# Safety at Work

Tips & Guidelines for Employers & Workers

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# Slips, Trips, & Falls

**(29 CFR 1910.22 & .23)**

"How can I get hurt? I'm just walking!"

## Workers slip, trip, & fall because:

1. They slipped on a liquid or granular product on the floor;
2. They slipped on paper or small parts;
3. They tripped over a pallet or other objects on or near the floor;
4. They tripped over a wrinkled floor mat;
5. They fell or stepped into an unguarded hole; or
6. They couldn't see over the materials they were carrying.

## Prevent slips, trips, & falls by:

1. Maintaining good housekeeping;
2. Carrying materials safely; and
3. Guarding all floor holes, open-sided floors, and skylights.

## Maintain Good Housekeeping

Proper housekeeping procedures can eliminate slip, trip, and fall hazards.

- Don't allow **anyone** to leave **anything** on the stairs or walkways.
- Boxes and other items can block access to stairs and can cause workers to trip and fall.
- Items like pens and pencils, paper, trash, paperclips, etc. on the stairs can cause workers' feet to slip out from under them and result in a fall.
- Make sure the walkway is clear, clean, and unobstructed.
- Clean up liquids, granular products, and other slippery substances on floors as soon as possible.
- Pick up anything that could cause someone to slip and fall [paper, pencils and pens, small parts, tools, banding, etc.].
- Pick up anything that someone could trip over [pallets, boxes, cords, etc.].
- Make sure mats and other floor coverings are not wrinkled or have upturned corners.
- Make sure you have good lighting so everyone can see where they are going.
- Mark step-ups and step-downs (including stair risers) with caution tape or brightly colored paint so they are easy to see.
- Clear snow and ice off of walkways as soon as possible, and put salt or other melting agents on the walkway to keep it clear.
- Make sure the access to emergency equipment (emergency disconnects, fire extinguishers, etc.) are clear so workers won't get hurt trying to get to them.

## Carrying Materials Safely

- Carry materials so you can see over them to the floor or stairs ahead of you. If you can't see where you're going, you can't adjust.
- Don't carry objects in both hands when ascending or descending stairs. Keep one hand on the stair rail.
- Carry materials that are a safe size and weight so you won't get thrown off balance and fall while carrying them.
- Actively watch where you are going and look for hazards in your path of travel. Don't assume your path is clear.
- Make sure your footwear is adequate for the job you are doing and the surfaces you will be working on. Your footwear should grip the floor and not be prone to slipping or sliding.

## Floor Holes

- Replace any removable covers or flooring that has been removed as soon as possible (not when you get around to it).

- Cover any opening in the floor with a material that will support the weight of any person or equipment that could pass over the floor hole.
- Barricade any floor hole or other opening that you can't cover properly. Don't leave a floor hole exposed or unattended for any length of time.
- Secure any floor cover you use so it can't slide off of the hole when someone steps on it.
- You can also place a standard guardrail around a floor hole instead of putting a cover over the hole.

## Open-sided Floors

- Anytime a floor surface is four feet or more above the adjacent floor or ground, the opening must be guarded.
- Guard open-sided floors with a standard guardrail.
- A standard guardrail system consists of the following elements:
  - A top rail and intermediate rail;
  - A standard toe-board must be provided whenever a person could pass beneath the landing, or where falling materials could damage moving machinery or equipment. (A standard toe-board is 4 inches in height above the floor surface and cannot have a gap between the floor and the bottom of the toe-board of more than ¼ inch.)
  - The top rail of the guardrail system must be able to support 200 pounds of pressure from any direction at any point along the rail.

## Skylights

- Put a guard over all skylights or directly under the skylight opening. The guard must be able to support at least 200 pounds

- A standard guardrail could also be installed around skylights or other roof openings.

# Falls from Ladders

**(29 CFR 1910.25 & .26)**

"What could happen on a ladder?"

## Ladders are uncomplicated and simple to use, but you shouldn't take ladder safety for granted. Workers get hurt using ladders because:

1. They slipped or fell off;
2. They had wet, greasy, or oily shoes;
3. They were holding object(s) with one or both hands;
4. They were using the wrong ladder for the job;
5. The ladder was poorly maintained and it failed;
6. They weren't shown how to inspect ladders;
7. They were not trained on the safe use of ladders; or
8. The ladder was not secured or tied down.

## Prevent falls from ladders by:

1. Choosing the right ladder;
2. Inspecting ladders;
3. Using ladders properly; and
4. Keeping ladders in good shape.

## Choosing the Right Ladder

Consider the type of ladder you need to do the job safely.

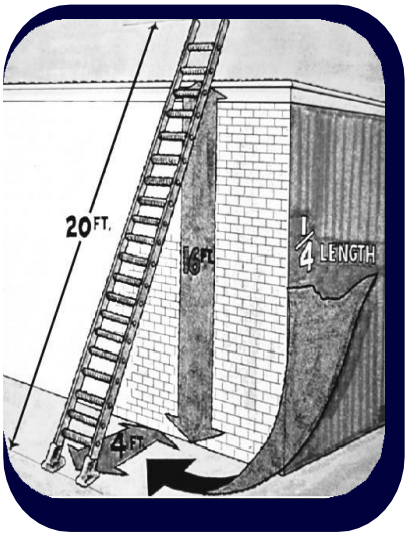
1. Do you need a step ladder or a straight ladder?
2. What length do you need?
   - It should be tall enough to reach what you need to work on without YOU having to reach out or up.
3. Do you need a non-conductive ladder for this job?
   - A dry wood ladder or a fiberglass ladder **will not** conduct electricity.
   - A metal ladder **will** conduct electricity.
4. How strong does the ladder need to be?
   - How much weight and stress is this job going to place on the ladder?

## Inspect the ladder for:

- Broken or bent rungs, side rails, or spreaders;
- Sharp edges and splinters;
- Securely attached hardware and fittings (rivets, braces, etc.);
- Movable parts operate freely without binding or undue play;
- Rungs that are free of oil and grease;
- Safety feet are in place and operable;
- Frayed or badly worn rope;
- Stability (does the ladder bow or lean to one side when weight is put on it?); and
- Other defective, corroded, broken, or worn out parts.

## Using Ladders Properly

- **DO NOT USE** ladders with broken or missing steps, rungs, or cleats, broken side rails, or other defective parts.
- Ladders must be placed on stable, level surfaces, unless you tie them off to a solid object to prevent movement.
- When going up and down the ladder, you should: 1) face the ladder, 2) have at least three points of contact with the ladder at all times, and 3) never carry something that could cause you to lose your balance or footing and fall.
- Ladders must not be placed on boxes, barrels, or other unstable bases to attain additional height.
- Unless designed to do so, ladders must never be tied or fastened together to make them longer.
- Ladders must not be used in a horizontal position as a platform, runway, or scaffold.
- Ladders must not be placed in front of doors opening toward the ladder unless the door is blocked open, locked, or guarded.
- When using a straight ladder, make sure that for every four feet the ladder goes up, the base of the ladder comes out one foot.
- The top of straight ladders must have a support under both rails.
- Don't climb on ladders made by fastening cleats (or boards) to a single rail.
- Portable ladders are rated and designed as one person ladders.




