

Widest Variety of Bushings For All Tasks

**UNITED Does
Bushings Best**



SF BUSHING SETS
Page A16



GUN DRILL LINER & INSERT
Page A48



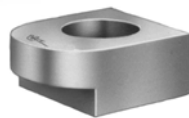
HEADLESS LINER
Page A12



HEAD PRESS FIT
Page A4



SLIP FIXED RENEWABLE
Page A8



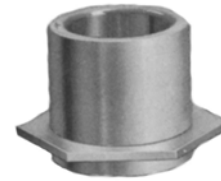
ROUND END CLAMP
Page A15



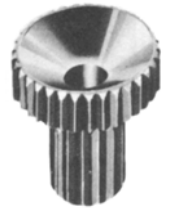
SER-CAST
Page A20



HEADLESS PRESS FIT
Page A3



HEX GRIP
Page A22



SER-HEAD
Page A23



COOLANT CHIPBREAKER
Page A60



OIL GROOVE
Page A55



FLANGE GROOVE
Page A22



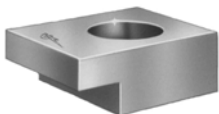
UNI-LOCK LINER
Page A13



SER-PRESS
Page A23



HEAD LINER
Page A13



FLAT CLAMPS
Page A15



LOCK SCREWS
Page A14



BORING BAR SLEEVES
Page A79



COLLET HOLDER
Page A77



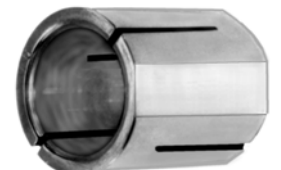
LONG SLOT TOOL HOLDER
Page A76



TAP HOLDER BUSHING & COLLAR
Page A78



HEAD 4-WAY SPLIT
Page A73



4-WAY SPLIT HEADLESS
Page A72



SOFT BLANK TOOL HOLDER
Page A75



SPLIT MILL FLAT TOOL HOLDER
Page A74



CLEARANCE HOLES TOOL HOLDER
Page A75



TOOL HOLDER LINER
Page A77

**P-H-SF-L-HL-UL
Bushings**

UNITED Drill Jig Bushings

ANSI TOLERANCES AND SPECIFICATIONS



P-PU-PTE
HEADLESS PRESS FIT



H-HU-HTE
HEAD PRESS FIT



SF-SFX-SFTE-SFXN
SLIP FIXED RENEWABLE



L-LU-LTE
HEADLESS LINER



HL-HLU
HEAD LINER



UL
UNI-LOCK LINER

ALL BUSHINGS SHOWN ARE IN THIS SECTION.

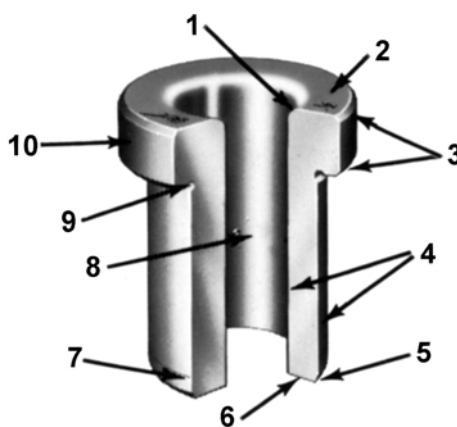
CONCENTRICITY — T.I.R. (Total Indicator Reading):
1/8" to 1/2" I.D. — .0003" max. All other sizes are T.I.R. .0005" max.
T.I.R. met at drill exit end.

HARDNESS: Rockwell RC61-65 in the hole.

RADIUS COUNTERSINK: UNITED features a radius countersink at the drill entrance end.

LEAD: Concentric ground lead
.001 to .002 smaller than O.D.
+45° chamfer.

REAMER BUSHINGS:
Specify "Reamer Bushing."
Bushings will be furnished at extra charge with correct clearance according to your specifications. Reamer Bushings are stamped with the letter "R" and are normally supplied in type SF only. Specify Reamer Size if different than chart.



TOLERANCE ON INSIDE DIAMETER

For DRILL BUSHINGS

I. D. RANGE	TOLERANCE OVER NOM.
Up to .2500	+0.0001 to +0.0004
Over .2500 to .7500	+0.0001 to +0.0005
Over .7500 to 1.5000	+0.0002 to +0.0006
Over 1.5000 and Up	+0.0003 to +0.0007

For REAMER BUSHINGS

Up to .2500	+0.0005 to +0.0008
Over .2500 to 1.0000	+0.0006 to +0.0010
Over 1.0000	+0.0008 to +0.0012

1. RADIUS blended and polished for smooth entry of drill.
2. SIZE clearly marked on each Bushing
3. HEAD double-chamfered and polished. Replaceable types are knurled for easier handling.
4. CONCENTRICITY .0003 to .0005 T.I.R. depending upon size.
5. 45° CHAMFERED and polished end eases entry into jig.
6. TOLERANCE on length held $\pm .015$.
7. CONCENTRIC LEAD ground lead provided initial alignment.
8. HARDNESS in hole: Rockwell C61-65.
9. DOUBLE UNDERCUT keeps bushing flat against jig plate.
10. 100% FINAL INSPECTION of every Bushing.

11. 3,400 ADDITIONAL standard types / sizes not catalogued by competitors.
12. COMPLETE EXTENDED RANGE sizes from 3/4" to 7" in length to 5" I.D.
13. A FULL LINE of Circuit Board Bushings at standard catalog prices.
14. UNITED manufactures precision parts and tooling to your specifications.
15. THE MAJORITY of our bushings in stock are non-counterbored full bearing and are provided at catalog prices. If you have a preference, add the suffix NCB for non-counterbore and CB for counterbore. We reserve the right to provide counterbore in micro sizes and extra long lengths at catalog prices.

EASY STEPS FOR ACCURATE ORDERING THE UNITED WAY

5-STEP FORMAT ORDER PLAN	1 QTY	2 -TYPE	3 -O.D. (64ths)	4 -LENGTH (16ths)	5 -I.D. (DECIMAL)
UDB EXAMPLE:	25	P	32 (1/2)	1" (16/16)	3/16
ANSI EXAMPLE:	25	P	32 (32/64=1/2)	16	0.1875

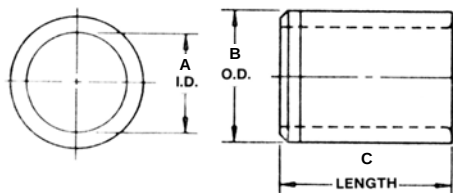
**ASK FOR 'PRIME TIME'
IF YOU NEEDED IT
YESTERDAY!**

Over 2,500,000 Units Finished Stock, 3,000,000 Units In-Process and 2,000,000 Blanks in stock.

Headless Press Fit Type P

A.N.S.I. Standards

P-Headless Press
Fit Bushings



Headless Press Fit P and PU



Most Bushings in stock are non-counterbored full bearing. We usually provide counterbore in micro sizes and extra long lengths.

If you have a preference, add the suffix 'CB' for counterbore and 'NCB' for non-counterbore. MILLIMETER DRILL SIZES HAVE BEEN ADDED TO I.D. RANGE.

ALL UNITED STANDARD BUSHINGS ARE MANUFACTURED TO UNITED AND ANSI STANDARDS.

SPECIFY 'PU' FOR UNGROUND.

For Quantity Discount Pricing, see bottom of page.

