Hand and Power Tools

PURPOSE

The purpose of the Hand and Power Tools program is to ensure that all authorized personnel are familiarized with the general principles, operations, brands, capabilities, and guarding required for individual tools.

PROCEDURE

An effective hand and power tools orientation/training course will be provided by Supervisory personnel prior to initial assignment and or use of specified hand and or power tools. Mandatory refresher training may be required due to unsafe operations, accidents, near misses, and or change in conditions.

The training program conducted by supervisory personnel will address the following:

- Only capable trained operators will be allowed to operate the equipment.
- Guards and guarding will be in place as per the manufacture recommendations. Guards are always in place and operable while the tool is in use. Guards may not be manipulated in such a way that will compromise their integrity or compromise the protection in which intended. Guarding shall meet the requirements set forth in ANSI B11.19.
- Daily operation inspections of equipment, tools, and their surroundings to make sure that tools are maintained in a safe condition according to the manufacture's recommendations.
- Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dust, fumes, mist vapors, or gases shall be provided with PPE necessary to protect them from the hazard. These PPE items may include, but are not limited to; protective chaps, face shields, ear protection, body protection, safety glasses, various types of respirators, etc.
- Proper body positioning, ergonomics, repetitive motion hazards, personal lifting techniques, line of fire, fatigue, material handling, walking/working surfaces, and soft tissue injury prevention.
- Any tools which are not in compliance with any of the above requirements will be prohibited from use by means of tagging or locking the controls to render them inoperable or shall be physically removed from their place of operation.

For other rules and regulations regarding Tools – Hand and Power, please refer to the Construction Safety Standard, Part G of Chapter 296-155-350 WAC, through Chapter 296-155-380 WAC.

GENERAL REQUIREMENTS

Condition of tools

You must maintain all hand and power tools and similar equipment, whether furnished by the employer or the employee, in a safe condition.

Guarding

- When power operated tools are designed to accommodate guards, they must be equipped with such guards when in use.
- Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded if such parts are exposed to contact by employees or otherwise create a hazard. Guarding must meet the requirements as set forth in American National Standards Institute, B11.19.

Personal protective equipment

Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases must use the personal protective equipment necessary to protect them from the hazard. All personal protective equipment must meet the requirements and be maintained according to 29 CFR Part 1926 Subpart E and WAC 296-155-200.

Ergonomical Considerations when Using Tools

Employees should follow these safe practices when using tools to put the least amount of strain on their bodies and prevent injuries:

- Store it off the floor – Lifting from the floor doubles your risk of back injury compared to lifting at waist level.
- Push don't pull – Pushing lets you use your body weight and larger muscles to move a load.
- Keep it close – Shorter reaches to tools, materials and supplies means less strain on your arms, shoulders and back.
- Hands below head – Keeping your hands below your head reduces stress on your shoulders and neck.
- Grip don't pinch – Gripping with the whole hand uses stronger muscles than pinching with your fingers. This means less strain on your hands and fingers.
- Keep wrists straight – You have more grip strength, and you'll feel less strain on your hands and wrists.
- Roll it – Use carts, hand trucks and conveyors instead of carrying items. Carrying is hard on your hands, arms and back, and can make a slip or trip more likely.

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- Work at waist height – Too much bending, kneeling and squatting puts strain on your back, knees and hips.
- Keep a level head – Tipping, tilting or twisting your head to see your workplaces strain on your neck and shoulders.
- Use low vibration hand tools – Using tools with high vibration reduces your hand strength and dexterity and increases the chance of injury.
- Change it up – Moving the same way over and over for a long time can lead to fatigue, mistakes, and injury. Reduce how often and how long risky tasks are done.
- Match work height to the task – Set your work a little below elbow height when you have to use more force. Set your work a little above elbow height when the task needs a light touch and a better view.

Switches

- **Scope:** This subsection does not apply to concrete vibrators, concrete breakers, powered tampers, jack hammers, rock drills, and similar hand operated power tools.
- All hand-held powered platen sanders, grinders with wheels two-inch diameter or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws, and jigsaws with blade shanks 1/4 of an inch wide or less may be equipped with only a positive "on-off" control.
- All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than two inches in diameter, disc sanders, belt sanders, reciprocating saws, saber saws, and other similar operating powered tools must be equipped with a momentary contact "on-off" control and may have a lock-on control provided that turn-off can be accomplished by a single motion of the same finger or fingers that turn it on.
- All other hand-held powered tools, such as circular saws, chain saws, and percussion tools, must be equipped with a constant pressure switch that will shut off the power when the pressure is released.
- **Disconnect switches:** All fixed power-driven tools must be provided with a disconnect switch that can either be locked or tagged in the off position.
- **Self-feed:** Automatic feeding devices must be installed on machines whenever the nature of the work permits. Feeder attachments must have the feed rolls or other moving parts covered or guarded to protect the operator from hazardous points.

