Health, Safety, Security
and Environment

Process Title
Hand and Power Tools

Process Objective
Ensure compliance with corporate standards and government requirements.

Document owner and change code

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1 OBJECTIVE

Many of the accidents which occur each year can be attributed to improper or unsafe use of tools or to the use of tools which are in bad condition. The few extra seconds required to examine tools before using them and then using them properly can reduce the number of injuries. The following pages give safety tips and recommendations for the safe use of hand tools and power tools.

2 SCOPE

This policy applies to all hand and power tools and equipment provided by Mechanical Systems, Inc. or by employees.

3 PROCEDURE

A. Potential Hazards

1. Hand Tools

   • The greatest hazards posed by hand tools result from misuse and improper maintenance. Examples include:

      1. If a chisel is used as a screwdriver, the tip of the chisel may break and fly off, hitting the user or other employees.

      2. If a wooden handle on a tool, such as a hammer or an axe, is loose, splintered, or cracked, the head of the tool may fly off and strike the user or other employees.

      3. If the jaws of a wrench are sprung, the wrench might slip.

      4. If impact tools such as chisels, wedges, or drift pins have mushroomed heads, the heads might shatter on impact, sending sharp fragments flying toward the user or other employees.

   • Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances.

2. Power Tools

   • Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment.

   • Electrical flash burns, minor shock that may cause falls, and shock that results in death from electrically powered tools.
• Fire and explosion hazards.
• Flying fragments from portable abrasive grinding, cutting, polishing, and wire buffing wheels.
• The danger of getting hit by a pneumatic tool’s attachments or by some kind of fastener that is being used with the tool.
• Tripping and stumbling on an air hose.
• Noise associated with pneumatic tools.
• Fuel vapors that can burn or explode and give off dangerous exhaust fumes from the use of fuel-powered tools.

3. Tool Selection

The following should be considered when selecting the right tool for the job:

• The handle’s shape and form and the material used to make it. An ergonomically well-designed tool will reduce fatigue and injury.
• The quality of the tool, including sharpness of cutting edges, which affects the amount of force needed to do a job.
• Power tools designed to have minimal vibration will be more comfortable to use and less likely to result in hand-arm vibration syndrome (HAVS).

4. Tool Storage and Transport

• Tools must be kept in a safe place. Tools should not be placed in pockets, on floors or work surfaces, or on tables between uses. All tools must be returned to a tool room or tool box at the end of the work day.
• Chisels, screwdrivers, and pointed tools should not be placed in a pocket. These tools should be carried in a tool box, a cart, a carrying belt, a pocket tool pouch, or in the hand with points and cutting edges away from the body.
• Tools that must be raised or lowered from one elevation to another must be placed in an approved tool bucket or firmly attached to hand-line.
• Tools should neither be dropped nor thrown from place to place nor from person to person.
• Employees should not carry tools in any way that might interfere with their ability to freely use both hands on a ladder or while climbing on a structure.

5. General Safe Practices

• Employees using hand or portable tools must be trained in their use and wear the proper personal protective equipment (safety goggles, gloves, etc.).
• Employees must change clothing or take off jewelry that could become entangled in the tools they are to use. Clothing should be free of oil, solvents, or frayed edges.
• Each tool should be examined by the employee before use. Broken or damaged hand or power tools should be removed from the job site and tagged “Do Not Use”.
• Power tools must be double insulated and/or grounded.
• Hand and power tools should be operated according to the manufacturer’s instructions.
• The proper tool for the job must be used.
• Metal measuring tapes, tapes having metal strands woven into fabric, brass bound rules, wire or metal bound hose or rope with wire core must not be used when working on or near energized electrical circuits or equipment.
• Tool guards or safety features must be in place before any tool is used. The guards may not be manipulated in such way that will compromise its integrity or compromise the protection in which intended.
• Floors should be kept as clean and dry as possible to prevent accidental slips with or around hand and power tools.
• Tools must be inspected and maintained on a regular basis to ensure they are kept in good, safe working condition.