RC-61-65

A I.D. DRILL RANGE		B O.D. SIZE		ANSI SYMBOL	C P and PU LENGTH OVERALL / ANSI LENGTH SYMBOL BY 16ths															
INCH / METRIC NOMINAL	U.S.A. INCH DECIMAL	NOM.	U.S.A. INCH DECIMAL		1/4 -4	5/16 -5	3/8 -6	1/2 -8	5/8 -10	3/4 -12	1" -16	1-1/4 -20	1-3/8 -22	1-1/2 -24	1-3/4 -28	2" -32	2-1/8 -34	2-1/2 -40	3" -48	
#80 - #70 .35 - .70MM	.0135 - .0280 .0138 - .0276	5/32	.1578 - .1575 .166 - .161	P-10 PU-10	26.80	27.93	28.77	29.17												
#69 - 3/64 .75 - 1.25MM	.0292 - .0469 .0295 - .0492	5/32	.1578 - .1575 .166 - .161	P-10 PU-10	23.88	24.93	25.33	25.98		27.93										
#55 - 1/16 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	5/32	.1578 - .1575 .166 - .161	P-10 PU-10	18.90	19.75	20.14	20.45		22.13										
#69 - 3/64 .75 - 1.25MM	.0292 - .0469 .0295 - .0492	3/16	.1891 - .1888 .201 - .197	P-12 PU-12	23.88	24.93	25.33	25.98		27.93										
#55 - 1/16 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	3/16	.1891 - .1888 .201 - .197	P-12 PU-12	18.90	19.75	20.14	20.45	21.39	22.13										
#52 - #39 1.65 - 2.50MM	.0635 - .0995 .0650 - .0984	3/16	.1891 - .1888 .201 - .197	P-12 PU-12	8.94	9.86	10.48	11.00	11.53	12.03										
#80 - #70 .35 - .70MM	.0135 - .0280 .0138 - .0276	13/64	.2046 - .2043 .213 - .208	P-13 PU-13	26.80	27.93	28.77	29.17												
#69 - 3/64 .75 - 1.25MM	.0292 - .0469 .0295 - .0492	13/64	.2046 - .2043 .213 - .208	P-13 PU-13	23.88	24.93	25.33	25.98		27.93										
#55 - 1/16 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	13/64	.2046 - .2043 .213 - .208	P-13 PU-13	18.90	19.81	20.14	20.45		22.13	25.13									
#52 - #39 1.65 - 2.25MM	.0635 - .0995 .0650 - .0886	13/64	.2046 - .2043 .213 - .208	P-13 PU-13	8.82	9.86	10.58	11.00		11.96	13.08		16.51							
#40 - 9/64 2.35 - 4.90MM	.0980 - .1406 .0925 - .1929	1/4	.2516 - .2513 .265 - .260	P-16 PU-16	8.20	8.62	9.36	9.86	10.58	11.11	12.35		19.51	20.45	21.50					
1/8 - #10 3.10 - 4.90MM	.1250 - .1935 .1220 - .1929	5/16	.3141 - .3138 .327 - .322	P-20 PU-20	6.74	7.16	7.47	7.78	8.20	8.52	8.94		13.08	15.06	17.14					
#10 - #1 4.90 - 5.75MM	.1935 - * .2280 .1925 - .2264	3/8	.3766 - .3763 .390 - .385	P-24 PU-24	5.90	6.02	6.64	6.74	7.16	7.47	8.71									
3/16 - F 4.75 - 6.50MM	.1875 - * .2570 .1870 - .2559	13/32	.4078 - .4075 .421 - .416	P-26 PU-26	5.90	6.02	6.64	6.74		7.47	8.71		9.86	11.11	12.35					
A - L 5.90 - 7.30MM	.2340 - * .2900 .2323 - .2874	7/16	.4392 - .4389 .453 - .448	P-28 PU-28	5.90	6.02	6.64	6.74	7.16	7.47	8.71									
3/16 - O 4.75 - 8.00MM	.1875 - * .3160 .1870 - .3150	1/2	.5017 - .5014 .520 - .515	P-32 PU-32	5.90	6.02	6.64	6.74		7.47	8.71		9.86	11.11	12.35		24.93			
M - 11/32 7.50 - 8.70MM	.2950 - .3437 .2953 - .3425	9/16	.5642 - .5639 .582 - .577	P-36 PU-36	6.74	5.90	6.24	6.24	6.64	6.74	7.16									
5/16 - 7/16 8.80 - 11.00MM	.3125 - * .4375 .3465 - .4331	5/8	.6267 - .6264 .645 - .640	P-40 PU-40	6.74	5.90	6.24	6.24	6.64	6.74	7.16	9.76	9.76	10.27	11.11		13.41			
5/16 - 17/32 7.10 - 14.00MM	.3125 - * .5312 .2795 - .5512	3/4	.7518 - .7515 .770 - .765	P-48 PU-48	7.16	6.02	6.74	6.74	7.16	7.16	7.78	9.86	9.86	10.58	11.53		13.59	24.93		
1/2 - 21/32 12.50 - 16.50MM	.5000 - * .6562 .4921 - .6496	7/8	.8768 - .8765 .895 - .890	P-56 PU-56		8.94	9.23	8.20	8.52	8.52	8.94	9.76	9.76	10.58	11.63		13.41	15.47		
1/2 - 49/64 12.50 - 19.50MM	.5000 - .7656 .4646 - .7677	1"	1.0018 - 1.0015 1.020 - 1.015	P-64 PU-64				8.52	8.52	8.52	9.03	9.76	9.76	11.00	12.03		13.41	15.47	26.07	
49/64 - 27/32 19.00 - 21.00MM	.7656 - .8438 .7980 - .8268	1-1/8	1.1270 - 1.1267 1.145 - 1.140	P-72 PU-72				13.08	12.35	11.11	13.08	14.63		15.90	17.14					
55/64 - 15/16 21.50 - 23.50MM	.8594 - * .9375 .8465 - .9252	1-1/4	1.2520 - 1.2517 1.270 - 1.265	P-80 PU-80					12.35	11.11	13.08	14.63		15.90	17.14	19.81				
5/8 - 1-1/32 15.50 - 26.00MM	.6250 - 1.0312 .6102 - 1.0236	1-3/8	1.3772 - 1.3768 1.395 - 1.390	P-88 PU-88				13.41	12.67	11.11	13.41	14.76	14.76	16.22	17.66	20.25	20.45	22.86	31.58	
1-1/64 - 1-1/8 25.00 - 28.00MM	1.0156 - 1.1250 .9843 - 1.1024	1-1/2	1.5022 - 1.5018 1.520 - 1.515	P-96 PU-96						16.71	14.76	16.71		17.86	19.02	22.13				
1" - 1-25/64 25.00 - 34.00MM	1.0000 - 1.3906 .9843 - 1.3386	1-3/4	1.7523 - 1.7519 1.770 - 1.765	P-112 PU-112						16.71	14.76		16.71	17.86	19.02		22.13	23.37	36.34	
1-3/8 - 1-49/64 34.00 - 44.00MM	1.3750 - 1.7656 1.3386 - 1.7323	2-1/4	2.2525 - 2.2521 2.270 - 2.265	P-144 PU-144							19.22		21.28	22.33	23.37		27.02	29.71	41.16	
1-49/64 - 2-17/64 44.00 - 55.00MM	1.7656 - 2.2656 1.7323 - 2.1654	2-3/4	2.7526 - 2.7522 2.770 - 2.765	P-176 PU-176						36.52	38.58	42.77	41.16	42.77	44.37	46.38	47.07	50.17	62.38	
I. D. RANGES		O. D. SIZES		A N S I SYMBOL	1/4 -4	5/16 -5	3/8 -6	1/2 -8	5/8 -10	3/4 -12	1" -16	1-1/4 -20	1-3/8 -22	1-1/2 -24	1-3/4 -28	2" -32	2-1/8 -34	2-1/2 -40	3" -48	

* SEE INSET CHARTS FOR ADDITIONAL I.D. STANDARDS.

QTY DISCOUNT	1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%
--------------	----------	---------	-----------	------------	------------	------------	--------------	--------------	--------------	----------------

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800) 421-3466 IN CA / (800) 486-3466 • FAX (562) 803-6898 / (800) 486-3465

8-21-06

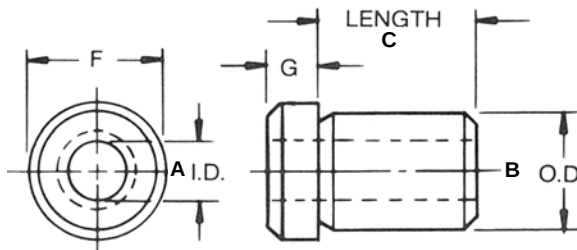
EMAIL united@ucc-udb.com WEBSITE www.ucc-udb.com

A3

Head Press Fit H Bushings

Head Press Fit Type H

A.N.S.I. Standards



Head Press Fit H and HU

RC-61-65

HEAD DIMENSIONS for H-HU, HTE-HTEU					
O.D.	F	G	O.D.	F	G
5/32	1/4	3/32	5/8	51/64	7/32
3/16	5/16	3/32	3/4	59/64	7/32
13/64	19/64	3/32	7/8	1-7/64	1/4
1/4	23/64	3/32	1"	1-15/64	5/16
5/16	27/64	1/8	1-1/8	1-5/16	3/16
3/8	1/2	3/32	1-1/4	1-1/2	1/4
13/32	1/2	5/32	1-3/8	1-39/64	3/8
7/16	9/16	3/32	1-1/2	1-49/64	3/8
1/2	39/64	7/32	1-3/4	1-63/64	3/8
9/16	11/16	3/32	2-1/4	2-31/64	3/8

For Quantity Discount Pricing, see below.

ALL UNITED STANDARD BUSHINGS
ARE MANUFACTURED TO UNITED AND ANSI STANDARDS.

MILLIMETER DRILL SIZES HAVE BEEN ADDED TO I.D. RANGE. SPECIFY 'HU' FOR **UNGROUND**.

