

# Hand and Portable Power Tool Safety Program

## Purpose

The purpose of this Plan is to protect Caltech employees from the hazards of hand and power tools and to comply with the Title 8, California Code of Regulations, Subchapter 7, General Safety Orders, Group 3, General Plant Equipment and Special Operations Article 20, *Hand and Portable Powered Tools and Equipment*.

## Scope

This Plan covers site-specific practices and requirements for safe hand and portable power tool operation and maintenance.

The Plan applies to (list non-exhaustive):

- Hand-held tools and portable equipment with point-of-operation hazards or physical defects such as broken handles, mushroomed heads, or dull edges that may cause an injury to the user.
- Knives, axes, shovels, hammers, chisels, and paper cutters.
- Portable power tools supplied by energy (e.g., electric, pneumatic, hydraulic, powder-actuated, explosive-actuated, and compressed air).
- Lawnmowers and jacks.

## Responsibilities

Caltech will protect its employees from hazards related to hand and portable power tools and equipment through engineering controls, tool safeguards, communication of hazards and solutions, employee training, and personal protective equipment (PPE).

## Administrator

The Administrator is responsible for:

- Assisting supervisors in identifying hazardous conditions in regards to hand/power tools
- Inspecting areas to ensure that this policy is being adhered to
- Providing safety awareness training, as needed

## Supervisor

Department supervisors are responsible for:

- Anticipating work hazards
- Ensuring employees are trained to use tools properly and in accordance with the manufacturer's instructions

- Providing authorized employee training in the proper inspection, use, and maintenance of each tool.
- Maintaining training records, maintenance documentation, and inspection records of hand and portable power tools.
- Providing additional on-the-job (OJT) training if the employee is not familiar with the equipment.
- Providing safe hand and portable power tool equipment to employees.
- Removing defective hand or portable power tools from service.

**Note:** Supervisors may designate other employees to implement and enforce the provisions of this Plan.

## Employees

All employees who use hand and portable power tools will:

- Anticipate work hazards.
- Understand and follow the hand and power tool safety procedures in this Plan.
- Follow safety guidelines for the use of hand/power tools and according to manufacturer’s instructions.
- Inspect hand and portable powers tool before use.
- Refrain from using damaged hand or portable power tools.
- Use the right tool for the job.
- Immediately pull damaged tools from use and report them to a supervisor.
- Not tamper with or remove safety guards.

## Definitions

Hand tool	A tool that is non-powered or operates only through physical exertion by hand (e.g., axes, screwdrivers, wrenches, pliers, tin snips, and paper-cutting boards in offices) (list non-exhaustive).
Point of operation	The area of a tool where the work is performed, which may expose the employee to injury if defective or not properly guarded.
Portable power tool	A portable tool that requires a power source to operate, such as electric, pneumatic, liquid fuel, hydraulic, explosive-actuated, and powder-actuated device or power supply. Examples of regulated portable power tools are portable abrasive wheels and grinders, lawn mowers, powered drills, portable circular saws, portable belt sanding machines, explosive-actuated fastening tools, jacks, and abrasive blast cleaning nozzles.

## Hazard Assessments

The Supervisor will ensure that a hazard assessment is conducted in each work area where hand and portable power tools may be used.

The assessment will identify hazards that could expose employees to:

- Flying objects
- Electric shock
- Sparks
- Punctures or lacerations
- Crushing forces

For example, sparks produced by iron and steel hand tools can be a dangerous ignition source around flammable substances.

Once hazards are identified, the Supervisor will recommend appropriate control measures (elimination, substitution, engineering, and/or administrative) and provide guidance on appropriate PPE selections when a hazard control is not feasible or satisfactory.

Supervisors may use the attached [Job Hazard Analysis Worksheet](#) and [PPE Hazard Assessment Certificate](#) for guidance when conducting assessments.

## General Safety Requirements

### Personal Protective Equipment (PPE)

Employees using hand and power tools may be exposed to falling, flying, abrasive and splashing objects, flying dusts, fumes or mists, vapors or gases, and should be fitted with the appropriate PPE necessary to protect them from hazards.

