UL PureSafety

OSHA 10 General Industry

Complete Job Aid

Revised November 30, 2021

This job aid provides reminders about information covered in UL online training courses. Always abide by local rules, regulations, equipment instructions, and your company's health and safety policies and procedures.

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Introduction to OSHA

The Occupational Safety and Health Act of 1970 was passed by Congress “to assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources.”

The Occupational Safety and Health Administration (OSHA) is a division of the United States Department of Labor.

Since its creation in 1971, OSHA has had a big impact on worker health and safety.

Employer Responsibilities

The mission of OSHA is to save lives, prevent injuries and protect the health of America’s workers. Employers must:

- Meet their responsibility to provide a workplace free from recognized hazards
- Keep workers informed about OSHA and safety and health matters with which they are involved
- Comply, in a responsible manner, with standards, rules and regulations issued under the OSH Act
- Be familiar with mandatory OSHA standards
- Make copies of standards available to employees for review upon request
- Evaluate workplace conditions
- Minimize or eliminate potential hazards
- Provide safe, properly maintained tools and equipment and ensure that employees use them
- Warn employees of potential hazards
- Establish or update operating procedures and communicate them to employees
- Provide medical examinations when required
- Provide training required by OSHA standards
- Report a fatality, hospitalization, amputation or loss of an eye
- Keep OSHA-required records of work-related injuries and illnesses and post them appropriately
- Avoid discriminating against employees who properly exercise their rights under the OSH Act
- Provide access to employee medical records and exposure records to workers and others as required by law
- Determine if personal protective equipment (PPE) should be used to protect workers
- Pay for most required PPE

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Employer Rights

- Seek free advice and on-site consultation from OSHA
- Be involved in job safety and health through industry associations
- Take an active role in developing safety and health programs
- Be assured of the confidentiality of any trade secrets
- Submit a written request to the National Institute for Occupational Safety and Health (NIOSH) for information on whether any substance in a workplace has potentially toxic effects in the concentrations being used
- Submit information or comments to OSHA on the issuance, modification or revocation of OSHA standards and request a public hearing

Employee Responsibilities

- Read the OSHA “It’s the law!” poster (OSHA 3165) at the jobsite
- Comply with all applicable OSHA standards
- Follow all employer safety and health rules and regulations, and wear or use prescribed protective equipment while engaged in work
- Report hazardous conditions to their supervisor
- Report any job-related injury or illness to their employer, and seek treatment promptly
- Cooperate with the OSHA compliance officer conducting an inspection
- Exercise their rights under the OSH Act in a responsible manner

Employee Rights

- Receive adequate training and information
- Request information from their employer on safety and health hazards, precautions and emergency procedures
- Review copies of appropriate OSHA standards, rules, regulations and requirements that the employer should have available at the workplace
- Request that OSHA investigate if employees believe hazardous conditions or violations of standards exist in their workplace
- Observe any monitoring or measuring of hazardous materials and see any related monitoring or medical records
- Object to the abatement period set in a citation issued to their employer
- Participate in hearings conducted by the Occupational Safety and Health Review Commission
- Submit information or comments to OSHA on the issuance, modification or revocation of OSHA standards and request a public hearing
- Seek safety and health on the job without fear of punishment
- Refuse to do a job if they believe in good faith that they are exposed to imminent danger

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OSHA's Recordkeeping Requirements

As set out in the OSH Act, OSHA established an effective, centralized, nationwide system for monitoring occupational safety and health problems – a vital requirement for gauging problems and solving them.

Keeping records allows OSHA to compile survey material, helps identify high-hazard industries, and informs employees about their employers' workplace safety record. These records also help employers identify potential sources of injuries and illnesses at their worksites – and hopefully then correct or mitigate them.

Inspections

Inspections may be conducted by OSHA compliance safety and health officers. A typical on-site inspection includes the presentation of inspector credentials, an opening conference, an inspection walk-around and a closing conference. **Inspection priorities, in order, are:**

1. **Imminent Danger:** Inspecting a workplace where a danger exists that can be expected to cause death or serious physical harm is the highest priority.
2. **Fatalities/Catastrophes:** Fatalities as well as catastrophes that result in hospitalization, amputation or loss of an eye must be reported by the employer to OSHA.
3. **Complaints/Referrals:** A worker or worker representative can file a complaint about a safety or health hazard in the workplace.
4. **Programmed Inspections:** These inspections cover industries and employers with high injury and illness rates, specific hazards or other exposures.
5. **Follow-up Inspections:** OSHA also conducts follow-up and monitoring inspections. These inspections are made as needed and take priority over programmed inspections.

Citations and Penalties

Citations inform the employer and employees of the regulations and standards allegedly violated and of the proposed time for abatement. The employer must post a copy of each citation at or near the place where the violation occurred, for 3 days or until the violation is corrected, whichever is longer.

Under the OSH Act, OSHA may cite the following violations and propose the following penalties. Note that the threshold for penalties changes annually. You can find more information on the OSHA website.

- **Other-than-Serious:** A violation that has a direct relationship to job safety and health, but probably would not cause death or serious physical harm. OSHA may propose penalties for each other-than-serious violation
- **Serious:** A violation where there is substantial probability that death or serious physical harm could result and that the employer knew, or should have known, of the hazard. OSHA may propose a mandatory penalties for each serious violation
- **Willful:** A violation that the employer intentionally and knowingly commits, or a violation that the employer commits with plain indifference to the law. OSHA may propose large penalties for each willful violation, and there is a minimum penalty for each violation

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Other penalties are **Repeated** and **Failure-to-Abate**. If an employer chooses to appeal a decision, it must be done formally in writing within 15 working days of receiving the citation.

General Duty Clause

What if there is no specific standard forbidding a particular activity, but that activity can easily be identified as being dangerous and potentially harmful to a worker? Can the employer be cited? The answer is YES!

The company or employer can be cited under the “General Duty Clause” found in the OSH Act.

Resources

There are many resources available to you if you want to find out more information about a safety or health issue in your workplace.

These include:

- Your employer, supervisor and co-workers
- Safety Data Sheets (SDSs)
- Labels and warning signs
- Employee orientation manuals and other training materials
- Written procedures
- OSHA’s hotline at **1-800-321-OSHA (6742)**
- The OSHA website: **http://www.osha.gov**
- Your local area or regional OSHA office
- Compliance Assistance Specialist training sessions/materials
- Health Hazard Evaluations (HHEs) conducted by the National Institute for Occupational Safety and Health (NIOSH)
- OSHA Training Institute Education Centers (OTIEC) and other university occupational and environmental health programs
- Doctors, nurses and other healthcare providers
- Public libraries

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Safety Signs – Supervisor Supplement

Use this guide to support your workers after they complete the *Safety Signs* course.

Safety Sign Inspections

Periodically, walk through the work area and look at the safety signs. Make sure each sign is:

- Visible
- Legible
- Placed in the right area
- Accompanied by appropriate controls

Workplace Safety Sign Tour

When workers start a new job, either because they are new hires or their responsibilities are changing, take time to give them a brief safety sign tour of their work area.

During the tour:

- Point out safety signs
- Explain the controls associated with the signs
- Ask the workers if they have any questions about what the signs mean or what workers need to do

Follow-up Questions to Ask Workers

After workers take the *Safety Signs* course, stop by to ask them if they have any questions about specific signs in their work areas or if they have noticed any problems with those signs.

Remind workers to tell you if they see any problems, especially if signs are present without appropriate safety controls.

Worker Observation

After workers take the *Safety Signs* course, observe them to make sure they are noticing signs and acting accordingly. Remember to praise workers for doing a good job, not just point out when there is something wrong.

When you give feedback:

DO:

- Explain your purpose (safety)
- Assume people don't know the risks
- Lead with the positive
- Be timely and specific
- Express concern
- Be personable
- Restate what they say to you
- Thank the person

DON'T:

- Distract workers
- Assume you know what is wrong and how to fix it
- Make it personal
- Be vague/general
- Write while observing

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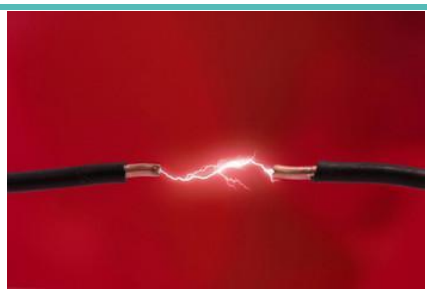
Recognizing Electrical Hazards Awareness

How Electricity Works



To work, electricity must have a power source, a means of transport and a force to make it flow. An electrical source is usually a power generating station. Electrical current is transported through electrical conductors, such as wires.

The force that makes electricity flow comes from a generator or battery and is called **voltage** (measured in volts). The force that opposes the flow is called **resistance** (measured in ohms).

Electricity always follows the path of least resistance to surfaces with lower electrical potential.

Key Electrical Terms

Conductors:
- Permit electricity to flow
- Include metal and water containing electrolytes (e.g., perspiration)

Insulators:
- Impede the flow of electricity
- Include rubber, porcelain and fiberglass

Anything conductive touching an electrical current and the ground at the same time is **grounded**. The object providing the connection between the current and the ground is referred to as the **path to ground**.

Why Electrical Incidents Occur

Electrical incidents occur anytime conditions cause a human being to become part of a circuit. For example, when a worker:
- Touches something conductive to a live, energized wire
- Touches wet/sweaty skin to an energized circuit or part
- Does not use proper grounding

Dangers Associated with Electrical Hazards

Electrical shock normally occurs when an individual is in contact with the ground or a surface with different electrical potential and then comes into contact with one of the following:
- Both wires of an electrical circuit
- One wire of an energized circuit
- A part that has become energized through contact with an energized conductor

The effects of an electrical shock range from tingling and pain to muscular contraction and nerve damage. If electrical current passes through the torso, it can affect the heart and lungs, causing severe injury or death. The severity of an electrical shock varies according to the:

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- Amount of current (measured in amps)
- Current's path through the body
- Length of time the body is part of the circuit

An electrical **arc-flash** is a short circuit through the air. It may be caused by electrical equipment failure, conductive dust entering electrical cabinets, inadvertently contacting energized conductors or circuits, or dropping a conductive object, such as a tool.

Arc-flashes can be up to four times hotter than the surface of the sun! They can:

- Ignite or melt clothing on skin, causing severe burns
- Damage vision, sometimes resulting in blindness
- Knock over the individual (due to **arc-blast**)

Secondary Hazards

Electrical burns:

- May occur when touching faulty wiring or equipment that has been improperly used or maintained
- Are often on hands, but can also affect internal organs and other areas
- Require immediate attention and first aid

Arc-flashes and arc-blasts may:

- Start structure fires and damage nearby equipment
- Cause explosions when near flammable gases, vapors or combustible dust

Collisions or falls that result from muscle contractions and arc-blasts can cause:

- Bruises
- Bone fractures
- Death

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Electrical Arc Flash Awareness

Significance of the Arc Flash Hazard

The deadly arc flash hazard can generate:

- An explosion with a temperature of up to 19,000 °C (35,000 °F)
  - Vaporizes metal
  - Burns clothing and fuses synthetic material to skin
- A blast strong enough to knock you off your feet and rupture your eardrums

Victims suffer from their injuries and painful surgeries for the rest of their lives – if they survive.

Arc Flash Definition

An arc flash is a phenomenon where a flashover of electric current leaves its intended path and travels through the air from one conductor to another, or to ground. The flash creates an arc fault that generates an instantaneous blast and pressure wave of significant:

- Energy
- Heat
- Debris
- Sound

An arc flash can be caused by many things, including:

- Dust that builds up and is then disturbed
- Material in the electrical equipment, such as dirt, debris, tools or foreign objects
- The accidental touching of equipment
- Equipment that is faulty due to failure or corrosion

Common Causes of Injury

There are many elements in an arc flash that can cause injury. In addition to the intense heat and light from the flash, an explosion (or blast) can generate dangerous:

- Flying debris
- Molten metal
- Fire
- Hot gases
- Shock waves

Workers can be crushed by materials, equipment or even buildings. They can also be severely burned, thrown across rooms or knocked off ladders or platforms.

General Precautions and Safe Work Practices

Precautions

To help prevent an arc flash:

- Never open an electrical panel or attempt to reset a breaker unless you have been trained and authorized to do so
  - Be aware that these actions may put you at risk of an arc flash
  - Resetting breakers without knowing what activated these protective devices is DANGEROUS
- Do not enter or block access to electrical rooms
- Understand and respect arc flash labels, which identify safe boundaries

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If you are qualified to perform electrical work, then follow all guidelines and requirements related to work area barricading. All other workers must stay clear of electrical work.

PPE

If you are not authorized to work on electrical systems or components, you still need to be aware of the types of PPE that must be worn by authorized employees. The type of PPE required is determined by the amount of risk, voltage and current available.

Typical arc flash PPE includes:

- Electrically rated eye/face protection
- Balaclava
- Smock or electrically rated suit
- Hearing protection
- Gloves

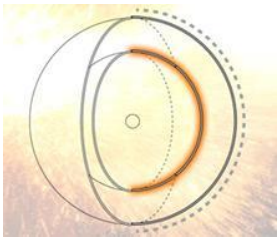
Labels

To protect workers from electrical hazards such as arc flash, employers should conduct an arc flash assessment and label hazardous electrical equipment with pertinent information from the assessment.

- Warning labels provide information about:
    - Arc flash protection
    - Shock protection
    - Required PPE

Safe Work Practices: Boundaries

Boundaries are identified on warning labels.



- The Arc Flash Protection boundary is also known as the outer boundary – the point farthest away from the energized equipment that PPE must be worn to protect against 2nd-degree burns or worse if an arc flash occurs
- The Limited Approach boundary indicates where barriers should be placed to protect unqualified people from an electrical shock hazard. The higher the voltage, the greater the distance. Unqualified people should not cross this boundary unless they are escorted by a qualified person and are wearing the proper PPE
- The Restricted Approach Boundary *(pictured)* can only be crossed by a qualified person wearing appropriate PPE because of the increased risk of electric shock

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Lockout/Tagout (LOTO) Programs and Procedures

Energy powers industrial machines and systems. Many people may hear the word “energy” and think of electricity. However, many other forms of energy are hazardous. For example, energy may be: electrical, mechanical, hydraulic, pneumatic, radiation, thermal or chemical. See your supervisor or safety professional or review lockout/tagout procedures to learn about forms of hazardous energy where you work.