A I.D. DRILL RANGE			B O.D. SIZE		ANSI SYMBOL	C H and HU LENGTH UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths															
INCH / METRIC	U.S.A. INCH	NOM.	U.S.A. INCH	DECIMAL		1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2"	2-1/8	2-1/2	3"	
NOMINAL	DECIMAL						-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-32	-34	-40	-48
#80 - .35	#70 .70MM	.0135 - .0138	.0280 .0276	5/32	.1578 - .166	.1575 .161	H-10 HU-10	27.93	28.77	29.49	29.71										
#69 - .75	3/64 1.25MM	.0292 - .0295	.0469 .0492	5/32	.1578 - .166	.1575 .161	H-10 HU-10	24.93	25.33	25.98	26.60		29.17								
#55 - 1.30	1/16 1.60MM	.0520 - .0512	.0625 .0630	5/32	.1578 - .166	.1575 .161	H-10 HU-10	19.81	19.81	20.45	20.78		23.07								
#55 - 1.30	1/16 1.60MM	.0520 - .0512	.0625 .0630	3/16	.1891 - .201	.1888 .197	H-12 HU-12	19.81	19.81	20.45	20.78		23.07								
#52 - 1.65	#39 2.50MM	.0635 - .0650	.0995 .0984	3/16	.1891 - .201	.1888 .197	H-12 HU-12	11.53	11.63	12.35	12.67		14.33								
#80 - .35	#70 .70MM	.0135 - .0138	.0280 .0276	13/64	.2046 - .213	.2043 .208	H-13 HU-13	27.93	28.77	29.49	29.71										
#69 - .75	3/64 1.25MM	.0292 - .0295	.0469 .0492	13/64	.2046 - .213	.2043 .208	H-13 HU-13	24.93	25.33	25.98	26.60		29.17								
#55 - 1.30	1/16 1.60MM	.0520 - .0512	.0625 .0630	13/64	.2046 - .213	.2043 .208	H-13 HU-13	19.81	20.14	20.45	20.78		23.17	26.37							
#52 - 1.65	#39 2.25MM	.0635 - .0650	.0995 .0886	13/64	.2046 - .213	.2043 .208	H-13 HU-13	11.53	11.63	12.35	12.67		14.33	18.70							
#40 - 2.35	9/64 4.90MM	.0980 - .0925	.1406 .1929	1/4	.2516 - .260	.2513 .255	H-16 HU-16	9.86	10.58	11.11	11.53	12.67	14.14	18.18		25.98	27.63				
1/8 - 3.10	#10 4.90MM	.1250 - .1220	.1935 .1929	5/16	.3141 - .327	.3138 .322	H-20 HU-20	8.20	8.71	9.23	9.36	9.55	9.76	11.63		19.75	22.33				
#10 - 4.90	#1 5.75MM	.1935 - .1925	.2280 .2264	3/8	.3766 - .390	.3763 .385	H-24 HU-24	7.47	8.20	8.52	8.71	9.03	9.23	11.00							
3/16 - 4.75	F 6.50MM	.1875 - .1870	*.2570 .2559	13/32	.4078 - .421	.4075 .416	H-26 HU-26	7.47	7.78	8.52	8.71		9.23	11.00		12.35	13.72	15.06			
A - 5.90	L 7.30MM	.2340 - .2323	*.2900 .2874	7/16	.4391 - .453	.4389 .448	H-28 HU-28	7.47	8.20	8.52	8.71	9.03	9.23	11.00							
3/16 - 4.75	O 8.00MM	.1875 - .1870	*.3160 .3150	1/2	.5017 - .520	.5014 .515	H-32 HU-32	7.47	7.78	8.52	8.71		9.23	11.00		12.35	13.72	15.06			
M - 7.50	11/32 8.70MM	.2950 - .2953	.3437 .3425	9/16	.5642 - .582	.5639 .577	H-36 HU-36	8.52	7.47	8.20	8.20	8.52	8.52	9.23		12.35					
5/16 - 8.80	7/16 11.00MM	.3125 - .3465	*.4375 .4331	5/8	.6267 - .645	.6264 .640	H-40 HU-40	8.52	7.47	7.78	7.78	8.52	8.52	9.23		12.35	13.08	14.14		16.41	
5/16 - 7.10	17/32 14.00MM	.3125 - .2795	*.5312 .5512	3/4	.7518 - .770	.7515 .765	H-48 HU-48	9.23	8.20	8.52	8.52	8.82	9.23	9.86	12.67	12.67	13.41	14.21		16.71	
1/2 - 12.50	21/32 16.50MM	.5000 - .4921	*.6562 .6496	7/8	.8768 - .895	.8765 .890	H-56 HU-56			10.27	10.27	10.48	11.00	12.03	12.03	13.41	14.76	16.71		16.71	
1/2 - 12.50	49/64 19.50MM	.5000 - .4646	*.7656 .7677	1"	1.0018 - 1.020	1.0015 1.015	H-64 HU-64				10.58		10.58	11.53		12.35	14.33	16.22		19.02	
55/64 - 21.50	15/16 23.50MM	.8594 - .8465	.9375 .9252	1 - 1/4	1.2520 - 1.270	1.2517 1.265	H-80 HU-80				16.30	15.47	17.01	19.02		20.45	21.83	24.73			
5/8 - 15.50	1-1/32 26.00MM	.6250 - .6102	*1.0312 1.0236	1-3/8	1.3772 - 1.395	1.3768 1.390	H-88 HU-88				17.14		15.78	17.45		19.31	21.50	22.13		22.95	
1 - 25.00	1-25/64 34.00MM	1.0000 - .9843	1.3906 1.3386	1-3/4	1.7523 - 1.770	1.7519 1.765	H-112 HU-112					23.37	21.08		23.37	24.42	25.45		28.87	31.99	
1-3/8 - 34.00	1-49/64 44.00MM	1.3750 - 1.3386	1.7656 1.7323	2-1/4	2.2525 - 2.270	2.2521 2.265	H-144 HU-144						27.02		30.14	31.99	31.99	36.52	41.16		
I. D. RANGES			O. D. SIZES		ANSI SYMBOL	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2"	2-1/8	2-1/2	3"	
						-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-32	-34	-40	-48	

BOXED ANSI SIZES INDICATE SIZES OF COUNTERBORED BUSHINGS PROVIDED AS STANDARD.

TOLERANCE ON INSIDE DIAMETER FOR ANSI STANDARD DRILL SIZES		
ANSI For DRILL BUSHINGS		
NOM. I. D. RANGE	TOLERANCE	
#80 to 1/4"	+0.001	to +0.004
Over 1/4" to 3/4"	+0.001	to +0.005
Over 3/4" to 1-1/2"	+0.002	to +0.006
Over 1-1/2"	+0.003	to +0.007
ANSI For REAMER BUSHINGS		
Up to 1/4"	+0.005	to +0.008
Over 1/4" to 1"	+0.006	to +0.010
Over 1"	+0.008	to +0.012

* NEW STANDARD I. D.s	
I. D.	O. D.
* .2510	13/32
* .2510	7/16
* .2510	1/2
* .3760	5/8
* .3760	3/4
* .5010	3/4
* .5010	7/8
* .5010	1"
* .7510	1-3/8

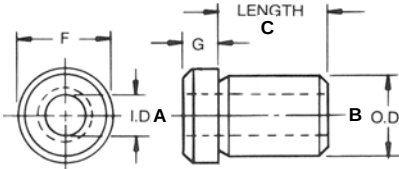
* SEE INSET CHARTS FOR ADDITIONAL I.D. STANDARDS.

QTY DISCOUNT	1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%
--------------	----------	---------	-----------	------------	------------	------------	--------------	--------------	--------------	----------------

Extra Thinwall Bushings

LARGER I.D.s Within Each A.N.S.I. O.D. Range
A.N.S.I. TOLERANCES APPLY

HTE and PTE Space Saver Thinwalls



RC-61-65

9,800 MORE SPACE SAVER DRILL-SIZED BUSHINGS FOR YOUR FIXTURE! UNITED DESIGNED For Your CLOSE HOLE SPACING Needs — MANUFACTURED

FOR HTE HEAD DIMENSIONS, SEE THIS SECTION.

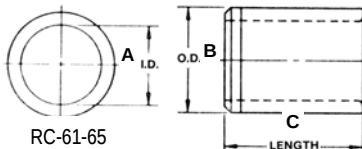
HTE EXTRA THINWALL — WITH HEAD

For Quantity Discount Pricing, see below.				C LENGTH OF BUSHING — BODY ONLY								See this Section for Head Dimensions.					
A I.D. DRILL RANGE		B O.D. SIZE		ANSI	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/4	
INCH - METRIC NOM.	U.S.A. DEC. INCH	NOM.	ACTUAL	SYMBOL	-4	-5	-6	-8	-10	-12	-16	-20	-24	-28	-32	36	
#38 - .31 2.55 - 3.00MM	.1015 - .1200 .1004 - .1181	3/16	.1891 - .1888	HTE-12	24.10	24.61	25.98	26.50	28.77	30.44		Drill and Reamer Tolerances are in this Section.					
9/64 - .14 3.50 - 4.60MM	.1406 - .1820 .1378 - .1811	1/4	.2516 - .2513	HTE-16	21.08	22.23	23.68	24.10	27.02	30.14							
9 - C 4.90 - 6.10MM	.1960 - .2420 .1929 - .2402	5/16	.3141 - .3138	HTE-20	17.14	18.37	19.43	19.75	20.14	20.45	24.61						
A - 19/64 5.90 - 7.50MM	.2340 - .2968 .2323 - .2953	3/8	.3766 - .3763	HTE-24	15.38	16.09	17.33	17.55	18.37	18.49	21.83						
M - 23/64 7.40 - 9.10MM	.2950 - .3594 .2913 - .3583	7/16	.4392 - .4389	HTE-28	15.38	16.09	17.33	17.55	18.37	18.49	21.83						
S - 29/64 8.80 - 11.50MM	.3480 - .4531 .3465 - .4528	9/16	.5642 - .5639	HTE-36	17.33	15.06	16.09	16.09	16.82	17.33	18.49						
29/64 - 17/32 11.50 - 13.00MM	.4531 - .5312 .4528 - .5118	5/8	.6267 - .6264	HTE-40		15.06	16.09	16.09	16.82	17.33	18.49	24.61					
35/64 - 21/32 13.50 - 16.50MM	.5469 - .6562 .5315 - .6496	3/4	.7518 - .7515	HTE-48		16.41	17.33	17.33	17.86	18.49	19.75	25.45					
43/64 - 49/64 17.00 - 19.00MM	.6719 - .7656 .6693 - .7480	7/8	.8768 - .8765	HTE-56			20.45	20.45	20.99	20.99	22.23	24.10	27.02				
25/32 - 7/8 19.50 - 22.00MM	.7812 - .8750 .7677 - .8661	1"	1.0018 - 1.0015	HTE-64				21.08	21.50	21.50	22.86	25.03	28.77	33.11			
55/64 - 1" 21.50 - 25.00MM	.8594 - 1.0000 .8465 - .9843	1-1/8	1.1270 - 1.1267	HTE-72				33.11	34.08	34.08	34.08	39.23	41.16	43.41			
61/64 - 1-7/64 24.00 - 27.00MM	.9531 - 1.1093 .9449 - 1.0630	1-1/4	1.2520 - 1.2517	HTE-80					34.08	34.08	34.08	39.23	41.16	43.41	50.17		
1-3/64 - 1-7/32 26.00 - 30.00MM	1.0469 - 1.2187 1.0236 - 1.1811	1-3/8	1.3772 - 1.3768	HTE-88					34.08	34.08	34.08	39.23	41.16	43.41	50.17		
1-9/64 - 1-5/16 28.00 - 33.00MM	1.1406 - 1.3125 1.1024 - 1.2992	1-1/2	1.5022 - 1.5018	HTE-96						47.91	47.91	47.91	49.21	50.49	57.38	60.38	
I. D.		O. D.		ANSI	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/4	
RANGES		SIZES		SYMBOL	-4	-5	-6	-8	-10	-12	-16	-20	-24	-28	-32	36	

Drill and Reamer Tolerances are in this Section.



HTE



RC-61-65

UNITED SPACE SAVER THINWALLS SOLVE SPECIAL FIXTURE SPACE PROBLEMS

Need Fixture Space?
We have it! Now YOU can have it!

