



## DEPARTMENT OF ENERGY, LABOR & ECONOMIC GROWTH DIRECTOR'S OFFICE GENERAL INDUSTRY SAFETY STANDARDS

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(By authority conferred on the director of the department of consumer and industry services by sections 16 and 21 of Act No. 154 of the Public Acts of 1974, as amended, and Executive Reorganization Order No. 1996-2, being §§408.1016, 408.1021, and 445.2001 of the Michigan Compiled Laws)

R 408.12613 is Rescinded. R 408.12615 and R 408.12617 are effective as of the date of this amendment.

### PART 26. METALWORKING MACHINERY

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#### GENERAL PROVISIONS

##### R 408.12601. Scope.

**Rule 2601.** This part sets forth rules, not covered in other standards, for the safety of employees in all places of employment where a hazard may exist in the use of metalworking machinery. Press brakes and handheld portable powered tools are not included in this part.

##### R 408.12602. Applicability.

**Rule 2602.** (1) A metalworking machine with the point of operation inaccessible or remote from the operator and other assigned employees shall not be required to have guarding for the point of operation.

(2) The general rules of this part apply to all metal working machinery.

(3) The specific rules shall apply only to those metalworking machines specified.

##### R 408.12603. Definitions A to C.

**Rule 2603.** (1) "Aisle" means a designated path of travel for vehicles and employees.

(2) "Alligator shear" means a machine having a powered blade and a fixed blade which creates a shearing action when the moving blade meets the fixed blade.

(3) "Awareness device" means a device that will warn the operator that he or she is approaching the point of operation.

(4) "Barrier" means protection for an operator from a hazard point on machinery and equipment.

(5) "Boring machine" means a machine with a boring tool which, when brought into contact with metal by force, increases the size of a hole.

(6) "Circular metal saw" means a machine with a support for the material and with a circular blade which is used for cutting metal.

(7) "Cold header" means a machine consisting of a set of dies that, when closed by a ram with a hammer action, forms headed parts such as bolts or rivets from rod stock.

##### R 408.12604. Definitions F to L.

**Rule 2604.** (1) "Fixed barrier" means a type of guard, attached by fasteners that cannot be readily removed, that keeps the operator from the point of operation.

(2) "Interlocked barrier" means a type of guard with a control interlocked with a machine circuit that will stop the machine if the barrier is removed or opened.

(3) "Lockout" means to secure by use of a lock.

**R 408.12605. Definitions M, O.**

**Rule 2605.** (1) "Metal band saw" means a machine that is equipped with 2 wheels on which a continuous blade is used for metal cutting purposes.

(2) "Metal embossing machine" means a machine that imparts a design to a piece of metal by pressure.

(3) "Metalworking machinery" means a machine which removes, forms, works, or shapes metal or which is used to assemble parts.

(4) "Milling machine" means a machine with a multi-edged revolving cutter which, when brought into contact with metal, makes a desired cut.

(5) "Multislide" means a machine which has dies attached to ends of multiple slides and which, when actuated, brings the dies together to piece, form, or bend coil stock into a desired shape.

(6) "Operator" means an employee who controls the machine or operation.

(7) "Operator's position" means that location where an operator controls a machine or operation.

(8) "Other assigned employees" means those employees who service or attend a machine or operation.

**R 408.12606. Definition P.**

**Rule 2606.** (1) "Pay off", sometimes called a top hat, means an uncoiling device upon which the undrawn coil of wire rests.

(2) "Pinch point" means a point where it is possible to be caught between the moving parts of a machine and the material in process or between moving and stationary parts of a machine.

(3) "Planer" means a machine with a cutting tool held stationary while the work is moved back and forth underneath it to reduce 1 of its dimensions.

(4) "Point of operation" means that point at which cutting, shaping, working, assembly or forming is accomplished upon the stock.

(5) "Point of operation device" means a control or attachment which:

- (a) Restrains the operator from inadvertently reaching into the point of operation.
- (b) Prevents normal machine operation if the operator's hands are inadvertently within the point of operation.
- (c) Automatically withdraws the operator's hands if they are within the point of operation as the machine cycles.

(6) "Powered bender" means a machine consisting of dies or fixtures located between a moving and a fixed machine part. When metal is placed between the parts, the moving part is pressed against the fixed part, bending the metal to a desired shape.

