	☐ Yes ☐ No
Are operators periodically observed and evaluated in the workplace and, if deficiencies are noted, retrained?	☐ Yes ☐ No
Are any operators who have experienced an accident or near miss or who have been observed operating a PIT in an unsafe manner, (or where work/PIT operations have significantly changed) been prohibited from operating a PIT until being retrained?	☐ Yes ☐ No
Have documented performance evaluations been conducted on each PIT operator within the last 3 years?	☐ Yes ☐ No
If used, are signed “Operator Performance Requirements” statements on file for each operator?	☐ Yes ☐ No
PIT Workplace Requirements	**Compliant**
Are ONLY appropriately rated PITs used in designated hazardous areas?	☐ Yes ☐ No
Do all PITs capable of lifting over 72”, have overhead guards?	☐ Yes ☐ No
Are load backrests utilized when there is a danger of a load falling rearward?	☐ Yes ☐ No
Are personnel-lifting PITs fitted with a safety platform firmly secured to the lifting carriage or forks, and, as necessary, overhead protection for the personnel on the platform?	☐ Yes ☐ No
Are any modifications made to the PIT approved by the manufacturer and the truck appropriately labeled?	☐ Yes ☐ No
Are any PITs with front-end attachments marked to identify the attachment and show the weights at maximum elevation with the load laterally centered?	☐ Yes ☐ No
Are the markings legible and maintained in good condition?	☐ Yes ☐ No
Is directional lighting provided where general lighting is less than 2 lumens per square foot?	☐ Yes ☐ No
Are there sufficient safe clearances in aisles, at loading docks, through doorways, turns and passageways?	☐ Yes ☐ No
Are clearance limit signs posted where appropriate?	☐ Yes ☐ No
Are any open pits, dock ways, ditches, etc. appropriately guarded and marked?	☐ Yes ☐ No
Is sufficient overhead clearance from lights, pipes, sprinkler systems, etc. maintained in PIT operating areas?	☐ Yes ☐ No
Maintenance	**Compliant**
Are all PITs not in safe operating condition removed from service?	☐ Yes ☐ No
Are all repairs made by authorized personnel?	☐ Yes ☐ No
Are all PITs examined prior to use or at the start of each shift by the operator?	☐ Yes ☐ No
Are all PITs maintained in a clean condition, free of excess oil, grease or lint?	☐ Yes ☐ No

Description of Requirement	
PIT – Dock-boards and Bridge plates	**Compliant**
Are portable and powered dock-boards strong enough to carry the load imposed on them?	☐ Yes ☐ No
Are portable dock-boards secured in position, by anchoring or anti-slip devices?	☐ Yes ☐ No
Are handholds provided on portable dock-boards?	☐ Yes ☐ No
Is positive protection (i.e. wheel chocks, brakes, fixed jacks or other means) provided to prevent any railroad car or truck movement while dock-boards or bridge plates are in position or use?	☐ Yes ☐ No
PIT Battery Charging and Storage	**Compliant**
Are all battery charging installations protected from potential damage by equipment?	☐ Yes ☐ No
Are all battery charging installations adequately ventilated?	☐ Yes ☐ No
Do all battery changing installations have facilities for flushing and neutralizing spilled electrolyte?	☐ Yes ☐ No
Is a conveyor, hoist or equivalent equipment provided for handling batteries?	☐ Yes ☐ No
Are carboy tilters or siphons provided for handling electrolyte in PIT maintenance shops?	☐ Yes ☐ No
Is the addition of battery acid done according to a procedure and by trained individuals?	☐ Yes ☐ No
Are all PITs properly positioned and brakes (including parking brakes) applied before changing or charging batteries?	☐ Yes ☐ No
Are battery compartment covers kept open to dissipate heat during charging?	☐ Yes ☐ No
Are open flames and electric arcs prohibited in or near charging facilities?	☐ Yes ☐ No
Are tools and other metal objects kept away from the tops of uncovered batteries?	☐ Yes ☐ No
Safe Use Requirements - General	**Compliant**
Are all PITs operated as safe speeds, which permit stops and turns in a safe manner?	☐ Yes ☐ No
Are safe distance requirements (3 truck lengths) maintained from other vehicle traffic during travel?	☐ Yes ☐ No
Do operators and riders avoid placing arms or legs between the uprights of the mast or outside the running lines of the PIT?	☐ Yes ☐ No
Passing at intersections, blind spots or other locations where hazards may be present avoided?	☐ Yes ☐ No
Do operators slow down and sound the horn at cross aisles and other locations where vision is obstructed?	☐ Yes ☐ No
Do drivers slow down on wet or slippery floors?	☐ Yes ☐ No
When loads obstruct the forward view are PIT operators required to travel with the load trailing?	☐ Yes ☐ No
Are grade changes of greater than 10% maneuvered with the load upgrade?	☐ Yes ☐ No
Are all load and load engaging means tilted back, if applicable, and raised only as far as necessary to clear the road surface on all grades?	☐ Yes ☐ No
Are all load engaging means fully lowered, controls neutralized, power shut off, and brakes set (and wheels chocked on inclines) when any PIT is left unattended? (unattended is when the operator is more than 25 ft away from the PIT or the PIT is out of the operator's view of sight.)	☐ Yes ☐ No

Description of Requirement	
Safe Use Requirements - Loads	**Compliant**
Are all handled loads stable and safely arranged?	☐ Yes ☐ No
When loads cannot be centered, are additional safety precautions and care taken during handling?	☐ Yes ☐ No
Are load weights carried and handled by PITs within the weight restrictions for the PIT/PBC?	☐ Yes ☐ No
Are all long, high or multiple tiered loads adjusted appropriately?	☐ Yes ☐ No
Are load-engaging means (i.e. pallets) placed under the load where possible?	☐ Yes ☐ No
Are PIT masts carefully tilted backward to stabilize the load whenever appropriate (without excessive tilt)?	☐ Yes ☐ No
Except when picking up a load or placing a load in rack or stack, is tilting forward with the load engaging means elevated prohibited?	☐ Yes ☐ No
Safe Use Requirements– Dock-plates, Trailer Loading, Elevators	**Compliant**
Are dockboards or bridgeplates properly secured prior to use?	☐ Yes ☐ No
Is care taken to drive slowly over dockboards and bridgeplates, and their rated capacities never exceeded?	☐ Yes ☐ No
Are elevators entered squarely and approached slowly?	☐ Yes ☐ No
Once on an elevator, does the PIT operator neutralized controls, shut the power off and set the brakes, prior to elevator operation?	☐ Yes ☐ No
Do motorized hand trucks always enter elevators with load-ends forward?	☐ Yes ☐ No
Do operators check to assure the vehicle being loaded or unloaded is properly set, blocked, jacked or otherwise prevented from movement prior to loading or unloading?	☐ Yes ☐ No
Are trucks, trailers and railroad cars checked for floor breaks or weakness prior to driving the PIT onto the vehicle?	☐ Yes ☐ No
Safe Use Requirements – Hazardous Locations	**Compliant**
Exhaust from PIT's is controlled to a safe level when they are used indoors or in other situations where exposure to personnel is potentially harmful.	☐ Yes ☐ No
Are only specially approved PITs used in hazardous locations?	☐ Yes ☐ No
Are battery compartments locked closed on "EX" rated PITs in hazardous areas?	☐ Yes ☐ No
Safe Use Requirements - Pedestrians	**Compliant**
Are pedestrians prohibited from passing underneath an elevated portion of any truck, whether loaded or empty?	☐ Yes ☐ No
Do PIT operators defer to pedestrians in aisles, where appropriate?	☐ Yes ☐ No

PALLET JACK OPERATOR DAILY INSPECTION CHECKLIST

ACCELERATOR, TRANSMISSION & SERVICE BRAKES	**ENERGY SYSTEM** *[Battery Powered]:*	**MAST & TILT CYLINDERS**
☐ Vehicle accelerates smoothly	☐ Battery casing closed	☐ Lift carriage to maximum height
☐ Brakes slow without jerking or locking	☐ Vehicle has been removed from the charging system before activation	☐ Lower carriage to just above floor
☐ Vehicle moves forward/backward properly	**FORKS**	☐ Carriage moves smoothly & completely
COMPONENT TIRES	☐ Centered on carriage and equally spaced	**PARKING BRAKES**
☐ No excessive wear splitting or missing material	☐ No cracks or other damage	☐ Parking brake prevents movement
☐ Wheel nuts and rim condition good	☐ Locking pins work correctly	**STEERING**
IDENTIFICATION PLATE	**GAUGES**	☐ Wheel turns while stopped
☐ Readable	☐ All gauges work properly	☐ Wheel turns while moving
	☐ All indicators work properly	☐ Wheel turns Forklift smoothly & precisely
	☐ Moving parts work smoothly & properly	☐ No strange noise or hesitation

Deficiencies Noted and Reported or Comments:

Date:	**Signature:**

PALLET JACK OPERATOR EVALUATION ASSESSMENT

This form (or its equivalent) must be retained for records management for 3 years or until superseded.

Equipment Operated (make/model):						
Name of Operator:			Employee Identification#:			Date:
Signature of Operator:			Signature of Evaluator:			
YES	**NO**	**Activity**	**YES**	**NO**	**Activity**	
☐	☐	Performs pre-shift checks				
UNDERSTANDS CONTROLS						
☐	☐	Forward/reverse	☐	☐	Service brake	
☐	☐	Lifting/raising	☐	☐	Instrumentation	
☐	☐	Steering technique	☐	☐	Attachment	
☐	☐	Parking brakes				
TRUCK HANDLING						
☐	☐	Smooth starts/stops	☐	☐	Smooth/controlled turns	
☐	☐	Inching/plugging	☐	☐	Clears obstacles safely	
☐	☐	Approach is square	☐	☐	Proper maneuvering speed	
☐	☐	Proper fork height	☐	☐	Looks in travel direction	
DOCK EQUIPMENT/AREA						
☐	☐	Checks/secures dock board	☐	☐	Rail car wheel chocks	
☐	☐	Checks/secure wheel chocks	☐	☐	Trailer/railcar brakes on	
☐	☐	Walks trailer before entry	☐	☐	Nose jack in place, if required	
PARKING PROCEDURES						
☐	☐	Power shut off	☐	☐	Parks in safe area	
LOAD HANDLING						
☐	☐	Load against backrest	☐	☐	Proper load placement	
☐	☐	Smooth starts/stops	☐	☐	Proper fork spread	
☐	☐	Proper truck speed	☐	☐	Proper truck capacity	
Comments:						
SAFETY						
☐	☐	Uses horn as required	☐	☐	Uses proper travel on ramps	
☐	☐	Uses intersection mirrors	☐	☐	Stacks straight and square	
☐	☐	Stops at major intersections	☐	☐	Yields right-of-way	

TRAINING ATTENDANCE ROSTER
FORKLIFT AND PALLET JACK

Forklift Training Includes:	***Pallet Jack Training Includes:***
• General rules • Parts of the truck • Inspection requirements • Traveling • Load handling and Parking • Stability • Fueling or Charging • Attachments • Reach lift requirements (as applicable)	• Types of Equipment • Handle Brakes and Switches • Inspection • Safe Operation • Hazards

INSTRUCTOR:	***DATE:***	***LOCATION:***

NAME (Please Print) FIRST - MI - LAST	**SIGNATURE**
By signing below, I attest that I have attended the safety training for the topic indicated, and will abide by the safety information, procedures, rules, regulations and/or company policy as presented and instructed	

Name of Interpreter, if utilized:

_____

FORKLIFT (PIT) TRUCK DESIGNATIONS/TRUCK USE IN HAZARDOUS ATMOSPHERES

There are eleven (11) different designations for PITs. They are: **D, DS, DY, E, ES, EE, EX, G, GS, LP, and LPS**.

- The **D** designated units are units similar to the G units except that they are diesel engine powered instead of gasoline engine powered.
- The **DS** designated units are diesel powered units that are provided with additional safeguards to the exhaust, fuel and electrical systems. They may be used in some locations where a D unit may not be considered suitable.
- The **DY** designated units are diesel powered units that have all the safeguards of the DS units and in addition do not have any electrical equipment including the ignition and are equipped with temperature limitation features.
- The **E** designated units are electrically powered units that have minimum acceptable safeguards against inherent fire hazards.
- The **ES** designated units are electrically powered units that, in addition to all of the requirements for the E units, are provided with additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures. They may be used in some locations where the use of an E unit may not be considered suitable.
- The **EE** designated units are electrically powered units that have, in addition to all of the requirements for the E and ES units, the electric motors and all other electrical equipment completely enclosed. In certain locations the EE unit may be used where the use of an E and ES unit may not be considered suitable.
- The **EX** designated units are electrically powered units that differ from the E, ES, or EE units in that the electrical fittings and equipment are so designed, constructed and assembled that the units may be used in certain atmospheres containing flammable vapors or dusts.
- The **G** designated units are gasoline powered units having minimum acceptable safeguards against inherent fire hazards.
- The **GS** designated units are gasoline powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of a G unit may not be considered suitable.
- The **LP** designated unit is similar to the G unit except that liquefied petroleum gas is used for fuel instead of gasoline.
- The **LPS** designated units are liquefied petroleum gas powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of an LP unit may not be considered suitable.

Forklift (PIT) Trucks for Hazardous (Classified) Atmospheres

The atmosphere or location shall have been classified as to whether it is hazardous or non-hazardous prior to the consideration of industrial trucks being used and the correct type of industrial truck required shall be as provided for any hazardous classified locations.

- Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentration of acetylene, butadiene, ethylene oxide, hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas), propylene oxide, acetaldehyde, cyclopropane, diethyl ether, ethylene, isoprene, or unsymmetrical dimethyl hydrazine (UDMH).
- Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentrations of metal dust, including aluminum, magnesium, and their commercial alloys, other metals of similarly hazardous characteristics, or in atmospheres containing carbon black, coal or coke dust except proved power-operated industrial trucks designated as EX may be used in such atmospheres.
- In atmospheres where dust of magnesium, aluminum or aluminum bronze may be present, fuses, switches, motor controllers, and circuit breakers of trucks shall have enclosures specifically approved for such locations.
- Only approved power-operated industrial trucks designated as EX may be used in atmospheres containing acetone, acrylonitrile, alcohol, ammonia, benzine, benzol, butane, ethylene dichloride, gasoline, hexane, lacquer solvent vapors, naphtha, natural gas, propane, propylene, styrene, vinyl acetate, vinyl chloride, or xylenes in quantities sufficient to produce explosive or ignitable mixtures and where such concentrations of these gases or vapors exist continuously, intermittently or periodically under normal operating conditions or may exist frequently because of repair, maintenance operations, leakage, breakdown or faulty operation of equipment.
- Power-operated industrial trucks designated as DY, EE, or EX may be used in locations where volatile flammable liquids or flammable gases are handled, processed or used, but in which the hazardous liquids, vapors or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in the case of abnormal operation of equipment; also in locations in which hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation but which might become hazardous through failure or abnormal operation of the ventilating equipment; or in locations which are adjacent to Class I, Division 1 locations, and to which hazardous concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clear air, and effective safeguards against ventilation failure are provided.

Forklift (PIT) Trucks for Hazardous (Classified) Atmospheres

- In locations used for the storage of hazardous liquids in sealed containers or liquified or compressed gases in containers, approved power-operated industrial trucks designated as DS, ES, GS, or LPS may be used. This classification includes locations where volatile flammable liquids or flammable gases or vapors are used, but which, would become hazardous only in case of an accident or of some unusual operating condition. The quantity of hazardous material that might escape in case of accident, the adequacy of ventilating equipment, the total area involved, and the record of the industry or business with respect to explosions or fires are all factors that should receive consideration in determining whether or not the DS or DY, ES, EE, GS, LPS designated truck possesses sufficient safeguards for the location. Piping without valves, checks, meters and similar devices would not ordinarily be deemed to introduce a hazardous condition even though used for hazardous liquids or gases. Locations used for the storage of hazardous liquids or of liquified or compressed gases in sealed containers would not normally be considered hazardous unless subject to other hazardous conditions also.
- Only approved power operated industrial trucks designated as EX shall be used in atmospheres in which combustible dust is or may be in suspension continuously, intermittently, or periodically under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures, or where mechanical failure or abnormal operation of machinery or equipment might cause such mixtures to be produced.
- The EX classification usually includes the working areas of grain handling and storage plants, room containing grinders or pulverizers, cleaners, graders, scalpers, open conveyors or spouts, open bins or hoppers, mixers, or blenders, automatic or hopper scales, packing machinery, elevator heads and boots, stock distributors, dust and stock collectors (except all-metal collectors vented to the outside), and all similar dust producing machinery and equipment in grain processing plants, starch plants, sugar pulverizing plants, malting plants, hay grinding plants, and other occupancies of similar nature; coal pulverizing plants (except where the pulverizing equipment is essentially dust tight); all working areas where metal dusts and powders are produced, processed, handled, packed, or stored (except in tight containers); and other similar locations where combustible dust may, under normal operating conditions, be present in the air in quantities sufficient to produce explosive or ignitable mixtures.
- Only approved power-operated industrial trucks designated as DY, EE, or EX shall be used in atmospheres in which combustible dust will not normally be in suspension in the air or will not be likely to be thrown into suspension by the normal operation of equipment or apparatus in quantities sufficient to produce explosive or ignitable mixtures but where deposits or accumulations of such dust may be ignited by arcs or sparks originating in the truck.
- Only approved power-operated industrial trucks designated as DY, EE, or EX shall be used in locations which are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

Forklift (PIT) Trucks for Hazardous (Classified) Atmospheres

- Only approved power-operated industrial trucks designated as DS, DY, ES, EE, EX, GS, or LPS shall be used in locations where easily ignitable fibers are stored or handled, including outside storage, but are not being processed or manufactured. Industrial trucks designated as E, which have been previously used in these locations may be continued in use.
- On piers and wharves handling general cargo, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements for these types may be used.
- If storage warehouses and outside storage locations are hazardous only the approved power-operated industrial truck specified for such locations shall be used. If not classified as hazardous, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements for these types may be used.
- If general industrial or commercial properties are hazardous, only approved power-operated industrial trucks specified for such locations shall be used. If not classified as hazardous, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements of these types may be used.

Converted industrial trucks. Power-operated industrial trucks that have been originally approved for the use of gasoline for fuel, when converted to the use of liquefied petroleum gas fuel, may be used in those locations where G, GS or LP, and LPS specifically-designated trucks are specified.