PTE EXTRA THINWALL — HEADLESS

RC-61-65				See Quantity Pricing Below.				C LENGTH OF BUSHING															
A I.D. DRILL RANGE				B O.D. SIZE		ANSI	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/4					
INCH - METRIC NOM.	U.S.A. DEC. INCH	NOM.	ACTUAL	SYMBOL	-4	-5	-6	-8	-10	-12	-16	-20	-24	-28	-32	36							
#38 - #31 2.55 - 3.00MM	.1015 - .1200 .1004 - .1181	3/16	.1891 - .1888	PTE-12	19.81	22.23	23.26	23.99	25.45	26.50					PTE								
9/64 - 14 3.50 - 4.60MM	.1406 - .1820 .1378 - .1811	1/4	.2516 - .2513	PTE-16	18.37	19.43	20.99	21.83	23.26	24.61													
9 - C 4.90 - 6.10MM	.1960 - .2420 .1929 - .2402	5/16	.3141 - .3138	PTE-20	15.06	16.09	16.82	17.33	17.86	18.49	22.86												
A - 19/64 5.90 - 7.50MM	.2340 - .2968 .2323 - .2953	3/8	.3766 - .3763	PTE-24	13.19	13.72	14.86	15.06	15.90	16.41	19.43												
M - 23/64 7.40 - 9.10MM	.2950 - .3594 .2913 - .3583	7/16	.4392 - .4389	PTE-28	13.19	13.72	14.86	15.06	15.90	16.41	19.43												
S - 29/64 8.80 - 11.50MM	.3480 - .4531 .3465 - .4528	9/16	.5642 - .5639	PTE-36	15.06	13.19	14.02	14.02	14.86	15.06	16.09												
29/64 - 17/32 11.50 - 13.00MM	.4531 - .5312 .4528 - .5118	5/8	.6267 - .6264	PTE-40		13.19	14.02	14.02	14.86	15.06	16.09	21.50											
35/64 - 21/32 13.50 - 16.50MM	.5469 - .6562 .5315 - .6496	3/4	.7518 - .7515	PTE-48		13.72	15.06	15.06	15.90	16.09	17.33	21.83											
43/64 - 49/64 17.00 - 19.00MM	.6719 - .7656 .6693 - .7480	7/8	.8768 - .8765	PTE-56			20.45	18.37	18.79	18.79	19.75	21.50	23.68										
25/32 - 7/8 19.50 - 22.00MM	.7812 - .8750 .7677 - .8661	1"	1.0018 - 1.0015	PTE-64				18.79	18.90	18.90	20.14	21.50	24.10	26.50									
55/64 - 1" 21.50 - 25.00MM	.8594 - 1.0000 .8465 - .9843	1-1/8	1.1270 - 1.1267	PTE-72				27.02	27.02	28.77	28.77	33.11	36.01	39.23									
61/64 - 1-7/64 24.00 - 27.00MM	.9531 - 1.1093 .9449 - 1.0630	1-1/4	1.2520 - 1.2517	PTE-80					27.02	28.77	28.77	33.11	36.01	39.23	47.91								
1-3/64 - 1-7/32 26.00 - 30.00MM	1.0469 - 1.2187 1.0236 - 1.1811	1-3/8	1.3772 - 1.3768	PTE-88					27.02	28.77	28.77	33.11	36.01	39.23	47.91								
1-9/64 - 1-5/16 28.00 - 33.00MM	1.1406 - 1.3125 1.1024 - 1.2992	1-1/2	1.5022 - 1.5018	PTE-96						36.34	36.34	36.34	39.23	41.16	49.21	53.69							
I. D.		O. D.		ANSI	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/4							
RANGES				SIZES				SYMBOL				-4	-5	-6	-8	-10	-12	-16	-20	-24	-28	-32	36
QTY DISCOUNT					1-2	3-5	6-11	12-23	24-49	50-99	100-199	200-499	500-999	1000 & UP									
LIST					-6%	-23%	-30%	-35%	-42%	-47%	-51%	-53%	-56%										

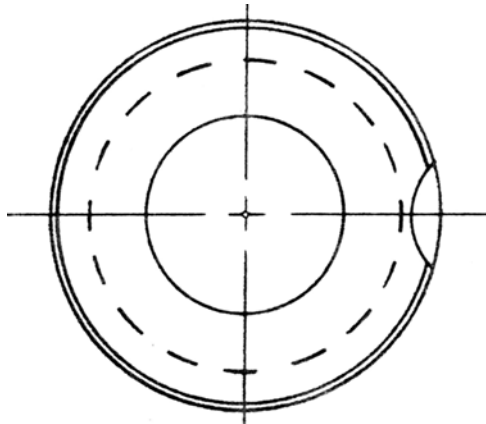


PTE

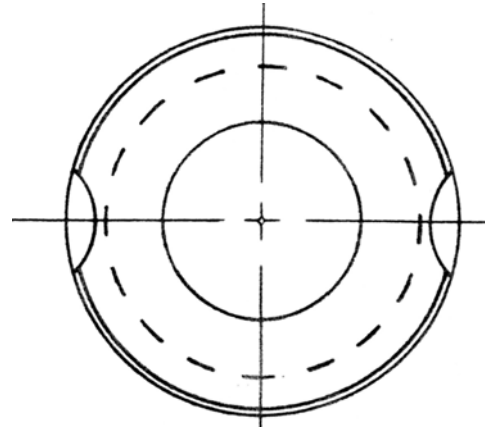
The New Standard

Automotive - Industrial

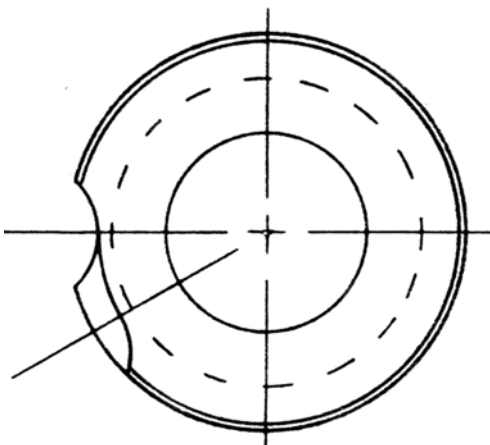
ALL DIMENSIONS ARE TO ANSI



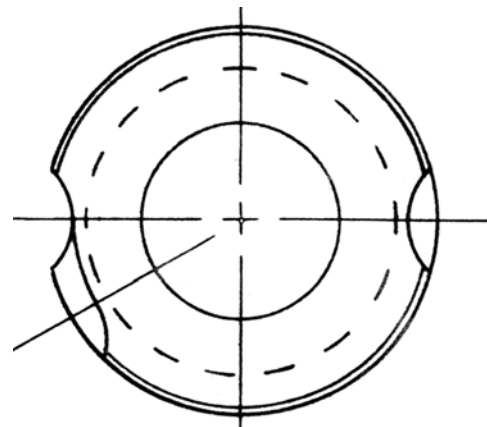
F - FT - FTE
1 2 3



FF - FFT - FFTE
4 5 6



S - ST - STE
13 14 15



SF - SFT - SFTE
FS - FST - FSTE
16 17 18
19 20 21

UNITED
IS THE
ORIGINAL
DESIGNER
AND
HOLDS
THE
ORIGINAL
PATENT
3,606,566
FOR
THE
SFX
BUSHING
STYLE.

91,800 INDIVIDUAL COMBINATIONS of 'S', 'F' and 'X' BUSHINGS EXIST!

Twenty-seven designations of HEAD STYLES have developed from eight basic configurations throughout the past fifty years! **91,800** Potential Sizes and Designations are possible.

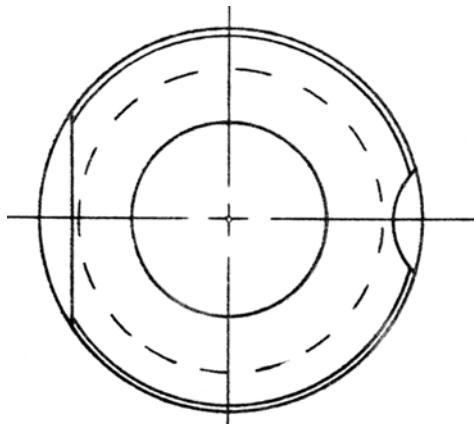
The UNITED 'SFX' combines all 27 STANDARD DESIGNATIONS for LOCKING, HOLDING and CLAMPING OPTIONS into one Logical Head Configuration.

Now **91,800** Sizes are being standardized into **3400 'SFX' Sizes.**

- Aircraft - Head Styles

AND INDUSTRY STANDARDS

The **SFX**



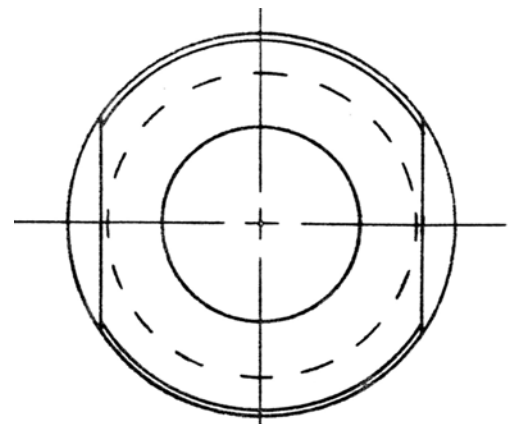
FX - FTX - FTXE

7

8

9

UNITED
IS THE
ORIGINAL
DESIGNER
AND
HOLDS
THE
ORIGINAL
PATENT
3,606,566

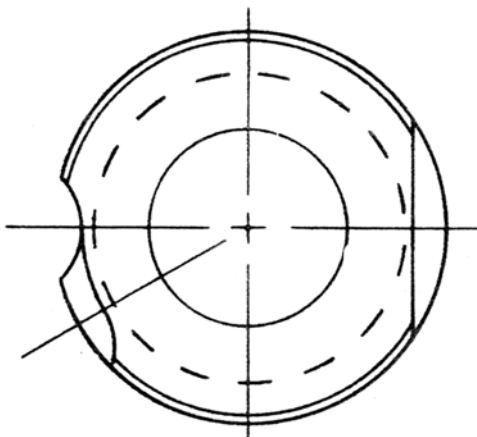


FXX - FTXX - FTXXE

10

11

12



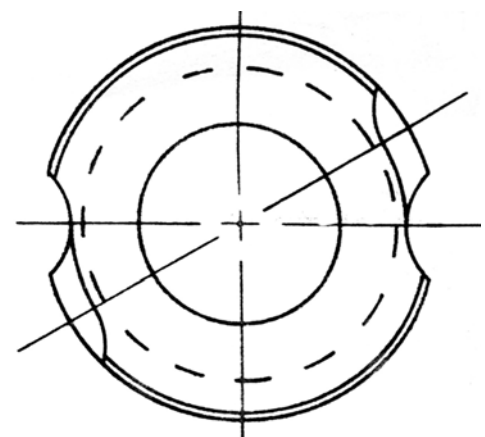
SX - STX - STEX

22

23

24

FOR
THE
SFX
BUSHING
STYLE.



