ASME B5.52-2003

(Revision of ANSI B5.52M-1980)

Power Presses: General Purpose, Single-Point Gap Type

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME B5.52-2003
(Revision of ANSI B5.52M-1980)

Power Presses: General Purpose, Single-Point Gap Type

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

Three Park Avenue • New York, NY 10016

Date of Issuance: December 15, 2004

This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda or written interpretations of the requirements of this Standard issued to this edition.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

CONTENTS

FOREWORD

Recognizing the need for a standard for mechanical power presses, The American Society of Mechanical Engineers' Committee on Machine Tools and Components (B5) reestablished Technical Committee 30 in December 1973 to develop an American National Standard addressing the interchangeability of bolsters, press tooling, and mounting provisions between general purpose presses of comparable bed size, capacity, and type.

The B5-TC30 membership consists of a balance between manufacturers, users, accessory suppliers, and others associated with power presses. The committee's work was based on the JIC (Joint Industry Conference) Press Room Standards, once the most widely used document, to develop a standard for mechanical power presses, and on basic data submitted by U.S. manufacturers of power presses.

On December 22, 1980, the American National Standards Institute approved ANSI B5.52M-1980, Mechanical Power Presses General Purpose Single Point, Gap Type (Metric). This standard was reaffirmed in 1994.

On April 19, 2000, the committee completed drafting of ASME B5.61-2003, Power Presses: General Purpose, Single Action, Straight Side Type, and prepared to submit it for approval to the American National Standards Institute. The expanded scope and revised format of this document led to the committee decision to revise ANSI B5.52M-1980 to bring it into conformance with the new format. The decision was made to include hydraulic and pneumatic power presses in the revised standard for general purpose, single-point gap type presses. ASME B5.52-2003 was approved by ANSI on July 7, 2003.

ASME B5 STANDARDS COMMITTEE
Machine Tools — Components, Elements, Performance, and Equipment

(The following is the roster of the Committee at the time of approval of this Standard.)

OFFICERS

C. T. Wax, *Chair*
J. R. Bird, *Secretary*

B5 COMMITTEE PERSONNEL

J. R. Bird, *Secretary,* The American Society of Mechanical Engineers
A. M. Bratkovich, The Association for Manufacturing Technology
C. J. Gregorovich, C. J. Gregorovich & Associates
J. Homsey, Boeing
D. King, Parlec
D. L. Lewis
C. D. Lovett, National Institute of Standards and Technology
G. R. Rawlinson, Rawlinson & Associates
W. S. Roorda, Alcona Associates
H. Soons, National Institute of Standards and Technology
R. C. Spooner, Powerhold, Inc.
C. T. Wax, Scully-Jones Corp.

TECHNICAL COMMITTEE 30 — POWER PRESSES

K. J. Koroncey, *Chair,* General Motors Corp.
T. Werding, *Secretary,* Schuler Hydroforming Inc.
R. Boge, Smedberg Machine Corp.
A. M. Bratkovich, The Association for Manufacturing Technology
G. Clouse, Oak Products, Inc.
D. L. Cota, Benchmaster Inc.
C. J. Gregorovich, C. J. Gregorovich & Associates
W. S. Roorda, Alcona Associates
A. Sambel, Schuler Inc.
E. D. Steinke, The Minster Machine Co.
L. A. Wood, Whirlpool Corp.

CORRESPONDENCE WITH THE B5 COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by proposing revisions and attending Committee meetings. Correspondence should be addressed to:

Secretary, B5 Standards Committee
The American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Attending Committee Meetings. The B5 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B5 Standards Committee.

POWER PRESSES: GENERAL PURPOSE, SINGLE-POINT GAP TYPE

1 SCOPE, PURPOSE, AND APPLICATION

1.1 Scope

This Standard applies to hydraulic and mechanical power presses having a one-piece frame that guides the slide and supports the bolster, adjustable bed, or horn. The frame is configured to provide unrestricted access to the front and sides of the die space. By means of dies or tooling attached to the slide and bolster or horn, these machines are used to shear, punch, form, or assemble metal or other materials.

This Standard includes only the following types of presses:

(a) bench
(b) open back inclinable (OBI)
(c) open back stationary (OBS)
(d) adjustable bed/horn

See Fig. 1 for examples of press types.

1.2 Purpose

The purpose of this Standard is to define and describe gap frame power presses, and their interface, to permit interchangeability of bolsters, dies, and tooling components between presses of comparable type, size, and capacity.

1.3 Application

Any power press described as an American National Standard power press shall comply with the applicable requirements of this Standard.

2 DEFINITIONS AND TERMINOLOGY

Terms used in this Standard are defined in ASME B5.49.

3 METRIC/U.S. CUSTOMARY RATIONALIZATION

3.1 Metrication

All units of dimension and capacity stated herein are in accordance with ASME B5.51M. Approximate U.S. customary units shown in parentheses are for reference only. Wherever used in this Standard, the unit *tons* denotes U.S. tons.

3.2 Metric/U.S. Customary Conversion

Appendix I provides conversion multipliers applicable to this Standard.

4 PRESS CHARACTERISTICS

4.1 Rated Capacity

See Table 1.

4.2 Rating Points (Mechanical Power Presses)

See Table 2.

4.2.1 Drive Design. Drive design shall be based on providing the torque that produces the rated press capacity at the rating point.

4.2.2 Press Capacity. Press capacity at points other than the rating point are shown

(a) in Table II-1 for presses rated at 1.6 mm ($\frac{1}{16}$ in.)
(b) in Table II-2 for presses rated at 3.2 mm ($\frac{1}{8}$ in.)
(c) in Table II-3 for presses rated at 6.3 mm ($\frac{1}{4}$ in.)

4.3 Energy Capacity (Mechanical Power Press)

4.3.1 Function of the Flywheel. The energy required for performing press operations is stored in the flywheel. During the working portion of the press cycle, the flywheel slows down as it supplies the required energy to the drive train.

4.3.2 Function of the Drive Motor. The drive motor restores flywheel energy during the nonworking portion of the press cycle, which may include the interval between press cycles for presses operating in single stroke modes.

4.3.3 Drive Motor Selection. The selection of the drive motor is dependent upon the energy requirements. Factors determining the energy requirements are the

(a) rated capacity
(b) press speed (strokes per minute)
(c) press stroke

Based on the optimum slide velocity for the material being worked, a longer stroke press will be required to operate at a slower speed than a shorter stroke press. The longer the stroke, the deeper the draw that can be made, and the greater the energy required to sustain

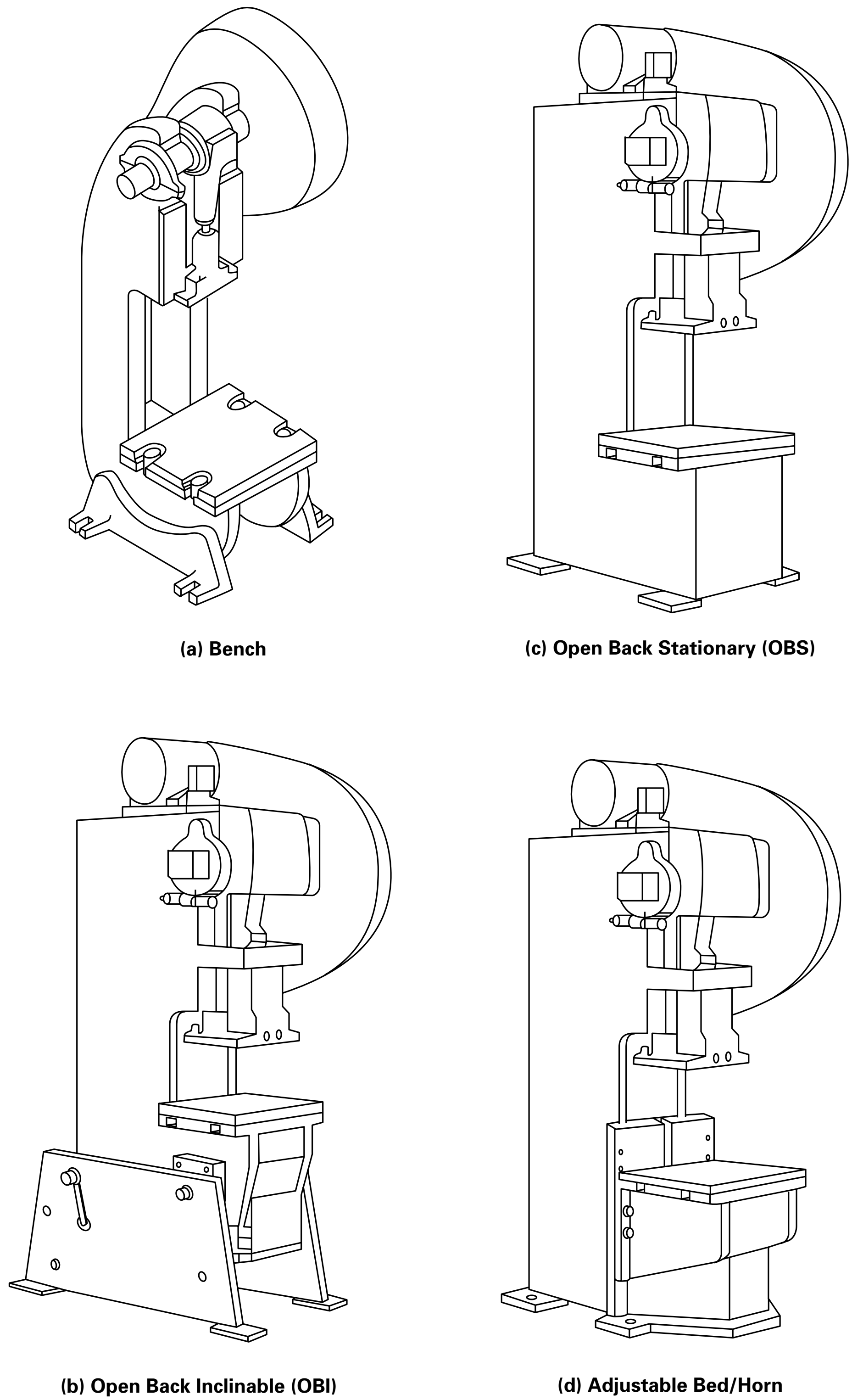


Fig. 1 Examples of Press Types

Table 1 Standard Capacity Ratings

Metric Capacity, kN	Corresponding Old Standard, tons
20	2
50	6
100	11
160	18
250	30
400	45
500	60
630	70
1 000	110
1 600	180
2 000	225
2 500	280

the press through the depth of the draw. Typical press speed/drive motor relationships are:

Press Speed, spm	Type of Motor Required
Between 10 and 30	Design D, 5% to 8% slip
30 or more	Design B, 3% to 5% slip

4.3.4 Drive Motor/Flywheel Relationship. The usable energy that a flywheel can supply is a function of the ability of the drive motor to tolerate slowdown without overheating. The usable flywheel energy, expressed as a percentage of total flywheel energy, is a function of the motor slowdown. Table 3 shows the properties of the two types of single-speed drive motors that are most commonly used on mechanical power presses. Appendix III provides a method for calculating the usable flywheel energy.