6. Hand Tools

General Precautions

• Excessive pressure or force on any hand tool should not be used.
• Saw blades, knives, or other tools should be directed away from aisle areas and other employees working in close proximity.
• Knives and scissors must be kept sharp. Dull tools can be more hazardous than sharp ones.
• Wrenches must not be used when jaws are sprung to the point that slippage occurs.
• Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads. The wooden handles of tools must not be splintered.
• Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances or dusty locations. Where these hazards exist, spark-resistant tools made of non-ferrous materials should be used.
• Screwdrivers
  1. Never attempt to use a screw driver as a pry tool, drift or chisel.
  2. Use the right size and type screwdriver for the job.
  3. Do not hold screwdriver work in palm of hand. The screwdriver may slip causing injury.
4. Screwdrivers should be filed properly to prevent slipping.

7. Hammers

- Hammers must have a clear path for back swing, and the target area must be free from obstructions.
- Hammers with "mushroomed" heads should never be used as they might glance off the target, or the damaged head may splinter and send metal fragments flying.

8. Files

- Do not use a file for a pry or hammer as it is brittle and breaks easily.
- Files shall be fitted with wooden handles to protect workers from the pointed file end.

9. Pry Bars

- Be sure tip of bar is secure under load by first applying a slight pressure.
- Check your own balance before exerting full force.
- A cheater bar shall not be used on pry bars.

10. Wrenches

- Wrenches should be pushed away from the body, if possible to reduce the chance of the wrench slipping and striking the user in the face or body.
- Adjustable (crescent) and combination wrenches should be snug on bolts and nuts to avoid slipping.
- Never use a wrench as a hammer or a hammer on a wrench that is not designated to be used as such.
- Never use a cheater bar on a wrench or "double wrench" a nut. Use a hammer wrench or impact instead.

11. Chisels & Punches

- Unsafe defects: Mushroomed heads, chipped points and over tempered surfaces.
- Do not strike with hardened hammer or chip toward yourself or others.
- Do not use without proper eye protection.

12. Knives

- Unsafe defects: Dull or nicked edges or point, loose or broken handle.
- Do not pull a knife towards body.
• Use a knife with a locking blade.
• Knives used for cutting insulation must be kept in a protective sheath when not in use and never carried in a back pocket where it could impale the person if angled incorrectly.
• Ask yourself: “Is this REALLY the right tool for the job?”

13. Shovels, Pick Axes and Axes

• Unsafe defects: Rough, loose, cracked or split handles; dull or nicked edges, over tempered surfaces.
• Do not use as a wedge, pry bar or hammer.
• Non conductive wood or fiberglass handles for shovels and pothole diggers should be used to protect from electrical shock.

14. Portable Power Tools

General Precautions

• Tools should never be carried by the cord or hose.
• The cord or hose of a power tool should never be yanked to disconnect it from the receptacle.
• Tools must be disconnected when not in use, before servicing, and when changing accessories.
• Cords and hoses must be kept away from heat, oil, and sharp edges.
• All employees not involved with the work should be kept at a safe distance away from the work area.
• To avoid accidental starting, employees should not hold fingers on the switch button while carrying a plugged-in tool.
• Manufacturer’s instructions must be followed for lubricating and changing accessories on power tools.

Guards

• Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of power tools must be guarded if such parts are exposed to employees.
• Machine guards, as appropriate, must be provided to protect the operator and others from the following:
  1. Point of operation
  2. In-running nip points
  3. Rotating parts
  4. Flying chips and sparks
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- Safety guards must never be removed when a tool is being used. Portable circular saws having a blade greater than 2 inches in diameter must be equipped at all times with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work material.

- Abrasive wheel tools must be equipped with guards that:
  1. cover the spindle end, nut, and flange projections:
  2. maintain proper alignment with the wheel; and
  3. do not exceed the strength of the fastenings.