An **energy-isolating device** physically prevents the transmission or release of energy by blocking or isolating it. Examples include a manually operated electrical circuit breaker, a disconnect switch, a conductor switch, a line valve, a block, a blank flange, or a bolted slip blind. The power button on a machine or piece of equipment is NOT an energy-isolating device.

Lockout is locking the energy-isolating device so that people CANNOT operate the equipment or restore power until the lockout device is removed. A lockout device holds an energy-isolating device in a safe position. Examples include padlocks and hasps.

Tagout is tagging the equipment to indicate that people MAY NOT operate it or restore power until the tagout device is removed. Tagout is not a physical restraint. A tagout device, such as a tag, warns people not to operate equipment. Use tagout devices in addition to lockout devices. When lockout is not possible, we must still tag out. Tagout devices must be legible, durable and secure. Attach tagout devices to (or as close as possible to) the energy-isolating device.

Lockout and tagout devices must be durable (able to withstand environment/use), standardized (consistent in color, shape, size, print and format), substantial (able to withstand 50 lbs or 23 kg of force, hard to accidentally remove or miss) and identifiable (easy to recognize and understand).

Energy Control Program

Employers use an **energy control program** to ensure that equipment is de-energized and isolated from its energy sources before people perform service and maintenance. The program includes information that employees need to know so they may safely perform lockout/tagout. Programs are written to meet the needs of the workplace and the types of equipment people will maintain or service.

Energy control programs include:

- **Energy control procedures** including: how to use the procedure; steps to shut down, isolate, block and secure equipment; steps to place, remove and transfer lockout/tagout devices; responsibilities during procedures; and requirements for testing equipment to verify energy control.
- **Inspection requirements**. At least once per year, employers conduct formal inspections of their energy control procedures to make sure they are effective, and that people are using them appropriately. The inspection may include reviewing procedures and responsibilities with employees to ensure their understanding of the energy control program. Inspection documentation include the name of the inspector, the date of the inspection, and the equipment and people included in the inspection. The inspector and responsible people note any defects, correct those defects and document their corrective actions, per their employer's requirements.
- **Training requirements**. Energy control programs outline training and retraining requirements employees must meet depending on their exposure to equipment, types of energy and hazards.

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In addition to refresher training, employees receive training when inspections reveal defects and when assignments, equipment or procedures change.

As you are using the energy control program, if you identify a problem, you must stop. Make sure you or a qualified person addresses any issues before you continue working.

Applying Locks and Tags

Please use your employer's specific energy control program and procedures. Only authorized employees apply locks and tags. If you have any questions about your authorization or the energy control program, please ask your supervisor. The authorized employee will:

1. Notify affected employees.
2. Prepare for shutdown.
3. Shut down equipment.
4. Isolate energy.
5. Apply locks and tags.
6. Make stored/residual energy safe.
7. Verify de-energization.

Removing Locks and Tags

Please follow your employer's specific energy control program and procedures when removing lockout/tagout devices. Only the authorized employee who installed the locks and tags can remove locks and tags. In rare cases in which the authorized employee is not available/ reachable, follow the energy control program guidance to identify a designee to remove the locks and tags and inform the original installer.

The authorized employee will:

1. Inspect the work area.
2. Keep people away.
3. Remove lockout/tagout devices.
4. Notify affected people.

Other Considerations for Lockout/Tagout

There are some situations when your energy control program will have unique procedures you must follow.

These may include:

- **Energization required for testing**. Some servicing or maintenance operations may require equipment or components to be energized. In these cases, the energy control program may require the authorized person to clear the area, remove the devices, test the equipment and then, eventually, reapply locks and tags using standard procedures.
- **Outside personnel being on-site**. When outside personnel, such as contractors, are on-site, the employers should inform each other of their respective lockout or tagout procedures. Each employer ensures that their employees understand and comply with all the procedures, restrictions and prohibitions in their energy control programs.
- **Shift changes**. Use the procedures in the energy control program during shift or personnel changes to ensure the continuity of lockout or tagout protection.
- **Group lockout/tagout procedures**. Please consult your employer's energy control program for procedures for group lockout/tagout. These may include identifying a person responsible for group lockout/tagout; describing personal lockout or tagout device and processes; and using a group lockbox or lockout device

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Machine Guarding

Any machine part, function, or process that may cause injury must be safeguarded. If a machine has been designed with a guard in place, do not tamper with or remove it!

Your supervisor is responsible for providing you training when any new safeguards are put into service or when anyone is assigned to a new machine or operation.

Mechanical Hazards

All machines have three fundamental hazards:

- **Point of operation** – The area of a machine where the work is being performed
- **Power-transmission apparatuses** – All components of the mechanical system that conduct energy to the part of the machine tool doing the work including flywheels, pulleys, belts, chains, couplings, spindles, cams, gears, connecting rods and any other machine components that transmit energy
- **Other moving parts** – Machine components that move during the machine operation such as reciprocating, rotating and transverse moving parts, as well as auxiliary machine parts

Despite all machines having the same basic characteristics, their safeguarding needs widely vary due to their differences in design and operator involvement.

Hazardous Motions and Actions

Many mechanical motions and actions can be hazardous. The basic types of hazardous mechanical motions and actions include:

Motion/Action	Description	Example
Rotating	Circular movement of couplings, cams, clutches, flywheels and spindles as well as shaft ends and rotating collars that may catch your clothing or otherwise force a body part into a dangerous location	
Reciprocating	Back-and-forth or up-and-down action that may strike or entrap you between a moving part and a fixed object	

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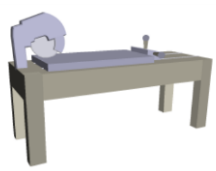
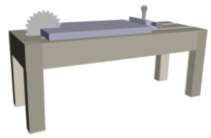
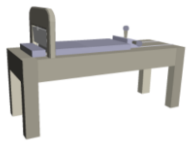
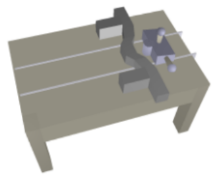
Transversing	Movement in a straight, continuous line that may strike or catch you in a pinch or shear point created between the moving part and a fixed object	
Cutting	Action generated during sawing, boring, drilling, milling, slicing and slitting	
Punching	Motion resulting when a machine moves a slide (ram) to stamp or blank metal or other material	
Shearing	Movement of a powered slide or knife during metal trimming or shearing	
Bending	Action occurring when power is applied to a slide to draw or form metal or other materials	

You should also be aware of non-mechanical hazards, including:

- Potentially dangerous power sources (electrical and hydraulic)
- Unwanted sound or noise
- The use of cutting fluids, coolants and other potentially harmful substances

Requirements for Safeguards

At a minimum, safeguards must meet these following general requirements:

- **Prevent contact** – Safeguards must minimize the possibility of you or your co-workers placing your hands into hazardous moving parts
- **Remain secure** – You should not be able to easily remove or tamper with the safeguard
- **Protect from falling objects** – Safeguards should ensure that no objects can fall into moving parts
- **Create no new hazards** – A safeguard defeats its purpose if it creates a hazard of its own
- **Create no interference** – A safeguard should not create an unacceptable obstruction
- **Allow safe maintenance and lubrication** – It should be possible to lubricate the machine without removing the safeguard

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Guards

Guards are barriers that prevent access to danger areas. There are four general types of guards with which you should be familiar:

- **Fixed** – A fixed guard is a permanent part of the machine. It's not dependent upon moving parts to perform its intended function. This guard is usually preferable to other types
- **Interlocked** – When this type of guard is opened or removed, the tripping mechanism and/or power automatically shuts off or disengages. This means the machine can't be started until the guard is back in place
- **Adjustable** – Adjustable guards are useful because they allow flexibility in accommodating various sizes of stock
- **Self-adjusting** – The size of the openings of this type of guard is determined by the movement of the stock

Guards designed and installed by the manufacturer (builder) offer two main advantages – they usually conform to design and function of the machine, and they can be designed to strengthen the machine in some way or to serve some additional purpose. However, user-built guards are sometimes necessary.

Safety Devices

Safety devices help prevent contact with points of operation and may replace or supplement guards. The most common types are:

- **Presence-sensing devices** – Use a system of light sources and controls that can interrupt the machine's operating cycle. If the light field is broken, the machine stops and will not cycle. This device must be used only on machines that can be stopped before the operator can reach the danger area
- **Radio frequency (capacitance) devices** – Use a radio beam that is a part of the machine control circuit. The operating principle is similar to presence-sensing devices
- **Electromechanical sensing** – Uses a probe or contact bar that descends to a preset distance when you start the machine cycle. If an obstruction prevents it from descending its full distance, the control circuit won't allow the machine to start
- **Safety mats** – Function similarly by detecting worker presence on a pressure-sensitive mat which will either enable or disable equipment cycling control functions
- **Two-hand controls** – These devices require constant pressure by the operator to activate the machine. The operator's hands are required to be at a safe location (on the control switches) and at a safe distance from the danger area while the machine completes its cycle
- **Gate** – This device is a movable barrier that protects the operator from the point of operation *before* the machine cycle can be started. Gates are often designed to be operated with each machine cycle

Other Safeguarding

- **Location or Distance Safeguards** – Sometimes the location of the machine or your distance from mechanical hazards can be used as a safeguard
- **Potential Feeding and Ejection Methods** – Many feeding and ejection methods don't require you to place your hands in the danger zone
- **Awareness barriers, shields and special hand tools** – While these don't necessarily give complete protection from machine tool hazards, they will provide you with an extra margin of safety

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Document your inspections and keep records. Your documentation should identify the machine, inspection date, problems noted, and any corrective action taken. Noting problems helps to ensure that corrective action will be taken.

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Personal Protective Equipment (PPE) Overview – General Guidelines

OSHA's PPE standard (29 CFR 1910.132-138) requires employers to set up and administer an effective PPE program.

According to the standard:

- Employers must have written hazard identification and evaluation of hazards, including a determination of whether PPE is an appropriate control measure
- If employees use PPE, the program must also state how they should select, maintain and evaluate PPE
- Employers must also train employees about how to properly use PPE

PPE Fit

PPE shouldn't move around or fall off while you work, and shouldn't be too tight or constricting. To get a good fit:

- Choose a size that fits snugly but not tight
- Check for a good seal when fitting:
    - Respirators
    - Goggles
    - Hearing protection

Too-loose PPE could:

- Snag on something, tear and become ineffective
- Get caught in machinery – and draw you in as well
- Provide an inadequate seal to block out the hazards

Find a balance between having enough comfort and enough protection. Safety comes first.

Cleaning and Storing PPE

Keeping PPE clean, dry and damage-free helps increase the lasting quality of it.
Clean PPE:

- After checking with your employer for cleaning procedures
- After reading the manufacturer's label
- Before and after each use
- With soap and water (alcohol, thinners and strong cleaning agents can degrade materials)

Inspecting PPE

After cleaning PPE, inspect it for:

- Signs of excessive wear (i.e., holes, cracks, tears)
- Broken fittings
- Elastic straps that are slack, worn or twisted
- Modifications or changes to the equipment's structure

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After visually inspecting the PPE, you may also need to:

- Conduct an air or water test to check for leaks
- Send PPE out for testing, repair and recertification by a qualified professional

***Never use ineffective PPE*.** Instead, replace or repair it. Be sure to label it as “out of service” so no one else will use it.

PPE requirements vary depending on which part of your body might be exposed to hazards:

PPE for the Head

Wear head protection anytime you may be exposed to the hazards that typically cause head injuries such as:

- Being exposed to falling objects
- Bumping your head against a fixed object
- Working near exposed electrical conductors

PPE for the Eyes and Face

Wear eye protection anytime you may be exposed to the hazards that typically cause eye and face injuries such as:

- Splashes of toxic or corrosive chemicals
- Hot liquids and molten metal
- Flying objects
- Fumes
- Gases and mists of toxic or corrosive chemicals
- Intense light
- Optical radiation

PPE for the Ears

Wear PPE for your ears to conserve your hearing.

- Your employer may require it based on the level or intensity of noise and exposure time
- If you ever notice signs of hearing damage or loss, be sure to wear hearing protection regardless of whether your employer requires it or not

PPE for the Hands

Wear hand protection anytime you may be exposed to the hazards that typically cause hand injuries. Examples of such hazards include:

- Corrosive or toxic chemicals
- Dangerous chemicals
- Electrical sources
- Objects that can strike, cut or pinch
- Extremely cold or hot objects

Choose gloves made of an appropriate material:

- Canvas and leather gloves protect against dust and abrasions
- Cut-resistant gloves are made from synthetic fibers
- Chemical and electrical gloves are made from a variety of natural and synthetic rubbers

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PPE for the Body

Jeans and long-sleeve shirts are often adequate against minor hazards like dirt, dust, minor abrasions and sun exposure. Other types of body protection may include:

- Full-body suits
- Gowns
- Jackets
- Vests
- Aprons

Choose body PPE made of material that is appropriate for each hazard.