4.3.5 Variable Speed Presses. Unless otherwise specified by the purchaser, usable flywheel energy for variable speed presses shall be rated at one-half the maximum speed.

IMPORTANT: The energy range for a variable speed press varies as the square of the speed range. For example, a speed range of 3:1 would provide an energy range of 9:1. For a press with a speed range of 20 to 60 spm, the following would be the energies available:

Strokes per Minute	Energy Available, %
20	45
30	100
60	400

4.4 Structural Capacity

Gap frame power presses shall be designed to ensure that maximum press frame deflection at rated capacity, measured at the vertical centerline of the die space, does not exceed 0.002 mm/mm (0.002 in./in.) of the throat depth (distance from the slide centerline to the frame).

5 TOOLING RELATED CHARACTERISTICS

5.1 Stroke and Shutheight Related Dimensions

Refer to Table 4 for the following requirements:
(a) stroke length
(b) shutheight
(c) slide adjustment (mechanical presses)
(d) knockout stroke

5.2 Bed Area Related Dimensions

Refer to Table 5 for the following requirements:
(a) die space dimensions
(b) bed plate opening dimensions
(c) open back width
(d) throat depth
(e) bolster mounting hole locations

5.3 Bolster Dimensions

Refer to Table 5 for the bolster mounting slot and mounting hole location requirements.

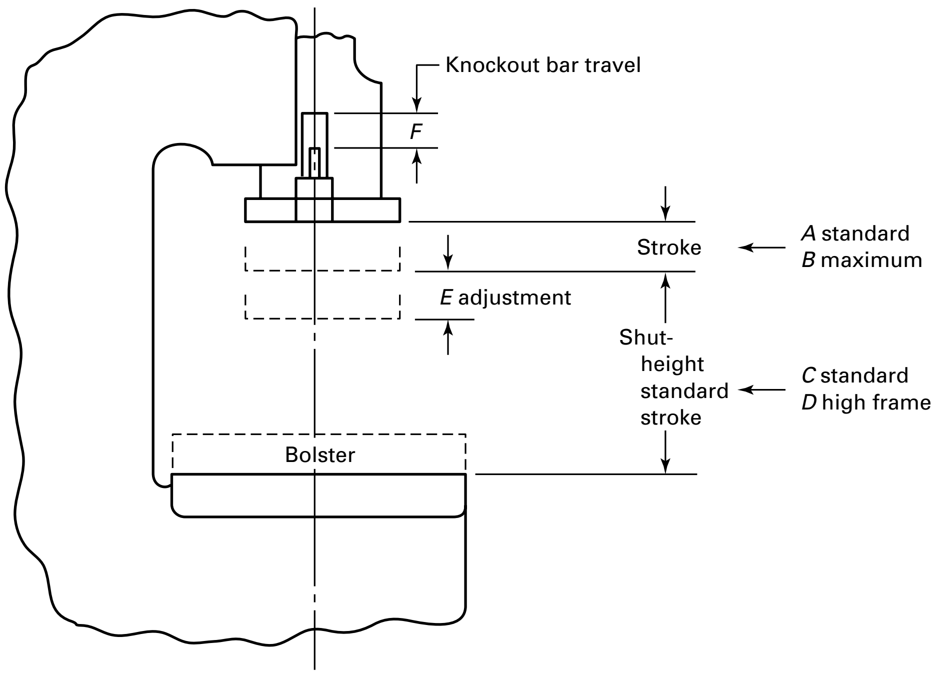
Refer to Table 6 for the following requirements:
(a) bolster size
(b) bolster handling hole locations
(c) T-slot locations

Table 2 Standard Rating Points

Rated Capacity, kN (tons)	Flywheel Drives, mm (in.)	Geared Drives, mm (in.)
20 to 160 (2 to 18)	1 ($^1/_{32}$)	1.6 ($^1/_{16}$)
160 to 400 (18 to 45)	1 ($^1/_{32}$)	3.2 ($^1/_8$)
400 to 1 600 (45 to 180)	1.6 ($^1/_{16}$)	6.3 ($^1/_4$)
1 600 through 2 500 (180 through 280)	. . .	6.3 ($^1/_4$)

Table 3 Usable Flywheel Energy

Motor Design	Motor Slip, %	Max. Flywheel Slowdown, %	Usable Flywheel Energy, %
B	3 to 5	10	19
D	5 to 8	15	28



Side Elevation

Table 4 Stroke and Shutheight Related Dimensions

Rated Capacity, kN (tons)	Standard Stroke, *A*, mm (in.)	Maximum Stroke, *B*, mm (in.)	Standard Shutheight, *C*, mm (in.)	High Frame Shutheight, *D*, mm (in.)	Slide Adjustment, *E*, mm (in.)	Knockout Stroke, *F*, mm (in.)
20 (2)	20 (0.75)	25 (1)	125 (5)	200 (8)	25 (1)	None
50 (6)	25 (1)	50 (2)	180 (7)	260 (10.25)	25 (1)	6 (0.25)
100 (11)	38 (1.5)	75 (3)	190 (7.5)	270 (10.75)	38 (1.5)	12 (0.5)
160 (18)	50 (2)	100 (4)	200 (8)	280 (11)	38 (1.5)	19 (0.75)
250 (28)	63 (2.5)	125 (5)	230 (9)	330 (13)	50 (2)	32 (1.25)
400 (45)	80 (3.25)	160 (6.3)	280 (11)	380 (15)	63 (2.5)	50 (2)
500 (56)	90 (3.5)	180 (7)	315 (12.5)	425 (16.75)	63 (2.5)	57 (2.25)
630 (70)	100 (4)	200 (8)	375 (14.75)	500 (19.75)	75 (3)	63 (2.5)
1 000 (110)	125 (5)	250 (10)	450 (17.75)	600 (23.75)	90 (3.5)	75 (3)
1 600 (180)	160 (6.3)	315 (12.5)	600 (23.75)	750 (29.5)	112 (4.5)	100 (4)
2 000 (225)	200 (8)	315 (12.5)	630 (25)	800 (31.5)	125 (5)	100 (4)
2 500 (280)	200 (8)	315 (12.5)	630 (25)	800 (31.5)	125 (5)	100 (4)

5.4 Bolster Handling Holes

Bolster handling holes shall be M20 (¾ in.-10) by 38 mm (1.5 in.) deep. Refer to Table 6 for location.

5.5 Bolster Mounting Provisions

(a) Refer to Table 7 for specifications of bolster mounting slots for open-back inclinable, bench, adjustable bed/horn, and open-back stationary presses.

(b) Refer to Table 8 for specifications of bolster mounting round-head square-neck bolts for bench presses.

(c) Refer to Table 9 for specifications of bolster mounting bolts.

(d) Bolster mounting bolts shall meet the following material specifications:

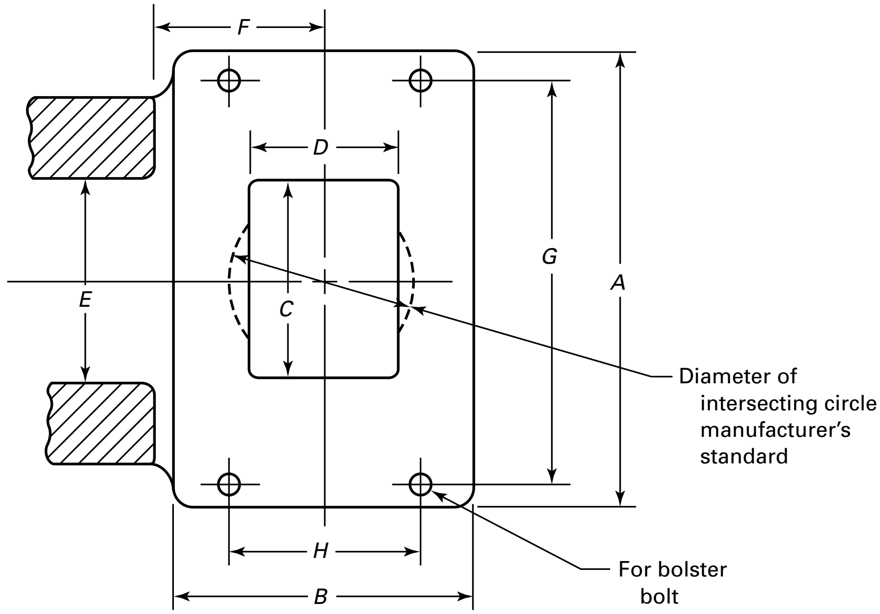
(1) medium carbon steel, hardened and tempered

(2) tensile strength 1 000 MPa (150,000 psi) minimum, Brinell hardness 264–353

5.6 Slide Related Dimensions

Refer to Tables 10 and 11 for the following requirements:

(a) slide size
(b) shank hole diameter
(c) die mounting hole locations
(d) T-slot locations