- No ladder should be used to gain access to a roof unless the top of the ladder extends at least three feet above the point of support, at eave, gutter, or roofline.
- Never step on the top two steps of step ladders.
- Never step on the top four rungs of a straight ladder.

- A ladder must not be moved, shifted, or extended while someone is on the ladder.
- Never climb the bracing on the back of step ladders, it's only there for support.

## Maintaining Ladders

- Follow the ladder manufacturers' recommendations for using and maintaining your ladders.
- Keep ladders out of the weather and away from corrosive chemicals, if possible.
- Make sure the rungs and steps of metal ladders have a non-slip surface on them.
- Keep all parts of ladders free of oil, grease, and other slippery substances.
- Remove any splinters or rough edges that have appeared on ladders.
- Do not overload ladders. Don't drop or throw ladders.
- Frequently, lubricate metal bearings of locks, wheels, pulleys, etc.
- Replace worn or frayed rope on ladders. Inspect all ladders frequently. Ladders that have developed defects must be taken out of service for repair or destruction and tagged or marked "Dangerous! Do Not Use."

# Falls on Stairways

**(29 CFR 1910.24)**

"What could happen on a stairway?"

## Workers get hurt on stairs because:

1. They slipped or fell;
2. They tripped over objects on the steps;
3. The stair treads were loose;
4. They were not holding the handrail;
5. The handrails were missing;
6. They were holding objects with one or both hands; or
7. The stairway was poorly maintained.

## Prevent falls on stairs by:

1. Maintaining stairway components (foot treads, handrail system, etc.);
2. Using stairs correctly; and
3. Maintaining good housekeeping.

## Maintain Stairway Components

Every flight of stairs with four or more steps must be equipped with **standard handrails**.

- Stairways less than 44 inches wide must have at least one handrail (preferably on the right side descending).
- If a stairway has an **open side**, that side must be protected with standard railing.
- Stairways more than 44 inches must have two handrails.
- Stairways more than 88 inches wide need a handrail on both sides and midway between the sides.
- Where doors open directly onto a stairway, a platform must be provided, and the swing of the door must leave 20 inches of effective width on the platform.

## Standard Handrail System

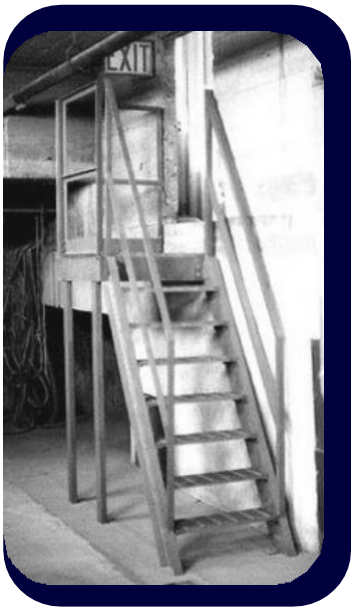
- Stair rails must be between 30 and 34 inches from the upper surface of the handrail to the surface of the stair tread at the front edge of the tread.
- A handrail must consist of a continuous piece of material mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so it will offer no obstruction to a smooth surface along the top and both sides of the handrail.
- There must be a three inch space between the handrail and the wall or other projection.
- The brackets supporting the handrail must be spaced no more than eight feet apart.
- The handrail must be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail.

## Stair Treads

- Are they securely attached?
- Are they structurally sound?
- Are they slip-resistant?
- Is the rise-height evenly spaced?
- Is the stair width the same?
- Is the tread depth the same?
- Is the leading edge of the tread distinguishable from the rest of the step?

## Stair Landings

- Stairway landings must be protected by a standard railing system whenever there is an open side, four feet or more above the adjacent floor or ground. A standard railing includes:
  - A top rail and intermediate rail;
  - A standard toe-board must be provided whenever a person could pass beneath the landing, where there is moving machinery under the landing, or if falling materials could create a hazard to equipment under the landing;
  - A standard toe-board is four inches in height above the floor surface and cannot have a gap between the floor and the bottom of the toe-board of more than ¼ inch.




## Use Stairs Correctly

- Hold the handrail as you are ascending and descending stairs.
- Don't carry objects with both hands.
- Stay to the right when others are or may be on the stairs.
- Look for hazards on the stairs (i.e. water or other slippery liquids, boxes, parts, or equipment, small objects like nuts and bolts or pens you could slip on).
- Don't run on stairs. Take stairs one step at a time.
- People with new glasses should be extra careful on stairs.

## Maintain Good Housekeeping

- Proper housekeeping procedures can eliminate stairway slip, trip, and fall hazards.
- Repair or block off stairs that have compromised stair treads or handrails.
- Don't allow employees to use defective stairs.
- Don't allow anyone to leave anything on the stairs.
  - Boxes and other bulky items block access to stairs and can cause workers to trip.
  - Small items like pens and pencils, paper, trash, paperclips, or anything else on stairs can cause workers' feet to slip out from under them and result in a fall.
- Clean up liquids or other slippery substances on stairs as soon as possible.
- Pick up all objects that are left on stair treads or at the top or bottom of stairways.
- Make sure you have good lighting in stairwells. You can't avoid what you can't see!
- Don't use stairwells or steps as storage areas.

# Permit-Required Confined Spaces

**(29 CFR 1910.146)**

"What is a confined space?"

## A confined space is a space that:

1. Is large enough so all or part of your body can get in to do work;
2. Has limited means of getting in and out (you can't just walk out); and
3. Is not designed for continuous human occupancy.

If a confined space does not contain any of the safety or health hazards listed below (i.e. there is **NO WAY** that any hazards capable of causing a serious injury or death are in the space) OSHA does not require you to follow a confined space plan.

**BUT**, if a confined space also contains (or has the potential to contain)...

1. A hazardous atmosphere;
2. A material that could engulf a person;
3. An internal configuration that narrows down to a small area where a person could be trapped or asphyxiated; or
4. Contains any other recognized serious safety or health hazard.

...You must follow a written permit-required confined space program and use a permit when entering the space for any reason!

## What is involved in a permit-required confined space program?

1. Make sure you know **all** the hazards that may be in the space you are entering.
   - Bad air or chemicals in the space;
   - Electrical & mechanical hazards; or
   - Substances that can engulf or trap an entrant in the space.
2. Develop procedures for safely entering and performing work in permit spaces.
   - Specify what entry conditions will be acceptable and verify that the space is safe before entry;
   - Isolate the space from all sources of energy, chemicals, etc.;
   - Develop procedures to control atmospheric hazards; and
   - Develop procedures to work with other employers in a space.
3. Develop a permit system for all entries. This will include:
   - A system to prepare, issue, use, and cancel permits; and
   - A permit that has all the required fields on it and is filled in completely.

