N-25-05

AMERICAN NATIONAL STANDARD

Punch and Die Sets (Metric)

ANSI B5.25M - 1980

SECRETARIAT

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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FOREWORD

The present committee was reorganized in January of 1976 for the purpose of updating the existing ANSI B5.25 Die Set standard. With the completion of the standard, the committee began development of a metric standard to fulfill the present industry requirements. Manufacturers and users had already begun specifying metric components and the committee has tried to put together a workable standard to suit industry needs. An attempt is made to conform with ISO and European standards where practical.

Dimensioning And Tolerancing, American National Standard Y-14.5-1973 is used throughout this standard where applicable.

This metric version of ANSI B5.25, after approval of the Committee and the Secretariat, was approved by ANSI on February 27, 1980 and designated B5.25M-1980.

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AMERICAN NATIONAL STANDARD

PUNCH AND DIE SETS (METRIC)

1.0 SCOPE

This American National Standard covers the design dimensions and tolerances for two, three and four guide post punch press tool all steel die sets referred to in the standard as "Standard Die Sets". Included in the standard are back post, center post, diagonal post and rectangular two, three and four post all steel die sets, including three (or more) plate die sets. This standard is limited to die sets not exceeding die space dimensions of 630 by 400 millimeters. Plain and anti-friction bearing components are included in this standard.

This standard is not intended to limit the design of die sets as may be specifically agreed upon between vendor and customer, nor to impose restrictions on proprietary designs.

2.0 TERMINOLOGY & DEFINITIONS

EXPLANATORY NOTES

2.1 Die Sets (See American National Standard Punch and Die Sets B5.25-1978)

2.1.1 Back Post Sets (ANSI B5.25-1978)

2.1.2 Center Post Sets (ANSI B5.25-1978)

2.1.3 Diagonal Post Sets (ANSI B5.25-1978)

2.1.4 Rectangular Die Sets (ANSI B5.25-1978)

2.1.5 Anti-friction Bearing Die Set. A die set in which the guiding elements are anti-friction bearings operating under a preload.

Guiding elements are made up of guide post, guide post bushing, cage with balls or rollers and optional cage retainer.

2.2 Punch Holder (ANSI B5.25-1978)

2.3 Punch Holder Shank (ANSI B5.25-1978)

2.4 Die Holder (ANSI B5.25-1978)

2.5 Guide Post (ANSI B5.25-1978)

2.6 Guide Post Bushings (ANSI B5.25-1978)

2.7 Flanges (ANSI B5.25-1978)

2.8 Punch Press Tool Height (ANSI B5.25-1978)

2.9 Die Area (ANSI B5.25-1978)

2.12 Cage

A sleeve having multiple openings which retain the balls or rollers and positions them between the guide post and guide post bushing.

There are a variety of materials as well as designs of cages. Balls or rollers are retained in the cage by several different methods.

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2.13 Retainer

A means of holding the cage to the guide post or in the guide post bushing.

2.14 Preload

Interference fit between guide post, balls or rollers and guide post bushing.

Preload of elements varies between manufacturers design of components.

2.15 Fool Proofing

Positioning of guide posts in the die set assembly in order to insure correct assembly.

"Fool Proofing" can be accomplished by using two guide posts of different diameters for 2 guide post sets or by offsetting one guide post of a four guide post set.

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Table 1 Tolerances of Die Set Components Dimensions & Tolerances (Millimeters)

ELEMENTS	CHARACTERISTICS	TOLERANCES
Die Holder		
Top and Bottom Faces	Flatness	0.008 per 100
	Parallelism*	0.012 per 100
	Thickness	+1.5 -3.5
	Clamping Flange Thickness	
	Machined	+1.5 -3.5
	Unmachined	+3.5 -0.0
Punch Holder		
Top and Bottom	Flatness	0.008 per 100
	Parallelism*	0.012 per 100
	Thickness	+1.5 -3.5
Shank (When and integral Part of Punch Holder) Removable Shank Data may be found in Table 6	Diameter	+0.0 -0.05
	Length	+0.0 -0.8
	Taper (top and bottom)	0.025 max.
	Max. deviation in squareness	0.025 per 75
	Radius at base of shank	Max. 6
	Undercut at base of shank	Max. 9 width Max. 1 depth
Guide Posts	Diameter	
	32 or less	+0.009 -0.006
	40 thru 50	+0.009 -0.011
	63 thru 80	+0.009 -0.013
Guide Post Bushings	Concentricity	
	I.D. Bearing Surface to inserted diameter	Max. 0.01 T.I.R.
Flame Cut special steel Punch and Die Holders	Length and Width measured on the side of Holder to be used for Mounting Punch or Die Details	
	Surface less than 600 long.	+3.5 -1.5
	Surface 600 to 1500 long.	+5.0 -1.5
	Surface over 1500	+6.5 -1.5
Flame Cut Openings	Length and Width measured on the side of Holder to be used for Mounting Punch or Die Details	+3.5 -0.0
	Location measured at top surface of Die Holder and bottom surface of Punch Holder	+1.5 -1.5
Sides of rectangular sets	Squareness of die area	0.8 per 100
	Angularity of edge to die surface. (Smallest dimension for length, width, and openings should be at top of Die Holder and bottom of Punch Holder)	0.8 per 25 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.

