

§ 1910.217

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to come in contact with the roll bite or be caught between a roll and an adjacent object, then, provided such elements are made a fixed part of a calender, safety control devices listed in paragraph (c) of this section shall not apply.

(e) *Trip and emergency switches.* All trip and emergency switches shall not be of the automatically resetting type, but shall require manual resetting.

(f) *Stopping limits—(1) Determination of distance of travel.* All measurements on mills and calenders shall be taken with the rolls running empty at maximum operating speed. Stopping distances shall be expressed in inches of surface travel of the roll from the instant the emergency stopping device is actuated.

(2) *Stopping limits for mills.* All mills irrespective of the size of the rolls or their arrangement (individually or group-driven) shall be stopped within a distance, as measured in inches of surface travel, not greater than 1½ percent of the peripheral no-load surface speeds of the respective rolls as determined in feet per minute.

(3) *Stopping limits for calenders.* (i) All calenders, irrespective of size of the rolls or their configuration, shall be stopped within a distance, as measured in inches of surface travel, not greater than 1¾ percent of the peripheral no-load surface speeds of the respective calender rolls as determined in feet per minute.

(ii) Where speeds above 250 feet per minute as measured on the surface of the drive roll are used, stopping distances of more than 1¾ percent are permissible. Such stopping distances shall be subject to engineering determination.

[39 FR 23502, June 27, 1974, as amended at 49 FR 5323, Feb. 10, 1984; 61 FR 9240, Mar. 7, 1996]

§ 1910.217 **Mechanical power presses.**

(a) *General requirements.*

(1)–(3) [Reserved]

(4) *Reconstruction and modification.* It shall be the responsibility of any person reconstructing, or modifying a mechanical power press to do so in accordance with paragraph (b) of this section.

(5) *Excluded machines.* Press brakes, hydraulic and pneumatic power presses, bulldozers, hot bending and hot metal presses, forging presses and ham-

mers, riveting machines and similar types of fastener applicators are excluded from the requirements of this section.

(b) *Mechanical power press guarding and construction, general—(1) Hazards to personnel associated with broken or falling machine components.* Machine components shall be designed, secured, or covered to minimize hazards caused by breakage, or loosening and falling or release of mechanical energy (i.e. broken springs).

(2) *Brakes.* Friction brakes provided for stopping or holding a slide movement shall be inherently self-engaging by requiring power or force from an external source to cause disengagement. Brake capacity shall be sufficient to stop the motion of the slide quickly and capable of holding the slide and its attachments at any point in its travel.

(3) *Machines using full revolution positive clutches.* (i) Machines using full revolution clutches shall incorporate a single-stroke mechanism.

(ii) If the single-stroke mechanism is dependent upon spring action, the spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, and designed to prevent interleaving of the spring coils in event of breakage.

(4) *Foot pedals (treadle).* (i) The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal.

(ii) A pad with a nonslip contact area shall be firmly attached to the pedal.

(iii) The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in event of breakage.

(iv) If pedal counterweights are provided, the path of the travel of the weight shall be enclosed.

(5) *Hand operated levers.* (i) Hand-lever-operated power presses shall be equipped with a spring latch on the operating lever to prevent premature or accidental tripping.

(ii) The operating levers on hand-tripped presses having more than one operating station shall be interlocked

to prevent the tripping of the press except by the "concurrent" use of all levers.

(6) *Two-hand trip.* (i) A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls.

(ii) Two-hand trip systems on full revolution clutch machines shall incorporate an antirepeat feature.

(iii) If two-hand trip systems are used on multiple operator presses, each operator shall have a separate set of controls.

(7) *Machines using part revolution clutches.* (i) The clutch shall release and the brake shall be applied when the external clutch engaging means is removed, deactivated, or deenergized.

(ii) A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactivation of the clutch shall require use of the operating (tripping) means which has been selected.

