

Hand and Power Tool Safety



Training Objectives

- General Safety
- Hand Tools
- Power Tools
- Hazards and Controls



General Safety



Employees who use hand and power tools face many hazards. Most hazards, such as being struck by flying objects, inhaling harmful particles, and being pinched by moving parts can be avoided through proper work habits.

What you need to know:

- Why hand and power tool safety is important
- Required employer responsibilities
- Basic tool safety rules

Hazardous Conditions and Unsafe Acts

- Broken and defective tools
- Missing guards, exposed belts and blades
- Bad electrical cords
- Misuse of tools
- Mushroomed heads
- Cracked and split handles
- Not using required PPE



Potential Outcomes

- Bruises, sprains and strains
- Struck by projectiles
- Lacerations and amputations
- Entanglement
- Eye and face injuries due to flying objects
- Shocks and electrocutions
- Leading to injury or death







Responsibilities

Employer responsibilities:

- Assuring the safe condition of tools and equipment within the workplace
- Training employees in the proper use and handling of tools and equipment

Employee responsibilities:

- Following established safe practices and procedures
- Immediately communicating any identified hazards

General Tool Safety Rules

- Maintain regularly
- Use the right tool for the job
- Inspect before use
- Operate according to the manufacturer's instructions
- Use the proper personal protective equipment
- Use the guards



Housekeeping

Keep work and walking areas free of clutter to eliminate tripping hazards before accidents occur.

- Store tools away from walkways, where they will not obstruct or trip employees.
- Put away tools and equipment when not in use.
- Dispose of the debris in a timely manner.
- Keep aisles, stairways, and doorways unobstructed.



Inspection and Maintenance

- Perform regular maintenance.
 - Keep all tools clean.
 - Keep sharp tools sharp.
- Inspect the tool and perform tests daily and prior to use to verify that all safety measures are working properly.





Hand Tools



Hand tools are powered manually. They include a wide variety, from screwdrivers to pliers and axes to wrenches. Mindful operation, inspection, and maintenance of your hand tools will prevent common injuries..

What you need to know:

- Hand tool hazards
- Utility knife safety
- Proper housekeeping

Hand Tool Hazards

Most hand tool hazards result from improper maintenance or use.



- Never use hand tools for any purpose other than what they were designed for, e.g., using a chisel as a screwdriver.
- Never use tools that show signs of excessive wear. For example:
 - Wrenches with sprung jaws
 - Impact tools with mushroomed heads
 - Tools with loose, cracked, or splintered handles
 - Tools with taped handles, as the tape may conceal cracks



Hand Tool Hazards

Sparks:

Metal hand tools may produce sparks that can ignite flammable substances.

When working around flammable hazards, use spark-resistant tools made of non-ferrous materials.

Sharp edges:

When using sharp tools, such as saw blades or knives:

- Direct movement away from people and walkways.
- Never use dull tools. They are more difficult to control and require more force, so they cause more injuries than sharp ones.



Striking Tools

Hammers:

- Strike blow squarely
- Never strike with the side of the hammer
- Never strike another hammer
- Always wear safety goggles when hammering
- Striking chisels, punches, wedges, etc. = Bigger Hammer Face