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Table 2 Tolerances of Partial Assembly (Punch Holder removed from Die Holder) (Millimeters)

ELEMENTS	CHARACTERISTICS	TOLERANCES
Guide Posts	Parallelism between Guide Post	0.025 per 100
	Squareness to bottom surface of Die Holder	0.025 per 100
	Height	+1.5 -1.5
	Press Fit Allowance	0.038 to 0.064
All Guide Posts Bushings	Parallelism between Guide Post Bushings	0.025 per 100
	Squareness to top surface of punch holder	0.025 per 100
	Height of Sleeve Type	+1.5 -1.5
Demountable Clamped Guide Post Bushings	Assembly fit between Guide Post Bushings and Hole in Punch or Die Holder	0.012 Max. Clearance on Diameter
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		0.05

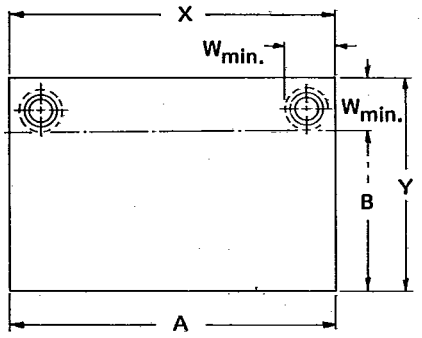
For other tolerances see Tables 1 and 3.

Table 3 Tolerances of Assemblies Dimensions & Tolerances (Millimeters)

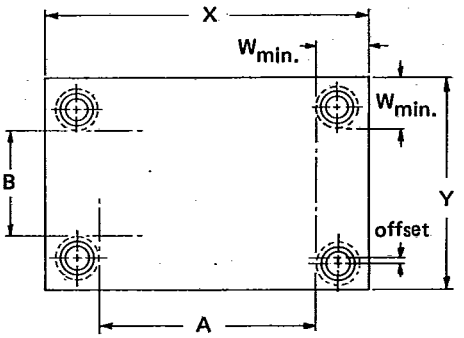
ELEMENTS	CHARACTERISTICS	TOLERANCES
Top surface of Punch Holder and bottom surface of Die Holder	Parallelism	0.020 per 100
Guide Post and inside diameter of Guide Post Bushings Plain Bearing Only	Clearance on Diameter when Guide Post is 25 or less	0.008 to 0.012
NOTE: Anti-friction bearing bushing assemblies operate with interference fit. (Preload)	When Guide Post is 32	0.010 to 0.015
	When Guide Post is 40	0.012 to 0.018
	When Guide Post is 50	0.018 to 0.028
	When Guide Post is 63	0.020 to 0.030
	When Guide Post is 80	0.025 to 0.035

For other tolerances see Tables 1 and 2.

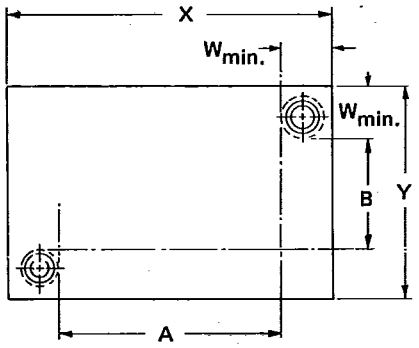
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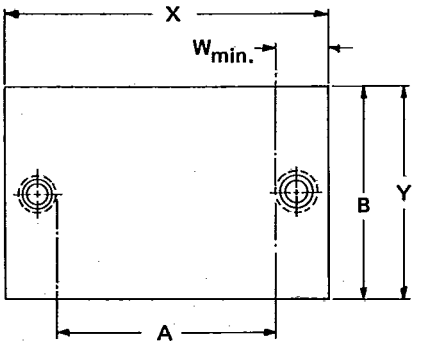
Back Post Die Sets