**Note:** Safety eyewear, hard hats, gloves, and appropriate safety shoes are required on all construction sites.

### Hearing Protection

Hearing protection is recommended when using power tools.

*[See the [Hearing Conservation Plan](#) for more information about noise protection.]*

### Tool Maintenance

All hand tool and portable power tools and similar equipment, whether furnished by Caltech or by or the employee, will be maintained regularly and kept in a safe working condition.

### Housekeeping

- Floors will be kept as clean and dry as possible to prevent slips and falls.
- Extension cords will be used as needed for temporary power only, and must be stored properly when not in use.
- Waste will be disposed of in the appropriate receptacles.
- All work areas and walkways will be well lit.

## **Hand Tools**

Hand tools are non-powered or operate only through physical exertion by hand. The greatest hazards posed by hand tools result from misuse and improper maintenance.

Hand tool precautions include the following:

- Use the right tool for the job.
- Saw blades, knives, and other sharp tools will be directed away from aisle areas and other employees working in close proximity.
- Knives and scissors will be kept sharp; dull tools can be more hazardous than sharp ones.
- Only spark-resistant tools made from brass, plastic, aluminum, or wood will be used around flammable substances.
- Wrenches, including adjustable, pipe, box-end, and socket-style wrenches, will not be used when the jaws or socket are stripped or sprung in such a way that slippage occurs.
- Impact tools such as drill pins or punches, wedges, and chisels will be kept free of mushroomed heads.
- Wooden-handled tools will be kept free of cracks and splinters and will be kept tightly attached to the working end of the tool.
- Tools will be stored in appropriate storage areas when not in use.

## **Portable Power Tools**

A portable tool is one that requires a power source to operate, such as electric, pneumatic, liquid fuel, hydraulic, explosive-actuated, and powder-actuated device or power supply. Power tools can be hazardous if used improperly.

Examples of regulated portable power tools include:

- Portable abrasive wheels and grinders
- Lawn mowers
- Powered drills
- Portable circular saws
- Portable belt sanding machines
- Explosive-actuated fastening tools
- Jacks
- Abrasive blast cleaning nozzles

Power tool general precautions include the following:

- Read the owner's manual to understand the tool's proper applications, limitations, operation, and hazards
- Use the right tool for the job.
- Inspect tools prior to each use. Inspection will include the power cord and plug.
- Wear proper eye and face protection while operating power tools.
- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Never stand in or near water when operating tools.
- Keep cords and hoses away from heat, oil, and sharp edges.
- Electric power tools will be either three-wire grounded or double-insulated and must be listed by Underwriters' Laboratories or another recognized listing agency.
- Disconnect tools and ensure a zero-energy state when not in use, prior to servicing and cleaning, and when changing accessories such as blades, bits, and cutters.
- Keep unauthorized persons away from the work area by using signage, barricades, stanchions, keyed access, etc.
- Avoid accidental starting; do not hold fingers on the switch button while carrying a plugged-in tool.
- Maintain tools with care; keep them sharp and clean for best performance.
- Never leave tools unattended with parts still moving; even after the machine is turned off, some parts may still be capable of moving.
- Maintain good housekeeping practices by keeping the work area free of debris or other items that can get caught in tools or power equipment.
- Follow instructions in the user's manual for the tool when lubricating and changing accessories.
- Maintain good footing and balance when operating power tools.
- Do not wear loose clothing, ties, or jewelry when operating portable power tools; such items can become caught in moving parts.
- Remove all damaged or defective portable electric tools from use and tag them: "Do Not Use." If not repairable, cut off power cord and discard/recycle.
- Always plug cord-connected, hand-held electric tools into ground-fault circuit interrupter (GFCI)-protected receptacles or in compliance with the facility's assured electrical grounding conductor program.
- Cup wheels (Types 6 and 11) will be protected by safety guards or special "revolving cup guards" which mount behind the wheel and turn with it. They will be made of steel or other material with adequate strength and will enclose the wheel sides upward from the back for one-third of the wheel thickness.
- The maximum angular exposure of the portable grinding wheel periphery and sides for safety guards used on other portable grinding machines will not exceed 180° and the top half of the wheel will be enclosed at all times.
- Belt sanding machines will be provided with guards at each nip point where the sanding belt runs onto a pulley.
- Never clamp a hand-held grinder in a vise.