**Operating Controls and Switches**

- The following hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released:
  1. drills
  2. tappers
  3. fastener drivers
  4. horizontal, vertical, and angle grinders with wheels more than 2 inches in diameter
  5. disc sanders with discs greater than 2 inches
  6. belt sanders
  7. reciprocating saws
  8. saber saws, scroll saws, and jigsaws with blade shanks greater than ¼ inch wide

- These tools also may be equipped with a "lock-on" control, if it allows the worker to also shut off the control in a single motion using the same finger or fingers.

- The following hand-held power tools must be equipped with either a positive "on-off" control switch, a constant pressure switch, or a "lock-on" control:
  1. disc sanders with discs 2 inches or less in diameter
  2. grinders with wheels 2 inches or less in diameter
  3. platen sanders, routers, planers, laminate trimmers, nibblers, shears, and scroll saws
  4. jigsaws, saber and scroll saws with blade shanks a nominal ¼ inch or less in diameter

- It is recommended that the constant-pressure control switch be regarded as the preferred device.

- Other hand-held power tools such as circular saws having a blade diameter greater than 2 inches, chain saws, and percussion tools with no means of holding accessories securely must be
equipped with a constant-pressure switch that will shut off the power when the pressure is released.

**Electric Tools**

- Electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low-voltage isolation transformer.
- Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong must never be removed from the plug.
- Double-insulated tools are more convenient and provide protection against electrical shock without third-wire grounding. On double-insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.
- Electric tools should be operated within their design limitations.
- Gloves and safety footwear should be used during the use of electric tools.
- When not in use, tools should be stored in a dry place.
- Electric tools should not be used in damp or wet locations.
- Electric tools should not be used in Class II locations unless dust in the work area has been cleaned up thoroughly and dust-producing equipment in the vicinity has been shut down.

**Abrasive Wheel Tools**

1. Before an abrasive wheel is mounted, it must be inspected closely for damage and should be sound- or ring-tested to ensure that it is free from cracks or defects. To test, wheels should be tapped gently with a light, non-metallic instrument. If the wheels sound cracked or dead, they must not be used because they could fly apart in operation. A stable and undamaged wheel, when tapped, will give a clear metallic tone or "ring."

2. To prevent an abrasive wheel from cracking, it must fit freely on the spindle. The spindle nut must be tightened enough to hold the wheel in place without distorting the flange. The

3. The spindle speed of the machine should not exceed the maximum operating speed marked on the wheel.

4. Employees should never stand directly in front of the wheel as it accelerates to full operating speed because of the risk of the wheel disintegrating or exploding during start-up.

5. Portable grinding tools need to be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of wheel breakage.

6. Eye protection is required when using a powered grinder.
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Pneumatic Tools

- Employees working with pneumatic tools must wear eye protection. Head and face protection is also recommended.
- Employees must check to see that pneumatic tools are fastened securely to the hose to prevent them from becoming disconnected.
- A short wire or positive locking device attaching the air hose to the tool must also be used and will serve as an added safeguard.
- If an air hose is more than ½ inch in diameter, a safety excess flow valve must be installed at the source of the air supply to reduce pressure in case of hose failure.
- When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during the operation.
- When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation.
- Screens must be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.
- Compressed air guns should never be pointed toward anyone. Workers should never "dead-end" them against themselves or anyone else.
- Compressed air should not be used for cleaning purposes, except where reduced to less than 30 p.s.i. and only with effective chip guarding and personal protective equipment.
- Compressed air must never be used for personal cleaning of clothes.
- Working with noisy pneumatic tools requires proper, effective use of appropriate hearing protection.

Liquid Fuel Tools

- Gas must be handled, transported, and stored only in approved flammable liquid containers, and according to proper procedures for flammable liquids.
- Before refilling a fuel-powered tool tank, the user must shut down the engine and allow it to cool to prevent accidental ignition of hazardous vapors.
- When a fuel-powered tool is used inside a closed area, effective ventilation and/or proper respirators such as atmosphere-supplying respirators must be utilized to avoid breathing carbon monoxide.
- Fire extinguishers must also be available in the area.