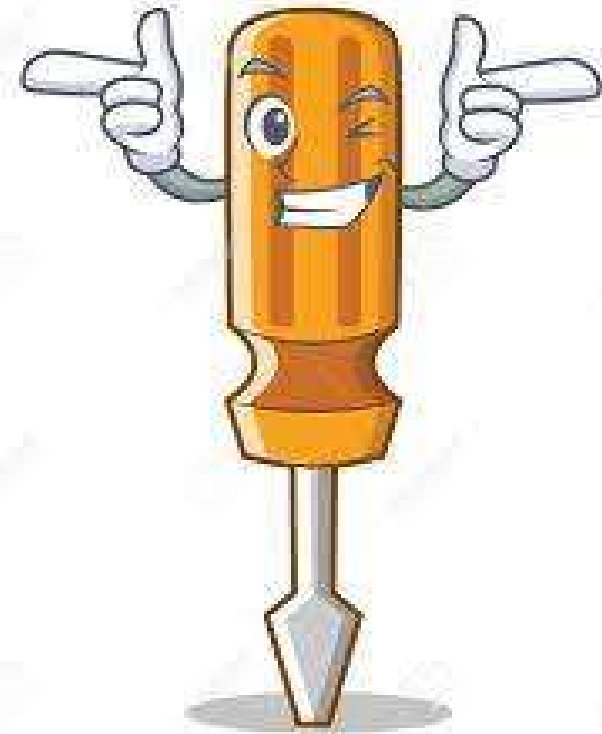
Axes and hatchets are meant to strike wood. They should never be struck against metal, stone, or concrete.



Screwdrivers

Screwdrivers:

- Use a tool belt or box
- Pointed ends aiming downward
- Pass them handle-first
- Personal protective equipment
- Secure the work
- Screwdriver for electrical work





Power Tools

Improper use of power tools lead to approximately 400,000 emergency room visits each year. Powered by electricity, air pressure, fuel, or even gunpowder, these tools require extreme caution to operate.

What you need to know:

- Electrical hazards
- Best practices
- Power tool types
- Associated hazards

General Precautions

- Disconnect tools when not in use, before servicing and cleaning, and when changing accessories.
- Follow your lockout/tagout program.
- When possible, secure work with clamps or a vise, freeing both hands to operate the tool.
- Do not hold the switch button while carrying a plugged-in tool.



- Never remove equipment guards without proper authorization.
- Be sure the power tool is off and has stopped rotating before putting it down.
- Do not use compressed air for cleaning unless the pressure is reduced to less than 30 psi.

General Precautions



Electrical Tools

Electrical hazards:

- Power tools can present serious electrical hazards, including shocks, burns, and heart failure.
- It only takes a small amount of electric current to cause heart fibrillation or even death.



Electrical Cord Precautions

- Assure that power cords are properly laid out or secured to prevent tripping hazards.
- Do not use power cords to carry tools or to hoist or lower tools.
- Do not disconnect tools by pulling on the cords or hoses.
- Keep cords and hoses clear from hazards such as heat, oil, and sharp edges.
- Always inspect the cord for damages before use

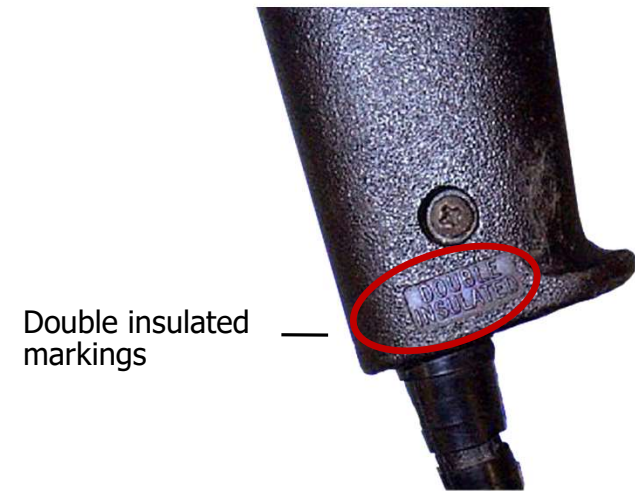


- Use double-insulated, three-wire cords that have a grounding pin.
- Use tools with low-voltage isolation transformers.
- An Assured Grounding Program is strongly advised.



— Plug with a grounding pin

Grounding Best Practices



Double insulated markings —



Electricity and Water is a Dangerous Combination!



Electrical Tools Guidelines

- Only use electric tools within their manufacturer-specified design limits.
- Keep work areas well lit and dry, unless the tool is approved for working in wet conditions.
- When not in use, make sure that tools are stored in a dry place.
- Use appropriate PPE to protect from flying or falling debris. This includes:
 - Gloves, except where they would present a pull-in hazard
 - Safety shoes.

