

# Hand and Power Tool Safety

## Introduction

The large variety of hand and portable power tools available on the market today is mind boggling. These tools allow us to work faster and increase the number of different jobs that we can accomplish. However, if used improperly, hand and power tools can cause injury. By using protective equipment, and following proper work practices, you can operate hand and power tools safely and with confidence.

## HAND TOOLS

### Personal Protective Equipment

The type of personal protective equipment (PPE) you need when using hand tools depends on the tool being used. At a minimum, eye protection in the form of safety glasses or goggles must be worn at all times. The simple act of snipping copper wire with a side-cutting pliers, striking a nail with a hammer or sawing wood can propel small pieces of debris into the air.

It is also important to protect your hands from cuts, abrasion and repeated impact. Cut-resistant gloves made of Kevlar, Spectra or stainless steel can help protect against the effects of a misplaced blade. Wearing standard cotton or leather gloves can help prevent wood splinters or skin abrasions from handling lumber. On jobs that require long periods of hammering, impact-resistant gloves with gel or rubber palms can reduce vibration.

Safety shoes with a reinforced toe can help protect your feet from injury caused by a dropped tool. Safety footwear come in a variety of styles and are widely available. Choose footwear that offers adequate traction for your work site.

### Proper Work Practices

#### *Wrenches*

Wrenches come in an endless variety of styles such as socket, open-end, combination, adjustable and torque, just to name a few. Wrenches are designed to turn or hold bolts, nuts, or multiple-threaded fasteners. They are sized to keep the leverage and load in an acceptable balance.

- Choose a wrench that properly fits the fastener you wish to turn. Use metric wrenches for metric bolts and American inch wrenches for inch-sized bolts. By using the correct size, the wrench is less prone to slip or round off the fastener corners.
- Avoid using an extension to improve the leverage of a wrench.
- Do not use open-end or adjustable wrenches for final tightening or loosening frozen fasteners. These wrenches do not have the strength of a box-end or socket wrench.
- Apply penetrating oil on frozen fasteners before using a striking face box, socket or heavy-duty box wrench.
- Do not expose a wrench to temperatures that could weaken tool hardness.
- Always try to pull on a wrench (instead of pushing) in case the fastener loosens.
- Adjustable wrenches must be adjusted tightly to the fasteners and then pulled, putting the force on the fixed end.

- Turn power off and use electrically insulated wrenches when working on or around electrical components.
- Never alter a wrench.
- Do not over torque a fastener. Use a torque wrench to tighten the fastener to the exact torque required.
- Inspect wrenches periodically for damage, such as cracking, severe wear or distortion.
- Always use nonsparking wrenches when in the presence of flammable vapors or dusts.

### ***Pliers***

Pliers come in all shapes and sizes, such as lineman, diagonal cutting, needle nose, slip joint, locking tongue and groove. Plier uses include gripping, cutting, turning and bending. Pliers are a versatile tool but must be used according to how they are designed.

- Do not increase a pliers handle length to gain more leverage, instead choose larger sized pliers.
- Never subject pliers to temperatures that could decrease tool hardness.
- Cut hardened wire only with pliers designed for that purpose.
- Do not substitute a pliers for a wrench when turning nuts and bolts.
- Be sure the plier's jaws can grasp properly when bending rigid wire.
- Do not hammer with pair of pliers.
- Cut wire at right angles without bending wire back and forth against the cutting edge of a pliers.
- Always use nonsparking pliers when in the presence of flammable vapors or dusts.

### ***Hammers and Striking Tools***

Hammers are one of the most used tools in our toolboxes. (Unfortunately, they are also the most abused tool.) Nail, soft-face, ball-peen, chipping, sledge and setting are just a few of the hammers we use in the workplace and home. Many hammer types are specific to a particular industry, such as bricklayers, machinists, and loggers. Each kind of hammer has a head that is tailored to work best for a particular application. Recently, even hammer handles have been improved to be stronger, ergonomically shaped and transmit less shock to the user.

- Always use a hammer of the proper weight and size for the task.
- Do not strike the surface at an angle. The hammer face should contact the striking surface squarely, so the two are parallel.
- Do not use a hammer if the handle is damaged or loose.
- Use a hammer face that is 3/8" larger in diameter than the striking tool.
- Never weld, heat, or regrind a hammer head.
- Remove from service any hammer exhibiting signs of excessive wear, cracks, mushrooming or chips.
- Do not use one hammer to strike another.
- Do not use the wrong hammer for the job; match the proper type of hammer to the task it is designed to perform.
- Always use nonsparking hammers in the presence of flammable vapors or dust.

### ***Screwdrivers***

Screwdrivers are intended for turning a variety of threaded fasteners, such as machine or wood screws, in or out of materials. Screwdriver tips come in a variety of different shapes and sizes. The slotted and Phillips tips are the most common, however, torx, hex, square and various others are also used. As with any tool, it is important to match the type of screwdriver you use to the type of job you're doing.