HAND AND PORTABLE POWER TOOL PROGRAM ASSESSMENT

Unit Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
Purchase of Tools	
Are all electrical tools been listed by a Nationally Recognized Testing Laboratory (NRTL) such as Underwriters Laboratory (UL)?	☐ Yes ☐ No
Are all tools company owned or leased (no personally owned tools)?	☐ Yes ☐ No
Are modifications made to tools required to be inspected by a qualified person to assure the modifications meet existing electrical standards?	☐ Yes ☐ No
Tool Inspection	
Are procedures are in place to conduct visual inspections of tools prior to use?	☐ Yes ☐ No
If testing is required (e.g., GFCI testing before each use), are procedures in place to ensure compliance?	☐ Yes ☐ No
Safe Work Practices	
Do employees understand and follow manufacturer's instructions?	☐ Yes ☐ No
Are tools routinely inspected prior to use?	☐ Yes ☐ No
Do employees use the tools only for the purpose for which they were designed and intended?	☐ Yes ☐ No
Are ergonomically designed tools (for repetitive tasks and for those jobs for which a job hazard analysis or ergonomic assessment indicates a need for such tools) made available, as appropriate?	☐ Yes ☐ No
Do employees understand that unsafe behavior while using tools shall result in corrective action (e.g., retraining, disciplinary action)?	☐ Yes ☐ No
Are employees fully aware of the hazards associated with the particular tool and task before a job is started?	☐ Yes ☐ No
Are tools producing 100 dB (A) of noise labeled with a "Hearing Protection Required" sticker?	☐ Yes ☐ No
Are adjusting keys and wrenches removed before connecting to the power supply?	☐ Yes ☐ No
Are users of power tools appropriately dressed for the job (i.e. no loose clothing/jewelry, long hair is confined, gloves and other PPE are worn as appropriate)?	☐ Yes ☐ No
Are tools (pliers, rakes, or hooks) used to pull or dislodge chips or turning from tools or parts (not fingers)?	☐ Yes ☐ No
Are air powered tools hooked up only to lines supplied for the purpose (i.e. not compressed gas lines)?	☐ Yes ☐ No
Are tools carried in a way that prevents the starting trigger or button from being accidentally actuated?	☐ Yes ☐ No
Are appropriate precautions utilized when tools are used in a wet location (i.e. GFCI and appropriate gloves and other PPE)?	☐ Yes ☐ No

Description of Requirement	Compliant?
Are tools disconnected when not in use?	☐ Yes ☐ No
Are all tools disconnected from the power source prior to lubricating, cleaning, or adjustment?	☐ Yes ☐ No
Are the manufacturer's instructions for lubricating, changing accessories, and inspection followed?	☐ Yes ☐ No
Maintenance and Repair	
Is a maintenance program is in place to identify and repair defective or unsafe tools?	☐ Yes ☐ No
Are repairs to portable electrical tools only made by an authorized manufacturer's tool service/repair group or by the approved company tool repair service?	☐ Yes ☐ No
Are tools that are damaged or defective removed from service?	☐ Yes ☐ No
Training	
Is training conducted (as part of an apprenticeship program or other Company recognized training forums)?	☐ Yes ☐ No
Can employees who indicate they have had prior training demonstrate understanding and capabilities prior to being assigned to work?	☐ Yes ☐ No
Are manufacturer's instructions retained for training/reference purposes?	☐ Yes ☐ No
Specialized Applications	
Are hand and power tools that may generate sparks or high temperatures prohibited from use in areas that are hazardous due to the presence of flammable or combustible materials?	☐ Yes ☐ No
In hazardous locations, is the use of non-sparking tools required (unless monitoring ensures levels below 25% of the lower explosive limit (LEL))?	☐ Yes ☐ No
Has training in the use of a powder-actuated tools been provided by the manufacturer?	☐ Yes ☐ No
For such powder-actuated tools, is a license issued after training?	☐ Yes ☐ No
Do individuals using powder-actuated tools have the license on their person when using the tool?	☐ Yes ☐ No
Is a record of powder-actuated tool training kept in personnel files (or equivalent recordkeeping system)?	☐ Yes ☐ No
Electrical Applications and Safeguards	
Is either Ground Fault Circuit Interrupter (GFCI) Protection or an Assured Equipment Grounding Conductor Program provided for all 120V (or greater) powered tools?	☐ Yes ☐ No
Are adapters that interrupt the continuity of the equipment-grounding conductor prohibited (e.g., 3-wire to 2-wire adapter)?	☐ Yes ☐ No
Do double-insulated tools require GFCI protection (they do not require an equipment-grounding conductor (3rd wire) in the cord)?	☐ Yes ☐ No
Are power cords or hoses kept in good operating condition and not abused during use (i.e. yanked for disconnect, protected from heat, oil and sharp edges)?	☐ Yes ☐ No
Are cords and hoses routed in such a manner as to not create a tripping hazard?	☐ Yes ☐ No

HAZARD COMMUNICATION
PROGRAM ASSESSMENT CHECKLIST

Assessor:	**Date:**

Requirement Explanation	Elements to Verify	Compliant?
It is the employee's right, to know about the hazards of chemicals they may be exposed to, and the measures to protect themselves from these hazards.	Employees understand the requirements of the Hazard Communication Program	☐ Yes ☐ No
Hazard Communications Program requires that at least one person in the company be assigned or designated to coordinate the program.	Responsibilities have been assigned for tasks, including: ➢ Developing the written program ➢ Implementing the written program ➢ Maintaining the written program	☐ Yes ☐ No
Develop, implement and maintain a written hazard communication program that contains or describes: • List of chemicals • Access to and maintenance of a current SDS • Labeling procedures • Protective measures • Training program elements • Provisions for contractors (multi-employer workplaces) • Procedures for non-routine tasks and unlabeled pipelines	A prepared written program is available (using the provided template or an equivalent document)	☐ Yes ☐ No
	The written program is available to employees	☐ Yes ☐ No
	A written list of hazardous chemicals, using an identity that is referenced on the SDS, is available to all employees	☐ Yes ☐ No
	The written chemical list is kept current	☐ Yes ☐ No
	Copies of any previous versions of the chemical list are retained for 3 years	☐ Yes ☐ No
Assure labels and other forms of warning are affixed to the containers, as appropriate. • Full labeling: All containers must be labeled with the chemical name, appropriate hazard warnings and the manufacturer name and address. Vendor labels should be in compliance. Such labels may not be defaced or covered. • Shortened labeling: may be used for process materials and must contain the chemical identity (easily referenced back to the SDS), and appropriate hazard warnings (e.g. HMIS codes) and readily available SDS that are consistent with the training program. • Not required for portable containers which will be immediately utilized by the employee on that work-shift and which remain in the direct control of the employee at all times.	Containers and pipelines in the workplace are labeled properly	☐ Yes ☐ No
	Containers leaving the workplace are labeled properly	☐ Yes ☐ No
	Labels on containers are updated when there is new hazard information	☐ Yes ☐ No

Requirement Explanation	Elements to Verify	How Met / Records, Procedures
Assure Safety Data Sheets (SDS) for each chemical used in the workplace are readily accessible to employees on each work shift, and are written in English.	Current SDS for each hazardous chemical and mixture in the work area are present	☐ Yes ☐ No
	SDS are readily available to workers in the work area during the work shift	☐ Yes ☐ No
	SDS are provided to other employers when shipping chemicals to them	☐ Yes ☐ No
Assure SDS are retained for at least as long as employees who use them are employed (longer for any material involved in an overexposure incident).	SDS are maintained for at least the duration of employment for any employee using the material.	☐ Yes ☐ No
	SDS for chemicals involved in overexposure incidents are maintained for the duration of employment plus 30 years.	☐ Yes ☐ No
Train and inform employees on initial assignment and whenever a new physical, chemical or health hazard is introduced.	Employees are trained in the Hazard Communication Program upon initial assignment	☐ Yes ☐ No
	Employee training is updated when there is a new physical or health hazard	☐ Yes ☐ No
	Employees are trained when there is a new or non-routine task	☐ Yes ☐ No
	Initial employee training includes all required elements	☐ Yes ☐ No
Develop and implement a method of communication between the contractor and the company which describes and outlines: • the method used to communicate hazards and precautions • the method used to access SDS • the method used to communicate emergency situations • the labeling methods utilized.	Contractors in your workplace are informed of: the hazards and precautions, the labeling system used, how to access SDS, and emergency procedures	☐ Yes ☐ No
Assure that the company has evaluated and determined the hazards of any new or existing chemicals.	Chemicals and mixtures produced or imported are evaluated to determine if they are hazardous	☐ Yes ☐ No
Hazard Communication Program Features - For Those Who Ship Chemicals Out of the Workplace The company is required to determine the hazards of any products or chemicals they manufacture and/or sell. This information is generally found on the Safety Data Sheet (SDS) for the product.	Step 1: List a representative sampling of chemicals that are being shipped from the workplace. Include chemicals: • repackaged • supplied in the original container • raw materials • products	☐ Yes ☐ No
	Step 2: Verify that each container is labeled, tagged, or marked with • the identity of the hazardous chemical • appropriate hazard warnings • name and address of the chemical manufacturer, importer, and other responsible party • information that does not conflict with Federal Department of Transportation (DOT) requirements	☐ Yes ☐ No
	Step 3: Verify that a Safety Data Sheet is sent with the shipped container or has been sent prior to the time of shipment.	☐ Yes ☐ No

Requirement Explanation	Elements to Verify	How Met / Records, Procedures
Hazard Communication Program Features - For those who Manufacture and/or Use Chemicals	Step 1: List a 10% representative sampling of chemicals in the work area/workplace. Include chemicals: • with the most potential exposure • used in the most hazardous areas • that are in a variety of containers • that are manufactured by vendors and by the company (if applicable)	☐ Yes ☐ No
Best Management practices suggest that the effectiveness of the program and its corresponding training be VERIFIED. These steps will assist in that process.	Step 2: List 5-20 people in the work area/ workplace. Use a cross section of employees including: • contract, summer, and supplemental employees • most and least senior employees • learning, hearing, or visually impaired • non-English-speaking employees • those working in out-of-the-way places/times and on multiple shifts	☐ Yes ☐ No
	Step 3: Using the list from Step 1, verify that: • the current SDS are accessible • the chemicals on the chemical list • the containers in the workplace are labeled with the identity of the contents and hazard warnings.	☐ Yes ☐ No
	Step 4: Ask each person listed from Step 2: • what the most hazardous operations in their work area/ workplace are • what chemical(s) pose the most potential for exposure • to explain the health and physical hazards and protective measures they use for chemicals in Step 1 • what methods and observations they use to detect a release of hazardous chemical • where the chemical list, SDS file and written program are located • where they go for additional information to locate SDS for some of the chemicals in Step 1	☐ Yes ☐ No

LASER PROGRAM ASSESSMENT

Unit Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
Administrative	
Are lasers classified appropriately (2, 3a, 3b, 4a, 4b)?	☐ Yes ☐ No
Are Standard Operating Procedures written and available?	☐ Yes ☐ No
Are alignment procedures written and available?	☐ Yes ☐ No
Are viewing cards or similar systems used for alignment?	☐ Yes ☐ No
Do laser operators attend appropriate training?	☐ Yes ☐ No
Is an inventory maintained?	☐ Yes ☐ No
Labeling and Posting	
Is an identification label affixed to the machine?	☐ Yes ☐ No
Are class designation and appropriate warning label(s) present?	☐ Yes ☐ No
Is radiation output information on the label?	☐ Yes ☐ No
Is an aperture label present?	☐ Yes ☐ No
Are appropriate warning/danger sign(s) at the entrance to the laser area?	☐ Yes ☐ No
Is a warning posted for “invisible” radiation exposure?	☐ Yes ☐ No
Control Measures	
Is the protective housing present and in good condition?	☐ Yes ☐ No
Is the beam attenuator present?	☐ Yes ☐ No
Is the laser table below eye level?	☐ Yes ☐ No
Is the beam enclosed as much as possible?	☐ Yes ☐ No
Is the beam pointed away from any doors or windows?	☐ Yes ☐ No
Are beams terminated with fire-resistant beam stops?	☐ Yes ☐ No
Do surfaces minimize specular reflections?	☐ Yes ☐ No
Are controls located so that the operator is not exposed to beam hazards?	☐ Yes ☐ No

Description of Requirement	Compliant?
Personal Protective Equipment	
Is eye protection appropriate for the wavelength?	☐ Yes ☐ No
Does eye protection have adequate OD (optical density)?	☐ Yes ☐ No
Can warning/indicator lights be seen through protective filters?	☐ Yes ☐ No
Class 3b and 4 Lasers	
Are interlocks provided on protective housing?	☐ Yes ☐ No
Is the service access panel present and kept closed?	☐ Yes ☐ No
Is there limited access to other employees or persons?	☐ Yes ☐ No
Has a nominal hazard zone been determined and marked?	☐ Yes ☐ No
Is a process in place to assure that operators do not wear watches or reflective jewelry while laser is operating?	☐ Yes ☐ No
Are viewing portals present and used where the MPE (maximum permissible exposure) is potentially exceeded? (recommended)	☐ Yes ☐ No
Class 4 Lasers	
Are failsafe interlocks located at entry to controlled areas?	☐ Yes ☐ No
Are areas restricted to only authorized personnel?	☐ Yes ☐ No
Are lasers capable of being fired remotely?	☐ Yes ☐ No
Are curtains or other materials fire-resistant (if present)?	☐ Yes ☐ No
Are areas designed to allow and facilitate rapid egress and exit during an emergency?	☐ Yes ☐ No
Pulsed – are interlocks designed to prevent firing of the laser by dumping the stored energy into a dummy load?	☐ Yes ☐ No
CW – are interlocks designed to turn off power supply or interrupt the beam by means of shutters?	☐ Yes ☐ No
Is a process in place to assure that operators do not wear ties or other loose clothing around the operating laser, and that any long hair is restrained?	☐ Yes ☐ No
If applicable, do they sign the entry permit?	☐ Yes ☐ No
Non-Beam Hazards	
Is any high voltage equipment properly grounded?	☐ Yes ☐ No
Is high voltage equipment located away from wet surfaces or water sources (and operators trained not to operate equipment with wet hands)?	☐ Yes ☐ No
Is a high voltage-warning label in place?	☐ Yes ☐ No
Are any compressed gases properly secured?	☐ Yes ☐ No

Lock Out/Tag Out Guidance Procedure for Vehicles

PROCEDURE TO FOLLOW WHEN SERVICING A VEHICLE:

1. Remove all keys from the ignition switch.
2. Obtain any other keys or remote starter mechanisms.
3. Place keys in a secure area. The service technician must be in control of all keys and remote switch devices (key holder on wall, top drawer of mechanics tool box, etc.)
4. Place a LOTO tag and/or sign on the steering wheel and/or door of the vehicle. (see examples below)
5. If a team is servicing the vehicle, each service technician must attach their own LOTO tag.

NOTE: Some States may require the battery to be disconnected. If the battery is disconnected power to the vehicle computers will be lost. There may be special devices that can be used (ex. SNAP ON *TOOL)* that fits into the vehicle cigarette lighter maintaining low voltage to the computers allowing this specific task to be completed.

Types of Lock Out Tags

LOTO PROGRAM ASSESSMENT

Facility, Area or Machine:	Assessor:	Date:

Description of Requirement	Compliant?
LOTO – (1910.147)	
Is all machinery or equipment capable of movement required to be de-energized or disengaged and locked-out during cleaning, servicing, adjusting or setting up operations, whenever required?	☐ Yes ☐ No
Are written procedures established for machinery/equipment that requires control of energy or movement?	☐ Yes ☐ No
Are all LOTO procedures reviewed with authorized employees within one calendar year prior to use?	☐ Yes ☐ No
Does the lockout procedure require that stored energy (mechanical, hydraulic, air, etc.) be released or blocked before equipment is lockout for repairs?	☐ Yes ☐ No
Is it required that employees check the safety of the lockout by attempting a startup after making sure not one is exposed?	☐ Yes ☐ No
Are employees instructed to always push the control circuit stop button immediately after checking the safety of the lockout (i.e. is the de-energization verified)?	☐ Yes ☐ No
Where the power disconnecting means for equipment does not also disconnect the electrical control circuit, are the appropriate electrical enclosures identified? (Control circuits sometimes have different sources of energy. Have all the energy sources been identified for each discreet piece of equipment?)?	☐ Yes ☐ No
Where the power disconnecting means for equipment does not also disconnect the electrical control circuit, is means provided to assure the control circuit can also be disconnected and locked-out?	☐ Yes ☐ No
Is the locking-out of control circuits in lieu of locking-out main power disconnects prohibited?	☐ Yes ☐ No
Are all equipment control valve handles provided with a means for locking-out?	☐ Yes ☐ No
Are appropriate employees provided with individually keyed personal-safety locks and/or other appropriate devices?	☐ Yes ☐ No
Are employees required to keep personal control of their key(s) while they have safety locks in use, or in group lock out situations is a designated person established for this control?	☐ Yes ☐ No
Is it required that only the employee exposed to the hazard, place or remove the safety lock?	☐ Yes ☐ No
Is there a means provided to identify any or all employees who are working on lockout equipment by their locks or accompanying tags?	☐ Yes ☐ No
Are a sufficient number of accident preventive tags and safety padlocks provided for any reasonably foreseeable repair emergency?	☐ Yes ☐ No
When machine operations, configuration or size requires the operator to leave his or her control station to install tools or perform other operations, and that part of the machine could move if accidentally activated, is such element required to be separately locked or blocked out?	☐ Yes ☐ No
In the event that equipment or lines cannot be shut down, locked out and tagged, is a safe job procedure established and rigidly followed?	☐ Yes ☐ No
Have all persons utilizing or exposed to LOTO devices trained to the appropriate level of their involvement?	☐ Yes ☐ No
Are contractors informed of company LOTO procedures and familiar with company LOTO devices, where applicable?	☐ Yes ☐ No

Description of Requirement	Compliant?
Electrical Lockouts - (1910.333)	
Does the organization have a valid lock-out/tag-out program per 1910.147 “The Control of Hazardous Energy”?	☐ Yes ☐ No
Have all live parts to which an employee may be exposed been de-energized prior to work or where de-energization is infeasible, other specific safeguards and procedures enforced to ensure the safety of the employees?	☐ Yes ☐ No
Are conductors and parts of electrical equipment that have been de-energized but have not been locked out and tagged treated as energized parts?	☐ Yes ☐ No
Have safe procedures for de-energizing circuits and equipment been determined **before** circuits are (or equipment is) de-energized?	☐ Yes ☐ No
Are circuits and equipment to be worked on disconnected from all electrical energy sources?	☐ Yes ☐ No
Are control circuit devices, such as push buttons, selector switches, and interlocks, prohibited from use as the sole means of de-energizing circuits or equipment?	☐ Yes ☐ No
Are interlocks for electric equipment prohibited from use as a substitute for lockout/tagout procedures?	☐ Yes ☐ No
Have capacitors and high capacitance elements been short-circuited and grounded, where appropriate?	☐ Yes ☐ No
Has any non-electrical energy that could energize electric circuit parts (i.e. trip an interlock) been blocked or relieved to prevent accidental energization?	☐ Yes ☐ No
Are all locks accompanied by tags and have the tags been appropriately filled-out with all pertinent information?	☐ Yes ☐ No
Do only qualified persons verify the release of stored energy?	☐ Yes ☐ No
Do only qualified persons re-energize the equipment?	☐ Yes ☐ No
Where work on live parts and circuits must be performed, does only a qualified person perform this work?	☐ Yes ☐ No
Where there is exposure to overhead power sources and power lines, are these lines de-energized prior to work, or sufficient safeguards in place to assure employee safety?	☐ Yes ☐ No

MACHINE GUARDING PROGRAM ASSESSMENT

Facility or Area:	Assessor:	Date:

Description of Requirement	Compliant?
General Equipment	
Have all machine guards been reviewed/approved by the safety staff or other qualified person?	☐ Yes ☐ No
Are electrical (and other hazardous energy) lock-out and de-energization controls available, where needed?	☐ Yes ☐ No
Are power shutoffs within easy reach of operators?	☐ Yes ☐ No
Are emergency stops within easy reach of operators during normal machine use?	☐ Yes ☐ No
Have all controls for new or relocated machines been tested to assure they are operating properly prior to machine use?	☐ Yes ☐ No
Has the position of controls been reviewed by safety staff?	☐ Yes ☐ No
Does each piece or type of equipment have documented procedures or operations manuals that provide instruction for the safe start-up, operation, or shut-down of the machine?	☐ Yes ☐ No
Is machinery where safeguards must be removed for a specific task operated only by exception, with additional LOTO safeguards in place, and only performed by a qualified or specifically trained operator?	☐ Yes ☐ No
Do all operators understand the function and operation of all safety devices and controls on the machines to which they are assigned?	☐ Yes ☐ No
Are safety devices checked and tested at the beginning of each work shift (or for continuous running machines at each period of down time)?	☐ Yes ☐ No
Safeguard Design Considerations	
Are safety devices checked and tested prior to placing the machine back into service after repair, adjustment or maintenance?	☐ Yes ☐ No
Are operators protected by safeguards from nips, rotating or flying parts, point-of operation hazards, moving chains and gears, chips or sparks?	☐ Yes ☐ No
Do general safeguards prevent any part of the operator's body from being in the danger zone during the operating cycle?	☐ Yes ☐ No
Are safeguards affixed to the machines (or where not feasible, secured elsewhere) to protect the operators from hazards?	☐ Yes ☐ No
Are point-of-operation guards designed and constructed to prevent any part of the body from entering the danger zone during the operating cycle?	☐ Yes ☐ No
Are guards firmly secured, not easily removed, and constructed of appropriate materials for the type of work performed?	☐ Yes ☐ No
Are guards constructed and set so they do not present additional hazards?	☐ Yes ☐ No
Where drums or barrels are revolving (tumble blending) to blend materials, is an enclosure that is interlocked with the drive mechanism present and functioning properly?	☐ Yes ☐ No
Are fans less than seven feet above the floor guarded with an opening no larger than ½ inch?	☐ Yes ☐ No
Is equipment designed for a fixed location secured to prevent tipping, walking or moving?	☐ Yes ☐ No
Are special tools for placing or adjusting materials readily available to supplement protective devices, where required?	☐ Yes ☐ No