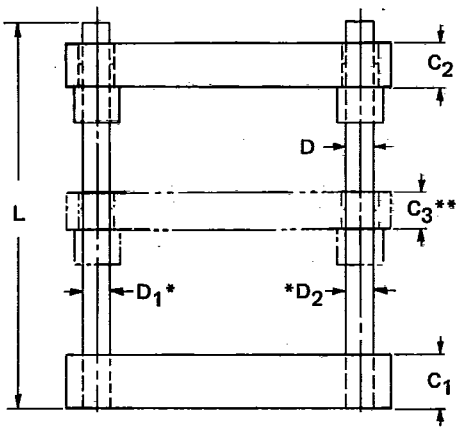
Four Post Die Sets



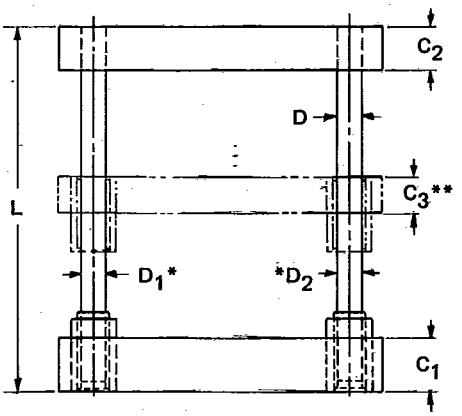
Diagonal Post Die Sets



Center Post Die Sets



Plain Bearing Die Sets



Anti-Friction Bearing Die Sets

*Nomenclature used for different post diameters (Center and Diagonal 2 post sets).
**Nomenclature used for 3 plate die set.

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Table 4 Minimum Dimension—Edge of Die Set to Bushing O.D.

Nominal Guide Post Sizes	W—Minimum Dimension		
	Plain Bearing Shoulder Bushings	Anti-Friction Bearing Bushings	
		Sleeve	Shoulder
12	32	—	—
*19	44	54	58
20	44	57	61
25	60	61	68
32	70	72	78
40	83	86	92
*44	88	91	97
50	97	102	105
63	113	116	125
80	133	135	145

*Not ISO—Renard 10 Series (not preferred)

Note: All dimensions in millimeters.

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Table 5 Standard Metric Die Sets

Die Space		Nominal Guide Post Sizes		Nominal Finished Plate Thickness		
Left to Right A	Front to Back B	D1	(D2)	Punch Holder C2	Die Holder C1	Center Plates C3
80	80	20	(25)	25	32	25
	100					
100	80					
	100					
	125	20	(25)	32	40	32
125	100					
	125					
	160					
	200					
160	100					
	125					
	160					
	200	25	(32)			
200	125					
	160					
	200					
	250					
250	125					
	160					
	200					
	250					
	315	32	(40)	40	50	40
315	160					
	200					
	250					
	315					
	400					
400	160					
	200					
	250					
	315					
	400					
500	200					
	250					
	315					
	400					
630	200					
	250					
	315					
	400					

Note: Guide post size in parenthesis to be used for "fool proofing" where necessary.

All dimensions in millimeters.

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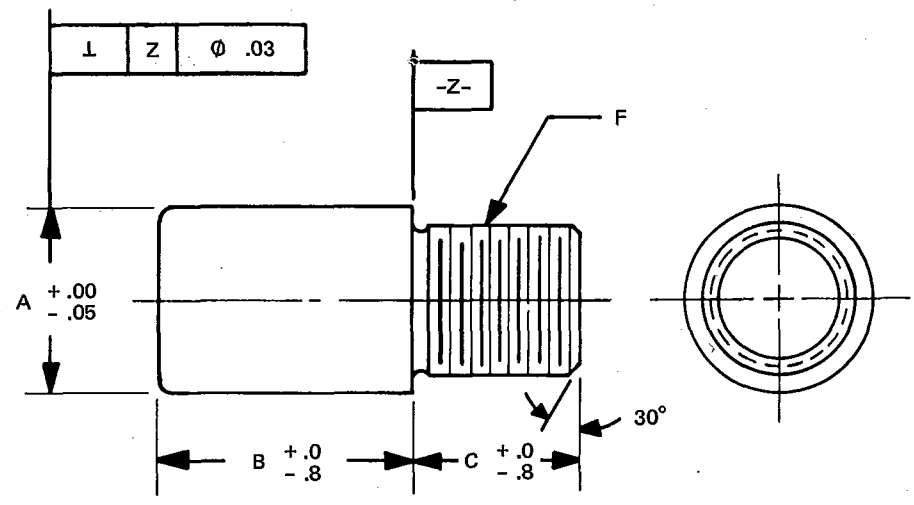