(iii) A means of selecting Off, "Inch," Single Stroke, and Continuous (when the continuous function is furnished) shall be supplied with the clutch/brake control to select type of operation of the press. Fixing of selection shall be by means capable of supervision by the employer.

(iv) The "Inch" operating means shall be designed to prevent exposure of the workers hands within the point of operation by:

(a) Requiring the concurrent use of both hands to actuate the clutch, or

(b) Being a single control protected against accidental actuation and so located that the worker cannot reach into the point of operation while operating the single control.

(v) Two-hand controls for single stroke shall conform to the following requirements:

(a) Each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press.

(b) The control system shall be designed to permit an adjustment which will require concurrent pressure from both hands during the die closing portion of the stroke.

(c) The control system shall incorporate an antirepeat feature.

(d) The control systems shall be designed to require release of all operators' hand controls before an interrupted stroke can be resumed. This requirement pertains only to those single-stroke, two-hand controls manufactured and installed on or after August 31, 1971.

(vi) [Reserved]

(vii) Controls for more than one operating station shall be designed to be activated and deactivated in complete sets of two operator's hand controls per operating station by means capable of being supervised by the employer. The clutch/brake control system shall be designed and constructed to prevent actuation of the clutch if all operating stations are bypassed.

(viii) Those clutch/brake control systems which contain both single and continuous functions shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of Continuous on the stroking selector, before actuation of the operating means will result in continuous stroking.

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

(x) Foot operated tripping controls, if used, shall be protected so as to prevent operation from falling or moving objects, or from unintended operation by accidental stepping onto the foot control.

(xi) The control of air-clutch machines shall be designed to prevent a

significant increase in the normal stopping time due to a failure within the operating valve mechanism, and to inhibit further operation if such failure does occur. This requirement shall apply only to those clutch/brake air-valve controls manufactured and installed on or after August 31, 1971, but shall not apply to machines intended only for continuous, automatic feeding applications.

(xii) The clutch/brake control shall incorporate an automatic means to prevent initiation or continued activation of the Single Stroke or Continuous functions unless the press drive motor is energized and in the forward direction.

(xiii) The clutch/brake control shall automatically deactivate in event of failure of the power or pressure supply for the clutch engaging means. Reactivation of the clutch shall require restoration of normal supply and the use of the tripping mechanism(s).

(xiv) The clutch/brake control shall automatically deactivate in event of failure of the counterbalance(s) air supply. Reactivation of the clutch shall require restoration of normal air supply and use of the tripping mechanism(s).

(xv) Selection of bar operation shall be by means capable of being supervised by the employer. A separate pushbutton shall be employed to activate the clutch, and the clutch shall be activated only if the driver motor is deenergized.

(8) *Electrical.* (i) A main power disconnect switch capable of being locked only in the Off position shall be provided with every power press control system.

(ii) The motor start button shall be protected against accidental operation.

(iii) All mechanical power press controls shall incorporate a type of drive motor starter that will disconnect the drive motor from the power source in event of control voltage or power source failure, and require operation of the motor start button to restart the motor when voltage conditions are restored to normal.

(iv) All a.c. control circuits and solenoid valve coils shall be powered by not more than a nominal 120-volt a.c. supply obtained from a transformer

with an isolated secondary. Higher voltages that may be necessary for operation of machine or control mechanisms shall be isolated from any control mechanism handled by the operator, but motor starters with integral Start-Stop buttons may utilize line voltage control. All d.c. control circuits shall be powered by not more than a nominal 240-volt d.c. supply isolated from any higher voltages.

(v) All clutch/brake control electrical circuits shall be protected against the possibility of an accidental ground in the control circuit causing false operation of the press.

(vi) Electrical clutch/brake control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of a control component to function properly, including relays, limit switches, and static output circuits.

(9) *Slide counterbalance systems.* (i) Spring counterbalance systems when used shall incorporate means to retain system parts in event of breakage.

