

DEPARTMENT OF CONSUMER AND INDUSTRY SERVICES

BUREAU OF SAFETY AND REGULATION

GENERAL INDUSTRY SAFETY STANDARDS COMMISSION

(By authority conferred on the general industry safety standards commission by sections 16 and 21 of Act No. 154 of the Public Acts of 1974, as amended, being SS408.1016 and 408.1021 of the Michigan Compiled Laws)

PART 23. HYDRAULIC POWER PRESSES

GENERAL PROVISIONS

R 408.12301 Scope.

Rule 2301. This part applies to power presses which shear, punch, form, or assemble metal or any other material by means of tools or dies attached to plungers or slides, commonly referred to as hydraulic power presses.

This part does not apply to mechanical power presses, air-powered presses, press brakes, bulldozers, hot-metal presses, forging hammers, hot-bending presses, tube-bending machines, molding machines, welder presses, riveting or similar fastener machines, nut clinching machines, metal stitching machines, 4 slide machines, or a hydraulic press for nonproductive straightening or for the assembly or the removal of items such as cutting tools, bearings, or bushings from spindles, shafts, axles, or housings.

History: 1979 AC.

R 408.12303 Definitions; A.

Rule 2303. (1) "Adjustable press-barrier device" means an enclosure that permits adjustment for each job or die setup.

(2) "Anti-creep device" means an attachment installed on the feet of a press, which prevents the press from moving across the floor.

(3) "Automatic feeding or ejection" means placing material or a part within, or removing it from, the point of operation by a method or device that does not require an action by an operator at each stroke of the slide.

(4) "Automatic press" means a press equipped with automatic feeding and ejection, and operated in a continuous mode.

History: 1979 AC.

R 408.12304 Definitions; C.

Rule 2304. (1) "Concurrent" means acting in conjunction, not necessarily simultaneously, and is used to describe a situation wherein 2 or more controls exist in an operated condition at the same time.

(2) "Counterbalance" means a mechanism used to balance or support the weight of the slide and upper dies.

History: 1979 AC.

R 408.12305 Definitions; D.

Rule 2305. (1) "Die-enclosure guard" means an enclosure attached to the die shoe, punch shoe or bolster, and fixed in position.

(2) "Die set" means a unit consisting of a lower die shoe and an upper die shoe or punch holder. It is essentially a tool holder held in correct alignment by heel blocks, guide pins or posts, and bushings.

(3) "Die-setting" means the process of placing dies in, or removing dies from, a hydraulic press, and the process of adjusting dies, other tooling, and safeguarding means to cause them to function properly and safely.

(4) "Die shoe" means a plate or block on which die sections and details are mounted. A die shoe functions primarily as a base for the complete die assembly, and, when used, is bolted or clamped to the bolster plate or slide.

History: 1979 AC.

R 408.12306 Definitions; E.

Rule 2306. (1) "Ejector" means a device for removing work or material from between dies.

(2) "Electronic-control device" means a device so designed and controlled that when the operator's hand or any other part of his body is within the point of operation, the press cannot be tripped, and if the hand or any other part of the operator's body is inserted into the point of operation area while the slide is descending, the device shall automatically stop the slide. Such a device may employ active circuit elements such as vacuum tubes, gas tubes, or semiconductor amplifiers (but not magnetic amplifiers) in conjunction with passive circuit elements such as transformers, inductors, capacitors, resistors or magnetic device operating coils.

History: 1979 AC.

R 408.12307 Definitions; F.

Rule 2307. (1) "Face of the slide" means the surface of the slide (ram) to which the punch or die is usually attached.

(2) "Fixed barrier guard" means a die enclosure attached to the press frame.

(3) "Foot control" means a foot-operated control mechanism which activates a press.

History: 1979 AC.

R 408.12308 Definitions; G, H.

Rule 2308. (1) "Gate or movable barrier device" means a movable barrier so arranged that it encloses the point of operation before the press cycle (stroke) can be started.

(2) "Guard" (point of operation) means an enclosure that prevents entry of the operator's hands or fingers into the point of operation. See also definitions of "die enclosure guard," "fixed barrier guard," and "interlocked press barrier guard."

