



What are electric power tools?

Power tools

The invention of portable electric power tools benefits industry and mechanics in almost every field. Greater speed, increased production, reduced effort to perform tasks, and — in most cases — greater accuracy are the advantages these tools provide.

However, portable power tools also have hazards. If precautions are not taken, serious injuries can occur.

Dangers of speed must be recognized

The highway safety warning that speed kills also could apply to the potential dangers of operating many portable electric power tools. Employees who previously worked only with hand tools should be made aware of the hazards. The dangers caused by the tool's speed of operation should be carefully pointed out before any worker uses it for the first time.

Respect for tool makes for safety

Training in the safe and proper use of portable power tools can prevent mistakes that could result in injuries. Workers must thoroughly understand the functions, as well as the hazards, of each tool they use and respect portable power equipment. They must be aware of defects that may develop in the tools. Well-rounded safety training induces a greater respect for portable power tools as well as an alertness for the associated dangers.

Personal protective equipment is a safety must

The use of protective clothing and other accessories designed for safety is important for operations involving portable power tools.

Workers must wear safety glasses and a face shield on jobs where chips may fly, or tools may break. Safety shoes with metatarsal protection or plastic shoe guards will minimize toe and other foot injuries. When working with portable power tools on high levels, a safety harness must be worn. The

slightest shock from a short circuit can cause a disastrous fall.

Workers should never wear loose clothing or jewelry while operating a portable power saw, drill or grinder because it may catch in the whirling tool and cause serious injury. Hard hats must be worn in areas where there is danger from flying, falling or moving objects. Ear protection is required where noise levels exceed acceptable standards and is recommended in most other cases.

Frequent inspections are vital

A continuous maintenance schedule is extremely important to keep portable power tools safe. Operating a poorly maintained portable tool is hazardous; this also shortens the life of the tool. Inspect and clean all power tools after each use, and lubricate according to the manufacturers' specifications. Keep sufficient grease in gear boxes. Keep air holes clean.

Frequently inspect blade guards and switches of saws, drills and grinding wheels. Keep motors in good running order. Carefully check cords and plugs of portable power tools. Immediately replace badly worn cords or defective plugs. The grounding wire and fastener must be in good condition, and the ground must be a true one.

Guards that are built onto the tool for safety must be used and be in good working condition. Every portable tool must undergo a thorough maintenance check at recommended intervals.

Ground or double insulate the tool

The most feared danger associated with the use of portable electric power tools is the ever-present threat of electrical shock. For this reason, the law requires all electrical-powered portable tools with exposed noncurrent-carrying metal parts be grounded to protect against ground faults.

Another approved method of protection is the use of a ground fault circuit interrupter (GFCI). According to the National Electric Code, a GFCI is required when working in damp or wet locations. In addition, employers should provide equipment with GFCI protection for all construction-related work activities. Where employed, the equipment must be distinctively marked.

Ungrounded portable power tools that may be defective can cause burns and shock capable of killing the operator. Even a slight shock can cause the worker to lose control of the tool. This can result in severe injury to the operator or others.

What causes the shock?

Acquaint everyone with the following electrical defects and situations that are often responsible for severe shock to workers operating portable electric power tools:

- Breakdown in the insulation of the tool's motor, a common shock-producing condition, can result from metal chips or water entering the motor, from a badly worn spot on the cord at the point where it enters the motor housing, or from a hard pull on the cord that loosens the insulation at the point where it feeds into the motor. Do not try to repair such damage; always return damaged tools to the manufacturer for repair;
- Breakdown in the insulation of the circuit makes it impossible to ground the tool, except when the switch is closed;
- Breakdown in the tool and circuit insulation on opposite sides of the circuit is an unsafe condition; Tool safety is dependent on the position of the prongs of a non-polarized two-prong plug or incorrectly wired outlet with a polarized plug as it is plugged into the outlet; one position is safe while the alternate position is unsafe. The operator has no way of determining one from the other.
- Low body resistance of the operator to the ground, which comes from wet, damp, continuous sweating, can cause a shock powerful enough to electrocute the operator.

Keep electrical grounds safe

Each portable power tool should have its own place in the tool crib or central storage area. The tool crib attendant should have a thorough knowledge of the proper and safe methods of handling and storing all types of portable power equipment.

Remove power tools from counters near the tool crib's receiving window so workers are not exposed to the tool's sharp cutting edges. The tool crib attendant should check each returned tool and place it in the designated storage place or arrange for repair if it is defective.

Report any defect discovered in a portable power tool to the tool crib attendant. The attendant should remove the tool from service and tag it for inspection. The inspection tag should indicate the tool's defect or defects. This basic procedure maintains continuous safety in the use of portable power tools.

If the workers are permitted to return portable power tools to the storage area themselves, they must follow safe storage practices.

Safe practices with portable electric power tools

Portable electric drills, when improperly used, are the cause of many injuries.

The driving bit may be pushed into the hand, leg or another part of the body. If the drill is dropped and cracked, pieces of either the drill or the drill bit may fly into the eyes of the operator or other persons.

Select the drill bit carefully for the specific job; its length should be no longer than the job requires.

If the operator's hand is used to guide a drill, fit a special sleeve around the drill bit. This sleeve protects the operator's hand and also serves as a limit stop to control the depth of the drilled hole.