SS - SST - SSTE

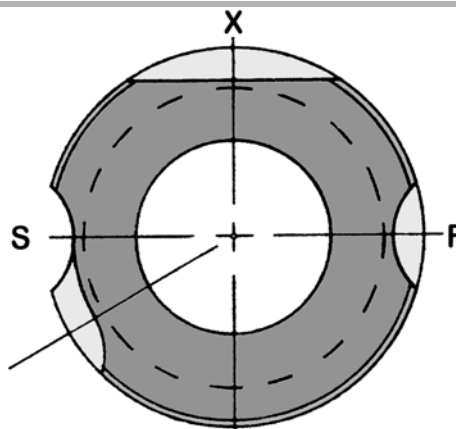
25

26

27

The Newest

**ONE STYLE
DOES IT ALL!**



Standard

**UNITED'S SFX
DOES IT ALL!**

ANOTHER

SFX

UNITED DESIGN

SF Slip Fixed Renewable Bushings



PATENT No. 3,606,566

**SLIP FIXED
RENEWABLE
SF**

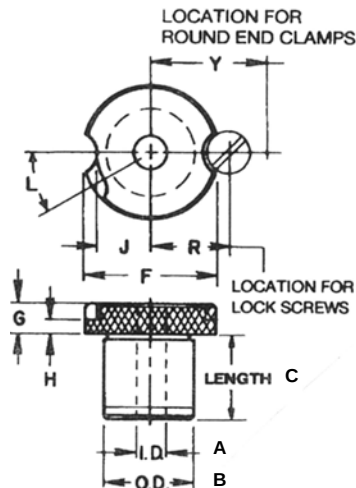
RC-61-65

For Quantity Discount
Pricing, see below.

Originated by **UNITED**

Slip Fixed Renewable

A.N.S.I. Standards



USE THIS DIAGRAM FOR
REFERENCE AND
SEE THIS SECTION FOR
SF AND **SFX** HEAD
DIMENSIONS, LOCK
SCREWS AND CLAMPS.

ALL UNITED STANDARD BUSHINGS
ARE MANUFACTURED TO **UNITED** AND
ANSI STANDARDS.

A I.D. DRILL RANGE			B O.D. SIZE		ANSI SYMBOL	C SF LENGTH - UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths															
INCH — METRIC	U.S.A. INCH	NOM.	DECIMAL	1/4		5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"			
NOMINAL	DECIMAL																				
#80 - .35 - .70MM	.0135 - .0280 .0138 - .0276	3/16	.1875 - .1873	SF-12	34.08	34.73	35.37	35.69	39.87	47.91	BOXED ANSI SIZES INDICATE SIZES OF COUNTER- BORED BUSHINGS PROVIDED AS STANDARD.	TOLERANCE ON INSIDE DIAMETER FOR ANSI STANDARD DRILL SIZES									
#69 - .75 - 1.25MM	.0292 - .0469 .0295 - .0492	3/16	.1875 - .1873	SF-12	29.49	29.71	30.21	31.20	32.47	33.66		ANSI For DRILL BUSHINGS									
#55 - 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	3/16	.1875 - .1873	SF-12	22.13	22.54	22.95	23.37	24.42	25.45		NOM. I. D. RANGE								TOLERANCE	
#52 - 1.65 - 2.50MM	.0635 - .0980 .0650 - .0984	3/16	.1875 - .1873	SF-12	13.41	13.72	14.02	14.33	15.60	16.41		#80 to 1/4"								+ .0001 to + .0004	
#39 - 2.50 - 3.50MM	.0995 - .1405 .0984 - .1378	1/4	.2500 - .2498	SF-16	12.35	12.35	12.67	13.41	14.21	15.16		Over 1/4" to 3/4"								+ .0001 to + .0005	
#80 - .35 - .70MM	.0135 - .0280 .0138 - .0276	5/16	.3125 - .3123	SF-20	34.08	34.73	35.69	36.01		47.91		Over 3/4" to 1-1/2"								+ .0002 to + .0006	
#69 - .75 - 1.25MM	.0292 - .0469 .0295 - .0492	5/16	.3125 - .3123	SF-20		29.49	30.21	30.95		33.66		Over 1-1/2"								+ .0003 to + .0007	
#55 - 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	5/16	.3125 - .3123	SF-20		22.54	22.95	23.37		25.45		ANSI For REAMER BUSHINGS									
#52 - 1.65 - 2.25MM	.0635 - .0890 .0650 - .0886	5/16	.3125 - .3123	SF-20			13.59	13.81	14.33			16.41	20.14								
#42 - 2.30 - 4.90MM	.0935 - .1935 .0906 - .1929	5/16	.3125 - .3123	SF-20			12.03	12.35	13.08	13.72		14.63	17.55		22.54						
#10 - 4.90 - 5.80MM	.1935 - .2280 .1925 - .2282	3/8	.3750 - .3748	SF-24			9.03	9.43	9.86	10.39	10.58	12.03									
A - 5.90 - 7.30MM	.2340 - *.2900 .2323 - .2874	7/16	.4375 - .4373	SF-28			9.03	9.43	9.86	10.39	10.58	12.03									
#28 - 3.50 - 4.75MM	.1405 - *.1875 .1378 - .1870	1/2	.5000 - .4998	SF-32			10.30	10.58	11.00	0.00	12.03	13.72		15.78	16.95	18.37					
#12 - 4.80 - 8.75MM	.1890 - .3437 .1890 - .3445	1/2	.5000 - .4998	SF-32			9.03	9.43	9.76	0.00	10.58	12.03		14.33	15.06	16.51	31.20				
M - 7.50 - 8.70MM	.2950 - .3437 .2953 - .3425	9/16	.5625 - .5623	SF-36			9.03	9.43	9.86	10.27	10.58	12.03									
S - 8.80 - 11.00MM	.3480 - *.4375 .3465 - .4331	5/8	.6250 - .6248	SF-40				9.55	9.55	9.86	10.27	10.79	14.33								
9/32 - 7.10 - 14.00MM	.2812 - *.5625 .2795 - .5512	3/4	.7500 - .7498	SF-48				9.43	9.55		10.27	11.00		14.33	15.47	16.71	19.02	32.47	45.02		
35/64 - 13.50 - 16.50MM	.5469 - .6562 .5315 - .6496	7/8	.8750 - .8748	SF-56					12.03	12.35	12.58	13.41	14.63		16.22						
15/32 - 11.80 - 19.50MM	.4688 - *.7812 .4646 - .7677	1"	1.0000 - .9998	SF-64					12.03		12.35	13.41		14.63	15.78	17.55	21.08	34.73	45.50		
55/64 - 21.50 - 23.50MM	.8594 - .9375 .8465 - .9252	1-1/4	1.2500 - 1.2498	SF-80	*NEW STANDARD I.D.s																
					I. D. O. D.																
23/32 - 18.00 - 26.00MM	.7187 - *.10625 .7087 - 1.0236	1-3/8	1.3750 - 1.3747	SF-88	*.2510 7/16 *.2510 1/2 *.3760 5/8 *.3760 3/4						18.37	20.78		22.43	23.88	25.73	28.87	39.23	50.81		
1-1/64 - 25.00 - 28.00MM	1.0156 - 1.1250 .9843 - 1.1024	1-1/2	1.5000 - 1.4997	SF-96	*.5010 3/4 *.5010 1" *.7510 1" *.7510 1-3/8						26.80	24.42		26.70	28.52	30.21	31.99	42.77	50.81		
31/32 - 24.50 - 35.00MM	.9687 - 1.4062 .9646 - 1.3780	1-3/4	1.7500 - 1.7497	SF-112							36.01	33.11		36.01	37.77	39.23	44.70	50.17	58.19		
1-11/32 - 34.00 - 47.00MM	1.3437 - 1.8750 1.3386 - 1.8504	2-1/4	2.2500 - 2.2496	SF-144																	
I. D. RANGES		O. D. SIZES		ANSI SYMBOL	1/4 -4	5/16 -5	3/8 -6	1/2 -8	5/8 -10	3/4 -12	1" -16	1-1/4 -20	1-3/8 -22	1-1/2 -24	1-3/4 -28	2-1/8 -34	2-1/2 -40	3" -48			
* SEE INSET CHARTS FOR ADDITIONAL I.D. STANDARDS. SEE SECTION A FOR LONG HEAD SFX UNALLOY.				QTY DISCOUNT	1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%							

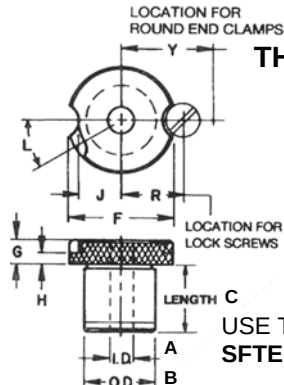
* SEE INSET CHARTS FOR ADDITIONAL I.D. STANDARDS.
SEE SECTION A FOR LONG HEAD SFX UNALLOY.

QTY	1-2	3-5	6-11	12-23	24-49	50-99	100-199	200-499	500-999	1000 & UP
DISCOUNT	LIST	-6%	-23%	-30%	-35%	-42%	-47%	-51%	-53%	-56%

Extra Thinwall Bushings

LARGER I.D.s Within Each A.N.S.I. O.D. Range
A.N.S.I TOLERANCES APPLY

**SFTE Super
Extra Thinwalls**



THINWALLS SOLVE SPECIAL FIXTURE SPACE REQUIREMENTS

7,000 MORE SFTE SPACE SAVERS!

SFTE is designed for Close Hole Spacing.

- Add more bushing holes in your fixture.
- Solve customary hole space problems.
- Save up to 3/4 inch with each bushing.

RC-61-65

SFTE
SPACE SAVER
EXTRA THINWALL
SLIP FIXED RENEWABLE
WITH HEAD

For Quantity Discount
Pricing, see below.