Description of Requirement	Compliant?
Mechanical/Power Presses Equipped with Presence-Sensing Devices	
Friction brakes are capable of quickly stopping the operation of the press and of holding the slide in constant position.	☐ Yes ☐ No
Foot pedals are protected to prevent accidental operation of the machine by falling objects or by stepping on the pedals.	☐ Yes ☐ No
Foot pedals have pads with non-slip contact areas.	☐ Yes ☐ No
Foot pedal return spring(s) are of the compression type or are designed to prevent interleaving of spring coils in the event of breakage.	☐ Yes ☐ No
Foot pedal counterweight paths of travel are enclosed.	☐ Yes ☐ No
Hand lever operated power presses have a spring latch on the operating lever.	☐ Yes ☐ No
The operating levers on hand-tripped presses having more than one operating station are interlocked to prevent the tripping of the press except by the concurrent use of all levers.	☐ Yes ☐ No
On machines using part revolution clutches in addition to the above, a red color stop control is used to open the clutch, apply the brake and stop the machine.	☐ Yes ☐ No
The main power disconnect switch on each machine is capable of being locked only in the main OFF position.	☐ Yes ☐ No
The motor start button is protected by a guard, cover, etc., to prevent accidental operation.	☐ Yes ☐ No
Mechanical power press controls have drive motor-starters that automatically disconnect from the power source when there is a power failure.	☐ Yes ☐ No
Electrical clutch/brake control electrical circuits have features that will prevent an accidental ground in the control circuit causing false operation of the press.	☐ Yes ☐ No
The electronic device is operated from a closed electric circuit so that the interruption of current prevents the machinery from cycling.	☐ Yes ☐ No
The facility utilized the formula found in 29CFR1910.217(c) (3) (iii) (e) when determining the safe distance from sensing field to the point of operation.	☐ Yes ☐ No
The device is not used on full revolution mechanical power presses (i.e. can only be used with part revolution mechanical power presses).	☐ Yes ☐ No
Machinery with Two Hand Controls	
Controls are installed and supervised to prevent operation by one hand only.	☐ Yes ☐ No
Controls are located far enough apart to prevent operation with the hand and elbow of one arm.	☐ Yes ☐ No
Separate two-hand controls requiring concurrent activation are provided for each operator when press tasks require two operators.	☐ Yes ☐ No
The facility utilizes the formula found in 29CFR1910.217(c) (d) (vii) (c) to ensure that controls are located far enough from the point of operation to prevent the operator from reaching the danger zone after energizing the controls.	☐ Yes ☐ No

Description of Requirement	Compliant?
Woodworking Machinery (table saws, band saws, etc.)	
All belts, pulleys, gears, shafts and moving parts are guarded in accordance with 29CFR1910.219.	☐ Yes ☐ No
Controls are arranged so that an operator may cut off the power from the machine without leaving their position at the point of operation.	☐ Yes ☐ No
• Saws are guarded by an adjustable hood or enclosure capable of adjusting to the size of the material being cut.	☐ Yes ☐ No
• Radial arm saws have a return.	☐ Yes ☐ No
• Disk sanding machines have a guard enclosing the revolving disk.	☐ Yes ☐ No
Abrasive Wheel Machinery	
The spindle end, nut and flange projections are guarded.	☐ Yes ☐ No
Work rests are in place and kept adjusted close to the wheel (1/8 inch maximum).	☐ Yes ☐ No
The distance between the wheel periphery and the tongue guard does not exceed ¼ inch.	☐ Yes ☐ No
Press Brakes	
Do brake monitors automatically prevent the activation of a successive stroke if the safe stopping time or distance could fall outside set limitations (do they monitor each stroke)?	☐ Yes ☐ No
Do type B and movable barrier device monitors detect slide top-stop overrun beyond normal limits?	☐ Yes ☐ No
Do monitors provide an indication (visual or audible) when brake performance has deteriorated outside set limits?	☐ Yes ☐ No

NOISE EXPOSURE AND HEARING CONSERVATION PROGRAM ASSESSMENT

Facility or Area:	Assessor:	Date:

Description of Requirement	Compliant?
Hearing Conservation Coordinator (HCC)	
Has management designated a Hearing Conservation Coordinator (HCC)?	☐ Yes ☐ No
Does management understand the responsibilities of the HCC and provide sufficient time, resources and authority?	☐ Yes ☐ No
Has the (HCC) attended training presented by an Audiologist?	☐ Yes ☐ No
Has the HCC read and understood the Hearing Conservation regulations?	☐ Yes ☐ No
Has the HCC read the most current company noise exposure report(s)?	☐ Yes ☐ No
Does the HCC understand that he/she must be aware of any changes that could increase/decrease noise exposure in the areas and assess these changes?	☐ Yes ☐ No
Does the HCC understand that he/she must be notified prior to any change in the length of scheduled work shifts to assess the effects on noise exposures?	☐ Yes ☐ No
Exposure Controls	
Does any new equipment or machinery meet an 80 dB noise limit?	☐ Yes ☐ No
Has the HCC verified that any hearing/noise reduction recommendations made have been implemented, or that a plan and timeline exist?	☐ Yes ☐ No
Has the HCC or management explored feasible noise control engineering for each area, or has a plan and timeline to do so?	☐ Yes ☐ No
Is a plan and timeline in place to reduce exposure of persons in noise zones to less than 100% dose (90 dBA as an 8-hour average)?	☐ Yes ☐ No
Noise Zone Member Training	
Has each member of the Noise Zone attended the introductory training class?	☐ Yes ☐ No
Has each member of the Noise Zone received localized, site-specific annual training taught by a trained and qualified HCC or other designated person?	☐ Yes ☐ No
Hearing Protection Equipment	
Is a variety of hearing protection readily available?	☐ Yes ☐ No
Does management enforce the use of hearing protection in the Noise Zone?	☐ Yes ☐ No

Description of Requirement	Compliant?
Noise Zone Compliance	
Is a copy of OSHA 29CFR1910.95 posted in the Noise Zone?	☐ **YES** ☐ **NO**
Has each member of the Noise Zone been made aware of the details of the Noise Zone and which operations require the use of hearing protection?	☐ **YES** ☐ **NO**
Does each member of the Noise Zone receive annual audiograms?	☐ **YES** ☐ **NO**
Is a process or procedure in place that ensures any new members of the Noise Zone receive baseline audiograms within 6 months of assignment?	☐ **YES** ☐ **NO**
Has the HCC verified that the appropriate “Noise Zone – Hearing Protection Required” signs are properly displayed at the entrance to Noise Zones?	☐ **YES** ☐ **NO**
Are “Hearing Protection required” stickers affixed to identified tools?	☐ **YES** ☐ **NO**
Do all members of the noise zone wear hearing protection when required?	☐ **YES** ☐ **NO**

Guidelines for Interaction with OSHA Representatives

OSHA Has Sent A Letter:

1) Read through the ENTIRE letter and accompanying documents before taking any action.
2) Follow the instructions.
   - If you need more time than what is allotted, call the OSHA officer who initiated the letter and speak with them regarding a stay for more time.
3) Document your activities.
   - Maintain any procedures, documents, training attendance rosters or similar documentation of activities
   - Maintain any receipts, for materials or services purchased
   - Where appropriate, take pictures of the area of violation before and after corrective measures.
4) Maintain applicable documentation for 3 years.

OSHA Is On The Phone:

1) The most frequent reason for a phone call from OSHA is due to an employee complaint. The second most frequent reason is that your company did not respond to a letter or fax previously sent, requesting information from your company.
2) Speak to them.
   - Be polite, disclosing only the information requested. Do not be argumentative.
   - Take notes during the call, so nothing is forgotten.
   - Answer the questions truthfully.
   - Thoroughly document Compliance Office requirements and expectations to comply.
   - Mark your calendar for any follow-up date requirements.
3) Follow through with more information, as needed.
   - Comply, by the required date, submitting requested documentation, emails or phone calls required to close the issue.
4) Request an acknowledgement from OSHA when the case is closed whether or not there was any action taken.
5) Maintain applicable documentation for 3 years.

OSHA Is At The Door:

1) Let them in.
   - You have the right to refuse entry but OSHA has the right get a warrant from local law enforcement to enter at a future date.
2) The company owner or manager should lead the initial discussions with OSHA.
   - If the owner or manager is not on the premises, ask the OSHA Compliance Officer if they would consider coming back later in the day or on another day.
   - If the OSHA compliance officer is not willing to delay the inspection, ask the most senior staff member available to lead the inspection.
3) Ask the OSHA Compliance Officer what the scope of the visit is and specifically what the visit is related to.
   - If the visit is a general inspection, then the whole facility is open to inspection (and citation).
   - If the visit is based on an employee complaint or a specific process or hazard, then generally only that process or machinery is open to inspection (and/or citation).

Guidelines for Interaction with OSHA Representatives

OSHA Is At The Door (continued):

4) Provide a conference room or office for the OSHA Compliance Officer to work in.
5) Request an Opening Meeting, if the OSHA compliance Officer does not offer one.
   - Senior managers from facility areas that fall within the scope of the inspection should attend the opening meeting.
6) Upon request, present applicable records, documents or employees to the compliance officers, rather than have the compliance officers walking around your facility.
   - To the extent possible, try to limit the amount of time the compliance officers spend "on the floor" to prevent additional citations.
   - Explain to any employees being interviewed on what to expect during an interview (types of questions, etc.). Do not council the employee on what to say or what not to say.
   - The employees can, when interviewed by the compliance officers, choose to have a company manager present, or can refuse to have the company manager present, either one. Company mangers should not interfere with the compliance officers' interview, simply take notes and observe.
   - Have someone available as a "runner" in case more details or further documentation (records, procedures, training attendance rosters, etc.) are needed by the Compliance Officers.
7) Accompany the OSHA compliance Officer want during the facility walkthrough.
   - Only offer information as requested. Do not volunteer additional information.
   - Take the most direct route to the area of violation. Avoid the "scenic" route or "tour." The less the compliance officer sees, the less opportunities for citation.
   - If the Compliance Officer conducts monitoring or takes photos, take a duplicate sample or photo of the same scene for facility records.
8) A closing conference will be set by the compliance officer.
   - If the inspection occurs over several days, request a brief end of day closing closing meeting. This provides the opportunity to make violation/finding corrections while the inspection is on-going potentially limiting the citation fines imposed.
   - The final closing conference may not be immediately after the inspection, it may be several days later
   - The official listing of citations and fines will be mailed to you, generally within 3 weeks of the inspection.

Industries Partially Exempt
From OSHA Recordkeeping Requirements (NAICS Codes)

4412	Other Motor Vehicle Dealers	**5151**	Radio and Television Broadcasting	**5412**	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	**6213**	Offices of Other Health Practitioners
4431	Electronics and Appliance Stores	**5172**	Wireless Telecommunications Carriers (except Satellite)	**5413**	Architectural, Engineering, and Related Services	**6214**	Outpatient Care Centers
4461	Health and Personal Care Stores	**5173**	Telecommunications Resellers	**5414**	Specialized Design Services	**6215**	Medical and Diagnostic Laboratories
4471	Gasoline Stations	**5179**	Other Telecommunications	**5415**	Computer Systems Design and Related Services	**6244**	Child Day Care Services
4481	Clothing Stores	**5181**	Internet Service Providers and Web Search Portals	**5416**	Management, Scientific, and Technical Consulting Services	**7114**	Agents & Mgrs for Artists/Athletes/Entertain/ Other Public Figures
4482	Shoe Stores	**5182**	Data Processing, Hosting, and Related Services	**5417**	Scientific Research and Development Services	**7115**	Independent Artists, Writers, and Performers
4483	Jewelry, Luggage, and Leather Goods Stores	**5191**	Other Information Services	**5418**	Advertising and Related Services	**7213**	Rooming and Boarding Houses
4511	Sporting Goods, Hobby, and Musical Instrument Stores	**5211**	Monetary Authorities - Central Bank	**5511**	Management of Companies and Enterprises	**7221**	Full-Service Restaurants
4512	Book, Periodical, and Music Stores	**5221**	Depository Credit Intermediation	**5611**	Office Administrative Services	**7222**	Limited-Service Eating Places
4531	Florists	**5222**	Nondepository Credit Intermediation	**5614**	Business Support Services	**7224**	Drinking Places (Alcoholic Beverages)
4532	Office Supplies, Stationery, and Gift Stores	**5223**	Activities Related to Credit Intermediation	**5615**	Travel Arrangement and Reservation Services	**8112**	Electronic and Precision Equipment Repair and Maintenance
4812	Nonscheduled Air Transportation	**5231**	Securities and Commodity Contracts Intermediation and Brokerage	**5616**	Investigation and Security Services	**8114**	Personal and Household Goods Repair and Maintenance
4861	Pipeline Transportation of Crude Oil	**5232**	Securities and Commodity Exchanges	**6111**	Elementary and Secondary Schools	**8121**	Personal Care Services
4862	Pipeline Transportation of Natural Gas	**5239**	Other Financial Investment Activities	**6112**	Junior Colleges	**8122**	Death Care Services
4869	Other Pipeline Transportation	**5241**	Insurance Carriers	**6113**	Colleges, Universities, and Professional Schools	**8131**	Religious Organizations
4879	Scenic and Sightseeing Transportation, Other	**5242**	Agencies, Brokerages, and Other Insurance Related Activities	**6114**	Business Schools and Computer and Mgmt Training	**8132**	Grantmaking and Giving Services
4885	Freight Transportation Arrangement	**5251**	Insurance and Employee Benefit Funds	**6115**	Technical and Trade Schools	**8133**	Social Advocacy Organizations
5111	Newspaper, Periodical, Book, and Directory Publishers	**5259**	Other Investment Pools and Funds	**6116**	Other Schools and Instruction	**8134**	Civic and Social Organizations
5112	Software Publishers	**5312**	Offices of Real Estate Agents and Brokers	**6117**	Educational Support Services	**8139**	Business, Professional, Labor, Political, and Similar Organizations
5121	Motion Picture and Video Industries	**5331**	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	**6211**	Offices of Physicians		
5122	Sound Recording Industries	**5411**	Legal Services	**6212**	Offices of Dentists		

OSHA
Forms for Recording
Work-Related Injuries and Illnesses

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

Dear Employer:

This booklet includes the forms needed for maintaining occupational injury and illness records for 2004. These new forms have changed in several important ways from the 2003 recordkeeping forms.

In the December 17, 2002 Federal Register (67 FR 77165-77170), OSHA announced its decision to add an occupational hearing loss column to OSHA's Form 300, Log of Work-Related Injuries and Illnesses. This forms package contains modified Forms 300 and 300A which incorporate the additional column M(5) Hearing Loss. Employers required to complete the injury and illness forms must begin to use these forms on January 1, 2004.

In response to public suggestions, OSHA also has made several changes to the forms package to make the recordkeeping materials clearer and easier to use:

- On Form 300, we've switched the positions of the day count columns. The days "away from work" column now comes before the days "on job transfer or restriction."
- We've clarified the formulas for calculating incidence rates.
- We've added new recording criteria for occupational hearing loss to the "Overview" section.
- On Form 300, we've made the column heading "Classify the Case" more prominent to make it clear that employers should mark only one selection among the four columns offered.

The Occupational Safety and Health Administration shares with you the goal of preventing injuries and illnesses in our nation's workplaces. Accurate injury and illness records will help us achieve that goal.

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

What's Inside...

In this package, you'll find everything you need to complete OSHA's *Log* and the *Summary of Work-Related Injuries and Illnesses* for the next several years. On the following pages, you'll find:

- ***An Overview: Recording Work-Related Injuries and Illnesses —*** General instructions for filling out the forms in this package and definitions of terms you should use when you classify your cases as injuries or illnesses.

- ***How to Fill Out the Log —*** An example to guide you in filling out the *Log* properly.

- ***Log of Work-Related Injuries and Illnesses —*** Several pages of the *Log* (but you may make as many copies of the *Log* as you need.) Notice that the *Log* is separate from the *Summary*.

- ***Summary of Work-Related Injuries and Illnesses —*** Removable *Summary* pages for easy posting at the end of the year. Note that you post the *Summary* only, not the *Log*.

- ***Worksheet to Help You Fill Out the Summary —*** A worksheet for figuring the average number of employees who worked for your establishment and the total number of hours worked.

- ***OSHA's 301: Injury and Illness Incident Report —*** A copy of the OSHA 301 to provide details about the incident. You may make as many copies as you need or use an equivalent form.

Take a few minutes to review this package. If you have any questions, ***visit us online at www.osha. gov*** **or** ***call your local OSHA office.*** We'll be happy to help you.

An Overview: Recording Work-Related Injuries and Illnesses

The Occupational Safety and Health (OSH) Act of 1970 requires certain employers to prepare and maintain records of work-related injuries and illnesses. Use these definitions when you classify cases on the Log. OSHA's recordkeeping regulation (see 29 CFR Part 1904) provides more information about the definitions below.

The *Log of Work-Related Injuries and Illnesses* (Form 300) is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened. The *Summary* — a separate form (Form 300A) — shows the totals for the year in each category. At the end of the year, post the *Summary* in a visible location so that your employees are aware of the injuries and illnesses occurring in their workplace.

Employers must keep a *Log* for each establishment or site. If you have more than one establishment, you must keep a separate *Log* and *Summary* for each physical location that is expected to be in operation for one year or longer.

Note that your employees have the right to review your injury and illness records. For more information, see 29 Code of Federal Regulations Part 1904.35, *Employee Involvement*.

Cases listed on the *Log of Work-Related Injuries and Illnesses* are not necessarily eligible for workers' compensation or other insurance benefits. Listing a case on the *Log* does not mean that the employer or worker was at fault or that an OSHA standard was violated.

When is an injury or illness considered work-related?

An injury or illness is considered work-related if an event or exposure in the work environment caused or contributed to the condition or significantly aggravated a preexisting condition. Work-relatedness is presumed for injuries and illnesses resulting from events or exposures occurring in the workplace, unless an exception specifically applies. See 29 CFR Part 1904.5(b)(2) for the exceptions. The work environment includes the establishment and other locations where one or more employees are working or are present as a condition of their employment. See 29 CFR Part 1904.5(b)(1).

Which work-related injuries and illnesses should you record?

Record those work-related injuries and illnesses that result in:

- death,
- loss of consciousness,
- days away from work,
- restricted work activity or job transfer, or
- medical treatment beyond first aid.

You must also record work-related injuries and illnesses that are significant (as defined below) or meet any of the additional criteria listed below.

You must record any significant work-related injury or illness that is diagnosed by a physician or other licensed health care professional. You must record any work-related case involving cancer, chronic irreversible disease, a fractured or cracked bone, or a punctured eardrum. See 29 CFR 1904.7.

What are the additional criteria?

You must record the following conditions when they are work-related:

- any needlestick injury or cut from a sharp object that is contaminated with another person's blood or other potentially infectious material;
- any case requiring an employee to be medically removed under the requirements of an OSHA health standard;
- tuberculosis infection as evidenced by a positive skin test or diagnosis by a physician or other licensed health care professional after exposure to a known case of active tuberculosis.
- an employee's hearing test (audiogram) reveals 1) that the employee has experienced a Standard Threshold Shift (STS) in hearing in one or both ears (averaged at 2000, 3000, and 4000 Hz) and 2) the employee's total hearing level is 25 decibels (dB) or more above audiometric zero (also averaged at 2000, 3000, and 4000 Hz) in the same ear(s) as the STS.

What is medical treatment?

Medical treatment includes managing and caring for a patient for the purpose of combating disease or disorder. The following are not considered medical treatments and are NOT recordable:

- visits to a doctor or health care professional solely for observation or counseling;

What do you need to do?

1. Within 7 calendar days after you receive information about a case, decide if the case is recordable under the OSHA recordkeeping requirements.
2. Determine whether the incident is a new case or a recurrence of an existing one.
3. Establish whether the case was work-related.
4. If the case is recordable, decide which form you will fill out as the injury and illness incident report.

   You may use *OSHA's 301: Injury and Illness Incident Report* or an equivalent form. Some state workers compensation, insurance, or other reports may be acceptable substitutes, as long as they provide the same information as the OSHA 301.