(7) "Powered feed rolls" means parallel rolls that run inward to move material into the point of operation of a machine.

(8) "Presence sensing device" means a device designed, constructed and arranged to create a sensing field or area and to deactivate the point of operation when an operator's hand or other body part is within such field or area.

**R 408.12607. Definitions R, S.**

**Rule 2607.** (1) "Remote" means that an operator or other assigned employee who is operating or attending a machine cannot, because of distance or location, place any part of his

or her body within the point of operation when a hazard exists.

(2) "Riveter" means a machine that consists of a ram with a tool attached so that, when pressed against a fixed part with a rivet or other fastener in between, it will cause pieces of material to be joined together.

(3) "Roll form machine" means a machine with in-running rolls so arranged to form a desired shape of metal when the metal is fed through the rolls.

(4) "Safety factor" means the ratio of the breaking strength of a piece of material or an object to the maximum designed load or stress applied when in use.

(5) "Slitter" means a machine which has circular knives mounted on powered shafts with the cutting faces adjacent to each other in a manner that shears metal when it is fed through the knives.

(6) "Squaring shear" means a machine that has a table which utilizes a driven ram with a blade for shearing action. The ram moves a nonrotary blade at a constant rate past the edge of a fixed blade at the table and cuts metal.

**R 408.12608. Definitions T to W.**

**Rule 2608.** (1) "Tumbling mill" means a machine with a powered revolving container which is used to dry, smooth or polish metal parts.

(2) "Wire drawing machine" means a machine that draws or pulls metal wire or rod through a predetermined size of die to reduce its diameter.

**R 408.12611. Employer responsibility.**

**Rule 2611.** An employer shall:

- (a) Provide training to each employee as to the potential hazards and safe operation of the assigned job.
- (b) Maintain metalworking machinery, in conformance with this part.
- (c) Establish and maintain a lockout procedure as prescribed in subrule (1) or rule 2618.

**R 408.12612. Employee responsibility.**

**Rule 2612.** An employee shall:

- (a) Not use machinery and equipment unless authorized and trained in its use.
- (b) Report defective machinery and equipment and hazardous conditions, when detected, to his/her supervisor.
- (c) Not remove guards from machinery and equipment except when necessary for servicing. The guard shall be replaced before returning the machinery or equipment to normal operation.
- (d) Not wear loose clothing and neckwear encircling the neck or exposed jewelry, such as rings and necklaces, near a machine having reciprocating or rotating shafts or spindles.

**R 408.12613. Rescinded.**

**R 408.12614. Rescinded.**

**R 408.12615. Aisles, floor, and platforms.**

**Rule 2615.** (1) The outline of a designated aisle shall be marked or otherwise indicated.

(2) A designated aisle shall be not less than 4 feet wide and access shall be maintained from a work station to an aisle.

**R 408.12616. Machine and equipment installation.**

**Rule 2616.** (1) A metalworking machine or equipment shall be installed so that the normal operator's position is not in an aisle, or the employee shall be protected by a standard barrier as prescribed in rule 231 of the general industry safety standards commission standard, Part 2. Floor and

Wall Openings, Stairways and Skylights, being R 408.10231 of the Michigan Administrative Code.

(2) Metalworking machines and equipment, except portable types, shall be fastened to a floor, platform or bench to prevent tipping or inadvertent movement, or be equipped with nonslip pads.

(3) Electrically powered metalworking machines and equipment shall be grounded.

(4) Provision shall be made to prevent metalworking machines and equipment from automatically restarting upon restoration of power after a power interruption, if such restart would be hazardous.

#### **R 408.12617. Controls.**

**Rule 2617.** (1) When a presence-sensing device is used as a safety device, the control shall incorporate a fail-safe feature.

(2) Machine start controls shall be designed and installed or guarded to prevent unintentional activation by contact with objects or a part of the body.

(3) A machine shall be provided with a stop device within reach of the operator's designated position.

#### **R 408.12618. Maintenance and lubrication.**

**Rule 2618.** (1) A power source of any metalworking machine or equipment to be repaired or services shall be locked out and, where required, residual pressure relieved by each employee doing such work if unexpected motion would cause injury, except where power is essential for testing and set up.

