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**POWERED HANDTOOLS ACCIDENTS**

- LACK OF GUARDING
- IMPROPER TOOL USAGE
- EYE PROTECTION

**These resulted in lacerations, amputations and loss of sight**





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**HANDTOOLS ACCIDENTS**

- BACK STRAINS WHILE SHOVELING
- IMPROPER BODY POSITION WHILE PRYING
- IMPROPER TOOL USE WHILE PRYING (SHOVEL)
- IMPROPER TOOLS FOR HAMMERING
- TOOL SLIPAGE WHILE USING A WRENCH




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**BASIC SAFETY RULES**

- Perform regular maintenance
- Use right tool for the job
- Inspect all tools before use
- Use the right personal protective equipment (PPE)
- Report to your supervisor any unsafe tool




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**TOOL SAFETY**

- Do not use defective tools
- Use tied-off containers to keep tools from falling off of molds or work platforms.
- Keep all cutting tools sharp.
- Carry all sharp tools in a sheath or holster.
- Return tools to their storage places after use.




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**TOOL SAFETY**

- Floors should be kept as clean and dry as possible to prevent accidental slips with or around dangerous tools.
- The greatest hazards posed by tools result from misuse and improper maintenance.
- Employees have the responsibility for properly using and maintaining tools.
- Keep tools away from aisle areas and other employees working in close proximity.




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**TOOL SAFETY**

- Tag worn, damaged or defective tools "out of service" and do not use them. 
- Do not use a tool if its handle has splinters, burrs, cracks, splits or if the head of the tool is loose.
- Do not use impact tools such as hammers, on chisels, punches or steel stakes that have mushroomed heads. 




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**TOOL SAFETY**

- Do not perform "make-shift" repairs to tools.
- Do not carry tools in your hand when climbing, or by the cord.
- Do not throw tools from one location to another, from one employee to another, from scaffolds or other elevated platforms.
- Do not remove or bypass guards




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**TOOL SAFETY**

- Watch your hands and fingers.
- Keep your mind on your work.
- Grip tools firmly.
- Operate according to the manufacturer's instructions.
- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits and cutters.




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**TOOL SAFETY**

- Ground all tools unless double insulated.
- Avoid dangerous environments. Do not use power tools in a damp, wet and/or explosive atmosphere -- fumes, dust or flammable materials.
- All observers should be kept at a safe distance away from the work area.
- Secure work with clamps or a vise, freeing both hands to operate the tool.
- Do not hold a finger on the switch button while carrying a plugged-in tool.




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**TOOL SAFETY**

- Be sure to keep good footing and maintain good balance.
- The proper apparel should be worn. Loose clothing, or jewelry can become caught in moving parts.
- Don't use an accessory or attachment unless the power tool manufacturer recommends its use on the product
- Keep cords and hoses away from heat, oil, and sharp edges.




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**CROWBARS**

- Use the proper size and kind of bar for the job
- A piece of pipe or an iron bar, should never be substituted for a crowbar since they may skip and cause injury.





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**CROWBARS**

- The crowbar should have a point or toe of such shape that
  - will grip the object to be moved
- The crowbar should have a heel
  - to act as a pivot or fulcrum.
  - In some cases, a block of wood under the heel will prevent the crowbar from slipping and injuring the hand.
- Do not leave crowbars lying on shop floors or work areas; they may cause a tripping hazard.





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**WRENCHES**

- Pliers are meant for gripping and cutting operations. They are not a substitute for wrenches
- There is a correct wrench for every nut and bolt.
- Using the wrong size wrench can
  - round the corners of the bolt
  - cause slippage
  - make it difficult to then apply the proper size.
- Remove caked dirt and grime from inside sockets to allow them to seat fully.





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**WRENCHES**

- Be careful not to allow pipe wrenches to slip, causing loss of balance and falls.
- Wrenches, including adjustable, pipe, end, and socket wrenches shall not be used when jaws are sprung to the point that slippage occurs.
- Never overload the capacity of a wrench by using a pipe extension on the handle or strike the handle of a wrench with a hammer.






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**Ring Test**

- A ring test should be performed before mounting an abrasive wheel to help determine if the wheel is cracked.
- The wheel has to be dry and free of sawdust when applying the ring test, otherwise the sound may be deadened.
- The ring test doesn't work with certain wheels because of their shape or size.
  - Wheels 4 inches diameter and smaller
  - Plugs and Cones
  - Mounted Wheels
  - Segments
  - Plate-Mounted Wheels
  - Inserted Nut and Projecting Stud Disc Wheels




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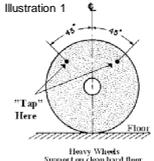
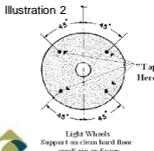
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### How to do the Ring Test

- Suspend the wheel by putting a small pin or your finger through the arbor hole in the wheel. Heavier wheels may be allowed to rest in a vertical position on a clean hard floor (See Illustration 1).
- Tap the flat side of the wheel with a light non-metallic implement, such as the handle of a screw driver, at a point
- 45 degrees from the vertical center line on each side of the wheel (See Illustration 2) **and**
- 1 – 2 inches from the edge of the wheel. Large, thick wheels may be struck on the periphery rather than the side of the wheel.
- Rotate the wheel 45 degrees and repeat the test until the entire wheel has been checked.