Bed

Table 5 Bed Area Related Dimensions

Rated Capacity, kN (tons)	Bed/Bolster L–R, *A*, mm (in.)	Bed/Bolster F–B, *B*, mm (in.)	Bed Opening L–R, *C*, mm (in.)	Bed Opening F–B, *D*, mm (in.)	Open Back Width (Min.), *E*, mm (in.)	Throat Depth, *F*, mm (in.)	Bolster Mounting Slots/Holes L–R, *G*, mm (in.)	Bolster Mounting Slots/Holes F–B, *H*, mm (in.)
20 (2)	180 (7)	125 (5)	60 (2.4)	60 (2.4)	80 (3.25)	75 (3)	140 (5.5)	[Note (1)]
50 (6)	250 (10)	160 (6.5)	90 (3.5)	90 (3.5)	110 (4.5)	90 (3.5)	210 (8.25)	100 (4)
100 (11)	280 (11)	190 (7.5)	100 (4)	100 (4)	125 (5)	105 (4.1)	240 (9.4)	130 (5.1)
160 (18)	450 (18)	300 (12)	140 (5.5)	140 (5.5)	160 (6.3)	160 (6.3)	402 (15.8)	220 (8.7)
250 (28)	600 (23.75)	400 (16)	280 (11)	200 (8)	300 (12)	220 (8.7)	552 (21.7)	250 (9.8)
400 (45)	700 (27.5)	450 (17.75)	350 (13.8)	250 (9.8)	350 (14)	255 (10)	644 (25.4)	335 (13.2)
500 (56)	800 (31.5)	530 (21)	360 (14.2)	280 (11)	380 (15)	290 (11.4)	744 (29.3)	400 (15.7)
630 (70)	900 (35.5)	600 (23.75)	425 (17)	315 (12.5)	450 (18)	325 (12.8)	832 (32.8)	450 (17.7)
1 000 (110)	1 060 (41.75)	700 (27.5)	500 (20)	350 (13.8)	530 (21)	375 (14.8)	992 (39)	520 (20.5)
1 600 (180)	1 250 (49)	850 (33.5)	500 (20)	350 (13.8)	630 (25)	400 (16)	1 182 (46.5)	650 (25.6)
2 000 (225)	1 500 (59)	900 (35)	750 (29.5)	450 (17.7)	750 (29.5)	435 (17.25)	1 307 (51.5)	675 (26.6)
2 500 (280)	1 500 (59)	1 000 (40)	750 (29.5)	450 (17.7)	900 (35)	435 (17.25)	1 432 (56.4)	750 (29.5)

NOTE:
(1) For the 20 kN (2 ton) press only, two slots/holes are provided, located at the left and right sides, and centered front to back.

5.7 T-Slots

(a) T-slots are 75 mm (3 in.) from centerline and are spaced at 150 mm (6 in.).

(b) T-slots run from left to right as well as front to back.

(c) For length of T-slot, see Table 6.

(d) T-slots shall be sized to accommodate M20 (3/4 in.) bolts.

(e) T-slots, bolts, and nuts shall conform to the requirements of ASME B5.1M.

5.8 Knockouts

(a) Refer to Table 4 for knockout stroke requirements.

(b) Knockout holes shall be 22 mm (0.87 in.) diameter drill through.

(c) Knockout holes shall be on the left-to-right centerline of the slide and spaced as follows:

(1) The first pair of holes shall be 75 mm (3 in.) from the front-to-back centerline of the slide.

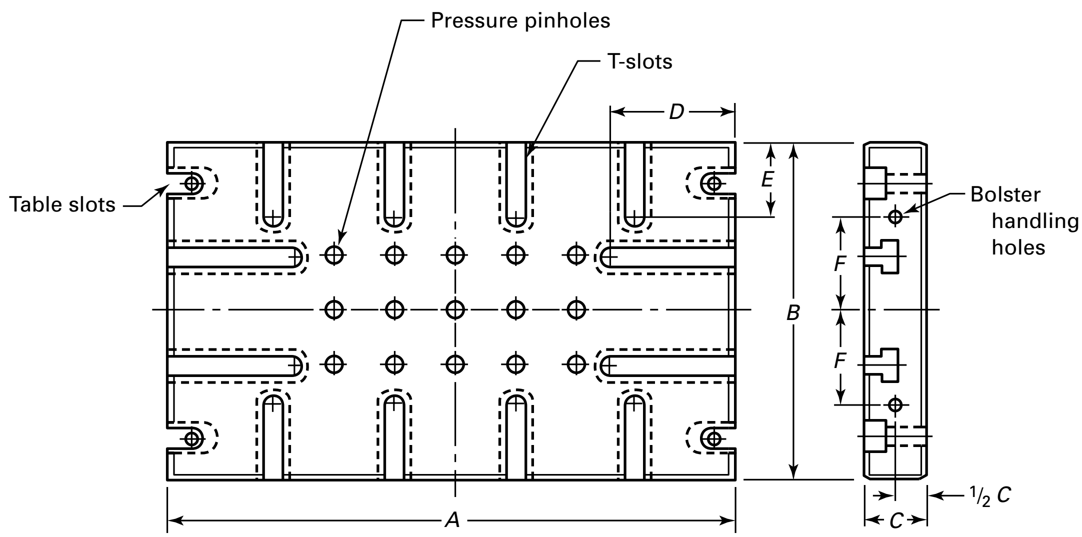


Table 6 Bolster Related Dimensions

Rated Capacity, kN (tons)	Bed/Bolster L–R, A, mm (in.)	Bed/Bolster F–B, B, mm (in.)	Bolster Thickness, C, mm (in.)	Front-to-Back T-Slots L–R, D, mm (in.)	Front-to-Back T-Slots Number of T-Slots [Note (1)]	Left-to-Right T-Slots F–B, E, mm (in.)	Left-to-Right T-Slots Number of T-Slots [Note (1)]	Handling Hole Location, F, mm (in.)
20 (2)	180 (7)	125 (5)	16 (0.63)	NA	NA	NA	NA	NA
50 (6)	250 (10)	160 (6.5)	22 (0.87)	NA	NA	NA	NA	NA
100 (11)	280 (11)	190 (7.5)	25 (1)	NA	NA	NA	NA	NA
160 (18)	450 (18)	300 (12)	30 (1.2)	NA	NA	NA	NA	NA
250 (28)	600 (23.75)	400 (16)	67 (2.6)	100 (4.3)	4	100 (4.3)	8	150 (6.0)
400 (45)	700 (27.5)	450 (17.75)	75 (3)	150 (6.0)	4	100 (4.3)	8	125 (5.0)
500 (56)	800 (31.5)	530 (21)	75 (3)	200 (7.9)	4	100 (4.3)	8	150 (6.0)
630 (70)	900 (35.5)	600 (23.75)	85 (3.35)	225 (8.9)	4	100 (4.3)	8	150 (6.0)
1 000 (110)	1 060 (41.75)	700 (27.5)	95 (3.75)	250 (10.4)	8	150 (6.0)	8	150 (6.0)
1 600 (180)	1 250 (49)	850 (33.5)	125 (5)	300 (11.8)	8	200 (7.9)	8	150 (6.0)
2 000 (225)	1 500 (59)	900 (35)	125 (5)	300 (11.8)	8	200 (7.9)	12	300 (11.8)
2 500 (280)	1 500 (59)	1 000 (40)	150 (6.0)	300 (11.8)	8	250 (9.8)	12	300 (11.8)

GENERAL NOTE: Where pressure pinholes are provided, see para. 5.12 for specifications.

NOTE:
(1) Total number of T-slots on both sides of bolster.

(2) The second pair of holes shall be 150 mm (6 in.) from the front-to-back centerline of the slide.

(3) The third pair of holes shall be 225 mm (9 in.) from the front-to-back centerline of the slide.

(d) For knockout hole quantities, refer to Table 11.

5.9 Pneumatic Die Cushions

Die cushions, when provided, shall meet the following requirements:

(a) Die cushion capacity shall approximate 15% of the rated capacity of the press.

(b) Die cushion capacity shall be rated at 700 kPa (100 psi) of air pressure.

(c) Die cushion stroke shall be approximately one-third of the press stroke.

(d) The distance between the die cushion pin plate and the top of the bed shall be 13 mm (0.5 in.), with tolerances of plus 0, minus 0.75 mm (0.030 in.). Means shall be provided, integral with the die cushion, to positively stop the die cushion stroke at its upper limit.

(e) Die cushion pin plate(s) shall be provided with a minimum wear surface Brinell hardness of 200.

(f) Die cushion pressure variation shall not exceed 20% during a complete press cycle.

5.10 Hydraulic Die Cushions

(a) Due to the wide variety of applications for hydraulic die cushions, no standards have been developed.

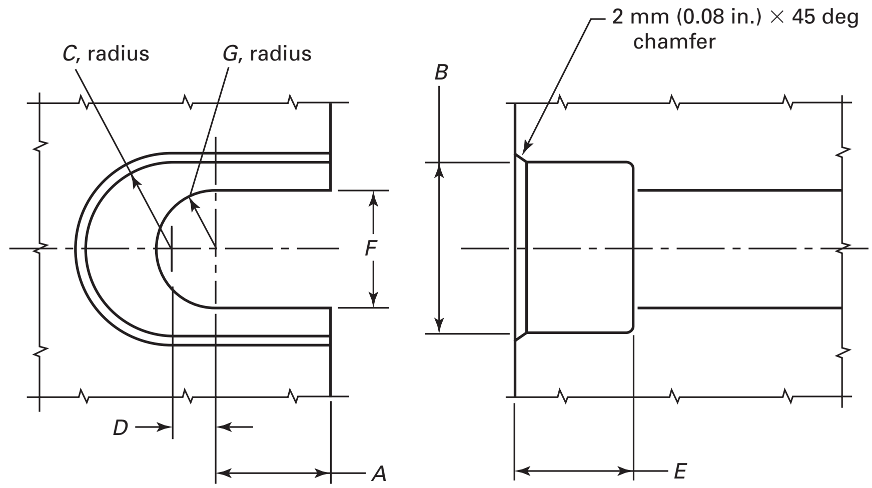


Table 7 Bolster Mounting Slot Dimensions

Rated Capacity, kN (tons)	Bolt Size, Metric (English)	*A*, mm (in.)	*B*, mm (in.)	*C*, mm (in.)	*D*, mm (in.)	*E*, mm (in.)	*F*, mm (in.)	*G*, mm (in.)
20 (2)	M10 (3/8-16)	20 (0.79)	25 (1)	6 (0.24)	0	6 (0.24)	12 (0.47)	6 (0.24)
50 (6)	M12 (7/16-14)	20 (0.79)	30 (1.18)	7 (0.28)	0	8 (0.31)	14 (0.55)	7 (0.28)
100 (11)	M16 (5/8-11)	20 (0.79)	35 (1.38)	9 (0.35)	0	10 (0.4)	18 (0.7)	9 (0.35)
160 (18), 250 (28)	M20 (3/4-10)	24 (0.94)	34 (1.34) [Note (1)]	17 (0.67) [Note (1)]	10 (0.4)	20 (0.79)	24 (0.94)	12 (0.47)
400 (45), 500 (56)	M24 (1-8)	28 (1.10)	40 (1.57)	20 (0.79)	12 (0.47)	25 (0.98)	28 (1.10)	14 (0.55)
Over 500 (56)	M30 (1 1/4-7)	34 (1.34)	50 (1.97)	25 (0.98)	15 (0.59)	30 (1.18)	34 (1.36)	17 (0.67)

NOTE:
(1) For round-head square-neck bolster mounting bolts, dimension *B* is 40 (1.57) and *C* is 20 (0.79).