Table 6 Removable Punch-Holder Shanks
Dimensions and Tolerances (Millimeters)

Shank		Thread		
Diameter A	Length B	Length C	Diameter-Pitch	Minimum Number Full F
25	35	16.0	20 x 1.5	7
		40.0		23
40	56	25.0	33 x 2.0	9
		50.0		22
63	70	25.0	33 x 2.0	9
		50.0		22

Material: Low carbon mild steel or equivalent.

Heat Treatment: Does not require heat treatment.

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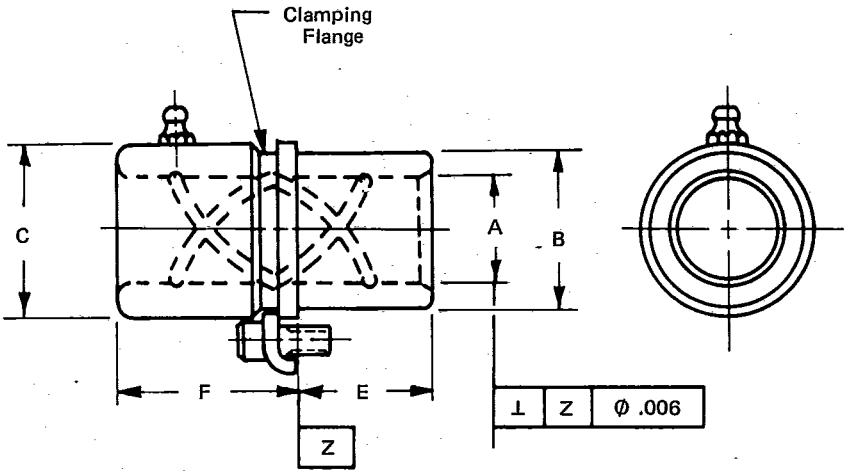


Table 7 Metric Plain Bearing Shoulder Bushing
Dimensions and Tolerances (Millimeters)

Nominal Inside Diameter A	Nominal Inserted Diameter B	Shoulder Diameter C	Length of Inserted End E	Shoulder Length F		
				Regular	Low Profile	Extra Long
12	20	25	16	20	13	–
*19	28	31-34	18-37	32	13-19	50
20	28	31-34	18-37	32	13-19	50
25	38	41-44	22-42	32-50	13-19	75-100
32	45	50-53	25-47	32-50	13-19	75-100
40	54	59-63	30-54	40-50	13-19	75-100
*44	58	65-69	30-54	40-50	13-19	75-100
50	65	75-79	35-62	40-50	13-19	75-100
63	81	89-92	45-77	50-63	13-19	75-100
80	100	108-111	45-78	50-63	13-19	75-100

Material: Hardened steel, bronze-plated steel, bronze lined, solid bronze, hard anodized aluminum, or other suitable materials.

Heat Treatment: Hardened steel bushings shall have a Rockwell hardness of C58 minimum. Solid bronze bushings shall have a hardness of 202-248 BHN.

These bushings generally have figure-eight oil grooves.

*Not ISO R-10 Series (Not Preferred)

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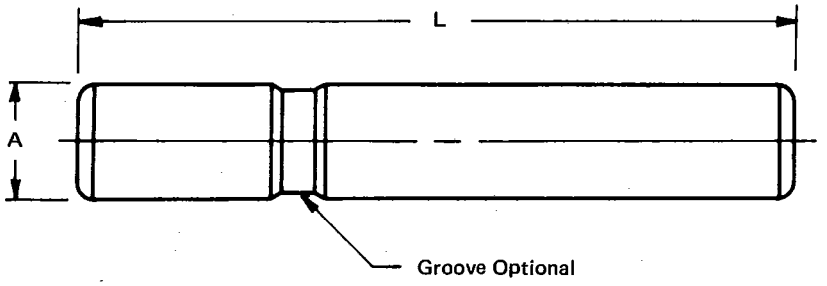


Table 8 Metric Plain Bearing Guide Posts
Dimensions (Millimeters)

Nominal Guide Post Diameter A	Suggested Length Range L
12	90 to 150
*19	100 to 200
20	100 to 200
25	120 to 280
32	130 to 320
40	130 to 360
*44	150 to 360
50	150 to 460
63	200 to 500
80	200 to 500
	Recommended increment is in multiples of "10" varying according to diameter.