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### How to use ring test results

- The ring test depends on the fact that a crack in the wheel will normally change the sound emitted when the wheel is lightly tapped. An undamaged wheel will give a clear tone. If cracked, there will be a dead sound and not a clear ring.
- Comparison of the sound with other wheels of the same lot and specification will allow rejection of any wheel with a suspiciously different ring.

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### Failure to Ring Test




- Failure to ring test could result in a disintegrating wheel.
- This could lead to serious injury or death.
- TOOL REST MUST BE ADJUSTED TO NO MORE THAN 1/8 OF AN INCH**

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### Grinder Safety

**1926.300 (b)(7) General requirements**  
**"Tongue guard"**  
 The distance between the wheel periphery and the adjustable tongue or the end of the peripheral member at the top shall never exceed **1/4 inch**.

**1926.303 (c)(2) "Work rests"**  
 On floor and bench mounted grinders, shall be provided with work rests which are rigidly supported and readily adjustable. Such work rests shall be kept at a distance not to exceed **one-eighth inch** from the surface of the wheel.

The diagram shows a bench grinder with a blue body and two grinding wheels. A red arrow points to the adjustable tongue guard above the wheel, with a label 'Tongue Guard'. Two other red arrows point to the gap between the tongue guard and the wheel periphery, labeled '1/4 in.' and '1/8 in.'. A third red arrow points to the work rest below the wheel, labeled 'Work Rest'. The NPCA logo is in the bottom left corner.

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### Safety Guard – 1926.300(b)(8)

The angular exposure of the grinding wheel periphery and sides for safety guards used on machines known as bench and floor stands should not exceed **90 deg.** or **one-fourth** of the periphery.

The diagram shows a grey safety guard for a grinding wheel. A red arrow points to the adjustable tongue at the top, labeled 'Adjustable tongue'. A red arrow points to the gap between the tongue and the wheel, labeled '1/4"'. A red arrow points to the side of the guard, labeled '90 deg. guard'. A red arrow points to the work rest at the bottom, labeled 'Work rest'. A red arrow points to the gap between the work rest and the wheel, labeled '1/8"'. The NPCA logo is in the bottom left corner.

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### Grinder Safety

**1926. 303(a) "Speeds"**  
 All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation.

The image shows a close-up of a grinding wheel label. The label includes the text: 'USE WHEEL GUARD FOR SAFETY', 'MAX. RPM 4000', 'MAX. SPEED 16000 S.F.F.M. 4800 m/minute', 'PARTS NO. 724603-3 FOR METAL', and 'LOT NO. 630012'. The NPCA logo is in the bottom left corner.

Max RPM Hazard - flying abrasive wheel parts

Wheel shall be compatible with the size motor of the grinder

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### Ring test

**1926.303(c)(7)**  
All abrasive wheels shall be closely inspected and ring-tested before mounting to ensure that they are free from cracks and defects.



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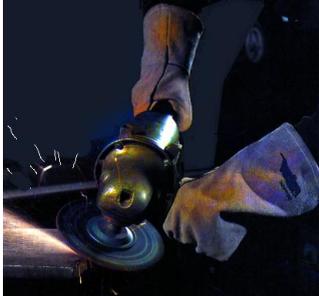
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### Grinder Safety

**Abrasive wheel grinders must be properly guarded**



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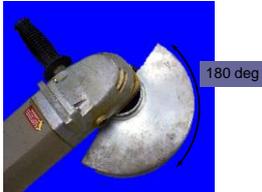
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### Grinder Safety

**1926.300(b)(9)**  
**"Cylinder grinders"**  
The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on cylindrical grinding machines shall not exceed 180 deg.



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### Grinder Safety

**1926.300(d)(1) "Controls"**  
 All hand-held powered platen sanders, grinders with wheels 2-inch diameter or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws, and jigsaws with blade shanks one-fourth of an inch wide or less may be equipped with only a **positive "on-off" control**.



positive "on-off" control




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### Grinder Safety

**1926.300(d)(2) "On-Off switches"**  
 All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders, belt sanders, reciprocating saws, saber saws, and other similar operating powered tools shall be equipped with a momentary contact "on-off" control and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.



on-off control




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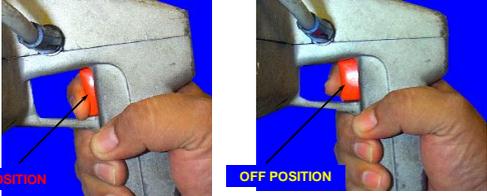
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### Grinder Safety

**1926.300(d)(3) "Switches"**  
 All other hand-held powered tools, such as circular saws, chain saws, and percussive tools without positive accessory holding means, shall be equipped with a **constant pressure switch** that will shut off the power when the pressure is released.



