

Portable Power Tools

GENERAL DISCUSSION

Most of us use power tools every day. Generally we don't get hurt. But every year, portable power tools injure almost 70,000 construction workers seriously enough to keep them off the job.

Working with power tools, you can get an electric shock, lose a finger, lose an eye, or go deaf. It's especially dangerous to use a tool that's defective, that's been modified, or that's not designed for the job you're doing. Of course, you can also get injured if you use any tool carelessly. Power tools require training, protective equipment, and your full attention.

You or a crewmember may want to add a personal story about portable power tools. Next, discuss with the crew what power tools are being used at this particular job site:

After each question, give the crew time to suggest possible answers. Use the information following each question to add points that no one mentions.

1. We use many kinds of power tools in construction. They may be air-powered, gasoline-powered, electric, or hydraulic. What do you think are the most common injuries from working with these tools?

- Electric shock.
- Falling (from losing your balance or from electric shock).
- Crushing or losing a finger, toe, arm, or leg.
- Flash burns.
- Eye injury.
- Hearing loss.
- Injury to wrist, arm, shoulder, or back (from vibration or awkward work position).

2. What safety rules should you keep in mind when you use portable power tools?

- Use the right tool for the job. Never use a tool for a job it wasn't designed to do. Make sure you're familiar with your tools and know how to use them properly.
- Keep secure footing and balance when you use tools. The area where you're standing shouldn't be slippery or cluttered.
- Use tools on a stable work surface. Hold the work with a vise or clamps if necessary.
- Use tools in a well-lighted area.
- Don't work with your body in an awkward position. Some tools are poorly designed and force you to work with unnecessary strain on your wrist, arm, shoulder, or back. Use tools with a better design. Also make sure you have enough space to work, and can keep your body at a comfortable angle to the work.
- Don't use powder-actuated tools unless you have a valid operator's card for the specific tool involved. You need special training.

3. How do you make sure your power tools stay in safe condition?

- Keep tools clean. Inspect them every day. Check blades, bits, and other cutting parts prior to each use. Make sure they are sharp, and not worn or cracked. Check chucks, collars, and other tool holding parts to make sure they are in good operating condition. Tag tools and take them out of service if there's a problem.
- Make sure tools have guards on their blades, bits, rollers, chains, gears, sprockets, and other dangerous moving parts.
- Never remove guards. Don't tie them back or modify them either.

4. What can you do to avoid shocks from electric power tools?

- Make sure power tools have a 3-wire cord and are grounded. (Double-insulated tools don't need a ground.)
- Don't remove the third prong (the ground prong) from a plug. If you use an adapter (3-prong plug to 2-hole outlet), make sure it's grounded.
- Check power tools and cords daily for cracks, exposed wire, and breaks in the insulation.
- If a power tool buzzes, report it immediately and have an electrician check it out. Either the wiring or the tool itself may be defective.
- Don't use ordinary household extension cords. Use 3-wire cords intended for heavy duty. Don't run them near water, other liquids, or metal, which can carry current.
- Don't touch any electrical equipment when the equipment is wet, you're wet, you're sweating, or you're standing on a wet surface.

5. What is a GFI grounding system and why is it important?

- A GFI is a ground fault circuit interrupter. It senses ground faults (accidental electrical paths to ground) and cuts off all power in the circuit.
- For example, if there is a short in a power tool, the metal casing can become live. A GFI will cut off power before you can get a serious shock.
- Most 110-120 volt circuits must have GFIs unless the company has an assured equipment grounding conductor program. (This is a program where the company does regular testing of the ground on plugs, outlets, cords, and other electrical equipment. Inspection marks are placed on equipment and records are kept.)

On this site, we use: ____GFIs____Grounding conductor program ____ both

6. Show the two power tools you brought to the meeting, such as a circular saw and jackhammer. Ask "What are the required safety features of these tools?"