- Treated wool and cotton for changing temperatures, dust and abrasions
- Insulated and tightly woven cotton protects for cuts, bruises, extreme temperatures
- Leather and welding aprons for hot work
- Paper-like synthetic fibers for liquid, puncture, tear and abrasion resistance
- Synthetic rubber and plastic materials for chemicals and other harmful substances

PPE for the Feet and Legs

Wear foot and leg PPE anytime you may be exposed to the hazards that typically cause foot or leg injuries. These hazards may include:

- Heavy/sharp objects
- Electricity
- Extreme heat/moisture
- Slippery surfaces
- Liquids (acids, caustics and molten metal)

Common foot PPE includes:

- Steel-toed boots
- Foundry shoes
- Conductive (CD-rated) shoes
- Static-dissipating (SD-rated) shoes
- EH-rated (electrical hazard) shoes

Respiratory Protection

Wear respiratory protection anytime you may be exposed to hazards that may damage your respiratory system. These hazards include:

- Dust
- Fumes
- Temperature extremes
- Gases
- Vapors

Respiratory protection may include:

- Air-purifying respirators (APRs) that remove contaminants from the air
- Air-supplying respirators (ASRs) that supply clean air from a source other

You must go through fit-testing, medical clearance and special training before using a respirator. Inspect your respirator before using it and have it repaired or replaced if you find anything wrong with it. After using your respirator, you should clean and disinfect it.
Store respirators in a sealable bag away from:

- Dust
- Sunlight
- Heat
- Extreme cold
- Moisture
- Damaging chemicals

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Respiratory Protection Awareness

Inhalation is the most common way that chemicals enter the body. Exposure to contaminated air may cause cancer, lung impairment or even death. Wearing a respirator can protect you against environments with insufficient oxygen or harmful dusts, fumes, fogs, smokes, mists, gases, vapors and sprays.

Requirements and Responsibilities

The respiratory protection standard protects the health of employees from harmful:

- dusts
- fogs
- fumes
- mists
- gases
- smokes
- sprays
- vapors

Your employer is required to maintain a respiratory protection program and identify all tasks that require respirator use. It is your responsibility to follow proper procedures and safe work practices when wearing a respirator.

OSHA requires your employer to provide a free medical evaluation to determine your ability to safely use a respirator. The proper fit of your respirator is essential to its effectiveness. Fit tests must be done initially and annually thereafter.

Types of Respirators

There are four types of respirators:

- Disposable dust respirators
- Air-purifying respirators (APRs)
- Self-contained breathing respirators (SCBAs)
- Air-line respirators

Disposable dust respirators protect the lungs from:

- Low concentrations of dusts
- Mists
- Pollen
- Animal dander
- Fibrosis-producing dusts and mists such as coal dust

These respirators are lightweight, disposable and inexpensive. Do not wear this type of respirator if you have facial hair as it prevents a protective seal.

Air-purifying respirators (APRs) have filters, cartridges or canisters that remove contaminants from the air by passing the ambient air through the air-purifying element before it reaches the user. They can be either full-face or half-masks with mechanical or chemical cartridges.

APRs do not protect against oxygen-deficient atmospheres because their canisters or cartridges do not provide oxygen. They should not be used in situations where the oxygen content in the air is questionable.

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A **self-contained breathing apparatus (SCBA)** provides the user with clean air from a high-pressure cylinder carried on the user's back, giving the maximum degree of protection available from airborne contaminants. There are two types of SCBAs:

- Negative flow
- Positive flow

Air-line respirators provide clean, fresh air to the wearer from a stationary source, such as a compressor or compressed air cylinders. They may be equipped with a half or full facepiece, helmet or hood. Air-line respirators may be used for long periods of time and provide a high degree of protection from a variety of air contaminants. Air-line respirators can only be used when the wearer would be able to escape unharmed from the atmosphere without the aid of the respirator.

Use and Maintenance

Inspections

All respirators should be inspected before each use and during cleaning to be sure they are clean and that all components are present and operable. When inspecting your respirator:

- Evaluate the respirator’s tightness of connections
  - Note the condition of the various parts
  - Check the elastomeric parts for pliability and signs of deterioration

Respirators that fail an inspection, or are otherwise found to be defective, must be removed from service to be discarded or repaired. Only trained personnel may repair respirators.

Seal Checks

Maximum design protection cannot be achieved unless the facepiece is carefully fitted to the wearer's face. A tight fit is necessary to prevent inward leakage of contamination. You can test the respirator fit by performing a positive-pressure test and negative-pressure test.

Respirator Failure

Always exit the hazardous atmosphere before removing your respirator. Exit the respirator use area if you:

- Detect an odor or taste, or your eyes or throat feel irritated
- Experience changes in breathing resistance or leakage of the facepiece
- Experience any discomfort, such as nausea, dizziness or weakness

Storage

When not in use, respirators should be stored to prevent conditions that can deform the facepiece. Protect the respirator from excessive exposure to dust, sunlight, extreme temperatures, excessive moisture or damaging chemicals. Plastic containers with lids provide adequate storage for respirators. Always follow the manufacturer’s recommendations for proper storage.

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Hearing Conservation Awareness

Exposure to noisy machinery or equipment may cause hearing loss or hearing impairment. Repeated exposure to high noise levels can result in permanent hearing loss. The good news is that noise-induced hearing loss is fully preventable.

Effects of Noise

The outer ear collects and concentrates sound waves in the air, channeling them to the inner ear. Loud noises can cause hearing loss by damaging the delicate hair cells in the inner ear where noise is converted by hair cells into nerve impulses. As noise levels increase, the tiny hairs at the top of the hair cells can be injured or broken off. Hair cells do not repair themselves. When enough hair cells are damaged, irreversible hearing loss results.

The extent of damage to your hearing depends primarily on the intensity of the noise and the duration of the exposure.

- **Temporary Threshold Shift (TTS)** is temporary hearing loss resulting from short-term exposures to noise; normal hearing returns after a period of rest
- **Acoustic Trauma** is a short, intense sound, such as an explosion, causing immediate hearing loss
- **Permanent Threshold Shift (PTS)** is damage that happens gradually upon exposure to high noise levels over a period of time

Decibels

Sound is measured in decibels (dB). The higher the decibel level, the louder the sound.

- A normal conversation in a noisy restaurant takes place at about 60 decibels
- Ringing telephone = 80 decibels
- A chainsaw produces noise = 110 decibels

Prolonged exposure to noise above 85 decibels can cause hearing loss. OSHA requires your employer to administer a hearing conservation program whenever employee noise exposures equal an 8-hour time-weighted average sound level of 85 decibels.

PPE

Your employer may be able to reduce noise levels by changing equipment and work schedules. If your employer cannot reduce or eliminate the level of hazardous noise, hearing protection, such as earplugs or earmuffs, must be worn.

NRR

Not every type of hearing protection is useful for every type of noise. Each type of hearing protector has a different Noise Reduction Rating (NRR). This rating is required to be printed on the package of the device and is a quick way to determine the device's ability to reduce noise. The higher the NRR, the greater protection it provides.

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Types of PPE

Earplugs

- Expandable foam plugs are made of a formable material designed to expand and conform to the shape of your ear canal
- Roll the expandable plugs into a thin, smooth tube using both your thumb and fingers or by rolling it across your palms
- It should be thin enough to allow half of its length to fit easily into your ear canal

Pre-molded plugs

- Pre-molded, reusable plugs are made from silicone, plastic or rubber and are manufactured as “one-size-fits-most” or are available in several sizes
- The plugs should seal the ear canal without being uncomfortable
- Dispose of the plugs when they no longer form a good seal in the ear
- Insert this type of plug by reaching over your head with one hand to pull up and back on the top of your ear
- Then use your other hand to insert the plug with a gentle rocking motion until you have sealed the ear canal
- Because directions for fitting each model of pre-molded plugs may differ slightly, consult the manufacturer’s directions

Pre-molded plugs are relatively inexpensive, reusable, washable, convenient to carry and come in a variety of sizes. Nearly everyone can find a plug that will be comfortable and effective. Pre-molded plugs are preferable to expandable plugs in dirty or dusty environments, because you do not need to handle or roll the tips.

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Hazard Communication

The purpose of the **Hazard Communication (HazCom) Standard** is to ensure that employers and employees know about work hazards and how to protect themselves in order to reduce the incidence of illnesses and injuries due to hazardous chemicals.

The standard covers chemical manufacturers, importers, distributors, employers and employees exposed to chemical hazards. It applies to general industry, shipyards, marine terminals, longshoring, construction and healthcare.

Types of Hazards

- **Physical hazards** can cause serious accidents and injuries (ex: flammable/explosive)
- **Health hazards** can affect a person's short-term or long-term health (ex: toxic)

Employer's Responsibilities

- Identify and list hazardous chemicals in the workplace
- Obtain Safety Data Sheets (SDSs) and labels for each hazardous chemical, if not provided by the manufacturer, importer or distributor
- Implement a written HazCom program, including:
    - Hazard classification
    - The written program
    - SDSs and labels
    - Training

Hazardous Chemical Inventory

Employers must:

- Identify and list all hazardous chemicals in their workplaces to which employees could potentially be exposed
- Consider chemicals in all forms (liquids, solids, gases, vapors, fumes and mists)
- Identify chemicals in containers (including pipes) and consider chemicals generated in work operations, such as welding fumes, dusts and exhaust fumes

Written Program

The written program must include all of the following:

- The hazardous chemicals present at the site
- Who is responsible for the various aspects of the program at the location
- Where written materials will be made available to employees
- Multi-employer workplaces

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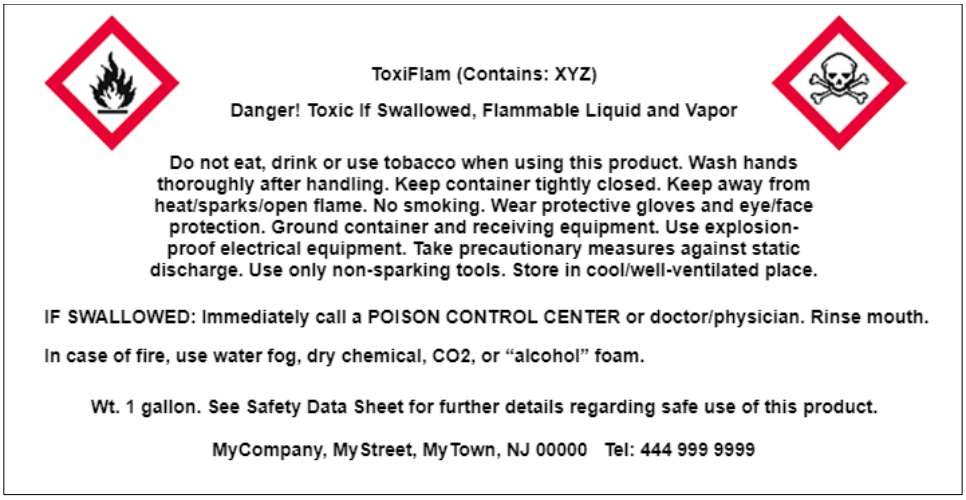
- How the location will meet the requirements for:
  - Labels and other forms of warning
  - SDSs
  - Employee information and training
- How employees will be informed of the hazards of non-routine tasks
- Pipes and piping systems containing hazardous substances or transporting substances in a hazardous state must be labeled according to the standard's requirements

Labels

- Labels must be legible, in English (plus other languages, if desired), and prominently displayed
- Labels include:
  - Product name or identifier
  - Pictograms (symbols)
  - Signal words (“Danger” is more severe than “Warning”)
  - Standardized hazard statements describing the nature of the hazards
  - First aid statements
  - Precautionary statements
  - Name, address and telephone number of the supplier



Rating Systems

The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) classification system rates hazards with 1 being the highest and 5 being the lowest. This is OPPOSITE of the NFPA hazard rating system. NFPA and HMIS rating systems are still permitted for workplace containers.

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Safety Data Sheets (SDSs)

- Have a specific 16-section format
- Are to be prepared and provided by the chemical manufacturer, importer or distributor and must describe:
    - Physical hazards, such as fire and explosion
    - Health hazards, such as signs and symptoms of exposure
    - Routes of exposure
        - Absorption (skin contact)
        - Inhalation (breathing)
        - Ingestion (swallowing)
        - Injection (direct entry into the bloodstream through a needle or break in the skin)
    - Precautions for safe handling and use
    - Emergency and first aid procedures
    - Control measures
- Must be in English (other languages are optional) and include information regarding the specific chemical identity and common names
- Must provide information about the:
    - Physical and chemical characteristics
    - Health effects and first aid
    - Carcinogenicity (cancer-causing ability)
    - Identification (name, address and telephone number) of the organization responsible for preparing the sheet
- Must be readily accessible to employees in their work area

Manufacturers must evaluate the hazards of chemicals. If no SDS has been received for a hazardous chemical, the employer must contact the supplier, manufacturer or importer to obtain one and maintain a record of the contact.

Training

Employers must train employees about the hazard communication program:

- Before potential exposure or work with a hazardous chemical
- Whenever the hazard changes
- Whenever a new hazard is introduced into their work area

Training must include:

- An explanation of the HazCom program, including information about labels, SDSs, and how to obtain and use available hazard information
- The physical and health hazards of chemicals in the employees' work areas
- What employees can do to protect themselves from these hazards
- How to detect the presence or release of a hazardous chemical

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Industrial Hygiene Awareness

What Is Industrial Hygiene?

Industrial hygiene is:

- The art and science of preventing/controlling conditions that may expose people to workplace contaminants and physical agents that can harm their health
- A job title or part of a job description
- A focus area or principle in all occupational health and safety programs

We can use the science of industrial hygiene in all industries to protect workers, their families and the community.

What Does Industrial Hygiene Target?

Contaminants and physical agents that can harm people's health may include:

- Air contaminants (pollution, particles, vapors)
- Chemical hazards (products, pesticides, metals)
- Biological hazards (blood, mold, sewage)
- Physical hazards (noise, temperature, radiation)

Workers may be exposed to contaminants or hazards by:

- Inhalation (breathing things in)
- Ingestion (eating/drinking/smoking contamination)
- Injection (sharp objects and open wounds)
- Absorption (skin/eye/mouth contact)

The health effects of an exposure may be:

- Acute (immediate)
- Chronic (long-term)

The duration and intensity of the exposure may be a factor in health effects.

Occupational exposure limits (OELs) are how much of contaminants or physical agents an average worker may be exposed to at work over a set period before they may suffer harmful health effects. There may be limits for full or partial shift exposures.

The limit at which harmful health effects may occur may be lower for people with:

- Chronic diseases (autoimmune, cancer, asthma)
- Pregnancy
- Advanced age
- Excess weight
- General health problems

People who have any of these risk factors may need to work within limits that are lower than the OEL. In recognition of individual susceptibility differences, some companies adopt limits which are more stringent than those required by law.