- When operating a riding-rotary mower, never make sharp turns at high speeds, especially on a hill. Never put hands or feet under a running mower.
- Always shut off the mower and disconnect the spark plug before servicing or reaching under the mower deck.

## **Guards**

Hazardous moving parts of a power tool need to be safeguarded. For example, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment shall be guarded if such parts are exposed to contact by employees.

Guards, as necessary, shall be provided to protect the operator and others from the following:

- Point of operation
- Nip points
- Rotating parts
- Flying chips and sparks

Power tool guarding precautions include the following:

- Always consult supervisor when the manufacturer recommendations for guarding a specific power tool are not available or cannot be implemented.
- Guards must not be removed or bypassed unless the power tool is unplugged or locked out from the power source and is in a zero-energy state.
- Notify a supervisor immediately when any unguarded moving parts or dangerous points of operation are observed. Stop work and shut down the tool until the condition is corrected.
- Do not use unauthorized or damaged guards.
- Operate power tools only when all guards are in place and properly attached according to the manufacturer's recommendations, and are functioning properly.
- If a guard is damaged, bypassed, or missing, the tool will be removed from service and tagged with "Do Not Use" until repairs can be made.

## **Safety Switches**

All hand-held power tools will be fitted with any one of the following safety switch methods as appropriate for the particular tool:

- A momentary contact "on-off" control.
- A lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.
- A pressure switch which requires constant pressure to run and will shut off when the pressure is released, such as required for hand-held gasoline-powered chain saws.

## **Electric Tools**

Portable electric tools will be of the approved double-insulated type and used with an approved grounding device such as a GFI (Ground Fault Indicator) to prevent the unlikely event of an electrical shock.

Electric-power operated tool precautions include the following:

- Never use electrical cords for hoisting or lowering tools.
- Unplug the power cord by pulling on the plug rather than pulling on the cord.
- Keep cords and hoses away from heat, oil, and sharp edges.
- Operate electrical tools only within their design limitations.
- Wear gloves and safety footwear as appropriate during use of electric tools.
- When not in use, store electrical tools in a dry place.
- Do not use electrical tools in damp or wet locations without authorization and proper precautions taken to prevent electrical shock.

## **Pneumatic Tools**

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders.

Pneumatic tool precautions include the following:

- Pneumatic power tools will be secured to the hose or whip by some positive means such as a tool retainer to prevent the tool from becoming accidentally disconnected.
- Safety clips or retainers will be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.
- Eye protection is required and face protection is recommended for employees working with pneumatic tools.
- Use appropriate hearing protection when working with noisy tools such as jackhammers.
- Screens must be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.
- The safe operating pressure stated by the manufacturer will not be exceeded.
- Pneumatic powered tools will be secured to the hose or connection by a positive means to prevent them from being accidentally expelled.
- Hoses will not be used for hoisting or lowering.
- All hoses exceeding ½ inch inside diameter must have a safety device to reduce pressure should the hose fail.

- All pneumatically-driven nailers, staplers, and other similar tools provided with automatic fastener feeds which operate at more than 100 psi pressure to the tool will have a safety device on the muzzle end to prevent the tool from ejecting fasteners unless the muzzle is in contact with the work surface.
- A safety clip or retainer must be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel.
- Compressed air guns must never be pointed toward anyone. Users must never “dead-end” the gun against themselves or anyone else.
- Eye protection must be worn when operating a compressed air gun.
- Supplied compressed air will not be used for cleaning purposes except when reduced to 30 pounds per square inch (psi) and then only with effective chip guarding and with proper PPE.
- Airless spray guns which atomize paints and fluids and operate at pressure of 1,000 psi or more will be equipped with an automatic or visible manual safety device which prevents the accidental pulling of the trigger to prevent the release of paint or fluid until the device is manually released.
- Instead of the safety device, the gun may be equipped with a diffuser nut which will prevent high pressure and high velocity release while the nozzle tip is removed, plus a nozzle tip guard, or other equivalent protection, which will prevent the tip from coming into contact with the operator.
- Abrasive blasting nozzles will be equipped with a valve which must be activated manually for operation and a holding rack for non-operation. The nozzle will be mounted on a support when it is not in use.