USE THIS DIAGRAM AND SEE BELOW FOR
SFTE HEAD DIMENSIONS, LOCK SCREWS and CLAMPS.

A					B		C													
I.D. DRILL RANGE					O.D. SIZE		ANSI	HEAD SLIP FIXED EXTRA THINWALL — LENGTH OF BUSHING — BODY ONLY												
INCH-METRIC NOM	USA DEC. INCH				NOM.	ACTUAL	SYMBOL	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/4	
								-4	-5	-6	-8	-10	-12	-16	-20	-24	-28	-32	-36	
#38 - 3.00MM	.1015 - .1004	.1200 - .1181	3/16	.1875 - .1873	SFTE-12	30.14	30.44	32.47	33.11	34.73	36.34					TOLERANCE ON INSIDE DIAMETER FOR ANSI STANDARD DRILL SIZES ANSI For DRILL BUSHINGS NOM. I. D. RANGE TOLERANCE #80 to 1/4" +.0001 to +.0004 Over 1/4" to 3/4" +.0001 to +.0005 Over 3/4" to 1-1/2" +.0002 to +.0006 Over 1-1/2" +.0003 to +.0007 ANSI For REAMER BUSHINGS Up to 1/4" +.0005 to +.0008 Over 1/4" to 1" +.0006 to +.0010 Over 1" +.0008 to +.0012				
9/64 - 3.50	.1406 - .1378	.1820 - .1811	1/4	.2500 - .2498	SFTE-16	27.41	28.77	30.14	30.88	33.11	34.08									
9 - 4.90	.1960 - .1929	.2420 - .2402	5/16	.3125 - .3123	SFTE-20	27.93	28.77	30.44	31.20	28.77	34.08	40.83								
A - 5.90	.2340 - .2323	.2968 - .2953	3/8	.3750 - .3748	SFTE-24	22.86	23.68	24.42	24.61	25.98	27.02	30.14								
M - 7.40	.2950 - .2913	.3594 - .3583	7/16	.4375 - .4373	SFTE-28	22.86	23.68	24.42	24.61	25.98	27.02	30.14								
S - 8.80	.3480 - .3465	.4531 - .4528	9/16	.5625 - .5623	SFTE-36	22.86	23.68	24.42	24.61	25.98	27.02	30.14								
29/64 - 11.50	.4531 - .4528	.5312 - .5118	5/8	.6250 - .6248	SFTE-40		22.86	23.68	23.68	24.42	25.03	27.33	33.11							
37/64 - 14.50	.5781 - .5709	.6562 - .6496	3/4	.7500 - .7498	SFTE-48		23.07	24.10	24.10	24.61	25.45	27.63	33.11							
43/64 - 17.00	.6719 - .6693	.7656 - .7480	7/8	.8750 - .8748	SFTE-56			25.03	25.98	26.50	27.33	29.71	32.47	36.34						
51/64 - 20.00	.7969 - .7874	.8750 - .8661	1"	1.0000 - .9998	SFTE-64				26.18	26.80	27.63	30.14	33.11	37.77	41.16					
55/64 - 21.50	.8594 - .8465	1.0000 - .9843	1-1/8	1.1250 - 1.1248	SFTE-72				36.34	37.77	39.23	42.77	47.91	50.17	53.69					
61/64 - 24.00	.9531 - .9449	1.1093 - 1.0630	1-1/4	1.2500 - 1.2498	SFTE-80					37.77	39.23	42.77	47.91	50.17	53.69	60.38				
1-5/64 - 25.00	1.0781 - .9843	1.2187 - 1.1811	1-3/8	1.3750 - 1.3747	SFTE-88					39.23	40.83	43.41	47.91	50.17	56.59	61.10				
1-9/64 - 28.00	1.1406 - 1.1024	1.3125 - 1.2992	1-1/2	1.5000 - 1.4997	SFTE-96						53.69	57.38	57.38	60.12	62.38	72.36	80.49			
I. D. RANGES					O. D. SIZES		ANSI SYMBOL	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/4	
							-4	-5	-6	-8	-10	-12	-16	-20	-24	-28	-32	-36		
							QTY DISCOUNT	1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%			

UNITED is way AHEAD!

UNITED is way AHEAD!

ANSI HEAD DIMENSIONS For SF, SFX, SFXN and SFTE

O.D.	F	G	H	J	K	L	R	X	Y	LOCK SCREW	ROUND CLAMP	FLAT CLAMP	HEAD DIMENSIONS
3/16	5/16	3/16	3/32	3/32		55°	17/64			LS-0		F-1	
1/4	7/16	1/4	1/8	9/64		30°	23/64			TW-2	R-1	F-1	
5/16	35/64	1/4	1/8	11/64	11/64	65°	1/2	5/8	11/16	LS-1	R-1	F-1	
3/8	5/8	1/4	1/8	15/64	3/16	30°	29/64	37/64	45/64	TW-2	R-1	F-1	
7/16	5/8	1/4	1/8	15/64	7/32	30°	29/64	37/64	47/64	TW-2	R-1	F-1	
1/2	51/64	1/4	1/8	19/64	17/64	65°	5/8	3/4	25/32	LS-1	R-1	F-1	
9/16	7/8	1/4	1/8	23/64	9/32	30°	37/64	45/64	51/64	TW-2	R-1	F-1	
5/8	7/8	1/4	1/8	23/64	5/16	30°	37/64	47/64	53/64	TW-2	R-1	F-1	
3/4	1-3/64	1/4	1/8	27/64	25/64	50°	3/4	7/8	57/64	LS-1	R-1	F-1	
7/8	1-1/4	3/8	3/16	31/64	3/8	30°	53/64	1-1/8	1-1/4	TW-7	R-3	F-2	
1	1-27/64	3/8	3/16	19/32	1/2	35°	59/64	1-7/64	1-9/64	LS-2	R-3	F-2	
1-1/8	1-1/2	3/8	3/16	39/64	1/2	30°	61/64	1-1/4	1-1/8	TW-7	R-3	F-2	
1-1/4	1-5/8	3/8	3/16	43/64	9/16	30°	1-1/64	1-5/16	1-13/64	TW-7	R-3	F-2	
1-3/8	1-51/64	3/8	3/16	25/32	11/16	30°	1-7/64	1-19/64	1-21/64	LS-2	R-3	F-2	
1-1/2	1-7/8	3/8	3/16	51/64	11/16	30°	1-9/64	1-7/16	1-21/64	TW-7	R-3	F-2	
1-3/4	2-19/64	3/8	3/16	1	7/8	30°	1-25/64	1-41/64	1-33/64	LS-3	R-3	F-3	
2-1/4	2-51/64	3/8	3/16	1-1/4	1-1/8	25°	1-41/64	1-57/64	1-49/64	LS-3	R-3	F-3	

2-15-06

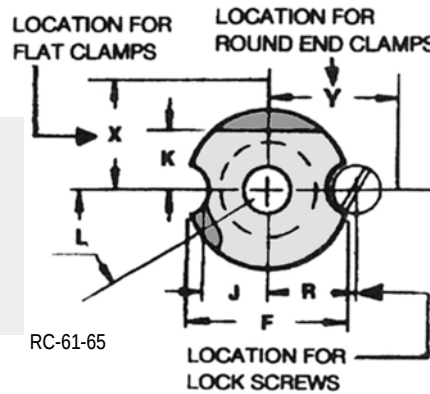
SFX Slip Fit Renewable Bushings

Slip Fixed Renewable With Flat A.N.S.I. Standards



SLIP FIXED RENEWABLE with FLAT SFX

USE THIS DIAGRAM FOR
REFERENCE AND SEE
THIS SECTION FOR SFX
HEAD DIMENSIONS, LOCK
SCREWS AND CLAMPS.



FOR TRIPLE MILLED HEAD
STYLE SPECIFY "SFX"

This Triple Milled Slip Fit
Bushing consolidates 6900
sizes down to 2300!

SFX USES ALL BUSHING
CLAMPS and LOCKSCREWS .

This is the BEST HEAD
CONFIGURATION for ALL
RENEWABLE BUSHINGS —
IT HOLDS EVERYTHING!

For Quantity Discount Pricing, see below.

