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AMERICAN NATIONAL STANDARD

Punch and Die Sets

ANSI B5.25 - 1978

[REVISION OF ANSI B5.25-1968 (R1975)]

SECRETARIAT

SOCIETY OF AUTOMOTIVE ENGINEERS
SOCIETY OF MANUFACTURING ENGINEERS
NATIONAL MACHINE TOOL BUILDERS ASSOCIATION
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

PUBLISHED BY

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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FOREWORD

This American National Standard for Punch and Die Sets was developed by Technical Committee No. 9 of the American National Standards Committee B5, Standardization of Small Tools and Machine Tool Elements. The Committee, organized in September 1922, under the procedures of the American Engineering Standards Committee (later known as the American Standards Association, and recently reorganized as the American National Standards Institute) is responsible for the development of numerous Standards within the scope of its activities, and it is sponsored by the Society of Manufacturing Engineers, Society of Automotive Engineers, the National Machine Tool Builders' Association, the American Society of Mechanical Engineers.

In September 1928, Technical Committee No. 9 was organized. After much work and a reorganization in the Spring of 1934 a draft of this standard was finally submitted in June of 1949 to the Committee for letter ballot vote. Upon approval of Committee it was submitted to the sponsor bodies for their approval and subsequent transmission to the American Standard Association for final approval and designation as an American Standard. This approval was given on March 22, 1950.

In March of 1963, a reorganization of Technical Committee 9 was begun in an effort to revise the Standard to bring it into line with current practice. A proposal was prepared by the Chairman of TC-9 and distributed to the Membership for their comments and suggestions in April of 1965. After several re-issues of the proposal it was approved on November 22, 1966 by the Technical Committee. The Sectional Committee, now renamed USA Standards Committee, approved the draft revision on September 18, 1967. Following approval by the sponsors it was approved by the USA Standards Institute on April 5, 1968. On June 19, 1975, after a poll of TC-9 membership, the Standard was reaffirmed by ANSI and became B5.25-1968 (R1975).

On January 27, 1976 the reorganized TC-9 Committee met for the purpose of revising the existing standard to be in line with current technology. The Chairman charged the Committee with the responsibility of providing for the industry a standard which would be functional as well as conservative of national resources. These concepts are now reflected in this document which shall be known as the American National Standard, consistent with the change in name to American National Standards Institute and American National Standards Committee B5-Machine Tools.

The current revision was approved as an American National Standard on January 17, 1978.

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Machine Tools, Components, Elements, Performance and Equipment

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AMERICAN NATIONAL STANDARDS

PUNCH AND DIE SETS

1. SCOPE

This American National Standard covers the design, dimensions and tolerances for 2, 3, and 4 post punch press tool die sets referred to in the standard as "die sets." They are in general demand by tool designers and are used by die makers for the mounting of punch press tool details and components. Included in the standard are back post, center post, diagonal post, and rectangular 2, 3, and 4 post all steel die sets. The standard shall be further divided into two categories. Those die sets which would comprise what is generally termed standard die sets consisting of back post, center post, and diagonal post sets in the size range up to 25" x 14" in die area and 4 post rectangular die sets with a die area up to 24" x 16". The range of sizes covered have been carefully selected with a view to meeting the largest volume of present needs of users and, therefore, may be manufactured on a production basis. The second category of this standard shall include sizes which are classified as special. Realistic tolerances which can be readily met with modern equipment have been established that will insure a high grade tool which can be maintained economically in respect to both the component parts and the die set assembly. Die sets covered in this standard are those as stated above and are both heavy and light duty. The die sets shown are of the conventional type with pressed in guide posts and press fit guide post bushings or with demountable guide posts and demountable guide post bushings or any combination thereof. The standard die areas may also apply to die sets with patented mountings for the guide posts and guide post bushings. There are in existence several different types of special guide posts and guide post bushings, some of which are proprietary in nature and therefore are not included in this standard.

2. TERMINOLOGY AND DEFINITIONS

2.1 Die Sets. A die set is an assembly consisting of an upper member called a punch-holder and a lower member called a die holder. The punch-holder is usually fitted with guide bushings and the die holder with guide posts which aid in maintaining alignment as the tool is installed in and reciprocated in a punch press.

2.1.1 Back Post Sets. Back post die sets are those which have two rear guide posts and bushings with the die area being that space available in front of the guide post bushings.

Explanatory Notes

The lower surface of the punch-holder and the upper surface of the die holder are those on which the punch and die details of a finish punched press tool are mounted. In use, the die holder is clamped to the bed or bolster plate of the press while the punch-holder is clamped to the ram. The punch-holder may be fitted with a shank which is used for centering the die in the punch press ram. The tool is actuated by the reciprocating motion of the ram. The size of the die set is generally designated by its available die area.

The aligning means is completely in the rear of the die set with the available die area in front of the aligning mechanism. The die area may be either square or rectangular. This type of die set may also include a round die area which is shown in phantom in the drawing on page 9. The die holders may have clamping flanges on two sides with surfaces suitable for clamping.

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Terminology and Definitions (Cont.)

2.1.2 Center Post Sets. Center post die sets have two guide posts of different sizes on the left to right centerline of the die set with the die area being the space available between the guide post bushings.

2.1.3 Diagonal Post Sets. Diagonal post die sets have one front guide post and one rear guide post located on a diagonal centerline in relation to the die area. The die area is the space available between the guide post bushings in the direction of stock feed.

2.1.4 Rectangular Die Sets. These die sets have a rectangular die holder and a rectangular punch-holder. They are available in 2, 3, or 4 guide post combinations.

2.2 Punch-holder. A die set top member is referred to as the punch-holder. Its upper and lower surfaces are parallel.

2.3 Punch-holder Shank. Punch-holder shank is a cylindrical protrusion from the upper surface of the punch-holder.

Explanatory Notes

The purpose of two different size guide posts is to "fool-proof" the assembly. The die holder may be furnished with a clamping flange all around or front and back.

Guide posts are of a different diameter for "fool-proofing".

Two post sets are furnished as back post, center post, or diagonal. In three post sets, usually the front guide post is in the left hand corner of the die set. Four post die sets have 4 posts, 1 in each corner. Center post and diagonal post sets are each furnished with one guide post of a different size to insure "fool-proofing". On 4 post die sets there may be 1 post of a different diameter but more generally the right front corner guide post is offset for "fool-proofing". On rectangular steel die sets, flanges are not provided, a means of clamping being established by the die design engineer. For semi-steel sets, flanges generally are furnished for both die and punch-holder.

The punch-holder is generally equipped with guide bushings to assure alignment with its mating part, the die holder. Various methods of clamping punch-holders to the ram of the punch press are used. Punch-holders in the smaller sizes of die sets may have a shank which fits the shank hole in the face of the punch press ram. Usually the punch or male member of the die set is mounted to the punch-holder, however, on occasion, the die or female portion of the die is mounted to this upper member.

The punch-holder shank is used as a means of locating the punch-holder to the ram of a press. Several different styles of punch-holder shanks are available. Removable punch shanks are screwed into a threaded hole in the punch-holder and after being assembled, may be locked in place to prevent turning thus becoming an integral part of the punch-holder. On other sets, inserted shoulder shanks or welded shanks are provided as an integral part of the punch-holder. Special swivel adapters and floating shanks are also available in several designs.

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Terminology and Definitions (Cont.)

2.4 Die Holder. The die set base, or lower portion of the die set, is referred to as the die holder. The upper and lower surface of the die holder are parallel.

2.5 Guide Posts. Guide posts are cylindrically shaped, and hard surfaced, highly polished, and used in the die set for guiding the reciprocating action.

2.6 Guide Post Bushings. Guide post bushings are cylindrical in shape. They have an axial hole which is concentric with the outside inserted diameter. Bushings usually have a hard, highly polished wear surface which includes grooves for retaining lubricant.