HAND TOOLS

- You must not issue or permit the use of unsafe hand tools.
- You must not use wrenches, including adjustable, pipe, end, and socket wrenches when jaws are sprung or worn to the point that slippage occurs.
- You must not cut nails with an axe.

- You must keep impact tools, such as drift pins, wedges, and chisels, free of mushroomed heads.
- You must keep the wooden handles of tools free of splinters or cracks and must be kept tight in the tool.

POWER OPERATED HAND TOOLS

- **Electric power-operated tools:**
  - Electric power operated tools must either be of the approved double-insulated type or grounded in accordance with 29 CFR Part 1926 Subpart K and I, and WAC 296-155-360.
  - The use of electric cords for hoisting or lowering tools must not be permitted.
- **Pneumatic power tools:**
  - Pneumatic power tools and hose sections must be secured by threaded couplings, quick disconnect couplings or by 100-pound tensile strength safety chain or equivalent across each connection to prevent the tool or hose connections from becoming accidentally disconnected.
  - Safety clips or retainers must be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.
  - All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, must have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.

Exception: Pneumatic nailers or staplers utilizing “fine wire” brads or staples do not require a muzzle contact safety device, provided:

- The overall weight of the fastening device does not exceed the weight of standard 18-gauge wire, 1-1/2 inches long.
- The operator and any other person within 12 feet of the point of operation wear approved eye protection.

Note: The normal maximum diameter tolerance for manufacturing standard 18-gauge wire is .045 inches.

- You must not use compressed air at the nozzle for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment which meets the requirements of 29 CFR Part 1926 Subpart E and WAC 296-56-60109.

Note: The above requirement does not apply to concrete form, mill scale and similar cleaning purposes. Concrete form, mill scale, and similar cleaning may be performed with air pressure exceeding 30 psi provided the nozzle and/or cleaning pipe is at least 3 feet long with a quick-closing (deadman) valve between the hose and the nozzle or pipe. The operator and all other employees within range of flying debris must be protected by eye or face protection as specified in WAC 296-155-215.

- You must not exceed the manufacture's safe operating pressure for hoses, pipes, valves, filters, and other fittings.
- You must not permit the use of hoses for hoisting or lowering tools.
- All hoses exceeding 1/2-inch inside diameter must have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.
- Airless spray guns of the type which atomize paints and fluids at high pressures (1,000 pounds or more per square inch) must be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released.
- In lieu of the above, a diffuser nut which will prevent high pressure, high velocity release, while the nozzle tip is removed, plus a nozzle tip guard which will prevent the tip from coming into contact with the operator, or other equivalent protection, must be provided.
- **Abrasive blast cleaning nozzles:** The blast cleaning nozzles must be equipped with an operating valve which must be held open manually. Support must be provided on which the nozzle may be mounted when it is not in use.

- **Fuel powered tools:**
  - You must stop all fuel powered tools while being refueled, serviced, or maintained, and you must transport, handle, and store fuel in accordance with 29 CFR Part 1926 Subpart F and WAC 296-155-360(3)(a)(b).
  - When fuel powered tools are used in enclosed spaces, the applicable requirements for concentrations of toxic gases and use of personal protective equipment as outlined in 29 CFR Part 1926 Subpart D and E, and WAC 296-56-60243.
- **Hydraulic power tools:**
  - The fluid used in hydraulic powered tools must be fire resistant fluid approved under schedule 30 of the Bureau of Mines, U.S. Department of the Interior, 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 must not be exceeded.

POWDER ACTUATED FASTENING TOOLS

This standard provides safety requirements for a powder actuated fastening tool or machine which propels a stud, pin, fastener, or other object for the purpose of affixing it by penetration to another object.

This standard does not apply to devices designed for attaching objects to soft construction materials, such as wood, plaster, tar, dry wallboard, and the like, or to stud welding equipment.

General Requirements

- The tool must be designed to prevent inadvertent actuation.
- The tool must be designed to prevent actuation when dropped in any altitude from a height of 3 meters (10 ft) onto a smooth, hard surface such as concrete or steel, if such actuation can propel a fastener or any part thereof in free flight.
- Actuation of the tool must be dependent upon at least two separate and distinct operations by the operator, with at least one operation being separate from the operation of holding the tool against the work surface.
- The tool must be designed not to be operable other than against a work surface with a force on the work surface equal to 22 newtons (5 lb.) greater than the weight of the tool or a minimum impact energy of 4 joules (3 ft-lb).
- All tools must be designed so that compatible protective shields or fixtures, designed, built, and supplied by the manufacturer of the tool, can be used (see WAC 296-155-36307 (2)(b), (3)(b), (4)(b) and 296-155-36313(8)).
- The tool must be designed so that a determinable means of varying the power levels is available for selecting a power level adequate to perform the desired work (see WAC 296-155-36309(5)).
- The tool must be designed so that all principal functional parts can be checked for foreign matters that may affect operation.
- The tool must be designed so that all parts will be of adequate strength to resist maximum stresses imposed upon actuation when the tool is used in accordance with the manufacturer's instructions and is powered by any commercially available power load which will properly chamber in the tool.
- Each tool must bear a legible permanent model designation, which must serve as a means of identification. Each tool must also bear a legible, permanent manufacturer's unique serial number.
- You must provide a lockable container for each tool. The words "powder actuated tool" must appear in plain sight on the outside of the container. The following notice must be attached on the inside cover of the container: "WARNING – POWDER