A I.D. DRILL RANGE				B O.D. SIZE		C SFX LENGTH - UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths																
INCH - METRIC		U.S.A. INCH		U.S.A. INCH		ANSI	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"		
NOMINAL		DECIMAL		NOM.	DECIMAL	SYMBOL	-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-34	-40	-48		
#80 - .35 - .70MM	.0135 - .0280 .0138 - .0276	3/16	.1875 - .1873	SFX-12	34.91	35.69	36.34	36.34	40.83	46.95	BOXED ANSI SIZES INDICATE SIZES OF COUNTER-BORED BUSHINGS PROVIDED AS STANDARD. TOLERANCE ON INSIDE DIAMETER FOR ANSI STANDARD DRILL SIZES ANSI For DRILL BUSHINGS NOM. I. D. RANGE TOLERANCE #80 to 1/4" +0.001 to +.0004 Over 1/4" to 3/4" +0.001 to +.0005 Over 3/4" to 1-1/2" +0.002 to +.0006 Over 1-1/2" +0.003 to +.0007 ANSI For REAMER BUSHINGS Up to 1/4" +0.005 to +.0008 Over 1/4" to 1" +0.006 to +.0010 Over 1" +0.008 to +.0012											
#69 - .75 - 1.25MM	.0292 - .0469 .0295 - .0492	3/16	.1875 - .1873	SFX-12	30.21	30.44	31.20	31.99	33.11	34.73												
#55 - 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	3/16	.1875 - .1873	SFX-12	23.17	23.37	23.99	24.30	25.45	26.50												
#52 - 1.65 - 2.50MM	.0635 - .0980 .0650 - .0984	3/16	.1875 - .1873	SFX-12	14.33	14.86	14.95	15.38	16.51	17.45												
#39 - 2.50 - 3.50MM	.0995 - .1405 .0984 - .1378	1/4	.2500 - .2498	SFX-16	13.29	13.29	13.72	14.21	15.25	16.22												
#80 - .35 - .70MM	.0135 - .0280 .0138 - .0276	5/16	.3125 - .3123	SFX-20	34.91	35.69	36.52	36.52		47.33												
#69 - .75 - 1.25MM	.0292 - .0469 .0295 - .0492	5/16	.3125 - .3123	SFX-20		30.14	31.20	31.99		34.73												
#55 - 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	5/16	.3125 - .3123	SFX-20		23.68	23.99	24.42		26.50												
#52 - 1.65 - 2.25MM	.0635 - .0890 .0650 - .0886	5/16	.3125 - .3123	SFX-20		14.33	14.63	15.06		17.14	20.81											
#42 - 2.30 - 4.90MM	.0935 - .1935 .0906 - .1929	5/16	.3125 - .3123	SFX-20		12.86	13.29	13.72	14.54	15.47	18.37		23.37									
#10 - 4.90 - 5.80MM	.1935 - .2280 .1925 - .2282	3/8	.3750 - .3748	SFX-24	9.36	9.86	10.27	10.71	11.11	11.42	12.86											
A - 5.90 - 7.30MM	.2340 - *.2900 .2323 - .2874	7/16	.4375 - .4373	SFX-28	9.36	9.86	10.27	10.71	11.11	11.42	12.86											
#28 - 3.50 - 4.75MM	.1405 - *.1875 .1378 - .1870	1/2	.5000 - .4998	SFX-32		11.11	11.42	11.83		12.86	14.54		16.51	17.76	19.22							
#12 - 4.80 - 8.75MM	.1890 - .3437 .1890 - .3445	1/2	.5000 - .4998	SFX-32		9.86	10.27	10.58		11.42	12.86		15.25	15.90	17.33	31.83						
M - 7.50 - 8.70MM	.2950 - .3437 .2953 - .3425	9/16	.5625 - .5623	SFX-36		9.86	10.27	10.71	11.11	11.42	12.86											
S - 8.80 - 11.00MM	.3480 - *.4375 .3465 - .4331	5/8	.6250 - .6248	SFX-40			10.39	10.39	10.71	11.11	11.63	15.25										
9/32 - 7.10 - 14.00MM	.2812 - *.5625 .2795 - .5512	3/4	.7500 - .7498	SFX-48			10.27	10.39		11.11	11.83	0.00	15.25	16.30	17.55	19.81	33.43	45.98				
35/64 - 13.50 - 16.50MM	.5469 - .6562 .5315 - .6496	7/8	.8750 - .8748	SFX-56				12.86	13.19	13.37	14.21	15.47		17.01								
15/32 - 11.80 - 19.50MM	.4688 - *.7812 .4646 - .7677	1"	1.0000 - .9998	SFX-64				12.86		13.19	14.21		15.47	16.64	18.37	22.02	38.58	46.30				
55/64 - 21.50 - 23.50MM	.8594 - .9375 .8465 - .9252	1-1/4	1.2500 - 1.2498	SFX-80	* NEW STANDARD I.D.s																	
					I. D.		O. D.															
23/32 - 18.00 - 26.00MM	.7187 - *.10625 .7087 - 1.0236	1-3/8	1.3750 - 1.3747	SFX-88		* .2510	7/16							19.22	21.83		23.26	24.73	26.60	29.71	39.87	51.61
1-1/64 - 25.00 - 28.00MM	1.0156 - 1.1250 .9843 - 1.1024	1-1/2	1.5000 - 1.4997	SFX-96		* .2510	1/2															
						* .3760	5/8															
						* .3760	3/4															
31/32 - 24.50 - 35.00MM	.9687 - 1.4062 .9646 - 1.3780	1-3/4	1.7500 - 1.7497	SFX-112		* .5010	3/4							27.53	25.33		27.53	29.49	31.20	32.80	42.88	51.61
						* .5010	1"															
1-11/32 - 34.00 - 47.00MM	1.3437 - 1.8750 1.3386 - 1.8504	2-1/4	2.2500 - 2.2496	SFX-144		* .7510	1"							36.78	33.76		36.78	38.27	40.05	45.50	50.17	59.16
						* .7510	1-3/8															
I. D.		O. D.		ANSI	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"				
RANGES		SIZES		SYMBOL	-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-34	-40	-48				

* SEE INSET CHARTS FOR ADDITIONAL I.D. STANDARDS.
ALL UNITED STANDARD BUSHINGS ARE
MANUFACTURED TO UNITED AND ANSI STANDARDS.

QTY	1-2	3-5	6-11	12-23	24-49	50-99	100-199	200-499	500-999	1000 & UP
DISCOUNT	LIST	-6%	-23%	-30%	-35%	-42%	-47%	-51%	-53%	-56%

SFXN Bushings
The Lifelong Tool



★ 5 to 10 Times Greater Life!

★ ***Eliminates 4600 head sizes***

★ *Reduces inventories*

★ ***Replaces all Fixed, Slip and Flat bushings***

★ **Look for SFXN markings**

★ **ANSI Standards for All**

Dimensions

SEE THIS SECTION FOR HEAD DIMENSIONS, LOCK SCREWS AND CLAMPS.

Originated and Patented by *UNITED*

UNALLOY—SUPER MATERIAL HARDENED EQUIVALENT TO RC-65-70



SFXN
UNALLOY
WITH FLAT

A I.D. DRILL RANGE				B O.D. SIZE		C SFXN LENGTH UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths																						
INCH - METRIC		U.S.A. INCH		U.S.A. INCH		ANSI	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"								
NOMINAL		DECIMAL		NOM.	DECIMAL	SYMBOL	-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-34	-40	-48								
#80 - .35	#70 .70MM	.0135 - .0138	.0280 .0276	3/16	.1875 - .1873	SFXN-12	102.47	104.18	106.12	107.40	107.40	136.33	BOXED ANSI SIZES INDICATE SIZES OF COUNTER-BORED BUSHINGS PROVIDED AS STANDARD.	TOLERANCE ON INSIDE DIAMETER FOR ANSI STANDARD DRILL SIZES ANSI For DRILL BUSHINGS NOM. I. D. RANGE TOLERANCE #80 to 1/4" +.0001 to +.0004 Over 1/4" to 3/4" +.0001 to +.0005 Over 3/4" to 1-1/2" +.0002 to +.0006 Over 1-1/2" +.0003 to +.0007 ANSI For REAMER BUSHINGS Up to 1/4" +.0005 to +.0008 Over 1/4" to 1" +.0006 to +.0010 Over 1" +.0008 to +.0012														
#69 - .75	3/64 1.25MM	.0292 - .0295	.0469 .0492	3/16	.1875 - .1873	SFXN-12		89.18	90.68	91.97		100.32																
#55 - 1.30	1/16 1.60MM	.0520 - .0512	.0625 .0630	3/16	.1875 - .1873	SFXN-12		69.78	70.87	72.36		78.78																
#52 - 1.65	#40 2.50MM	.0635 - .0650	.0980 .0984	3/16	.1875 - .1873	SFXN-12		40.83	41.81	43.41		47.59																
#39 - 2.50	#28 3.50MM	.0995 - .0984	.1405 .1378	1/4	.2500 - .2498	SFXN-16	37.62	37.62	38.27	39.87	42.72	45.66																
#80 - .35	#70 .70MM	.0135 - .0138	.0280 .0276	5/16	.3125 - .3123	SFXN-20	102.47	104.18	106.12	107.40		136.33																
#69 - .75	3/64 1.25MM	.0292 - .0295	.0469 .0492	5/16	.3125 - .3123	SFXN-20		89.18	90.68	91.97		100.32																
#55 - 1.30	1/16 1.60MM	.0520 - .0512	.0625 .0630	5/16	.3125 - .3123	SFXN-20		69.78	70.87	72.36		78.78																
#52 - 1.65	#43 2.25MM	.0635 - .0650	.0890 .0886	5/16	.3125 - .3123	SFXN-20		40.83	41.81	43.41		47.59									60.38							
#42 - 2.30	#10 4.90MM	.0935 - .0906	.1935 .1929	5/16	.3125 - .3123	SFXN-20		37.62	38.27	39.87	41.02	45.98									54.02		68.59					
#10 - 4.90	#1 5.80MM	.1935 - .1925	.2280 .2282	3/8	.3750 - .3748	SFXN-24		31.20	31.83	32.80		35.96	41.48															
A - 5.90	L 7.30MM	.2340 - .2323	*.2900 .2874	7/16	.4375 - .4373	SFXN-28		27.33	28.37	29.17		31.83	35.96															
#28 - 3.50	3/16 4.75MM	.1405 - .1378	*.1875 .1870	1/2	.5000 - .4998	SFXN-32		31.20	31.83	32.80		35.96	41.48		47.59	50.68	51.35											
#12 - 4.80	11/32 8.75MM	.1890 - .1890	.3437 .3445	1/2	.5000 - .4998	SFXN-32		27.33	28.37	29.17		31.83	35.96		43.41	45.98	50.81	91.97										
M - 7.50	11/32 8.70MM	.2950 - .2953	.3437 .3425	9/16	.5625 - .5623	SFXN-36			28.37	28.77	31.20	31.20	32.80		43.41	46.95												
S - 8.80	7/16 11.00MM	.3480 - .3465	*.4375 .4331	5/8	.6250 - .6248	SFXN-40			28.37	28.77	31.20	31.20	32.80		43.41	46.95												
9/32 - 7.10	9/16 14.00MM	.2812 - .2795	*.5625 .5512	3/4	.7500 - .7498	SFXN-48			28.37	28.77	31.20	31.20	32.80		43.41	46.95	50.17	57.38	96.78	135.04								
35/64 - 13.50	21/32 16.50MM	.5469 - .5315	.6562 .6496	7/8	.8750 - .8748	SFXN-56				35.96	37.62	37.62	39.87	44.05	44.05	47.59												
15/32 - 11.80	25/32 19.50MM	.4688 - .4646	*.7812 .7677	1"	1.0000 - .9998	SFXN-64				35.96		37.62	39.87		44.05	47.59	52.72	63.35	103.54	136.33								
55/64 - 21.50	15/16 23.50MM	.8594 - .8465	.9375 .9252	1-1/4	1.2500 - 1.2498	SFXN-80	NEW STANDARD I.D.s I. D. O. D.					54.98	62.38		67.53	71.71	77.49											
23/32 - 18.00	1-1/16 26.00MM	.7187 - .7087	*1.0625 1.0236	1-3/8	1.3750 - 1.3747	SFXN-88	* .2510 7/16					54.98	62.38		67.53	71.71	77.49	86.50	116.72	153.06								
1-1/64 - 25.00	1-1/8 28.00MM	1.0156 - .9843	1.1250 1.1024	1-1/2	1.5000 - 1.4997	SFXN-96	* .2510 1/2					79.42	73.31		79.42	85.53	91.32	102.58										
31/32 - 24.50	1-13/32 35.00MM	.9687 - .9646	1.4062 1.3780	1-3/4	1.7500 - 1.7497	SFXN-112	* .3760 5/8																					
1-11/32 - 34.00	1-7/8 47.00MM	1.3437 - 1.3386	1.8750 1.8504	2-1/4	2.2500 - 2.2496	SFXN-144	* .3760 3/4																					
							* .5010 3/4																					
							* .5010 1"																					
					* .7510 1"					108.05	99.04		108.05	112.55	117.26	133.77	147.91	174.92										
					* .7510 1-3/8																							
I. D. RANGES						O. D. SIZES		ANSI SYMBOL		1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"					
										-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-34	-40	-48					

* SEE INSET CHARTS FOR ADDITIONAL I.D. STANDARDS.