The shanks of heavy bits should not be ground down to fit chucks of smaller drills. Either a drill with a large capacity chuck or a small chuck drill with a special adapter should be used. This special adapter, equipped with speed-reduction gears, prevents overloading and overheating of the drill.

When drilling, clamp or anchor the material being drilled to prevent whipping and possible injury.

The use of constant pressure switches is recommended, rather than positive off/on or lock-on switches. (This same recommendation should be followed with grinders, buffers, circular sanders and saws.)

To avoid excess pressure, always use sharp drills. Remember, don't change direction after the drill has been started.

Portable electric grinding wheels are exposed to more abuse than stationary grinders. Because of this, the tools must be carefully maintained. Check the wheels for cracks. The slightest evidence of a cracked grinding wheel warrants immediate removal from service because it can fly apart, causing serious injuries. Storage racks or cabinets help protect the wheels from abusive bumps and knocks, keeping them in safe condition for use.

All grinding wheels should have guards that enclose at least 180 degrees of the wheel's periphery. Guards should be easily adjustable so that workers can adjust them rather than remove them for certain grinding jobs.

The worker's entire face must be shielded while using a portable grinding wheel. This safety measure is important because of the unusual positions in which the portable grinding wheel operates and the possibility of ground particles flying from the wheel in all directions. In addition to wearing a face shield, employees are required to wear safety glasses.

It is more difficult to operate a grinding wheel than other electric tools because of the extra weight of the tool and the high speed at which it operates. Workers who use a grinding wheel should be trained in its safe and proper use and alerted to its dangers.

Never wear loose clothing and gloves. Clothing must be free of oil or other flammable liquids that might ignite from the sparks of the turning wheel. Frayed edges of clothing are particularly hazardous because they may catch in the revolving wheel. Only allow trained workers to mount a wheel on the tool. The housing of the tool must be plainly marked with the maximum wheel size and speed. Except with a cup wheel, never grind the side of the wheel.

A motor speed test is recommended. Match the speed of the motor to the wheel speed recommended by the manufacturer. Ring test grinding wheels before mounting them. A sound wheel will have a bell-like ring. Note: Electric buffers that have the same operating action as electric grinding wheels require the same safety measures.

Portable electric sanders are used in a motion directed away from the body. All clothing must be kept away from moving parts. Serious skin abrasions often happen when a rapidly revolving sanding belt or disc is allowed to contact the user's hands, legs or other part of the body.

Sanders are usually equipped with certain guarding devices, but complete guarding is impossible. Workers who use sanders, therefore, should receive thorough safety training in safe practices for all operations of the tool. Workers must wear dust goggles and plastic face shields to protect against the flying grit and dust that results from sanding operations.

When the dust problem is acute, respirators are necessary. In addition to the common hazards associated with the sanding of wood, dust creates the danger of fire and explosion.

The basic recommendation for overcoming these dangers is proper ventilation. If the sander has a dust collector or vacuum bag, check to make sure it is functioning properly. In plants where the greater percentage of work is wood sanding, use sanders specially designed for this operation to minimize fire and explosion hazards.

Proper maintenance of sanders is important for efficient operation, but can cause injuries if not properly and safely conducted. Clean sanders that are used continuously each day by blowing them out with a vacuum.

Completely dismantle the tool periodically, and give it a thorough cleaning. Workers who use compressed air to clean a sander must wear safety goggles and have a transparent shield between their bodies and the blasts of air.

Portable electric saws usually include the necessary guards to protect the operator. The worker should be trained to use the guards and should never operate electric power saws with guards that are not functioning properly. Never jam or crowd a circular saw into the work.

Never start or stop the saw while inside the kerf of its cut. Workers should be particularly careful to keep their bodies out of the saw's cutting path. The safest electric saws are equipped with trigger switches, which shut the power off automatically when the operator's finger is released.

Portable electric scratch wheels operate in the same manner as electric grinding wheels. Follow the same safety precautions.

Portable electric soldering irons, when hot, must not be placed with their tips contacting wood or other combustible surfaces. Use insulated, non-combustible holders, which practically eliminate the fire hazard.

Even some metal coverings over a wood workbench are not firesafe against contact with the hot tip of a soldering iron. The metal conducts heat and, in time, is likely to ignite the wood below. Many workers are in the habit of reaching for a hot soldering iron without looking. Therefore, holders should be

positioned and designed so the hands of workers cannot accidentally touch the tool's hot tip. The danger of inhaling noxious soldering fumes must be eliminated by providing adequate ventilation.

Electric cords should be inspected on a continuous schedule and must be kept in safe condition. Caution all workers who use electric power tools against:

- Grabbing the cord and jerking its end plug from the wall receptacle;
- Allowing sharp objects to come in contact with the cord's covering;
- Allowing heat, oil or other rubber-softening solvents to accumulate on the cord;
- Using the cord in tension.

Workers should know that cords on floors create stumbling or tripping hazards, but injuries still occur. Whenever possible, suspend electrical cords or power tools over aisles or work areas.

Keep them out of the path of workers and away from objects and materials that are being moved. An accidental pull on the electrical plug of a power tool may cause the tool to jam, which can possibly injure the operator.

Extension cords must be the three-conductor type, complete with three-conductor plugs and receptacles. A three-conductor extension cord, when used with a tool having this required means of grounding, will assure a continuous path to ground from the case of the tool to the ground that is provided at the source of power.