Hand grinders and other portable grinding tools

- **Install safety guards:** Prevent the operator from encountering the wheel surface and from flying debris if the wheel breaks.
- **Hold hand grinders during operation:**
 - Never place a hand grinder in a vise for operation.
 - Always use eye or face protection.
 - Turn off the power when not in use.
 - Never clamp a hand-held grinder in a vise.



Abrasive wheels are hazardous because they can create **flying debris** while grinding, cutting, and polishing materials.

Guards must:

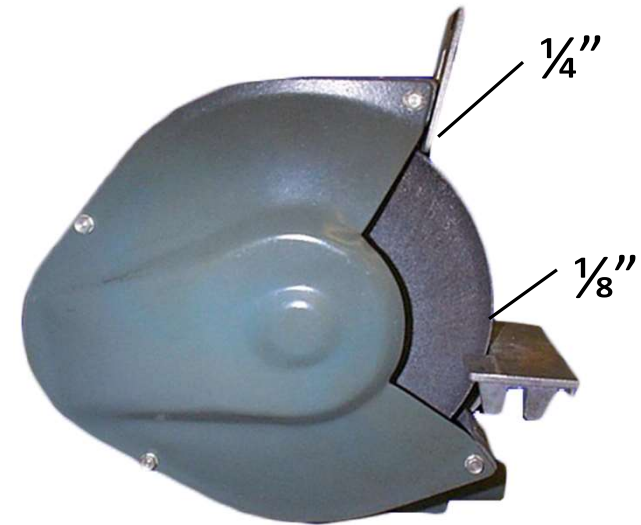
- Protect the user from foreign objects.
- Maintain proper alignment with the wheel.
- Only expose a minimal amount of the wheel.

Abrasive wheel guards



Abrasive Wheel Measurements

- There should be $\frac{1}{4}$ " of space between the top guard and the grinding wheel.
- Work rests should be $\frac{1}{8}$ " or less from the wheel's surface. This prevents work from getting jammed between the wheel and the rest.



Abrasive wheel Inspection

- Closely inspect abrasive wheels for damage prior to use.
- Use the ring test to assure that the wheel is free from cracks or other defects:
 - Gently tap the wheel with a light, non-metallic instrument.
 - If the wheel sounds dead or cracked, do not use it, as it may not be structurally sound.



Abrasive wheel operation

- Stand to the side of the wheel as it reaches the proper speed.
- Allow the wheel to reach the proper speed before starting on your grind or cut.
- Do not grind with the side of the wheel.
- Do not adjust the wheel or the rest while the wheel is rotating.
- Install the wheel properly, not distorting the flange.



Do not exceed the maximum spindle speed indicated on the wheel.

Hand drills

- Be aware of the drill's voltage. If the torque is high, such as 24-volt, you must hold the drill securely with both hands.
- Hold the drill in a comfortable position.
- For awkward positions, use a lower voltage drill, such as 18-volt or less.



- Use appropriate PPE, including safety glasses or goggles and hearing protection.
- Do not wear loose clothing or jewelry.
- Secure work with a clamp or drill vise to keep it from being spun by the bit.

Drill presses



Pneumatic tools are powered by compressed air. Examples include nail guns, jack hammers, and sanders.

Dangers associated with pneumatic tools include being struck by moving parts and puncture wounds from flying nails and fasteners.