4. Provide all the necessary equipment to work in the spaces. This includes:
   - Testing and monitoring equipment;
   - Ventilating equipment;
   - Personal protective equipment;
   - Communications equipment;
   - Rescue and emergency equipment; and
   - Other equipment as necessary.
5. Evaluate permit space conditions when entries are made.
   - Test the conditions in the space to determine if acceptable entry conditions exist before entry,
   - Test the conditions throughout the entry.
6. Provide at least one attendant outside the space during entries.
   - An attendant must be outside the space for the duration of the entry.
7. Designate the persons who will have responsibilities during permit-space entries and train them.
   - Identify the duties of all authorized entrants, attendants, entry supervisors, persons who test the atmosphere and operate other equipment; and
   - Train these persons in the details and procedures of their responsibilities during entries.
8. Develop procedures for summoning rescue and emergency services.
   - Arrange for trained rescue and emergency services to be available throughout all entries.
9. Review the program annually and revise it to ensure the safety of everyone involved in confined space entries.
   - Use cancelled permits from the past year to monitor, review, and revise the program to ensure employees are being protected from the hazards.

## Everyone involved with an entry must be trained in the following:

- What hazards may be faced during entry;
- How to identify the signs and symptoms, of exposure to hazards in the space;
- The consequences of exposure to hazards in the space;
- How to properly use all equipment involved in the entry;
- How to communicate with the attendants and entrants involved in the entry;
- When to alert the entrant or attendant that something may be wrong; and
- When exit from the space is required and how to signal that exit.

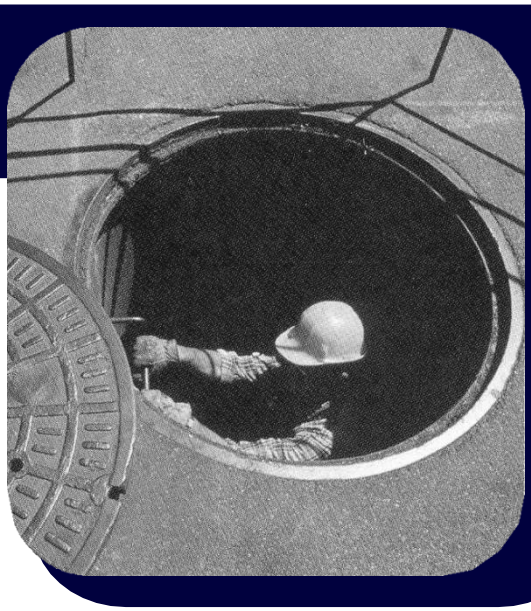
## In addition to the training listed above, the attendants must be trained in the following:

- What possible behavioral effects may result from exposure to the hazards;
- How to continually maintain an accounting of who is in the space;
- How to monitor the activities inside and outside the space to determine if it is still safe to continue the entry;
- How to summon rescue and emergency services; and
- How to perform non-entry rescue.

## In addition, entry supervisors must be trained in the following:

- How to verify that the permit has been completed correctly and that all hazards have been controlled before allowing entry to begin;
- When and how to cancel the permit;
- How to verify that rescue and emergency services are available and that the means for summoning them are operable; and
- How to determine that acceptable entry conditions are maintained throughout the entry.

# Hazards in Confined Spaces



**(29 CFR 1910.146)**

"What hazards can be found in a confined space?"

**Many different hazards can be present in confined spaces. The main categories of hazards are:**

1. A hazardous atmosphere;
2. Materials that could engulf a person;
3. A space that has an internal configuration that narrows down to a small area where a person could be trapped or asphyxiated; and
4. A space that contains any other recognized serious safety or health hazard.

**Engulfment:**

## Non-Atmospheric Hazards

Engulfment is the entrapment of a person by the contents of a space. The contents surround the entrant(s) and holds them.

The substance can be a liquid or flow able solid substance. Entrants can be captured and die due to:

- Being pressed on by the substance with enough force that they can no longer breathe and are strangled, constricted, or crushed; or
- Sinking down into the substance and aspirating it, causing death by filling or plugging the respiratory system.

Engulfment can occur when working in spaces with:

- Liquids;
- Small granular products such as grain;
- Materials that cling to the sides of the space (the material falls);
- Materials that form a "bridge" inside the space (these materials fall also);
- Accidental or deliberate flooding of the space with a liquid; or
- Dirt, rocks, ice, etc.

*Completely empty the contents of the space before entry begins, if possible!

*Use non-entry retrieval and fall arrest equipment to prevent workers from falling or sinking down into the contents of the space.

**Internal configuration that narrows to a small area:**

If a space has inwardly converging walls or a floor that slopes and tapers to a smaller cross section, entrants could fall down to the smaller area and be trapped.

Some spaces may have hazards due to the internal configuration of the space caused by:

- Multiple ladders or scaffolds in the space;

- Pits or other uneven flooring in the space;
- Complex layouts, tunnels, or tight corners;
- Sharp edges that can tear protective clothing and other equipment; or
- Low or narrow areas that can trap workers.

*Know **ALL** the hazards and quirks of your space. When you're planning, consider every piece of equipment, every opening, every twist, and turn. Plan for **EVERYTHING**!

### Mechanical Hazards

- Paddles
- Blades
- Shafts and augers
- Chain or belt drives
- Hydraulic or pneumatic energy

*Lock and tag out **everything** that could move and injure workers.

### Electrical

- Non-explosion proof lighting
- Broken lighting or other equipment
- Electrical sensing devices
- Limit switches
- Level indicating devices
- Hazards from equipment taken into the space

*Check all equipment before using it in a potentially explosive atmosphere – make sure it's explosion-proof. Protect employees from any live electrical hazards by locking and tagging them out.

### Stability and Portability

- Rail Cars
- Concrete trucks
- Semi-trailers

*Chock wheels, secure ignition keys, place signs at 'hitching' positions, put derails in place.

### Temperature

- Heat stroke, stress
- Severe burns from surfaces
- Hot surfaces that burn equipment
- Extremely cold surfaces can freeze to the skin

*Do not allow entry until temperatures are within a pre-set range.

### Noise

- Extreme, short-term noise can cause permanent hearing loss
- Loud environment may interfere with communication and delay rescue or emergency services if needed

*Protect workers' ears and preplan how you will have effective communication between the entrants.

## Atmospheric Hazards

A space that contains or has the potential to contain a hazardous atmosphere can be deadly. If an atmosphere can cause death, incapacitation, impairment of the ability to self-rescue, serious injury, or acute illness, there is a serious problem and it must be addressed and made safe before any entry can be made.

There are a number of ways in which an atmosphere inside of a confined space can be hazardous:

1. **A flammable gas, vapor, or mist that is in excess of 10% of its Lower Explosive Limit (LEL).**

In a flammable atmosphere, a small spark occurring inside or outside the space can ignite the space instantly.

The flammable substance could come from:

- Fumes of chemicals left on the inner surfaces of the space;
- Rotting organic materials in the space;
- Leaks in pipes or hoses inside or outside the space;
- By-products of work being performed in the space (brazing, painting, cleaning, degreasing, de-scaling, etc.); or
- Vaporization of flammable liquids in the space.