(ii) Spring counterbalances when used shall have the capability to hold the slide and its attachments at midstroke, without brake applied.

(iii) Air counterbalance cylinders shall incorporate means to retain the piston and rod in case of breakage or loosening.

(iv) Air counterbalance cylinders shall have adequate capability to hold the slide and its attachments at any point in stroke, without brake applied.

(v) Air counterbalance cylinders shall incorporate means to prevent failure of capability (sudden loss of pressure) in event of air supply failure.

(10) *Air controlling equipment.* Air controlling equipment shall be protected against foreign material and water entering the pneumatic system of the press. A means of air lubrication shall be provided when needed.

(11) *Hydraulic equipment.* The maximum anticipated working pressures in any hydraulic system on a mechanical power press shall not exceed the safe working pressure rating of any component used in that system.

(12) *Pressure vessels.* All pressure vessels used in conjunction with power presses shall conform to the American Society of Mechanical Engineers Code

TABLE O-10—Continued
[In inches]

Distance of opening from point of operation hazard	Maximum width of opening
5½ to 6½	¾
6½ to 7½	7/8
7½ to 12½	1¼
12½ to 15½	1½
15½ to 17½	1⅞
17½ to 31½	2⅞

This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings.

(g) *Reports of injuries to employees operating mechanical power presses.* (1) The employer shall, within 30 days of the occurrence, report to either the Director of the Directorate of Safety Standards Programs, OSHA, U.S. Department of Labor, Washington, D.C. 20210, or the State agency administering a plan approved by the Assistant Secretary of Labor for Occupational Safety and Health, all point of operation injuries to operators or other employees. The following information shall be included in the report:

- (i) Employer's name, address and location of the workplace (establishment).
- (ii) Employee's name, injury sustained, and the task being performed (operation, set-up, maintenance, or other).
- (iii) Type of clutch used on the press (full revolution, part revolution, or direct drive).
- (iv) Type of safeguard(s) being used (two hand control, two hand trip, pull-outs, sweeps, or other). If the safeguard is not described in this section, give a complete description.
- (v) Cause of the accident (repeat of press, safeguard failure, removing stuck part or scrap, no safeguard provided, no safeguard in use, or other).
- (vi) Type of feeding (manual with hands in dies or with hands out of dies, semiautomatic, automatic, or other).
- (vii) Means used to actuate press stroke (foot trip, foot control, hand trip, hand control, or other).
- (viii) Number of operators required for the operation and the number of operators provided with controls and safeguards.

(h) *Presence sensing device initiation (PSDI)*—(1) *General.* (i) The require-

ments of paragraph (h) shall apply to all part revolution mechanical power presses used in the PSDI mode of operation.

(ii) The relevant requirements of paragraphs (a) through (g) of this section also shall apply to all presses used in the PSDI mode of operation, whether or not cross referenced in this paragraph (h). Such cross-referencing of specific requirements from paragraphs (a) through (g) of this section is intended only to enhance convenience and understanding in relating to the new provisions to the existing standard, and is not to be construed as limiting the applicability of other provisions in paragraphs (a) through (g) of this section.

(iii) Full revolution mechanical power presses shall not be used in the PSDI mode of operation.

(iv) Mechanical power presses with a configuration which would allow a person to enter, pass through, and become clear of the sensing field into the hazardous portion of the press shall not be used in the PSDI mode of operation.

(v) The PSDI mode of operation shall be used only for normal production operations. Die-setting and maintenance procedures shall comply with paragraphs (a) through (g) of this section, and shall not be done in the PSDI mode.

(2) *Brake and clutch requirements.* (i) Presses with flexible steel band brakes or with mechanical linkage actuated brakes or clutches shall not be used in the PSDI mode.