Pneumatic Tools



Pneumatic Tools Precautions

- Read the manual
- Wear the PPE
- Post Signage
- Set up Screens
- Inspect the tool and hose



**Nail Gun -
Cut-Away View**



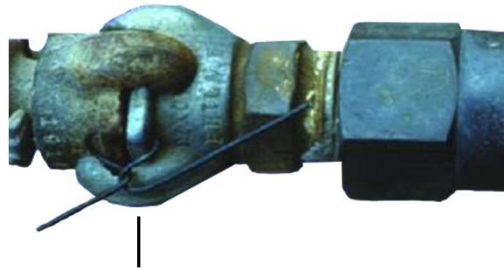
Pneumatic tool safety

- Assure that proper safety devices are in place to prevent fasteners or attachments from ejecting when the muzzle is not in contact with your work surface.
- Keep hands well outside of operating areas.
- Apply the same safety measures to air hoses that you would for electrical cords.



Fasteners for pneumatic tools

- Make sure that the tool is securely fastened to the air hose.
- Use a positive locking device or short wire to keep the hose and tool attached.



The hose and tool are secured by a wire.

Connections for pneumatic tools

Hose fittings are acceptable pneumatic tool connections, but hose clamps are not.



Hose fittings



Hose clamps

Other Pneumatic Tools Precautions

Air nozzles:

If attaching a nozzle to a compressed air line, the air must be reduced to less than 30 p.s.i.

The use of nozzles requires proper PPE (e.g., eye protection).

Pneumatic tools that shoot nails, rivets, staples, or similar fasteners

Airless spray guns

Do not use compressed air for cleaning. Clean your tools, work areas, or surfaces with a brush or vacuum instead.



Liquid Fuel Tools

Fuel-powered tools include concrete cutters and are typically gasoline-powered.

They can emit fuel vapors and exhaust fumes that can ignite, explode, or pose threats to your health or the environment.

Guidelines:

- Prior to refueling, power down the engine and allow it to cool.
- If using a fuel-powered tool in an enclosed area, assure that the area is properly ventilated, or employees are provided with proper respirator devices and hearing protection.
- Make sure fire extinguishers are readily available in the work area.



Store Fuel Properly!



Danger

Hazards and Controls



Improper use of tools can lead to serious injury or death. Nail guns alone cause 37,000 emergency visits a year. Safe work habits and hazard controls, including machine guards and PPE, are essential for your safety.

What you need to know:

- Points of operation
- Motion hazards
- Machine guarding
- Required PPE

Guarding Hazards

The **point of operation** is the place where the work is actually performed on the materials.

Points of operation need to be guarded.

Power transmission devices, such as gears or belts, provide power. If these moving parts are exposed, machine guarding is necessary.



Motion Hazards

Power tools present various motion hazards.

Examples:

- A rotating drill can grab loose material and pull it into the operating mechanism. This is known as a **caught-in hazard** and a **rotation hazard**.
- Tools with two points rotating towards each other or tools with a rotating part converging with a stationary part create **nip points**. A nip point is another type of caught-in hazard, as it can trap body parts or clothes.
- A saw blade creates a **cutting hazard**.



Machine Guarding



Circular saw guard

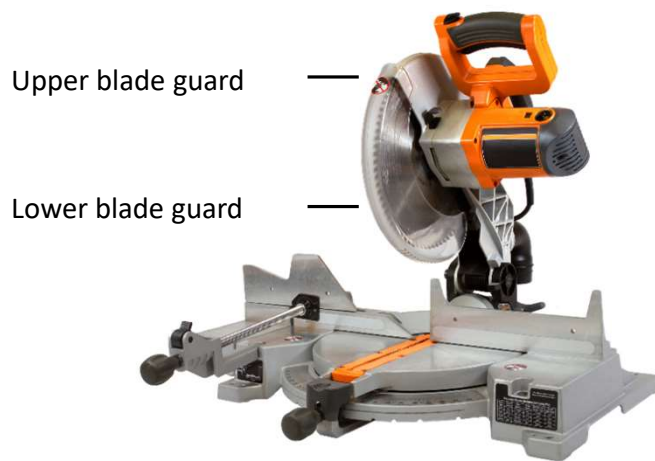
Guards are now standard on most power tools.

- Never remove a guard.
- Never reach into an operating or guarded area of a tool when it is in use.
- Routinely inspect installed guards for defects and check for proper function.
- Guards must be designed by the manufacturer and installed by a qualified person.