2.7 Flanges. The flange portion of a die set is a ledge of metal which may be either extended or machined into the body of the punch-holder, the die holder, or both and which is located in such a manner as to provide convenient clamping.

2.8 Punch Press Tool Height. The die set height, or shutheight, of the tool when assembled as measured from the lower surface of the die holder to the upper surface of the punch-holder when the tool is closed as in the operating position.

Explanatory Notes

The die holder is generally equipped with guide posts set at right angles to the upper surface of the die holder. These are located so as to fit the guide post bushings of the mating punch-holder and allow the punch-holder to move up and down without binding. Usually the die, or female portion of the die set, is mounted to the die holder. In some cases the punch or male member is mounted on the die holder.

Guide posts are generally made to be press fit in the die holder and a sliding fit in the guide posts bushings. Removable type guide posts are available as are regular guide posts in diameters ranging from ½" to 3" as required by several types and sizes of die sets. For each diameter, a selected series of lengths is provided. Pilot and quick fit precision guide posts are also available for fast, easy alignment of guide posts and bushings. Insulated guide posts for use in electrical discharge machining die sets are now available in a number of sizes.

Guide post bushings are fitted to the punch-holder to afford a hard wear surface to maintain proper alignment of the die set. Bushings are produced in both press fit and demountable clamp type of steel, bronze, or bronze plated steel. They are available in a number of sizes, lengths, and designs. The demountable clamp type is held in the punch-holder by two, three, or four clamps depending upon the size of the bushing. Sleeve type press fit bushings are also available in short and long series. There are also available, insulated demountable bushings for use in electrical discharge machining die sets in a variety of sizes. Also available are several types of ball bearing bushing assemblies which are not included in the scope of this standard. In addition, there are available cast iron boss bushings of various designs.

Flanges are manufactured to the thickness desired for effective and proper clamping. Elongated clamping slots and clamping holes are also used as a means of mounting the die set to the bed or bolster plate, or press ram.

The maximum shutheight of the die set mounted tool which can be accommodated by the die space of the punch press is determined by measuring from the upper surface of the bolster plate of the press bed to the ram of the press with the stroke down and the adjustment up.

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Terminology and Definitions (Cont.)

2.9 Die Area. Die area is the maximum surface on the die holder that may be utilized for the mounting of tool members of the die set.

2.10 Commercial Grade. Die sets and details listed as Commercial Grade are manufactured to tolerances suitable for most punch press tooling.

2.11 Precision Grade. Die sets and die set details listed as Precision Grade are manufactured to tolerances where punch press tools require close fits and punch thin materials.

Explanatory Notes

The die area of four post rectangular center post, or diagonal post die sets is the maximum available area between the guide post bushings of a die set for mounting of punch press tool components. The die area of a back post die set is the maximum available area in front of the guide post bushings.

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STANDARD DIE SETS

Table 1 Tolerances of Components**

Element	Characteristic	Tolerance	
		Commercial Grade	Precision Grade
Die Holder			
Top and bottom faces	Flatness	0.001 in. per lin ft	0.0005 in. per lin ft
	Parallelism*	0.0015 in. per lin ft	0.0007 in. per lin ft
	Thickness	+0.06 in. -0.12 in.	+ 0.06 in. -0.12 in.
	Clamping Flange Thickness		
	Machined	+0.06 in. -0.12 in.	+0.06 in. -0.12 in.
	Unmachined	+ 0.12 in. -0 in.	+0.12 in. -0 in.
Punch Holder			
Top and bottom faces	Flatness	0.001 in. per lin ft	0.0005 in. per lin ft
	Parallelism*	0.0015 in. per lin ft	0.0007 in. per lin ft
	Thickness	+0.06 in. -0.12 in.	+0.06 in. -0.12 in.
Shank*** (When an integral part of Punch Holder)	Diameter	+0.000 in. -0.002 in.	+0.000 in. -0.002 in.
	Length	+0 in. -0.03 in.	+0 in. -0.03 in.
	Taper (top and bottom)	0.001 in. max	0.001 in. max
	Max. deviation in squareness	0.001 in. in 2.88 in.	0.001 in. in 2.88 in.
	Radius at base of shank	Max 0.25 in.	Max 0.25 in.
	Undercut at base of shank	Max 0.38 in. width Max 0.05 in. depth	Max 0.38 in. width Max 0.05 in. depth
Guide Post	Diameter of Working Fit portion	+ 0.005 in. -0.0002 in.	+ 0.0003 in. -0 in.
	Diameter of Press Fit portion		
	0.50 thru 1" Dia.	+ 0.002 in. + 0.0015 in.	+ 0.002 in. + 0.0015 in.
	1.25 thru 1.50 Dia.	+ 0.003 in. + 0.002 in.	+ 0.003 in. + 0.002 in.
	Diameter of press fit portion when same dia as working fit portion	+ 0.0005 in. -0.0002 in.	+ 0.0003 in. -0 in.
	Concentricity		
	Press Fit Portion to Working Fit Portion	Max 0.0003 in. T.I.R.	Max 0.0002 in. T.I.R.
Guide Post Bushings	Concentricity		
	I.D. to O.D. Bearing surfaces	Max 0.0004 in T.I.R.	Max 0.0003 in T.I.R.
Flame Cut Steel Punch and Die Holders	Length and Width measured on the side of Holder to be used for Mounting Punch or Die Details		
	Surface Up to 25 in. long	+ 0.12 in. -0.06 in.	+ 0.12 in. -0.06 in.
Sides of rectangular sets	Squareness	0.09 in./ft	0.09 in./ft
	Angularity (Smallest dim for length, width, and openings should be at the top of Die Holder and bottom of Punch Holder)	0.03 in./in. of thickness	0.03 in./in. of thickness

*Tolerance for parallelism shall apply to die space or contact surfaces, a small amount of run-off at corners being permissible except at the seating area of shoulder type guide post bushings and guide posts.
For other tolerances see tables of Die Set details.

**These tolerances apply to back post, center post and diagonal post die sets up to 25 x 14 inch die area and to four post die sets up to 24 x 16 inch die area. Unless otherwise agreed upon between customer and manufacturer these toleranches shall apply.

***Removable Shank data may be found in Table 7.

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STANDARD DIE SETS

Table 2 Tolerances of Partial Assembly (Punch Holder Removed from Die Holder)**

Element	Characteristic	Tolerance	
		Commercial Grade	Precision Grade
Guide Post	Parallelism between Guide Posts	0.0015 in. in 6 in.	0.001 in. in 6 in.
	Squareness to bottom surface of Die Holder	0.0015 in. in 6 in.	0.001 in. in 6 in.
	Height	+ 0.0 in. -0.12 in.	+ 0.0 in. -0.12 in.
	Press Fit allowance	0.0015 in. to 0.0025 in.	0.0015 in. to 0.0025 in.
All Guide Post Bushings	Parallelism between Guide Post Bushings	0.0015 in. in 6 in.	0.001 in. in 6 in.
	Squareness to top surface of Punch Holder	0.0015 in. in 6 in.	0.001 in. in 6 in.
	Height of Sleeve Type	±0.03 in.	±0.03 in.
	Press Fit Allowance for Press Fit Guide Post Bushings 0.50 thru 1.50 diameter	0.0015 to 0.0025 in.	0.0015 to 0.0025 in.
Demountable Clamped Guide Post Bushings	Assembly fit between Guide Post Bushing and Hole in Punch or Die Holder	0.0005 in. max clearance on dia	0.0005 in. max clearance on dia
When measured separately, the differences in center distances at the top of the Guide Posts and the Engaging Ends of the Guide Post Bushings shall not exceed		0.002 in.	0.002 in.

For other tolerances see table of Die Set details.