**2. A concentration of combustible dust in the air that is at or above its LEL.**

- "Rule of thumb" - Where dust obscures your vision at a distance of 5 feet or less a dust explosion could occur.

**3. An oxygen concentration that is below 19.5% or above 23.5%.**

- Oxygen can be consumed by:
  - The process of combustion when there is welding, cutting, or brazing in the space;
  - The fermentation process in a space; or
  - A chemical reaction, like the formation of rust that consumes oxygen.
- Oxygen can be displaced by other substances pushing the oxygen out, such as:
  - Methane, carbon dioxide, methane, argon, etc.
- Oxygen levels can be elevated by:
  - Using oxygen to ventilate the space; or
  - Taking compressed oxygen tanks into the space, or having a leak in an oxygen supply hose in the space.

**4. The concentration of any chemical or substance is in excess of its Short Term Exposure Limit (STEL).**

Chemicals can burn your skin, eyes, and respiratory system; you can inhale chemicals that will damage your nervous system and other internal organs; and some chemicals can cause you to pass out, stop breathing, and die very quickly.

Chemicals in an enclosed space could come from:

- Chemicals left on inner surfaces;
- Decomposition of materials in the space;
- Leaks in hoses or pipes;
- Chemicals being released while working in the space;
- Chemicals put in the space to make the space non-flammable; or
- Chemical reactions during work.

**5. Any other atmospheric condition that is Immediately Dangerous to Life and Health (IDLH).**

Exposure to any chemical that can cause an immediate or delayed threat to life or health is a threat in a confined space.

- Some chemical effects can be delayed 12 to 72 hours.
- Some chemicals can cause irreversible health effects that do not show up immediately.

*The **number one** cause of deaths in confined spaces is **oxygen deficiency.** Always test the atmosphere to make sure there is enough oxygen in the space!

*The **number two** cause of deaths in confined spaces is **flammable explosions**. Always test the atmosphere to make sure the flammable content in the spaces is less than 10% of the LEL!

# Combustible Dust

Combustible dusts are fine particles that can explode when suspended in air under certain conditions. A dust explosion can be catastrophic and cause injuries, deaths, and destruction of entire buildings. In many combustible dust accidents, employers and employees were unaware that a hazard even existed. It is important to determine if this is a potential hazard at your worksite. If so, action must be taken now to prevent tragic consequences.

## Which dusts are combustible?

Materials that form combustible dusts include:

- metals (i.e., aluminum and magnesium)
- wood
- coal
- plastics
- bio solids (treated sludge)
- sugar paper soap
- dried blood
- some textiles

Combustible dust explosion hazards exist in a variety of industries, including:

- food (candy, sugar, spice, starch, flour)
- grain & feed
- tobacco
- plastics
- wood, pulp, & paper
- tire & rubber
- furniture
- textiles
- fertilizer & pesticides
- pharmaceuticals
- dyes
- metal processing (aluminum, chromium, iron, magnesium, & zinc)
- fossil fuel power generation (coal)

## Why are dust explosions so serious?

1. An initial (primary) explosion occurs in processing equipment or in an area where dust has accumulated.

2. The shock wave dislodges more accumulated dust into the air in the immediate area or in a nearby area, ductwork, vessel, or building.

3. Heat from the explosion or a spark from another ignition source in the area of the dislodged dust can ignite the dust causing one or more secondary explosions.

The secondary explosions are often much more destructive than the primary explosion because there is more dust in the air. The more dust in the air (fuel), the bigger the explosion!

## Dust Control Recommendations

1. **Inspect:** Begin a hazardous dust inspection program to inspect for dust accumulation in **ALL** open and hidden areas regularly, including the tops of dropped ceilings.

2. **Housekeeping:** Clean floors and other horizontal surfaces to minimize dust accumulations. Include the tops of ducts, pipes, hoods, ledges, and beams.

3. **Capture:** Install and use approved dust collection systems and filters to safely capture the dust you produce. Don't recycle the air back into the work area.

4. **Control:** Minimize the escape of dust from seams in process equipment and ventilation systems, such as ductwork.

5. **Engineer:** Try to eliminate horizontal surfaces in dusty areas so dust accumulation will be minimized and cleaning will be easier.

6. **Access:** Make sure there is access to all hidden areas where dust could settle to permit inspection and cleaning.

7. **If ignition sources are present:** Use cleaning methods that do not generate dust clouds. If this is impossible, conduct cleaning when all heat and ignition sources can be turned off. Don't use compressed air to clean dust accumulations, use a vacuum system!

8. **Safe collectors:** Only use vacuum cleaners and other collection system equipment that are approved for dust collection. Vacuums used to collect dust must be explosion-proof models.

9. **Venting:** Vent relief valves to the outside, away from dust deposits, work areas, doors, and other potentially occupied areas.

## Ignition Control Recommendations

1. Make sure all electrical wiring, equipment and industrial trucks are approved for locations containing combustible dusts (Class II locations)

2. Control static electricity, including grounding and bonding all equipment, to dissipate electrostatic charges

3. In areas where dust is produced, don't allow smoking, open flames or spark-producing equipment. Post "No Smoking" signs in these areas.

4. Make sure that dust collection systems, including the ductwork, are bonded and grounded.

# Electrical Hazards

**(29 CFR 1910.300 through .322)**

Electrical hazards come in many shapes and forms. Many workers have been injured or killed by not taking the proper precautions and/or having an incomplete understanding of the danger.

## Here are some examples of accidents related to electrical hazards:

- A worker was using a long-handled finishing broom to smooth out newly poured concrete and it made contact with an overhead power line.
- Two workers were electrocuted when they were moving the scaffold they had erected and it made contact with a power line.
- A worker on a ladder was removing a piece of electrical cable from an energized junction box when he was shocked and fell from the ladder.
- A worker was welding with a gas/electric powered torch. The torch's power cord had multiple breaks in it and he apparently passed out, fell onto the cord, and was electrocuted.
- Five workers were positioning a large ladder to access the roof when it made contact with an overhead power line, killing two of them.

## Before you do any work with or around electricity, ask yourself (and your supervisor) these questions:

- Is there a Job Hazard Analysis (JHA) for the job?

  There should be a JHA for each hazardous job that shows the step-by-step procedures to complete the job and what safety precautions and equipment need to be used.
- Have you been properly trained to do this job?

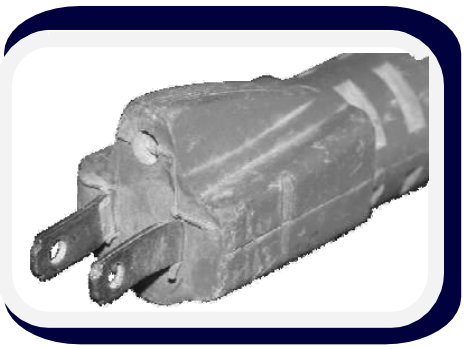
  All employees who perform jobs that could be hazardous should be given training that includes the procedures and precautions on the JHA so they can know how to complete the job correctly and safely.
- Is there some hazard in the environment?

