

MACHINERY AND MACHINE GUARDING SUBPART O

It is important to understand how Subpart O applies to machinery in the workplace. Section 212 is a general (or a horizontal) standard that applies to all machines not specifically mentioned elsewhere in other sections of Subpart O. The other sections are specific (vertical) standards that apply to particular types of machines; e.g., Section 213 applies only to woodworking machinery.

DEFINITIONS - 1910.211

In order to properly apply these standards, it is essential to understand the meaning of the machinery terms as prescribed in this section.

GENERAL REQUIREMENTS FOR ALL MACHINES - 1910.212

Machine Guarding

One or more methods of machine guarding shall be provided to protect employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks.

Guards shall be affixed to the machine where possible and secured elsewhere if not possible.

A guard shall not offer an accident hazard in itself.

The point of operation of machines whose operation exposes an employee to injury shall be guarded.

Revolving drums, barrels and containers shall be guarded by an enclosure which is interlocked with the drive mechanism.

When the periphery of the blades of a fan is less than 7 feet above the floor or working level, the blades shall be guarded with a guard having openings no larger than ½ inch.

Anchoring Fixed Machinery

Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

WOODWORKING MACHINERY REQUIREMENTS - 1910.213

Machine Construction, General

Each machine shall be so constructed as to be free from sensible (able to be felt) vibration when the largest size tool is mounted and run idle (no cutting load) at full speed.

Machine Controls and Equipment

A mechanical or electrical power control shall be provided on each machine to make it possible for operators to cut off the power from each machine without leaving their position at the point of operation.

On applications where injury to the operator might result if motors were to restart after power failures, provision shall be made to prevent machines from automatically restarting upon restoration of power.

Power controls and operating controls should be located within easy reach of the operators while they are at their regular work location, making it unnecessary for them to reach over the cutter to make adjustments. This does not apply to constant pressure controls used only for setup purposes.

Specific Machine Requirements

The remaining paragraphs of Section 213 contain guarding requirements for specific woodworking machines. A discussion of some of these requirements follows.

All woodworking machinery such as table saws, swing saws, radial saws, band saws, jointers, tenoning machines, boring and mortising machines, shapers,

planers, lathes, sanders, veneer cutters, and other miscellaneous woodworking machinery shall be effectively guarded to protect the operator and other employees from hazards inherent to their operation.

Table Saws

Circular table saws shall have a hood over the portion of the saw above the table, so mounted that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut.

Circular table saws shall have a spreader aligned with the blade, spaced no more than one-half inch behind the largest blade mounted in the saw. The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required.

Circular table saws used for ripping shall have nonkickback fingers or dogs.

Feed rolls and blades of self-feed circular saws shall be protected by a hood or guard to prevent the hand of the operator from coming into contact with the in-running rolls at any point.

Swing or Sliding Cut-Off Saws

All swing or sliding cut-off saws shall be provided with a hood that will completely enclose the upper half of the saw.

Limit stops shall be provided to prevent swing or sliding type cut-off saws from extending beyond the front or back edges of the table.

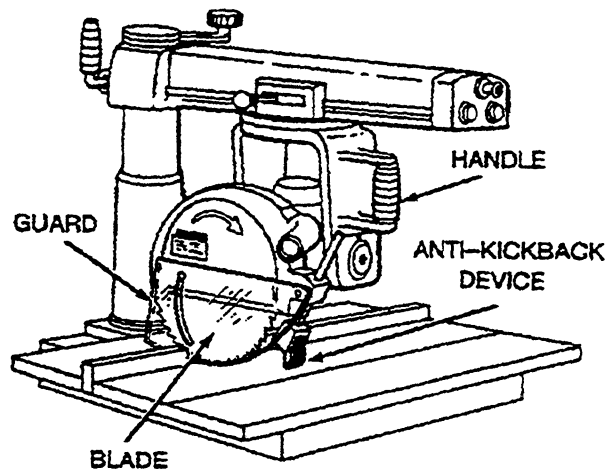
Each swing or sliding cut-off saw shall be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel.

Inverted sawing or swing cut-off saws shall be provided with a hood that will cover the part of the saw that protrudes above the top of the table or material being cut.

Radial Saws

The upper hood shall completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor.

The sides of the lower exposed portion of the blade shall be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock and remain in contact with stock being cut.