How to work with the Log

1. Identify the employee involved unless it is a privacy concern case as described below.
2. Identify when and where the case occurred.
3. Describe the case, as specifically as you can.
4. Classify the seriousness of the case by recording the **most serious outcome** associated with the case, with column G (Death) being the most serious and column J (Other recordable cases) being the least serious.
5. Identify whether the case is an injury or illness. If the case is an injury, check the injury category. If the case is an illness, check the appropriate illness category.

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- diagnostic procedures, including administering prescription medications that are used solely for diagnostic purposes; and
- any procedure that can be labeled first aid. (*See below for more information about first aid.*)

What is first aid?

If the incident required only the following types of treatment, consider it first aid. Do NOT record the case if it involves only:

- using non-prescription medications at non-prescription strength;
- administering tetanus immunizations;
- cleaning, flushing, or soaking wounds on the skin surface;
- using wound coverings, such as bandages, BandAids™, gauze pads, etc., or using SteriStrips™ or butterfly bandages.
- using hot or cold therapy;
- using any totally non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc.;
- using temporary immobilization devices while transporting an accident victim (splints, slings, neck collars, or back boards).
- drilling a fingernail or toenail to relieve pressure, or draining fluids from blisters;
- using eye patches;
- using simple irrigation or a cotton swab to remove foreign bodies not embedded in or adhered to the eye;
- using irrigation, tweezers, cotton swab or other simple means to remove splinters or foreign material from areas other than the eye;
- using finger guards;
- using massages;
- drinking fluids to relieve heat stress

How do you decide if the case involved restricted work?

Restricted work activity occurs when, as the result of a work-related injury or illness, an employer or health care professional keeps, or recommends keeping, an employee from doing the routine functions of his or her job or from working the full workday that the employee would have been scheduled to work before the injury or illness occurred.

How do you count the number of days of restricted work activity or the number of days away from work?

Count the number of calendar days the employee was on restricted work activity or was away from work as a result of the recordable injury or illness. Do not count the day on which the injury or illness occurred in this number. Begin counting days from the day after the incident occurs. If a single injury or illness involved both days away from work and days of restricted work activity, enter the total number of days for each. You may stop counting days of restricted work activity or days away from work once the total of either or the combination of both reaches 180 days.

Under what circumstances should you NOT enter the employee's name on the OSHA Form 300?

You must consider the following types of injuries or illnesses to be privacy concern cases:

- an injury or illness to an intimate body part or to the reproductive system,
- an injury or illness resulting from a sexual assault,
- a mental illness,
- a case of HIV infection, hepatitis, or tuberculosis,
- a needlestick injury or cut from a sharp object that is contaminated with blood or other potentially infectious material (see 29 CFR Part 1904.8 for definition), and
- other illnesses, if the employee independently and voluntarily requests that his or her name not be entered on the log.

You must not enter the employee's name on the OSHA 300 *Log* for these cases. Instead, enter "privacy case" in the space normally used for the employee's name. You must keep a separate, confidential list of the case numbers and employee names for the establishment's privacy concern cases so that you can update the cases and provide information to the government if asked to do so.

If you have a reasonable basis to believe that information describing the privacy concern case may be personally identifiable even though the employee's name has been omitted, you may use discretion in describing the injury or illness on both the OSHA 300 and 301 forms. You must enter enough information to identify the cause of the incident and the general severity of the injury or illness, but you do not need to include details of an intimate or private nature.

What if the outcome changes after you record the case?

If the outcome or extent of an injury or illness changes after you have recorded the case, simply draw a line through the original entry or, if you wish, delete or white-out the original entry. Then write the new entry where it belongs. Remember, you need to record the most serious outcome for each case.

Classifying injuries

An injury is any wound or damage to the body resulting from an event in the work environment.

Examples: Cut, puncture, laceration, abrasion, fracture, bruise, contusion, chipped tooth, amputation, insect bite, electrocution, or a thermal, chemical, electrical, or radiation burn. Sprain and strain injuries to muscles, joints, and connective tissues are classified as injuries when they result from a slip, trip, fall or other similar accidents.

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Classifying illnesses

Skin diseases or disorders

Skin diseases or disorders are illnesses involving the worker's skin that are caused by work exposure to chemicals, plants, or other substances.

Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; friction blisters, chrome ulcers; inflammation of the skin.

Respiratory conditions

Respiratory conditions are illnesses associated with breathing hazardous biological agents, chemicals, dust, gases, vapors, or fumes at work.

Examples: Silicosis, asbestosis, pneumonitis, pharyngitis, rhinitis or acute congestion; farmer's lung, beryllium disease, tuberculosis, occupational asthma, reactive airways dysfunction syndrome (RADS), chronic obstructive pulmonary disease (COPD), hypersensitivity pneumonitis, toxic inhalation injury, such as metal fume fever, chronic obstructive bronchitis, and other pneumoconioses.

Poisoning

Poisoning includes disorders evidenced by abnormal concentrations of toxic substances in blood, other tissues, other bodily fluids, or the breath that are caused by the ingestion or absorption of toxic substances into the body.

Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals; poisoning by carbon monoxide, hydrogen sulfide, or other gases; poisoning by benzene, benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays, such as parathion or lead arsenate; poisoning by other chemicals, such as formaldehyde.

Hearing Loss

Noise-induced hearing loss is defined for recordkeeping purposes as a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more in either ear at 2000, 3000 and 4000 hertz, and the employee's total hearing level is 25 decibels (dB) or more above audiometric zero (also averaged at 2000, 3000, and 4000 hertz) in the same ear(s).

All other illnesses

All other occupational illnesses.

Examples: Heatstroke, sunstroke, heat exhaustion, heat stress and other effects of environmental heat; freezing, frostbite, and other effects of exposure to low temperatures; decompression sickness; effects of ionizing radiation (isotopes, x-rays, radium); effects of nonionizing radiation (welding flash, ultra-violet rays, lasers); anthrax; bloodborne pathogenic diseases, such as AIDS, HIV, hepatitis B or hepatitis C; brucellosis; malignant or benign tumors; histoplasmosis; coccidioidomycosis.

When must you post the Summary?

You must post the *Summary* only — not the *Log* — by February 1 of the year following the year covered by the form and keep it posted until April 30 of that year.

How long must you keep the Log and Summary on file?

You must keep the *Log* and *Summary* for 5 years following the year to which they pertain.

Do you have to send these forms to OSHA at the end of the year?

No. You do not have to send the completed forms to OSHA unless specifically asked to do so.

How can we help you?

If you have a question about how to fill out the *Log*,

- ❑ ***visit us online at www.osha.gov*** or
- ❑ ***call your local OSHA office.***

Optional

Calculating Injury and Illness Incidence Rates

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What is an incidence rate?

An incidence rate is the number of recordable injuries and illnesses occurring among a given number of full-time workers (usually 100 full-time workers) over a given period of time (usually one year). To evaluate your firm's injury and illness experience over time or to compare your firm's experience with that of your industry as a whole, you need to compute your incidence rate. Because a specific number of workers and a specific period of time are involved, these rates can help you identify problems in your workplace and/or progress you may have made in preventing work-related injuries and illnesses.

How do you calculate an incidence rate?

You can compute an occupational injury and illness incidence rate for all recordable cases or for cases that involved days away from work for your firm quickly and easily. The formula requires that you follow instructions in paragraph (a) below for the total recordable cases or those in paragraph (b) for cases that involved days away from work, *and* for both rates the instructions in paragraph (c).

(a) *To find out the total number of recordable injuries and illnesses that occurred during the year,* count the number of line entries on your OSHA Form 300, or refer to the OSHA Form 300A and sum the entries for columns (G), (H), (I), and (J).

(b) *To find out the number of injuries and illnesses that involved days away from work,* count the number of line entries on your OSHA Form 300 that received a check mark in column (H), or refer to the entry for column (H) on the OSHA Form 300A.

(c) *The number of hours all employees actually worked during the year*. Refer to OSHA Form 300A and optional worksheet to calculate this number.

You can compute the incidence rate for all recordable cases of injuries and illnesses using the following formula:

Total number of injuries and illnesses x *200,000* ÷ *Number of hours worked by all employees* = *Total recordable case rate*

(The 200,000 figure in the formula represents the number of hours 100 employees working 40 hours per week, 50 weeks per year would work, and provides the standard base for calculating incidence rates.)

You can compute the incidence rate for recordable cases involving days away from work, days of restricted work activity or job transfer (DART) using the following formula:

(Number of entries in column H + Number of entries in column I) x *200,000* ÷ *Number of hours worked by all employees* = *DART incidence rate*

You can use the same formula to calculate incidence rates for other variables such as cases involving restricted work activity (column (I) on Form 300A), cases involving skin disorders (column (M-2) on Form 300A), etc. Just substitute the appropriate total for these cases, from Form 300A, into the formula in place of the total number of injuries and illnesses.

What can I compare my incidence rate to?

The Bureau of Labor Statistics (BLS) conducts a survey of occupational injuries and illnesses each year and publishes incidence rate data by various classifications (e.g., by industry, by employer size, etc.). You can obtain these published data at www.bls.gov/iif or by calling a BLS Regional Office.

Worksheet

Total number of injuries and illnesses			Number of hours worked by all employees		Total recordable case rate
	X 200,000	÷		=	

Number of entries in Column H + Column I			Number of hours worked by all employees		DART incidence rate
	X 200,000	÷		=	

How to Fill Out the Log

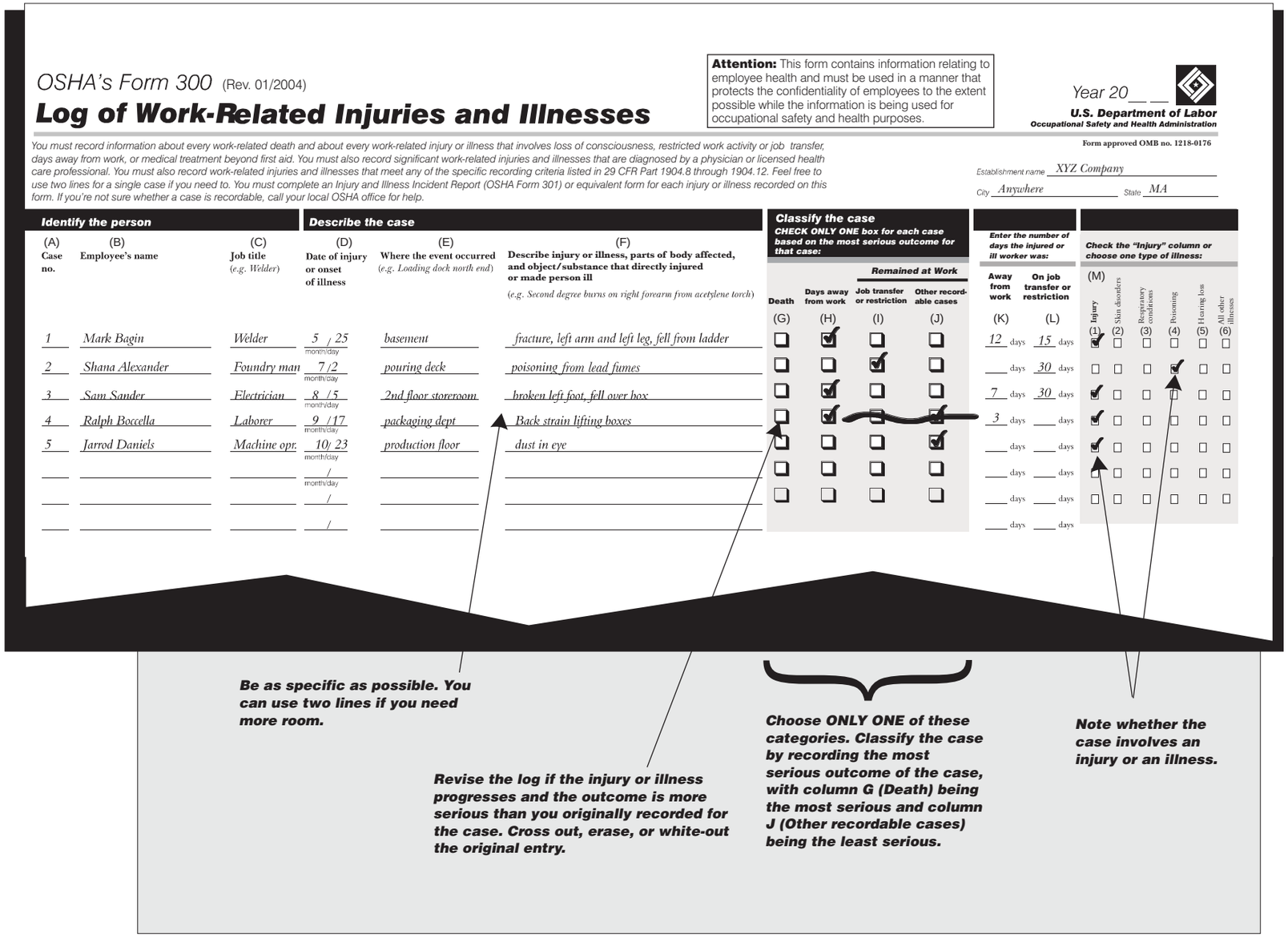
The *Log of Work-Related Injuries and Illnesses* is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened.

If your company has more than one establishment or site, you must keep separate records for each physical location that is expected to remain in operation for one year or longer.

We have given you several copies of the *Log* in this package. If you need more than we provided, you may photocopy and use as many as you need.

The *Summary* — a separate form — shows the work-related injury and illness totals for the year in each category. At the end of the year, count the number of incidents in each category and transfer the totals from the *Log* to the *Summary*. Then post the *Summary* in a visible location so that your employees are aware of injuries and illnesses occurring in their workplace.

You don't post the Log. You post only the Summary at the end of the year.



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

Log of Work-Related Injuries and Illnesses

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

Year 20__ __

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

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name XYZ Company
City Anywhere State MA

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
							Remained at Work										
(A) Case no.	(B) Employee's name	(C) Job title (*e.g. Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g. Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g. Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	(M) Injury (1)	Skin disorders (2)	Respiratory conditions (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
1	Mark Bagin	Welder	5/25	basement	fracture, left arm and left leg, fell from ladder	☐	☑	☐	☐	12 days	15 days	☑	☐	☐	☐	☐	☐
2	Shana Alexander	Foundry man	7/2	pouring deck	poisoning from lead fumes	☐	☐	☑	☐	___ days	30 days	☐	☐	☐	☑	☐	☐
3	Sam Sander	Electrician	8/5	2nd floor storeroom	broken left foot, fell over box	☐	☑	☐	☐	7 days	30 days	☑	☐	☐	☐	☐	☐
4	Ralph Boccella	Laborer	9/17	packaging dept	Back strain lifting boxes	☐	☑	☐	☐	3 days	___ days	☑	☐	☐	☐	☐	☐
5	Jarrod Daniels	Machine opr.	10/23	production floor	dust in eye	☐	☐	☐	☑	___ days	___ days	☑	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days						

Be as specific as possible. You can use two lines if you need more room.

Revise the log if the injury or illness progresses and the outcome is more serious than you originally recorded for the case. Cross out, erase, or white-out the original entry.

Choose ONLY ONE of these categories. Classify the case by recording the most serious outcome of the case, with column G (Death) being the most serious and column J (Other recordable cases) being the least serious.

Note whether the case involves an injury or an illness.

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

Log of Work-Related Injuries and Illnesses

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

Year 20__ __

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

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ____________________

City ____________________ State ____________

Identify the person			Describe the case			Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Remained at Work: Job transfer or restriction (I)	Remained at Work: Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
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____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
____	____	____	__/__ month/day	____	____	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
					Page totals➤	____	____	____	____	____	____	____	____	____	____	____	____
												Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

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

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

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

Summary of Work-Related Injuries and Illnesses

Year 20__ __

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

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .

(M)

(1) Injuries _____

(2) Skin disorders _____

(3) Respiratory conditions _____

(4) Poisonings _____

(5) Hearing loss _____

(6) All other illnesses _____

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

___ ___ ___ ___

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

___ ___ ___ ___ ___ ___

Employment information *(If you don't have these figures, see the Worksheet on the back of this page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

( ) - / /
Phone Date

Optional

Worksheet to Help You Fill Out the Summary

At the end of the year, OSHA requires you to enter the average number of employees and the total hours worked by your employees on the summary. If you don't have these figures, you can use the information on this page to estimate the numbers you will need to enter on the Summary page at the end of the year.

How to figure the average number of employees who worked for your establishment during the year:

❶ ***Add*** the total number of employees your establishment paid in all pay periods during the year. Include all employees: full-time, part-time, temporary, seasonal, salaried, and hourly.

The number of employees paid in all pay periods = ❶ _____

❷ ***Count*** the number of pay periods your establishment had during the year. Be sure to include any pay periods when you had no employees.

The number of pay periods during the year = ❷ _____

❸ ***Divide*** the number of employees by the number of pay periods.

❶ / ❷ _____ = ❸ _____

❹ ***Round the answer*** to the next highest whole number. Write the rounded number in the blank marked *Annual average number of employees*.

The number rounded = ❹ _____

For example, Acme Construction figured its average employment this way:

For pay period...	Acme paid this number of employees...
1	10
2	0
3	15
4	30
5	40
▼	▼
24	20
25	15
26	+10
	830

Number of employees paid = 830 ❶

Number of pay periods = 26 ❷

830 / 26 = 31.92 ❸

31.92 rounds to 32 ❹

32 is the annual average number of employees

How to figure the total hours worked by all employees:

Include hours worked by salaried, hourly, part-time and seasonal workers, as well as hours worked by other workers subject to day to day supervision by your establishment (e.g., temporary help services workers).

Do not include vacation, sick leave, holidays, or any other non-work time, even if employees were paid for it. If your establishment keeps records of only the hours paid or if you have employees who are not paid by the hour, please estimate the hours that the employees actually worked.

If this number isn't available, you can use this optional worksheet to estimate it.

Optional Worksheet

_____ ***Find*** the number of full-time employees in your establishment for the year.

X _____ ***Multiply*** by the number of work hours for a full-time employee in a year.

_____ This is the number of full-time hours worked.

\+ _____ ***Add*** the number of any overtime hours as well as the hours worked by other employees (part-time, temporary, seasonal)

_____ ***Round*** the answer to the next highest whole number. Write the rounded number in the blank marked *Total hours worked by all employees last year.*

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

OSHA's Form 301
Injury and Illness Incident Report

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

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

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary,* these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (_____)_____--_____ **Date** ____/ ____/ ____

Information about the employee

1) **Full name** _____

2) **Street** _____

City _____ **State** _____ **ZIP** _____

3) **Date of birth** _____ / _____ / _____

4) **Date hired** _____ / _____ / _____

5) ❒ **Male**
❒ **Female**

Information about the physician or other health care professional

6) **Name of physician or other health care professional** _____

_____

7) **If treatment was given away from the worksite, where was it given?**

Facility _____

Street _____

City _____ **State** _____ **ZIP** _____

8) **Was employee treated in an emergency room?**
❒ **Yes**
❒ **No**

9) **Was employee hospitalized overnight as an in-patient?**
❒ **Yes**
❒ **No**

Information about the case

10) **Case number from the *Log*** _____ *(Transfer the case number from the Log after you record the case.)*

11) **Date of injury or illness** _____ / _____ / _____

12) **Time employee began work** _____ **AM / PM**

13) **Time of event** _____ **AM / PM** ☐ **Check if time cannot be determined**

14) ***What was the employee doing just before the incident occurred?*** **Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific.** ***Examples:*** **"climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."**

15) ***What happened?*** **Tell us how the injury occurred.** ***Examples:*** **"When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."**

16) ***What was the injury or illness?*** **Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore."** ***Examples:*** **"strained back"; "chemical burn, hand"; "carpal tunnel syndrome."**

17) ***What object or substance directly harmed the employee?*** ***Examples:*** **"concrete floor"; "chlorine"; "radial arm saw."** ***If this question does not apply to the incident, leave it blank.***

18) ***If the employee died, when did death occur?*** **Date of death** _____ / _____ / _____

If You Need Help...

If you need help deciding whether a case is recordable, or if you have questions about the information in this package, feel free to contact us. We'll gladly answer any questions you have.