(3) "Hand tool" means a hand-held tool designed for placing material in position between dies or for removal after the material has been processed.

(4) "Hand-tool feeding" means placing material within, or removing it from, the point of operation by use of a hand tool.

(5) "Holdout or restraint device" means a mechanism, including attachments for the operator's hands, that, when anchored and adjusted, prevents the operator's hands from entering the point of operation.

History: 1979 AC.

R 408.12309 Definitions; I to M.

Rule 2309. (1) "Interlocked press-barrier guard" means an enclosure which is interlocked so that the press cycle cannot be started normally unless the guard or hinged or movable sections enclose the point of operation.

(2) "Knockout" means a mechanism for releasing material from either die.

A stripper or liftout is a type of knockout.

(3) "Manual feeding" means handling by an operator at each stroke of the power press the material or part being processed.

History: 1979 AC.

R 408.12310 Definitions; P.

Rule 2310. (1) "Pinch point" means any point, other than the point of operation, at which it is possible for a part of the body to be injured by being caught between the moving parts of the press or auxiliary equipment, or between moving and stationary parts of the press or auxiliary equipment, or between the material and moving parts of the press or auxiliary equipment.

(2) "Point of operation" means the area of the press where material is actually positioned, and where work is being performed, during any process such as shearing, punching, or forming.

(3) "Point of operation device" means a press control or attachment that does any of the following:

(a) Restrains the operator from inadvertently reaching into the point of operation.

(b) Prevents normal press operation if the operator's hands are inadvertently within the point of operation.

(c) Automatically withdraws the operator's hands if they are inadvertently within the point of operation as the dies close.

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

(5) "Press," as referred to in this part, means a powered machine, having a liquid energy transfer media that actuates the slide motion toward and away from the bed surface (the slide being guided in a definite path by a frame or cylinder).

(6) "Primary operation" means a preliminary press operation applied to material to be subsequently processed. Examples of primary operation include blanking, piercing, and corner cutting.

(7) "Pull-out device" means a mechanism attached to the operator's hands or arms and connected to the slide or upper die, and designed to withdraw the operator's hands from the point of operation as the slide or upper die descends.

History: 1979 AC.

R 408.12311 Definitions; S.

Rule 2311. (1) "Safety block" means a prop that, when inserted between the upper and lower dies or, in absence of a die, between bolster plate and face of the slide, prevents the slide or upper die from falling of its own dead weight.

(2) "Secondary operation" means a press operation in which a preworked part is further processed. This operation includes forming, drawing, and coining.

(3) "Semiautomatic feeding" means placing or removing material or parts within the point of operation, by an auxiliary device, controlled by an operator at each stroke of the press slide.

(4) "Slide" means the main reciprocating press member (also called the ram, plunger, or platen).

(5) "Slide lock device" means a positive mechanical lock or block capable of preventing the slide from closing of its own dead weight.

(6) "Stripper" means a device for removing the material or part from the punch.

(7) "Sweep device" means a single or double arm attached to the slide or upper die of the press, which moves the hands of an operator from within the point of operation as the slide or upper die descends.

History: 1979 AC.

R 408.12312 Definitions; T, U.

Rule 2312. (1) "Two-hand control" means an actuation device that requires the concurrent use of both hands of an operator to trip or control the press.

(2) "Unitized tooling" means a type of die in which the upper and lower members are incorporated in a self-contained unit so arranged as to hold the die members in alignment.

History: 1979 AC.

R 408.12316 Duties of employer.

Rule 2316. The employer shall:

(a) Use dies or operating methods, or both, designed to control or eliminate hazards to operating personnel.

(b) Furnish, and require the use of, a hand tool for freeing and removing stuck work or scrap pieces from the die, so that an employee need not reach into the point of operation for such purposes.

History: 1979 AC.

GUARDING

R 408.12321 Safeguarding in general at point of operation.

Rule 2321. (1) Where operator exposure exists, a press shall be equipped and operated with a point of operation guard or a point of operation protection device for every press operation performed, except where the point of operation is limited to an opening of 1/4 inch or less.

(2) One or more means of safeguarding a press operator at the point of operation shall be provided and used on a press, depending upon the method of feeding and in accordance with table 1.

(3) During die tryout, R 408.12322 to R 408.12341 and R 408.12365 do not apply.