**See note under Table 1.

STANDARD DIE SETS

Table 3 Tolerances of Assemblies**

Element	Characteristic	Tolerance	
		Commercial Grade	Precision Grade
Top surface of Punch Holder and bottom surface of Die Holder	Parallelism	0.0025 in./lin ft	0.0015 in./lin ft
Press Fit Guide Post Bushing	Length of Bellmouthing at each end of Guide Post Bushing inside diameter	0.50 in. max	0.38 in. max
Guide Post and inside diameter of Guide Post Bushings	Clearance on Diameter		
	When Guide Post is 1.25 in. or less	0.0002 in. min 0.0006 in. max	0.0002 in. min 0.0004 in. max
	When Guide Post is 1.50 in.	0.0003 in. min 0.0007 in. max	0.0003 in. min 0.0005 in. max

For other tolerances see tables of Die Set Details.
**See note under Table 1

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SPECIAL DIE SETS (ALL STEEL)

Table 1A Tolerances of Components**

Element	Characteristic	Tolerance
Die Holder		
Top and Bottom faces	Flatness	0.0015 in. per lin ft
	Parallelism*	0.0015 in. per lin ft
	Thickness	
	Up to 2 in.	+0 in. -0.12 in.
	2.25 to 3 in.	+0 in. -0.18 in.
	Over 3 in.	+0 in. -0.25 in.
	Clamping Flange Thk.***	+0.06 in. -0.12 in.
Punch Holder		
Top and Bottom faces	Flatness	0.0015 in. per lin ft.
	Parallelism*	0.0015 in. per lin ft
	Thickness	
	Up to 2 in.	+0 in. -0.12 in.
	2.25 to 3 in.	+0 in. -0.18 in.
	Over 3 in.	+0 in. -0.25 in.
Shank**** (When an integral part of Punch Holder)	Diameter	+0.000 in. -0.002 in.
	Length	+0 in. -0.03 in.
	Taper (top and bottom)	0.001 in. max
	Max. deviation in squareness	0.001 in. in 2.88 in.
	Radius at base of shank	Max 0.25 in.
	Undercut at base of shank	Max 0.38 in. width Max 0.05 in. depth
Guideposts	Diameter of Working Fit portion	+0.0005 in. -0.0002 in.
	Diameter of Press Fit portion 1.75 thru 3 in.	+0.003 in. +0.002 in.
	Diameter of Press Fit portion when same dia as working fit portion	+0.0005 in. -0.0002 in.
	Concentricity Press Fit portion to Working Fit portion	Max 0.003 in. T.I.R.
Guidepost Bushings	Concentricity I.D. to O.D. Bearing surfaces	Max 0.0004 in. T.I.R.
Flame Cut Punch and Die Holders	Length and Width measured on the side of Holder to be used for Mounting Punch or Die Details	
	Surface 24 in. to 60 in. long	+0.18 -0.06
	Surface over 60 in. long	+0.25 -0.06
Flame Cut openings	Length and Width measured on the side of Holder to be used for Mounting Punch or Die Details	+0.12 -0 in.
	Location measured at top surface of Die Holder and bottom surface of Punch Holder	±0.06 in.
Sides of rectangular sets Flame Cut	Squareness	0.09 in./ft
	Angularity (Smallest dim for length, width, and openings should be at the top of Die Holder and bottom of Punch Holder)	0.03 in./in. of thickness

*Tolerance for parallelism shall apply to die space or contact surfaces, a small amount of run-off at corners being permissible except at the seating area of shoulder type guide post bushings. For other tolerances see tables of Die set details.

**These tolerances apply to special die sets which are larger than 24 x 16 die area. Unless otherwise agreed upon between customer and manufacturer these tolerances shall apply.

***Clamping flange when supplied will be machined to this tolerance.

****Removable Shank data may be found in Table 7.

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SPECIAL DIE SETS (ALL STEEL)

Table 2A Tolerances of Partial Assembly (Punch Holder Removed from Die Holder)**

Element	Characteristic	Tolerance
Guide Posts	Parallelism between Guide Posts	0.0015 in. in 6 in.
	Squareness to bottom surface of Die Holder	0.0015 in. in 6 in.
	Height	±0.06 in.
	Press Fit Allowance 1.75 thru 3" diameter	0.0025 in. to 0.0035 in.
All Guide Post Bushings	Parallelism between Guide Post Bushings	0.0015 in. in 6 in.
	Squareness to top surface of Punch Holder	0.0015 in. in 6 in.
	Height of Sleeve Type	±0.06 in.
	Press Fit Allowance for Press Fit Guide Post Bushings 1.75 thru 3" diameter	0.003 in. to 0.004 in.
Demountable Clamped Guide Post Bushings	Assembly fit between Guide Post Bushings and Hole in Punch or Die Holder	0.0005 in. max clearance on dia
When measured separately, the differences in center distances at the top of the Guide Posts and the Engaging Ends of the Guide Post Bushings shall not exceed		0.002 in.

For other tolerances see tables of Die Set details.

**See note under Table 1A.

SPECIAL DIE SETS

Table 3A Tolerances of Assemblies**

Element	Characteristic	Tolerance
Top surface of Punch Holder and bottom surface of Die Holder	Parallelism	0.0025 in./lin ft
Press Fit Guide Post Bushing	Length of Bellmouthing at each end of Guide Post Bushing inside diameter	0.50 in max
Guide Post and inside diameter of Guide Post Bushings	Clearance on Diameter	
	When Guide Post is 1.75 in.	0.0006 in. min 0.0010 in. max
	When Guide Post is 2 in.	0.0007 in. min 0.0011 in. max
	When Guide Post is 2.50 in.	0.0008 in. min 0.0012 in. max
	When Guide Post is 3 in.	0.001 in. min 0.0014 in. max

For other tolerances see tables of Die Set details.

**See note under Table 1A

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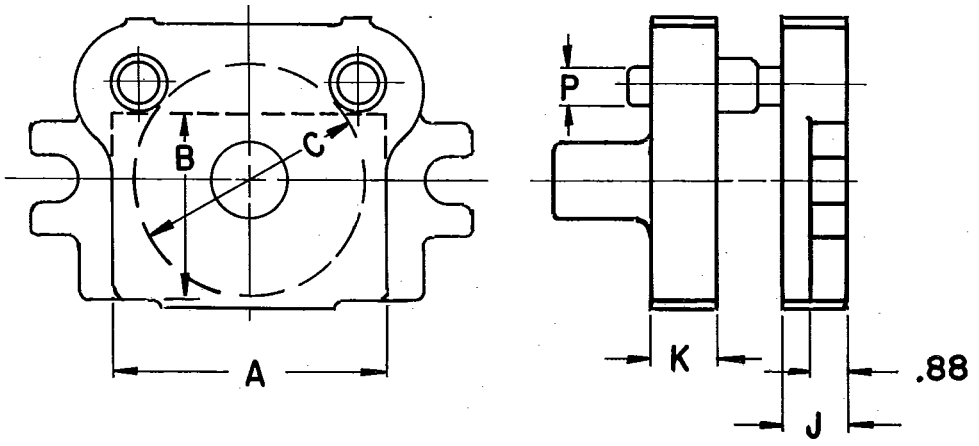


Table 4 Dimensions of Back-Post Standard Die Sets
(all dimensions are given in inches)

Die Area			Thickness				Min. Guide Post Dia
Right to Left	Front to Back	Diameter	Die Holder J		Punch Holder K		
A	B	C	From	To	From	To	P
3	3	3	1	1.25	1	—	0.75
4	4	4	1.38	1.75	1.25	—	1
4	6	—	1.50	2.75	1.25	2.25	1
5	4	—	1.38	1.75	1.25	—	1
5	5	5	1.50	2	1.25	1.75	1
5	8	—	1.50	3	1.25	2.25	1
6	3	—	1.50	2	1.25	1.75	1
6	4	5	1.50	2.75	1.25	2.25	1
6	6	6.50	1.50	2.50	1.25	2.25	1
6	9	—	1.50	3.25	1.25	2.25	1.25
7	5	5.75	1.50	3	1.25	2.25	1
7	7	7.50	1.50	2.50	1.25	2.25	1
7	10	—	1.62	3.25	1.38	2.25	1.25
8	4	—	1.50	2.50	1.25	2.25	1
8	6	7	1.50	3	1.25	2.25	1
8	8	8.50	1.50	2.50	1.25	2.25	1
9	12	—	1.75	3.50	1.50	2.25	1.50
10	5	—	1.50	2.50	1.25	1.75	1.25
10	7	—	1.38	2.75	1.38	2.25	1.25
10	10	10	1.62	2.75	1.38	2.25	1.25
10	14	—	1.88	3.75	1.62	2.75	1.50
11	9	10	1.75	3.50	1.50	2.25	1.25
12	4	—	1.75	2.25	1.50	2	1.25
12	6	—	1.50	2.50	1.50	2	1.25
12	12	12.50	1.75	3.50	1.75	2.25	1.50

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Table 4 Dimensions of Back-Post Standard Die Sets (Contd.)