  Are there power lines, open electrical boxes, or underground electrical cables or other services in the area?
- Working on live electricity requires special training and tools. If you are not licensed or qualified, stay away.

## Power Cords

1. Are cords in sound, useable condition? The insulation on the cords and equipment must be intact with no tears or cracks to the insulation, no breaks, no exposed wire, and the ground pin must be intact.

2. Cords cannot be routed through doorways, windows, or anywhere else their insulation could be cut or compromised by the surrounding materials or movement of equipment.



## Energized Machines & Circuits

1. Do you have the proper training and equipment to work on the equipment? Only qualified electricians can work on live electrical equipment.

2. Don't open any compartments that contain electrical components unless the machine and all power to it have been de-energized and locked out

3. Is it really de-energized? All sources of energy must be eliminated and locked out, including electric, hydraulic or steam pressure, spring and gravity. If you don't have the knowledge and the tools to be able to ensure that what you are about to work on is completely de-energized, do not attempt it.

## Overhead Power Lines

1. Actively look for overhead power lines in or close to your work area.

2. Anything (except specialized electrical tools) that touches an overhead power line can carry the current to the nearest ground. If you are touching something that touches a power line, the current is probably going to get to the ground through you.

   Power lines at a home or office building are just as deadly as those at a factory. Keep all objects at least ten feet away from any power line at **ALL** times.

4. Never touch a fallen overhead power line. Never assume that a wire is safe to touch even if it is down or appears to be insulated.

5. If an overhead wire falls across your vehicle while you are driving, stay inside the vehicle and continue to drive away from the line. If the engine stalls, do not leave your vehicle. Warn people not to touch the vehicle or the wire. Call the local electric utility company and emergency services.

## Ground Fault Circuit Interrupter

All electrical outlets within six feet of a source of water or other liquid should be GFCI protected.

# Emergencies

## (29 CFR 1910.38 & 1910.165)

OSHA requires every workplace to have an emergency action plan in place to protect employees when emergencies occur.

Does your workplace have a plan for responding to each type of emergency that could occur at your facility?

Do you know what you are supposed to do in each type of emergency at your workplace?

### What is included in an Emergency Action Plan?

1. The procedures for reporting a fire or other emergency;
2. Emergency evacuation procedures, including the type of evacuation and exit route assignments;
3. Procedures to be followed by key employees who must operate or shut down critical plant operations before they evacuate;
4. Procedures to account for all employees after an evacuation;
5. Procedures for employees designated to perform rescue or medical duties; and
6. The name or job title of all persons that can be contacted by an employee who needs more information about the plan or an explanation of their duties during an emergency.

### What else is required so each workplace is prepared for emergencies?

- **Employee Alarm Systems:** Each workplace must have and maintain an alarm system. Workplaces with 10 or fewer employees can use voice communication as long as all employees are located where they can hear the voice communication.

  The alarm system must use distinctive signals that tell employees the type of emergency that is occurring. Alarms must be heard over equipment and other noise at the facility. If employees have hearing restrictions, other methods, such as flashing lights, can be used.

- **Training:** Every employee must be given training about the emergency action plan so they can recognize and properly respond to emergency signals, 1) when they begin working at a facility, 2) when an employee's responsibilities in the plan change, and 3) when the plan is changed.

## Emergencies

1. **Fire:** Workers should exit the building and report to the designated area. There may be more than one area designated so you can determine the wind direction (or other factors) and assemble at the safest location.

   Only employees who are designated and trained to fight fires at the facility should attempt to use a fire extinguisher on any fire that is bigger than a small, office-sized trash can.

2. **Tornado:** Workers must proceed to the storm shelter - usually a reinforced room close to the center of the building.

3. **Bomb Threat:** Workers should exit the building and report to the designated area. It is important that workers not panic and cause injury to others trying to exit the building.

4. **Accident/Injury:** Workers need to know who is designated for rescue and medical help and call them immediately.

   No workers should put themselves in danger to assist others. If guards are not in place or confined spaces have not been confirmed as safe to enter, do not proceed.

5. **Earthquake:** If an earthquake occurs, you should drop to the floor; take cover under a sturdy desk or table and hold on to the desk/table until all the shaking stops, even if it moves. If there is nothing to take cover under, cover your head with your arms and try to protect yourself from falling debris.

6. **Workplace Violence:** Workers need to know who to call if an argument is getting out of hand, if workers are threatening to hurt others, if you see weapons in the facility or if you see or hear anything that leads you to believe someone may become violent.

## Signals and Designated Areas

**Who do I contact if I discover:**

- Fire: _____
- Bomb: _____
- Accident/Injury: _____
- Violence: _____

**What are the emergency signals at this facility?**

- Fire/Bomb Threat: _____
- Tornado: _____

**Where are the designated exit routes and assembly areas?**

- Fire/Bomb Threat: _____
- Tornado: _____

*It is important to take the Exit Routes designated for your area and to report to the designated Assembly Area when an emergency signal is heard.

*Rescuers will continue to try to locate any personnel who are not accounted for at the designated assembly areas, so do not leave the premises without notifying someone of your safety.

# Don't Take Work Exposures Home

We may expect to be exposed to harmful products at work, but are we always diligent to make sure we don't take them home to our family and friends?

## How can hazardous chemicals be unknowingly taken home?

- **In work clothing:** Powders, dusts, fiber, and particles of harmful products can fall or be rubbed off your clothing and shoes. These can get into the air or cling to surfaces in your home and your vehicle.
- **Tools and equipment:** Hand tools and other equipment that have had contact with hazardous materials can contaminate whatever they touch, such as seats and interior surfaces of your vehicle and the furniture and flooring in your house.
- **Materials from work:** Bags, rags, scrap lumber, and other materials scavenged from work can be contaminated and spread to your clothing, skin, vehicle, and home. Every time you touch the item, you contaminate your skin again.

  Personal items you take to work lunch bags, coffee mugs, backpacks, purses, and other items you take to your workstation can become contaminated with hazardous chemicals.
- **Your body:** Harmful materials can be carried on your skin, in your hair, eyelashes, and eyebrows.

If you have not carefully removed hazardous substances from your clothing, skin, hair, tools, and personal items, you are likely to spread the contamination wherever you go.

## How are we exposed to the hazards?

- **Inhalation:** Chemicals can evaporate into the air and fibers/dusts can float in the air for hours or days before settling onto the floor and other surfaces. These hazards in the air will be inhaled by anyone in the area. Children crawling on the floor will be exposed to the materials that have collected there.
- **Skin and eye contact:** Contamination by hazardous materials can spread just like cold germs; any surfaces that are contaminated can transfer that contamination to the next person who touches the surface. Some chemicals can enter directly into the bloodstream through skin contact, so if you have a chemical on your hand or clothing and wipe your eyes or adjust a contact lens, you have most likely transferred some of the chemical there.
- **Swallowing:** Although most of us would not knowingly drink a hazardous substance, we can swallow them if they are transferred to our food, a beverage container, or our hands.