- Never use a screwdriver as a pry bar, chisel, punch, stirrer or scraper.
- Always use a screwdriver tip that properly fits the slot of the screw.
- Throw away screwdrivers with broken or worn handles.
- Never expose screwdrivers to temperatures that could reduce tip hardness.
- Turn power off and use electrically insulated screwdrivers when working on or around electrical components.
- Straighten tips or redress rounded edges with file.
- Never use pliers on a screwdriver for extra leverage. Only use a wrench on screwdrivers specifically designed to accept them.
- Use magnetic or screw-holding screwdrivers to start fasteners in tight areas.
- Use both hands when using a screwdriver one guide the tip and the other to turn the handle. Final tightening requires both hands on the screwdriver handle.
- Always use nonsparking screwdrivers in the presence of flammable vapors or dusts.

## **PORTABLE POWER TOOLS**

### **Personal Protective Equipment**

Power tools present more hazards than hand tools due to the speed at which they operate. Although similarities exist, there are distinct differences between the PPE suggested for use with hand tools and the PPE recommended for safe power tool use.

Eye protection, such as safety glasses or goggles, is especially important when using power tools. The speed in which drills, saws, grinders, sanders, and routers operate can propel small particles much faster and farther than do hand tools. Others working around the area where power tools are used should also wear protective eyewear. Certain power tools may require using a face shield, in addition to safety glasses or goggles. For example, a face shield is recommended while using a grinder, due to the amount of hot metal particles generated.

Standard cotton or leather work gloves can protect your hands from minor scrapes and cuts while working with various materials. Unfortunately, cut-resistant gloves are not designed for, or even capable of, providing protection against a moving blade or bit. The best way to prevent injury from moving parts is to keep your hands on the tools handles and keep all guards in place. Anti-vibration gloves minimize the vibration created by hammer drills and rotary hammer drills.

Safety footwear is recommended when using power tools because power tools are heavy and they can cut. Safety shoes with a nonslip, insulated sole and a steel toe protect against dropped objects and misdirected electricity.

The higher sound levels generated by some power tools, especially if used over extended periods of time, may require the use of earplugs or earmuffs. Even the use of a dust respirator may be necessary in sanding and cutting operations. Each situation must be analyzed to determine the type of PPE that is required for the safe use of each type of power tool.

Along with PPE, proper attire is also important while using power tools. Avoid loose clothing to avoid being caught in moving blades. Long hair should be tied back or covered for the same reason; remove all jewelry as well.

## Proper Work Practices

Portable power tools are designed for a wide variety of uses. Circular saws, jigsaws, drills, hammer drills, sanders, grinders, routers and numerous other power tools save us time and effort on the job. The growing popularity of cordless battery-operated tools is putting power tools to use in more places than ever before. The increased use of power tools heightens the need for awareness of the dangers they present if not operated properly. The following safety rules are common to all power tools. In addition, each type of tool has its own unique hazards which must be taken into account.

- Read the tools owners manual to understand the tools proper applications, limitations, operation, and hazards.
- Do not use electric power tools in the proximity of flammable vapors, dusts or construction materials. Also avoid using electric power tools in wet environments.
- Protect yourself from electric shock by insuring that your tools are properly grounded; use a Ground Fault Circuit Interrupter for corded tools. Always check for hidden wires that may contact bladed tools.
- Select a tool based on the task it is designed to do. Only use attachments specifically recommended for your power tools, and ensure their proper installation.
- Inspect tools for damage including the cord, presence of guards, correct alignment, binding of components, or any condition that would effect the operation of the tool. If a tool is damaged, or a condition develops while a tool is in use, have the tool fixed before putting it back into service.
- Avoid excessive force to make cutting tools cut faster. Feed material only as fast as the tool is designed to accept to prevent excessive wear and decreased control.
- Keep others away from the work area, or provide shields to stop flying debris and other distractions.
- Always maintain tool control by keeping a tight grip on a tool. Also maintain your balance and do not overreach. Do not operate a power tool if you are under the influence of medications or alcohol, or if you are tired or distracted.
- Secure your work in a vise or clamp for increased stability. Use the tools side handle, if available, for better control.
- Verify that all tools are unplugged or that the power source is removed when changing blades, performing maintenance or when tools are not in use. Be sure adjustment knobs are tightened and remove any adjustment keys before use.
- Keep tools in a secure location when not in use.
- Avoid unintentional tool start up by keeping your finger off of the power switch.

## Commonly Asked Questions

Q. ***Does the Occupational Safety and Health Administration (OSHA) regulate the use of hand and/or power tools?***

A. Hand and power tools are addressed in [29 CFR 1910, Subpart P](#), Hand and Portable Powered Tools and Other Hand-Held Equipment. Design, guarding and maintenance requirements are covered.

Q. ***What size extension cord should I use for my power tool?***

- A. Proper extension cord size is determined by the length of cord and the amperage required by the tool. Longer cords and higher amperage tools require extension cords with larger wires. Consult your tools owners manual for the recommended wire gauge size for your application.