Die Area			Thickness				Min. Guide
Right to Left	Front to Back	Diameter	Die Holder J		Punch Holder K		Post Dia
A	B	C	From	To	From	To	P
12	16	—	2	3.75	1.75	2.75	1.50
14	8	—	1.75	3.25	1.62	2.75	1.50
14	10	11.25	1.75	3.25	1.62	2.75	1.50
14	14	14	1.75	3.25	1.62	2.25	1.50
15	5	—	1.50	2.50	1.50	2	1.50
15	9	—	1.50	2.50	1.50	2	1.50
18	8	—	1.50	2.50	1.50	2	1.50
18	10	—	1.50	2.50	1.50	2.25	1.50
18	14	15	2	3	1.75	2.25	1.50
18	16	17	2	3	1.75	2.25	1.50
20	5	—	1.75	2.50	1.50	2	1.50
22	6	—	1.75	2.50	1.50	2.25	1.50
22	12	—	2	3	1.50	2	1.50
25	7	—	1.75	3	1.50	2.25	1.50
25	14	—	1.75	3	1.50	2.25	1.50

Dimensions A and B are basic and may vary +0.50 -0 from the dimension shown. These sets may be obtained without shanks or with Integral Shanks in the sizes of removable Punch-Holder Shanks shown in Table 7.

MATERIAL: These sets shall be made from semi-steel (high quality, gray cast iron) or steel. If semi-steel they shall be sound, free from hard constituents such as massive iron carbides which impair machineability, and shall exhibit tensile strength of 25,000 to 49,000 psi in standard ASTM Test Bar. If steel, they shall be made from commercially sound, mild steel plate having a carbon content of 0.15 to 0.30 percent and a manganese content of 0.30 to 0.90 percent.

HEAT TREATMENT: Prior to finish machining, Die Sets shall be stress relieved when specified by the purchaser, or at the option of the manufacturer. This material shall be of sufficient hardness to provide reasonable service life, but shall also have good machining qualities.

NOTE:
For additional information see tolerances in Tables 1, 2, and 3.

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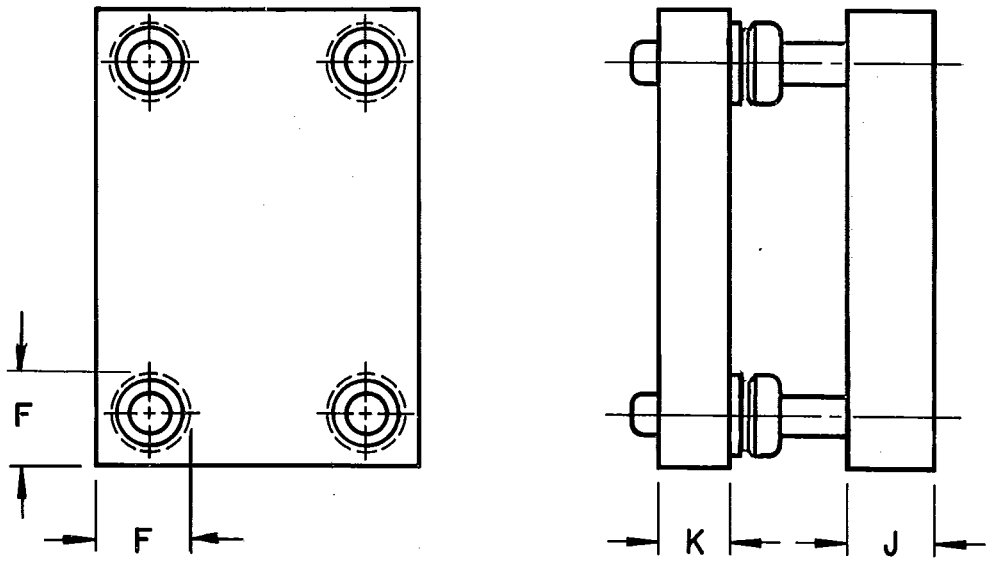


Table 5 Minimum Dimensional Requirements for Special Steel Die Sets as Related to Size of Guide Posts and Bushings
(All dimensions are given in inches)

Nominal Diameter of Guide Posts and Bushings	Thickness Die Holder J	Thickness Punch Holder K	Location Guide Post F
0.50	1	0.75	1.68
0.62	1	0.75	1.80
0.75	1	1	1.94
0.88	1.25	1	2.22
1	1.38	1.25	2.38
1.25	1.50	1.38	2.62
1.50	1.50	1.50	2.88
1.75	1.75	1.75	3.12
2	2	2	3.56
2.50	2.50	2	4.06
3	3	2	4.56

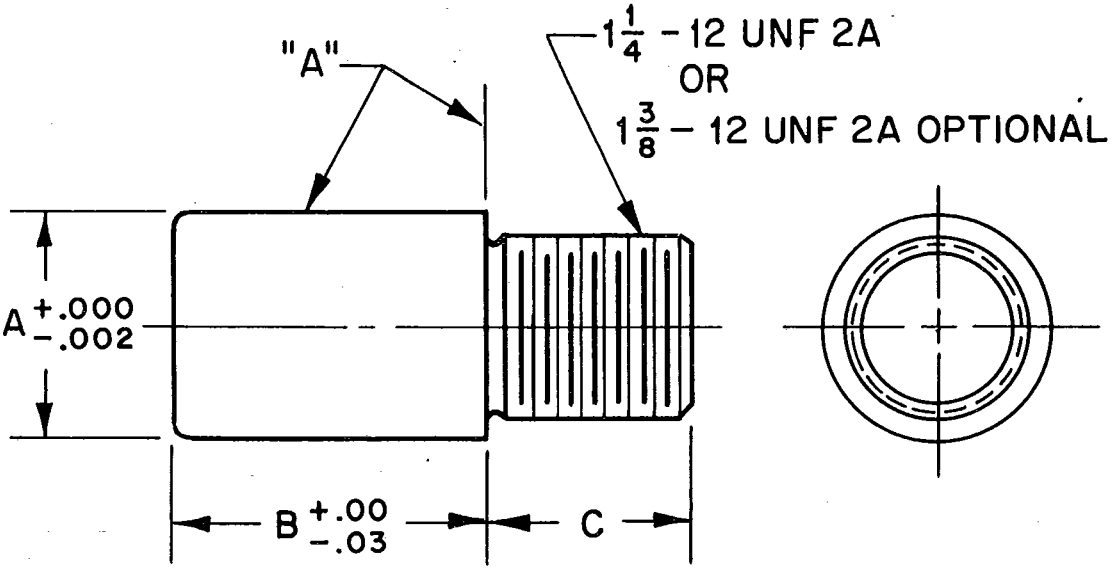
"F" dimension applies to all 2, 3, or 4 post die sets. On 4 post sets one pin should be offset or of a different diameter to prevent improper setting of the Die Holder relative to the Punch Holder. For similar protection of Center and Diagonal 2 Post Sets, use posts of different diameters.

MATERIAL: These sets shall be made from commercially sound, mild steel plate, having a carbon content of 0.15 to 0.30 percent and manganese content of 0.30 to 0.90 percent.