ACTUATED TOOL, TO BE USED ONLY BY A QUALIFIED OPERATOR AND KEPT UNDER LOCK AND KEY WHEN NOT IN USE"

- Each tool must bear a durable warning label with the following statement, or the equivalent: "WARNING – FOR USE ONLY BY QUALIFIED OPERATORS ACCORDING TO MANUFACTURER'S INSTRUCTION MANUAL"
- Each tool must be supplied with the following:
    - Operator's instruction and service manual.
    - Power load chart.
    - Tool inspection record.
    - Service tools and accessories.
- In determining tool test velocities, you must measure the velocity of the fastener in free flight at a distance of two meters (6-1/2 ft) from the muzzle end of the tool, using accepted ballistic test methods.

Design Requirements - Low-velocity Class

- Low-velocity tools, indirect-acting (piston) type, as defined in WAC 296-155-36305, must meet the requirements of WAC 296-155-36307(1).
- A shield must be supplied with each tool.

Design Requirements - Medium-velocity Class

- Medium-velocity tools, indirect-acting (piston) type, as defined in WAC 296-155-36305, must meet the requirements of WAC 296-155-36307(1).
- The tool must have a shield at least 63 mm (2-1/2 in) in diameter mounted perpendicular to, and concentric with, the muzzle end, when it is indexed to the center position. A special shield or fixture may be used when it provides equivalent protection.
- The tool must be designed so that it cannot be actuated unless it is equipped with a shield or fixture.
- The tool must be designed with angle control so that it will not actuate when equipped with the standard shield indexed to the center position if the bearing surface of the shield is tilted more than 12 degrees from a flat surface.

Design Requirements - High-velocity Class

- High-velocity tools, direct-acting or indirect-acting type, as defined in WAC 296-155-36305, must meet the requirements of WAC 296-155-36307(1).
- The tool must have a shield at least 88 mm (3-1/2 in) in diameter mounted perpendicular to, and concentric with, the muzzle end, when it is indexed to the center position. A special shield or fixture may be used when it provides equivalent protection.

- The tool must be designed so that it cannot be actuated unless it is equipped with a shield or fixture.
- The tool must be designed with angle control so that it will not actuate when equipped with the standard shield indexed to the center position if the bearing surface of the shield is tilted more than 8 degrees from a flat surface.

Power Loads

- **Identification of cased power loads:** Cased power loads must be coded to identify power load levels by case color and power load color as specified in Table G-1.
- **Identification of caseless power loads:** Caseless power loads must be coded to identify power load levels by power load color as specified in Table G-1 and by configuration.
- **Power load use limitation:** No power load (cased or caseless) must be used if it will properly chamber in any existing commercially available tool and will cause a fastener to have a test velocity more than the maximum test velocities specified for the said tool.
- **Identification of power load packages:** Power load packages must provide a visual number-color indication of the power level of the power load as specified in Table G-1.
- **Optional power load variation:** Where means other than power loads of varying power levels are to be used to control penetration, such means must provide an equivalent power level variation.

Table G-1

Color Identification			Nominal velocity	
Power Level	Case Color	Load Color	Meters per Second (± 13.5)	Feet per Second (± 45)
1	Brass	Gray	91	300
2	Brass	Brown	119	390
3	Brass	Green	146	480
4	Brass	Yellow	174	570
5	Brass	Red	201	660
6	Brass	Purple	229	750
7	Nickel	Gray	256	840
8	Nickel	Brown	283	930
9	Nickel	Green	311	1020
10	Nickel	Yellow	338	1110
11	Nickel	Red	366	1200
12	Nickel	Purple	393	1290

Fasteners

Fasteners for use in power actuated tools must be designed and manufactured to function compatibly with these tools and, when used in masonry, concrete, or steel, to effect properly the application for which they are recommended.