Demonstrate the safety features of the tools you have chosen. For example:

Electric circular saw

1. Three-wire plug (with ground)
2. Double-insulated (if applicable)
3. Fixed guard on upper teeth
4. Hinged guard on lower teeth
5. Switch requiring constant contact (spring-loaded trigger, etc.) with hold button
6. Trigger releases with one single motion
7. Blade is in good condition (not cracked or worn) and securely attached

Jackhammer

1. Keeper for the bit
2. Hand guards
3. Switch requiring constant contact (spring-loaded trigger, etc.)
4. Single motion release lock
5. Rubber grips to reduce vibration

Safety features of the particular tools you are demonstrating:

7. With the same two power tools you have just demonstrated, Ask "What kind of personal protective equipment should you use when you work with these tools?"

Most tools:

1. Eye protection (goggles, or safety glasses with side shields)
2. Gloves
3. Foot protection (safety shoes or boots)

Jackhammers:

1. Eye protection (goggles, or safety glasses with side shields)
2. Special gloves that reduce vibration
3. Foot protection (steel covering over whole foot, not just toes)
4. Hearing protection (ear plugs or muffs)

Protective equipment for the particular tools you are demonstrating:

- If you have to use any of the personal protective equipment (PPE) that we've discussed, the company is required to supply it and train you in its use.

(PPE is covered in more detail in a separate Training Guide.)

OSHA Regulations

Explain: OSHA requires most of the safety measures we've talked about. We have to take these precautions; it's the law. I have a Checklist of the OSHA regulations on portable power tools. If you'd like to know more, see me after the meeting.

Company Rules

(Only if applicable.) Besides the OSHA regulations, we have some additional company rules about portable power tools.

Discuss company rules

Comments From the Crew

Ask "Do you have any other concerns about portable power tools? Do you see any problems on our job?"

"What about other jobs you've worked on? Have you had any experience with portable power tools that might help us work safer on this job?"

GENERAL SAFETY REVIEW

This is a time to review all safety concerns, not just today's topic. Keep your notes on this page before, during and after the safety meeting.

Are you aware of any safety hazards from any other crews? Point out any hazards other crews are creating that this crew should know about. Tell the crew what you intend to do about those hazards.

Do we have any other safety business? Discuss any past issues or problems. Report any progress of investigations and action taken.

Have there been any accidents, near misses or complaints? Discuss any accidents, near misses, and complaints that have happened since the last safety meeting. Also recognize the safety contributions made by members of the crew.

Please remember, we want to hear from you about any health and safety issues that come up. If we don't know about problems, we can't take action to fix them.

ENDING THE MEETING

Circulate Sign-Off Form.

Assign one or more crew member(s) to help with next safety meeting.

Refer action items for follow-up.

Do you have any Safety Recommendations?

Do you have any Job Specific Topics you would like us to discuss?

Comments

SAFETY TALK REVIEW

Hazard Identification:

1. The company has a written safety and Health Program that meets all OSHA requirements. It includes identification of hazards on the site involving portable power tools, as well as regular inspections, accident investigation, and correction of hazardous conditions.
2. All hazards from portable power tools have been identified.
3. Types of portable power tools used on site:
 - Electrical
 - Pneumatic (air)
 - Gasoline-powered
 - Power-actuated
 - Hydraulic

Selection:

1. The right tool is used for the job; tools are used within their design limitation.

2. Tools are used only for their intended purpose.
3. Tools can be used without the hand or wrist in an awkward position.
4. Tools are well-balanced.
5. Tools fit the hand comfortably.
6. Tools are not so heavy that they strain the arm and shoulder.
7. Tool handles are designed to minimize the grip force needed. (For example, they are not slippery).
8. Handles have soft grips that don't cut into your hand.

Inspection:

1. Tools are inspected daily before use and are kept clean and in good repair.
2. Blades, bits, and other cutting parts are inspected prior to each use, are kept sharp, and are replaced if worn or cracked.
3. Chucks, collars, and other tool holding parts are in good operating condition.
4. Damaged, defective, or worn tools are tagged and removed from service until repaired.