## Protecting You and Your Family

1. **Wear personal protective equipment (PPE) and use proper work procedures to keep hazardous chemicals off your skin, clothing, hair, etc.** Wear your PPE consistently and take it off before eating and before leaving the plant.

2. **Don't take food, beverage containers, and other personal items into the work area where hazardous materials are present.** If your employer does not have a safe, clean place for you to store these items, ask them to provide a place.

3. **Don't keep PPE and work clothes in the same locker.** If you have PPE that is contaminated with a hazardous chemical, don't store them with uncontaminated clothing.

   If you change into work clothes when you get to work, don't store your clean street clothes where the contaminated work clothing has been hanging.

4. **Wash your hands, arms, face and any other contaminated area of your body thoroughly before eating, drinking, smoking, applying lip balm, or contact lenses or using the toilet.** If you wash up and then touch a contaminated object such as your contaminated clothing, you need to wash again.

5. **Wash thoroughly after any exposure to a hazardous substance for at least 15 minutes.** If you suspect contact with a chemical that is hazardous to your skin or can be absorbed through your skin, you need to wash for 15 minutes with soap and water.

   If your PPE or clothing gets contaminated, peel it down like a banana, starting at the top and moving down the body. Use gloves if possible, and don't touch the contaminated parts of the clothing.

6. **Shower and change clothes when possible before leaving work.** If you work in an area where hazardous materials can contact your clothing and skin, shower and change into clean clothes before leaving work, if possible.

7. **Don't wear work clothing that could contain hazardous material contamination away from work.** You have the potential to spread workplace exposures wherever you wear contaminated clothing. At the very least, wash your hands, arms, and face and change out of contaminated clothing at the end of your shift. Keeping your vehicle clean and safe for family members is important for their safety.

8. **Place protective coverings over your car seats and floor mats if you must drive with contaminated clothing or footwear.** If you must drive your vehicle at work while wearing contaminated clothing, protect the environment in your vehicle by covering the seat and floorboard. If you carry tools or materials that may be contaminated, use protective coverings over any surface they touch (including the bed of a truck).

9. **Launder work clothes separately from other clothing and laundry.** Never wash items that contain hazardous chemical, dust, or fiber residues with your family's clothing, towels, or linens. Some of the hazardous material will inevitably transfer to the other items in the washer.

   If items of your clothing has flammable chemicals on, don't put them in the dryer until you have washed them and made sure it has all been washed away and there is no more odor in the material.

10. **Don't take tools, scraps, packaging, or other items home.** If items you scavenge from work have been exposed to liquid or powdered chemicals or hazardous fibers, don't take them home!

# Personal Protective Equipment on the Job

## Protective Footwear

OSHA requires protective footwear whenever there is a danger of foot injuries due to:

- Falling or rolling objects
- Objects piercing the sole, or
- Foot exposure to electrical hazards.

Protective footwear does not necessarily mean "steel toed safety shoes." In some situations, a sturdy leather shoe or boot can provide adequate foot protection.

**Steel toed safety shoes** are designed to protect the foot against weights of 30-75 pounds being dropped on the toe. When you are carrying heavy packages or other objects such as tools, parts or doing any other work where objects might fall on your feet, steel toed shoes are probably in order. Some other examples of where steel toed shoes would be in order are moving skid trucks, heavy paper rolls, or heavy pipes.

**Puncture resistant shoe soles** would be needed where there is the hazard of nails, wires, tacks, screws, large staples, or scrap metal on the floor where you could step on them. **Metatarsal (instep)** protection is needed where heavy objects could be dropped on the upper part of the foot. Other types of protective footwear include electrical conductive or insulating, heat insulating, or chemical resistant.

Protective footwear should comply with ANSI (American National Standards Institute) Z41- 1994.

## Eye Protection

Eye or face protection is necessary if you are exposed to:

* Flying particles
* Acids or caustics
* Molten metals
* Chemical acids or vapors
* Liquid chemicals
* Dangerous light radiation

**Side shields** are also required when the danger is flying particles. Side shields on glasses should be substantial.

Safety glasses are usually marked with **ANSI Z 87** (usually on the temple piece). The lenses of prescription safety glasses are also marked with the manufacturer's initials on the glass.

When prescription safety glasses are needed, OSHA does allow "visitor" type glasses to be worn over street glasses if the wearer is adequately protected by such.

Filter lenses are required when you are ex- posed to dangerous light radiation. Examples of such tasks are welding, brazing, and cutting. **Remember** that in addition to protecting the welder, the welder's helper and often people working or walking nearby to welding may need eye protection. Consult OSHA's regulations 1910.133 for specific shades needed in glasses.

NOTE: Welding helmets, hoods, and goggles also can be used as PPE. However, most welders need both safety glasses and a welding helmet. In fact, anyone using a face shield should always wear protective glasses.

## Head Protection

OSHA requires head protection when there is a danger to the head from:

- Falling objects
- Electrical hazards

Some examples of when head protection might be needed are:

- Other workers overhead using tools or materials that could fall
- Working around or under conveyor belts which are carrying parts or materials
- Working below machinery or processes which may cause material or objects to fall
- Working on exposed energized conductors

Protective helmets must meet ANSI Z 89.1- 1986. The classes of hard hats include **Class A** which are rated for impact, penetration, and low voltage protection. Most people wearing hard hats use this kind. **Class B** hard hats are rated for impact, penetration, and high voltage protection. This kind of hat is used by electrical workers. The third kind of hard hat is used in **Class C**. These are rated for impact and penetration and are made of aluminum (for heat resistance). These are not worn by electrical workers but are worn around furnaces.

## Hand Protection

Hand protection is required by OSHA whenever there is the hazard of:

- Skin absorption of hazardous substances
- Severe cuts or lacerations
- Punctures
- Chemical burns
- Thermal burns
- Harmful temperature extremes.

Unfortunately, there is no glove that will protect against all hazards. Gloves are limited in what they will protect against.

Gloves for protection against chemicals must be carefully matched to assure they will provide the required protection. Some gloves will only stop chemicals for a few seconds and other gloves will provide hours of protection. Some gloves cannot be reused or cleaned when used with certain chemicals, others can be cleaned. If gloves become stiff, worn, or frayed, discontinue their use and get new ones.

Some gloves (leather, for example) that work well against metal cuts are dangerous to use around chemicals because the leather absorbs toxic materials.

Some gloves may make it harder to hold tools and will put more stress on the user's hand. It may also be dangerous to wear gloves around moving machine parts because the hand may be trapped and pulled into the machine.

Whether you are using gloves, hard hats, glasses, or safety shoes, the employer must first survey the workplace and determine what personal protective equipment (PPE) should be used in each situation. This is called a hazard assessment. The correct PPE is then selected based on this assessment. You should also receive training on the PPE you are using.