Features that have been incorporated include the following:

(1) programmable force throughout the stroke

(2) programmable ejection function (hold-down feature)

(b) Die cushion capacity shall be a minimum of 15% of the rated capacity of the press.

(c) Die cushion stroke shall be a minimum of one-third of the press stroke.

(d) The distance between the die cushion pin plate and the top of the bed shall be 13 mm (0.5 in.), with tolerances of plus 0, minus 0.75 mm (0.030 in.). Means shall be provided, integral with the die cushion, to positively stop the die cushion stroke at its upper limit.

(e) Die cushion pin plate(s) shall be provided with a minimum wear surface Brinell hardness of 200.

5.11 Pressure Pins

Pressure pins shall meet the following requirements:

(a) For normal service, material shall be SAE 1020 cold drawn steel.

(b) For heavy service, the material shall be SAE 1020 cold drawn steel, carburized 1.3 mm (0.05 in.) to 1.5 mm (0.06 in.) deep and hardened to 50 to 60 Rockwell C scale.

(c) Tolerance of the diameter shall be plus 0, minus 0.13 mm (0.005 in.).

(d) Ends shall be smooth, flat, and square to the pin.

Dimensions for plain pressure pins shall be as specified in Table 12.

5.12 Pressure Pinholes

(a) Pressure pinholes start on the centerline and shall be spaced at 75 mm (3 in.) between T-slot centerlines.

(b) For pressure pinhole dimensions, refer to Table 12.

(c) Refer to Table 13 for pressure pinhole patterns.

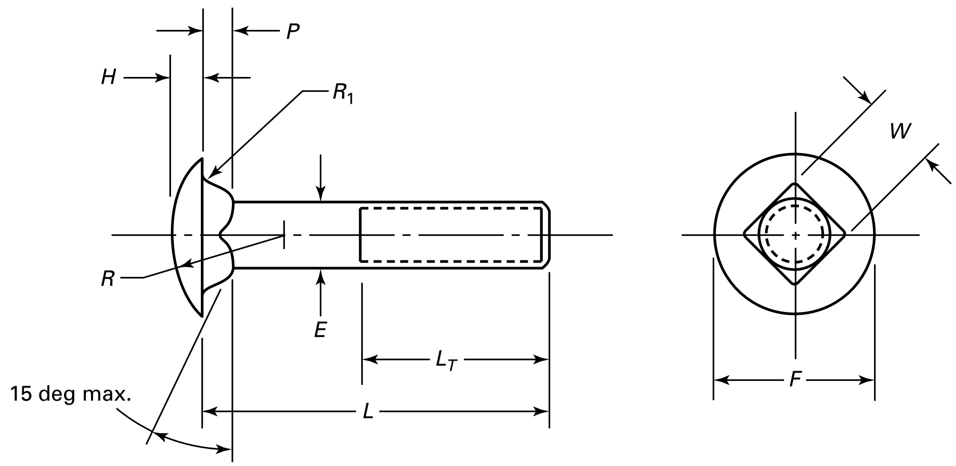
5.13 Counterbalance

The counterbalance, when provided, shall meet the following requirements:

(a) It shall balance the combined weight of the slide, upper die, and attachments.

(b) The maximum allowable upper die weight is calculated as the equivalent weight of solid steel that occupies one-fourth of the die space.

(c) Pneumatic counterbalance pressure variation shall not exceed 20% during a complete press cycle.



Round-Head Square-Neck Bolt

Table 8 Bolster Mounting Bolts: Bench Presses

Bolt Size, Metric (U.S. Customary)	Rated Capacity, kN (tons)	Nominal Diameter, mm (in.), E	Pitch, mm (in.)	Head Diameter, mm (in.), F	Head Height, mm (in.), H		Approx. Head Radius, mm (in.), R	Fillet Rounds, mm (in.), R_1		Depth of Square, mm (in.), P		Width of Square, mm (in.), W			Min. Full Thread Length, mm (in.), L_T
					Max.	Min.		Max.	Min.	Max.	Min.	Nominal	Max.	Min.	
M10 (3/8-16)	20 (2)	10 (0.39)	1.5 (0.06)	20.6 (0.81)	5.5 (0.22)	5.0 (0.2)	13.7 (0.54)	0.8 (0.031)	0.4 (0.016)	4.0 (0.16)	3.0 (0.12)	10 (0.39)	10.58 (0.42)	9.83 (0.39)	26 (1)
M12 (1/2-13)	50 (6)	12 (0.47)	1.75 (0.07)	24.7 (0.97)	6.5 (0.26)	6.0 (0.24)	16.5 (0.65)	0.8 (0.031)	0.4 (0.016)	4.0 (0.16)	3.0 (0.12)	12 (0.47)	12.7 (0.5)	11.8 (0.46)	30 (1.2)
M16 (5/8-11)	100 (11)	16 (0.63)	2 (0.08)	33.1 (1.30)	8.8 (0.35)	8.0 (0.31)	22.6 (0.89)	1.6 (0.063)	0.8 (0.031)	5.0 (0.2)	4.0 (0.16)	16 (0.63)	20.84 (0.82)	15.77 (0.62)	38 (1.5)
M20 (3/4-10)	140 (15)	20 (0.79)	2.5 (0.10)	39.8 (1.57)	10.8 (0.43)	10.0 (0.39)	27.3 (1.07)	1.6 (0.063)	0.8 (0.031)	5.0 (0.2)	4.0 (0.16)	20 (0.79)	24.84 (0.98)	19.77 (0.78)	40 (1.6)

GENERAL NOTE: Length (L) and finish to be specified by purchaser.

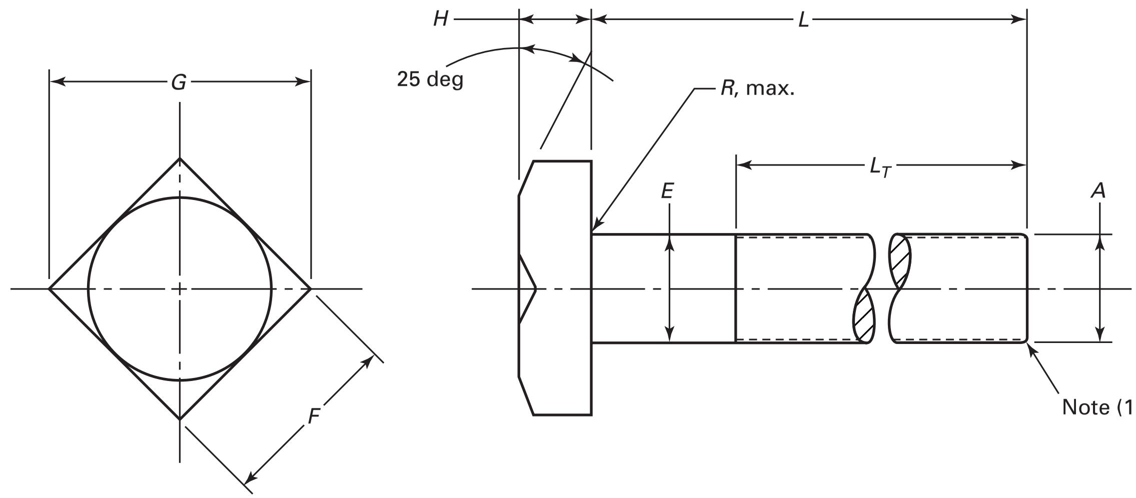


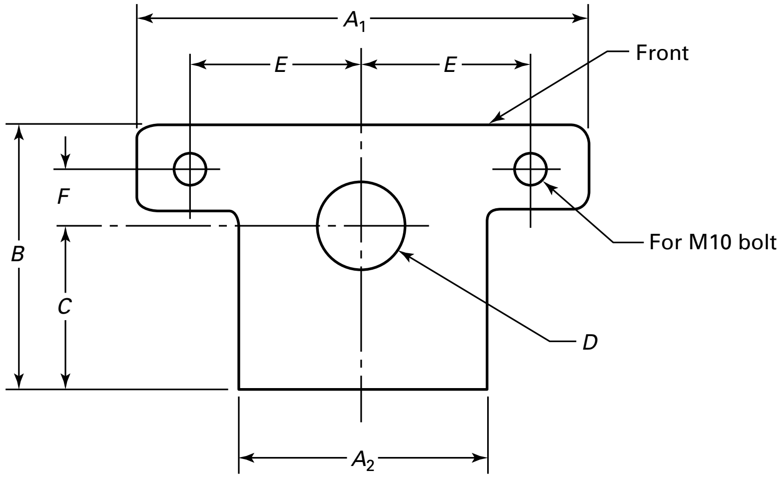
Table 9 Bolster Mounting Bolts

Bolt Size, Metric (U.S. Customary)	Rated Capacity, kN (tons)	Nominal Diameter, mm (in.), E	Head Width, mm (in.), F		Min Width Across Corners, mm (in.), G	Head Thickness, mm (in.), H			Max. Radius, mm (in.), R	Pitch, mm (in.)	Thread Data, mm (in.), A Basic Major Diam.	Basic Pitch Diam.	Min. Full Thread Length, mm (in.), L_T
			Nom. and Max.	Min.		Nominal	Max.	Min.					
M20 ($^3/_4$-10)	140 (15), 200 (20), 300 (35)	20 (0.75)	30 (1.2)	29 (1.14)	39.8 (1.57)	14 (0.55)	14.6 (0.57)	13.4 (0.53)	2 (0.08)	2.5 (0.10)	19.96 (0.75)	18.38 (0.69)	50 (2.0)
M24 (1-8)	560 (60)	24 (1.0)	36 (1.42)	34.8 (1.37)	47.8 (1.88)	16 (0.63)	16.7 (0.66)	15.3 (0.6)	2 (0.08)	3 (0.125)	23.95 (1.0)	22.05 (0.92)	58 (2.3)
M30 (1$^1/_4$-7)	Over 560 (60)	30 (1.25)	46 (1.81)	44.5 (1.75)	61.1 (2.41)	20 (0.79)	20.8 (0.82)	19.2 (0.76)	2 (0.08)	3.5 (0.14)	29.95 (1.25)	27.73 (1.16)	70 (2.8)

GENERAL NOTE: Length (*L*) and finish to be specified by purchaser.