Operation

- **Acceptable tools:** You must only use tools meeting the requirements of this standard.
- **Qualified operators:** Only qualified operators must operate tools.
- **Use lowest velocity:** You must use the lowest velocity class of tool that will properly set the fastener.
- **Operating limitations:** You must operate tools in strict accordance with the manufacturer's instructions.
- **Personal protection:** Operators, assistants, and adjacent personnel must wear eye or face protection, or both, when the tool is in use. Hearing protection must be used when making fastenings in confined areas.
- **Daily inspections:** Each day, prior to use, the operator must inspect the tool to determine that it is in proper working condition in accordance with the testing methods recommended by the manufacture [manufacturer] of the tool.
- **Defective tools:** You must immediately remove from service any tool found not to be in proper working condition and tag it "DEFECTIVE": you must not use it until it has been properly repaired in accordance with the manufacturer's instructions.

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- **Proper accessories:** You must use the proper shield, fixture, adapter, or accessory, suited for the application, as recommended, and supplied by the manufacturer.
- **Proper loads and fasteners:** You must only use those types of fasteners and power loads recommended by the tool manufacturer for a particular tool, or those providing the same level of safety and performance.
- **Questionable material:** Before fastening into any questionable material, the operator must determine its suitability by using a fastener as a center punch. If the fastener point does not easily penetrate, is not blunted, and does not fracture the material, initial test fastenings must then be made in accordance with the tool manufacturer's recommendations. (See WAC 296-155-36315(3))
- **Tool safety:** You must not load any tool unless it is being prepared for immediate use. If the work is interrupted after loading, you must unload the tool at once.
- **Powder actuated magazine or clip-fed tools** are not considered loaded unless a power load is actually in the ram (firing chamber), even though the magazine or clip is inserted in the tool. If work is interrupted, you must clear the firing chamber and remove the magazine or clip.
- **Pointing tools:** You must not load tools until just prior to the intended firing time. You must not point either loaded or empty tools at any person; you must keep hands clear of the open barrel end.
- **Tool perpendicular to work:** You must always hold the tool perpendicular to the work surface when fastening into any material, except for specific applications recommended by the tool manufacturer.
- **Misfires:** In the event of a misfire, the operator must hold the tool firmly against the work surface for a period of 30 seconds and then follow the explicit instructions set forth in the manufacturer's instructions.
- **Different power levels:** You must keep power loads of different power levels and types in separate compartments or containers.
- **Signs:** You must post a sign, at least 20 x 25 cm (8 x 10 in), using boldface type no less than 2.5 cm (1 in) in height, in plain sight on all construction projects where tools are used. The sign must bear wording like the following: "POWDER ACTUATED TOOL IN USE"

Limitations of Use

- **Explosive and flammable atmospheres:** You must not use the tool in an explosive or flammable atmosphere.
- **Unattended tools prohibited:** You must never leave a tool unattended in a place where it would be available to unauthorized persons.

- **Fasteners in hard, brittle areas:** You must not drive fasteners into very hard or brittle materials including, but not limited to, cast iron, glazed tile, hardened steel, glass block, natural rock, hollow tile, or most brick. (See WAC 296-155-36313(10))
- **Fasteners in soft materials:** You must not drive fasteners into easily penetrated or thin materials, or materials of questionable resistance, unless backed by a material that will prevent the fastener from passing completely through the other side.
- **Fasteners in steel:** You must not drive fasteners closer than 13 mm (1/2 in) from the edge of steel except for specific applications recommended by the tool manufacturer.
- **Fasteners in masonry:** You must not drive fasteners closer than 7.5 cm (3 in) from the unsupported edge of masonry materials except for specific applications recommended by the tool manufacturer.
- **Fasteners in concrete:** You must not drive fasteners into concrete unless material thickness is at least 3 times the fastener shank penetration.
- **Fasteners in spalls:** You must not drive fasteners into any spalled area.
- **Fasteners in existing holes:** You must not drive fasteners through existing holes unless a specific guide means, as recommended, and supplied by the tool manufacturer, is used to ensure positive alignment.

Maintenance and Storage

- **Use of tools:** You must have the tool serviced and inspected for worn or damaged parts at regular intervals as recommended by the tool manufacturer. Prior to the tool being put back into use, you must have all worn or damaged parts replaced by a qualified person using only parts supplied by the tool manufacturer. A record of this inspection must be noted and dated on the tool inspection record.
- **Instruction manuals:** You must store instruction manuals, maintenance tools, and accessories supplied with the tool in the tool container when not in use.
- **Security:** You must lock powder actuated tools and power loads in a container and store them in a safe place when not in use and you must ensure that they are accessible only to authorized personnel.

Authorized Instructor

- **Operator qualifications:** Only people trained and authorized by the tool manufacturer or by an authorized representative of the tool manufacturer are qualified to instruct and qualify operators for the manufacturer's powder actuated tools.
- **Instructor qualifications:** All authorized instructors must have read and be familiar with this standard, and must be capable of:
    - Disassembling, servicing, and reassembling the tool.