- **Visit us online at www.osha.gov**
- **Call your OSHA Regional office and ask for the recordkeeping coordinator**

  or

- **Call your State Plan office**

Federal Jurisdiction

Region 1 - 617 / 565-9860
Connecticut; Massachusetts; Maine; New Hampshire; Rhode Island

Region 2 - 212 / 337-2378
New York; New Jersey

Region 3 - 215 / 861-4900
DC; Delaware; Pennsylvania; West Virginia

Region 4 - 404 / 562-2300
Alabama; Florida; Georgia; Mississippi

Region 5 - 312 / 353-2220
Illinois; Ohio; Wisconsin

Region 6 - 214 / 767-4731
Arkansas; Louisiana; Oklahoma; Texas

Region 7 - 816 / 426-5861
Kansas; Missouri; Nebraska

Region 8 - 303 / 844-1600
Colorado; Montana; North Dakota; South Dakota

Region 9 - 415 / 975-4310

Region 10 - 206 / 553-5930
Idaho

State Plan States

Alaska - 907 / 269-4957

Arizona - 602 / 542-5795

California - 415 / 703-5100

*Connecticut - 860 / 566-4380

Hawaii - 808 / 586-9100

Indiana - 317 / 232-2688

Iowa - 515 / 281-3661

Kentucky - 502 / 564-3070

Maryland - 410 / 767-2371

Michigan - 517 / 322-1848

Minnesota - 651 / 284-5050

Nevada - 702 / 486-9020

*New Jersey - 609 / 984-1389

New Mexico - 505 / 827-4230

*New York - 518 / 457-2574

North Carolina - 919 / 807-2875

Oregon - 503 / 378-3272

Puerto Rico - 787 / 754-2172

South Carolina - 803 / 734-9669

Tennessee - 615 / 741-2793

Utah - 801 / 530-6901

Vermont - 802 / 828-2765

Virginia - 804 / 786-6613

Virgin Islands - 340 / 772-1315

Washington - 360 / 902-5554

Wyoming - 307 / 777-7786

*Public Sector only

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

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

Have questions?

If you need help in filling out the *Log* or *Summary,* or if you have questions about whether a case is recordable, contact us. We'll be happy to help you. You can:

- Visit us online at: **www.osha.gov**
- Call your regional or state plan office. You'll find the phone number listed inside this cover.

PERSONAL PROTECTIVE EQUIPMENT ASSESSMENT

Area Assessed:	Date:
Assessor(s):	

Description of Requirement	Compliant?
PPE PROGRAM FEATURES	
Is there a written program for the area (i.e., procedures, documentation)?	☐ Yes ☐ No
Are responsibilities listed and assigned?	☐ Yes ☐ No
PPE SURVEY/ASSESSMENT/ANALYSIS	
Are surveys/assessments structured (example: uses Hazard Recognition Checklist and JHA Form)?	☐ Yes ☐ No
Are these surveys integrated with other parts of the company's safety program (example: JHA's and SOPs reflect PPE needs)?	☐ Yes ☐ No
Are reassessments routinely scheduled?	☐ Yes ☐ No
PPE EQUIPMENT SELECTION	
Does PPE meet current national standards (ANSI standards – American National Standards Institute – a recognized agency that provides guidance for specific equipment)?	☐ Yes ☐ No
Does PPE selection involve the area Occupational Health and Safety Service provider(s)?	☐ Yes ☐ No
Does the selection process and available equipment protect against identified hazards and allow for correct type, size, and fit?	☐ Yes ☐ No
Is a process in place to ensure proper PPE supply and maintenance per procedure requirements?	☐ Yes ☐ No
PPE TRAINING	
Is the content of the training program specific to the job, including: • When PPE is necessary? • What PPE is necessary? • How to properly don, doff, adjust, and wear PPE? • Limitations of PPE? • Maintenance, care, useful life, disposal of PPE?	☐ Yes ☐ No
Can the employee demonstrate: • Understanding of training? • Ability to use PPE?	☐ Yes ☐ No
Is there a process in place to initiate retraining when: • Process/workplace changes result in changed PPE requirements (skill/knowledge updates)? • Observations of employee behavior show inadequate understanding?	☐ Yes ☐ No

Description of Requirement	Compliant?
EMPLOYEE PERFORMANCE	
Do interviews with or observations of employees indicate that they know: • When PPE is necessary? • What PPE is necessary? • How to properly don, doff, adjust, and wear PPE? • How to properly maintain & care for PPE? • When and how to properly dispose of PPE at the end of its useful life?	☐ Yes ☐ No
RECORDKEEPING	
Do workplace assessment documents show: • Identity as *Certificate of Hazard Assessment*? • Name of workplace(s) evaluated? • Name of person(s) completing the evaluation? • Date(s) of assessment?	☐ Yes ☐ No
Is attendance for training officially recorded?	☐ Yes ☐ No
Do records indicate that all PPE training is current?	☐ Yes ☐ No
Do records indicate that all new employees receive all necessary PPE training before they begin work?	☐ Yes ☐ No

RESPIRATORY PROTECTION PROGRAM ASSESSMENT

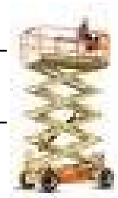
Area or Department Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
General Process	
Are respirators or other respiratory protection methods required by the company? Note that the only exemption from the requirements is for voluntary use of dust-masks only. If employers require dust-masks (or any other form of respiratory protection), or if employees voluntarily wear respiratory protection other than dust-masks, this regulation applies.	☐ Yes ☐ No
Is the work area where respiratory protection is required periodically (and frequently) evaluated to determine: • If respiratory protection is still required • The degree of employee exposure • The degree of stress to employees using respiratory protection	☐ Yes ☐ No
Has a trained respiratory protection coordinator been assigned for the company?	☐ Yes ☐ No
Is the workplace regularly evaluated for methods to reduce or eliminate the need for respiratory protection?	☐ Yes ☐ No
Are respirator users frequently consulted on the effectiveness of the respiratory protection program and to identify any problems?	☐ Yes ☐ No
Written Documentation	
Does a written respiratory protection program exist?	☐ Yes ☐ No
Does the program contain the following elements? • Procedures for selection • Medical evaluation documentation • Fit testing procedures • Proper use procedures • Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding and maintaining respirators • Procedures to ensure adequate air supply and flow • Employee training • Periodic evaluation to assure the program is needed?	☐ Yes ☐ No
Does documentation exist that shows hazards were evaluated and reduction efforts made prior to implementation of respiratory protection?	☐ Yes ☐ No
Are respirators selected based on the hazard, and is this information documented?	☐ Yes ☐ No
Do written procedures exist that specify the selection, use and care of respirators for each task or operation requiring their use?	☐ Yes ☐ No
Are fit-testing procedures in place, and is fit testing performed at least annually?	☐ Yes ☐ No
Do procedures that outline the proper use of respirators include both routine and non-routine uses?	☐ Yes ☐ No
Do schedules (and written procedures) exist for respirator routine cleaning, maintenance and disposal?	☐ Yes ☐ No

Scissor Lift Training Wallet Cards

COMPANY:__________________________

THIS IS TO CERTIFY THAT__________________________ HAS BEEN SUCCESSFULLY TESTED AND TRAINED IN SCISSOR LIFT OPERATIONS USE AND CARE AND IS QUALIFIED TO USE A LIFT.

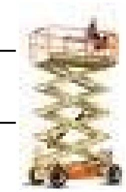


____
OPERATOR SIGNATURE DATE

____
CERTIFIER SIGNATURE DATE

COMPANY:__________________________

THIS IS TO CERTIFY THAT__________________________ HAS BEEN SUCCESSFULLY TESTED AND TRAINED IN SCISSOR LIFT OPERATIONS USE AND CARE AND IS QUALIFIED TO USE A LIFT.



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OPERATOR SIGNATURE DATE

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CERTIFIER SIGNATURE DATE

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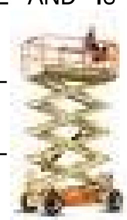

____
OPERATOR SIGNATURE DATE

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CERTIFIER SIGNATURE DATE

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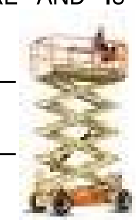

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OPERATOR SIGNATURE DATE

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CERTIFIER SIGNATURE DATE

COMPANY:__________________________

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OPERATOR SIGNATURE DATE

____
CERTIFIER SIGNATURE DATE

COMPANY:__________________________

THIS IS TO CERTIFY THAT__________________________ HAS BEEN SUCCESSFULLY TESTED AND TRAINED IN SCISSOR LIFT OPERATIONS USE AND CARE AND IS QUALIFIED TO USE A LIFT.

____
OPERATOR SIGNATURE DATE

____
CERTIFIER SIGNATURE DATE

INSTRUCTIONS FOR USE

1. Designate a Trainer/Certifier to conduct the training and testing of all company Scissor Lift Operators.
2. Operator signature is the operator of the lift, the Certified Signature is the person who administered the practical exam.

WALKING AND WORKING SURFACES PROGRAM ASSESSMENT

Facility Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
General Work Environment	
Is a documented, functioning housekeeping program in place?	☐ Yes ☐ No
Are all worksites clean, sanitary and orderly?	☐ Yes ☐ No
Walkways	
Are aisles and passageways kept clear?	☐ Yes ☐ No
Are aisles and walkways marked as appropriate?	☐ Yes ☐ No
Are wet surfaces covered with non-slip materials?	☐ Yes ☐ No
Are holes in the floor, sidewalk or other walking surface repaired properly, covered or otherwise made safe?	☐ Yes ☐ No
Is there safe clearance for walking in aisles where motorized or mechanical handling equipment is operating?	☐ Yes ☐ No
Are materials or equipment stored in such a way that sharp projections will not interfere with the walkway?	☐ Yes ☐ No
Are spilled materials cleaned up immediately?	☐ Yes ☐ No
Are changes of direction or elevation readily identifiable?	☐ Yes ☐ No
Are aisles or walkways that pass near moving or operating machinery, welding operations or similar operations arranged so employees will not be subjected to potential hazards?	☐ Yes ☐ No
Is adequate headroom provided for the entire length of any aisle or walkway?	☐ Yes ☐ No
Are standard guardrails provided where ever aisle or walkway surfaces are elevated more than 30 inches above any adjacent floor to the ground?	☐ Yes ☐ No
Are bridges provided over conveyors and similar hazards?	☐ Yes ☐ No
Floor and Wall Openings	
Are floor openings guarded by a cover, a guardrail, or equivalent on al sides (except at entrance to stairways or ladders)?	☐ Yes ☐ No
Are toe-boards installed around the edges of permanent floor openings (where persons may pass below the opening)?	☐ Yes ☐ No
Are skylight screens of such construction and mounting that they will withstand a load of at least 200 pounds?	☐ Yes ☐ No
Is the glass in the windows, doors, glass walls, etc., which are subject to human impact, of sufficient thickness and type for the condition of use?	☐ Yes ☐ No
Are grates or similar type covers over floor openings (such as floor drains) of such design that foot traffic or rolling equipment will not be affected by the grate spacing?	☐ Yes ☐ No
Are unused portions of service pits and pits not actually in use either covered or protected by guardrails or equivalent?	☐ Yes ☐ No

Are manhole covers, trench covers and similar covers, plus their supports, designed to carry a truck rear axle load of at least 20,000 pounds when located in roadways and subject to vehicle traffic?	☐ Yes ☐ No
Are floor or wall openings in fire resistive construction provided with doors or covers compatible with the fire rating of the structure and provided with a self-closing feature when appropriate?	☐ Yes ☐ No
Stairs and Stairways	☐ Yes ☐ No
Are standard stair rails or handrails installed on all stairways that have four or more risers?	☐ Yes ☐ No
Are all stairways at least 22 inches wide?	☐ Yes ☐ No
Do stairs have landing platforms not less than 30 inches in the direction of travel and extend 22 inches in width at every 12 feet or less of vertical rise?	☐ Yes ☐ No
Do stairs angle no more than 50 and no less than 30 degrees?	☐ Yes ☐ No
Are step risers on stairs uniform from top to bottom?	☐ Yes ☐ No
Are steps on stairs and stairways designed or provided with a surface that renders them slip resistant?	☐ Yes ☐ No
Are stairway handrails located between 30 and 34 inches above the leading edge of stair treads?	☐ Yes ☐ No
Do stairway handrails have at least 3 inches of clearance between the handrails and the wall or surface they are mounted on?	☐ Yes ☐ No
Where doors or gates open directly on a stairway, is there a platform provided so the swing of the door does not reduce the width of the platform to less than 21 inches?	☐ Yes ☐ No
Where stairs or stairways exit directly into any area where vehicles may be operated, are adequate barriers and warnings provided to prevent employees stepping into the path of traffic?	☐ Yes ☐ No
Do stairway landings have a dimension measured in the direction of travel, at least equal to the width of the stairway?	☐ Yes ☐ No
Elevated Surfaces	☐ Yes ☐ No
Are signs posted, when appropriate, showing the elevated surface load capacity?	☐ Yes ☐ No
Are surfaces elevated more than 48 inches above the floor or ground provided with standard guardrails?	☐ Yes ☐ No
Are all elevated surfaces (beneath which people or machinery could be exposed to falling objects) provided with standard 4-inch toe-boards?	☐ Yes ☐ No
Is a permanent means of access and egress provided to elevated storage and work surfaces?	☐ Yes ☐ No
Is required headroom provided where necessary?	☐ Yes ☐ No
Is material on elevated surfaces piled, stacked or racked in a manner to prevent it from tipping, falling, collapsing, rolling or spreading?	☐ Yes ☐ No
Are dock boards or bridge plates used when transferring materials between docks and trucks or rail cars?	☐ Yes ☐ No

SUPPLEMENTAL ARC WELDING AND CUTTING INFORMATION

- General
  - Equipment selection. Welding equipment shall be chosen for safe application to the work to be done as specified in section 9.2.
  - Installation. Welding equipment shall be installed safely as specified in section 9.3.
  - Instruction. Workmen designated to operate arc welding equipment shall have been properly instructed and qualified to operate such equipment as specified section 9.4.
- Application of arc welding equipment
  - General. Assurance of consideration of safety in design is obtainable by choosing apparatus complying with the Requirements for Electric Arc-Welding Apparatus, NEMA EW-1-1962, National Electrical Manufacturers Association or the Safety Standard for Transformer-Type Arc-Welding Machines, ANSI C33.2-1956, and Underwriters' Laboratories.
  - Environmental conditions. Standard machines for arc welding service shall be designed and constructed to carry their rated load with rated temperature rises where:
    - The temperature of the cooling air does not exceed 40 deg. C. (104 deg. F.),
    - The altitude does not exceed 3,300 feet (1,005.8 m), and
    - Shall be suitable for operation in atmospheres containing gases, dust, and light rays produced by the welding arc.
    - Unusual service conditions may exist, and in such circumstances machines shall be especially designed to safely meet the requirements of the service. These conditions may include exposure to:
      - Unusually corrosive fumes.
      - Steam or excessive humidity.
      - Excessive oil vapor.
      - Flammable gases.
      - Abnormal vibration or shock.
      - Excessive dust.
      - Weather.
      - Unusual seacoast or shipboard conditions.
  - Voltage. The following limits shall not be exceeded:
    - Alternating-current machines
      - Manual arc welding and cutting - 80 volts.
      - Automatic (machine or mechanized) arc welding and cutting - 100 volts.
    - Direct-current machines
      - Manual arc welding and cutting - 100 volts.
      - Automatic (machine or mechanized) arc welding and cutting - 100 volts.
    - When special welding and cutting processes require values of open circuit voltages higher than voltage limits specified, means shall be provided to prevent the operator from making accidental contact with the high voltage by adequate insulation or other means.
    - For a.c. welding under wet conditions or warm surroundings where perspiration is a factor, the use of reliable automatic controls for reducing no load voltage is recommended to reduce the shock hazard.

- Design.
  - A controller integrally mounted in an electric motor driven welder shall:
    - Have capacity for carrying rated motor current,
    - Be capable of making and interrupting stalled rotor current of the motor, and
    - Serve as the running over-current device if provided with the number of over-current units as specified by 29 CFR 1910 Subpart S - Electrical.
  - On all types of arc welding machines, control apparatus shall be enclosed except for the operating wheels, levers, or handles.
  - Input power terminals, tap change devices and live metal parts connected to input circuits shall be completely enclosed and accessible only by means of tools.
  - Terminals for welding leads should be protected from accidental electrical contact by personnel or by metal objects i.e., vehicles, crane hooks, etc. Protection may be obtained by use of:
    - Dead-front receptacles for plug connections;
    - Recessed openings with non-removable hinged covers;
    - Heavy insulating sleeves or taping or other equivalent electrical and mechanical protection.
  - If a welding lead terminal which is intended to be used exclusively for connection to the work is connected to the grounded enclosure, It must be done by a conductor at least two AWG sizes smaller than the grounding conductor, and the terminal shall be marked to indicate that it is grounded.
  - No connections for portable control devices such as push buttons to be carried by the operator shall be connected to an a.c. circuit of higher than 120 volts.
  - Exposed metal parts of portable control devices operating on circuits above 50 volts shall be grounded by a grounding conductor in the control cable.
  - Auto transformers or a.c. reactors shall not be used to draw welding current directly from any a.c. power source having a voltage exceeding 80 volts.
- Installation of arc welding equipment
  - General. Installation including power supply shall be in accordance with the requirements of 29 CFR 1910 Subpart S - Electrical.
  - Grounding.
    - The frame or case of the welding machine (except engine-driven machines) shall be grounded under the conditions and according to the methods prescribed in by 29 CFR 1910 Subpart S - Electrical.
    - Conduits containing electrical conductors shall not be used for completing a work-lead circuit.
    - Pipelines shall not be used as a permanent part of a work-lead circuit. Pipelines may be used during construction, extension or repair providing current is not carried through threaded joints, flanged bolted joints, or caulked joints and special precautions are used to avoid sparking at connection of the work-lead cable.
    - Chains, wire ropes, cranes, hoists, and elevators shall not be used to carry welding current.
    - Where a structure, conveyor, or fixture is regularly employed as a welding current return circuit, joints shall be bonded or provided with adequate current collecting devices.
    - All ground connections shall be checked to determine that they are mechanically strong and electrically adequate for the required current.

- Supply connections and conductors.
  - A disconnecting switch or controller shall be provided at or near each welding machine which is not equipped with such a switch.
    - The switch shall be in accordance with 29 CFR 1910 Subpart S - Electrical.
    - Over-current protection shall be provided as specified in 29 CFR 1910 Subpart S - Electrical.
    - A disconnect switch with overload protection or equivalent disconnect and protection means, permitted by 29 CFR 1910 Subpart S - Electrical, shall be provided for each outlet intended for connection to a portable welding machine.
  - For individual welding machines, the rated current-carrying capacity of the supply conductors shall be not less than the rated primary current of the welding machines.
  - For groups of welding machines, the rated current-carrying capacity of conductors may be less than the sum of the rated primary currents of the welding machines supplied.
  - The conductor rating shall be determined in each case according to the machine loading based on:
    - The use to be made of each welding machine, and
    - The allowance permissible in the event that all the welding machines supplied by the conductors will not be in use at the same time.
  - In operations involving several welders on one structure, d.c. welding process requirements may require the use of both polarities; or supply circuit limitations for a.c. welding may require distribution of machines among the phases of the supply circuit.
    - In such cases no load voltages between electrode holders will be 2 times normal in d.c. or 1, 1.41, 1.73, or 2 times normal on a.c. machines.
    - Similar voltage differences will exist if both a.c. and d.c. welding are done on the same structure.
    - All d.c. machines shall be connected with the same polarity.
    - All a.c. machines shall be connected to the same phase of the supply circuit and with the same instantaneous polarity.
- Operation and maintenance
  - Workmen assigned to operate or maintain arc welding equipment shall be acquainted with the requirements of sections 4, 5, 6 and,
  - Operation.
    - Before starting operations all connections to the machine shall be checked to make certain they are properly made.
    - The work lead shall be firmly attached to the work;
      - Magnetic work clamps shall be freed from adherent metal particles of spatter on contact surfaces.
      - Coiled welding cable shall be spread out before use to avoid serious overheating and damage to insulation.
    - Grounding of the welding machine frame shall be checked. Special attention shall be given to safety ground connections of portable machines.
    - There shall be no leaks of cooling water, shielding gas or engine fuel.