Machine Guard Examples

Chop saws:

Upper and lower guards must be installed on chop saws to prevent the operator from coming in contact with the rotating blade.



Portable circular saws:

When using portable circular saws, the guard must cover the full depth of the blade's teeth. Do not tamper with these guards by pinning them open.



Machine Guard Examples

Table saws must have the following guards:

- A hood guard
- A separator
- An anti-kick-back device



Defective Power Tools

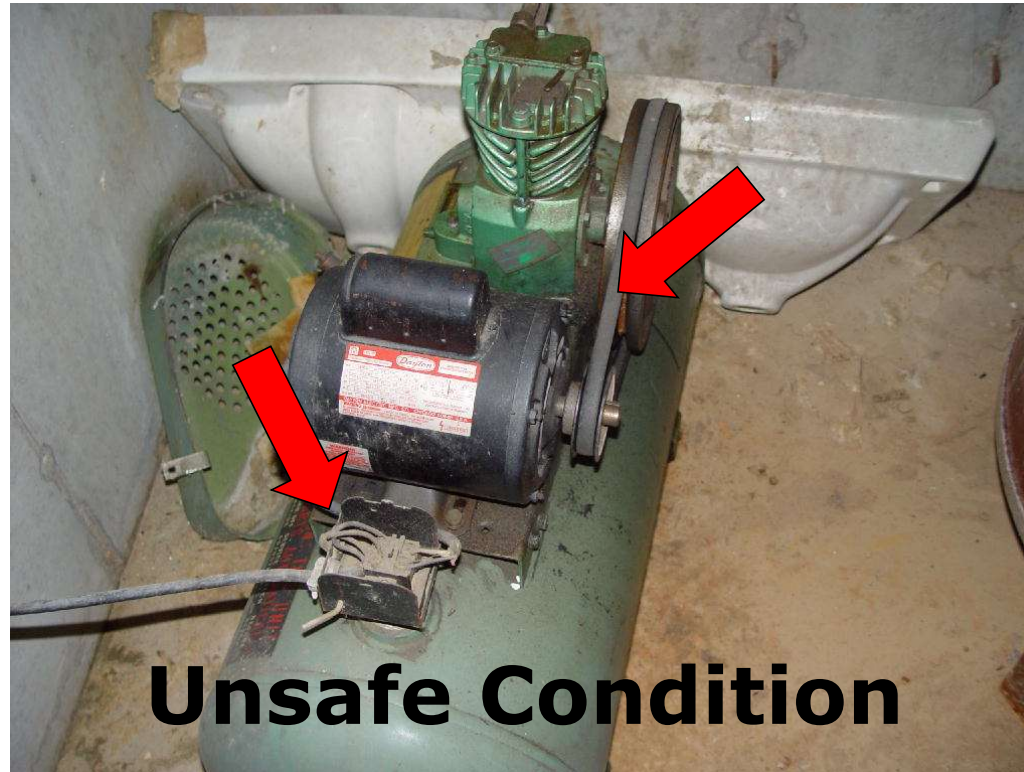
This saw has no blade guard,
and the belt is exposed.