## **Hydraulic Power Tools**

The fluid used in hydraulic powered tools will be fire-resistant and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The manufacturer’s safe operating pressures for hoses, valves, pipes, filters, and other fittings will not be exceeded.

## **Jacks**

- A jack is an appliance for lifting and lowering or moving horizontally a load by application of a pushing force. Jacks may be lever and ratchet, screw, and hydraulic.
- The manufacturer’s rated capacity for the jack will be legibly marked on all jacks and will not be exceeded. All jacks will have a positive stop to prevent and stop over-travel.
- When providing a firm foundation, the jack base, as well as the cap, will be blocked or cribbed to prevent slippage.
- Where there is a possibility of slippage of the metal cap of the jack, a wood block shall be placed between the cap and the load.
- Jacks will be maintained according to the manufacturer’s recommendations and inspected at least every 6 months and prior to use.

- For jacks subjected to abusive conditions such as freezing, load shock, or extreme heat, the jack will be examined for possible defects.
- Any jack found damaged or defective will be removed from service immediately and tagged with a “Do Not Use” tag. It is not being used until repaired by a person qualified to perform such repairs.

## **Fuel-Powered Tools**

- All fuel-powered tools will be stopped during refueling, servicing, or maintenance.
- Fuel will be transported, handled, and stored in accordance with USEPA and USDOT rules and procedures.
- When fuel-powered tools are used in enclosed spaces, the applicable requirements for toxic gas monitoring and use of PPE will be applied.

## **Powder-Actuated Tools**

Powder-actuated tools are also known as “explosive-actuated.” Such tools are actuated by explosives or any similar means, and propel a stud, pin, fastener, or other object for the purpose of affixing it by penetration to any other object.

Only employees who have been trained in the safe operation of the particular powder-actuated tool in use will be allowed to operate a powder-actuated tool.

Powder-actuated tool precautions include the following:

- Inspect the tool prior to use.
- Any tool found not in proper working order, or which develops a defect during use, will be immediately removed from service, tagged “Do Not Use”, and not used until properly repaired by an authorized provider.
- Tools will not be loaded until just prior to the intended firing time. At no time, loaded or unloaded, are the tools to be pointed at any employees.
- Hands will be kept clear of the open barrel.
- Loaded tools will not be left unattended or be accessible to unauthorized persons.
- Tools will not be used in an explosive or flammable environment.
- In case of a misfire, the operator will hold the tool in the operating position for at least 30 seconds and then try to operate the tool a second time. The operator will wait another 30 seconds, holding the tool in the operating position, then proceed to remove the explosive load in strict accordance with the manufacturer's instructions.
- Fasteners will not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.

- Driving into materials easily penetrated will be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying-missile hazard on the other side.
- Fasteners will not be driven directly into materials such as brick or concrete closer than 3 inches from the unsupported edge or corner or into steel surfaces closer than ½ inches from the unsupported edge or corner, unless a special guard, fixture, or jig is used. (Exception: Low-velocity tools may drive no closer than 2 inches from an edge in concrete or ¼ inches in steel).
- When fastening other materials, such as a 2- by 4-inches wood section to a concrete surface, it is permissible to drive a fastener of no greater than 7/32-inch shank diameter not closer than 2 inches from the unsupported edge or corner of the work surface.
- Fasteners will not be driven through existing holes unless a positive guide is used to secure accurate alignment.
- No fastener will be driven into a spalled area caused by an unsatisfactory fastening.
- Driving into materials easily penetrated will be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.