NOTE:

(1) 45 deg chamfer round point or first thread rolled undersize to facilitate assembly.



Plain Slide

Table 10 Slide Related Dimensions: Bench Presses 20 kN (2 tons) Through 160 kN (18 tons)

Rated Capacity, kN (tons)	Dimensions, mm (in.)							
	Slide, L–R, A_1	Slide, L–R, A_2	Slide, F–B, B	Shank Hole Location, C	Shank Hole Diameter, D	Shank Hole Depth	Mounting Hole Location L–R, E	Mounting Hole Location F–B, F
20 (2)	90 (3.5)	45 (1.8)	55 (2.17)	30 (1.2)	25 (1)	25 (1)	28 (1.1)	10 (0.4)
50 (6)	160 (6.3)	75 (3)	80 (3.15)	40 (1.57)	40 (1.57)	38 (1.5)	63 (2.5)	25 (1)
100 (11)	160 (6.3)	85 (3.35)	85 (3.35)	40 (1.57)	40 (1.57)	50 (2)	63 (2.5)	25 (1)
160 (18)	190 (7.5)	100 (4)	120 (4.7)	63 (2.5)	40 (1.57)	63 (2.5)	80 (3.15)	25 (1)

5.14 Machining Specifications

5.14.1 Tolerances. The following tolerances shall apply to die space related dimensions:

(a) bolster left-to-right and front-to-back dimensions: plus or minus 6 mm (0.25 in.)

(b) bolster thickness: plus or minus 0.4 mm (0.016 in.)

(c) bolster mounting slots and holes, from bolster centerlines: plus or minus 0.4 mm (0.016 in.)

(d) die mounting holes, from centerlines of slide: plus or minus 0.4 mm (0.016 in.)

(e) T-slot locations, from centerlines of bolster and slide: plus or minus 0.4 mm (0.016 in.)

(f) pressure pinholes, from centerline of bolster: plus or minus 0.4 mm (0.016 in.)

(g) knockout holes, from front-to-back slide centerline: plus or minus 0.8 mm (0.031 in.)

5.14.2 Surface Finish. The following specifications shall apply to surface finishes:

(a) bed surface and slide face: R_a 3.2 μm (125 μin.)

(b) top and bottom of bolster: R_a 3.2 μm (125 μin.)

(c) edges of mounting hole pockets: R_a 6.3 μm (250 μin.)

5.14.3 Chamfers. The following components shall be provided with the specified chamfers:

(a) all bolster edges and shank holes: 6 mm (0.25 in.) by 45 deg

(b) pressure pinholes: 1.5 mm (0.06 in.) by 45 deg

(c) knockout pin ends and knockout holes: 1.5 mm (0.06 in.) by 45 deg

6 ACCEPTANCE CONDITIONS

6.1 Accuracy

6.1.1 Press Level. The press shall be precision leveled in order to prevent cross-corner binding of the slide in the gibs, and to ensure a level bolster surface plane upon which to base measurements of press accuracy.

6.1.2 Bolster Flatness. Tool attachment surface flatness shall be within 0.05 mm (0.002 in.) up to the first 1 000 mm and 0.05 mm/m (0.0006 in./ft) for additional length over the first 1 000 mm.

6.1.3 Parallelism: Slide and Bolster. Parallelism between the tool attachment surfaces of the slide and the bolster shall meet the requirements in Table 14. Measurements shall be made

(a) with stroke down and adjustment up

(b) under no-load conditions and

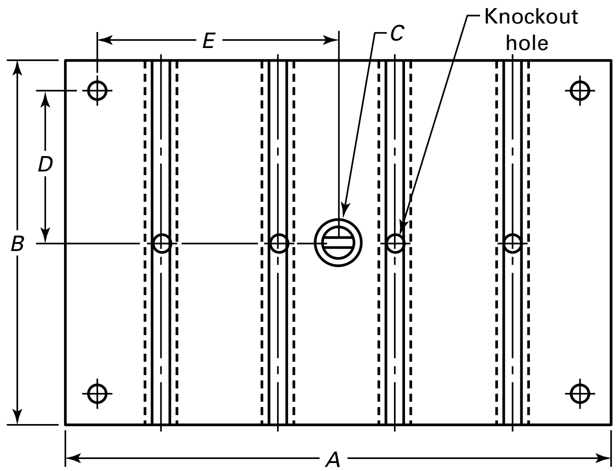


Table 11 Slide Related Dimensions: Presses 160 kN (18 tons) Through 2 500 kN (280 tons)

	Slide						Die Mounting Hole Centers	
Rated Capacity, kN (tons)	L–R, *A*, mm (in.)	F–B, *B*, mm (in.)	Shank Hole Diam., *C*, mm (in.)	Shank Hole Depth, mm (in.)	Number of T-Slots	Number of Knockout Holes	L–R, *D*, mm (in.)	F–B, *E*, mm (in.)
160 (18)	300 (11.8)	250 (10)	41 (1.6)	63 (2.5)	NA	2	120 (4.7)	95 (3.7)
250 (28)	380 (15)	300 (11.8)	41 (1.6)	63 (2.5)	NA	2	150 (5.9)	114 (4.5)
400 (45)	450 (18)	350 (14)	64 (2.5)	90 (3.5)	2	4	NA	NA
500 (56)	530 (20.9)	400 (16)	64 (2.5)	90 (3.5)	2	4	NA	NA
630 (70)	600 (24)	450 (18)	64 (2.5)	115 (4.5)	2	4	NA	NA
1 000 (110)	700 (27.6)	500 (20)	64 (2.5)	115 (4.5)	4	6	NA	NA
1 600 (180)	800 (32)	600 (24)	64 (2.5)	125 (4.9)	4	6	NA	NA
2 000 (225)	900 (36)	700 (27.6)	64 (2.5)	125 (4.9)	4	6	NA	NA
2 500 (280)	1 000 (40)	800 (32)	64 (2.5)	125 (4.9)	4	6	NA	NA

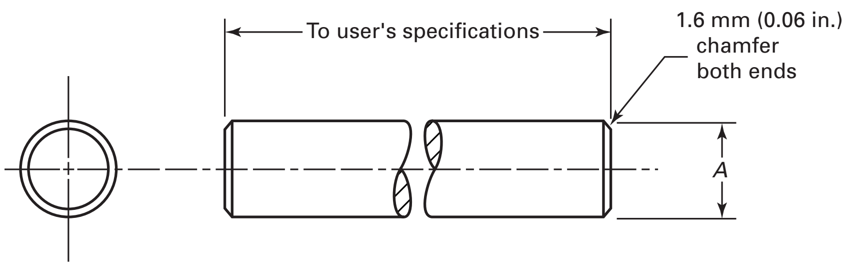


Table 12 Pressure Pin

Rated Capacity, kN (tons)	*A*, mm (in.)	Pressure Pinhole Diameter, mm (in.)
250 (28) to 630 (70)	20 (0.79)	22 (0.87)
630 (70) to 2 500 (280)	25 (1)	27 (1.06)

GENERAL NOTE: For above 2 500 kN (280 tons), see ASME B5.61-2003.

Table 13 Pressure Pinhole Patterns

Rated Capacity, kN (tons)	Number of Holes	Rows, Left to Right	Rows, Front to Back
20 (2) to 250 (28)	0	0	0
250 (28) to 400 (45)	9	3	3
400 (45) to 1 000 (70)	15	5	3
1 000 (110) to 2 000 (225)	35	7	5
2 000 (225) through 2 500 (280)	45	9	5

GENERAL NOTE: For above 2 500 kN (280 tons), see ASME B5.61-2003.

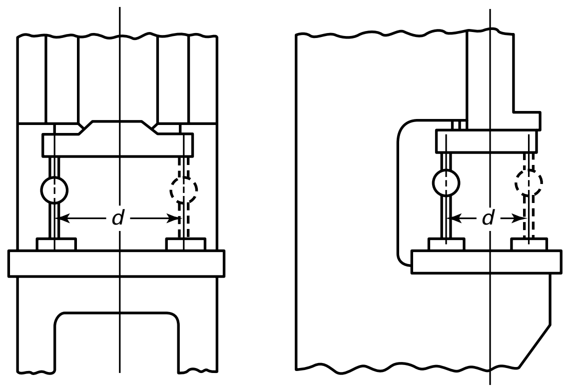


Table 14 Parallelism

Rated Capacity, kN (tons)	Left to Right, mm (in.)	Front to Back, mm (in.)
20 (2) to 500 (56)	0.05 (0.002)	0.05 (0.002)
500 (56) to 1 600 (180)	0.075 (0.003)	0.05 (0.002)
1 600 (180) through 2 500 (280)	0.1 (0.004)	0.075 (0.003)

GENERAL NOTE: For above 2 500 kN (280 tons), see ASME B5.61-2003.

(c) with all adjustments set for normal running conditions

6.1.4 Squareness: Slide Travel (See Fig. 2). The total F.I.M. (full indicator movement) of slide travel shall not exceed 0.03 mm (0.001 in.). Measurements shall be made

(a) both left to right and front to back

(b) for one-third of the slide travel that precedes the end of the stroke and

(c) with sufficient counterbalance force to overcome the cumulative clearances (lost motion) of the press drive

6.1.5 Parallelism: Die Cushion Pin Plate. Parallelism between the surface of the die cushion pin plate and the top of the bed shall be within 0.4 mm/m (0.005 in./ft) of die cushion dimensions, both left to right and front to back.