TABLE 1

Method of Feeding Press Safeguarding Required

A. Automatic feed Fixed barrier guard, or die enclosure guard, Automatic roll feed or gate or movable barrier device, or Automatic push, pull, interlocked press barrier or an operating transfer, or dial feed. device that assures press action will be stopped before the operator can reach into the point of operation. 1

B. Semiautomatic feed Fixed barrier guard, or die enclosure guard, Chute feed (both gravity or gate or movable barrier device, 2-hand and follow feed) control Slide or push feed Sliding dies Dial feed Revolving dies

C. Manual feed Fixed barrier guard, or die enclosure guard, or gate or movable barrier device, or sweep device, or pull out device, or restraint device, or electronic control device, or 2-hand control.

1. Where 2 or more presses are used in in-line operations with automatic loading and unloading equipment, either the safeguards required in "A" or an interlocked enclosure shall be used in conjunction with each press.

History: 1979 AC.

R 408.12322 Point of operation guards.

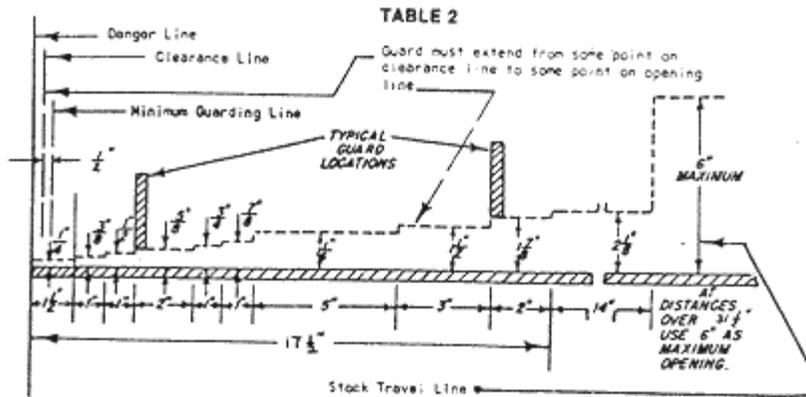
Rule 2322. (1) A point of operation guard shall be reliable in construction, application, and adjustment, and shall be attached to the press or to the die. The guard itself shall not offer any hazard and shall be so designed and constructed as to facilitate inspection and minimize the possibility of removing or misusing essential parts.

(2) The guard shall be designed and constructed in accordance with table 2, except as prescribed in subrule (3), to prevent entry of an operator's hand or fingers within the point of operation.

(3) A barrier guard may have feed holes for the stock which shall be of such size and distance from the die as to prevent entry of a hand or finger of each operator into the point of operation or other nip points.

(4) A guard shall be installed, maintained, and adjusted to provide safe operation.

Figure for 408.12322



This diagram shows the safe openings between the bottom edge of a guard and feed table at various distances from the danger line.

The various openings are such that for average size hands they do not permit the operator's finger to reach the nip zone even though the guard contact is on the back of the fingers, hand or forearm.

Any barrier extending from the dotted opening line to the clearance line will create a wedging of the fingers, hand or forearm between the barrier and the feed table preventing movement of the fingers to the danger line.

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

The minimum guarding line is the distance between the infeed side of the guard and danger line. Recommended minimum distance is 3/4" from the danger line.

CAUTION: When installing guards with openings over 1/4" careful tests should be made by operators who have small hands to make certain the guard is effective before the machine is operated. Check also for stability of mounting and rigidity of construction.

History: 1979 AC.

R 408.12323 Die-enclosure and fixed barrier guards.

Rule 2323. (1) A die-enclosure guard shall be attached to the die shoe or stripper or bolster in a fixed position and shall be so designed and constructed that the operator cannot reach over, under or around the guard and into the point of operation.

(2) At least a 1-inch clearance shall be provided between the top edge of the guard and the slide or any projection thereon, to prevent a shearing hazard caused by slide travel. The guard shall extend at least 1 inch above the bottom of the slide at the top of the stroke in order to prevent a shearing hazard.

(3) The guard shall afford at least 50% die visibility where visibility is necessary for proper placement of materials and permit easy feeding of the stock through openings in accordance with table 2. Where rods are used, they shall be vertical.