Explosive (Powder) Actuated Tools

- Such tools must be operated only by specially trained employees.
• When using powder-actuated tools, employees must wear suitable ear, eye, and face protection.

• All powder-actuated tools must be designed for varying powder charges so that the user can select a powder level necessary to do the work without excessive force.

• The muzzle end of the tool must have a protective shield or guard centered perpendicular to and concentric with the barrel to confine any fragments or particles that are projected when the tool is fired. A tool containing a high-velocity load must be designed not to fire unless it has this kind of safety device.

• If a powder-actuated tool misfires, the employee must hold the tool in the operating position for at least 30 seconds before trying to fire it again. If it still will not fire, the user must hold the tool in the operating position for another 30 seconds and then carefully remove the load in accordance with the manufacturer’s instructions. The bad cartridge should then be put in water immediately after removal.

• If the tool develops a defect during use, it should be tagged and must be taken out of service immediately until it is properly repaired.

• Safety precautions that must be followed when using powder-actuated tools include the following:

  1. These tools should not be used in an explosive or flammable atmosphere.

  2. Before using the tool, the employee should inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions and has the proper shield, guard, and attachments recommended by the manufacturer.

  3. The tool should never be pointed at anybody.

  4. The tool should not be loaded unless it is to be used immediately.

  5. Hands should be kept clear of the barrel end.

• When using powder-actuated tools to apply fasteners, several additional procedures must be followed:

  1. Fasteners should not be fired into material that would allow the fasteners to pass through to the other side.

  2. Fasteners should not be driven into very hard or brittle material that might chip or splatter or make the fasteners ricochet.

  3. An alignment guide should always be used when shooting fasteners into existing holes.
4. When using a high-velocity tool, fasteners should not be driven more than 3 inches from an unsupported edge or corner of material such as brick or concrete.

5. When using a high velocity tool, fasteners should not be placed in steel any closer than ½ inch from an unsupported corner edge unless a special guard, fixture, or jig is used.

Hydraulic Power Tools

- The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.
- The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.
- All jacks -- including lever and ratchet jacks, screw jacks, and hydraulic jacks -- must have a stop indicator, and the stop limit must not be exceeded. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded.
- A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. A block should be placed under the base of the jack when the foundation is not firm, and a block placed between the jack cap and load if the cap might slip.
- To set up a jack, the following steps must be taken:
  1. The base of the jack rests on a firm, level surface;
  2. The jack is correctly centered;
  3. The jack head bears against a level surface; and
  4. The lift force is applied evenly.
- Proper maintenance of jacks is essential for safety. All jacks must be lubricated regularly. In addition, each jack must be inspected according to the following schedule:
  1. For jacks used continuously or intermittently at one site -- inspected at least once every 6 months
  2. For jacks sent out of the shop for special work -- inspected when sent out and inspected when returned, and
3. For jacks subjected to abnormal loads or shock -- inspected before use and immediately thereafter.

Inspection and Maintenance

- Hand and power tools must be used, inspected, and maintained in accordance with the manufacturer’s instructions and recommendations and should be used only for the purpose for which designed. A copy of the manufacturer’s instructions and recommendations will be maintained with the tools.
- Hand and power tools must be inspected, tested, and determined to be in safe operating condition before use. Continued periodic inspections by Supervisors will be made to ensure safe operating condition and proper maintenance.
- Hand and power tools should be in good repair and with all required safety devices installed and properly adjusted. Tools having defects that will impair their strength or render them unsafe will be identified by tagging or locking the controls to render them inoperable or will be physically removed from the work site.

Training

- Mechanical Systems, Inc. will supply initial orientation training to new employees on the Hand and Power Tool Program as well as annual refresher training for existing employees. Training will include:

  1. Learning to recognize the hazards associated with different types of tools.
  2. Understanding the safety precautions and safe work practices necessary to prevent such hazards.
  3. Appropriate use of personal protective equipment.
  4. Tool care and maintenance.