(2) Lubrication shall be accomplished by 1 of the following:

- (a) Manually, when the machine can be shut off and locked out.
- (b) Automatic pressure or gravity feed system.
- (c) Extension pipe leading to an area outside of guards or away from any hazard.
- (d) Or a means which would provide equal or greater protection to the employee than (a), (b) or (c).

(3) In any case, rule 732 of the general industry safety standards commission standard, Part 7. Guards for Power Transmission, being R 408.10732 of the Michigan Administrative Code, shall be followed.

#### **R 408.12619. Hydraulic and pneumatic systems.**

**Rule 2619.** (1) A hydraulic or pneumatic system shall be designed and constructed to have a safety factor of not less than 4.

(2) Hydraulic or pneumatic flexible lines shall be protected from chafing.

(3) When hydraulic, air or steam lines are bled, equipment supported by these systems shall be physically blocked or otherwise secured by means other than components in the circuit, to provide for the safety of employees working on or about the equipment.

#### **R 408.12620. Chip Guards; protection from coolant splash.**

**Rule 2620.** (1) Chips which create a hazard shall be controlled by a chip guard that is located between the point of operation and any employee within range.

(2) If a machine uses a coolant, an employee shall be protected from coolant splash.

(3) Chips, dust, or sludge shall be removed by brush, tools, or mechanical means. Where air pressure is used, the discharge of a hand-held nozzle shall be less than 30 pounds per square inch under a static flow condition.

#### **R 408.12622. Electric magnets and vacuum chucks.**

**Rule 2622.** (1) A grinding machine with a rotating table and equipped with a magnetic or vacuum chuck to hold the stock shall be interlocked to prevent contact between the stock and tool, unless the stock is secured to the table or chuck and the employee is protected by a guard capable of retaining flying stock within the machine.

(2) A grinding machine with a reciprocating table and equipped with a magnetic or vacuum chuck to hold the stock shall have an end guard to protect an employee from flying stock or tools, or the machine shall meet the following conditions:

- (a) The machine shall be located so that, in case of chuck or magnet failure, any flying material or object will carry into a solid wall.
- (b) The wall shall be covered with an energy absorptive material capable of absorbing the shock and preventing the ricocheting of flying materials. Plaster board shall not be used where coolant is used in the operation.
- (c) The machine shall be positioned so as not to allow room for an employee to pass between the machine and the wall.

### SPECIFIC EQUIPMENT

#### **R 408.12631. Squaring shear.**

**Rule 2631.** (1) A squaring shear, mechanical or manual, shall have 1 of the following:

- (a) The blade and hold down clamp guarded by a fixed barrier set in accordance with figure 1.
- (b) Automatic clamps set within 1/4 inch of the table or stock with the cutouts filled in so that the fingers of the operator cannot enter the pinch point.
- (c) A self-adjusting barrier with a limit of not more than 1/4 inch above the table or material.

(2) Where small stock is being sheared, a pusher stick shall be provided and used.

(3) An employee tending the backside of a squaring shear shall be separated from the moving parts by a table, rack or chute, such as the back gauge, shear blade or work piece on which the sheared stock shall fall before being handled, or the point of operation shall be guarded as prescribed in subdivision (a) of subrule 1. The table, rack or chute shall maintain the employee's position not less than 3 feet from the point of operation or a hazardous moving part.

(4) An automatically fed squaring shear shall be guarded by a barrier so located to prevent access to the point of operation. The guard may be swung aside for hand feeding, providing the control is on inch setting.

#### **R 408.12632. Circular metal saws.**

**Rule 2632.** (1) A circular metal saw shall meet all of the following:

- (a) Have a guard made of material not less than 1/8 inch thick and capable of protecting the operator from broken teeth of the blade and chips. The guard shall enclose not less than the upper half of the blade, including the arbor and nut, and be positioned to stop sparks and chips from striking the operator.
- (b) Have a water tank below the table or an enclosure to trap sparks and chips.
- (c) Have a braking means capable of stopping the saw within 20 seconds, or the operator shall stand-by until the blade stops.

(2) A circular metal saw wheel or blade shall be operated at not more than its rated speed.