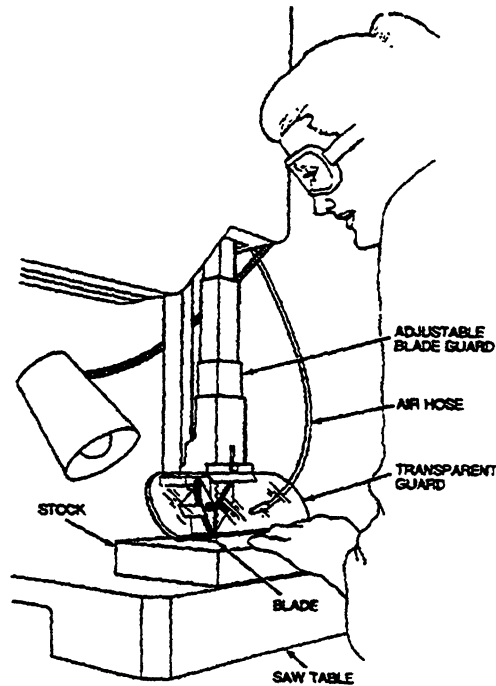
Radial saws used for ripping shall have nonkickback fingers or dogs.

An adjustable stop shall be provided to prevent the forward travel of the blade beyond the position necessary to complete the cut in repetitive operations.

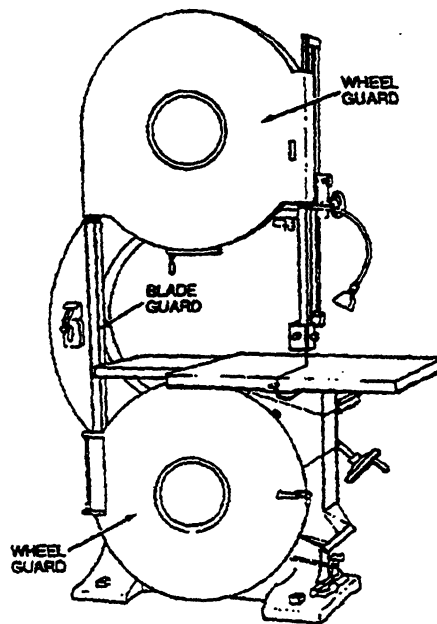
Installation shall be in such a manner that the front end of the unit will be slightly higher than the rear, so as to cause the cutting head to return gently to the starting position when released by the operator.

Bandsaws and Band Resaws

All portions of the saw blade shall be enclosed or guarded, except for the working portion of the blade between the bottom of the guide rolls and the table. See figure below.

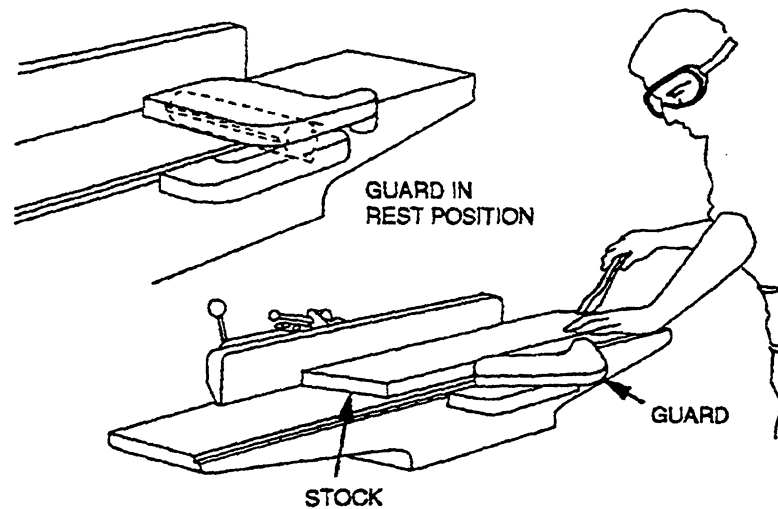


Bandsaw wheels shall be fully encased. The outside periphery of the enclosure shall be solid. The front and back shall be either solid or wire mesh or perforated metal.



Jointers

Each hand-fed jointer with horizontal cutting head shall be equipped with an automatic guard which will cover all the section of the head on the working side of the fence or gage.



Miscellaneous Woodworking Machines

This paragraph states that the mention of specific machines in previous paragraphs "is not intended to exclude other woodworking machines from the requirement that suitable guards and exhaust hoods be provided to reduce to a minimum the hazard due to the point of operation of such machines."