HEAT TREATMENT: Prior to finish machining, die sets shall be stress relieved when specified by the purchaser, or at the option of the manufacturer. This material shall be of sufficient hardness to provide reasonable service life, but shall also have good machining qualities.

NOTE:
For additional information see tolerances in Tables 1A, 2A, and 3A.

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"A" SURFACES TO BE SQUARE WITHIN .001 IN.

Table 6 Dimensions of Removable Punch-Holder Shanks
(All dimensions are given in inches)

Shank		Available Lengths for Screw Thread
Diameter A	Length B	C
1.50	2.12	1.38, 1.50, 1.75, 2, 2.25, 2.50, 3.50
1.56	2.12	
2	2.88	
2.50	2.88	
3	2.88	

MATERIAL: Mild low carbon steel or equivalent.

HEAT TREATMENT: Does not require heat treatment.

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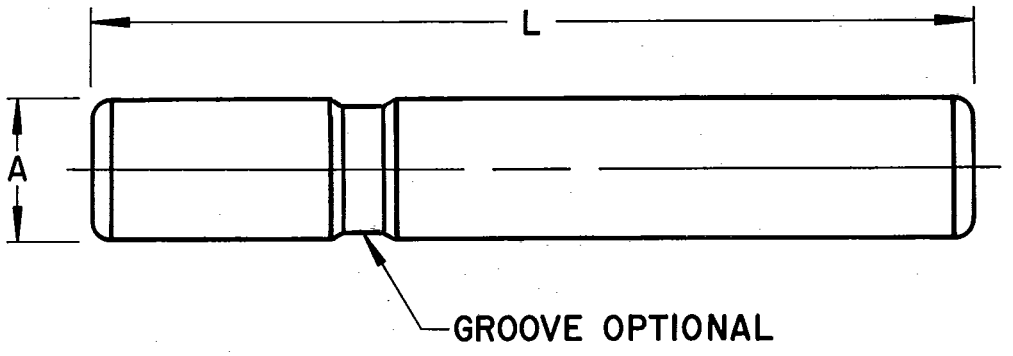


Table 7 Dimensions of Guide Posts (Commercial Series)
(All dimensions are given in inches)

Nominal Diameter	Diameter "A"		Suggested Length A
	Oversize	Nominal	
0.75	0.752	0.750	4 to 7
0.88	0.877	0.875	4 to 8
1	1.002	1.000	4 to 9
1.25	1.252	1.250	4.50 to 12
1.50	1.502	1.500	4.50 to 12
1.75	1.752	1.750	5.50 to 14
2	2.002	2.000	5.50 to 20
2.50	2.5025	2.500	6 to 20
3	3.0025	3.000	6 to 20

MATERIAL: A standard AISI steel of commercial soundness and shall contain no seams or other crack-like defects.

HEAT TREATMENT: Rockwell Hardness of C-58 minimum.

After finish grinding, the guide post surface may have further treatment such as honing, polishing or plating.

NOTE:
For additional information see tolerances in Tables 1, 2, 3 1A, 2A, and 3A.

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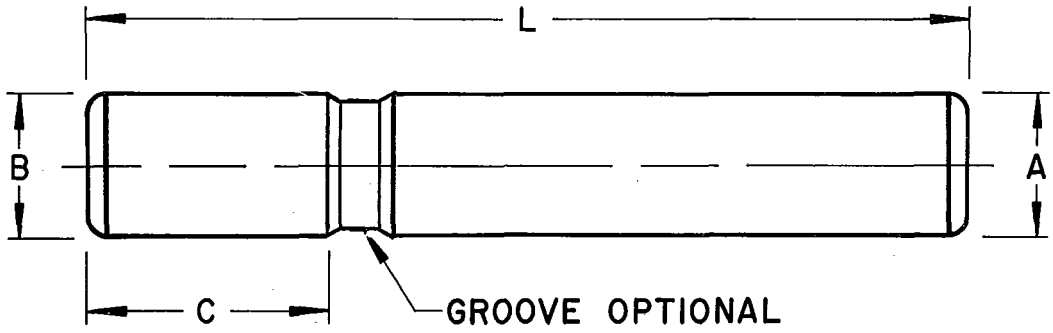


Table 8 Dimensions of Guide Posts (Precision Series)
(All dimensions are given in inches)

Diameter "A"		Press Fit B	Minimum Press Fit Length C	Suggested Length L
Oversize	Nominal			
0.502	0.500	0.502	1	3.50 to 5.50
0.627	0.625	0.627	1	4-6
0.752	0.750	0.752	1	4-8
0.877	0.875	0.877	1.25	3.50 to 8
1.002	1.000	1.002	1.38	4-9
1.252	1.250	1.252	1.50	4.50 to 12
1.502	1.500	1.502	1.50	4.50 to 14
1.752	1.750	1.752	1.75	6-20
2.002	2.000	2.002	2	6-20
2.5025	2.500	2.5025	2.50	6-20
3.0025	3.000	3.0025	3	6-20

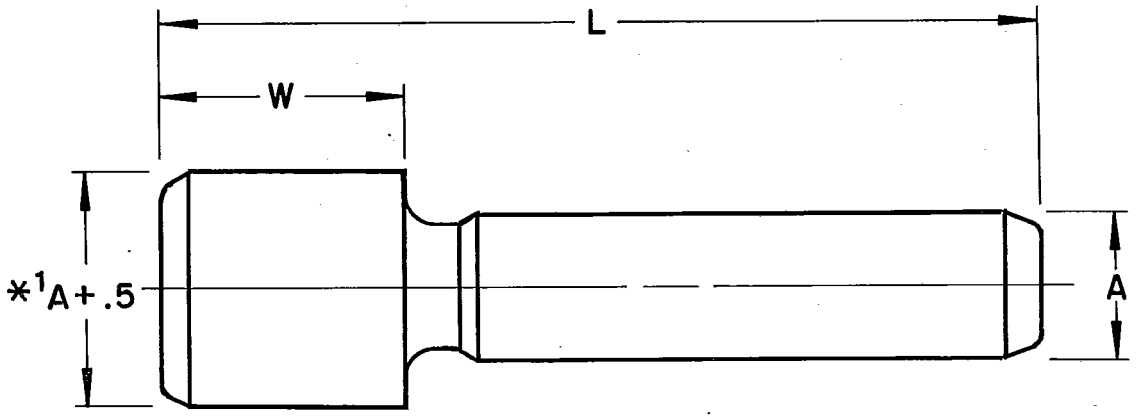
MATERIAL: A standard AISI steel of commercial soundness and shall contain no seams or other crack-like defects.

HEAT TREATMENT: Rockwell Hardness of C-58 minimum.

After finish grinding, the guide post surface may have further treatment such as honing, polishing or plating.

NOTE:
For additional information see tolerances in Tables 1, 2, 3, 1A, 2A, and 3A.

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[1] This dimension can be oversize to allow for fitting.

*NOTE: For 2.50 and 3.00 diameter Guide Post, shoulder diameter can be A+.50 to A+.75.

Table 9 Dimensions of Shoulder Guide Post
(All dimensions are given in inches)

Nominal Diameter A	Drive Fit Length W	Suggested Length L
1	1.50	4-9
1.25	2	4.50 to 14
1.50	2.38 to 2.50	4.50 to 14
1.75	2.88 to 3	6-15
2	3.38 to 3.50	6-20
2.50	3.88 to 4	12-30
3	5	12-30

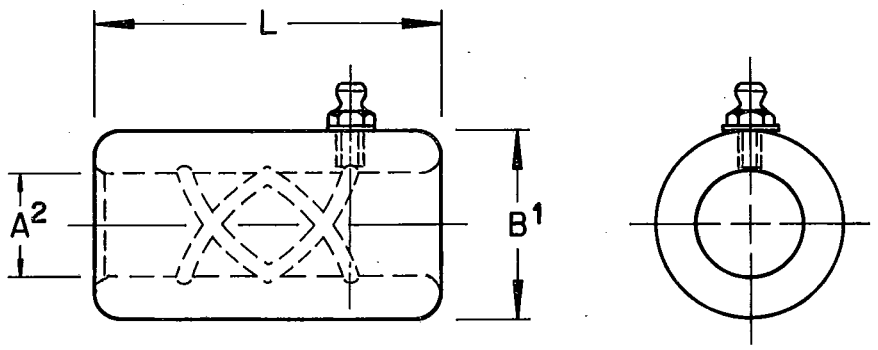
MATERIAL: A standard AISI steel of commercial soundness and shall contain no seams or other crack-like defects.