Many contaminants and physical agents can be difficult to see/measure. We may need to use special measuring devices to determine their presence and concentration.

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How Does Industrial Hygiene Work?

There are five general methods, in descending order of effectiveness, that we can use to apply industrial hygiene and reduce exposures to contaminants and physical agents that can harm health.

- **Eliminate** it by redesigning the process (example: outsource tasks to specialists)
- **Substitute** it with a safer process or product (example: use robots instead of people or choose safer chemicals)
- Provide **engineering controls** at the source (example: use exhaust vents/hoods)
- Reduce exposure through **administration** (example: mandate breaks and assign people in shifts)
- Use **personal protective equipment (PPE)** for added protection (examples: wear gloves when handling bodily fluids and put on hearing protection before entering noisy areas)

The best way to keep people safe and healthy is to use a **combination of controls**. The protection provided by controls can be additive, and if one control fails, other controls may be able to reduce exposure severity or prevent harmful health effects.

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Bloodborne Pathogens Awareness

Bloodborne pathogens (BBPs) are microorganisms that cause disease. BBPs are transmitted through contact with infected blood or other potentially infectious materials (OPIM).

Assume that all blood and OPIM are contaminated and handle them accordingly.

The three most common BBPs that pose a risk in your workplace are the hepatitis B virus, the hepatitis C virus and the human immunodeficiency virus (HIV). There is NO CURE for hepatitis B or HIV.

Hepatitis B and Hepatitis C

Hepatitis is inflammation of the liver. The two strains that pose the greatest risk in your workplace are hepatitis B and hepatitis C.

There is a vaccine available for hepatitis B, but not for hepatitis C.

Human Immunodeficiency Virus (HIV)

HIV attacks the white blood cells that play a major role in the body's immune system. HIV can eventually lead to acquired immunodeficiency syndrome (AIDS). Even without visible HIV symptoms, you can still infect others. There is no vaccine for HIV.

Routes of Exposure

Three routes of workplace exposure for BBPs include:

- Puncture wounds
- Open cuts and skin abrasions
- Eyes, nose and mouth

Emergency Procedures for Blood or OPIM Exposure

If you may have been exposed to a BBP, immediately:

- Wash hands and exposed skin with soap and running water or as soon as possible after using an alternative hand-washing method (hand sanitizer or antiseptic towelettes)
- Flush eyes and mucous membranes with water or normal saline solution for 15 minutes
- Alert your supervisor and any other appropriate personnel

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Confined Space Hazards

OSHA defines a confined space as a space that:

- Is large enough and configured such that an employee can enter
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults and pits)
- Is NOT designed for continuous occupancy

Spaces that have the potential to contain serious hazards are called “permit-required” confined spaces. Examples of serious hazards include:

- Unguarded moving parts or energized exposed electrical wires
- An atmosphere that would be dangerous to breathe
- Materials flowing into the space that can engulf, drown or asphyxiate
- Inwardly converging walls and floors that can trap or asphyxiate workers

Examples of Confined Spaces

- A silo is usually a tall cylinder, above or below ground, that is sealed to isolate the contents from air or the elements
- A vault is usually a large, underground room or chamber used for storage. Electrical vaults can be found under many city streets
- A tank is a large receptacle or storage chamber, especially for liquids or gases. Tanks come in all shapes and sizes and may be fixed or mobile
- A hopper is a container for a bulk material, such as grain, rock or trash, that typically tapers downward and is able to discharge its contents at the bottom. Hoppers are used in agricultural and other settings

Written Program & Training

Employers should:

- Develop and implement a written permit-space program that outlines the policies and procedures associated with confined space entry
- Evaluate, identify, label, and communicate confined spaces
- Use engineering controls to reduce hazards within confined spaces
- Provide personal protective gear

Because of the serious potential for injury when entering a confined space, employees need training on confined space entry.

- This includes the entrant, attendants monitoring individuals entering and leaving confined spaces, entry supervisors, and emergency personnel who may enter confined spaces to assist injured workers
- Never enter a confined space or attempt to rescue personnel inside a confined space unless trained to do so

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Confined Space Team

Authorized Entrants have been properly trained in confined space entry procedures and are authorized to enter a specific confined space. These individuals must:

- Maintain communication with the attendant
- Alert the attendant when conditions change

Attendants are stationed outside confined spaces and monitor authorized entrants. They also keep unauthorized people away from the space. They should NOT perform any work other while being attendants. Attendants must:

- Know the number, identity and status of all entrants in the confined space
- Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space
- Perform non-entry rescues or summon emergency services, as needed

Entry Supervisors are responsible for entry into confined spaces. These individuals should:

- Verify that all tests have been conducted and all procedures and equipment are in place
- Terminate entry and cancel any confined space permits when the job has been completed or a condition arises that violates the permit
- Verify that rescue services and a means of summoning them are available
- Ensure entry operations remain consistent with terms of any entry permits
- Make sure acceptable conditions are maintained
- Remove unauthorized entrants

Hazards

Mechanical Devices

Mechanical devices introduce serious hazards in confined spaces. Moving parts, coupled with the existing confined space hazards, can be deadly. Equipment may contain physical hazards such as extreme heat, noise and vibration.

Harmful Gases

Some confined spaces may appear to be harmless; however, they may contain very harmful gases. Gases such as carbon dioxide and propane are heavier than air and may lie in a tank or vault for hours or even days after the containers have been opened. Some gases are odorless so the hazard may be overlooked with fatal results.

Atmospheric Testing

- Since deaths in confined spaces often occur because the atmosphere is oxygen-deficient or toxic, confined spaces are always tested prior to entry and continually monitored
- A qualified person will test a confined space before entry to determine whether the confined space atmosphere is safe
- These tests will check for oxygen level, flammability, and known or suspected toxic substances

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Hazardous Atmospheres

Hazardous atmospheres can be divided into four distinct categories:

- Flammable (including oxygen enriched)
- Toxic
- Irritant/Corrosive
- Asphyxiating

Flammable

- The work being conducted in a confined space can generate flammable or explosive conditions
- Since many gases are heavier than air, they will settle in lower levels as in pits, sewers, and various types of storage tanks and vessels
- In a closed-top tank, lighter-than-air gases may rise and develop a flammable concentration if trapped above the opening
- If a source of ignition, such as a sparking or electrical tool, is introduced into a space containing a flammable atmosphere, an explosion will result
- An oxygen-enriched atmosphere (above 23.5%) will cause materials such as clothing and hair to burn violently when ignited
- Confined spaces are ventilated with normal air, never pure oxygen

Toxic

- Toxic fumes produced by processes near the confined space may enter and accumulate in the confined space
- When a product is stored in a confined space, the walls of the space can absorb the product and give off toxic vapors
- Toxic atmospheres can also be produced by the work being performed in the confined space, such as welding or brazing with metals, painting, scraping, and sanding
- Carbon monoxide (CO) is a hazardous gas that may build up in a confined space
    - CO is produced by internal combustion engines including diesel and propane-powered engines, as well as by burning wood, paper or plastic products
    - CO is odorless and colorless
    - Early stages of CO intoxication are nausea and headache

Irritant/Corrosive

- Irritant gases vary widely among all areas of industrial activity
- Examples include chlorine, ozone, hydrochloric acid, hydrofluoric acid, sulfuric acid, nitrogen dioxide, ammonia and sulfur dioxide

Asphyxiating

- An oxygen-deficient atmosphere has less than 19.5% oxygen content
- The oxygen level in a confined space can decrease because of work being done, such as welding, cutting or brazing
- The oxygen level is also decreased when another gas displaces oxygen; this can result in unconsciousness, followed by death
- When hazardous atmospheres are present, entrants must wear appropriate respiratory equipment such as an SCBA

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Hydrogen Sulfide (H_2S) Awareness

What Is Hydrogen Sulfide?

Hydrogen sulfide (H_2S) is a toxic, potentially deadly gas that is formed in nature when organic materials decay. Hydrogen sulfide is also a by-product of various industrial and chemical processes.

It is colorless. It smells like rotten eggs and is sometimes called sour gas, swamp gas or sewer gas. **Even though it has a distinct odor, it can instantly inhibit your sense of smell so that you cannot detect it.**

Hydrogen sulfide is heavier than air, so you should expect to find it in low areas, especially sewer lines, pits and cellars.

If you ignite hydrogen sulfide, the fire will flash back to the source of the gas.

Health Effects
Since hydrogen sulfide can impair your sense of smell, the first indication you may notice is burning or irritation of the eyes, throat and respiratory tract. This may cause you to cough, have a metallic taste in your mouth, cause your eyes to burn or water, give you a headache, and make you feel sleepy.

Hydrogen sulfide is both an irritant and a chemical asphyxiant and poses several health effects, such as:

- Temporary loss of your sense of smell
- Metallic taste
- Headache
- Labored breathing
- Unconsciousness
- Asphyxiation (can cause brain damage, cardiac arrest even death)

IMPORTANT:	In high concentrations, hydrogen sulfide can cause IMMEDIATE unconsciousness followed by death.

What Protection Should I Use?

Your employer may require tests to check the atmosphere where hydrogen sulfide may be present.

Use atmosphere-supplying respirators like SCBAs and air-line respirators that provide clean air from a bottled source or compressor.

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Escape-only air packs may be available for you to use ONLY when exiting a toxic atmosphere.

You should receive additional training about respiratory protection, a fit test and a medical evaluation BEFORE you use any respiratory equipment.

What Should I Do?

You should receive training about the emergency response plan for your employer and location.

If you suspect hydrogen sulfide is present:

1. ENSURE YOUR OWN SAFETY.
2. Call for assistance.
3. Wear a atmosphere-supplying respirator (NOT an escape-only air pack).
4. Move the victim to a safe area with fresh air.
5. Begin cardiopulmonary resuscitation (CPR).
6. Get professional medical care for the victim as soon as possible.

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Sources of Carbon Monoxide

Which of these do you have in or around your home?

- Gas appliances, such as:
  - Furnace/boiler
  - Water heater
  - Oven/range/stove
- Car, truck or other vehicle
- Fuel-powered equipment, such as:
  - Lawn mower
  - Leaf blower
  - Chainsaw
- Wood-burning or outdoor cooking/heating sources, such as:
  - Fireplace
  - Wood-burning stove
  - Portable gas stove or camping stove
  - Charcoal grill
  - Portable, flameless chemical heater
- Portable generator

Staying Safe: Gas Appliances
- Have appliances serviced by a technician every year
- Ventilate them properly
- Never use a gas oven to heat a home
- Never patch a vent pipe with tape, gum or anything else not intended for that purpose

Staying Safe: Fuel-powered Equipment
- Buy only equipment carrying the seal of an international testing agency, such as UL
- Do not leave equipment or vehicles running in enclosed spaces such as garages or sheds

Staying Safe: Fireplaces and Outdoors
- Inspect and clean fireplaces and wood-burning stoves yearly
- Never use portable camping stoves, charcoal grills or portable, flameless chemical heaters indoors

Staying Safe: Portable Generators
- Never use a generator inside your home, basement or garage
- Place generators at least 6 meters (20 feet) from windows, doors or vents

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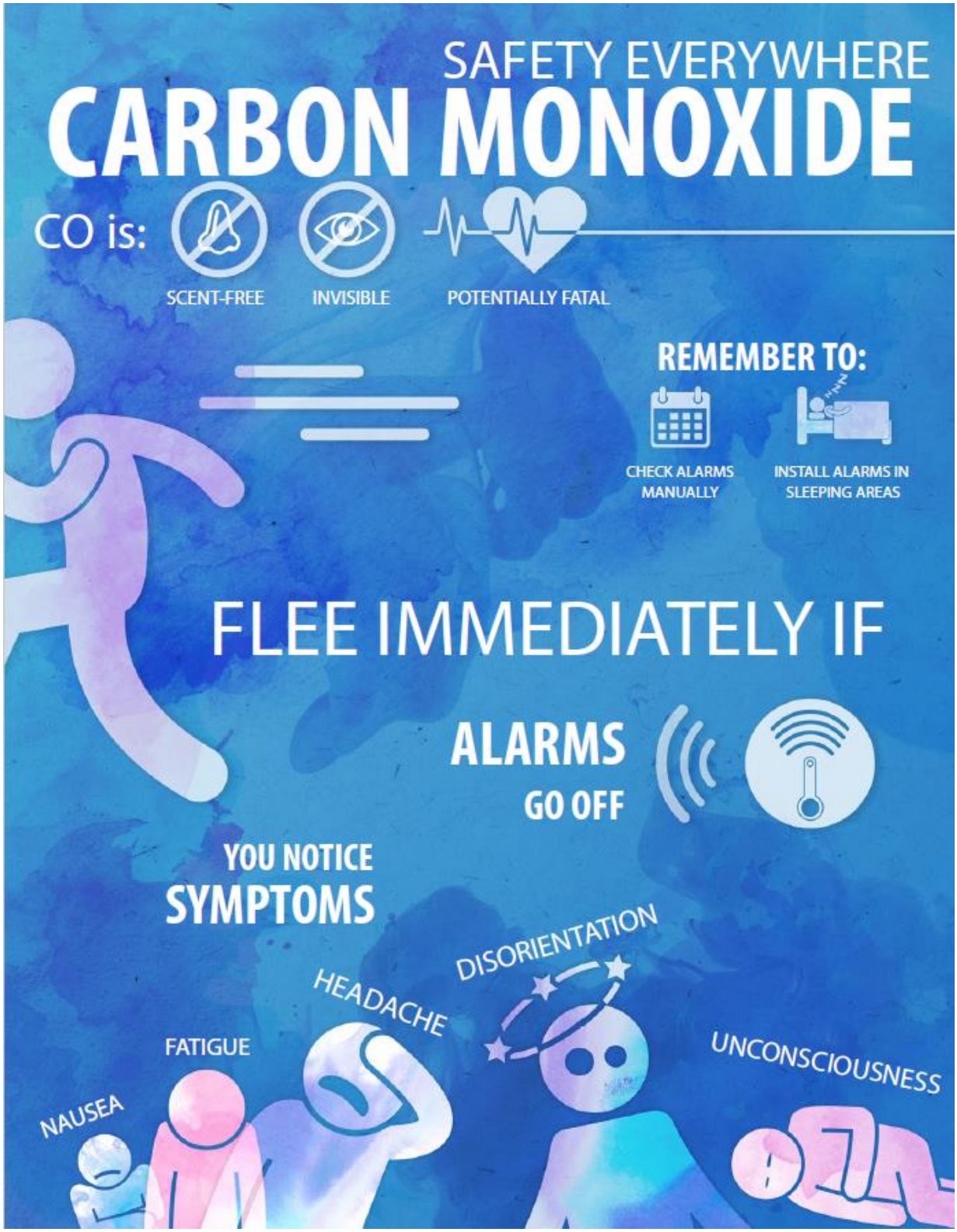
Safety Everywhere: Carbon Monoxide



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Egress and Emergency Action Plans Awareness

Egress Basics

"Egress" refers to a place or means of getting out or an exit. Safety regulations refer to a "means of egress" as a continuous and unobstructed way of exit travel from any point in a building or structure to a public way. A means of egress has three parts:

1. Exit access – the portion of "means of egress" that leads to an exit
2. Exit – the portion separated from all other spaces by construction or equipment that provides a protected way of travel to the exit discharge
3. Exit discharge – the portion between the termination of an exit and a public way

Requirements

The first fundamental requirement is that a building will have a sufficient number of exits. Every building or structure, new or old, designed for human occupancy shall be provided with exits sufficient to permit the prompt escape of occupants in case of fire or other emergency.