6.2 Frame Deflection

6.2.1 Linear Deflection (See Fig. 3). Allowable deflection at rated capacity shall not exceed 0.002 mm/mm

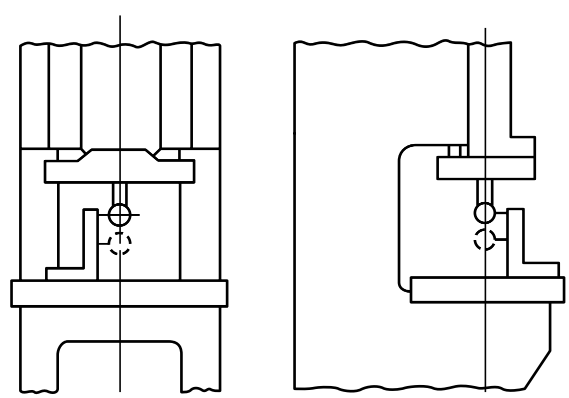


Fig. 2 Squareness

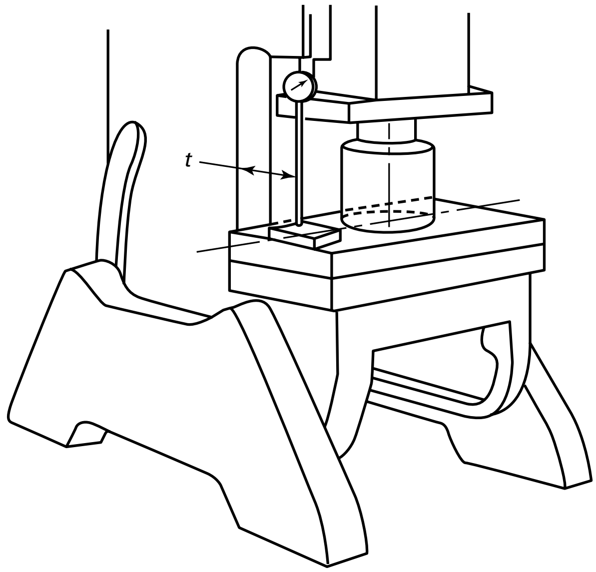


Fig. 3 Linear Frame Deflection

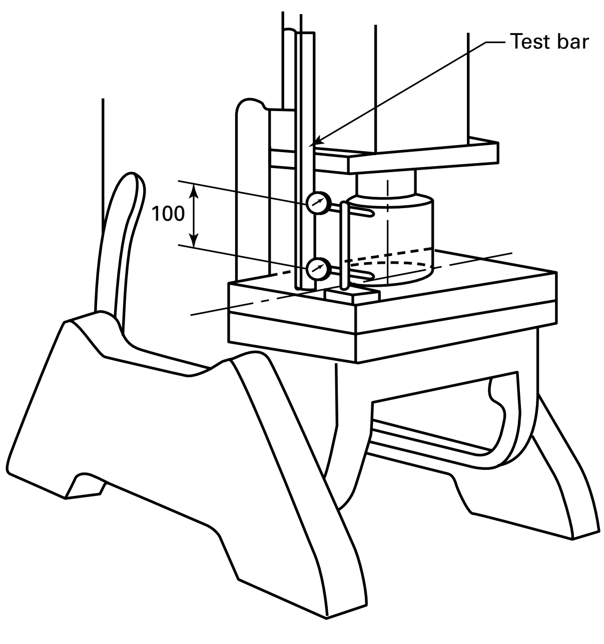


Fig. 4 Angular Frame Deflection

(0.002 in./in.) of throat depth (*t*). Measurements shall be made

(*a*) at the centerline of the slide and bolster
(*b*) with load applied at the center of the slide and
(*c*) with all adjustments set for normal running conditions

6.2.2 Angular Deflection (See Fig. 4). Allowable deflection at rated capacity shall not exceed 0.12 mm per 100 mm (0.001 in./in.). Measurements shall be made

(*a*) with the front test bar surface on the centerline of the slide and bolster
(*b*) with load applied at the center of the slide and
(*c*) with all adjustments set for normal running conditions

7 HEALTH AND SAFETY

7.1 Ergonomics

Ergonomic considerations in the design of power presses are provided in ANSI B11.TR-1.

7.2 Safeguarding

Safeguarding requirements in the use of power presses are provided in the following publications.

7.2.1 Code of Federal Regulations (CFR) [Mandated by U.S. Department of Labor Occupational Safety & Health Administration (OSHA)]

(*a*) 29 CFR 1910.147
(*b*) 29 CFR 1910.212
(*c*) 29 CFR 1910.217
(*d*) 29 CFR 1910.219

7.2.2 American National Standards Institute (ANSI)

(*a*) ANSI B11.1
(*b*) ANSI B11.2
(*c*) ANSI B11.19
(*d*) ASME B15.1
(*e*) NFPA 79

7.2.3 National Safety Council (General Requirements)

(*a*) Accident Prevention Manual (Volumes 1 and 2)
(*b*) Power Press Safety Manual

8 INFORMATION AND INSTRUCTIONS

8.1 Identification

The manufacturer shall provide data plates of durable material, permanently attached, to display information applicable to the press and its accessories. Letters and numbers shall be at least 3 mm (0.12 in.) high.

8.1.1 Press Data Plate. A data plate shall be attached to the front right-hand side of the press; height not to exceed 2 000 mm (80 in.) from floor level. See Figs. 5 and 6 for examples.

8.1.2 Counterbalance Data Plate. A data plate shall be attached adjacent to the counterbalance system pressure control. See Fig. 7 for an example.

8.1.3 Die Cushion Data Plate. When a die cushion is provided, a data plate shall be attached adjacent to the die cushion system pressure control. See Fig. 8 for an example.

8.1.4 Clutch/Brake Data Plate. When a pneumatic clutch/brake is provided, a data plate shall be attached

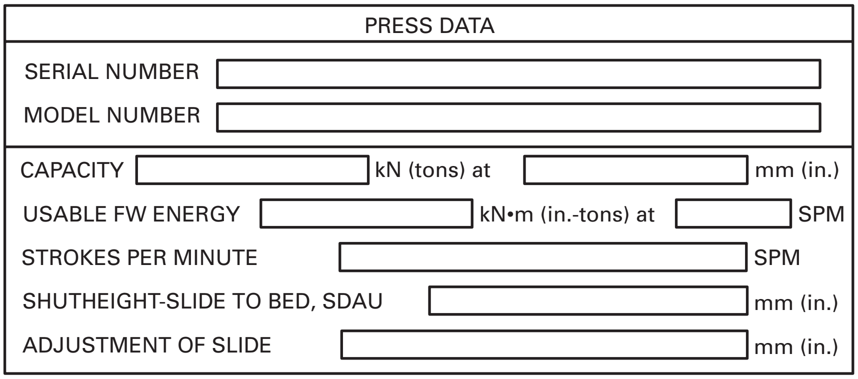


Fig. 5 Press Data Plate: Mechanical Press

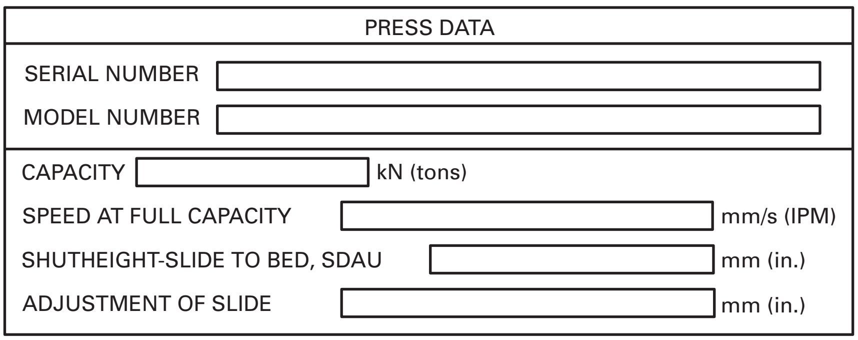


Fig. 6 Press Data Plate: Hydraulic Press

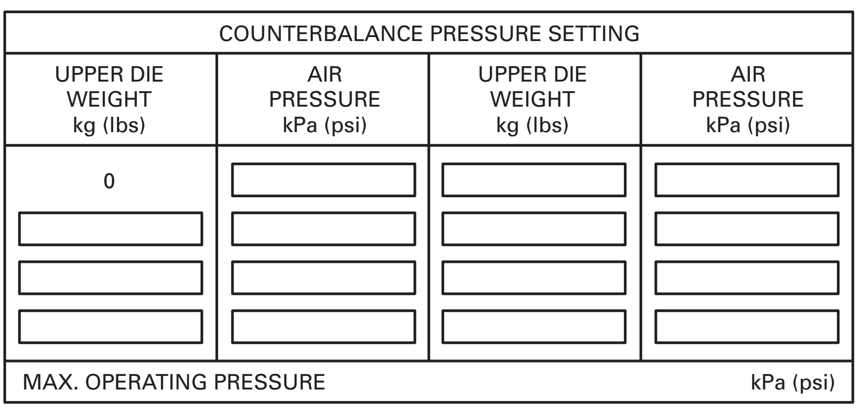


Fig. 7 Counterbalance Data Plate

adjacent to the pressure regulator to indicate clutch/brake air pressure for rated capacity.

8.1.5 Lubrication and Operating Fluid Data Plates. Lubrication and operating fluid data plates, when provided, shall be attached near lubricant fill points.

8.1.6 Press Designation. Presses shall be designated in accordance with the system shown in Fig. 9.

8.2 Shipping and Assembly Provisions

Properly designed handling holes or hooks shall be provided for safely handling the press. Handling holes or hooks shall be located to avoid interference with accessories and mounted on a machined surface.

Safety cables or straps shall be provided to secure major components that are mounted external to the press frame (i.e., motors, surge tanks, etc.).