Material: A standard AISI steel of commercial soundness containing no seams, pits or other crack-like defects.

Heat Treatment: Rockwell hardness of C58 minimum. After finish grinding, the surface may have further treatment such as polishing or plating.

*Not ISO R-10 Series (Not Preferred)

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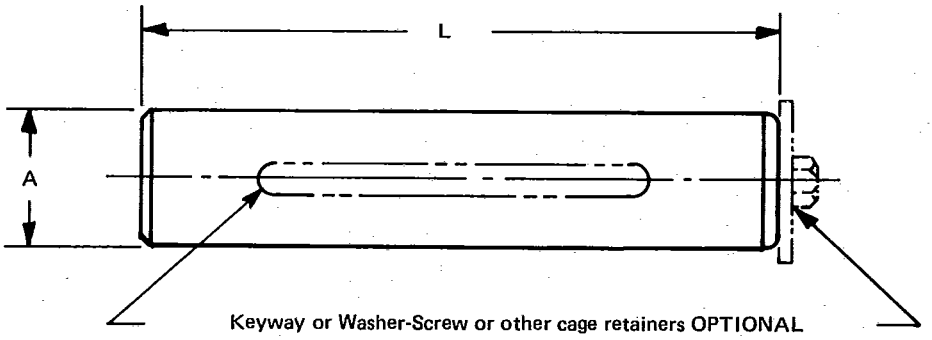


Table 9 Metric Anti-Friction Bearing Guide Posts
Dimensions (Millimeters)

Nominal Guide Post Diameter A	Suggested Length Range L
*19	75 to 150
20	75 to 150
25	80 to 260
32	100 to 310
40	110 to 360
*44	125 to 360
50	130 to 460
63	200 to 500
80	200 to 500 Recommended increment is in multiples of "10" varying according to diameter.

Material: A standard AISI steel of commercial soundness containing no seams, pits or other crack-like defects.

Heat Treatment: Rockwell hardness of C58 minimum.

*Not ISO R-10 Series (Not Preferred)

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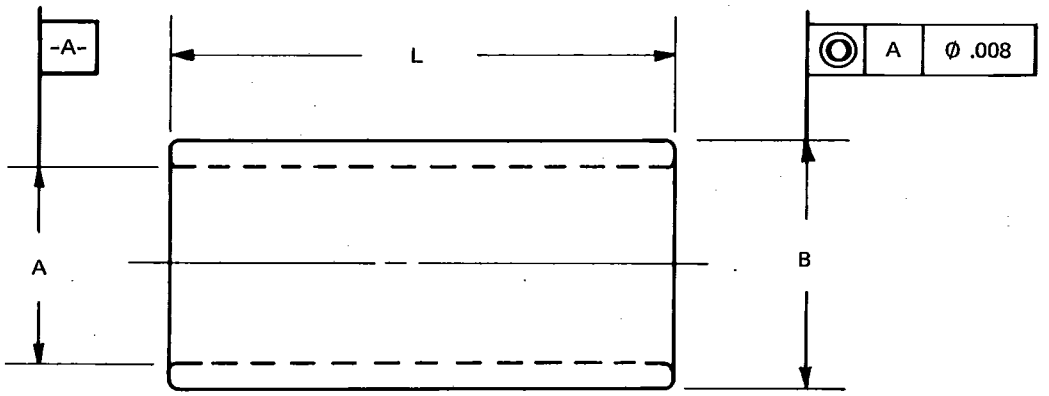


Table 10 Metric Anti-Friction Bearing Sleeve Bushings
Dimensions and Tolerances (Millimeters)

Nominal Guide Post Size	Nominal Inside Diameter A	Nominal Inserted Diameter B	Suggested Length L
*19	29	38	50 to 150
20	30	38	65 to 175
25	33-35	44-45	65 to 175
32	40-42	54	75 to 175
40	48-50	65	80 to 300
*44	58	74	125 to 330
50	62-64	81	110 to 350
63	75-77	95	150 to 350
80	92-94	112	150 to 500

Material: A standard AISI steel of commercial soundness containing no seams, pits or other crack-like defects.