(4) A fixed barrier guard shall enclose the point of operation in accordance with table 2 and shall be secured to the press frame, die or bolster by fasteners that would discourage removal by unauthorized personnel.

(5) A die enclosure or fixed barrier guard that does not meet the requirements of R 408.12322 to R 408.12324 and table 2 shall be used only with point of operation devices prescribed in R 408.12325 to R 408.12341.

History: 1979 AC.

R 408.12324 Interlocked press-barrier guards.

Rule 2324. An interlocked press-barrier guard, when required by table 1 shall enclose the die space or work area, and shall be so interlocked that the slide cannot be actuated unless the guard or hinged or moveable section is in position in accordance with table 2.

History: 1979 AC.

R 408.12325 Point of operation devices.

Rule 2325. (1) A point of operation device differs from a guard inasmuch as it allows the operator access to the point of operation for loading and unloading the die. It either prevents actual operation until the hands are removed or removes the hands from the point of operation as the press slide descends. A point of operation device may be a barrier device, which does not meet the requirements outlined in R 408.12322 to R 408.12324.

(2) A point of operation device shall be so designed, constructed, and located as to prevent, during normal operations, employee's hands or fingers from remaining within the point of operation during downward movement of the slide.

History: 1979 AC.

R 408.12326 Adjustable press-barrier devices.

Rule 2326. (1) An adjustable press-barrier device shall be attached to the frame of the press or die shoe and shall have front and side sections adjustable for dies or jobs of any size.

(2) Adjustments shall be verified by qualified and authorized personnel before the press is returned to production. Qualifications for such personnel shall include a knowledge of table 2. With the use of an adjustable press-barrier device, authorized personnel shall be instructed regarding proper adjustments of the device and that these adjustments are an important part of their jobs. An operator shall not be allowed to make any change in the adjustments without approval of supervisory personnel.

(3) Where the adjustable press-barrier device cannot be adjusted to give clearance within the limitations of table 2 (as, for example, for the insertion or removal of an irregularly shaped piece), mechanical feeds, ejectors, and/or other point of operation devices shall be used.

History: 1979 AC.

R 408.12327 Gate or movable barrier devices.

Rule 2327. (1) A gate or movable barrier device shall enclose the point of operation before power is transmitted to the slide.

(2) The device shall be interlocked with the press-control circuit so that the downward motion of the slide cannot begin until the device encloses the point of operation.

History: 1979 AC.

R 408.12331 Two-hand controls.

Rule 2331. (1) A 2-hand control shall require the application of both hands to operate the press, and shall require concurrent pressure on both controls until a point is reached in the downward stroke where the die opening is such that the operator cannot remove his hands and place them within the point of operation. Removal of 1 hand or both hands, before the closing portion of the cycle, shall either stop the slide or return the slide to its starting position.

(2) Two-hand controls for single-stroke operation, manufactured and installed on or after August 31, 1971, shall be designed to require release of all operator's hand controls before a second stroke can be initiated.

(3) Controls for more than 1 operating station shall be designed to be activated and deactivated in complete sets of 2-hand controls per operating station by means capable of being supervised by the employer.

(4) If foot control is provided, the selection method between hand and foot control shall be separated from the stroking selector, and shall be designed so that the selection may be supervised by the employer.

(5) A 2-hand control may be a mechanically, pneumatically, or electrically controlled system.

(6) A 2-hand control shall be installed to prevent "bridging" controls, and so that it can be operated by 2 hands only.

(7) In a press operation requiring more than 1 operator, a set of 2-hand controls shall be provided for each operator. However, a foot control may be used with 2-hand controls if arranged to operate concurrently (otherwise, no cycle) and if the operator is not exposed to the point of operation.

(8) If each of the operating stations is provided with a lockout arrangement, provision shall be made to prevent an unintentional press cycle when all of the operating controls are locked out.

History: 1979 AC.

R 408.12332 Two-hand devices; controls.

Rule 2332. (1) A 2-hand device may be a mechanically, pneumatically or electrically controlled system.

(2) A 2-hand device shall be installed to prevent "bridging" controls, and so that it can be operated by 2 hands only.