HEAT TREATMENT: Rockwell Hardness of C-58 minimum.

After finish grinding, the guide post surface may have further treatment such as honing, polishing or plating.

NOTE:
For additional information see tolerances in Tables 1A, 2A, and 3A.

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B^1 dimension shown is basic. The actual dimension provided by the manufacturer is to produce a minimum 0.0015 in. drive fit.

A^2 dimension is established by clearance between Guide Post and inside diameter of Guide Post Bushings. These clearances and the distinction between Commercial and Precision Guide Post Bushings are indicated in Tables 7, 8 and in Table 3.

Table 10 Dimensions of Straight (Sleeve) Bushings
(All dimensions are given in inches)

Nominal Inside Dim. A	Nominal Outside Dim. B	Suggested Length* L	
		Short	Long
0.50	0.81	1.50	3
0.62	1	1.50	3
0.75	1.12	1.75	3
0.88	1.38	1.75	3
1	1.50	1.75	3
1.25	1.75	2	3
1.50	2	2	3
1.75	2.25		3
2	2.50		3
2.50	3.25		3

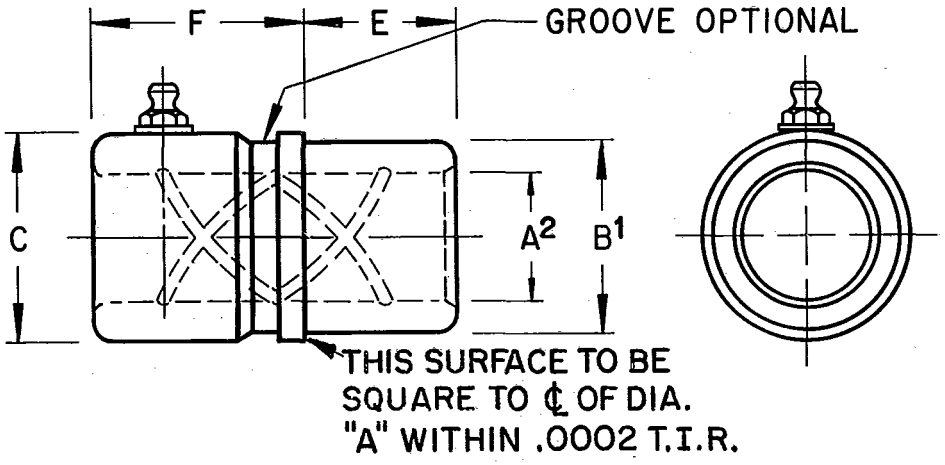
MATERIAL: Hardened steel, or solid bronze.
Steel Bushings shall be made from a standard AISI steel of commercial soundness and shall contain no seams or other crack-like defects. Solid bronze bushings shall be made from a hard grade of aluminum bronze, centrifugally cast blanks or bars. The bushings shall have no internal porosity or hard spots.

HEAT TREATMENT: Steel bushings shall have a Rockwell Hardness of C-58 Min. Solid bronze bushings shall have a hardness of 202-248 BHN (3000 kg)

NOTE:
These bushings generally have figure-eight oil grooves. For additional information see tolerances in Tables 1, 2, 3, 1A, 2A, and 3A.

*Range of sizes provided by the manufacturers.

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B^1 dimensions shown is basic. The actual dimension provided by the manufacturer is to produce a minimum 0.0015 in. drive fit.

A^2 dimension is established by clearance between guide post and inside diameter of guide post bushings. These clearances and the distinction between Commercial and Precision Guide Post Bushings are indicated in Tables 3, 7 and 8.

Table 11 Dimensions of Press Fit Shoulder Bushings
(All dimensions are given in inches)

Nominal Inside A	Dimension Outside B	Outside* Diameter C	Length of* Press Fit E	Shoulder Length—F*			
				Regular	Short	Medium	Long
0.50	0.81	0.94-1	0.68-0.94	1	0.81	1.50	
0.62	1	1.18	0.68		0.81	1.50	
0.75	1.12	1.31-1.38	0.68-0.94	1.25	0.81	1.75	
0.88	1.38	1.56-1.62	0.94	1.25	0.81	1.75	3.50
1	1.50	1.68-1.75	0.94-1.18	1.25-1.31	0.81	1.75-2.38	2.75-3.50
1.25	1.75	1.94-2	1-1.31	1.50	0.81	2	3-3.50
1.50	2	2.18-2.25	1.12-1.44	1.50	0.81	2	3-3.50
1.75	2.25	2.50-2.62	1.38-1.68	1.50	1	2	3-3.50
2	2.50	2.88-3.12	1.38-1.94	1.50	1	2	3-3.50
2.50	3-3.25	3.62	1.88-1.94	2	1	2.50	3.50
3	3.62-4	4.12	1.88-1.94	2	1	2.50	3.50

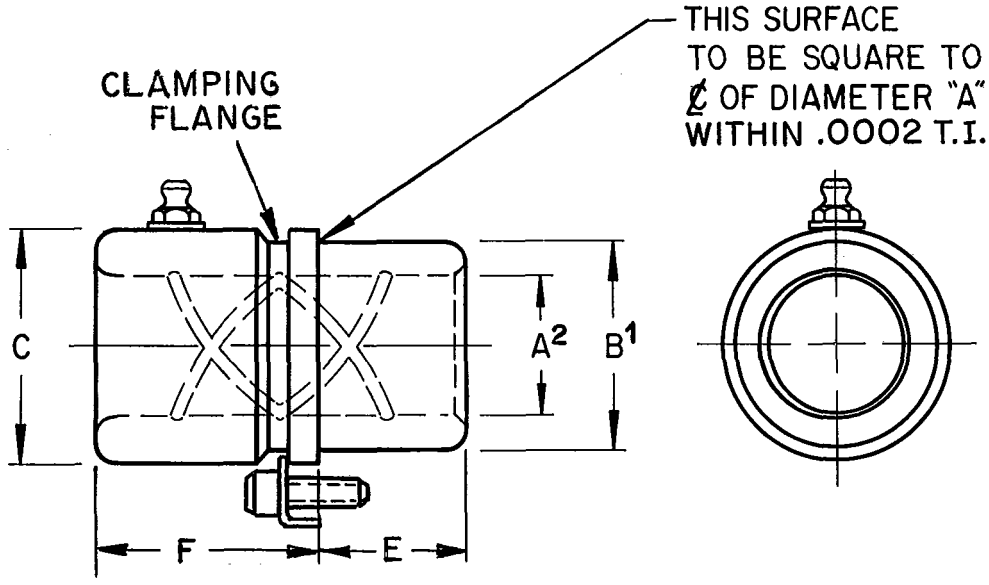
MATERIAL: Hardened steel, or solid bronze.
Steel bushing shall be made from a standard AISI steel of commercial soundness and shall contain no seams or other crack-like defects. Solid Bronze Bushings shall be made from a hard grade of aluminum bronze, centrifugally cast blanks or bars. The bushings shall have no internal porosity or hard spots.

HEAT TREATMENT: Steel Bushings shall have a Rockwell Hardness of C-58 minimum. Solid Bronze Bushings shall have a hardness of 202-248 BHN (3000 kg).

NOTE:
These bushings generally have figure-eight oil grooves.

*Range of sizes provided by the manufacturers. For additional information see tolerances in Tables 1, 2, 3, 1A, 2A, and 3A.