**R 408.12633. Bar stock and rod machines; screw machines; thread machines.**

**Rule 2633.** A bar stock and rod machine, screw machine or thread machine shall have the bar stock that extends beyond the machine guarded by a trough or tube or guarded by a standard barrier as prescribed in Part 2. Floor and Wall Openings, Stairways, and Skylights, being R 408.10201 et seq. of the Michigan Administrative Code.

**R 408.12634. Planers.**

**Rule 2634.** (1) A planer shall have the openings in the bed under the table, covered, and have a barrier protecting an employee if the table or material travels within 18 inches of a fixed object, such as a wall or post.

(2) An employee shall not ride the table of a planer unless he or she is protected against falling off the table.

**R 408.12635. Metal band saws.**

**Rule 2635.** (1) A vertical metal band saw shall be guarded as follows:

- (a) The band wheels and all portions of the blade, except as provided by subdivision (b) of this subrule, shall be fully enclosed by solid material or perforated metal which prevents the operator from coming in contact with the blade.
- (b) The portion of the blade between the table and the front side of the upper wheel shall have an adjustable blade guard that is maintained with 1/4 inch of the work to be cut or the holder of the material being cut.

(2) A horizontal metal band saw shall be guarded as follows:

- (a) The band wheels and the upper portion of the blade shall be fully enclosed by solid material or perforated metal which prevents the operator from coming in contact with the upper portion of the blade.
- (b) The guides shall be maintained as close as practical to the stock being cut.

(3) A horizontal metal band saw used in a vertical position shall be guarded as required by the provisions of subrule (1) of this rule.

**R 408.12636. Metal embossing machines.**

**Rule 2636.** (1) A press-type metal embossing machine shall be guarded at the point of operation as prescribed in the general industry safety standards commission standards, Part 23. Hydraulic Power Presses or Part 24. Mechanical Power Presses, being R 408.12301 et seq. and R 408.12401 et seq., respectively, of the Michigan Administrative Code.

(2) A powered roll type metal embossing machine shall be guarded as prescribed in R 408.12637.

**R 408.12637. Powered feed rolls.**

**Rule 2637.** Powered feed rolls shall have 1 of the following:

- (a) The in-running side of the feed rolls guarded by a barrier, fixed or adjustable, so designed that the material can be fed without permitting the fingers to be caught between the feed rolls or feed rolls and guard.
- (b) An emergency stop device which can be activated by the body to stop the feed rolls. When an emergency stop device has been actuated, it shall be required that the machine be restarted manually.

**R 408.12638. Wire drawing machines.**

**Rule 2638.** (1) A wire drawing machine shall have 1 of the following:

- (a) An emergency stop device adjacent to the block available to shut down the machine.
- (b) An emergency stop device, such as a bar, rope or cable, along the operating side of a continuous drawing frame or unit so designed that the device will stop the machine at any point along the unit. When an emergency stop device has been actuated, the machine shall be restarted manually.

(2) The live block, capstan and straightening rolls of a wire drawing machine shall be enclosed with a barrier guard.

(3) A wire drawing machine shall be equipped with a stopping device so arranged to stop the block automatically if the operator can be caught in the wire or the reel drawn to the machine, or the area from and including the payoff to the machine shall be enclosed with a standard barrier as prescribed in rule 231 of Part 2. Floor and Wall Openings, Stairways and Skylights. The stop device shall be as prescribed in subdivision (b) of subrule (1).

(4) Where straightening rolls are not used, a snarl switch interlocked with live block or capstan shall be provided.

(5) A pinch point less than 8 feet from a floor or platform, created by a moving wire or rod passing over or through the equipment, shall be guarded by a barrier if exposed to contact.

(6) All barrier guards or enclosures which can be removed or opened without tools shall be interlocked with the live block or capstan.

(7) A pinch pointer used to prepare wire or rod for insertion into a die shall be guarded if the opening is more than 1/4 larger than the material being fed into it.