(3) In a power press operation requiring more than 1 operator, a set of 2-hand devices shall be provided for each operator. However a foot control may be used with 2-hand devices if arranged to operate concurrently (otherwise, no cycle) and if the operator is not exposed to the point of operation. If each of the operating stations is provided with a lockout arrangement, provision shall be made to prevent an unintentional press cycle when all of the operating controls are locked out.

History: 1979 AC.

R 408.12334 Pull-out devices.

Rule 2334. (1) A pull-out device shall include attachments for the operator's hands or arms. The attachments shall be connected to the slide or upper die of the press so that the operator's hands or fingers are removed from the point of operation as the slide descends.

(2) Authorized personnel shall be trained and shall be responsible for proper adjustment of the device for each die setup and operator change.

They shall make periodic inspections to determine condition of worn and broken parts which shall be replaced before permitting operation.

(3) If more than 1 operator is required on a press, a set of pull-out devices shall be provided for each operator.

(4) Each pull-out device in use shall be visually inspected and checked for proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed. Necessary maintenance or repair, or both, shall be performed and completed before the press is operated. Records of maintenance shall be kept pursuant to R 408.12373.

History: 1979 AC.

R 408.12336 Rescinded.

History: 1979 AC; 1997 AACS.

R 408.12338 Holdout and restraint devices.

Rule 2338. A holdout or restraint device shall be securely anchored and adjusted so that the operator is restrained from reaching into the point of operation. A set of restraints shall be provided for each operator if more than 1 operator is required on a press.

History: 1979 AC.

R 408.12341 Presence sensing devices.

Rule 2341. (1) A presence sensing device shall be so designed and installed that, when the operator's hands or any other part of his body disturbs the sensing field, the downward travel of the slide is prevented or stopped. This device shall not be used as a tripping means.

(2) Equipment shall be installed so that failure of light or photoelectric relay or other energy source makes the press inoperative.

(3) These devices shall not, in themselves, create a physical or organic hazard to the operator.

(4) The safety distance (Ds) from the sensing field to the point of operation shall be greater than the distance determined by the following formula:

$D_s = 63 \text{ inches/second} \times TS$ where:

D_s = minimum safety distance (inches); 63 inches/second = hand speed constant; and

TS = stopping time of press measured when slide has completed approximately half of the downward stroke.

(5) To protect all areas of entry to the point of operation not protected by the presence sensing device, the partial enclosure shall be used and shall not create a pinch point or shear hazard.

History: 1979 AC.

R 408.12343 Hand-feeding tools.

Rule 2343. Hand-feeding tools, such as but not limited to pushers, pliers, pinchers, tweezers, suction discs or magnets, are intended for placing and removing materials, in order to permit safe feeding of material by the operator. Such tools shall not be accepted in lieu of other guards or devices as required in R 408.12321 to R 408.12341.

History: 1979 AC.

R 408.12344 Slide lock device.

Rule 2344. (1) When a slide lock device or block is used, an additional point of operation guard or device shall be used to protect the operator before the slide lock device is in position and secures the slide from closing. Visual indication of the operation of the slide lock device shall be provided.

(2) The slide lock device and area of contact with die or slide shall be of such design and strength as not to create an additional hazard.

History: 1979 AC.

R 408.12351 Foot pedal.

Rule 2351. The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects, or by accidental stepping onto the pedal.

History: 1979 AC.

R 408.12353 Foot-operated pedals.

Rule 2353. (1) Mechanical pedal return springs shall be the compression type, operated on a rod or guided within a hole or tube. If operated on a rod, the inside diameter of the spring shall be no greater than the diameter of the rod, plus 1/8 inch. If guided within a hole or tube, the inside diameter of the hole or tube shall be no greater than the outside diameter of the spring coil, plus 1/8 inch. A spring, in its initial compressed position, shall be so wound that the space between coils is less than the diameter of the wire.

(2) A pedal counterweight, if provided, shall have the path of the travel of the weight enclosed or guarded.

(3) A mechanical foot pedal shall be securely mounted on a press leg where the pedal is an integral part of the press.

History: 1979 AC.

R 408.12355 Hand-operated levers.

Rule 2355. (1) A hand lever operated press shall be equipped with a spring latch on the operating lever to prevent premature, accidental tripping.