(ii) Brake systems on presses used in the PSDI mode shall have sufficient torque so that each average value of stopping times (Ts) for stops initiated at approximately 45 degrees, 60 degrees, and 90 degrees, respectively, of crankshaft angular position, shall not be more than 125 percent of the average value of the stopping time at the top crankshaft position. Compliance with this requirement shall be determined by using the heaviest upper die to be used on the press, and operating at the fastest press speed if there is speed selection.

(iii) Where brake engagement and clutch release is effected by spring action, such spring(s) shall operate in compression on a rod or within a hole

or tube, and shall be of non-inter-leaving design.

(3) *Pneumatic systems.* (i) Air valve and air pressure supply/control.

(A) The requirements of paragraphs (b)(7)(xiii), (b)(7)(xiv), (b)(10), (b)(12) and (c)(5)(iii) of this section apply to the pneumatic systems of machines used in the PSDI mode.

(B) The air supply for pneumatic clutch/brake control valves shall incorporate a filter, an air regulator, and, when necessary for proper operation, a lubricator.

(C) The air pressure supply for clutch/brake valves on machines used in the PSDI mode shall be regulated to pressures less than or equal to the air pressure used when making the stop time measurements required by paragraph (h)(2)(ii) of this section.

(ii) Air counterbalance systems.

(A) Where presses that have slide counterbalance systems are used in the PSDI mode, the counterbalance system shall also meet the requirements of paragraph (b)(9) of this section.

(B) Counterbalances shall be adjusted in accordance with the press manufacturer's recommendations to assure correct counterbalancing of the slide attachment (upper die) weight for all operations performed on presses used in the PSDI mode. The adjustments shall be made before performing the stopping time measurements required by paragraphs (h)(2)(ii), (h)(5)(iii), and (h)(9)(v) of this section.

(4) *Flywheels and bearings.* Presses whose designs incorporate flywheels running on journals on the crankshaft or back shaft, or bull gears running on journals mounted on the crankshaft, shall be inspected, lubricated, and maintained as provided in paragraph (h)(10) of this section to reduce the possibility of unintended and uncontrolled press strokes caused by bearing seizure.

(5) *Brake monitoring.* (i) Presses operated in the PSDI mode shall be equipped with a brake monitor that meets the requirements of paragraphs (b)(13) and (b)(14) of this section. In addition, the brake monitor shall be adjusted during installation certification to prevent successive stroking of the press if increases in stopping time cause an increase in the safety distance

above that required by paragraph (h)(9)(v) of this section.

(ii) Once the PSDI safety system has been certified/validated, adjustment of the brake monitor shall not be done without prior approval of the validation organization for both the brake monitor adjustment and the corresponding adjustment of the safety distance. The validation organization shall in its installation validation, state that in what circumstances, if any, the employer has advance approval for adjustment, when prior oral approval is appropriate and when prior approval must be in writing. The adjustment shall be done under the supervision of an authorized person whose qualifications include knowledge of safety distance requirements and experience with the brake system and its adjustment. When brake wear or other factors extend press stopping time beyond the limit permitted by the brake monitor, adjustment, repair, or maintenance shall be performed on the brake or other press system element that extends the stopping time.

(iii) The brake monitor setting shall allow an increase of no more than 10 percent of the longest stopping time for the press, or 10 milliseconds, whichever is longer, measured at the top of the stroke.

(6) *Cycle control and control systems.* (i) The control system on presses used in the PSDI mode shall meet the applicable requirements of paragraphs (b)(7), (b)(8), (b)(13), and (c)(5) of this section.

(ii) The control system shall incorporate a means of dynamically monitoring for decoupling of the rotary position indicating mechanism drive from the crankshaft. This monitor shall stop slide motion and prevent successive press strokes if decoupling occurs, or if the monitor itself fails.

(iii) The mode selection means of paragraph (b)(7)(iii) of this section shall have at least one position for selection of the PSDI mode. Where more than one interruption of the light sensing field is used in the initiation of a stroke, either the mode selection means must have one position for each function, or a separate selection means shall be provided which becomes operable when the PSDI mode is selected.