**R 408.12639. Boring, honing, reaming, and drilling.**

**Rule 2639.** (1) When boring, honing, reaming, or drilling, all of the following provisions apply:

- (a) Except for hand-held honing, the workpiece shall be secured by a device to prevent it from being turned by the tool.
- (b) Manual measuring at the point of operation shall be done only when the tool or rotating workpiece has stopped.
- (c) A vertical metal cutting machine with a rotary table shall have a rim guard either fixed or portable around the table of a height to cover any pinch point or rotating hazard at the lower side and to a point not less than 2 inches above the workpiece or fixture, whichever is higher. Where the rotating table is at floor level, a removable standard barrier shall be installed as prescribed in rule 231 of the general industry safety standards commission standard, Part 2. Floor and Wall Openings, Stairways, and Skylights, being R 408.10231 of the Michigan Administrative Code.
- (d) Multiple-spindle heads, except when used for tapping and those with cam operated slides, shall have an emergency return control at each station.

(2) A chuck key that is used on a drill press should be as prescribed in R 408.12648(2).

**R 408.12640. Milling.**

**Rule 2640.** When milling, all of the following provisions apply:

- (a) Manual adjustments or measurements at the point of operation shall be made only after the tool and workpiece have stopped.

- (b) Machine torque shall not be used to loosen nuts.
- (c) A chip guard shall be installed between the point of operation and the operator and other employees within range.
- (d) The workpiece shall be securely clamped before the table moves in the direction of the cutter or the cutter moves to the workpiece.

**R 408.12641. Roll-form machines.**

**Rule 2641.** (1) An automatically fed roll-form machine shall have a shield which runs the entire length of the point of operation and which will prevent horizontal access to the rolls or a continuous stop cable shall be provided along the length of the machine. The shield shall be secured to the machine.

(2) A manually fed roll-forming machine shall be guarded as prescribed in R 408.12637.

**R 408.12642. Powered benders.**

**Rule 2642.** (1) A powered bender shall have 1 of the following:

- (a) A barrier or enclosure guard that is designed to protect the operator for the pinch points when clamping parts in the bender.
- (b) A single-stroke hand control device that can be activated with 1 hand holding the workpiece, remote from the pinch points, when clamping parts in the bender, or a single-stroke foot control device where both hands hold the workpiece, remote from the clamping pinch point.
- (c) A 2-hand, single-stroke control device.

(2) Where the sweep of the stock intrudes into the aisle or work area of another employee or endangers the operator or other employees, a standard barrier, as specified in rule 231 of the general industry safety standards commission standard, Part 2. Floor and Wall Openings, Stairways, and Skylights, being R 408.10231 of the Michigan Administrative Code, shall be provided.

**R 408.12643. Tumbling mills, barrels and revolving cylinders.**

**Rule 2643.** (1) A tumbling mill, barrel or revolving cylinder shall have an enclosure to a height of 42 inches to protect an employee if there are any moving projections.

(2) The enclosures shall have an interlocked gate or barrier at the machine opening which shall cut the power off when the gate or barrier is removed. An inch control may be used for positioning or emptying when the gate or barrier is removed.

**R 408.12644. Alligator shears.**

**Rule 2644.** An alligator shear shall have the jaw enclosed with a guard which adjusts to the size and shape of the material.

**R 408.12645. Riveters, braders and stakers.**

**Rule 2645.** (1) A vertical or horizontal ram on a riveter, brader or staker shall be guarded by a barrier, device or enclosure to protect the operator from the point of operation or an awareness device shall be used to warn the operator he or she is approaching the point of operation. The guard shall extend to within 3/8 inch of the material.

(2) Lodged rivets shall be removed only by a tool.

**R 408.12646. Powered clamping device.**

**Rule 2646.** An operator of a powered clamping device that is used for holding a workpiece shall be protected by employing 1 of the following methods:

- (a) Guarding or adjusting so that the opening between the clamp and workpiece insertion is not more than 1/4 of an inch.
- (b) Two-hand controls furnished to, and used by, each operator.
- (c) Providing a single control for each operator if the operator is remote from the point of operation or pinch point.
- (d) A means which would prevent the clamping device from closing while the employee is in the point of operation or pinch point.

**R 408.12647. Slitter.**

**Rule 2647.** A slitter shall have:

- (a) The in-running side guarded as specified in rule 2637.
- (b) A device to cut the scrap into short lengths or a rewinder to rewind the scrap for safe handling.
- (c) A method to secure the loose end to the coil before removing it from the rewinder.