ABRASIVE WHEEL MACHINERY - 1910.215

This section regulates only abrasive wheel machinery. It does not cover wire wheels, buffing wheels or the like. An abrasive wheel is made up of individual particles that are bonded together to form a wheel. The hazard here, of course, is that if not properly mounted and used, the wheel can literally explode! Sections of the wheel may fly out at high speeds and can strike the operator causing death or serious injury.

General Requirements

Machine Guarding

Abrasive wheels shall be used only on machines provided with safety guards with the following exceptions:

- Wheels used for internal work while within the work being ground;
- Mounted wheels, used in portable operations, 2 inches and smaller in diameter; and
- Type 16, 17, 18, 18R, and 19 cones, plugs, and threaded hole pot balls where the work offers protection.

Guard Design

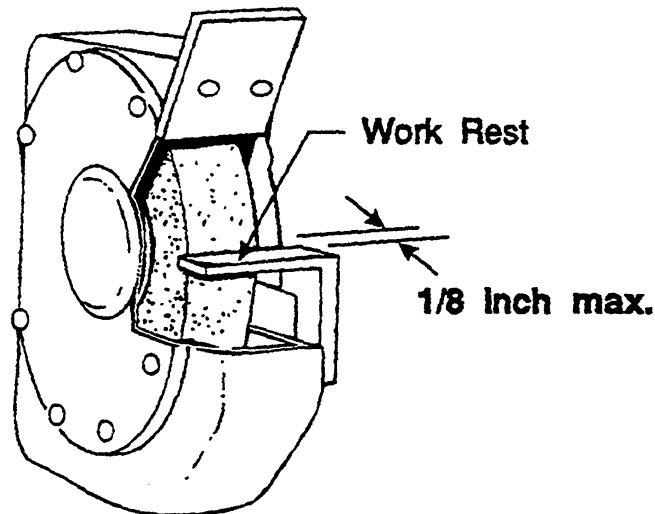
Abrasive wheel safety guards shall cover the spindle end, nut, and flange projections, except:

- 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;

- 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.

Work Rests

On offhand grinding machines, adjustable work rests of rigid construction shall be used to support the work. Work rests shall be kept adjusted closely to the wheel with a maximum opening of $\frac{1}{8}$ inch to prevent the work from being jammed between the wheel and the rest, which may cause breakage.

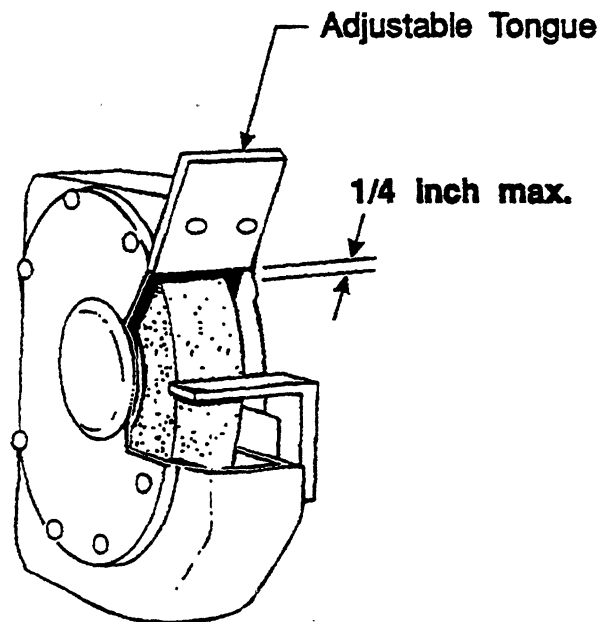


Angular Exposure

Abrasive wheel safety guards for bench and floor stands, and for cylindrical grinders shall not expose the grinding wheel periphery for more than 65 degrees above the horizontal plane of the wheel spindle.

Exposure Adjustment

The protecting member of the abrasive wheel safety guard shall be adjustable for variations in wheel size so that the distance between the wheel periphery and the adjustable tongue or the end of the peripheral member at the top shall never exceed $\frac{1}{4}$ inch.



Mounting

Immediately before mounting, all wheels shall be closely inspected and sounded by the user (ring test) to make sure they have not been damaged.

The spindle speed of the machine shall be checked before mounting of the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel.