  - Recognizing any worn or damaged parts or defective operation.
  - Recognizing and clearly identifying the colors used to identify power load levels.
  - Using the tool correctly within the limitations of its use.
  - Training and testing operators prior to issuing a qualified operator's card.
- **Instructor's card:** All authorized instructors must have in their possession a valid authorized instructor's card issued and signed by an authorized representative of the manufacturer. The card must be wallet size of approximately 6 x 9 cm (2-1/2 x 3-1/2 in), and the face of the card must bear text like that shown in Figure G-1.
- **List of instructors:** A list of all instructors authorized by the manufacturer to instruct and qualify operators must be maintained by the tool manufacturer and be made available to the department of labor and industries.
- **Revocation of instructor card:** Instructor's card may be revoked by the authorizing agent or the department of labor and industries, if the instructor is known to have issued a qualified operator's card in violation of any regulation contained in this standard. When an instructor is no longer authorized to issue qualified operator's cards, cards must be surrendered to the authorizing agent or the department of labor and industries.

Figure G-1: Sample of Authorized Instructors Card

AUTHORIZED INSTRUCTOR

. . . . . Powder Actuated Tools Date . . . . . .
(MAKE)

Card No. . . . . Social Security No. . . . . .

This certifies that . . . . . .
(NAME OF INSTRUCTOR)

has received the prescribed training in the operation and maintenance of powder actuated tools manufactured by . . . . . .
(NAME OF MANUFACTURER)

ndis qualified to train and certify operators of . . . . . .
powder actuated tools. (MAKE)

Model(s) . . . .

Authorized by . . . .

I have received instruction by the manufacturer's authorized representative in the training of operators of the above tools and agree to conform to all rules and regulations governing the instruction of tool operators.

Date of Birth . . . .

. . . .
(SIGNATURE)

Figure G-1
Sample of Authorized Instructor's Card

Qualified Operator

- **Operator qualifications:** The operator must be trained by an authorized instructor to be familiar with the provisions of this standard and the instructions provided by the manufacturer for operation and maintenance. The operator must also be capable of:
  - Reading and understanding the manufacturer's instruction manual.
  - Cleaning the tool correctly.
  - Recognizing any worn or damaged parts or defective operation.
  - Recognizing the number-color code system used in this standard to identify power load levels. In the event the operator is unable to distinguish the colors

used, the operator must be given special instructions which will enable the operator to avoid error.

- Using a tool correctly within the limitations of its use and demonstrating competence by operating the tool in the presence of the instructor.

- **Operator examination:** After training, the operator must substantiate competency by completing satisfactorily a written examination provided by the manufacturer of the tool.
  - The operator's written examination must consist of questions to establish the operator's competence with respect to:
    - The requirements of this standard.
    - The powder actuated fastening system.
    - The specific details of operation and maintenance of the tool(s) involved.
  - The examination must provide a statement, attested to by the instructor, that the applicant can (or cannot) readily distinguish the colors used to identify power load levels (see WAC 296-155-36309).
- **Operator's card:** Each applicant who meets the requirements as set forth in subsections (1) and (2) of this section must receive a qualified operator's card, issued, and signed by both the instructor and applicant. While using the tool, the operator must carry this card.
- **Card features:** The qualified operator's card supplied by the manufacturer must be wallet size of approximately 6 x 9 cm (2-1/2 x 3-1/2 in), and the face of the card must bear text similar to that shown in Figure G-2.
- **Revocation notation:** There must be printed on the card a notation reading: "Revocation of card - Failure to comply with any of the rules and regulations for safe operation of powder actuated fastening tools must be cause for the immediate revocation of this card."

Figure G-2: Sample of Qualified Operators Card

QUALIFIED OPERATOR

. . . . . Powder Actuated Tools Date . . . . . .
(MAKE)

Card No. . . . . Social Security No. . . . . .

This certifies that . . . . . .
(NAME OF OPERATOR)

has received the prescribed training in the operation of powder actuated tools manufactured by. . . . . .
(NAME OF MANUFACTURER)

Model(s) . . . . . .

Trained and issued by . . . . . .
(SIGNATURE OF AUTHORIZED INSTRUCTOR)

I have received instruction in the safe operation and maintenance of powder actuated fastening tools of the makes and models specified and agree to conform to all rules and regulations governing that use

Date of Birth . . . . . .

. . . . . .
(SIGNATURE)

ABRASIVE WHEELS AND TOOLS

Power

- You must supply all grinding machines with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation.