Another fundamental requirement is that the design of exits and other safeguards shall be such that reliance for safety to life in case of fire or other emergency will not depend solely on any single safeguard:

- An exit sign must be illuminated, so it can be seen if the lights in a building fail
- Buildings also have safety lights that turn on in the event of a power loss
- Buildings should have more than one exit – all with exit signs

Detailed Elements

Exits must be clearly identified. Every exit must be clearly visible and marked and access to exits must be conspicuously and unmistakably identified. Doorways or passageways that do not lead outside must be arranged or marked to minimize their possible confusion with real exits.

Exits must be illuminated:

- Adequate and reliable illumination should be provided for all exit facilities: both exit access and exits
- Every required sign designating an exit or way of exit access should be readily visible
- No decorations, furnishings or equipment should impair visibility of an exit sign
- No other distracting displays or signs should be put near or in the line of vision to a required exit sign

There must be **free and unobstructed egress** from all parts of the building at all times when it is occupied. No lock or fastening to prevent free escape from the inside of any building may be installed (exceptions include mental, penal or corrective institutions).

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Configuration

- When more than one exit is required from a story, at least two of them must be remote from each other
- Doors leading to exits or exit access must be side-hinged
- Exit access must not pass through a bathroom or other room subject to locking unless the exit is required to serve only the locked room
- Exit accesses must have smooth, solid, substantially level floors and guards on the unenclosed sides
- Stairs must be arranged to make clear the direction of egress to the street
- Exit stairs that continue beyond the floor of discharge must "force" persons to make the right choice when presented with a right and wrong way to the street
- If snow and ice are possible, the area must be covered or cleared regularly
- Travel paths must be permanent, unobstructed and reasonably straight
- Exits must discharge directly to an open space that gives safe access to a public way
- Open areas must be of adequate width and size to accommodate evacuees

Emergency Action Plans

An emergency action plan is a plan for a workplace describing procedures employer and employees must take to ensure employee safety from fire or other emergencies. An emergency action plan should include at a minimum:

1. Procedures for reporting a fire or other emergency
- Telephone number to call to report any emergency
- Remember, stay calm and answer all questions that are asked by emergency services
- Know the nearest manual fire-alarm pull station

2. Procedures for emergency evacuation
- Type of evacuation and exit route assignments

3. Procedures to be followed by employees who remain to operate critical plant operations before they evacuate

4. Accounting for all employees after evacuation

5. Procedures to be followed by employees performing rescue and medical duties
- These employees should receive special training and instruction

6. The names and job titles of every employee who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan
- Employees with questions need to be able to get answers

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Fire Prevention

Elements of Fire

Three elements must be present to start a fire: **oxygen**, **heat** and **fuel**.

Workplace Fires

Oxygen is in every workplace since it is in the air we breathe.

Some sources of **fuel** in the workplace include:

- Paper
- Wood
- Cloth
- Flammable liquids and gases

Sources of **heat** in the workplace include:

- Smoking
- Electrical hazards
- Overheating/malfunctioning equipment
- Friction
- Sparks
- Molten substances
- Lightning

Workplace Fire Prevention Tools and Practices

Housekeeping

Good housekeeping includes:

- Making sure combustibles are collected and stored
- Regularly removing dust from machines, pipes and overhead beams
- Disposing of garbage properly
- Keeping passageways and exits free from storage and waste
- Promptly removing waste paper, packaging, old rags and other fire hazards
- Designating employees to ensure that appliances are off
- Completing preventive maintenance on machines and equipment

Make sure you:

- Smoke only in designated locations
- Dispose of smoking materials and waste in designated containers
- Keep portable heaters at least 3 feet from combustibles
- Verify heaters have tip-over safety features certified by an independent testing laboratory, such as UL
- Do NOT weld or cut near flammable liquids, vapors or dusts
- Weld and cut in fire-safe rooms free of flammables and combustibles
- Use a fire watch when you weld or cut away from safe locations
- Handle welding fuel and oxygen carefully to prevent leaks or accidental intermingling

Keep in mind that **sparks and hot particles** can travel as far as 50 feet!

When you have **combustibles** in your workplace:

- Keep waste in metal cans or bins with self-closing covers
- Deposit oil-soaked or paint-soaked rags, clothing or waste in noncombustible containers with self-closing covers that are emptied daily

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- Store large quantities of waste in fire-resistant rooms with fire doors and automatic sprinklers
- Schedule regular collection and removal of combustible waste and garbage

To prevent fires involving **flammable liquids**:

- Store flammable liquids in a flammable liquid storage cabinet
- Label flammable liquid storage cabinets "FLAMMABLE – KEEP FIRE AWAY"
- Bond or ground containers when transferring flammables from drums to small containers or transferring large quantities of flammables
  - **Bonding** is when you connect two flammable liquid containers to each other by an electrical conductor
  - Connect both flammable liquid containers to a **grounding** rod or line
  - Do NOT transfer flammable liquids from a metal to a plastic container

To prevent **electrical equipment** fires:

- Ground or double-insulate all electrical equipment
- Use only approved equipment where flammable or explosive gases/vapors may be present
- Regularly inspect/repair/replace electrical equipment, portable electrical tools and cords
- Use waterproof cords and sockets in damp places
- Use surge protectors, when possible
- Train employees about the correct use of electrical equipment
- Immediately turn off, unplug and report equipment that begins to smell or give off smoke

When it comes to electrical equipment:

- Do NOT use makeshift wiring
- Do NOT run electrical cords across doorways or walkways, or pinch them behind furniture or equipment
- Do NOT overload outlets or extension cords
- Do NOT block circuit breakers or bypass fuses

Fire detectors and alarms:

- May detect heat, smoke, flames and/or gas
- Give an early warning to allow occupants to escape the building
- Start fire extinguishing procedures

Alarms must be:

- Clearly and immediately distinguishable from other signals and alarms
- In good working order and tested at least monthly

Alarms should be located so everyone can hear them (or see them if they are hearing-impaired).

To make sure **sprinklers** and **extinguishers** are effective, your company must:

- Inspect and test sprinkler systems and their water supplies regularly
- Train any workers who are expected to use fire extinguishers
- Inspect extinguishers at least monthly
- Make sure extinguishers are easy to see and access
- Replace used or damaged fire extinguishers immediately

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Fire Drills and Evacuations

Make sure:

- Fire **exit doors** and routes are NOT blocked or locked when employees are inside
- Fire doors are shut (not propped open)
- Doors and exit routes are free of obstructions and marked with exit signs

Ensure that **evacuation routes** and **emergency exits** are:

- Clearly marked and well-lit
- Wide enough to accommodate the number of evacuating personnel
- Unobstructed and clear of debris at all times
- Unlikely to expose evacuating personnel to additional hazards

Make sure your **fire protection plan** includes:

- Primary and secondary evacuation routes and exits
- How you plan to account for employees after evacuation

Use **fire drills** to remind employees of fire prevention and protection practices and also test the adequacy and condition of alarm systems.

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Flammable and Combustible Liquids

Flammable and Combustible Liquid Danger

- Flammable and combustible liquids let off vapors that mix with the air, where oxygen makes them ignitable
- Each liquid is classified by its **flash point** – the lowest temperature at which its vapors reach an ignitable concentration in the air
- Temperatures hotter than the flash point cause more evaporation, making the liquid even more dangerous
- Flammable liquids have lower flash points than combustible liquids (making them more dangerous because ignition can happen at a lower temperature)
- A flammable liquid has a flash point under 100 °F (38 °C)
    - Petroleum, for instance, has a flash point of about -45 °F (-43 °C), so its vapors can ignite on even a bitterly cold winter day
    - Common flammable liquids include acetone, benzene, ethanol, and gasoline/petrol
- Combustible liquids have flash points at or above 100 °F (38 °C) and below 199 °F (93 °C)
    - Common combustible liquids include diesel fuel, motor oil, kerosene, cleaning solvents and oil-based paints

General Safety Procedures

To prevent or extinguish fires, essentially remove any one of the components of fire (fire, heat, oxygen, and chemical chain reaction).

Keep ignition sources away from flammable and combustible liquids. Ignition sources include:

- Open flames
- Cigarettes
- Lightning
- Static electricity
- Friction
- Cutting
- Welding
- Grinding
- Radiant heat
- Electrical sparks
- Mechanical sparks
- Heat-producing chemical reactions

Bonding and Grounding

Use bonding and grounding to prevent static electricity. Bonding and grounding only work when you create a continuous metal-to-metal connection.

- **Bonding**: Connecting objects with wire so that electrons that move between the objects will travel through the wire, not the air
- **Grounding**: Creating a metallic path between an object and the ground

Proper Storage

Storage rooms for flammable and combustible materials:

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- Have ventilation systems that completely change out the air at least six times an hour to prevent flammable vapors from accumulating
- Are liquid-tight where the walls meet the floor
- Have varying capacities (ask your supervisor)
- Are NOT safe if you keep too much in them (observe limits set by your company)

In flammable and combustible material storage rooms:

- Have an aisle at least 3 feet (0.9 meters) wide
- Keep at least 3 feet (0.9 meters) clear under the ceiling and overhead fire protection systems
- Never stack containers of more than 30 gallons (114 liters)

Flammable and Combustible Liquid Cabinets

Cabinets should:

- Be conspicuously labeled “Flammable – Keep Fire Away”
- Be able to pass a standard fire test, and have special fire-resistant features

Flammable and Combustible Liquid Outside of Storage/Cabinets

The amount of flammable or combustible liquid that can be outside of a storage room, cabinet or fire area depends on the liquid and type of container. The less you have out, the safer you are. General maximums are:

- 25 gallons (95 liters) for highly flammable liquids
- 120 gallons (450 liters) for combustible liquids in containers
- 660 gallons (2,500 liters) for combustible liquids in tanks

Containers

- Choose containers designed, constructed and/or listed to meet the safety standards of appropriate safety organizations
- **Safety cans** often have spring-closing lids and spout covers and may also have flame arrester screens

Safety Principles and Procedures

Transferring Flammable and Combustible Liquids

It is best to only transfer flammable and combustible liquids by using:

- Safety cans
- A closed piping system
- An approved self-closing safety faucet
- Or a safety pump

Bond and ground your containers when you transfer flammable and combustible liquids!

Housekeeping

- Keep storage rooms, cabinets and your work area tidy (put liquids back after use)
- If you encounter a spill, clean it up immediately and then place the rags you used in an appropriate, labeled, closed-top container right away (dispose of waste regularly)
- If you see unsafe handling/storage, notify your supervisor or the appropriate person
- Do NOT keep materials that react to water in the same room as flammable and combustible liquids, because water may be needed to put out a fire

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- Appropriate fire control devices, such as fire extinguishers and hoses, should be available where flammable and combustible liquids are stored
- Only extinguish fires if you are properly trained to do so

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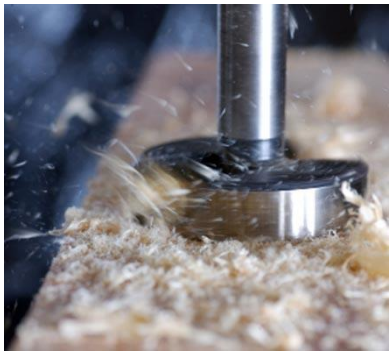
Combustible Dust



Definition and Sources

Combustible dust is dust that can ignite and burn. Combustible dusts are produced when we manufacture powders, such as cornstarch or aluminum powder coatings, or when we handle and process combustible materials such as wood, coal and plastic. Polishing, grinding, transporting and shaping many of these materials can produce very small airborne dust particles.
Combustible dust can also come from materials not normally considered combustible:

- Metal fines in an aluminum manufacturing plant
- Dry ingredients in a food processing plant
- Powders in a pharmaceutical lab

To determine if a dust is combustible, review the material's Safety Data Sheet (SDS) and/or the dust or job hazard analysis. If you have questions, consult your supervisor or safety manager.

Types of Fires

A primary event is the initial fire. If the initial fire produces a pressure wave – as is common with suspended dust fires – or if emergency workers disrupt settled dust when responding, more dust can be lofted into the air and ignite, resulting in a second fire.

Surface fires can occur when enough dust accumulates near an ignition source:

- Hot surfaces
- Static sparks
- Slag from a welding torch
- Electrical arcing from motors and switches

Any material that burns in a solid form can be explosive when in a finely divided form. These particles can create an extremely volatile **suspended dust fire** when enough combustible dust is airborne and an ignition source is present. The most basic type of suspended dust fire is a deflagration (heating a substance until it burns away rapidly), or flash fire.