Unsafe Condition

Defective Power Tools

Exposed Belt and Electrical Parts



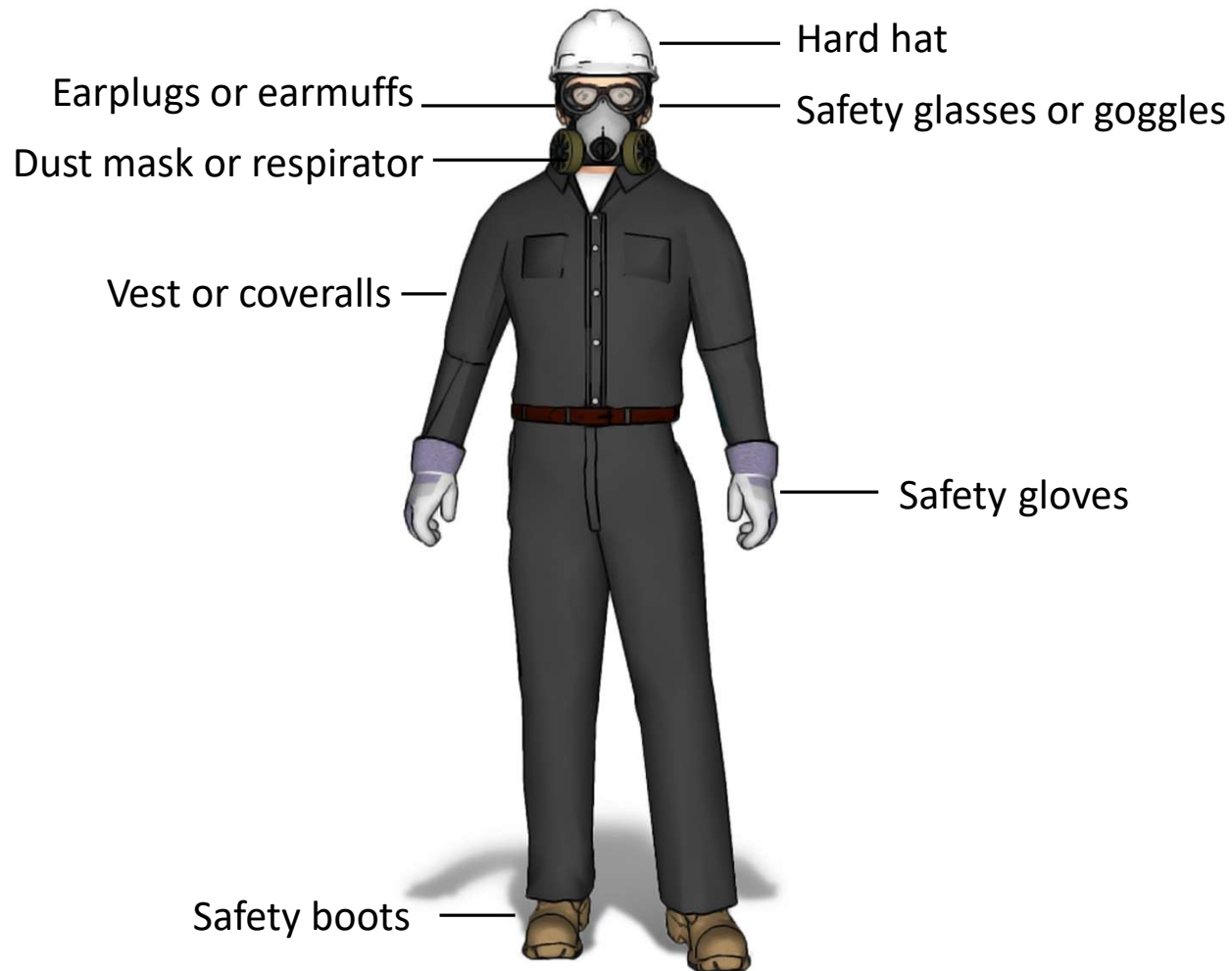
Required PPE

Using PPE also reduces injuries in the workplace. PPE includes eye, face, and other body protection.

- Use appropriate PPE for the tool and task.
- Appropriate PPE may include gloves, safety goggles, ear protection, or a respirator.
- Stay alert for nip point hazards when wearing gloves or PPE with loose or hanging straps or strings.



PPE Examples





Summary

- Most hazards are caused by improper use or maintenance.
- Only use tools after proper training.
- Wear appropriate PPE.
- Perform an inspection of the tool prior to use.
- Verify that points of operation and motion hazards are guarded.
- Always use safe handling and operating practices.
- Keep body parts away from hazardous areas.
- Store and maintain tools properly.