Guarding

- Grinding machines must be equipped with safety guards in conformance with the requirements of American National Standards Institute, B7.1-1970, Safety Code for the Use, Care and Protection of Abrasive Wheels.
- **Guard design:** The safety guard must cover the spindle end, nut, and flange projections. The safety guard must be mounted to maintain proper alignment with the wheel, and the strength of the fastenings must exceed the strength of the guard, except:
    - Safety guards on all operations where the work provides a suitable measure of protection to the operator, may be so constructed that the spindle end, nut, and outer flange are exposed; and where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted; and
    - The spindle end, nut, and outer flange may be exposed on machines designed as portable saws.

Use of Abrasive Wheels

- Floor stand and bench mounted abrasive wheels, used for external grinding, must be provided with safety guards (protection hoods). The maximum angular exposure of the grinding wheel periphery and sides must be not more than 90°, except that when work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure must not exceed 125°. In either case, the exposure must begin not more than 65° above the horizontal plane of the spindle. Safety guards must be strong enough to withstand the effect of a bursting wheel.
- Floor and bench-mounted grinders must be provided with work rests which are rigidly supported and readily adjustable. You must adjust such work rests to a distance not to exceed 1/8 inch from the surface of the wheel. The work rest may be omitted when contacts of the work piece with the grinding surface below the horizontal plane of the spindle are necessary and unavoidable, or where the size or shape of the work piece precludes use of the work rest.
- Cup type wheels used for external grinding must be protected by either a revolving cup guard or a band type guard in accordance with the provisions of the American National Standards Institute, B7.1-1970, Safety Requirements for the Use, Care, and Protection of

Abrasive Wheels. Abrasive wheels must only be used on machines provided with safety guards, except the following:

- Wheels used for internal work while within the work being ground.
- Mounted wheels, two inches and smaller in diameter used in portable operations.
- Types 16, 17, 18, 18R and 19 cones and plugs, and threaded hole pot balls where the work offers protection or where the size does not exceed 3 inches in diameter by 5 inches in length.
- Metal centered diamond lapidary wheels either notched, segmented or continuous rim used with a coolant deflector, when operated at speeds up to 3500 surface feet per minute (S.F.P.M.).
- Type 1 wheels not larger than two inches in diameter and not more than 1/2 inch thick, operating at peripheral speeds less than 1800 SFPM when mounted on mandrels driven by portable drills.
- Type 1 reinforced wheels not more than 3 inches in diameter and 1/4 inch in thickness, operating at peripheral speeds not exceeding 9500 SFPM, if safety glasses and face shield are worn.
- Valve seat grinding wheels.

- Portable abrasive wheels used for internal grinding must be provided with safety flanges (protection flanges) meeting the requirements listed in this section, except as follows:
  - When wheels two inches or less in diameter which are securely mounted on the end of a steel mandrel are used.
  - If the wheel is entirely within the work being ground while in use.
- When safety guards are required, they must be so mounted as to maintain proper alignment with the wheel, and the guard and its fastenings must be of sufficient strength to retain fragments of the wheel in case of accidental breakage. The maximum angular exposure of the grinding wheel periphery and sides must not exceed 180°.
- When safety flanges are required, they must be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled to ensure that the pieces of the wheel will be retained in case of accidental breakage, must be used.
- You must closely inspect all abrasive wheels and ring-tested before mounting to ensure that they are free from cracks or defects.
- Grinding wheels must fit freely on the spindle and must not be forced on. The spindle nut must be tightened only enough to hold the wheel in place.
- All employees using abrasive wheels must be protected by eye protection equipment in accordance with the requirements of WAC 296-155 Part C, except when adequate eye

protection is afforded by eye shields which are permanently attached to the bench or floor stand.

Other Requirements

All abrasive wheels and tools used by employees must meet other applicable requirements of American National Standards Institute, B7.1-1970, Safety Code for the Use, Care and Protection of Abrasive Wheels.

MASONRY SAWS

Guarding

- Masonry saws must be guarded by semicircular enclosures over the blade.
- A method for retaining blade fragments must be incorporated into the design of the semicircular enclosure.

Safety Latch

A safety latch must be installed on notched saws to prevent the motor and cutting head assembly from lifting out of the notches.

Blade Speed

You must maintain blade speed in accordance with the manufacturer's specifications.

Exhaust and Eye Protection

- All table mounted masonry saws must be equipped with a mechanical means of exhausting dust into a covered receptacle or be provided with water on the saw blade for dust control. The operator and any nearby worker must wear appropriate eye protection in accordance with WAC 296-155-215.
- All portable hand-held masonry saw operators must wear appropriate eye and respiratory protection in accordance with WAC 296-155-215 and chapter 296-842 WAC.

Grounding

The motor frames of all stationary saws must be grounded through conduit, water pipe, or a driven ground. Portable saws must be grounded through 3-pole cords attached to grounded electrical systems.

Inspection

You must inspect masonry saws at regular intervals and maintain them in safe operating condition.