- It shall be determined that proper switching equipment for shutting down the machine is provided.
- Printed rules and instructions covering operation of equipment supplied by the manufacturers shall be strictly followed.
- Electrode holders when not in use shall be so placed that they cannot make electrical contact with persons, conducting objects, fuel or compressed gas tanks.
- Cables with splices within 10 feet (3 m) of the holder shall not be used.
- The welder should not coil or loop welding electrode cable around parts of his body for danger of electric shock.

o Maintenance.

- The operator should report any equipment defect or safety hazard to his supervisor and the use of the equipment shall be discontinued until its safety has been assured.
- Repairs shall be made only by qualified personnel.
- Machines which have become wet shall be thoroughly dried and tested before being used.
- Cables with damaged insulation or exposed bare conductors shall be replaced.
- Joining lengths of work and electrode cables shall be done by the use of connecting means specifically intended for the purpose. The connecting means shall have insulation adequate for the service conditions.

SUPPLEMENTAL OXYGEN-FUEL GAS WELDING & CUTTING INFORMATION

- General Requirements
  - Mixtures of fuel gases and air or oxygen may be explosive and shall be prevented.
  - No device or attachment facilitating or permitting mixtures of air or oxygen with flammable gases prior to consumption, except at the burner or in a standard torch, shall be allowed unless approved for the purpose.
  - Under no condition shall acetylene be generated, piped (except in approved cylinder manifolds) or used at a pressure in excess of 15 psig (103 kPa gauge pressure) or 30 psia (206 kPa absolute). (The 30 psia (206 kPa absolute) limit is intended to prevent unsafe use of acetylene in pressurized chambers such as caissons, underground excavations or tunnel construction.)
  - This does not apply to storage of acetylene dissolved in a suitable solvent in cylinders manufactured and maintained according to U.S. Department of Transportation requirements, or to acetylene for chemical use.
  - The liquid acetylene will not be used.
- Apparatus.
  - Only approved apparatus such as torches, regulators or pressure-reducing valves, acetylene generators, and manifolds shall be used.
- Personnel.
  - Workmen in charge of the oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems shall be instructed and judged competent by their employers for this important work before being left in charge. Rules and instructions covering the operation and maintenance of oxygen or fuel-gas supply equipment including generators, and oxygen or fuel-gas distribution piping systems shall be readily available.
- Cylinders and Containers Approval and Marking.
  - General
    - All portable cylinders used for the storage and shipment of compressed gases shall be constructed and maintained in accordance with the regulations of the U.S. Department of Transportation, 49 CFR Parts 171-179.
    - Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas.
      - Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable.
      - Whenever practical, the marking shall be located on the shoulder of the cylinder. This method conforms to the American National Standard Method for Marking Portable Compressed Gas Containers to Identify the Material Contained, ANSI Z48.1,
    - Compressed gas cylinders shall be equipped with connections complying with the American National Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections, ANSI B57.1,
    - All cylinders with a water weight capacity of over 30 pounds (13.6 kg) shall be equipped with means of connecting a valve protection cap or with a collar or recess to protect the valve.
  - Storage of cylinders-general.
    - Cylinders shall be kept away from radiators and other sources of heat.
    - Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 (6.1 m) feet from highly combustible materials such as oil or excelsior.
      - Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways.
      - Assigned storage spaces shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons.
      - Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

        - Empty cylinders shall have their valves closed.
        - Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use.
    - Fuel-gas cylinder storage.
        - Inside a building, cylinders, except those in actual use or attached ready for use, shall be limited to a total gas capacity of 2,000 cubic feet (56 m(3)) or 300 pounds (135.9 kg) of liquefied petroleum gas.
        - Total gas capacity of cylinders in excess of 2,000 cubic feet (56 m(3)) or 300 pounds (135.9 kg) of liquefied petroleum gas, will be stored:
            - Outside, or
            - In a special building,
            - In a separate room or compartment conforming to the requirements of section 8.6.6 outside generator houses and inside generator rooms for stationary acetylene generators.
            - Special buildings, rooms or compartments shall:
                - Have no open flame for heating or lighting, and
                - Be well ventilated.
            - Special buildings, rooms or compartments may also be used for storage of calcium carbide in quantities not to exceed 600 (271.8 kg) pounds, when contained in metal containers.
        - Acetylene cylinders shall be stored valve end up.
    - Oxygen storage.
        - Oxygen cylinders shall not be stored:
            - Near highly combustible material, especially oil and grease; or
            - Near reserve stocks of carbide and acetylene or other fuel-gas cylinders, or
            - Near any other substance likely to cause or accelerate fire; or
            - In an acetylene generator compartment.
        - Oxygen cylinders stored in outside generator houses shall be separated from the generator or carbide storage rooms by a noncombustible partition having a fire-resistance rating of at least 1 hour. This partition shall be without openings and shall be gastight.
        - Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.
        - Where a liquid oxygen system is to be used to supply gaseous oxygen for welding or cutting and the system has a storage capacity of more than 13,000 cubic feet (364 m(3)) of oxygen (measured at 14.7 psia (101 kPa) and 70 deg. F (21.1 deg. C)), connected in service or ready for service, or more than 25,000 cubic feet (700 m(3)) of oxygen (measured at 14.7 psia (101 kPa) and 70 deg. F (21.1 deg. C)), including unconnected reserves on hand at the site, it shall comply with the provisions of the Standard for Bulk Oxygen Systems at Consumer Sites, NFPA No. 566-1965,
- Operating procedures.
    - Cylinders, cylinder valves, couplings, regulators, hose, and apparatus shall be kept free from oily or greasy substances.
    - Oxygen cylinders or apparatus shall not be handled with oily hands or gloves.
    - A jet of oxygen must never be permitted to strike an oily surface, greasy clothes, or enter a fuel oil or other storage tank.
    - When transporting cylinders by a crane or derrick, a cradle, boat, or suitable platform shall be used. Slings or electric magnets shall not be used for this purpose. Valve-protection caps, where cylinder is designed to accept a cap, shall always be in place.
    - Cylinders shall not be dropped or struck or permitted to strike each other violently.
    - Valve-protection caps shall not be used for lifting cylinders from one vertical position to another and are designed to protect cylinder valves from damage. Bars shall not be used under valves or valve-protection caps to pry cylinders loose when frozen to the ground or otherwise fixed; the use of warm (not boiling) water is recommended.

- Unless cylinders are secured on a special truck, regulators shall be removed and valve-protection caps, when provided for, shall be put in place before cylinders are moved.
- Cylinders not having fixed hand wheels shall have keys, handles, or nonadjustable wrenches on valve stems while these cylinders are in service.
- In multiple cylinder installations only one key or handle is required for each manifold.
- Cylinder valves shall be closed:
  - Before moving cylinders.
  - When work is finished.
  - When cylinders are empty
- Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag, or flame will not reach them. When maintaining safe distance is not possible, fire-resistant shields shall be used.
- Cylinders shall not be placed where they might become part of an electric circuit.
  - Avoid contact with third rails, trolley wires, etc.,
  - Cylinders shall be kept away from radiators, piping systems, layout tables, etc., that may be used for grounding electric circuits such as for arc welding machines.
  - Any practice such as the tapping of an electrode against a cylinder to strike an arc shall be prohibited.
- Cylinders shall never be used as rollers or supports, whether full or empty.
- The numbers and markings stamped into cylinders shall not be tampered with.
- No person, other than the gas supplier, shall attempt to mix gases in a cylinder.
- No one, except the owner of the cylinder or person authorized by him, shall refill a cylinder.
- No one shall tamper with safety devices in cylinders or valves.
- Cylinders shall not be dropped or otherwise roughly handled.
- Unless connected to a manifold, oxygen from a cylinder shall not be used without first attaching an oxygen regulator to the cylinder valve.
- Before connecting a regulator to a cylinder valve, the valve shall be opened slightly and closed immediately.
- The valve shall be opened while standing to one side of the outlet; never in front of it.
- Never crack a fuel-gas cylinder valve near other welding work or near sparks, flame, or other possible sources of ignition.
- Do not use a hammer or wrench to open cylinder valves. If valves cannot be opened by hand, notify the supplier.
- Do not tamper with or attempt to repair cylinder valves. If trouble is experienced, promptly report to the supplier the character of the trouble and the cylinder's serial number. Follow the supplier's instructions as to its disposition.
- Avoid complete removal of the stem from a diaphragm-type cylinder valve.
- Fuel-gas cylinders shall be placed with valve end up whenever they are in use. .
- Liquefied gases shall be stored and shipped with the valve end up.
- Handle cylinders carefully.
- Rough handling, knocks, or falls are liable to damage the cylinder, valve or safety devices and cause leakage.
- Before removing a regulator from a cylinder valve, the cylinder valve shall be closed and the gas released from the regulator.
- Do not place anything on top of an acetylene cylinder when in use which may damage the safety device or interfere with the quick closing of the valve.
- If cylinders are found to have leaky valves or fittings which cannot be stopped by closing of the valve, the cylinders shall be taken outdoors away from sources of ignition and slowly emptied.
- A warning should be placed near cylinders having leaking fuse plugs or other leaking safety devices not to approach them with a source of ignition (including a lit cigarette).
  - Plainly tag such cylinders;
  - Promptly notify the supplier of the trouble, and
  - Follow the supplier’s instructions as to the return such cylinders.
- Do not tamper with safety devices.
- Fuel-gas shall never be used from cylinders through torches or other devices equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.

- Always slowly open a cylinder valve.
- Do not open an acetylene cylinder valve more than one and one-half turns of the spindle, and preferably no more than three-fourths of a turn.
- Where a special wrench is required it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel-gas flow can be quickly turned off in case of emergency. In the case of manifolded or coupled cylinders at least one such wrench shall always be available for immediate use.

- Manifolding of cylinders
  - Fuel-gas manifolds.
    - Manifolds shall be approved either separately for each component part or as an assembled unit.
    - Fuel-gas cylinders connected to one manifold inside a building shall be limited to a total capacity not exceeding 300 pounds (135.9 kg) of liquefied petroleum gas or 3,000 cubic feet (84 m(3)) of other fuel-gas.
    - More than one such manifold with connected cylinders may be located in the same room provided the manifolds are:
      - At least 50 feet (15 m) apart, or
      - Separated by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.
    - Fuel-gas cylinders connected to one manifold having an aggregate capacity exceeding 300 pounds (135.9 kg) of liquefied petroleum gas or 3,000 cubic feet (84 m(3)) of other fuel-gas shall be located outdoors, or in a separate building or room constructed conforming to the requirements of section 8.6.6 Outside generator houses and inside generator rooms for stationary acetylene generators.
    - Separate manifold buildings or rooms may also be used for the storage of drums of calcium carbide and cylinders containing fuel gases conforming to the requirements of section 8.2.3 Fuel gas cylinder storage. Such buildings or rooms shall:
      - Have no open flames for heating or lighting, and
      - Be well-ventilated.
    - High-pressure fuel-gas manifolds shall be provided with approved pressure regulating devices.
  - High-pressure oxygen manifolds (for use with cylinders having a Department of Transportation service pressure above 200 psig (1.36 MPa)).
    - Manifolds shall be approved either separately for each component part or as an assembled unit.
    - Do not locate Oxygen manifolds in an acetylene generator room.
    - Oxygen manifolds shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.
    - Oxygen cylinders connected to one manifold shall be limited to a total gas capacity of 6,000 cubic feet (168 m(3)).
    - More than one such manifold with connected cylinders may be located in the same room provided the manifolds are:
      - At least 50 feet (15 m) apart, or
      - Separated by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.
    - An oxygen manifold, to which cylinders having an aggregate capacity of more than 6,000 cubic feet (168 m(3)) of oxygen are connected, should be located outdoors or in a separate noncombustible building.
    - Such a manifold, if located inside a building having other occupancy, shall be located in a separate room of noncombustible construction having a fire-resistance rating of at least one-half hour or in an area with no combustible material within 20 feet (6.1 m) of the manifold.
    - An oxygen manifold or oxygen bulk supply system which has storage capacity of more than 13,000 cubic feet (364 m(3))of oxygen (measured at 14.7 psia (101 kPa) and 70 deg. F (21.1 deg. C)), connected in service or ready for service, or more than 25,000 cubic feet (700 m(3)) of oxygen (measured at 14.7 psia (101 kPa) and 70 deg. F (21.1 deg. C)), including unconnected reserves on hand at the site, shall comply with the provisions of the Standard for Bulk Oxygen Systems at Consumer Sites, NFPA No. 566-1965.
    - High-pressure oxygen manifolds shall be provided with approved pressure-regulating devices.

- Low-pressure oxygen manifolds (for use with cylinders having a Department of Transportation service pressure not exceeding 200 psig (1.36 MPa)).
  - Manifolds shall be of substantial construction suitable for use with oxygen at a pressure of 250 psig (1.7 MPa). These manifolds shall:
    - Have a minimum bursting pressure of 1,000 psig (6.8 MPa), and
    - Be protected by a safety relief device which will relieve at a maximum pressure of 500 psig (3.4 MPa). DOT-4L200 cylinders have safety devices which relieve at a maximum pressure of 250 psig (1.7 MPa) (or 235 psig (1.6 MPa) if vacuum insulation is used).
  - Hose shall have a minimum bursting pressure of 1,000 psig (6.8 MPa). Refer to section 8.5.5 Hose and Hose Connections for requirements of Hose and hose connections subject to cylinder pressure.
  - The assembled manifold including leads shall be tested and proven gas-tight at a pressure of 300 psig (2.04 MPa). The fluid used for testing oxygen manifolds shall be oil-free and not combustible.
  - The following sign shall be conspicuously posted at each manifold:
    - Low-Pressure Manifold
    - Do Not Connect High-Pressure Cylinders
    - Maximum Pressure - 250 psig (1.7 MPa)
- Portable outlet headers.
  - Do not use portable outlet headers indoors except for temporary service where the conditions prevent a direct supply from outlets located on the service piping system.
  - Each outlet on the service piping from which oxygen or fuel-gas is withdrawn to supply a portable outlet header shall be equipped with a readily accessible shutoff valve.
  - Refer to section 8.5.5 Hose and Hose Connections for requirements of Hose and Hose Connections for the requirements of hose and hose connections used for connecting portable outlet headers to the service piping
  - The entry end of the portable outlet headers will be equipped with master shutoff valves for both oxygen and fuel-gas.
  - Portable outlet headers for fuel-gas service shall be provided with an approved hydraulic back-pressure valve installed at the inlet and preceding the service outlets, unless an approved:
    - Pressure-reducing regulator,
    - Back-flow check valve, or
    - Hydraulic back-pressure valve is installed at each outlet.
  - Outlets provided on headers for oxygen service may be fitted for use with pressure-reducing regulators or for direct hose connection.
  - A valve assembly with a detachable outlet seal cap, chained or otherwise attached to the body of the valve will be provided for each service outlet on portable outlet headers.
  - Materials and fabrication procedures for portable outlet headers shall comply with the Service Piping System requirements, specifically sections 8.4.1 - Materials & Design, 8.4.2– Piping Joints and 8.4.5 Testing
  - Portable outlet headers shall be provided with frames which will support the equipment securely in the correct operating position and protect them from damage during handling and operation.
- Manifold operating procedures.
  - Installation of cylinder manifolds will only occur under the supervision of someone familiar with their construction and use.
  - All manifolds and parts used in methods of manifolding shall be used only for the gas or gases for which they are approved.
  - When acetylene cylinders are coupled, approved flash arresters shall be installed between each cylinder and the coupler block. For outdoor use only, and when the number of cylinders coupled does not exceed three, one flash arrester installed between the coupler block and regulator is acceptable.
  - The aggregate capacity of fuel-gas cylinders connected to a portable manifold inside a building shall not exceed 3,000 cubic feet (84 m(3)) of gas.

- Acetylene and liquefied fuel-gas cylinders shall be manifolded in a vertical position.
- The pressure in the gas cylinders connected to and discharged simultaneously through a common manifold shall be approximately equal.

- Service piping systems
  - Materials and design. Piping and fittings shall comply with section 2, Industrial Gas and Air Piping Systems, of the American National Standard Code for Pressure Piping ANSI B31.1, unless it conflicts with the following:
    - Pipe shall be at least Schedule 40 and fittings shall be at least standard weight in sizes up to and including 6-inch nominal.
    - Copper tubing shall be Types K or L in accordance with the Standard Specification for Seamless Copper Water Tube, ASTM B88-66a.
  - Piping shall be steel, wrought iron, brass or copper pipe, or seamless copper, brass or stainless steel tubing, with the following exceptions.
  - Oxygen piping and fittings at pressures in excess of 700 psi (4.8 MPa), shall be stainless steel or copper alloys.
    - Hose and hose connections as specified in section 8.5.5 Hose and Hose Connections will be used to connect the outlet of a manifold pressure regulator to piping providing:
      - The working pressure of the piping is 250 psi (1.7 MPa) or less,
      - The length of the hose does not exceed 5 feet (1.5 m) and has a minimum bursting pressure of 1,000 psig (6.8 MPa).
    - When oxygen is supplied to a service piping system from a low-pressure oxygen manifold without an intervening pressure regulating device, the piping system shall have a minimum design pressure of 250 psig (1.7 MPa). When the connected equipment is for use at pressures less than 250 psig (1.7 MPa), a pressure regulating device shall be used at each station outlet.
  - Piping for acetylene or acetylenic compounds shall be steel or wrought iron. Unalloyed copper shall not be used for acetylene or acetylenic compounds except in listed equipment.
- Piping joints.
  - Joints in steel or wrought iron piping shall be welded, threaded or flanged.
    - Fittings, such as ells, tees, couplings, and unions, may be rolled, forged or cast steel, malleable iron or nodular iron.
    - Gray or white cast iron fittings are prohibited.
  - Joints in brass or copper pipe shall be welded, brazed, threaded, or flanged. If of the socket type, they shall be brazed with silver-brazing alloy or similar high melting point (not less than 800 deg. F (427 deg. C)) filler metal.
  - Joints in seamless copper, brass, or stainless steel tubing shall be approved gas tubing fittings or the joints shall be brazed. If of the socket type, they shall be brazed with silver-brazing alloy or similar high melting point (not less than 800 deg. F (427 deg. C)) filler metal.
- Installation.
  - Distribution lines shall be installed and maintained in a safe operating condition.
  - All piping shall be run as directly as practicable, protected against physical damage, proper allowance being made for expansion and contraction, jarring and vibration.
    - Pipe laid underground in earth shall be located below the frost line and protected against corrosion.
    - After assembly, piping shall be thoroughly blown out with air, nitrogen, or carbon dioxide to remove foreign materials. For oxygen piping, only oil-free air, oil-free nitrogen, or oil-free carbon dioxide shall be used.
  - Only piping which has been welded or brazed shall be installed in tunnels, trenches or ducts.
    - Shutoff valves shall be located outside such conduits.
    - Oxygen piping may be placed in the same tunnel, trench or duct with fuel-gas pipelines, provided there is ventilation (natural or forced)
  - Low points in piping carrying moist gas shall be drained into drip pots constructed to permit pumping or draining out the condensate at necessary intervals.
    - Drain valves shall be installed for this purpose having outlets normally closed with screw caps or plugs.

- No open end valves or petcocks shall be used, except that in drips located out of doors, underground, and not readily accessible. Valves may be used at such points if they are equipped with means to secure them in the closed position.
- Pipes leading to the surface of the ground shall be cased or jacketed where necessary to prevent loosening or breaking.

▪ Gas cocks or valves shall be provided for all buildings at points where they will be readily accessible for shutting off the gas supply to these buildings in any emergency. There shall also be provided a shutoff valve in the discharge line from the generator, gas holder, manifold or other source of supply.
▪ Shutoff valves will be installed in safety relief lines so that the safety relief device cannot be rendered ineffective.
▪ Before assembly, examine fittings and lengths of pipe removing scale or dirt if necessary.
▪ Oxygen piping and fittings shall be washed out with a suitable solution which will effectively remove grease and dirt but will not react with oxygen. Hot water solutions of caustic soda or trisodium phosphate are effective cleaning agents for this purpose.
▪ Piping shall be thoroughly blown out after assembly to remove foreign materials.
- For oxygen piping, oil-free air, oil-free nitrogen, or oil-free carbon dioxide shall be used.
- For other piping, air or inert gas may be used.