But, keep in mind that PPE should be the **last resort** for protecting against hazards. Guarding, engineering controls, and sound manufacturing practices are the preferred methods to protect you against hazards in the workplace.

**Who pays for PPE?** OSHA published a directive that stated that PPE left at work and not used off the job is to be paid for by the employer. PPE that is taken home and used at work can have the cost negotiated between the employer and the employee. OSHA also allows for the employer to require the employee to pay for such.

# Why I Need a Safety Data Sheet

An SDS can warn you about the harmful effects of a chemical. So you can take precautions to work with it safely! Some chemicals can burn the skin:

- Acids
- Alkalis
- Corrosives
- Strong solvents

The SDS will describe dermatitis and other hazards and give you advice about specific personal protective equipment (PPE) to wear. Dermatitis is preventable if precautions are taken.

Other chemicals can be absorbed through your skin. (This is worsened if you have cracked skin or dermatitis.)

These chemicals can enter your body through your skin, so take precautions to prevent absorption.

Don't let clothing soaked with chemicals stay in contact with your skin. If you get a chemical spilled on your skin, clean it off quickly! Check for first aid instructions on the SDS. Other chemicals can cause eye irritation, corrosion, or other damage, especially if splashed in your eyes.

If the SDS says the chemical causes eye irritation, corrosion, or other damage, wear goggles, face shield, or both.

Make sure there is eyewash nearby any corrosive chemicals.

In addition to skin hazards, many chemicals can be hazardous if:

inhaled (breathed through the nose or mouth) or ingested (taken by mouth because of a splash or chemical on hands that is transferred to your food or drinking container.)

Some of the most important information on the SDS are the acute and chronic effects of the chemical.

**Acute effects** are usually from an instant type event, such as a splash or an accidental exposure to a chemical. Symptoms appear quickly after exposure.

**Chronic effects** develop over a long period of time, usually months or years. You have to guard against these for a long time or you might develop the associated illness.

PEL (Permissible Exposure Limit) is the OSHA law, and TLV (Threshold Limit Value) is a recommended exposure limit. Keeping exposures below these limits will keep the average person from getting sick at work. Industrial hygienists can measure the levels of most chemicals to determine your level of exposure.

The SDS also has other good pieces of information that will help keep you safe. It will tell you if the material you are working with:

Is hazardous to breathe

Is hazardous to touch

Is flammable

Is water reactive

Will damage your internal organs

Can harm unborn children

Can cause cancer

Is harmful to the environment

Will float (less dense than water)

Will sink (denser than water)

Is heavier than air*

Needs a specific respirator or other PPE.

* A chemical that is heavier or lighter than air will not layer out if wind or air movement keeps stirring it up, such as “iced tea and sugar”.

# Machine Guarding

## (29 CFR 1910.211 through .222)

Machinery related injuries are some of the worst in industry today. Unguarded machinery can mangle arms and legs, sever fingers, rip scalps off, and even kill workers.

### What equipment needs to be guarded?

- **Point of Operation:** The place where work is performed on the material, such as cutting, shaping, boring, rolling, punching, forming, or moving.
- **Power Transmission Apparatus:** Components of the mechanical system that transmit energy to the "working" part of the machine. These include flywheels, pulleys, belts, chains, connecting rods, couplings, cams, spindles, cranks, and gears.
- **Other Moving Parts:** All parts of machines that move while the machine is running could create a hazard. These could include rotating or reciprocating parts as well as feed mechanisms and anything else that moves.

*To prevent injury from any of these hazards, guards must be in place whenever work is in progress.

You must use proper lockout/tagout procedures or approved adjustment procedures if guards are removed.

### What can be used to guard equipment?

- **Barriers:** These physically prevent people and body parts from entering the hazard area.
- **Distance:** Placing equipment controls for all workers a safe distance away from moving parts ensures they won't get caught in the machine.
- **Light Curtains:** Precisely arranged light curtains will stop the machine when anything enters the hazard area.
- **Pressure Sensitive Mats:** These will stop the machine when anyone steps on them (or if something is dropped on them).
- **Retractable Guards:** Straps attached to the hands which prevent entry into the hazard area when the machine is operating.

## Machine guarding must:

1. **Prevent Contact:** The guard must prevent any part of a worker's body, hair, or clothing from making contact with dangerous moving parts. Good guards eliminate the possibility of body parts entering the hazardous area;

   An employee must not be able to reach over, under, around, through, or behind any guard to reach moving parts;

2. **Be Secured:** All machine guards must be securely attached so they prevent contact with hazards. Workers should not be able to easily remove or tamper with the guard;

3. **Be Durable:** Guards should be made of durable material that will withstand the conditions of normal use;

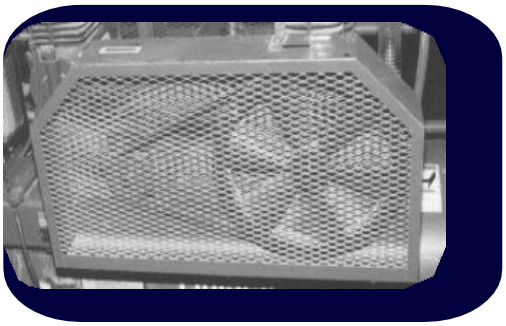
4. **Protect from Falling Objects:** Guards should prevent objects from falling into moving machinery where it could become a deadly projectile;

5. **Create No New Hazards:** Guards should not create any hazards such as jagged, sharp, or rough edges;

6. **Create No Interference:** Guards that impede the worker and are a "real hassle" might soon be removed or overridden. Proper design and installation can keep workers safe without impeding their work;

7. **Allow Safe Lubrication:** In most instances, you should be able to lubricate machines without removing any guards. Locating oil reservoirs outside the guards, with a line leading to the lubrication point, eliminates the need for workers to remove guards and enter the hazard area;

8. **Be Used Every Time:** Guards must be used any time the machinery is running;



## All Hands Scavenger Hunt

As a group, look around your department for any moving machinery that isn't guarded or doesn't meet the listed requirements.

As you are looking, discuss the following topics with the group, where applicable:

- How each machine guard provides protection from the hazards;
- How the guards are designed to work and why;
- When lockout/tagout is required;
- Under what circumstances, and by whom, machine guards can be removed;
- What specific procedures are required for set-up and changes; and
- What to do if a machine guard is missing, damaged, or does not provide adequate protection, how to better guard a machine when:
  - If the guard can be easily by passed or removed;
  - If the guard does not completely prohibit contact with moving parts;
  - If the design or installation of a guard creates a hazard in itself; or
  - If the design of a guard makes the job difficult.

# Ergonomics in the Office

"Reducing your risk of strains and stress"

In today's office environment (and often in factories), computers play an important and vital role. Many workers find themselves entering data or communicating via computer terminals for long periods of time. Computers have been good for Arkansas's businesses, but some problems have been identified in frequent users.