WOODWORKING TOOLS

Speeds

You must not operate any saw more than the manufacturer's recommended speed.

Guarding

All portable, handheld power-driven circular saws must be equipped with guards above and below the base plate or shoe. The upper guard must cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard must cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard must automatically and instantly return to the covering position.

Hand-fed Table Saws

- Each circular hand-fed table saw must be provided with a hood-type guard that will always cover the blade when the blade is not in use. This may be accomplished using a guard that will automatically adjust to the thickness of the material being cut, or by a fixed or manually adjusted guard. If a fixed or manually adjusted guard is used, the space between the bottom of the guard and the material being cut must not exceed 3/8 inch if 1-1/2 inches or more from the blade, and 1/4 inch if closer than 1-1/2 inches.
- When the blade is in use, the hood-type guard must enclose that portion of the blade above the material.
- Hood-type guards must be designed and constructed to resist blows and strains incidental to reasonable operation, adjusting, and handling, to protect the operator from flying splinters and broken saw teeth.
- The hood must be so mounted as to ensure that its operation will be positive, reliable, and in alignment with the saw. The mounting must be adequate to resist any reasonable side thrust or other force that would disrupt alignment.
- Where a hood-type guard cannot be used because of unusual shapes or cuts, you must use a jig or fixture that will provide equal safety for the operator. On the completion of such operations, you must immediately replace the guard.
- You must use a push stick on short or narrow stock when there is a possibility of the hand contacting the cutting tool.

- Each hand-fed circular ripsaw must be equipped with a spreader to minimize the possibility of material squeezing the saw or of material kickbacks. The spreader must be made of tempered steel, or its equivalent, and must be slightly thinner than the saw kerf. It must be of sufficient width to provide adequate stiffness or rigidity to resist any reasonable side thrust or blow tending to bend or throw it out of position. The spreader must be attached so that it will remain in true alignment with the blade, even when either the saw or table is tilted, and should be placed so that there is not more than 1/2-inch space between the spreader and the back of the blade when the recommended saw blade is in its maximum "up" position. If a blade smaller than the maximum permissible size is used, you must move the spreader to within 1/2 inch of the blade. The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required. On the completion of such operations, you must immediately replace the spreader.
- Each hand-fed circular ripsaw must be provided with antikickback devices so located as to oppose the thrust or tendency of the saw blade to pick up the material or throw it back toward the operator. These devices must be designed to provide holding power for all the thicknesses of material being cut.

RADIAL SAWS

Hoods and Guards

Each saw must be provided with a device that will completely enclose the upper portion of the blade down to a point that includes the end of the saw arbor. The upper hood must be so constructed as to protect the operator from flying splinters and broken saw teeth, and to deflect sawdust away from the operator. The sides of the lower exposed portion of the saw blade must be guarded from the tips of the blade teeth inward radially with no greater than 3/8-inch gullet exposure. The device must automatically adjust itself to the thickness of the stock and remain in contact with the stock being cut for the 90° blade positions (0° bevel) throughout the full working range of miter position. A permanent label not less than 1-1/2 inches X 3/4 inch must be affixed to the guard visible from the normal operating position, reading as follows: "WARNING: TO AVOID INJURY, SHUT OFF POWER BEFORE CLEARING A JAMMED LOWER GUARD" Such a label must be colored standard danger red or orange in accordance with American National Standard Safety Color Code for Marking Physical Hazards, Z535.1.

Spreaders

When radial saws are used for ripping, a spreader must be provided and must be aligned with the saw blade.

Antikickback Devices

You must use antikickback devices located on both sides of the saw blade on the outfeed side, to oppose the thrust or tendency of the blade to pick up the material or to throw it back toward the operator, on each radial saw used for ripping. These devices must be designed to provide adequate holding power for all the thicknesses of material being cut.

Adjustable Stops and Return Devices

- An adjustable stop must be provided to prevent the forward travel of the blade beyond the position necessary to complete the cut. A limit chain or other equally effective device must be provided to prevent the saw blade from sliding beyond the edge of the table; or the table must be extended to eliminate over-run.
- On any manually operated saw, installation must be such that the front of the machine is slightly higher than the rear, or some other means must be provided so that the cutting head will not roll or move out on the arm away from the column because of gravity or vibration. A permanent label not less than 1-1/2 inches X 3/4 inch must be affixed to the cutting head visible from the normal crosscut operating position, reading as follows: "WARNING: TO AVOID INJURY, RETURN CARRIAGE TO THE FULL REAR POSITION AFTER EACH CROSSCUT TYPE OF OPERATION" Such a label must be colored standard caution yellow in accordance with American National Standard Z535.1.
- **Direction of feed:** Ripping and ploughing must be against the direction in which the saw blade turns. The direction of the saw blade rotation must be conspicuously marked on the hoods. In addition, a permanent label not less than 1-1/2 inches X 3/4 inch must be affixed to the end of the guard at which the blade teeth exit the upper guard during operation. The label must be at approximately the level of the arbor and must read as follows: "DANGLER: TO AVOID INJURY, DO NOT FEED MATERIALS INTO CUTTING TOOL FROM THIS END" Such a label must be colored standard red or orange in accordance with American National Standard, Z53.1-1979.
- All woodworking tools and machinery must meet any other applicable requirements of American National Standards Institute, 01.1-1971, Safety Code for Woodworking Machinery.
- The control switch on all stationary radial arm saws must be placed at the front of the saw or table and must be properly recessed or hooded to prevent accidental contact.
- You must provide a firm level working area at the front of all stationary radial arm saws. You must keep the area free of all stumbling hazards.
- You must use a push stick or similar device must be used for pushing short material through power saws.