▪ During purging of air or gas from flammable gas lines or other parts of equipment, open lights or other sources of ignition are not permitted near uncapped openings.
▪ Welding or cutting on an acetylene or oxygen pipeline, including the attachment of hangers or supports, will not be performed until the line has been purged. Oxygen lines will be purged only with oil-free air, oil-free nitrogen, or oil-free carbon dioxide.

o Painting and signs.
▪ Underground pipe and tubing and outdoor ferrous pipe and tubing shall be covered or painted with a suitable material for protection against corrosion.
▪ Aboveground piping systems shall be marked in accordance with the American National Standard Scheme for the Identification of Piping Systems, ANSI A13.1-1956.
▪ Station outlets shall be marked to indicate the name of the gas.

o Testing.
▪ Piping systems shall be tested and proved gastight at 1 1/2 times the maximum operating pressure, and shall be thoroughly purged of air before being placed in service. The material used for testing oxygen lines shall be oil free and noncombustible.
▪ Do not use flames to detect leaks.

o Protective equipment, hose, and regulators
▪ Equipment shall be installed and used only in the service for which it is approved and recommended by the manufacturer.
▪ Service piping systems shall be protected by pressure relief devices set to function at not more than the design pressure of the systems and discharging upwards to a safe location.

o Piping protective equipment.
▪ The fuel-gas and oxygen piping systems, including portable outlet headers shall incorporate protective equipment. When only a portion of a fuel-gas system is to be used with oxygen, only that portion need comply with protective equipment requirements
▪ Approved protective equipment (designated P(F) Appendix A) shall be installed in fuel-gas piping to prevent:
- Backflow of oxygen into the fuel-gas supply system;
- Passage of a flash back into the fuel-gas supply system; and
- Excessive back pressure of oxygen in the fuel-gas supply system.

▪ The three functions of the protective equipment may be combined in one device or may be provided by separate devices.
▪ The protective equipment shall be located in the main supply line, at the head of each branch line, or at each location where fuel-gas is withdrawn, (refer to Appendix A).
▪ Where branch lines are of 2-inch pipe size or larger or of substantial length, protective equipment shall be located at the head of each branch line, or at each location where fuel-gas is withdrawn.

- Backflow protection shall be provided by an approved device that will prevent oxygen from flowing into the fuel-gas system or fuel from flowing into the oxygen system.
- Flash-back protection shall be provided by an approved device that will prevent flame from passing into the fuel-gas system.
- Back-pressure protection shall be provided by an approved pressure-relief device set at a pressure not greater than the pressure rating of the backflow or the flashback protection device, whichever is lower.
    - The pressure-relief device shall be located on the downstream side of the backflow and flashback protection devices.
    - The vent from the pressure-relief device shall be at least as large as the relief device inlet and installed without low points that may collect moisture. If low points are unavoidable, drip pots with drains closed with screw plugs or caps shall be installed at the low points.
    - The vent terminus shall:
        - Not endanger personnel or property through gas discharge;
        - Be located away from ignition sources; and
        - Terminate in a hood or bend.
- If pipeline protective equipment incorporates a liquid, the liquid level shall be maintained, and suitable antifreeze may be used to prevent freezing.
- Fuel gas for use with equipment not requiring oxygen shall be withdrawn upstream of the piping protective devices.

o Station outlet protective equipment.
- For each station outlet, including those on portable headers, to prevent backflow, the following devices will be provided (refer to Appendix A):
    - Check valve,
    - Pressure regulator,
    - Hydraulic seal, or
    - A combination of these devices
- When approved pipeline protective equipment is located at the station outlet, no additional check valve, pressure regulator, or hydraulic seal is required.
- A shutoff valve shall be installed at each station outlet on the upstream side of other station outlet equipment.
- If the station outlet is equipped with a detachable regulator, the outlet shall terminate in a union connection that complies with the Regulator Connection Standards, 1958, Compressed Gas Association.
- If the station outlet is connected directly to a hose, the outlet shall terminate in a union connection complying with the Standard Hose Connection Specifications, 1957, Compressed Gas Association.
- Station outlets may terminate in pipe threads to which permanent connections are to be made (ex. to a machine).
- Station outlets shall be equipped with a detachable outlet seal cap secured in place. This cap shall be used to seal the outlet except when a hose, a regulator, or piping is attached.
- Where station outlets are equipped with approved backflow and flashback protective devices, no more than four torches may be supplied from one station outlet through rigid piping, provided:
    - Each outlet from such piping is equipped with a shutoff valve, and
    - The fuel-gas capacity of any one torch does not exceed 15 cubic feet (0.42 m(3)) per hour.
    - This does not apply to machines.

o Hose and hose connections.
- Hose for oxy-fuel gas service shall comply with the Specification for Rubber Welding Hose, 1958, Compressed Gas Association and Rubber Manufacturers Association.
- When parallel lengths of oxygen and acetylene hose are taped together for convenience and to prevent tangling, not more than 4 inches (10.2 cm) out of 12 inches (30.5 cm) shall be covered by tape.
- Hose connections shall comply with the Standard Hose Connection Specifications, 1957, Compressed Gas Association.

        - Hose connections shall be securely fastened in a manner that will withstand, without leakage, twice the pressure to which they are normally subjected in service, but in no case less than a pressure of 300 psi (2.04 MPa). Oil-free air or an oil-free inert gas shall be used for the test.
        - Hose showing leaks, burns, worn places, or other defects rendering it unfit for service shall be repaired or replaced.
    - Pressure-reducing regulators.
        - Pressure-reducing regulators shall be used only for the gas and pressures for which they are intended. The regulator inlet connections shall comply with Regulator Connection Standards, 1958, Compressed Gas Association.
        - When regulators or parts of regulators, including gages, need repair, the work shall be performed by skilled mechanics who have been properly instructed.
        - Gages on oxygen regulators shall be marked "USE NO OIL."
        - Union nuts and connections on regulators shall be inspected before use to detect faulty seats which may cause leakage of gas when the regulators are attached to the cylinder valves.
- Acetylene generators
    - Approval and marking.
        - Generators shall be of approved construction, and plainly marked with the:
            - Maximum rate of acetylene in cubic feet per hour for which they are designed;
            - Weight and size of carbide necessary for a single charge;
            - Manufacturer's name and address; and
            - Name or number of the type of generator.
        - Carbide shall be of the size marked on the generator nameplate.
    - Rating and pressure limitations.
        - The total hourly output of a generator shall not exceed the rate for which it is approved and marked. Unless specifically approved for higher ratings, carbide-feed generators shall be rated at 1 cubic foot (0.028 m(3)) per hour per pound of carbide required for a single complete charge.
        - Relief valves shall be regularly operated to insure proper functioning. Relief valves for generating chambers shall be set to open at a pressure less than 15 psig (103 kPa gauge pressure). Relief valves for hydraulic back pressure valves shall be set to open at a pressure less than 20 psig (137 kPa gauge pressure).
        - Non-automatic generators shall not be used for generating acetylene at pressures exceeding 1 psig (7 kPa gauge pressure), and all water overflows shall be visible.
    - Location.
        - The space around the generator shall allow for free, unobstructed operation and maintenance, and permit ready adjustment and charging.
    - Stationary acetylene generators (automatic and Non-automatic).
        - General.
            - The foundation shall be arranged so that the generator will be level and that no excessive strain will be placed on the generator or its connections.
            - Acetylene generators shall be grounded.
            - Generators shall be placed where water will not freeze. Common salt (sodium chloride) or other corrosive chemicals for protection against freezing is not permitted.
            - Sources of ignition are not permitted in outside generator houses or inside generator rooms.
            - Water shall not be supplied through a continuous connection to the generator except when the generator is provided with an adequate open overflow or automatic water shutoff which will effectively prevent overfilling of the generator. Where a non-continuous connection is used, the supply line shall terminate at a point not less than 2 inches (5 cm) above the regularly provided opening for filling so that the water can be observed as it enters the generator.
            - Unless otherwise specifically approved, generators shall not be fitted with continuous drain connections leading to sewers.
            - Generators shall discharge through an open connection into a suitably vented outdoor receptacle or residue pit which may have connections leading to sewers. An open connection for the sludge draw-off is desirable to enable the generator operator to observe leakage of generating water from the drain valve or sludge cock.

- Each generator shall be provided with an escape or relief vent pipe.
  - Shall be rigidly installed without traps to ensure that any condensation will drain back to the generator.
  - Shall be carried full size to a suitable point outside the building.
  - It shall terminate in a hood or bend located at least 12 feet (3.7 m) above the ground, preferably above the roof, and as far away as practicable from windows or other openings into buildings and as far away as practicable from sources of ignition such as flues or chimneys and tracks used by locomotives.
- Generating chamber relief pipes shall not be inter-connected but shall be separately led to the outside air.
  - The hood or bend shall be so constructed that it will not be obstructed by rain, snow, ice, insects, or birds.
  - The outlet shall be at least 3 feet (0.9 m) from combustible construction.

▪ Gas Holders

- Shall be constructed on the gasometer principle, the bell being suitably guided. The gas bell shall move freely without tendency to bind and have a clearance of at least 2 inches (5 cm) from the shell.
- May be located in the generator room, in a separate room or out of doors.
  - In order to prevent collapse of the gas bell or infiltration of air due to a vacuum caused by the compressor or booster pump or cooling of the gas, a compressor or booster cutoff shall be provided at a point 12 inches (0.3 m) or more above the landing point of the bell.
  - When the gas holder is located indoors, the room shall be ventilated in accordance with section 8.6.6.10., and heated and lighted in accordance with sections 8.6.6.11 and 8.6.6.12.
- Gas holder seals shall be protected against freezing.
- Means shall be provided to stop the generator-feeding mechanism before the gas holder reaches the upper limit of its travel.
- When the gas holder is connected to only one generator, the gas capacity of the holder shall be not less than one-third of the hourly rating of the generator.
- If acetylene is used from the gas holder without increase in pressure at some points but with increase in pressure by a compressor or booster pump at other points, approved piping protective devices shall be installed in each supply line.
  - The low-pressure protective device shall be located between the gas holder and the shop piping, and
  - The medium-pressure protective device shall be located between the compressor or booster pump and the shop piping.
  - Approved protective equipment (designated P(F)) is used to prevent:
    - Backflow of oxygen into the fuel-gas supply system;
    - Passage of a flashback into the fuel-gas supply system; and
    - Excessive back pressure of oxygen in the fuel-gas supply system.
    - The three functions of the protective equipment may be combined in one device or may be provided by separate devices.

- The compressor or booster system
  - Shall be of an approved type.
  - Wiring and electrical equipment in compressor or booster pump rooms or enclosures shall conform to the provisions of 29 CFR 1910 Subpart S – Electrical for Class I, Division 2 locations.
  - Compressors and booster pump equipment shall be located in well-ventilated areas away from open flames, electrical or mechanical sparks, or other ignition sources.
  - Compressor or booster pumps shall be provided with pressure relief valves which will relieve pressure exceeding 15 psig (103 kPa gauge pressure) to a safe outdoor location as provided in section 8.6.4.2.6, or by returning the gas to the inlet side or to the gas supply source.
  - Compressor or booster pump discharge outlets shall be provided with approved protective equipment. (Refer to section 8.5)

o Portable acetylene generators.
- Shall be of a type approved for portable use.
- Portable generators shall not be used within 10 feet (3 m) of combustible material other than the floor.
- Portable generators shall not be used in rooms of total volume less than 35 times the total gas-generating capacity per charge of all generators in the room. Generators shall not be used in rooms having a ceiling height of less than 10 feet (3 m). (To obtain the gas-generating capacity in cubic feet per charge, multiply the pounds of carbide per charge by 4.5.)
- Portable generators shall be protected against freezing. The use of salt or other corrosive chemical to prevent freezing is prohibited.
- Portable generators shall be cleaned and recharged and the air mixture blown off outside buildings.
- When charged with carbide, portable generators shall not be moved by crane or derrick.
- When not in use, portable generators shall not be stored in rooms in which open flames are used unless the generators contain no carbide and have been thoroughly purged of acetylene. Storage rooms shall be well ventilated.
- When transported and operated on vehicles, portable generators shall be securely anchored to the vehicles. If transported by truck, the motor shall be turned off during charging, cleaning, and generating periods.
- Portable generators shall be located at a safe distance from the welding position so that they will not be exposed to sparks, slag, or misdirection of the torch flame or overheating from hot materials or processes.

o Outside generator houses and inside generator rooms for stationary acetylene generators.
- No opening in any outside generator house shall be located within 5 feet (1.5 m) of any opening in another building.
- Walls, floors, and roofs of outside generator houses shall be of noncombustible construction.
- When a part of the generator house is to be used for the storage or manifolding of oxygen cylinders, such space shall be separated from the generator or carbide storage section by partition walls continuous from floor to roof or ceiling. Such separation walls shall be without openings and shall be joined to the floor, other walls and ceiling or roof so a permanent gas-tight joint is achieved.
- Exit doors shall be readily accessible in case of emergency.
- Explosion venting for outside generator houses and inside generator rooms shall be provided in exterior walls or roofs. The venting areas shall be equal to not less than 1 square foot (0.09 m(2)) per 50 cubic feet (1.4 m(3)) of room volume and may consist of any one or any combination of the following:
  - Walls of light, noncombustible material preferably single-thickness, single-strength glass;
  - Lightly fastened hatch covers;
  - Lightly fastened swinging doors in exterior walls opening outward;
  - Lightly fastened walls or roof designed to relieve at a maximum pressure of 25 pounds per square foot (0.001 MPa).

- The installation of acetylene generators within buildings (may be on the roof or top floor of a building) shall be restricted to buildings not exceeding one story in height.
- Generators installed inside buildings shall be enclosed in a separate room.
- The walls, partitions, floors, and ceilings of inside generator rooms shall be of noncombustible construction having a fire-resistance rating of at least 1 hour. The walls or partitions shall be continuous from floor to ceiling and shall be securely anchored. At least one wall of the room shall be an exterior wall.
- Openings from an inside generator room to other parts of the building shall be protected by a swinging type, self-closing fire door for a Class B opening and having a rating of at least 1 hour. Windows in partitions shall be wired glass and approved metal frames with fixed sash. Installation shall be in accordance with the Standard for the Installation of Fire Doors and Windows, NFPA 80-1970.
- Inside generator rooms or outside generator houses shall be well ventilated with vents located at floor and ceiling levels.
- Heating shall be by steam, hot water, enclosed electrically heated elements or other indirect means. Heating by flames or fires shall be prohibited in outside generator houses or inside generator rooms, or in any enclosure communicating with them.
- Generator houses or rooms shall have natural light during daylight hours.
  - Where artificial lighting is necessary it shall be restricted to electric lamps installed in a fixed position. Unless specifically approved for use in atmospheres containing acetylene, such lamps shall be provided with enclosures of glass or other noncombustible material so designed and constructed as to prevent gas vapors from reaching the lamp or socket and to resist breakage. Rigid conduit with threaded connections shall be used.
- Lamps installed outside of wired-glass panels set in gas-tight frames in the exterior walls or roof of the generator house or room are acceptable.
- Electric switches, telephones, and all other electrical apparatus which may cause a spark, unless specifically approved for use inside acetylene generator rooms, shall be located outside the generator house or in a room or space separated from the generator room by a gas-tight partition,
  - Exception: Electrical equipment in the generator house or room shall conform to the provisions of 29 CFR 1910 Subpart S – Electrical for Class I, Division 2 locations where the generator system is designed so that no carbide fill opening or other part of the generator is open to the generator house or room during the operation of the generator, and residue is carried in closed piping from the residue discharge valve to a point outside the generator house or room.

o Maintenance and operation.
- Unauthorized persons shall not be permitted in outside generator houses or inside generator rooms.
- Operating instructions shall be posted in a conspicuous place near the generator or kept in a suitable place available for ready reference.
- When recharging generators the order of operations specified in the instructions supplied by the manufacturer shall be followed.
- In the case of batch-type generators, when the charge of carbide is exhausted and before additional carbide is added, the generating chamber shall always be flushed out with water, renewing the water supply in accordance with the instruction card furnished by the manufacturer.
- The water-carbide residue mixture drained from the generator shall not be discharged into sewer pipes or stored in areas near open flames. Clear water from residue settling pits may be discharged into sewer pipes.
- The carbide added each time the generator is recharged shall be sufficient to refill the space provided for carbide without ramming the charge. Steel or other ferrous tools shall not be used in distributing the charge.
- Generator water chambers shall be kept filled to proper level at all times except while draining during the recharging operation.

- Whenever repairs are to be made or the generator is to be charged or carbide is to be removed, the water chamber shall be filled to the proper level.
- Previous to making repairs involving welding, soldering, or other hot work or other operations which produce a source of ignition, the carbide charge and feed mechanism shall be completely removed.
  - All acetylene shall be expelled by completely flooding the generator shell with water and the generator shall be disconnected from the piping system.
  - The generator shall be kept filled with water, if possible, or positioned to hold as much water as possible.
- Hot repairs shall not be made in a room where there are other generators unless all the generators and piping have been purged of acetylene.

- Calcium carbide storage
  - Packaging.
    - Calcium carbide shall be contained in metal packages of sufficient strength to prevent rupture. The packages shall be:
      - Provided with a screw top or equivalent.
      - Constructed water- and air-tight.
    - Solder shall not be used in such a manner that the package would fail if exposed to fire.
    - Packages containing calcium carbide shall be conspicuously marked "Calcium Carbide - Dangerous If Not Kept Dry" or with equivalent warning.
    - Caution: Metal tools, even the so-called spark resistant type may cause ignition of an acetylene and air mixture when opening carbide containers.
    - Sprinkler systems shall not be installed in carbide storage rooms.
  - Storage indoors.
    - Calcium carbide in quantities not to exceed 600 pounds (272.2 kg) may be stored indoors in dry, waterproof, and well-ventilated locations.
    - Calcium carbide not exceeding 600 pounds (272.2 kg) may be stored indoors in the same room with fuel-gas cylinders.
    - Packages of calcium carbide, except for one of each size, shall be kept sealed. The seals shall not be broken when there is carbide in excess of 1 pound (0.5 kg) in any other unsealed package of the same size of carbide in the room.
    - Calcium carbide exceeding 600 pounds (272.2 kg) but not exceeding 5,000 pounds (2,268 kg) shall be stored:
      - In accordance with section 8.7.2.3
      - In an inside generator room or outside generator house; or
      - In a separate room in a one-story building which may contain other occupancies, but without cellar or basement beneath the carbide storage section. Such rooms shall be constructed in accordance with sections 8.6.6.8 and 8.6.6.9 and ventilated in accordance section 8.6.6.10. These rooms shall be used for no other purpose.
    - Calcium carbide in excess of 5,000 pounds (2,268 kg) shall be stored in one-story buildings without cellar or basement and used for no other purpose, or in outside generator houses.
      - If the storage building is of noncombustible construction, it may adjoin other one-story buildings if it is separated by un-pierced firewalls or detached less than 10 feet (3 m) from such building or buildings,
      - There shall be no opening in any of the mutually exposing sides of such buildings within 10 feet (3 m).
      - If the storage building is of combustible construction, it shall be at least 20 feet (6.1 m) from any other one- or two-story building, and at least 30 feet (9.1 m) from any other building exceeding two stories.
  - Storage outdoors.
    - Calcium carbide in unopened metal containers may be stored outdoors.
    - Carbide containers to be stored outdoors shall be examined to make sure that they are in good condition. Periodic reexaminations shall be made for rusting or other damage to a container that might affect its water or air tightness.
    - The bottom tier of each row shall be placed on wooden planking or equivalent, so that the containers will not come in contact with the ground or ground water.
    - Containers of carbide which have been in storage the longest shall be used first.