Work Practices:

1. Workers use only tools with which they have experience, or on which they have been trained.
2. Tools are used only on secure and stable work surfaces. Work is secured with a vise or clamps, if necessary.
3. Workers using tools stand on a clean, dry surface to prevent slipping.
4. Work areas are well lighted.
5. Workers' bodies are not forced into awkward positions when using tools.
6. Air hoses and electric cables used in elevated locations are securely fastened to a substantial anchorage at or near the working level. They are fastened no more than 15 feet from the working end.

Guarding:

1. Proper guards are in place and not altered.
2. All of the following parts are guarded:
 - Gears, sprockets, and sprocket chain drives
 - Belt and pulley drives
 - Hazardous revolving or reciprocating parts
 - Pulleys and drums
 - Exposed shafts
 - Projecting shaft ends

- Collars, clutches, and couplings

Switches and Controls:

1. Operating controls on all handheld power tools are located to minimize the possibility of accidental operation.
2. The following handheld power tools are equipped with a constant pressure switch or control that will shut off the power when the pressure is released:
 - Circular saws with blade diameters over 2 inches
 - Chain saws (electric, hydraulic, pneumatic, or gasoline)
 - Percussion tools
3. The following handheld power tools are equipped with a constant pressure switch or control that will shut off the power when the pressure is released, but they may have a lock-on control provided it can be turned off by a single motion:
 - Drills
 - Tapers
 - Fastener drivers (e.g. staplers, mailers)
 - Grinders with wheel diameters over 2 inches
 - Disc sanders with disc diameters over 2 inches
 - Belt sanders
 - Reciprocating, saber, scroll, and jig saws with blade shanks greater than nominal 1/4 inch

Personal Protective Equipment:

1. If necessary, personal protective equipment (PPE) is provided by the company and worn by workers. The types used are appropriate for the work and give adequate protection.
2. Workers using tools always wear safety glasses with side shields or other eye/face protection. Eye and face protection meets the requirements of *American National Standards Institute (ANSI) Z 87.1 1989 , American National Standard Practice for Occupational and Educational Eye and Face Protection.*
3. When work involves potential risk of cuts, burns, harmful physical or chemical agents, or radioactive material, workers use appropriate hand protection, including vibration-damping gloves when they use vibrating tools. (Exception: Not required if gloves might become caught in moving parts or machinery).
4. If gloves are used, tools can still be gripped easily.
5. Workers exposed to foot injuries from crushing or penetrating actions, hot surfaces, falling objects, falling objects, or hazardous substances, or who are required to work in abnormally wet locations, use appropriate foot

- protection such as steel-toed safety shoes and/or boots. (For jackhammers, workers wear steel covering over the whole foot, not just the toes).
6. Workers exposed to noise in excess of 90 dB use hearing protection.

Electrical Tools:

Grounding is assured through either a ground fault circuit interrupter (GFI) system or assured equipment grounding conductor program.

This site uses:

1. GFIs
2. Grounding conductor program
3. Both
 - (If GFI:) Approved GFI devices are present on all 120-volt, AC, single-phase, 15- and 20-ampere outlets which are not part of permanent building wiring.
 - (If grounding conductor program:) The program is in writing and covers all 120-volt, AC, single-phase cord sets, plugs, and receptacles, which are not part of permanent building wiring. The program includes daily visual inspection, regular testing, ID markings placed on the equipment, and record keeping.
4. All electrical tools are grounded or double insulated.
5. Earth returns are not used for grounding.
6. Every receptacle is grounded.
7. Electrical cords are protected from damage by vehicles, etc.
8. Electrical cords are regularly checked for fraying.
9. Electrical tools are not used in wet areas, or in areas where flammable vapors may be present, unless specifically designed for that purpose.
10. Electrical tools are not hoisted or lowered by their cords.

Pneumatic Tools:

1. Air hose connections are checked to make sure they are secured properly.
2. Compressed air over 10 psi is never used to blow dirt, chips, or dust from clothing while it is being worn.
3. All pneumatic impact tools have safety clips or retainers so dies and tools won't be accidentally expelled from the barrel.
4. Pneumatic nailers and staplers are disconnected at the tool from the air supply when not in use.