MILLS AND CALENDERS - 1910.216

This section regulates mills and calenders in the rubber and plastics industries. Due to the specialized nature of these rules, they are beyond the scope of this discussion.

MECHANICAL POWER PRESSES - 1910.217

This section deals with mechanical power presses. This is a specialized, complex topic that is beyond the scope of this discussion. There are, however, some basic rules that may be stated here:

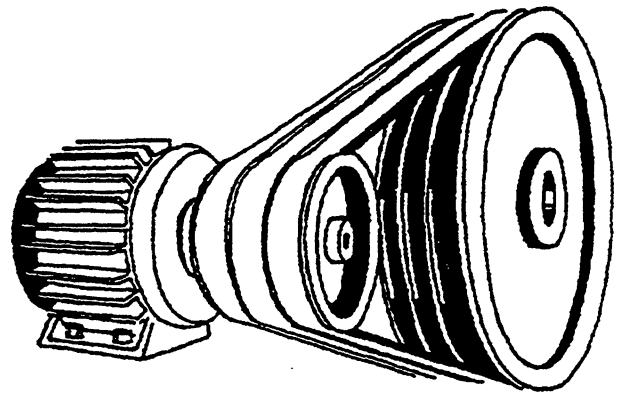
- The employer shall provide and ensure the usage of point-of-operation guards or properly applied and adjusted point-of-operation devices to prevent entry of hands or fingers into the point of operation by reaching through, over, under and around the guard on every operation performed on a mechanical power press. This requirement shall not apply when the point-of-operation opening is $\frac{1}{4}$ inch or less.
- A substantial guard shall be placed over the treadle on foot-operated presses.
- Pedal counterweights, if provided on foot-operated presses, shall have the path of the travel of the weight enclosed.
- Machines using full revolution clutches shall incorporate a single stroke mechanism, except where automatically fed in continuous operation and the points of operation are fully safe-guarded by a fixed barrier guard.
- Employers shall establish a program of regular inspections of their power presses to ensure safe operating condition, and shall maintain a record of inspections and maintenance work.
- All point-of-operation injuries must be reported to OSHA or the State agency within 30 days.

FORGING MACHINES - 1910.218

This section regulates forging machines. This is a highly specialized industry and this topic is beyond the scope of this discussion.

MECHANICAL POWER-TRANSMISSION APPARATUS - 1910.219

Mechanical power transmission apparatus refers to all components of the mechanical system which transmit energy from the prime mover (power source) to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, shafting, couplings, cams, spindles,



chains, cranks, and gears. The primary thrust of these regulations is to ensure that employees cannot be injured from being caught by rotating members, in-running nip points, sprockets or pulleys, and the like.

This section contains detailed requirements for the safeguarding of all the above-mentioned mechanical power transmission components. Some of these are discussed below.

Guards for mechanical power transmission equipment shall be made of metal or other suitable material. Wood guards may be used in the wood working and chemical industries, in industries where atmospheric conditions would rapidly deteriorate metal guards, or where temperature extremes make metal guards undesirable.

All pulleys, belts, sprockets and chains, flywheels, shafting and shaft projections, gears, and couplings, or other rotating or reciprocating parts, or any portion thereof, within 7 feet of the floor or working platform shall be effectively guarded.

All guards for inclined belts shall conform to the standards for construction of

horizontal belts, and shall be arranged in such a manner that a minimum clearance of 7 feet is maintained between the belt and floor at any point outside the guard.

Flywheels protruding through a working floor shall be guarded.

Where both runs of horizontal belts are 7 feet or less from the floor or working surface, the guard shall extend at least 15 inches above the belt.

Where gears require a guard, the guard shall extend 6 inches above the mesh point by a band guard covering the face, or be completely enclosed.

Couplings with bolts, nuts or set screws extending beyond the flange of the coupling shall be guarded by a safety sleeve.

Belts, pulleys, and shafting located in rooms used exclusively for power transmission apparatus need not be guarded when the following requirements are met:

- The basement, tower, or room occupied by transmission equipment is locked against unauthorized entrance;
- The vertical clearance in passageways between the floor and power transmission beams, ceiling, or any other objects is not less than 5 feet 6 inches;
- The intensity of illumination conforms to the requirements of ANSI A11.1-1965 (R1970);
- The route followed by the oiler is protected in such a manner as to prevent accidents.