SUPPLEMENTAL RESISTANCE WELDING INFORMATION

- **General**
  - All equipment shall be installed by a qualified electrician in conformance with by 29 CFR 1910 Subpart S - Electrical.
    - There shall be a safety-type disconnecting switch or a circuit breaker or circuit interrupter to open each power circuit to the machine.
    - The disconnecting switch shall be conveniently located at or near the machine, so that the power can be shut off when the machine or its controls are to be serviced.
  - Ignition tubes used in resistance welding equipment shall be equipped with a thermal protection switch.
  - Workmen designated to operate resistance welding equipment shall have been properly instructed and judged competent to operate such equipment.
  - Controls of all automatic or air and hydraulic clamps shall be arranged or guarded to prevent the operator from accidentally activating them.
- **Spot and seam welding machines (non-portable)**
  - All external weld initiating control circuits shall operate on low voltage, not over 120 volts, for the safety of the operators.
  - Stored energy or capacitor discharge type of resistance welding equipment and control panels involving high voltage (over 550 volts) shall be suitably insulated and protected by complete enclosures. All doors of the enclosures shall be provided with suitable interlocks and contacts wired into the control circuit.
    - Such interlocks or contacts shall be so designed as to effectively interrupt power and short circuit all capacitors when the door or panel is open.
    - A manually operated switch or suitable positive device shall be installed, in addition to the mechanical interlocks or contacts, as an added safety measure assuring absolute discharge of all capacitors.
  - All doors and access panels of all resistance welding machines and control panels shall be kept locked and interlocked to prevent access, by unauthorized persons, to live portions of the equipment.
  - All press welding machine operations, where there is a possibility of the operator's fingers being under the point of operation, shall be effectively guarded by the use of device such as an electronic eye safety circuit, two hand controls or protection similar to that prescribed for punch press operation, 29 CFR 1910.217 – Mechanical Power Presses. All chains, gears, operating bus linkage, and belts shall be protected by adequate guards, in accordance with 29 CFR 1910.219 - Mechanical Power Transmission Apparatus.
  - The hazard of flying sparks shall be, wherever practical, eliminated by installing a shield guard of safety glass or suitable fire-resistant plastic at the point of operation. Additional shields or curtains shall be installed as necessary to protect passing persons from flying parks. (See section 5.2.1.5.)
  - All foot switches shall be guarded to prevent accidental operation of the machine.
  - Two or more safety emergency stop buttons shall be provided on all special multi-spot welding machines, including 2-post and 4-post weld presses.
  - On large machines, four safety pins with plugs and receptacles (one in each corner) shall be provided so that when safety pins are removed and inserted in the ram or platen, the press becomes inoperative.
  - Where technically practical, the secondary of all welding transformers used in multi-spot, projection and seam welding machines shall be grounded.
    - This may be done by permanently grounding one side of the welding secondary current circuit.
    - Where not technically practical, a center tapped grounding reactor connected across the secondary or the use of a safety disconnect switch in conjunction with the welding control are acceptable alternates.
    - Safety disconnect shall be arranged to open both sides of the line when welding current is not present.

- **Portable welding machines**
  - All portable welding guns shall have suitable counterbalanced devices for supporting the guns, including cables, unless the design of the gun or fixture makes counterbalancing impractical or unnecessary.
  - All portable welding guns, transformers and related equipment that is suspended from overhead structures, eye beams, trolleys, etc. shall be equipped with safety chains or cables. Safety chains or cables shall be capable of supporting the total shock load in the event of failure of any component of the supporting system.
  - Each clevis shall be capable of supporting the total shock load of the suspended equipment in the event of trolley failure.
  - All initiating switches, including retraction and dual schedule switches, located on the portable welding gun shall be equipped with suitable guards capable of preventing accidental initiation through contact with fixtures, operator's clothing, etc. Initiating switch voltage shall not exceed 24 volts.
  - The movable holder, where it enters the gun frame, shall have sufficient clearance to prevent the shearing of fingers carelessly placed on the operating movable holder.
  - The secondary and case of all portable welding transformers shall be grounded. Secondary grounding may be by center tapped secondary or by a center tapped grounding reactor connected across the secondary.
- **Flash welding equipment**
  - Flash welding machines shall be equipped with a hood to control flying flash. In cases of high production, where materials may contain a film of oil and where toxic elements and metal fumes are given off, ventilation shall be provided in accordance with 1910.252(c) of this section.
  - For the protection of the operators of nearby equipment, fire-resistant curtains or suitable shields shall be set up around the machine and in such a manner that the operator’s movements are not hampered.
- **Maintenance**
  - Periodic inspection shall be made by qualified maintenance personnel, and a documented record maintained. The documented record shall include the:
    - Date of inspection,
    - Signature of the person who performed the inspection and
    - Serial number, or other identifier, for the equipment inspected.
  - The operator shall be instructed to report any equipment defects to his supervisor and the use of the equipment shall be discontinued until safety repairs have been completed.

WELDING, CUTTING, AND BRAZING PROGRAM ASSESSMENT

Unit Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
General Requirements	
Are welding locations approved by management, safety or the Fire and Emergency Services provider?	☐ Yes ☐ No
Are newly welded materials kept from causing a fire or a burning hazard to employees?	☐ Yes ☐ No
Are pressure vessels and pipes that have been welded, pressure tested to assure that no hazards are presented?	☐ Yes ☐ No
PPE and Health Protection	
Is the appropriate PPE worn when welding metals of toxic significance to protect welders and any exposed employees?	☐ Yes ☐ No
Is adequate ventilation provided during welding and cutting (e.g. local hoods or booths) to maintain the amount of toxic fumes, gases or dusts below regulatory levels?	☐ Yes ☐ No
Is PPE worn (and provided) to protect welders and employees from welding flashes and other welding hazards?	☐ Yes ☐ No
Area Hazards	
Wherever possible, are materials to be welded removed from their location and taken to a designated welding area?	☐ Yes ☐ No
Are all welding areas inspected for hazards (by the Welder and or Safety/Fire Services provider) prior to commencing field work?	☐ Yes ☐ No
Are all readily ignitable and combustible materials removed from the welding area (minimum 10m/35ft radius) prior to commencing work?	☐ Yes ☐ No
Is the welding area swept and clean from dusts?	☐ Yes ☐ No
Is welding prohibited from being performed when hazardous or ignitable vapors, gases or mists are present?	☐ Yes ☐ No
Are guards (i.e. screens and shields) utilized to confine heat, sparks and slag if objects to be welded cannot be removed to a safe area and if all fire hazards cannot be removed?	☐ Yes ☐ No
Equipment – Safe Use and Inspection	
Are all cutters or welders and their supervision trained in the safe operation of the equipment and in the process for the safe use of the equipment?	☐ Yes ☐ No
Are cutters or welders held responsible for the safety of the equipment and its safe use?	☐ Yes ☐ No
Are welding cables and other equipment kept clear of passageways, ladders and stairways?	☐ Yes ☐ No
Are welding cables in good condition?	☐ Yes ☐ No

Description of Requirement	Compliant?
"Hot Work"/Open Flame Permits	
Are "Hot Work Permits" (open flame permits) obtained prior to the start of the task, if applicable?	☐ **YES** ☐ **NO**
Are restrictions on the permits, if any, adhered to?	☐ **YES** ☐ **NO**
Gas and Fuel Cylinders	
Are compressed gas cylinders legibly marked with gas content?	☐ **YES** ☐ **NO**
Are acetylene cylinders stored valve end up and secured?	☐ **YES** ☐ **NO**
Are empty cylinders stored with valves closed?	☐ **YES** ☐ **NO**
Is cylinder storage inside buildings well protected, well ventilated, dry and at least 20 feet from any highly combustible material?	☐ **YES** ☐ **NO**
Are cylinders in storage areas secured and equipped with a valve protection cap?	☐ **YES** ☐ **NO**
Are oxygen cylinders in storage separated from fuel-gas cylinders or combustive materials by a distance of 20 feet or by a non-combustible barrier at least 5 feet high and having a ½ hour fire resistance rating?	☐ **YES** ☐ **NO**
Fire Watchers	
Are firewatchers present and cognizant of their duties whenever required?	☐ **YES** ☐ **NO**
Do firewatchers have suitable fire-extinguishing materials available to them at all times?	☐ **YES** ☐ **NO**
Have firewatchers been properly trained in their duties (i.e. operating an extinguisher, sounding an alarm, remaining at the welding location for at least ½ hour after work stops, wetting down combustible floors, etc.)?	☐ **YES** ☐ **NO**

X-RAY AND RADIATION PROGRAM ASSESSMENT

Facility or Area:	Assessor:	Date:

Description of Requirement	Compliant?
General	
Is a written Radiation Safety Program in place?	☐ Yes ☐ No
Does the program comply with any applicable State regulations? ➢ NOTE: State requirements are **NOT** outlined in this protocol.	☐ Yes ☐ No
Do the program objectives meet ALARA guidelines (ALARA = As Low As Reasonably Achievable)?	☐ Yes ☐ No
Does the program outline the responsibilities of an appointed Radiation Safety Officer for the company, as well as those for employees and management?	☐ Yes ☐ No
Has management appointed a Radiation Safety Officer (RSO) for the company?	☐ Yes ☐ No
Are all radiation sources registered with the appropriate Federal or State Agency?	☐ Yes ☐ No
If applicable, are all licenses for radiating devices and users issued and up-to-date?	☐ Yes ☐ No
Is the Radiation Safety Officer (RSO) provided with adequate resources (money and personnel) to manage the radiation safety program effectively?	☐ Yes ☐ No
Is the RSO notified when any new sources are purchased for the company so that appropriate registration and/or licenses can be obtained?	☐ Yes ☐ No
Radiation Safety Officer (and other radiation safety support staff, as needed)	
Does the RSO have the authority and responsibility for the maintenance and implementation of the company's radiation safety program?	☐ Yes ☐ No
Does the RSO serve as a liaison to all government agencies with regard to the program?	☐ Yes ☐ No
Does the RSO have appropriate training to perform radiation hazard assessments?	☐ Yes ☐ No
Does the RSO advise the company (and employees) on controls to maintain exposures to ALARA guidelines?	☐ Yes ☐ No
Does the RSO have the authority to enforce applicable regulations and guidelines?	☐ Yes ☐ No
Does the RSO, or an equivalently trained person, develop and implement employee training where radiation exposures exist?	☐ Yes ☐ No
Does the RSO have ultimate responsibility for managing radiation contaminated waste materials?	☐ Yes ☐ No
Does the RSO have the materials necessary to monitor employees and areas for radioactive contamination?	☐ Yes ☐ No
Does the RSO perform monitoring on employees and areas for radioactive exposures and contamination?	☐ Yes ☐ No
Does the RSO (or other appointed and trained persons) have responsibility over day-to-day management for the safe and legal use of radiation sources?	☐ Yes ☐ No
Is the Radiation Safety Officer (RSO) provided with adequate resources (money and personnel) to manage the radiation safety program effectively?	☐ Yes ☐ No
Is the RSO notified when any new sources are purchased for the company so that appropriate registration and/or licenses can be obtained?	☐ Yes ☐ No

Description of Requirement	Compliant?
Source Users	
Do all source users understand the operation and function of all safety devices and controls?	☐ **YES** ☐ **NO**
Do all users follow the written procedures and the manufacturer's recommendations to ensure safe exposure levels?	☐ **YES** ☐ **NO**
Do all users immediately report any malfunctioning equipment or devices, spills or unusual events to the RSO (or other equivalent person)?	☐ **YES** ☐ **NO**
Do all users maintain the appropriate documentation as required by the program, the company and any applicable regulations?	☐ **YES** ☐ **NO**
Do all users wear or utilize dosimeter devices, as needed or required? (any one likely to receive >25% dose; any one <18 years old and likely to receive >5% dose; or any one entering a high (potential 1 hr dose at >100millirem) radiation area.)	☐ **YES** ☐ **NO**
Training Requirements	
Does the RSO have appropriate training to perform radiation hazard assessments?	☐ **YES** ☐ **NO**
Does the RSO, or an equivalently trained person, develop and implement employee training where radiation exposures exist?	☐ **YES** ☐ **NO**
Do all users have training in accordance with state or federal requirements?	☐ **YES** ☐ **NO**
Does this training include information about the source(s) and the application or operation of the source(s)?	☐ **YES** ☐ **NO**
Is this training commensurate with the exposure level or hazard level of the source(s)? Such training may include: • Radiation Safety Officer or Coordinator Training • X-ray Equipment Radiation Safety • Radiation Safety for Emergency Responders • Sealed Source/Nuclear Gauge Radiation Safety • Nuclear Static Device Radiation Safety • Radioisotope User Training • Other current topics w/regard to Radiation Safety	☐ **YES** ☐ **NO**
Have employees been made aware (by physical activation of the alarm signaling system) of the alarm sounds and their actions to take when triggered?	☐ **YES** ☐ **NO**
Have employees who are exposed or potentially exposed been provided with a written copy of the regulation and a copy of the company's written plan?	☐ **YES** ☐ **NO**
Have employees been informed during training that they may request, and receive, a copy of any exposure reports and monitoring results?	☐ **YES** ☐ **NO**
Dosage Restrictions	
Are all sources limited or restricted to assure that no person receives a radiation dosage in one calendar year greater than ¼ the REM amount listed in table G-18 of 29CFR1910.1096?	☐ **YES** ☐ **NO**
Are all persons exposed limited to whole body exposures of less than 3 REMs and accumulated dosages are limited to 5*(Age-18) REMs?	☐ **YES** ☐ **NO**
Does the company maintain exposure records (for the length of employment plus 30 years) for dosages received?	☐ **YES** ☐ **NO**
Are exposures in the workplace to persons under the age of 18 limited to 10 percent of the REM amount listed in table G-18 of 29CFR1910.1096 in any three month period?	☐ **YES** ☐ **NO**

Description of Requirement	Compliant?
Are all sources of **airborne radiation** limited or restricted to assure that no person receives a radiation dosage in one calendar year greater than the limits set forth in Table1 of Appendix B to 10CFRPart20? ➢ Note that exposure is measured without any allowance for protective clothing, equipment or particle size	☐ **YES** ☐ **NO**
Are exposures in the workplace of **airborne radiation** to persons under the age of 18 limited to assure that they do not receive a radiation dosage in one calendar year greater than the limits set forth in Table2 of Appendix B to 10CFRPart20? ➢ Note that exposure is measured without any allowance for protective clothing, equipment or particle size	☐ **YES** ☐ **NO**
Do all users wear or utilize dosimeter devices, as needed or required? (any one likely to receive >25% dose; any one <18 years old and likely to receive >5% dose; or any one entering a high (potential 1 hr dose at >100millirem) radiation area.)	☐ **YES** ☐ **NO**
Caution Signs, Labels and Signals	
Are caution signs of the standard, industry accepted type (magenta or purple on yellow background and conventional three-bladed design)?	☐ **YES** ☐ **NO**
Is each radiation area conspicuously posted with symbols **AND** the words "Caution Radiation Area"?	☐ **YES** ☐ **NO**
Are high radiation areas (potential for 1 hr does at >100millirem) conspicuously posted with symbols **AND** the words "Caution High Radiation Area" **AND** equipped with a control device to reduce radiation levels to below threshold or that create a visible and audible alarm to alert others of the entry?	☐ **YES** ☐ **NO**
Is each area that contains airborne radiation (in concentrations greater that Table1 of Appendix B to 10CFRPart20, or where concentrations in any given week exceed 25% of these levels) conspicuously posted with symbols **AND** the words "Caution Airborne Radiation Area"?	☐ **YES** ☐ **NO**
Are "Caution Radioactive Materials" signs posted in any area that exceeds 10 times the quantity limits specified in Appendix C of 10CFRPart20 (or 100 times for natural uranium or thorium)?	☐ **YES** ☐ **NO**
Are containers used for transport, storage or non-immediate-usage in which radioactive material amounts exceeding the quantity limits in Appendix C of 10CFRPart20 (or 10 times the limits for natural uranium or thorium) labeled with the radiation caution symbol and the words "Caution Radioactive Materials"?	☐ **YES** ☐ **NO**
Are beakers, flasks, test tubes and other laboratory vessels labeled when materials are being stored in such vessels? ➢ Note this is not a requirement for in-use vessels, but recommended practice. It IS a requirement for any storage of materials in such vessels	☐ **YES** ☐ **NO**
Do evacuation alarms meet the requirements of 29CFR1910.1096 (f)? ➢ Mid-frequency complex sound wave with a frequency between 450 and 500 hertz and modulated at a subsonic rate between 4 and 5 hertz. Not less than 75 decibels and of sufficient length to ensure that all affected persons hear the sound. A unique sound (different from other emergency sounds).	☐ **YES** ☐ **NO**
Is the signaling system designed so that the signal is produced within one-half second of activation, it has a battery back-up system in case of power failure, and will activate either automatically or by human activation?	☐ **YES** ☐ **NO**
Is the signaling system located so that it is protected against unintended damage from physical, atmospheric or environmental hazards?	☐ **YES** ☐ **NO**
Is the alarm tested periodically (at least quarterly) and checked to minimize malfunction?	

Description of Requirement	Compliant?
Do alarm tests/checks include: • Power sources • Calibration • Trip levels • Continuity of function after power loss • All indicators • Trouble sensors (when used) • Air pressure (if used) • Sound level frequency	☐ YES ☐ NO
Have employees been made aware (by physical activation of the alarm signaling system) of the alarm sounds and their actions to take when triggered?	☐ YES ☐ NO
Is a copy of the regulation, and the company's written plan, conspicuously posted at or near the area, so that employees in the area can view them?	☐ YES ☐ NO
Are copies of the regulation and the company's written plan available for all employees who request them?	☐ YES ☐ NO
➢ NOTE: Some exceptions to posting and signage requirements are located in 29CFR1910.1096(g) and include: • human-implanted radioactive devices, ▪ some sealed sources and ▪ sources with a constant attendant for <8 hours (provided detection and alarm systems remain functional)	☐ YES ☐ NO
Other Requirements (Storage, Disposal, Incident Reporting and Notification, Records and Records disclosure, and NRC/State licensing)	
Are non-radiation areas used to store radioactive sources secured so that only authorized persons can retrieve them?	☐ YES ☐ NO
Are sources and devices disposed of in accordance with NRC regulations and State or Federal regulations?	☐ YES ☐ NO
Are provisions made to immediately report significant exposure incidents and accidents to either the NRC or OSHA, as applicable? Significant means: • whole body exposure to 25 rems or more • skin exposure to 150 rems or more • feet, ankles, hands or forearms to 375 rems or more • releases exceeding 5,000 times the limits set in Table2 of Appendix B to 10CFRPart20.	☐ YES ☐ NO
Are provisions made to report within 24 hours exposure incidents and accidents to either the NRC or OSHA, as applicable? Exposure incidents that require reporting are exposures of: • whole body exposure to 5 rems or more • skin exposure to 30 rems or more • feet, ankles, hands or forearms to 75 rems or more	☐ YES ☐ NO
Are provisions made for written exposure incident reports to be given to either the NRC or OSHA within 30 days of any overexposure incident (regardless of rem levels)? Such reports must include: • Extent of exposure • Levels of radiation • Concentration of radioactivity in material involved • Cause of the exposure • Levels of concentrations • Corrective and preventive actions taken to prevent recurrence	☐ YES ☐ NO
Are employees who have overexposures notified in writing of the nature and extent of the exposure, and contain the statement "You should preserve this report for future reference."?	☐ YES ☐ NO
Are exposure records kept (for standard monitoring, exposure reporting and overexposure incident) and personal exposure information provided (in both oral and written format) to the individual employees at least annually?	☐ YES ☐ NO

Description of Requirement	Compliant?
Are written exposure monitoring and reports furnished to former employees within 30 days of request, if applicable? Such reports must include: • Monitoring results from each calendar quarter (or lesser periods on request) • Results of any calculations made • Analysis of any radioactive material deposited in the body • The statement "You should preserve this report for future reference."	☐ **YES** ☐ **NO**
NRC contractors and NRC operators must be specifically licensed and comply with additional regulations outlined in 29CFR1910.1096(p), the provisions of the Atomic Energy Act of 1954, and the provisions of 10CFRPart20.	☐ **YES** ☐ **NO**
State agencies that may provide equivalent services and activities as those of the NRC must assure their contractors and operators are specifically licensed and comply with additional regulations outlined in 29CFR1910.1096 (p), the provisions of the Atomic Energy Act of 1954, the provisions of 10CFRPart20, and any additional State regulations governing ionizing radiation.	☐ **YES** ☐ **NO**
Private Industry that may provide equivalent services and activities as those of the NRC (or State equivalent) must assure their contractors and operators are specifically licensed and comply with additional regulations outlined in 29CFR1910.1096 (p), the provisions of the Atomic Energy Act of 1954, the provisions of 10CFRPart20, and any additional State regulations governing ionizing radiation.	☐ **YES** ☐ **NO**