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B^1 dimension shown is basic. The actual dimension provided by the manufacturer is to produce a fit as shown in Tables 2 and 2A.

A^2 dimensions is established by the clearance between Guide Post and inside diameter of Guidepost Bushings.

These clearances and the distinction between Commercial and Precision Guide Post Bushings are indicated in Tables 3, 7 and 8.

Table 12 Dimensions of Demountable Bushings
(All dimensions are given in inches)

Nominal Inside Dim A	Nominal Outside Dim B	Outside* Diameter C	Length of* Inserted Diam E	Shoulder Length—F*			
				Regular	Short	Medium	Long
1	1.50	1.68-1.75	0.94-1.18	1.25-1.31	0.81	1.75-2.38	2.75-3.50
1.25	1.75	1.94-2	0.94-1.31	1.50	0.81	2	3-3.50
1.50	2	2.18-2.25	1.12-1.44	1.50	0.81	2	3-3.50
1.75	2.25	2.50-2.62	1.38-1.68	1.50	1	2	3-3.50
2	2.50	2.88-3.12	1.38-1.94	1.50	1	2	3-3.50
2.50	3-3.25	3.62	1.88-1.94	2	1	2.50	3.50
3	3.62-4	4.12	1.88-1.94	2	1	2.50	3.50

MATERIAL: Hardened steel, bronze-plated hardened steel, or solid bronze. Steel Bushings shall be made from a standard AISI steel of commercial soundness and shall contain no seams or other crack-like defects.

Bronze-plated hardened steel bushings shall be made of the same material as shown for steel bushings. The plating shall be electrolytically deposited, of a conventional bronze bearing composition, and must exhibit good adhesion to the steel surface.

Solid bronze bushings shall be made from a hard grade of aluminum bronze, centrifugally cast blanks or bars.

HEAT TREATMENT: Steel Bushings and Bronze Plated Steel Bushings shall have a Rockwell Hardness of C-58 minimum. Solid Bronze Bushings shall have a hardness of 202-248 BHN (3000 kg).

NOTES:
Demountable bushings to be furnished with either two, three, or four hold-down clamps, and screws to provide sufficient clamping pressure to maintain alignment in service.

These bushings generally have figure-eight oil grooves.

For additional information see tolerances in Tables 1 and 2.

*Range of sizes provided by the manufacturers.

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APPENDIX A

CONVERSION TABLES FROM INCH TO MILLIMETER

Any dimension in this standard can be converted by the addition of its components from the tables in this Appendix.

Consider the actual or implied precision of the values in customary units in determining the number of significant digits to be retained in the SI equivalents. (For an explanation of conversion techniques, see American National Standard Metric Practice Guide, ANSI Z210.1-1976)

inch	mm
1	25.40
2	50.80
3	76.20
4	101.60
5	127.00
6	152.40
7	177.80
8	203.20
9	228.60
10	254.00
11	279.40
12	304.80

inch	mm
1/64	0.40
1/32	0.79
3/64	1.19
1/16	1.58
5/64	1.98
3/32	2.38
7/64	2.78
1/8	3.18
9/64	3.57
5/32	3.97
11/64	4.37
3/16	4.76
13/64	5.16
7/32	5.56
15/64	5.95
1/4	6.35
17/64	6.75
9/32	7.14
19/64	7.54
5/16	7.94
21/64	8.33
11/32	8.73
23/64	9.13
3/8	9.52
25/64	9.92
13/32	10.32
27/64	10.72
7/16	11.11
29/64	11.51
15/32	11.91
31/64	12.30

inch	mm
1/2	12.70
33/64	13.10
17/32	13.49
35/64	13.89
9/16	14.29
37/64	14.68
19/32	15.08
39/64	15.48
5/8	15.88
41/64	16.27
21/32	16.67
43/64	17.07
11/16	17.46
45/64	17.86
23/32	18.26
47/64	18.65
3/4	19.05
49/64	19.45
25/32	19.84
51/64	20.24
13/16	20.64
53/64	21.04
27/32	21.43
55/64	21.83
7/8	22.22
57/64	22.62
29/32	23.02
59/64	23.42
15/16	23.81
61/64	24.21
31/32	24.61
63/64	25.00

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Inch to Millimeter (for decimal inch values of less than one inch) [Do not interpolate]

Inch	0.xx0	0.xx1	0.xx2	0.xx3	0.xx4	0.xx5	0.xx6	0.xx7	0.xx8	0.xx9
0.00	0.00	0.03	0.05	0.08	0.10	0.13	0.15	0.18	0.20	0.22
0.01	0.25	0.28	0.30	0.33	0.36	0.38	0.41	0.43	0.46	0.48
0.02	0.51	0.53	0.56	0.58	0.61	0.64	0.66	0.69	0.71	0.74
0.03	0.76	0.79	0.81	0.84	0.86	0.89	0.91	0.94	0.96	0.99
0.04	1.02	1.04	1.07	1.09	1.12	1.14	1.17	1.19	1.22	1.24
0.05	1.27	1.30	1.32	1.35	1.37	1.40	1.42	1.45	1.47	1.50
0.06	1.52	1.55	1.57	1.60	1.63	1.65	1.68	1.70	1.73	1.75
0.07	1.78	1.80	1.83	1.85	1.88	1.90	1.93	1.96	1.98	2.01
0.08	2.03	2.06	2.08	2.11	2.13	2.16	2.18	2.21	2.24	2.26
0.09	2.29	2.31	2.34	2.36	2.39	2.41	2.44	2.46	2.49	2.51
0.10	2.54	2.57	2.59	2.62	2.64	2.67	2.69	2.72	2.74	2.77
0.11	2.79	2.82	2.84	2.87	2.90	2.92	2.95	2.97	3.00	3.02
0.12	3.05	3.07	3.10	3.12	3.15	3.18	3.20	3.23	3.25	3.28
0.13	3.30	3.33	3.35	3.38	3.40	3.43	3.45	3.48	3.50	3.53
0.14	3.56	3.58	3.61	3.63	3.66	3.68	3.71	3.73	3.76	3.78
0.15	3.81	3.84	3.86	3.88	3.91	3.94	3.96	3.99	4.01	4.04
0.16	4.06	4.09	4.11	4.14	4.17	4.19	4.22	4.24	4.27	4.29
0.17	4.32	4.34	4.37	4.39	4.42	4.44	4.47	4.50	4.52	4.55
0.18	4.57	4.60	4.62	4.65	4.67	4.70	4.72	4.75	4.78	4.80
0.19	4.83	4.85	4.88	4.90	4.93	4.95	4.98	5.00	5.03	5.05
0.20	5.08	5.11	5.13	5.16	5.18	5.21	5.23	5.26	5.28	5.31
0.21	5.33	5.36	5.39	5.41	5.44	5.46	5.49	5.51	5.54	5.56
0.22	5.59	5.61	5.64	5.66	5.69	5.72	5.74	5.77	5.79	5.82
0.23	5.84	5.87	5.89	5.92	5.94	5.97	5.99	6.02	6.05	6.07
0.24	6.10	6.12	6.15	6.17	6.20	6.22	6.25	6.27	6.30	6.32
0.25	6.35	6.38	6.40	6.43	6.45	6.48	6.50	6.53	6.55	6.58
0.26	6.60	6.63	6.65	6.68	6.71	6.73	6.76	6.78	6.81	6.83
0.27	6.86	6.88	6.91	6.93	6.96	6.98	7.01	7.04	7.06	7.09
0.28	7.11	7.14	7.16	7.19	7.21	7.24	7.26	7.29	7.32	7.34
0.29	7.37	7.39	7.42	7.44	7.47	7.49	7.52	7.54	7.57	7.59
0.30	7.62	7.64	7.67	7.70	7.72	7.75	7.77	7.80	7.83	7.85
0.31	7.87	7.90	7.92	7.95	7.98	8.00	8.03	8.05	8.08	8.10
0.32	8.13	8.15	8.18	8.20	8.23	8.26	8.28	8.31	8.33	8.36
0.33	8.38	8.41	8.43	8.46	8.48	8.51	8.53	8.56	8.59	8.61
0.34	8.64	8.66	8.69	8.71	8.74	8.76	8.79	8.81	8.84	8.86
0.35	8.89	8.92	8.94	8.97	8.99	9.02	9.04	9.07	9.09	9.12
0.36	9.14	9.17	9.19	9.22	9.25	9.27	9.30	9.32	9.35	9.38
0.37	9.40	9.42	9.45	9.47	9.50	9.52	9.55	9.58	9.60	9.63
0.38	9.65	9.68	9.70	9.73	9.75	9.78	9.80	9.83	9.85	9.88