Heat Treatment: Rockwell hardness of C58 minimum.

*Not ISO R-10 Series (Not Preferred)

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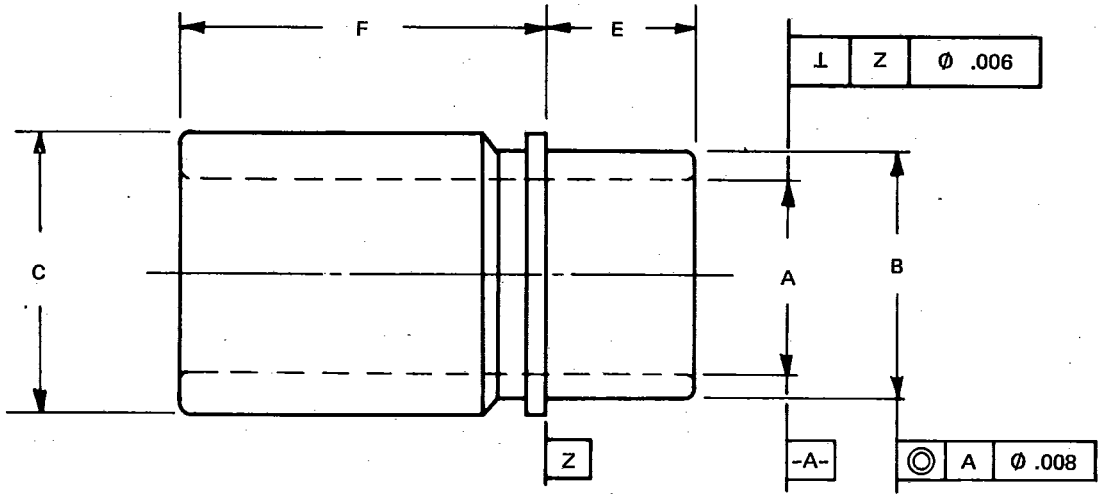


Table 11 Metric Anti-Friction Bearing Shoulder Bushings
Dimensions and Tolerances (Millimeters)

Nominal Guide Post Size	Nominal Inside Diameter A	Nominal Inserted Diameter B	Shoulder Diameter C	Press-Fit Length E	Shoulder Length F
*19	29	38	45	30	25-65
20	30	38	46	30	25-65
25	33-35	44-45	51	30	25-65
32	40-42	54	61	30	35-125
40	48-50	65	72	35	40-125
*44	58	74	81	35	40-155
50	62-64	81	91	35	40-155
63	75-77	95	105	35	90-155
80	92-94	112	122	35	90-155

Material: A standard AISI steel of commercial soundness containing no seams, pits or other crack-like defects.

Heat Treatment: Rockwell hardness of C58 minimum.

*Not ISO R-10 Series (Not Preferred)

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APPENDIX A

INSPECTION PROCEDURE

A. All plain bearing die sets may be checked by placing the die holder on matched parallels and indicating with a surface gage dial indicator (Fig. 4), left to right and front to back. The tolerances set forth in Table 1 of this Metric Standard shall be followed. The punch holder shall be checked in the same manner (Fig. 5). When assembled on the pins and bushings and with the punch holder supported on a single point, in the center of the die area, the top of the punch holder shall be checked again (Fig. 1). Deviations exceeding 0.020 mm per 100 mm not acceptable.

B. Anti-friction die set punch holder and die holder may be checked in a similar manner to plain bearing components described in A. When assembled they shall be checked using a matched pair of precision parallels placed between the underside of the punch holder and the top side of the die holder, and located one quarter of the "A" dimension from each end of the "A" dimension (Figs. 2 and 3). The top of the punch holder must be within 0.020 mm per 100 mm.