Combustible dust accumulation may lead to explosions. They are dust fires that cause a catastrophic, uncontrolled release of built-up pressure and generate a violent pressure wave.

When responding to even small dust fires, you must be careful to prevent any additional dust from lofting into the air and possibly triggering a secondary event. *Take all dust fires seriously!*

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Safety Measures

Capturing dust at the source, limiting accumulation and controlling ignition sources are the best methods for preventing combustible dust events.

Work areas that have the potential to contain hazardous or ignitable concentrations of dust may be “classified” areas. Equipment and materials used in these areas need to be dust-tight or dust-ignition-proof. Other precautions for classified locations include:

- Non-sparking tools and electronic devices
- Specially rated electrical equipment and wiring
- Specially rated powered industrial forklifts and equipment
- Flame-retardant clothing
- Prohibiting ignition sources, such as welding and other hot work

Housekeeping measures:

- Clean up dust before it can accumulate to hazardous levels
- Use mopping/washing, vacuuming and gentle sweeping to clean up dust
- Use vacuum systems specifically rated for the type of dust you are collecting
- To avoid dust clouds, don’t use compressed air or steam for cleaning unless you vacuum first, limit pressure to 15 pounds per square inch (103 kPa), and eliminate ignition sources

Hidden Dust

Overhead areas – Dust can accumulate on top of shelving or on overhead beams. If there is an ignition source, these overhead areas can catch fire and either spread rapidly or smolder unnoticed, later burning out of control. Overhead dust can also fall, creating suspended dust and greatly increasing the risk of a flash fire or explosion.

Low-lying areas – Dust can accumulate under cabinets and on the floor around equipment. Sparks or heat from equipment can easily ignite low-lying dust, causing a serious fire.

Hidden areas – Tiny particles of dust can fall into small openings, allowing accumulation in concealed areas. For example, dust can get behind or between walls, collect under raised floors, and settle in rooms that are not used often.

To avoid fires and explosions:

- Inspect work areas routinely and maintain them
- Monitor dust levels
- Keep work areas clean
    - Some dusts are hazardous at just 5% coverage at a thickness of 0.8 mm (1/32 inch)
- Make sure cracks and holes are repaired and sealed
- Train employees about the hazards created by possible ignition sources
- Resolve all potential combustible dust hazards

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Fire Extinguisher Safety: Part 1 - Fight or Flee

One of the most important things you need to know about fire extinguishers is when to use them and when NOT to use them.

Every fire has unique challenges and every extinguisher has limitations.

Know the Risks

Fighting a fire can stop its spread and keep evacuation routes clear, but there are risks. Fires can increase in size and intensity in SECONDS, blocking exit paths and creating a hazardous atmosphere. Portable fire extinguishers contain a limited amount of extinguishing agent and can be discharged in a matter of SECONDS.

Fight or Flee?

Ask yourself:

- Is the fire too big for a portable fire extinguisher?
- Is the environment too hot and smoky, making it difficult to breathe?
- Is there a safe evacuation route?
- Do you know the fire size and is any of it hidden (behind walls/ceilings)?

You may be able to **FIGHT** the fire:

- The fire just started and is limited to the original material ignited
- There is a clear evacuation path behind you

You may need to **FLEE** if:

- The fire involves a large amount of flammable solvents
- Heat is too intense to get within 10-15 feet (3-4.5 meters) of the fire
- Smoke is quickly filling the room
- You must crawl on the floor due to heat or smoke

REMEMBER: If the fire is not contained and fire, heat or smoke may block the evacuation path, flee as quickly as possible.

Fire-Fighting Overview

IMPORTANT: To effectively use fire extinguishers, you need additional training and hands-on practice. This training is only to give you an overview of best practices for fighting fires.

In general:

- Activate the emergency plan and clear the area
- Fight the fire if it is safe to do so
- If the fire becomes too dangerous or you are unable to put it out, evacuate immediately

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Fire Extinguisher Safety Part 2: Using Extinguishers

To effectively put out small fires, you need to CHOOSE and USE the right extinguishers.

How Fire Extinguishers Work

For fire to exist, the following elements must be present at the same time:

- Heat
- Oxygen
- Fuel

Fire extinguishers expel extinguishing agents when you press down on their handles.

The extinguishing agent will do one of the following:

- Cool burning fuel
- Displace or remove oxygen
- Stop the chemical reaction so a fire cannot continue to burn

Fire Extinguisher Types

Using the wrong extinguisher can be ineffective and may make the fire worse or cause new hazards.

- **Class A** fires involve ordinary combustibles such as paper, cloth, cardboard and wood. They require extinguishers labeled A, such as air-pressurized water and foam extinguishers. While portable fire extinguishers are the primary focus of this course, it's worth noting that water hoses and water barrel and bucket approaches may also qualify as Class A means to extinguish site fires.
- **Class B** fires involve flammable liquids such as gasoline, oil, grease, paint, lacquer and solvents. Carbon dioxide, or CO2, extinguishers are an example of class B and C extinguishers.
- **Class C** fires involve electrical equipment such as wiring, fuse boxes, energized electronics, motors, appliances, computers and other electrical sources. Halogen or clean agent extinguishers are an example of class B and C extinguishers.
- **Class D** combustible metals – such as aluminum, magnesium, titanium and sodium – require special extinguishers labeled D, such as dry powder extinguishers.
- **Class K** fires involve cooking oils and greases such as animal fats and vegetable fats. They require a wet chemical extinguisher labeled K.

Drench and monitor extinguished materials until re-ignition is no longer a threat, especially with Class A combustibles.

Note that some extinguishers work on multiple types of fires.

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Fire-Fighting Overview

IMPORTANT: To effectively use fire extinguishers, you need additional training and hands-on practice. This is an OVERVIEW of best practices for fighting fires.

1. Activate the alarm system and ask someone to notify the appropriate people, such as the fire department and site security.
2. Evacuate the immediate area.
3. Notify others of your intent.
4. Identify a safe evacuation path.
5. Choose the appropriate type of fire extinguisher.
6. Stand a safe distance from the flames (check extinguisher label).
7. Discharge the extinguisher using the PASS (pull, aim, squeeze and sweep) technique.
8. Back away from the extinguished fire.

If the fire becomes too dangerous or you are unable to put it out, evacuate immediately.

PASS Method

To use the PASS method:

1. PULL the pin.
2. AIM toward the base of the fire.
3. SQUEEZE the handle.
4. SWEEP from side to side at the base of the fire.

Watch the area. If the fire re-ignites, repeat the aim, squeeze and sweep steps.

Best Practices

Be sure to:

- Seek hands-on training in addition to the online course and this job aid
- Keep the right class of extinguisher for the materials in each area
- Make sure extinguishers are accessible and easy to locate
- NOT stack materials in front of extinguishers
- Document periodic extinguisher inspections
- NEVER re-mount a used extinguisher

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Fall Protection

A good precautionary measure is to use fall protection anytime you are working on an unprotected or elevated work surface from which you could fall. Good practices recommend using it whenever you are at least 4 to 6 feet above the ground.

Ask your manager or supervisor for guidance about using fall protection on your worksite.

Common Fall Hazards

Common fall hazards include:

- Floor holes
- Open-sided floors
- Roof edges
- Skylights
- Ladders
- Aerial lifts

Mistakes that may cause a fall include:

- Not respecting fall hazards
- Not paying attention
- Equipment/tool failure
- Slips
- Overreaching
- Complacency

Methods of Fall Protection

Consider using fall protection when:

- Guardrails are removed
- Guardrails/covers are not able to be installed
- You are working hands-free

Primary fall protection includes footing, balance, handholds, stable work surfaces, and positioning equipment.

Secondary fall protection is classified as active or passive:

- **Passive** systems include guardrails, covers and safety nets
- **Active** systems include:
  - **Work positioning**: Allows you to work hands-free
  - **Fall restraint**: Prevents you from falling off an edge or into an opening
  - **Fall arrest**: Catches your body after you have fallen

When planning to use personal fall protection, consider free fall, clearance and swing fall:

- **Free fall** is the distance traveled from the point where you start falling to the point where your fall protection system begins to slow you down
- **Clearance** is the distance required for your personal fall arrest equipment to activate, decelerate and then completely stop your fall
- **Swing fall** can occur when you walk away from under your anchor point. When you fall, you will swing back under your anchor point like a pendulum

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Fall Protection Equipment

Personal fall protection includes the following components:

- **Body support** includes a full body harness
- **Connectors** may be lanyards, snap hooks or carabiners
- **Anchor points** are the points at which you attach your anchorage connector
    - Use anchor points that are as high as possible and located at least at D-ring level
    - Anchor to a structure that can handle 5,000-pound load or that a qualified person has identified for you
    - Make sure you have enough clearance so your fall protection system stops you before your body strikes an object below
- **Self-Retracting Lifelines (SRLs)** require much less clearance than a lanyard and allow more freedom of movement
- **Vertical** and **horizontal lifelines** are also used on some worksites

Inspecting and Maintaining Equipment

You should inspect fall protection equipment before every use

- Inspect body support more frequently when welding or working with chemicals or sharp edges
- Inspect connectors periodically throughout the day

A qualified person should also inspect equipment annually.

If equipment is ever involved in a fall, even if it does not show signs of damage, remove it from use and return it to your supervisor.

To keep your fall protection equipment working, you should:

- Store equipment properly
- Never throw it into a storage box
- Keep it dry and clean
- Keep it out of direct sunlight

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Mobile Elevated Work Platforms Awareness

Safety is our primary concern when using any equipment to access work at heights. When we are above the ground, falls, tips and contact with overhead hazards can occur if we are not careful.

Types of Mobile Equipment

Two basic types of mobile equipment extend our reach:

- Aerial lifts
  - Are less stable than scissor lifts because they have small base dimensions and weight centered outside of the base footprint
    - May have an insulated non-conductive bucket for electrical work
- Scissor lifts
  - Are designed to lift larger loads
  - Accommodate multiple workers
  - Provide more work space
  - Large base dimensions and weight directly above the base provide good stability when stationary on flat surfaces
  - Are not designed for lifting extremely heavy material

Inspections

Follow **manufacturer's instructions** to perform the pre-use inspection of equipment and environment.

- Issues such as leaking fluids, hissing or grinding sounds, and erratic movement are cause for concern
- Use only lifts that have passed inspection. If you discover an unsafe condition, **tag** the lift "Out of Service" and **report** the issue immediately

Common Accident Causes

Common accident causes include falls, tip-overs, electrocution and contact with overhead machinery.

Accident Cause	Precautions
Choosing the wrong lift	• Consider task requirements and reach limits • Indoor lifts are *not* designed for rough outdoor terrain • Do not exceed vertical or horizontal reach limits
Lack of training	• Only trained/authorized people should operate lifts • Familiarize yourself with controls

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	○ Check the operator's manual and warning labels before operating new equipment ○ Remove keys from unattended lifts
Equipment failure	● Perform pre-use inspection per manufacturer instructions
Hazards in area	● Survey area and address hazards BEFORE using the lift: ○ Overhead electrical lines ○ Machinery and moving equipment ○ Material and debris ○ Soft ground, floor condition and drop offs ○ Workers and work activities ● Address hazards by taking precautions such as barricades, signs, insulation, de-energization and lockout/tagout
Instability	● Extend stabilizers and outriggers
High winds	● Do not use lifts above maximum manufacturer determined wind speeds (usually 24-40 kph or 15-25 mph) ● Follow the manufacturer's guidelines regarding wind ● Realize that as your lift gains altitude, it becomes more vulnerable to winds of all speeds
Falling off or being catapulted from the platform or bucket	● Do NOT step on rails, toeboards or anything inside the lift ● Don't lean over guardrails (reorient lift instead) ● Inspect and use fall protection ● Don't use lifts to move people
Uneven surfaces	● Avoid unprotected edges, curbs, soft ground, floor holes or excessively sloped surfaces ● Follow manufacturer directions, including equipment limitations and acceptable grades ● Always look in the direction that you are driving ● Know floor loading capacities for surfaces you travel on ● Travel with the counterweight upgrade

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Ladder Safety

Choosing the Right Ladder

- Choose the right ladder for the job
- Use fiberglass ladders around electricity
- Make sure the ladder is rated for the heaviest user and any tools or equipment they'll be using
- Portable ladders include stepladders, extension ladders, straight ladders, and platforms with wheels
- Fixed ladders are permanently attached to a structure

Inspecting a Ladder

- Visually **inspect ladders** before the first use each shift ladders are used
- Also inspect a ladder if it tips over, falls, is dropped, or is struck by moving equipment
- Check for modifications (painted, reinforced or altered) that may hide defects
- If a ladder is defective, tag it out of use and report it to maintenance or your supervisor
- Inspect:
    - Rungs, steps, non-slip surfaces
    - Side rails
    - Feet and supports
    - Extension ladder mechanisms, rung dogs, pulley system, and ropes/rail guides
    - Stepladder pail shelves and spreaders
    - Platform ladder casters, wheels, stops, locks and standing surfaces
    - Fixed ladder supports, cages, safety devices, chains and standing surfaces

Setting Up a Ladder

Once you've inspected your ladder and established that it's in good condition, it's important to know where and how to set up the ladder, and where and how not to.