**R 408.12648. Lathes.**

**Rule 2648.** (1) A lathe face plate or chuck with projections on the periphery shall not be used unless guarded.

(2) A chuck key for a lathe chuck shall be 1 of the following:

- (a) Counterweighted to return it to storage position.
- (b) Interlocked to prevent the chuck from being power driven when the key is in the chuck.
- (c) Spring loaded to eject it from the chuck.

**R 408.12649. Cold header.**

**Rule 2649.** (1) The sliding head and the dies of a cold header shall be blocked before starting any service work on the dies.

(2) All points of operation from the straightening rolls to, and including the dies, shall be enclosed.

**R 408.12650. Multislide machines.**

**Rule 2650.** A multislide machine shall have all moving parts guarded by barriers or an enclosure.

**FIGURE 1**  
POSITIONING OF GUARDS

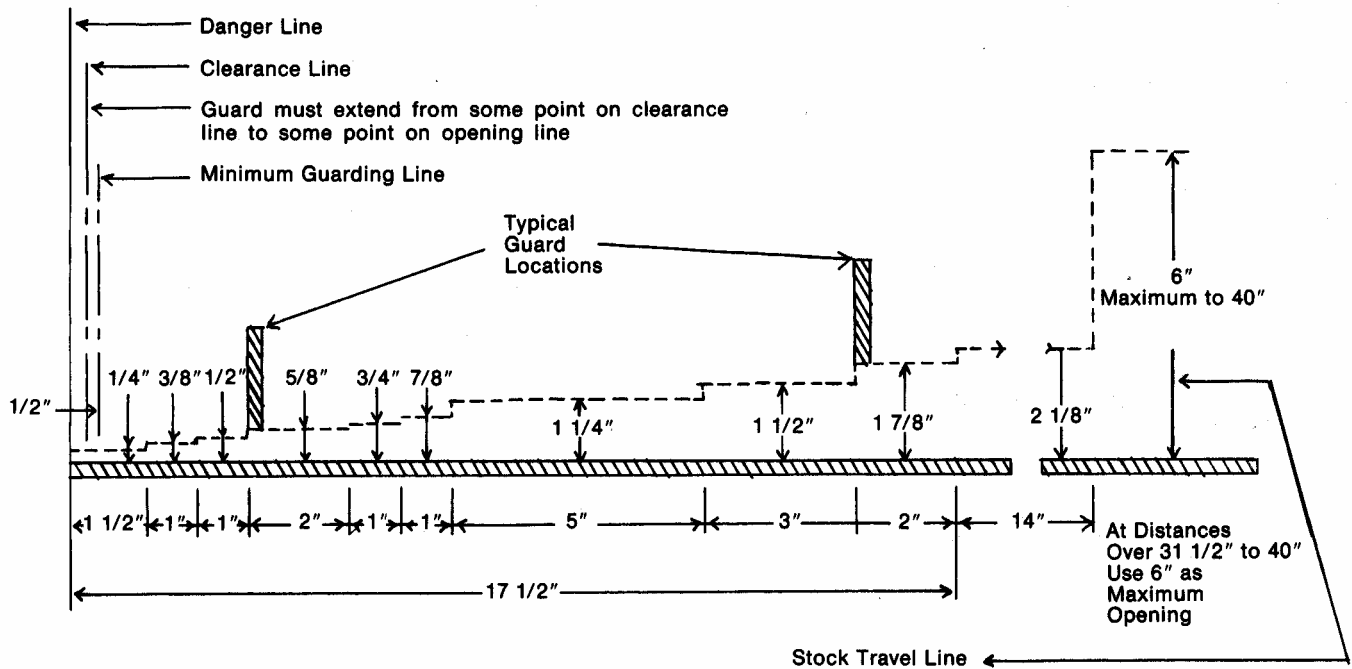


Fig. 1 shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation).

The *clearance line* marks the distance required to prevent contact between guard and moving parts.

The *minimum guarding line* is the distance between the infeed side of the guard and the danger line which is 1/2 inch from the danger line.

The various openings are such that for average size hands, an operator's fingers will not reach the point of operation.

After installation of point of operation guards and before a job is released for operation, a check shall be made to verify that the guard will prevent the operator's hands from reaching the point of operation.



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