§ 1910.218 Forging machines.

(a) *General requirements —*

(1) *Use of lead.* The safety requirements of this subparagraph apply to lead casts or other use of lead in the forge shop or die shop.

(i) Thermostatic control of heating elements shall be provided to maintain proper melting temperature and prevent overheating.

(ii) Fixed or permanent lead pot installations shall be exhausted.

(iii) Portable units shall be used only in areas where good, general room ventilation is provided.

(iv) Personal protective equipment (gloves, goggles, aprons, and other items) shall be worn.

(v) A covered container shall be provided to store dross skimmings.

(vi) Equipment shall be kept clean, particularly from accumulations of yellow lead oxide.

(2) *Inspection and maintenance.* It shall be the responsibility of the employer to maintain all forge shop equipment in a condition which will insure continued safe operation. This responsibility includes:

(i) Establishing periodic and regular maintenance safety checks and keeping certification records of these inspections which include the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, for the forging machine which was inspected.

(ii) Scheduling and recording the inspection of guards and point of operation protection devices at frequent and regular intervals. Recording of inspections shall be in the form of a certification record which includes the date the inspection was performed, the signature of the person who performed the inspection and the serial number, or other identifier, of the equipment inspected.

(iii) Training personnel for the proper inspection and maintenance of forging machinery and equipment.

(iv) All overhead parts shall be fastened or protected in such a manner that they will not fly off or fall in event of failure.

(3) *Hammers and presses.*

(i) All hammers shall be positioned or installed in such a manner that they remain on or are anchored to foundations sufficient to support them according to applicable engineering standards.

(ii) All presses shall be installed in such a manner that they remain where they are positioned or they are anchored to foundations sufficient to support them according to applicable engineering standards.

Expand Table

Table O-11—Strength and Dimensions for Wood Ram Props

Size of timber, inches[1]	Square inches in cross section	Minimum allowable crushing strength parallel to grain, p.s.i.[2]	Maximum static load within short column range[3]	Safety factor	Maximum recommended weight of forging hammer for timber used	Maximum allowable length of timber, inches
4 × 4	16	5,000	80,000	10	8,000	44
6 × 6	36	5,000	180,000	10	18,000	66
8 × 8	64	5,000	320,000	10	32,000	88
10 × 10	100	5,000	500,000	10	50,000	100
12 × 12	144	5,000	720,000	10	72,000	132

[1] Actual dimension.

[2] Adapted from U.S. Department of Agriculture Technical Bulletin 479. Hardwoods recommended are those whose ultimate crushing strengths in compression parallel to grain are 5,000 p.s.i. (pounds per square inch) or greater.

[3] Slenderness ratio formula for short columns is $L/d = 11$, where L = length of timber in inches and d = least dimension in inches; this ratio should not exceed 11.

(iii) Means shall be provided for disconnecting the power to the machine and for locking out or rendering cycling controls inoperable.

(iv) The ram shall be blocked when dies are being changed or other work is being done on the hammer. Blocks or wedges shall be made of material the strength and construction of which should meet or exceed the specifications and dimensions shown in Table O-11.

(v) Tongs shall be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends.

(vi) Oil swabs, or scale removers, or other devices to remove scale shall be provided. These devices shall be long enough to enable a man to reach the full length of the die without placing his hand or arm between the dies.

(vii) Material handling equipment shall be of adequate strength, size, and dimension to handle diesetting operations safely.

(viii) A scale guard of substantial construction shall be provided at the back of every hammer, so arranged as to stop flying scale.

(ix) A scale guard of substantial construction shall be provided at the back of every press, so arranged as to stop flying scale.

(b) *Hammers, general —*

(1) *Keys.* Die keys and shims shall be made from a grade of material that will not unduly crack or splinter.

(2) *Foot operated devices.* All foot operated devices (i.e., treadles, pedals, bars, valves, and switches) shall be substantially and effectively protected from unintended operation.

(c) *Presses.* All manually operated valves and switches shall be clearly identified and readily accessible.