- Think about stability and the work you will be doing, and consider alternatives (scissor/ aerial lifts, scaffolds, stairs) when frequent access, mobility and stability are concerns
- Before setting up a ladder, **check for mechanical and electrical hazards**
- **Clear the area** around the base and top of the ladder of debris, tools and other objects
- Secure or stabilize the base on unstable or unlevel surfaces
- Secure ladders against tipping from accidental collisions or **set up barricades** in high-traffic areas
- If in front of a door, add a sign about overhead work and lock or **block the door**
- Place the extension or straight ladder's feet 1/4 of the ladder's working length away from the base of the structure

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    - E.g., if the ladder measures 4 feet (1.2 meters) between its base and its support point at the top of a wall, there should be 1 foot (30 centimeters) between the base of the ladder and the foot of the wall
- Rest **both side rails on the top support** and secure the ladder to prevent slipping
- Make sure the top of the ladder is **three rungs higher** than the edge of the structure
- The distance from the base of the ladder to the structure is correct when you place one foot against each side rail, extend your arms straight out, and can touch a rung without lowering or raising your arms.
- Secure the ladder to prevent it from slipping. Tie to a support structure near the base or drive a stake into the ground. Lash the top to an overhead beam
- Do not set up a ladder on a box, bin, vehicle or machinery to gain height; on snow, ice, oil or debris; or on any other unstable or slippery surface
- Some ladders have flexible feet:
    - On hard surfaces: Feet should be set horizontally
    - On soft surfaces: Turn the feet parallel to the side rail and “plant” the bottom vertically

Climbing a Ladder

- Only **one person** can be on a ladder at a time
- **Face** the ladder to climb or descend it
- **Maintain three points of contact** by keeping two hands and one foot, or two feet and one hand, on the ladder at all times
    - One hand must be grasping the ladder at all times
- **Never carry any object** or load that will interfere with hand holds on the ladder or could cause you to lose your balance and fall
    - Consider a tool belt if tools must be carried

Staying On a Ladder

- Don’t climb higher than is safe
    - This may be marked on side rails
    - **Never stand on the top rung of a ladder!**
    - Never stand on the top cap or top rung of a stepladder
- **Don’t overreach** from a ladder
    - Keep the center of your body (your belt buckle area) between the side rails
- Never move, shift or extend ladders being used by another worker
    - Never attempt to move or “hop” the ladders you climb (instead get down and relocate the ladder from ground level

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Walking/Working Surfaces

Slips and falls on walking and working surfaces are a major source of workplace accidents. Elevated platforms, runways, ladder rungs, stairs, steps, scaffolds and outdoor areas are commonly overlooked walking and working surfaces. Wear shoes with soles suitable to working conditions.

Housekeeping

Housekeeping is an important factor in all work environments and plays a vital role in maintaining a safe workplace. Keeping walking and working surfaces tidy can prevent people from slipping, tripping or falling due to clutter or slick surfaces.

Walkways and Floors

Keep aisles clear and in good repair. Aisles should be sufficiently wide where mechanical handling equipment is used. Use covers or guardrails to protect personnel from the hazards of:

- Open pits
- Tanks
- Vats
- Ditches

Floor Loading Protection

Do not place a load on the floor or roof of a building or other structure if the load is heavier than the load rating limit. Check with your supervisor if you are concerned about heavy loads that you need to place in or carry through an area.

Ladders and Steps

Portable Ladders

Maintain ladders in good condition. Inspect ladders frequently and before each use, and withdraw them from service if they have defects.

- Tag or mark defective ladders as “Dangerous, Do Not Use”

Place ladders on level, solid ground unless you secure or stabilize them to prevent accidental displacement. Secure any ladder that must be placed on a slippery surface. If you use a ladder to access a roof or other area, make sure it extends at least 3 feet (0.9 meter) above the point of support.

When climbing or descending a ladder:

- Face the ladder
- Keep both hands on the ladder
- Do not carry objects that can interfere with your ability to grasp the ladder
- Remember that the top of a regular stepladder is not safe for standing

Fixed Ladders

It’s common to find cages and wells on tall ladders, but these protections are often ineffective at stopping falls. Newer ladders have systems that stop or prevent falls. A ladder safety device is any device, other than a cage or well, designed to eliminate or reduce accidental falls and may incorporate such features as friction brakes and sliding attachments. Landing platforms provide a means of interrupting a free fall and serve as a resting place during long climbs.

Step Bolts and Manhole Steps

- Step bolts and manhole steps must be uniformly spaced and in good condition
- Do not exceed the maximum intended load

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- Inspect each step visually before use; report any issues, such as a bent or missing step, or if you slip or lose your grip

Stairs and Steps

Standard stairs provide access from one walking-working surface to another when operations necessitate regular and routine travel between levels, including access to operating platforms for equipment. When using stairs and steps:

- Keep a clear view of your footing
- Make sure you have good lighting so you can easily see the next step
- Keep a hand free to grab the stair railing if you lose your footing
- Don't carry anything that keeps you from seeing the next steps
- Know that wet or slippery shoes are as dangerous as a wet or slippery surface

Scaffolds

- Follow the specific safety guidelines for the type of scaffold you use
- The footing or anchorage for scaffolds or planks must be sound, rigid and capable of carrying the maximum intended load without settling or displacement
- Maintain scaffolds in a safe condition; do not use damaged or weakened scaffolds
- Do not alter or move scaffolds while they are in use or occupied
- Install guardrails, midrails and toeboards on all open sides and ends of platforms more than 10 feet (3 meters) above the ground or floor; install wire mesh between the toeboard and the guardrail along the entire opening where persons are required to work or pass under the scaffolds

Dock boards and Ramps

- Secure loading ramps and dock boards (bridge plates) to prevent slipping
- Newer dock boards have raised edges on the sides to prevent accidental runoff
- Use handholds on portable dock boards to permit safe handling when the dock board must be repositioned or relocated

Falls and Falling Objects

Open-sided work platforms and surfaces present a risk of falls to lower levels or falls onto or into dangerous equipment. Prevent or stop falls with:

- Guardrails
- Work positioning
- Restraint systems
- Safety nets
- Personal fall arrest systems

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Preventing Slips, Trips and Falls

Slips, trips and falls can cause everything from painful bumps or bruises to broken bones, concussions or even death! Everyone in your workplace must take responsibility for slip, trip and fall safety. Before using a ladder at work for the first time, you much receive ladder safety training.

Definitions

- Slip: a loss of balance caused by too little friction between a person's foot/feet and his/her walking surface
- Trip: a loss of balance caused by the interruption of the movement of a person's foot by an obstacle
- Same-level fall: a slip and fall, trip and fall, or a step and fall
- Elevated fall: a fall from any distance, such as from a ladder, down stairs, off equipment, or from docks, trees, roofs or other height
- Same-level falls have a higher frequency, but are associated with lower damage
- Elevated falls have a lower frequency, but are associated with higher damage

Causes

Slip and fall injuries can be caused by a combination of slippery surfaces and the wrong footwear. Other causes include:

- Poor housekeeping
    - Items in aisles or on steps
    - Spilled liquids, puddles or water tracked in from outside
    - Poorly secured or anchored floor mats
- Inadequate lighting
    - Too dark
    - Glare
- Improper use of equipment
    - Ladders, scaffolds, vehicles, etc.
    - Makeshift ladders (climbing shelves, boxes or chairs)
- Bad habits
- Taking shortcuts

Solutions

There are simple steps you can take to make your work area a safer, more productive place:

- Keep work areas neat
- Keep work areas well-lit
- Use equipment correctly
- Develop good habits

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Keep Work Areas Neat

- Eliminate clutter from aisles
- Keep floors clean, dry and uncluttered
- Use caution signs on wet floors
- Keep outdoor areas safe too
- Use secure, non-slip mats
- Eliminate protruding nails, splinters or loose boards
- Take care when using cords
- Block off or mark hazardous areas

Keep Work Areas Well-Lit

- Keep work areas, stairs and aisles well-lit
- Avoid wearing sunglasses indoors

Use Equipment Correctly

The improper use of equipment is a significant cause of slips, trips, and falls. Care is needed when using:

- Ladders
  - Use the right ladder for the job
  - Do not use makeshift ladders such as: shelves, boxes or chairs
  - If a ladder is required as part of your job, you must have ladder safety training
- Stairs
  - Look where you are going
  - Take one step at a time
  - Hold handrails
  - Keep steps clean, dry and uncluttered
- Loading docks
  - Use portable railings
  - Be aware of traffic patterns
  - Keep area as clear as possible
  - Stay alert

Shoes

- Slip and fall injuries are often caused by a combination of a slippery surface and the wrong footwear
- Check with your employer about the most suitable shoes to wear in your workplace

Fall Response

- Keep your wrists, elbows and knees bent
- Do not try to break the fall with your hands or elbows
- It is better to land on your arm than on your head
- It is better to land on your buttocks than on your back

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Materials Handling and Storage

Handling and storing materials includes activities like hoisting materials with a crane, driving a truck with a load of bricks, and manually carrying bags.

Potential Hazards

Improper handling and storage of materials can cause costly injuries. Some factors that contribute to back injuries are:

- The weight and bulkiness of objects being lifted
- Body movement, especially bending, followed by twisting and turning

In addition, workers can be injured by falling objects, improperly stacked materials and various types of equipment.

When manually moving materials, be aware of potential injuries such as strains and sprains, fractures and bruises, and cuts and lacerations. Many injuries can result from improperly handling and storing materials. Examine your workplace to detect any unsafe or unhealthy conditions, practices or equipment and take the necessary steps to correct them.

Moving and Handling Materials

Seek help when:

- You cannot properly grasp or lift the load
- You cannot see around or over the load
- You cannot safely handle the load

Don't release the load until you remove your hands from under it. Blocking materials should be large and strong to support the load. Attach and use handles or holders to reduce finger pinching or smashing. Use personal protective equipment (PPE), including eye protection; hand, arm and foot protection; and steel-toe safety shoes or boots.

Mechanically Moving Materials

When mechanically moving materials, avoid overloading equipment. The rated capacity should be displayed on each piece of equipment. Also keep these practices in mind for powered industrial trucks:

- Center the load on the forks
- The load should be as close to the mast as possible
- Place the load at the lowest position for traveling

Storing Materials

- **Lumber**: Remove nails before stacking
- **Bricks**: Stacks should be no more than 7 feet (2 meters) high
- **Masonry blocks**: Taper back half block for each tier above the 6-foot (1.8-meter) level
- **Bags and bundles**: Stack in interlocking rows to remain secure
- **Baled paper and rags**: Store inside a building no closer than 18 inches (45 centimeters) from any walls, partitions or sprinkler heads
- **Drums, barrels and kegs**: Stack symmetrically
    - For stacks two or more tiers high, chock the bottom tier on each side

When stacking:

- Consider the need for availability of the material
- Use shelves or bins, as needed

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- Stack and block cylindrical materials, unless in racks
- Avoid stacking pipes and bars in racks that face main aisles
- Maximum stacking heights can vary based on fire protection sprinkler coverage

Conveyors

Conveyors present specific hazards:

- Hands and fingers may be caught in nip points at conveyor rollers
- You may be struck by material falling off the conveyor
- Limbs or clothing may become caught on or in the conveyor

Use the emergency button or pull cord to stop the conveyor. Clear any stoppages before restarting a conveyor. Where a conveyor passes over work areas or aisles, guards should keep employees from being struck by falling material. NEVER ride on a materials-handling conveyor. Screw conveyors should be completely covered except at loading and discharging points.

Cranes

Only thoroughly trained persons should operate cranes. Operators need to know what they are lifting and what it weighs. In addition:

- Always check the crane's load chart
- Plan lifts before starting
- Take additional precautions and exercise extra care when operating around power lines
- Some mobile cranes cannot operate with outriggers in the traveling position
- Outriggers should rest on firm ground or be sufficiently cribbed to spread the weight of the crane and the load over a large enough area
- Hoisting chains and ropes should:
    - Always be free of kinks or twists
    - Never be wrapped around a load (instead, put rigging on the load and connect to the rigging)
- Attach loads to the load hook by slings, fixtures and other devices that have the capacity to support the load
    - Sharp edges of loads should be padded to prevent cutting slings
    - Maintain proper sling angles so slings are not loaded in excess of their capacity
- All cranes must be inspected frequently by persons familiar with the crane

Slings

- When working with slings, employers should ensure that they are visually inspected before use and during operation, especially if used under heavy stress
- Do not shorten slings with knots, bolts or other makeshift devices
- Do not use sling legs if they are kinked
- Do not load slings beyond their rated capacity
- Suspended loads must be kept clear of all obstructions

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Safety and Health

Ergonomics is the study of work and is based on the principle that the job should be adapted to fit the person, rather than forcing the person to fit the job. Ergonomics ensures that the design and function of tools, equipment and tasks fit the employee's physical requirements and safeguard their health and well-being. Workers must lift as safely as possible when materials cannot be lifted mechanically.

Ergonomic principles for materials handling and storage include:

- Reducing the size or weight of the objects lifted
- Installing a mechanical lifting aid
- Changing the height of a pallet or shelf

Provide sufficient clearance for mechanically-moved materials in **aisles and passageways**, at loading docks, doorways and where turns are made. Sufficient clearance will prevent workers from being pinned and prevent the load from striking an obstruction and falling on an employee.

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Preventing Back Injury

The back protects the spinal cord nerves and anchors the legs, hips, ribs, arms and head. When there are back problems, these connected areas can be affected as well. The opposite is also true; issues with connected parts can stress the back

How the Back Works

- **Spinal nerves** carry motor, sensory and autonomic signals between the spinal cord and the body
- The **spinal cord** extends from the brain. It has three major functions:
    - Transporting motor information
    - Conducting sensory information
    - Coordinating certain reflexes
- The spine has interlocking bones called **vertebrae** that are held together by the muscles of the back and abdomen, often called core muscles
- Vertebrae are separated by **discs**, which act as cushions

Types of Injuries

Common injuries include:

- Strain and fatigue
- Fractured vertebrae
- Spinal cord nerve injury
- Pressure on nerves
- Tears in discs
- Disc fractures and ruptures
- Weakness

Risk Factors

Conditions that can increase the chance of an injury:

- Aging
- Poor physical fitness
- Body weight
- Strength
- Flexibility
- Physical stress
- Bad posture

Aging

- Degeneration of the spine
- Inappropriate alignment
- Loss of strength

Physical Condition

- Strong and flexible muscles and joints reduce your risk of injury
- Weak ligaments and muscles may cause discs to be susceptible to injury
- Strong core muscles will add extra support when handling objects
- Excess body weight puts extra strain on your back
- Excess body weight can cause damage because the back operates on a 10:1 ratio

Physical Stress

- Unwanted physical strain or pressure put on the body
- Stress may keep our muscles in a state of tension or contraction
- Stressed muscles are more susceptible to strains, sprains and spasms

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Bad Posture

Posture is the balance and alignment of your body.