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Inch to Millimeter (for decimal inch values of less than one inch) [Do not interpolate]

Inch	0.xx0	0.xx1	0.xx2	0.xx3	0.xx4	0.xx5	0.xx6	0.xx7	0.xx8	0.xx9
0.39	9.91	9.93	9.96	9.98	10.01	10.03	10.06	10.08	10.11	10.13
0.40	10.16	10.19	10.21	10.24	10.26	10.29	10.31	10.34	10.36	10.39
0.41	10.41	10.44	10.46	10.49	10.52	10.54	10.57	10.59	10.62	10.64
0.42	10.67	10.69	10.72	10.74	10.77	10.80	10.82	10.85	10.87	10.90
0.43	10.92	10.95	10.97	11.00	11.02	11.05	11.07	11.10	11.13	11.15
0.44	11.18	11.20	11.23	11.25	11.28	11.30	11.32	11.35	11.38	11.40
0.45	11.43	11.46	11.48	11.51	11.53	11.56	11.58	11.61	11.63	11.66
0.46	11.68	11.71	11.73	11.76	11.79	11.81	11.84	11.86	11.89	11.91
0.47	11.94	11.96	11.99	12.01	12.04	12.06	12.09	12.12	12.14	12.17
0.48	12.19	12.22	12.24	12.27	12.29	12.32	12.34	12.37	12.40	12.42
0.49	12.45	12.47	12.50	12.52	12.55	12.57	12.60	12.62	12.65	12.67
0.50	12.70	12.73	12.75	12.78	12.80	12.83	12.85	12.88	12.90	12.93
0.51	12.95	12.98	13.00	13.03	13.06	13.08	13.11	13.14	13.16	13.18
0.52	13.21	13.23	13.26	13.28	13.31	13.34	13.36	13.39	13.41	13.44
0.53	13.46	13.49	13.51	13.54	13.56	13.59	13.61	13.64	13.67	13.69
0.54	13.71	13.74	13.77	13.79	13.82	13.84	13.87	13.89	13.92	13.94
0.55	13.97	14.00	14.02	14.05	14.07	14.10	14.12	14.15	14.17	14.20
0.56	14.22	14.25	14.27	14.30	14.33	14.35	14.38	14.40	14.43	14.45
0.57	14.48	14.50	14.53	14.55	14.58	14.60	14.63	14.66	14.68	14.71
0.58	14.73	14.76	14.78	14.81	14.83	14.86	14.88	14.91	14.94	14.96
0.59	14.99	15.01	15.04	15.06	15.09	15.11	15.14	15.16	15.19	15.21
0.60	15.24	15.27	15.29	15.32	15.34	15.37	15.39	15.42	15.44	15.47
0.61	15.49	15.52	15.54	15.57	15.60	15.62	15.65	15.67	15.70	15.72
0.62	15.75	15.77	15.80	15.82	15.85	15.88	15.90	15.93	15.95	15.98
0.63	16.00	16.02	16.05	16.08	16.10	16.13	16.15	16.18	16.21	16.23
0.64	16.26	16.28	16.31	16.33	16.36	16.38	16.41	16.43	16.46	16.48
0.65	16.51	16.54	16.56	16.59	16.61	16.64	16.66	16.69	16.71	16.74
0.66	16.76	16.79	16.81	16.84	16.87	16.89	16.92	16.94	16.97	16.99
0.67	17.02	17.04	17.07	17.09	17.12	17.14	17.17	17.20	17.22	17.25
0.68	17.27	17.30	17.32	17.35	17.37	17.40	17.42	17.45	17.48	17.50
0.69	17.53	17.55	17.58	17.60	17.63	17.65	17.68	17.70	17.73	17.75
0.70	17.78	17.81	17.83	17.86	17.88	17.91	17.93	17.96	17.98	18.01
0.71	18.03	18.06	18.08	18.11	18.14	18.16	18.19	18.21	18.24	18.26
0.72	18.29	18.31	18.34	18.36	18.39	18.42	18.44	18.47	18.49	18.52
0.73	18.54	18.57	18.59	18.62	18.64	18.67	18.69	18.72	18.75	18.77
0.74	18.80	18.82	18.85	18.87	18.90	18.92	18.95	18.97	19.00	19.02
0.75	19.05	19.08	19.10	19.13	19.15	19.18	19.20	19.23	19.25	19.28
0.76	19.30	19.33	19.35	19.38	19.41	19.43	19.46	19.48	19.51	19.53
0.77	19.56	19.58	19.61	19.63	19.66	19.68	19.71	19.74	19.76	19.79

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Inch to Millimeter (for decimal inch values of less than one inch) [Do not interpolate]

Inch	0.xx0	0.xx1	0.xx2	0.xx3	0.xx4	0.xx5	0.xx6	0.xx7	0.xx8	0.xx9
0.78	19.81	19.84	19.86	19.89	19.91	19.94	19.96	19.99	20.02	20.04
0.79	20.07	20.09	20.12	20.14	20.17	20.19	20.22	20.24	20.27	20.29
0.80	20.32	20.35	20.37	20.40	20.42	20.45	20.47	20.50	20.52	20.55
0.81	20.57	20.60	20.62	20.65	20.68	20.70	20.73	20.75	20.78	20.80
0.82	20.83	20.85	20.88	20.90	20.93	20.96	20.98	21.01	21.03	21.06
0.83	21.08	21.11	21.13	21.16	21.18	21.21	21.23	21.26	21.29	21.31
0.84	21.34	21.36	21.39	21.42	21.44	21.46	21.49	21.51	21.54	21.56
0.85	21.59	21.62	21.64	21.67	21.69	21.72	21.74	21.77	21.79	21.82
0.86	21.84	21.87	21.89	21.92	21.95	21.97	22.00	22.02	22.05	22.07
0.87	22.10	22.12	22.15	22.17	22.20	22.22	22.25	22.28	22.30	22.33
0.88	22.35	22.38	22.40	22.43	22.45	22.48	22.50	22.53	22.56	22.58
0.89	22.61	22.63	22.66	22.68	22.71	22.73	22.76	22.78	22.81	22.83
0.90	22.86	22.89	22.91	22.94	22.96	22.99	23.01	23.04	23.06	23.09
0.91	23.11	23.14	23.16	23.19	23.22	23.24	23.27	23.29	23.32	23.34
0.92	23.37	23.39	23.42	23.44	23.47	23.50	23.52	23.55	23.57	23.60
0.93	23.62	23.65	23.67	23.70	23.72	23.75	23.77	23.80	23.83	23.85
0.94	23.88	23.90	23.93	23.95	23.98	24.00	24.03	24.05	24.08	24.10
0.95	24.13	24.16	24.18	24.21	24.23	24.26	24.28	24.31	24.33	24.36
0.96	24.38	24.41	24.43	24.46	24.49	24.51	24.54	24.56	24.59	24.61
0.97	24.64	24.66	24.69	24.71	24.74	24.76	24.79	24.82	24.84	24.87
0.98	24.89	24.92	24.94	24.97	24.99	25.02	25.04	25.07	25.10	25.12
0.99	25.15	25.17	25.20	25.22	25.25	25.27	25.30	25.32	25.35	25.37

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