5. Hoses over 1/2' inside diameter have safety devices at the supply source, or branch lines to reduce pressure in case of hose failure.
6. Operators using pneumatically driven nailers and staplers on steep roofs (1/3 pitch or greater) always wear a securely fastened safety belt and lanyard.
7. On roofs of 1/4 pitch or greater, the air hose for a pneumatic nailer or stapler is secured at roof level to provide ample, but not excessive, amounts of hose.
8. Pneumatic tools are not hoisted or lowered by their hoses.
9. On portable compressors:
 - Wheels are fixed, locked, or blocked to prevent rolling.
 - Fans are guarded with a shroud or side screens.
 - Air tanks are drained of liquid according to the manufacturer's specifications.
 - Air tanks comply with Article 3 of the Unfired Pressure Vessel Safety Orders.

Gasoline Powered Tools:

1. Gasoline is stored in approved containers or portable tanks per Department of Transportation (DOT) regulations.
2. Fire extinguishers of the correct type are available where gasoline is stored. An additional extinguisher is located outside of the room or immediate area where the gasoline is stored.
3. When tools are filled, or when gasoline is transferred between containers, proper grounding and bonding procedures are used.

Powder-Actuated Tools:

Since only trained workers with certification may use powder-actuated tools, the following is only a summary of a few requirements designed to protect other workers nearby. Many other requirements apply to tool operators.

1. Only trained workers holding a valid operator's card for the specific tool involved use powder-actuated tools.
2. All powder-actuated tools comply with *American National Standards Institute (ANSI) A 10.3 1977, Safety Requirements for Powder-Actuated Fastening Systems*.
3. Tool containers are lockable, and have the required warning labels on the inside and outside of the container.
4. Loaded powder-actuated tools are not left unattended.
5. Powder-actuated tools are operated in accordance with the manufacturer's instructions.

6. Powder-actuated tools are not loaded until ready for use. They are unloaded immediately if work is interrupted.
7. Powder-actuated tools are never pointed at any person, whether the tool is loaded or unloaded. Hands and feet are kept clear of the open barrel end.
8. On misfire, the tool is held in place for 30 seconds.
9. Warning signs are conspicuously posted within 50 feet of the area where powder-actuated tools are being used, and are removed promptly when no longer applicable.

Jackhammers:

1. All bolts are checked regularly to be sure they haven't loosened.
2. Drills are kept sharp.
3. Chuck bushings and hammers are in good condition.
4. Jackhammers have recommended safety equipment including:
 - A locking mechanism on the drill bit.
 - An instant trigger control and automatic release.
 - A hand guard extending from the handle to the body of the tool.

Circular Saws:

1. The upper half of the saw blade is permanently guarded.
2. The lower half of the saw blade is guarded with a telescope or hinged guard.
3. Guards are not blocked open to prevent functioning.

Gasoline Power Saws:

1. There is a control that returns to idle when released.
2. The clutch is adjusted to prevent the chain drive from engaging at idle speed.
3. The operator is positioned properly to avoid injury in case of "kick back".
4. The engine is stopped when the saw is carried over 100 feet, or when it is being cleaned, refueled, adjusted, or repaired.

Grinders and Abrasive Wheels:

1. Excessively worn grinding disks are discarded and replaced.
2. Abrasive wheels have hoods or guards to protect workers from flying fragments of a bursting wheel.

3. There are guards on the spindle end and on nut and flange projections. They are mounted to maintain proper alignment with the wheel. The strength of the fastenings exceeds the strength of the guard.
4. Wheels are inspected before mounting, and the spindle speed is checked to make sure that it doesn't exceed the rating marked on the wheel.
5. Wheels fit freely on the spindles and remain free under all grinding conditions.
6. All contact surfaces of wheels, blotters, and flanges are flat and free of foreign matter.
7. If there is a bushing in the wheel hole, it doesn't exceed the width of the wheel, and it doesn't contact the flanges.