A possible condition, musculoskeletal disorder (MSD) is often found in the computer operator. MSDs are problems in the muscles, tendons, ligaments, nerves and other structures in the human body. These problems can be caused by excessive stress and strain on the human body as the operator interacts with a machine. Some examples of MSDs are carpal tunnel syndrome, tendonitis, bursitis, neck problems, and back problems.

The purpose of this safety tip sheet is to identify some of the risk factors and describe some simple corrections. Hopefully, this will lower the operator's risk of developing MSD.

Keep in mind that each job must be customized for the individual. Some operators may not want (or need) to use all of the tips mentioned. Consult the operator for his/her preference.

**Tip #1: Keep arms, wrists, and hands parallel to the floor when using the keyboard, mouse, etc.** Avoid more than a 10 degree deviation from parallel. This may involve raising or lowering the keyboard or the operator.

**Tip #2: Use palm rests, arm rests, or elbow rests to help support some of the arm weight.**

**Tip #3: Use a copy holder mounted to the right or left of the monitor.** Arrange the copy holder so it is in the same plane as the monitor.

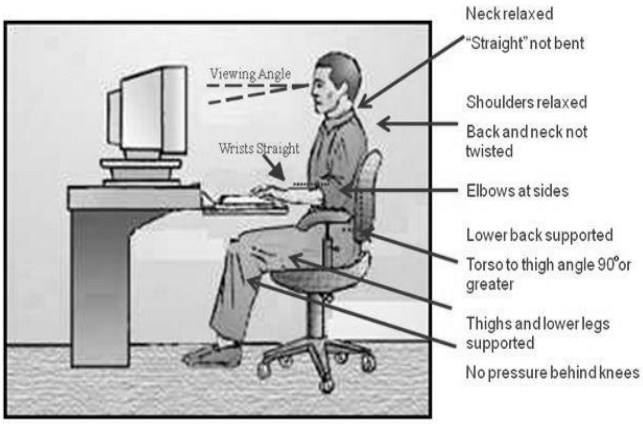
**Tip #4: The height of the monitor should be slightly lower than the level of the eyes.** Bifocal wearers may need special computer glasses. Locate the monitor so that glare from windows or overhead lights does not cause glare on the screen.

**Tip #5: The computer operator should have a good, adjustable chair.** There should be lumbar support for the middle back. The seat pan and the chair back should form a 100-110 degree angle. The seat pan should tilt slightly forward about 5 degrees.

**Tip #6: Don't sit for too long without getting up and walking around.** Sitting too long is bad for the back and can lead to back pain and problems. Get up at least every hour and move around, down the hall, to the filing cabinet, the printer, or the copier. This will help the blood flowing to the structures in the back.

**Tip # 7: Practice job enlargement**. Try to arrange jobs so that the operator does varied task during the day. Modifying jobs (such as data entry) so that the person working can also file, or copy can help reduce stress and strain. The goal is to have the office worker enjoy their work.

**Tip #8: Use sit/stand workstations if possible.** Computer terminals can be mounted on adjustable desks or poles and raised or lowered during the day. This gives the operator flexibility in working part of the day while seated and part of the day while standing. Persons with existing severe back problems may benefit from using prop chairs that are different from traditional office chairs.




**Remember injuries occur at our desks because:**

1. The height of the keyboard and/or mouse pad is incorrect;
2. The desk height is incorrect;
3. The chair height is incorrect;
4. There is no arm support; or
5. There is no support for the wrist while keying and mousing.

# Industrial Truck Safety Tips

**29 CFR 1910.178**

- Know the difference between your truck and an automobile. Understand the visibility limitations of the forklift.
- Know operating instructions, warnings and precautions for the specific truck you operate.
- Know each control and instrument on the forklift, where they are located, what they do and how they work.
- Know how the engine operates, how the vehicle steers and maneuvers, its capability, its stability, and any other precautions in the operator's manual.
- Know about the limitations of attachments.
- Know any inspections and maintenance the driver has to perform.
- Know how to refuel the lift and charge the batteries.
- The forklift operator should know the surface conditions where the truck will be operated (muddy, icy, poor lighting, etc.)

- The operator should know the composition of the load and its stability and how to stack, unstack, and manipulate the load
- The operator should be aware of narrow aisles and restricted spaces where the lift will be operated. (the aisle must be at least 3 feet wider than the forklift.) They must be aware of hazardous locations where the lift will be operated.
- The driver must know about ramps and other sloped or unstable surfaces that will affect the vehicle's stability.
- The driver should also be informed about the possible creation and hazards of carbon monoxide gas.
- The operator must be trained and evaluated.
- The best way to protect employees from injury also depends on the type of truck operated and worksite where it is being used.

For more specifics on powered industrial trucks, see: 29CFR 1910.178

# USING CHAINSAWS SAFELY

- Eye, face, and head protection should be worn. Protect your hearing with earplugs.
- Wear heavy clothes when operating a chainsaw. Chaps are best to protect your legs.
- Do not cut overhead.
- Have good footing when cutting. Make sure you have a clear, brush-free retreat path.
- Turn off the chainsaw and let it cool before refueling. Refuel it at least ten feet from open flames, where you will be cutting, or other ignition sources.
- Chainsaws with chain brakes and anti-kickback devices are required by OSHA.

# Are You Hydrated?

## Take the Urine Color Test

Match your urine to the closest color in the chart and read the hydration level on the chart.

Watch the stream, not the toilet water, as the water in the toilet will dilute your urine color.

In response to dehydration, the kidneys conserve water and excrete more concentrated urine; the more concentrated the urine, the darker the color.

## Purpose

With normal kidney function, your level of hydration is indicated by the color of your urine. Some medicines, vitamins, and supplements may change the color (bright yellow) of the urine unrelated to dehydration.

Since heat-related conditions often follow dehydration, this simple test will help protect your health.

Dehydration also increases your chances for kidney stones.

## Prevent Dehydration

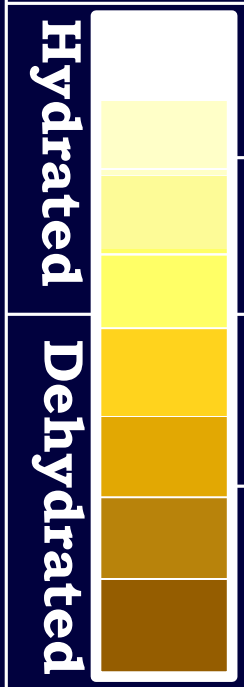
No amount of training or acclimatization can decrease the body's requirement for water.

The keys to prevention are: Water, Rest, and Shade.

When working outdoors in high temperatures, it is recommended to drink up to one (1) quart of water per hour, preferably 8 ounces (1 cup) every 15-20 minutes, not exceeding 12 quarts per day.

Ideally, hydration should begin 2 hours before you start your shift.

## Urine Color Chart




| | |
|---|---|
| Hydrated | Optimal Hydration |
| Hydrated | Well - Hydrated |
| Dehydrated | Signs of Dehydration (Drink more water, rest, and allow for recovery) |
| Dehydrated | Extreme Dehydration (Stop work and notify your supervisor immediately) |

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