- “S” or curved shape is the natural position of the spine
- Improper posture leads to musculoskeletal problems

Causes of Injuries

Identifying and understanding the following causes can be your best defense in preventing injury.

Overexertion

- You overexert your back when you strain or fatigue it
- Overexertion can compromise posture, lifting technique and balance - all of which can lead to injuries
- Limits for overexertion depend on the individual's risk factors
- Signs of overexertion include spasms and pain
- Don't ignore the physical limitations of the body

Improper Lifting

- Bending over
  - Using only your back muscles strains the back
- Unnatural body position, like reaching above shoulder height
  - Causes tension and overexertion
- Twisting
- Holding objects away from the body's center
- As the object moves farther from the body, the applied weight of the object and necessary exertion increase

Poor Environmental Conditions

Environmental conditions are the physical surroundings and situations. Potential hazards include:

- Path of travel
  - Wet floors
  - Uneven surfaces
- Arrangement of workplace
  - Reaching above shoulders or below knees increases risk of injury

Prevention

The following can prevent a back injury from occurring.

Proper Lifting Techniques

1. Assess the situation: What are you lifting and from where? Is your path clear? Are you ready? 2. Test the weight of the object; if it’s too heavy, get help or use a mechanical device
3. Bend your knees. Get a good grip. Tighten the muscles in your arms, legs and abdomen.
4. Look straight ahead. Hug the object. Turn with your feet; don’t twist at the waist.

When you lift bagged items, crouch over them with one leg braced and another kneeling. Lean the bag onto the kneeling leg, then slide it up to the braced leg. As you stand, keep the bag close to your body.

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Carrying

When you carry items:

- Wear appropriate gloves (gloves with rubber dots may improve grip while loose/thick gloves may make it hard to grip)
- Use handles, grips and handholds, if they are available
- If you use one hand, alternate between left and right
- Pad your shoulders if you carry loads on them

Proper Equipment

- Adjust your workplace (follow principles of good ergonomics)
- Wear comfortable shoes with slip-resistant heels and soles
- Use mechanical aids when lifting heavy or bulky objects
- Get help from a co-worker

Personal Prevention Strategies

- Maintain good posture
  - Don't slump, slouch or hunch over
- Outside work:
  - Exercise
- Sleeping:
  - Use a firm mattress
  - If you sleep on your side, keep knees slightly bent with a pillow between them
  - If you sleep on your back, keep a pillow under your knees
  - Avoid sleeping on your stomach with your head resting on a stack of pillows
- Reduce stress
- Know the facts about back injuries
  - Injuries are cumulative
  - Don't ignore minor back pain

Before you work and throughout your day, make time to stretch to reduce muscle fatigue and maintain flexibility.

NOTE: Stretching should provide muscle relief. If you feel more than a brief twinge of discomfort, or if you feel numbness or tingling, you may have an injury. Do not force movement. Instead, stop and consult a physician.

Strengthening the Back

- Exercises that stretch and strengthen the muscles of your spine can help prevent back problems
- If your back and abdominal muscles are strong, you can maintain good posture and keep your spine in its correct, most natural position
- Do exercises even if you've worked a long day

Injury Response

Most minor strains will go away in time if you stay limber and active. If you suffer an injury or if your back pain includes numbness or tingling anywhere on your body, you should see a medical professional.

Remember to:

- Report the injury to your supervisor immediately
- Follow workplace policies regarding medical care and/or treatment
- Follow medical advice about medications, treatment and physical activities

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Lifting Technique Checklist

Ask a supervisor or co-worker to observe your lifting technique to identify what you are doing right and what you can improve upon using the checklist below.

IMPORTANT: These lifting techniques are only for lightweight loads that can easily fit between your knees. Ideally, you should lift from a position higher than the floor.

Boxed Items

Yes	No	Observation
☐	☐	Pre-lift stretching complete
☐	☐	Bent the knees, not the back
☐	☐	Tested the load before lifting
☐	☐	Good grip
☐	☐	Lifted close to the body
☐	☐	Pushed up with legs
☐	☐	Stood, keeping the bag close to the body
☐	☐	Looked straight ahead while moving
☐	☐	Turned with feet, not waist

Bagged Items

Yes	No	
☐	☐	Pre-lift stretching complete
☐	☐	Crouched over the bag with one leg braced and another kneeling
☐	☐	Tested the load before lifting
☐	☐	Good grip
☐	☐	Slid the bag onto kneeling leg and then over to the braced leg
☐	☐	Stood, keeping the bag close to the body
☐	☐	Looked straight ahead while moving
☐	☐	Turned with feet, not waist

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Comments

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Preventing Cuts and Puncture Wounds

A cut, also known as a laceration, is an injury that results in a break or opening in the skin. A puncture wound is a forceful injury caused by a pointed object that penetrates the skin.

Cuts and punctures can:

- Damage organs, nerves, blood vessels, muscles, tendons, ligaments, bones or joints
- Increase the risk of infection
- Result in exposure to bloodborne pathogens for the victim and for others

Machine Tools

Machine tool hazards exist primarily at the point of operation. This is where body parts can come into contact with the moving parts of the machine or be exposed to debris, such as chips or splinters from turning and boring operations. When working around machine tools, make sure all guards are in place and adjusted properly. Any pinch points created by chains and sprockets or belts and pulleys should be guarded.

Another hazard associated with machine tools is handling the parts and by-products of the machining operation. Turnings and metal shavings, also called metal hay or chips, are by-products of the machining process and can cause severe cuts and puncture wounds. **NEVER USE YOUR BARE HANDS TO HANDLE METAL HAY OR TURNINGS.** Wear gloves that are cut-resistant and are woven in a manner that protects your skin from punctures. Whenever possible, use devices such as a hook or pliers**,** to remove turnings or metal hay.

Powered Hand Tools

Do not operate powered hand tools unless you are familiar with their use and associated risks. When using powered hand tools, always:

- Ensure the guards and safety devices are in place and working properly
- Operate according to the manufacturer’s specifications
- Keep your body clear of the point of operation

Extreme care and caution must be exercised when using pneumatic tools that shoot fasteners. These tools are capable of firing a projectile, much like a bullet from a firearm. The pressure setting of the gun must not exceed what's needed for the density and thickness of the material being nailed, otherwise the fastener can shoot through. Powered tools should only discharge a nail or staple when in contact with a solid object.

Hand Tools

Most hand tool injuries are caused by improper use, damaged tools or not using personal protective equipment (PPE).

To reduce your risk potential when using a **knife**, utility knife or box cutter, you should:

- Ensure the blade is loaded properly and the knife is assembled correctly
- Expose just one segment of snap-off knife blades to prevent breakage
- Keep your thumb off of the blade while making the cut
- Keep body parts out of the line of the cut by cutting away from your body
- Replace or sharpen blades whenever they become dull or start to tear rather than cut

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- Make several passes when cutting thick material rather than attempting to cut the material with one heavy cut
- Retract blades and re-sheath knives after use

To reduce your risk potential when using a **hand saw**, you should:

- Use a holding device to secure the material to be cut
- Keep your hand and body parts clear of the blade
- Cut using strong, steady strokes
- Maintain a balanced, stable position
- Wear eye protection

To reduce your risk potential when using a **screwdriver**, you should:

- Position your hands to avoid injury if the screwdriver slips
- Use a holding device to secure the part, if possible
- Never use a screwdriver for prying, punching, chiseling or scraping

Hazardous Objects

Objects such as screws, nails, splinters, construction debris and broken glass often have sharp edges and pointed ends that pose a cut or puncture risk.

- **Wooden crates:** always use PPE and the proper tools, use a crowbar or similar tool to safely pry the boards apart, and never place fingers in areas where there is a risk of pinch points
- **Boards with splinters:** wear the proper gloves to avoid a possible puncture wound
- **Materials with exposed fasteners:** take the time to remove the fasteners or bend them over to eliminate the hazard and discard the waste in a safe location
- **Construction materials:** make sure you wear the proper PPE and be extremely cautious of splinters, protruding fasteners and sharp edges
- **Broken glass:** use a broom to sweep the glass pieces into a dustpan, wear hand protection when picking up pieces, and place the pieces in a protective container or wrapping with cardboard before depositing into a waste receptacle

Wire Rope and Metal Banding

Never use your bare hand to check wire rope or cables for frayed strands. Gently pull a rag or paper towel down the wire.

- Wear gloves when banding and when disposing of banding material
- Use the correct tools to cut the bands and keep your body off to the side and out of the recoil path of the banding
- Cut straight across the band to avoid creating a sharp point
- Consider plastic banding as a replacement for steel banding material

Safe Practices

Be alert to potential hazards before an accident happens. Perform a quick risk assessment and take steps to eliminate or minimize risks.

- Recognize unguarded pinch points
- Use the right tool for the job, the right way every time
- Inspect tools and equipment to confirm good operating condition
- Follow lockout procedures before repairing or cleaning machinery
- Follow all safety precautions even if you are in a hurry
- Use the appropriate personal protective equipment (PPE)

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Injury Response

Should a minor injury occur, here are some simple steps to follow until your injury can be evaluated:

- First, check to see if the object that caused the wound is intact. If a piece is missing, it may be stuck in the wound
- Then, wash the wound with soap and water to prevent infection
- Allow the wound to bleed freely, unless the bleeding is too heavy to stop on its own. If this is the case, apply pressure until the bleeding stops
- Apply antibacterial ointment and cover the wound with a bandage
- Monitor a healing wound for increasing redness, warmth, tenderness and swelling that might indicate the presence of an infection; seek medical attention early if you might have an infection
- Report all cuts and punctures, no matter how minor, to your employer

Whenever you receive a cut or puncture wound, you need to get a tetanus shot as soon as possible if your tetanus shots are not up-to-date. You need to have had a tetanus shot within the last 5 years if your wound has been contaminated by dirt. Otherwise, you need to have had a tetanus shot within the last 10 years.

For serious injuries, seconds count, so be sure to know how to summon medical assistance, including emergency phone numbers. Remain calm and be prepared to provide emergency responders with information such as your location and the nature of the injury. Only properly trained personnel should provide first aid.

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Culture of Early Reporting

Value of Early Reporting

Early reporting:

- Makes it easier to identify and address problems before they are problems
- Draws attention to process improvement opportunities
- Increases hazard recognition, vigilance and preparedness
- Enables continuous and systematic learning (more data to analyze)
- Improves productivity
- Reduces time and revenue lost due to incidents
- Helps create a proactive culture of safety

Challenges of Early Reporting

EMPLOYEES may perceive early reporting as something that is:

- Not part of their job
- Risky
- Futile
- Difficult or time-consuming
- Discouraging without knowing what to look for
- Less important than production

From a MANAGEMENT viewpoint, early reporting can be dwarfed by competing priorities.

Strategies to Encourage Early Reporting

Promote the Value of Early Reporting

Promote the value of early reporting by:

- Reviewing corrective and preventive actions to improve work systems
- Promoting information sharing
- Crediting those involved in identifying, reporting and acting upon issues

Create a Culture of Early Reporting

A culture of safety includes:

- Communication
- Learning
- Feedback
- Buy-in
- Teamwork
- Well-qualified, passionate staff
- Positive perception of safety
- High expectations
- Accountability for corrective actions and clear hand-off procedures
- Transparency about safety incidents

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Managers/supervisors should:

- Never take the obvious for granted
    - Make sure employees know you have a reporting system
- Make sure employees are never “too busy” to report
    - Make reporting part of the routine/process/job
    - Schedule time for safety
- Demonstrate the value of early reporting
    - Engage employees in devising and implementing corrective actions
    - Communicate when and how problems were solved

Encourage Reporting

Frontline EMPLOYEES are more likely to report when their supervisors:

- Treat them as subject matter experts
- Take their suggestions seriously
- View safety as a critical priority
- Conduct safety briefings
- Frequently encourage reporting

Frontline SUPERVISORS are more likely to report to senior managers who:

- View safety as a priority
- Review safety data frequently
- Assign responsibility for the reporting system to a direct report

Convert Reporting to Learning

Increased reporting results in learning ONLY when it is part of a systematic approach.

For reporting to result in learning:

- A culture of safety has to exist
- Safety and learning must be infused into daily activities and routines

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Incident Investigation Awareness

By understanding what incident investigation and causal analysis are and how you can help, you can prevent accidents and make a safer workplace – before losses occur.

Incident Management

Begin an investigation as early as possible. After you've been notified of an incident or observation and addressed all medical issues and secured the scene, follow these steps:

1.	Identify losses and gather information.	**Investigative Process**
2.	Analyze reasons for losses and prioritize the risks.	
3.	Plan, assign and schedule corrective actions.	
4.	Track and report corrective action progress.	
5.	Control risks.	
6.	Record and share what you learned during the process.	

Information Gathering

Complete information gathering as soon as possible. If you need to make changes to improve safety, make note of the "before" and "after" conditions.

Some of the ways you may gather information include:

- Documenting
- Interviewing
- Photographing
- Sketching
- Collecting
- Reenacting

Interviews

During interviews:

- Avoid judgment and be humble
- Collect personal accounts
- Choose a convenient time
- Choose a private place near the scene
- State the purpose of the interview
- State how you'll use the information
- Show curiosity, interest and concern
- Focus on listening and learning
- Show and explain your notes
- Close with thanks and next steps

Photos/Sketches

When you take photos and draw sketches:

- Make a visual representation of the scene
- Capture relative positioning of evidence, damages and anything that seems out of place
- Consider witness perspectives/vantage points
- Include size and color references if these details are important
- Take pictures BEFORE you collect evidence

For major incidents, don't delete "bad" photos. If you do so, people may accuse you of trying to prove your opinions are right instead of trying to document the truth.

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Physical Evidence

Physical evidence can be used to test causal theories. After incidents, establish a **chain of custody** and protect and preserve physical evidence from damage and contamination. If you have any questions about what evidence to preserve or document, consult your management or corporate counsel.

Causal Analysis

There are many causal analysis methods. No single method is best for all types of investigations. Regardless of the method you use, it's important to remember that people do not fail; processes do. Asking "**Why?**" is a simple causal analysis approach in which you simply ask why as many times as you need to in order to get to the causal factor.

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