(d) *Power-driven hammers —*

(1) *Safety cylinder head.* Every steam or airhammer shall have a safety cylinder head to act as a cushion if the rod should break or pullout of the ram.

(2) *Shutoff valve.* Steam hammers shall be provided with a quick closing emergency valve in the admission pipeline at a convenient location. This valve shall be closed and locked in the off position while the hammer is being adjusted, repaired, or serviced, or when the dies are being changed.

(3) *Cylinder draining.* Steam hammers shall be provided with a means of cylinder draining, such as a self-draining arrangement or a quick-acting drain cock.

(4) *Pressure pipes.* Steam or air piping shall conform to the specifications of American National Standard ANSI B31.1.0-1967, Power Piping with Addenda issued before April 28, 1971, which is incorporated by reference as specified in § 1910.6.

(e) *Gravity hammers —*

(1) *Air-lift hammers.*

(i) Air-lift hammers shall have a safety cylinder head as required in paragraph (d)(1) of this section.

(ii) Air-lift hammers shall have an air shutoff valve as required in paragraph (d)(2) of this section.

(iii) Air-lift hammers shall be provided with two drain cocks: one on main head cylinder, and one on clamp cylinder.

(iv) Air piping shall conform to the specifications of the ANSI B31.1.0-1967, Power Piping with Addenda issued before April 28, 1971, which is incorporated by reference as specified in § 1910.6.

(2) *Board drophammers.*

(i) A suitable enclosure shall be provided to prevent damaged or detached boards from falling. The board enclosure shall be securely fastened to the hammer.

(ii) All major assemblies and fittings which can loosen and fall shall be properly secured in place.

(f) *Forging presses —*

(1) *Mechanical forging presses.* When dies are being changed or maintenance is being performed on the press, the following shall be accomplished:

(i) The power to the press shall be locked out.

(ii) The flywheel shall be at rest.

(iii) The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table O-11.

(2) *Hydraulic forging presses.* When dies are being changed or maintenance is being performed on the press, the following shall be accomplished:

(i) The hydraulic pumps and power apparatus shall be locked out.

(ii) The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table O-11.

(g) *Trimming presses —*

(1) *Hot trimming presses.* The requirements of paragraph (f)(1) of this section shall also apply to hot trimming presses.

(2) *Cold trimming presses.* Cold trimming presses shall be safeguarded in accordance with § 1910.217(c).

(h) *Upsetters —*

(1) *General requirements.* All upsetters shall be installed so that they remain on their supporting foundations.

(2) *Lockouts.* Upsetters shall be provided with a means for locking out the power at its entry point to the machine and rendering its cycling controls inoperable.

(3) *Manually operated controls.* All manually operated valves and switches shall be clearly identified and readily accessible.

(4) *Tongs.* Tongs shall be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends.

(5) *Changing dies.* When dies are being changed, maintenance performed, or any work done on the machine, the power to the upsetter shall be locked out, and the flywheel shall be at rest.

(i) *Other forging equipment —*

(1) *Boltheading.* The provisions of paragraph (h) of this section shall apply to boltheading.

(2) *Rivet making.* The provisions of paragraph (h) of this section shall apply to rivet making.

(j) *Other forge facility equipment —*

(1) *Billet shears.* A positive-type lockout device for disconnecting the power to the shear shall be provided.

(2) *Saws.* Every saw shall be provided with a guard of not less than one-eighth inch sheet metal positioned to stop flying sparks.

(3) *Conveyors.* Conveyor power transmission equipment shall be guarded in accordance with ANSI B20.1-1957, Safety Code for Conveyors, Cableways, and Related Equipment, which is incorporated by reference as specified in § 1910.6.

(4) *Shot blast.* The cleaning chamber shall have doors or guards to protect operators.

(5) *Grinding.* Personal protective equipment shall be used in grinding operations, and equipment shall be used and maintained in accordance with ANSI B7.1-1970, Safety Code for the Use, Care, and Protection of Abrasive Wheels, which is incorporated by reference as specified in § 1910.6, and with § 1910.215.

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