- **Circular power miter saws:** The same requirements of radial saw hoods and guards apply to guarding circular power miter saws.
- **Personal protective equipment:** All personal protective equipment required for use must conform to the requirements of WAC 296-155 Part C.

JACKS – LEVER AND RATCHET, SCREWS, AND HYDRAULICS

General Requirements

- The manufacturer's rated capacity must be legibly marked on all jacks, and you must not exceed this capacity.
- All jacks must have a positive stop to prevent over-travel.
- Specially designed jacks constructed for specific purposes must meet the approval of the department of labor and industries before being placed in service.
- Control parts must be designed so that the operator will not be subjected to hazard.
- **Blocking:** When it is necessary to provide a firm foundation, you must block or crib the base of the jack. Where there is a possibility of slippage of the metal cap of the jack, you must place a wood block between the cap and the load.

Operation and Maintenance

- After the load has been raised, you must immediately crib, block, or otherwise secure it.
- You must supply hydraulic jacks exposed to freezing temperatures with an adequate antifreeze liquid.
- You must properly lubricate all jacks at regular intervals. You should follow the lubricating instructions of the manufacturer, and only lubricants recommended by the manufacturer should be used.
- You must thoroughly inspect each jack at times which depend upon the service conditions. You must perform inspections at least as frequently as the following:
    - For constant or intermittent use at one locality, once every 6 months.
    - For jacks sent out of shop for special work, when sent out and when returned.
    - For a jacks subjected to abnormal load or shock, immediately before and immediately thereafter.
    - You must examine repair or replacement parts for possible defects.
    - You must tag jacks which are out of order accordingly, and you must not use them until repairs are made.

AIR RECEIVERS

Application

Hand and Power Tools

This section applies to compressed air receivers, and other equipment used in providing and utilizing compressed air for performing operations such as cleaning, drilling, hoisting, and chipping. On the other hand, however, this section does not deal with the special problems created by using compressed air to convey materials nor the problems created when persons work in compressed air as in tunnels and caissons. These standards are not intended to apply to compressed air machinery and equipment used on transportation vehicles such as steam railroad cars, electric railway cars, and automotive equipment.

New and Existing Equipment

- All new air receivers installed after the effective date of WAC 296-155-380 (05/20/2016) must be constructed in accordance with the 1968 Edition of the A.S.M.E. Boiler and Pressure Vessel Code, section VIII.
- All safety valves used must be constructed, installed, and maintained in accordance with the A.S.M.E. Boiler and Pressure Vessel Code, section VIII Edition 1968.

Installation

Air receivers must be so installed that all drains, handholes, and manholes therein are easily accessible. Air receivers should be supported with sufficient clearance to permit a complete external inspection and to avoid corrosion of external surfaces. Under no circumstances must an air receiver be buried underground or located in an inaccessible place. The receiver should be located as close to the compressor or after-cooler as is possible to keep the discharge pipe short.

Drains and Trap

All air receivers having an internal and external operating pressure exceeding 15 psi with no limitation on size, and air receivers having an inside diameter exceeding 6 inches, with no limitation on pressure, if subject to corrosion, must be supplied with a drain pipe and valve at the lowest point in the vessel; or a pipe may be used extending inward from any other location to within 1/4 inch of the lowest point. Adequate automatic traps may be installed in addition to drain valves. The drain valve on the air receiver must be opened and the receiver completely drained frequently and at such intervals as to prevent the accumulation of oil and water in the receiver.

Gages and Valves

- Every air receiver must be equipped with an indicating pressure gage (so located as to be readily visible) and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves must be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10%.
- You must not place any valve of any type between the air receiver and its safety valve or valves.

- Safety appliances, such as safety valves, indicating devices and controlling devices, must be constructed, located, and installed so that they cannot be readily rendered inoperative by any means, including the elements.
- You must test all safety valves frequently and at regular intervals to determine whether they are in good operating condition.