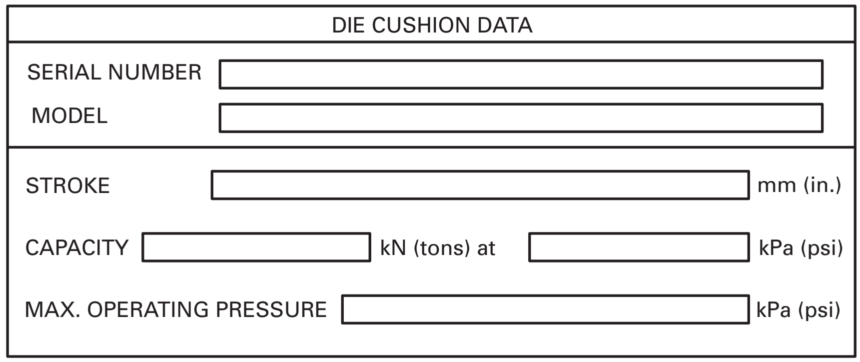


Fig. 8 Die Cushion Data Plate

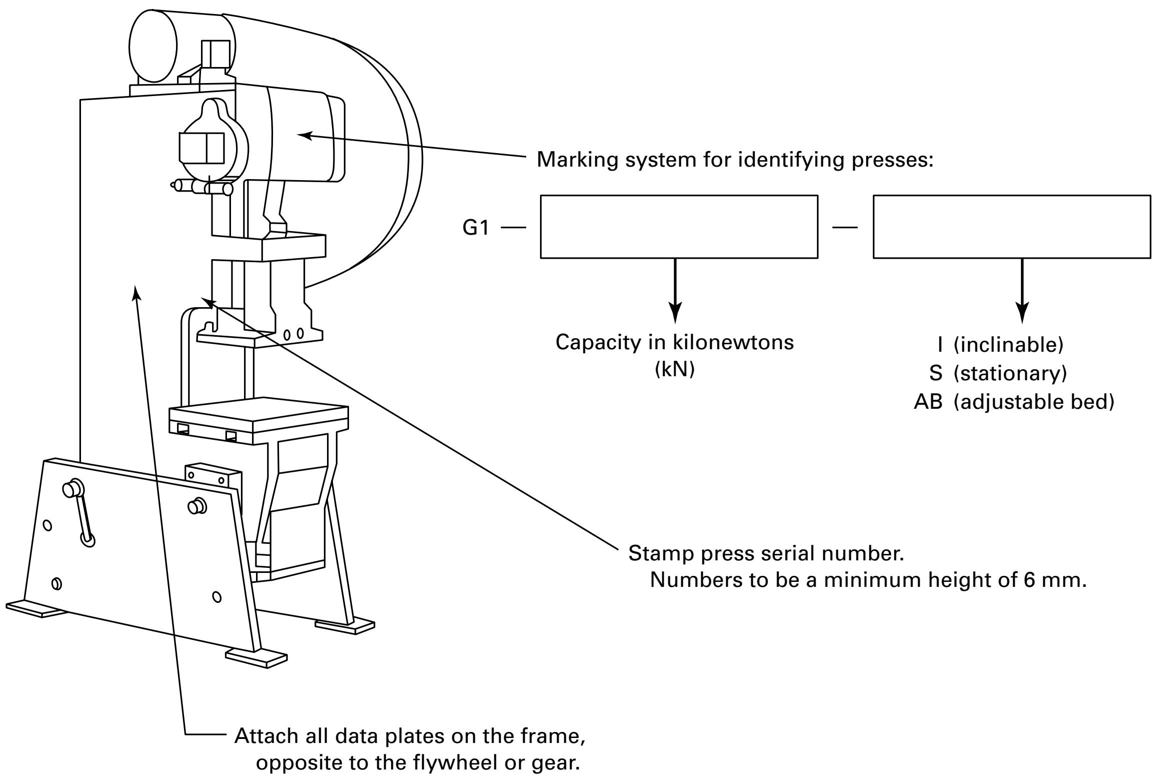


Fig. 9 Press Designation System

8.3 Instruction Manual

(a) The manufacturer shall provide a minimum of two instruction manuals on proper

(1) installation

(2) operation

(3) maintenance

(4) safeguarding

(b) For mechanical power presses, the instruction manual shall include the following information:

(1) press capability based on usable flywheel energy

(2) rated capacity based on drive torque

(3) slide velocity characteristics

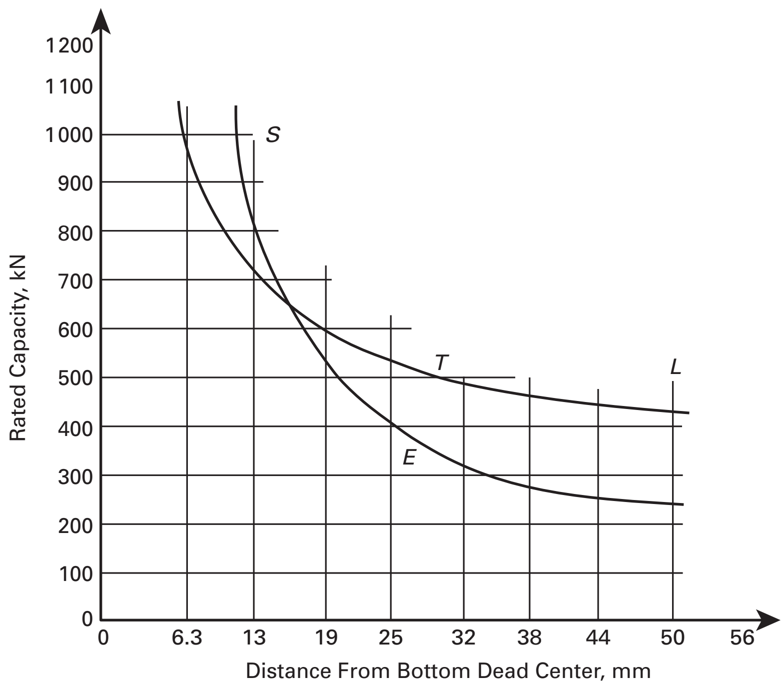
Press capability can be combined into a single press capability graph, such as the typical examples shown in Figs. 10 and 11.

9 DECLARATION OF MANUFACTURER COMPLIANCE

Upon request, the machine manufacturer shall provide a certificate of compliance with this Standard. The certificate, entitled "ASME B5.52 Compliance," is to include the following information:

(a) manufacturer

(b) press designation



E = energy capacity limit
L = stroke length limit
S = structural capacity limit
T = torque capacity limit

GENERAL NOTES:
(a) Capacity = 1 000 kN at 6.3 mm.
(b) Stroke length = 125 mm.
(c) Usable energy = 10.75 kN-m.

Fig. 10 Press Capability Graph (Metric)

(c) machine model
(d) machine serial number
(e) date

10 REFERENCE STANDARDS

10.1 Normative References

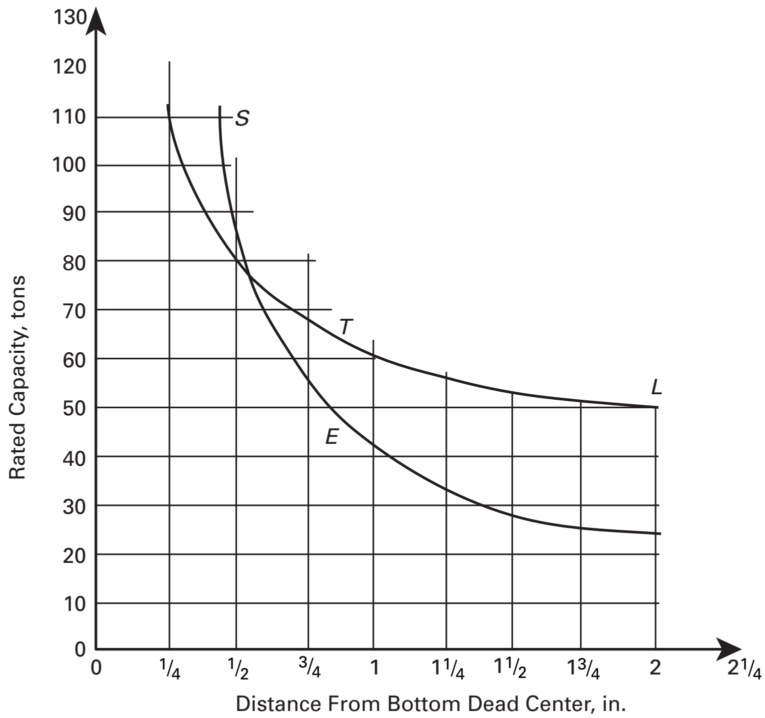
ANSI B11.TR-1-1995, Ergonomic Guidelines for the Design, Installation and Use of Machine Tools
ANSI B11.1-2002, Machine Tools — Mechanical Power Presses — Safety Requirements for Construction, Care, and Use
ANSI B11.2-1995 (R2002), Hydraulic Power Presses
ANSI B11.19-1990 (R1996), Performance Criteria for Safeguarding Machine Tools

Publisher: American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036

ANSI/ASME B5.1M-1985 (R1998), T-Slots, Their Bolts, Nuts, and Tongues
ASME B5.49-1998, Glossary of Power Press Terms
ASME B5.51M-1979 (R2002), Preferred SI Units for Machine Tools
ASME B15.1-2000, Safety Standard for Mechanical Power Transmission Apparatus

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout)
29 CFR 1910.212, General Requirements for All Machines
29 CFR 1910.217, Mechanical Power Presses



E = energy capacity limit
L = stroke length limit
S = structural capacity limit
T = torque capacity limit

GENERAL NOTES:
(a) Capacity = 110 tons at 1/4 in.
(b) Stroke length = 5 in.
(c) Usable energy = 31 in.-tons.

Fig. 11 Press Capability Graph (U.S. Customary)

29 CFR 1910.219, Mechanical Power-Transmission Apparatus
Publisher: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325

NFPA 79-1997, Electrical Standard for Industrial Machinery
Publisher: National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101

10.2 Informative References

ANSI B93.114M-1987, Pneumatic Fluid Power — Systems Standard for Industrial Machinery
Publisher: American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036

ASME B5.61-2003, Power Presses: General Purpose, Single Action, Straight Side Type

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

NFPA/T2.24.1 R1-2000, Hydraulic Fluid Power — Systems Standard for Stationary Industrial Machinery — Supplement to ISO 4413:1998, Hydraulic Fluid Power — General Rules Relating to Systems

Publisher: National Fluid Power Association (NFPA), 3333 North Mayfair Road, Milwaukee, WI 53222-3219

MANDATORY APPENDIX I
METRIC/U.S. CUSTOMARY CONVERSION

Quantity	To Convert From	Conversion Formula
Length	Inches to millimeters	1 in. = 25.4 mm
	Millimeters to inches	1 mm = 0.0394 in.
Force	Tons to kilonewtons	1 ton = 8.9 kN
	Kilonewtons to tons	1 kN = 0.1124 ton
Pressure	Pounds per square inch to kilopascals	1 psi = 6.9 kPa
	Kilopascals to pounds per square inch	1 kPa = 0.145 psi (1 bar = 100 kPa)
Energy	Inch-tons to kilonewton-meters	1 in.-ton = 0.226 kN·m
	Kilonewton-meters to inch-tons	1 kN·m = 4.425 in.-tons
Power	Horsepower to kilowatts	1 hp = 0.75 kW = 254.4 BTU/hr
	Kilowatts to horsepower	1 kW = 1.341 hp = 3,412 BTU/hr
	BTU per hour to horsepower	1 BTU/hr = 0.000293 kW = 0.000393 hp
Parallelism	Inches per foot to millimeters per meter	1 in./ft = 83.33 mm/m
	Millimeters per meter to inches per foot	1 mm/m = 0.012 in./ft [Note (1)]
Speed	Inches per minute to millimeters per minute	1 in./min = 25.4 mm/min
	Millimeters per minute to inches per minute	1 mm/min = 0.039 in./min
	Feet per minute to meters per second	1 fpm = 0.0051 m/sec
	Meters per second to feet per minute	1 m/sec = 197 fpm

NOTE:
(1) 1 in./ft = 25.4 mm/304.8 mm = 83.33 mm/m. The reciprocal of 83.33 is 0.012.