(2) The operating lever on a hand-tripped press having more than 1 operating station shall be so interlocked as to prevent operation of the press except by concurrent action of all levers.

(3) A guard or device shall be used in conjunction with the hand-operated lever to safeguard the point of operation, or the lever shall be located so that the operator cannot reach into the point of operation.

History: 1979 AC.

HYDRAULICS--DIES--SCRAP

R 408.12356 Hydraulic systems.

Rule 2356. A hydraulic pump used as a source of power for a press shall have the capability to sustain the required capacity.

History: 1979 AC.

DESIGN, CONSTRUCTION, AND SETTING OF DIES

R 408.12361 Design and construction of dies.

Rule 2361. (1) A die shall be so designed and constructed as to permit the use of guards as required in R 408.12322 to R 408.12324, or to permit safeguarding with point-of-operation devices as required in R 408.12325 to R 408.12341.

(2) Where hand-feeding tools are to be employed, a die shall be designed and constructed to allow easy access to the nest for loading and unloading.

History: 1979 AC.

R 408.12363 Ejecting stock and scrap.

Rule 2363. (1) Spring pads or rubber strippers, or equivalent means, shall be provided where required on punching or piercing dies to assure that parts are stripped or knocked out.

(2) Automatic ejection of stock and scrap should be considered during die design.

(3) The employee shall provide means for safely handling scrap from roll feed or random length stock operations. Scrap cutters used in conjunction with scrap handling systems shall be safeguarded pursuant to table 2.

Scrap recoil devices may be used instead of scrap cutters.

History: 1979 AC.

R 408.12365 Guide pins.

Rule 2365. Where there is exposure to guide pins, spring enclosures or guidepin covers shall be used if the guide pins separate from the bushing more than 1/4 inch. Where dies are guarded in accordance with R 408.12321 to R 408.12324, guide-pin protection is not necessary.

History: 1979 AC.

R 408.12366 Unitized tooling.

Rule 2366. When a unitized tooling is used, the opening between the top of the die and face of the slide or striking pad shall be guarded pursuant to the requirements of table 1.

History: 1979 AC.

R 408.12367 Die fastening.

Rule 2367. (1) Provision shall be made in both the upper and lower shoes for securely mounting a die to the bolster and slide. Where clamp caps or setscrews are used in conjunction with punch stems, additional means of securing the upper shoe to the slide shall be used.

(2) A die should be handled with equipment of proper capacity and designed for that purpose.

History: 1979 AC.

R 408.12369 Die setting.

Rule 2369. (1) A die setting procedure shall be established that will:

(a) Insure that enclosure guards or protective devices are used and properly installed prior to production, and

(b) Require the diesetter or authorized personnel to ascertain that all point of operation safety devices are effective before releasing the press for operation.

(2) Stops shall be provided to prevent losing control of the die while setting or removing the die on an inclined press.

History: 1979 AC.

R 408.12370 Die and press repair.

Rule 2370. (1) Repair work to a die while in a press, or mechanical repair work to a press, shall not commence until power to the press pump motor is disconnected. Where multiple presses use a common power source, other means shall be taken to assure that no press motion can occur to cause an injury.

(2) Safety blocks shall be used when a die is being repaired while in a press.

(3) Means shall be provided to prevent cycling a press with the safety block in place between the upper and lower dies, or between the bolster plate and slide face, unless the safety block is of such design and material as to safely withstand the total press capacity.

History: 1979 AC.

TRAINING AND INSPECTION

R 408.12371 Instruction of operators.

Rule 2371. Before starting work on a press and before starting work on an operation with which the operator is not familiar, he shall be carefully instructed in the particular operation and in the safe method of work.

History: 1979 AC.

R 408.12372 Die and stock lubrication.

Rule 2372. Brushes, swabs, lubricating rolls, and automatic or manual pressure guns shall be provided so that an operator will not be required to reach between dies to lubricate stock, punches or dies.

History: 1979 AC.

R 408.12373 Inspection and maintenance records.

Rule 2373. The employer shall establish and follow a program of periodic and regular inspections of his presses to insure that all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain records of these inspections and the maintenance work performed.

History: 1979 AC.