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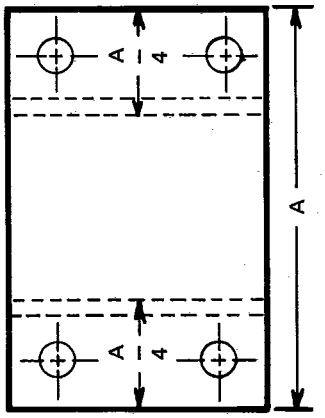


Figure 3 Top View

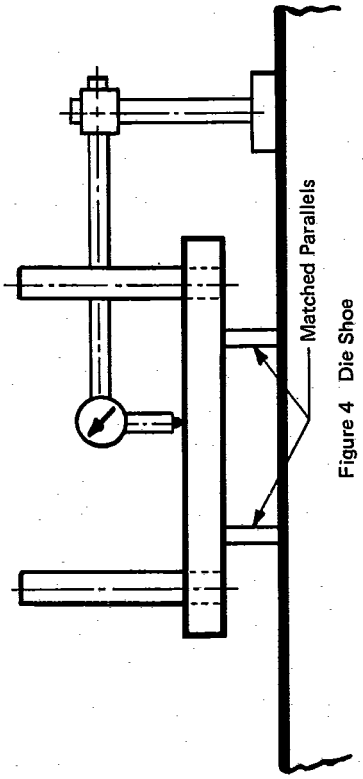


Figure 4 Die Shoe

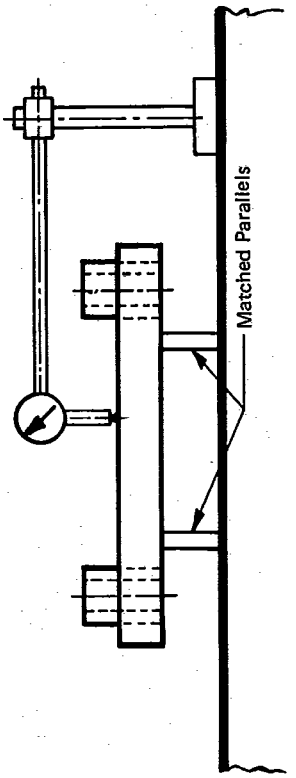


Figure 5 Punch Holder

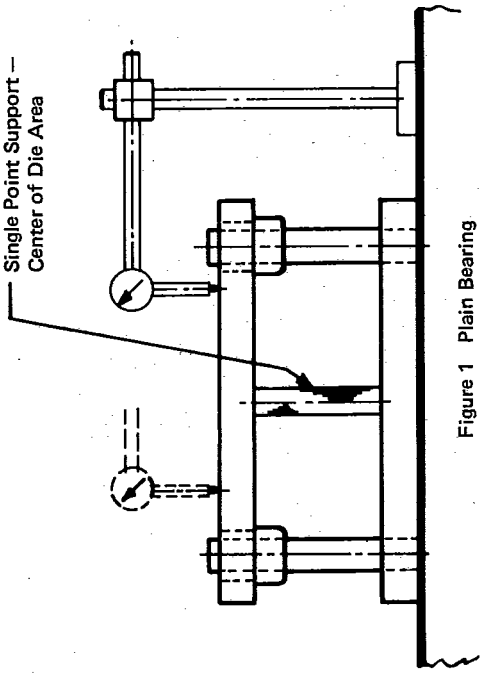


Figure 1 Plain Bearing

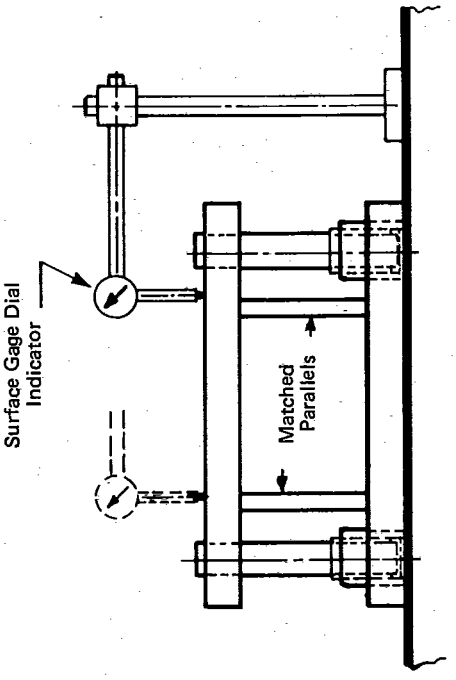


Figure 2 Anti-Friction Bearing

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AMERICAN NATIONAL STANDARDS FOR MACHINE TOOLS

T-Slots, Their Bolts, Nuts, Tongues, and Cutters	B5.1-1975	
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Chucks and Chuck Jaws	B5.8-1972	(R1979)
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