ON POSITION      OFF POSITION




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### Grinder Safety

**1926.302(a)(2)**  
**"Electric tools"**  
 The use of electric cords for hoisting or lowering tools shall not be permitted.

Strain relief device required where cord is pulled away from plug due to misuse




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### 1910.243(c)(3) Vertical portable grinders

Safety guards used on machines known as right angle head or vertical portable grinders shall have a maximum exposure angle of 180 deg.



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180 deg

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### HAND GRINDERS

- Portable grinding tools must be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of breakage.
  - Always use safety glasses and a face shield.
  - Turn off the power when not in use.
  - Never clamp a hand-held grinder in a vise.



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**PORTABLE CIRCULAR AND TABLE SAW**

- Always wear safety glasses and a full face shield when needed. Use a respirator in dusty work conditions. Wear hearing protection if noise level is 80 decibels or above.
- Be sure the switch actuates properly.
- Use the correct blade for the application.
- Use sharp blades.





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**PORTABLE CIRCULAR AND TABLE SAW**

- Check often to ensure that guards return to their normal position quickly.
- Never defeat the guard to expose the blade by, for example, tying it back or removing it.
- Before starting a circular saw, be sure the power cord and extension cord are
  - out of the blade path
  - long enough to freely complete the cut.
  - Keep aware of the cord location.





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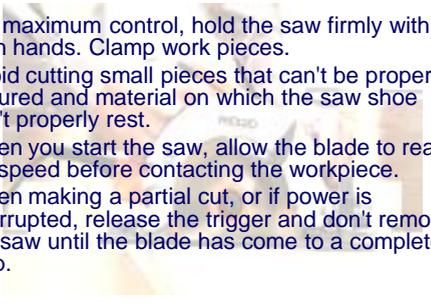
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**PORTABLE CIRCULAR AND TABLE SAW**

- For maximum control, hold the saw firmly with both hands. Clamp work pieces.
- Avoid cutting small pieces that can't be properly secured and material on which the saw shoe can't properly rest.
- When you start the saw, allow the blade to reach full speed before contacting the workpiece.
- When making a partial cut, or if power is interrupted, release the trigger and don't remove the saw until the blade has come to a complete stop.





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**PORTABLE DRILL**

- Check carefully for loose power cord connections and frays or damage to the cord.
- Be sure the chuck is tightly secured to the spindle. This is especially important on reversible type drills.
- Tighten the bit securely. The chuck key must be removed from the chuck before starting the drill.





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**PORTABLE DRILL**

- Check handles. Be sure they are securely installed. Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur.
- Always hold or brace the tool securely. Brace against stationary objects for maximum control.
- Don't force a drill. Apply enough pressure to keep the drill bit cutting smoothly. If the drill slows down, relieve the pressure.





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**MITER BOX SAWS**

- Stay alert to keeping hands and fingers away from the blade's path.
- Be sure all guards are in place and working.
- Use only recommended size and rpm rated blades.
- When installing or changing a blade, be sure the blade and related washers and fasteners are correctly positioned and secured on the saw arbor.





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**PNEUMATIC TOOLS**

- Pneumatic tools are powered by compressed air and include
  - Chippers
  - Drills
  - Hammers
  - Sanders.
- The main danger is getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.
- Eye protection is required and face protection is recommended for employees working with pneumatic tools





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**PNEUMATIC TOOLS**

- Tool retainer
  - A tool retainer shall be installed on each piece of utilization equipment which, without such a retainer, may eject the tool.
- Air hose
  - Hose and hose connections used for conducting compressed air to utilization equipment shall be designed for the pressure and service to which they are subjected.




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**COMPRESSED AIR**

1. Before making or breaking any air connection, always turn off the air supply. Use the valve to turn off the air - never kink the hose as a shortcut kinking the hose may damage or even rupture the air hose.
2. Protect the air hose from damage. Move it out of the way of vehicles so that it isn't run over. Also, be sure not to drag hoses around sharp corners.
3. Be sure to use the proper size air hose and fittings to keep air pressure at a maximum throughout the entire line. Most manufacturers recommend 90 psi at the tool.




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### COMPRESSED AIR

4. To ensure the best connection, clear any dirt off the nipple before connecting the air hose to the tool.
5. When the tool is connected, check the hose and all connections for leaks or damage before using the tool.
6. Maintain a clean, dry, regulated source of air to operate air tools at peak performance.
7. Do not use compressed air to blow your clothes.



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### Summary

- Power tools are very common to any production facility. They can expose employees to multiple hazards if they are not maintained and used properly.
- It is critical that you know how to maintain, test and operate any hand tool or power tool you intend to use.



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