MANDATORY APPENDIX II
MECHANICAL POWER PRESS CAPACITY

The slider-crank motion, imparted by a crankshaft, eccentric shaft, or eccentric gear, produces the reciprocating motion of the press slide. The changing mechanical advantage that results from the changing geometry of the crank arm position relative to the slide connection(s) converts the constant torque of the rotating drive members into a varying force when applied by the slide. This force is at its minimum when the crank arm and connection form a right angle (near midstroke). It is at its maximum when the slide approaches the end of its travel.

EXAMPLES:

(1) Capacity of 100 kN press, 50 mm stroke, 6.3 mm from bottom of stroke. From Table II-1, the capacity is 54% of rated capacity at 6.3 mm from bottom dead center (BDC). Capacity = 100 kN × 0.54 = 54 kN.

(2) Capacity of 10 ton press, 2 in. stroke, $\frac{1}{4}$ in. from bottom of stroke. From Table II-1, the capacity is 54% of rated capacity at $\frac{1}{4}$ in. from BDC. Capacity = 10 tons × 0.54 = 5.4 tons.

(3) Capacity of 250 kN press, 150 mm stroke, 25 mm from bottom of stroke. From Table II-2, the capacity is 37% of rated capacity at 25 mm from BDC. Capacity = 250 kN × 0.37 = 92.5 kN.

(4) Capacity of 45 ton press, 6 in. stroke, $1\frac{1}{2}$ in. from bottom of stroke. From Table II-2, the capacity is 34.5% of rated capacity at $1\frac{1}{2}$ in. from BDC. Capacity = 45 tons × 0.345 = 15.5 tons.

(5) Capacity of 1 400 kN press, 150 mm stroke, 25 mm from bottom of stroke. From Table II-3, the capacity is 54.5% of rated capacity at 25 mm from BDC. Capacity = 1 400 kN × 0.545 = 763 kN.

(6) Capacity of 150 ton press, 6 in. stroke, $1\frac{1}{2}$ in. from bottom of stroke. From Table II-3, the capacity is 48% of rated capacity at $1\frac{1}{2}$ in. from BDC. Capacity = 150 tons × 0.48 = 72 tons.

Table II-1 Capacity Above Rating Point of 1.6 mm (0.06 in.)

	Percent of Rated Capacity for Distance From Bottom Dead Center, mm (in.)									
Stroke, mm (in.)	1.6 (0.06)	3.2 (0.125)	6.3 (0.25)	12.7 (0.5)	19 (0.75)	25 (1)	38 (1.5)	50 (2)	75 (3)	100 (4)
25 (1)	100	75.5	56	...	...	...	...	...	...	...
38 (1.5)	100	75	55	42	...	...	...	...	...	...
50 (2)	100	74	54	41	36	...	...	...	...	...
63 (2.5)	100	73	53	40	35	31	...	...	...	...
75 (3)	100	72	52	39	34	30	...	...	...	...
100 (4)	100	71.5	51.5	38	33	29.5	27	...	...	...
125 (5)	100	71	51.5	37.5	32	28.5	25.5	24	...	...
150 (6)	100	71	51	37	31	28	24.5	23	...	...
200 (8)	100	71	51	36.5	30.5	27	23	21.5	19	...
250 (10)	100	71	50.5	36.5	30	26.5	22.5	20.5	18	17
300 (12)	100	71	50.5	36	30	26	22	20	17.5	16

Table II-2 Capacity Above Rating Point of 3.2 mm (0.13 in.)

	Percent of Rated Capacity for Distance From Bottom Dead Center, mm (in.)								
Stroke, mm (in.)	3.2 (0.13)	6.3 (0.25)	12.7 (0.5)	19 (0.75)	25 (1)	38 (1.5)	50 (2)	75 (3)	100 (4)
75 (3)	100	72	53	...	...	...	...	...	...
100 (4)	100	72	53	45.5	41.5	...	...	...	...
125 (5)	100	72	52.5	45	40.5	36	...	...	...
150 (6)	100	72	52	44	39	34.5	...	...	...
200 (8)	100	72	51.5	43	38	32.5	30	...	...
250 (10)	100	72	51	42.5	37	32	29	25.5	...
300 (12)	100	72	51	42	37	31	28	24.5	22.5

Table II-3 Capacity Above Rating Point of 6.3 mm (0.25 in.)

Stroke, mm (in.)	Percent of Rated Capacity for Distance From Bottom Dead Center, mm (in.): 6.3 (0.25)	12.7 (0.5)	19 (0.75)	25 (1)	38 (1.5)	50 (2)	75 (3)	100 (4)	125 (5)
75 (3)	100	75	64	58	. . .	. . .	. . .	. . .	. . .
100 (4)	100	74	63	57	52.5	. . .	. . .	. . .	. . .
125 (5)	100	73	62	55.5	49.5	47.5	. . .	. . .	. . .
150 (6)	100	72.5	61	54.5	48	44	. . .	. . .	. . .
200 (8)	100	72	60	53	45.5	41.5	38	. . .	. . .
250 (10)	100	72	60	52.5	44.5	40.5	36	34	. . .
300 (12)	100	71.5	59	52	43.5	39.5	34.5	31.5	30.5

MANDATORY APPENDIX III
USABLE FLYWHEEL ENERGY

III-1 EXPLANATION

The energy given up by the flywheel, as it slows down under load, will determine the distance through which the rated capacity of a mechanical power press can be sustained. The energy requirement is dependent on the work to be performed by the tooling during the process (duty factor). The usable flywheel energy is dependent on the amount the flywheel can slow down under load without overloading the motor when restoring the energy (motor factor).

III-2 CALCULATION IN METRIC UNITS

To calculate the usable flywheel energy in metric units, use the following equation and tables:

$$E = CD_F M_F[(0.04S + 10.2)/1\,000]$$

where
C = rated capacity, kN
D_F = duty factor (for variable speed presses, duty factor is based on one-half of maximum speed)
E = usable flywheel energy, kN-m
M_F = motor factor
S = press stroke, in.

Rated Capacity, kN	Drive Type	Rating Point, mm	Duty Factor
20 to 160	Nongeared	1.0	0.6
	Geared	1.6	0.8
160 to 400	Nongeared	1.0	0.6
	Geared	3.2	1.8
400 to 1 600	Nongeared	1.6	0.8
	Geared	6.3	2.4
1 600 through 2 500	Geared	6.3	2.4

Motor Design	Motor Slip, %	Motor Factor
B	3 to 5	0.19
D	5 to 8	0.28

EXAMPLE: 2 000 kN press, geared drive, 250 mm stroke, 5% to 8% slip motor. From the above tables, the duty factor is 2.4 and the motor factor is 0.28.

$E = (2\,000)(2.4)(0.28)[(0.04 \times 250 + 10.2)/1\,000] = 27$ kN·m required

III-3 CALCULATION IN U.S. CUSTOMARY UNITS

To calculate the usable flywheel energy in U.S. customary units, use the following equation and tables:

$$E = CD_F M_F(0.04S + 0.4)$$

where
C = rated capacity, tons
D_F = duty factor (for variable speed presses, duty factor is based on one-half of maximum speed)
E = usable flywheel energy, in.-tons
M_F = motor factor
S = press stroke, in.

Rated Capacity, tons	Drive Type	Rating Point, in.	Duty Factor
2 to 18	Nongeared	0.04	0.6
	Geared	0.06	0.8
18 to 45	Nongeared	0.04	0.6
	Geared	0.13	1.8
45 to 180	Nongeared	0.06	0.8
	Geared	0.25	2.4
180 through 280	Geared	0.25	2.4

Motor Design	Motor Slip, %	Motor Factor
B	3 to 5	0.19
D	5 to 8	0.28

EXAMPLE: 110 ton press, geared drive, 10 in. stroke, 5% to 8% slip motor. From the above tables, the duty factor is 2.4 and the motor factor is 0.28.

$E = (110)(2.4)(0.28)(0.04 \times 10 + 0.4) = 59$ in.-tons required

ASME Services

ASME is committed to developing and delivering technical information. At ASME's Information Central, we make every effort to answer your questions and expedite your orders. Our representatives are ready to assist you in the following areas:

ASME Press
Codes & Standards
Credit Card Orders
IMechE Publications
Meetings & Conferences
Member Dues Status
Member Services & Benefits
Other ASME Programs
Payment Inquiries
Professional Development Short Courses
Publications
Public Information
Self-Study Courses
Shipping Information
Subscriptions/Journals/Magazines
Symposia Volumes
Technical Papers

How can you reach us? It's easier than ever!

There are four options for making inquiries* or placing orders. Simply mail, phone, fax, or E-mail us and an Information Central representative will handle your request.

Mail
ASME
22 Law Drive, Box 2900
Fairfield, New Jersey
07007-2900

Call Toll Free
US & Canada: 800-THE-ASME
(800-843-2763)
Mexico: 95-800-THE-ASME
(95-800-843-2763)
Universal: 973-882-1167

Fax—24 hours
973-882-1717
973-882-5155

E-Mail—24 hours
Infocentral@asme.org

* Information Central staff are not permitted to answer inquiries about the technical content of this code or standard. Information as to whether or not technical inquiries are issued to this code or standard is shown on the copyright page. All technical inquiries must be submitted in writing to the staff secretary. Additional procedures for inquiries may be listed within.

ASME B5.52-2003

ISBN 0-7918-2851-4

9 780791 828519

M12003