QTY	1-2	3-5	6-11	12-23	24-49	50-99	100-199	200-499	500-999	1000 & UP
DISCOUNT	LIST	-6%	-23%	-30%	-35%	-42%	-47%	-51%	-53%	-56%

L-LU Liners LTE-LTEU Thinwall

Headless Liners L - LU - LTE -LTEU

A.N.S.I. Standards

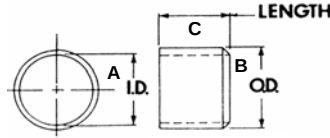
**L - LU STANDARD LINERS
AND
LTE - LTEU EXTRA THINWALL LINERS**

**IDEAL For SF BUSHINGS and SLIP FIT
LOCATING PINS**

RC-61-65

**IDEAL For Achieving Maximum I.D.
Size for Each SF Type Bushing and
Locating Pin—CLOSE HOLE
SPACING**

'U' in P/N signifies UNGROUND. Both Ground and Unground are Priced the Same.



MILLIMETER DRILL SIZES HAVE BEEN
ADDED TO I.D. RANGE.
SPECIFY 'LU' FOR UNGROUND.

For Quantity Discount Pricing, see below.

A I.D. RANGE NOM. / METRIC	RANGE U.S.A. INCH. DECIMAL	B O.D. SIZE U.S.A. INCH		ANSI SYMBOL	C HEADLESS LINERS										LENGTH OVERALL / ANSI				LENGTH SYMBOL BY 16ths			
		NOM.	DECIMAL		1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2"	2-1/8	2-1/2	3"			
3/16 5.00MM	.1876- .1969	.1879 .1972	1/4	.2516- .265-	.2513 .260	LTE-16	18.27	19.31	20.99	21.83	23.26	24.61										
3/16 5.00MM	.1876- .1969	.1879 .1972	5/16	.3141- .327-	.3138 .322	L-20 LU-20	6.74	7.16	7.47	7.78	8.20	8.52										
1/4 6.00MM	.2501- .2362	.2504 .2365	5/16	.3141- .327-	.3138 .322	LTE-20	15.06	15.38	16.82	17.19	17.86	18.70										
1/4 6.00MM	.2501- .2362	.2504 .2365	7/16	.4392- .453-	.4389 .448	L-28 LU-28	5.90	6.02	6.64	6.74	6.74	7.47										
5/16 8.00MM	.3126- .3150	.3129 .3154	7/16	.4392- .453-	.4389 .448	LTE-28	13.19	13.72	14.76	15.06	15.90	16.51										
5/16 8.00MM	.3126- .3150	.3129 .3154	1/2	.5017- .520-	.5014 .515	L-32 LU-32	5.90	6.02	6.64	6.74	6.74	7.47	8.71		9.86							
5/16 • 8.00MM	.3126- .3150	.3129 .3154	9/16	.5642- .582-	.5639 .577	L-36 LU-36	6.74	5.90	6.24	6.24	6.64	6.74	7.16									
3/8 10.00MM	.3751- .3939	.3754 .3944	9/16	.5642- .582-	.5639 .577	LTE-36	15.06	13.19	14.02	14.02	14.76	15.06	16.09									
3/8 •10.00MM	.3751- .3939	.3754 .3944	5/8	.6267- .645-	.6264 .640	L-40 LU-40	6.74	5.90	6.24	6.24	6.64	6.74	7.16									
7/16 •12.00MM	.4377- .4726	.4380 .4731	5/8	.6267- .645-	.6264 .640	L-40 LU-40	6.74	5.90	6.24	6.24	6.64	6.74	7.16									
9/16 15.00MM	.5627- .5908	.5630 .5913	5/8	.6267- .645-	.6264 .640	LTE-40	15.06	13.19	14.02	14.02	14.76	15.06	16.09									
1/2 •12.00MM	.5002- .4726	.5005 .4731	3/4	.7518- .770-	.7515 .765	L-48 LU-48		6.02	6.74	6.74		7.16	7.78		9.86	10.58	11.53		13.59			
9/16 •15.00MM	.5627- .5908	.5630 .5913	7/8	.8768- .895-	.8765 .890	L-56 LU-56		8.94	9.23	8.20	8.52	8.52	8.94	9.76								
5/8 •16.00MM	.6252- .6301	.6255 .6306	7/8	.8768- .895-	.8765 .890	L-56 LU-56		8.94	9.23	8.20	8.52	8.52	8.94	9.76								
3/4 •18.00MM	.7503- .7090	.7506 .7095	1"	1.0018- 1.020-	1.0015 1.015	L-64 LU-64		7.91	7.47	8.52		8.52	9.03		9.76	11.00	12.03		13.41			
7/8 22.00MM	.8754- .8664	.8757 .8671	1"	1.0018- 1.020-	1.0015 1.015	LTE-64		18.70	18.27	18.27	18.70	18.79	19.94	21.39								
7/8 •22.00MM	.8754- .8664	.8757 .8671	1-1/4	1.2520- 1.270-	1.2517 1.265	L-80 LU-80				13.08	12.35	11.11	13.08	14.63		15.90						
1" 26.00MM	1.0004- 1.0239	1.0007 1.0244	1-1/4	1.2520- 1.270-	1.2517 1.265	LTE-80				23.68	23.68	22.13	20.45	23.26	25.73		27.93					
1" •26.00MM	1.0004- 1.0239	1.0007 1.0244	1-3/8	1.3772- 1.395-	1.3768 1.390	L-88 LU-88				13.41		11.11	13.41		14.86	16.22	17.55		20.45			
1-1/8 30.00MM	1.1255- 1.1814	1.1259 1.1819	1-3/8	1.3772- 1.395-	1.3768 1.390	LTE-88				23.68	22.13	20.45	23.26	25.73		27.93	29.71					
1-1/4 30.00MM	1.2505- 1.1814	1.2509 1.1819	1-1/2	1.5022- 1.520-	1.5018 1.515	LTE-96				25.93	25.93	25.33	26.80	29.71		32.15	33.92					
1-1/4 •30.00MM	1.2505- 1.1814	1.2509 1.1819	1-5/8	1.6272- 1.645-	1.6268 1.640	L-104 LU-104					16.22	16.22		16.22		18.37		19.22				
1-3/8 35.00MM	1.3756- 1.3783	1.3760 1.3785	1-5/8	1.6272- 1.645-	1.6268 1.640	LTE-104				25.93	25.33	26.80	29.71		32.15	33.92	38.90					
1-3/8 •35.00MM	1.3756- 1.3783	1.3760 1.3785	1-3/4	1.7523- 1.770-	1.7519 1.765	L-112 LU-112					16.71	14.86		16.71	17.86	19.02	19.02	22.13				
1-1/2 35.00MM	1.5006- 1.3783	1.5010 1.3785	1-3/4	1.7523- 1.770-	1.7519 1.765	LTE-112				25.93	25.33	26.80	29.71		32.15	33.92	38.90					
1-1/2 •35.00MM	1.5006- 1.3783	1.5010 1.3785	1-7/8	1.8773- 1.895-	1.8769 1.890	L-120 LU-120					17.33	18.79		20.14		20.99		22.23				
1-3/4 •42.00MM	1.7508- 1.6534	1.7512 1.6545	2-1/4	2.2525- 2.270-	2.2521 2.265	L-144 LU-144					21.28	19.22		21.28	22.33	23.37		27.02				
2-1/4 •55.00MM	2.2510- 2.1658	2.2515 2.1665	2-3/4	2.7526- 2.770-	2.7522 2.765	L-176 LU-176					23.37	23.37		23.68	25.13	26.50		28.87				
I. D. RANGES		O. D. SIZES		ANSI SYMBOL		1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2"	2-1/8	2-1/2	3"		



**L - LU
are
Standard.
LTE- LTEU
are
Thinwall.**

**S
T
A
N
D
A
R
D

A
N
S
I

&

E
X
T
R
A

T
H
I
N
W
A
L
L**

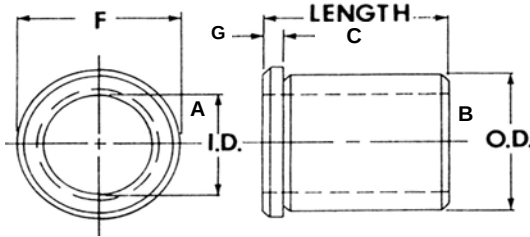
* MILLIMETER SIZE WHICH ACCOMMODATES
SFM O.D. PRICED AS SPECIAL

QTY DISCOUNT	1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%
-----------------	-------------	------------	--------------	---------------	---------------	---------------	-----------------	-----------------	-----------------	-------------------

Head and UniLock Liners

HL-HLU-UL-ULU-ULD A.N.S.I. Standards

HL-UL-ULD Liners
Metal and Plastic



RC-61-65

HEAD LINER PRESS FIT HL and HLU

ALL UNITED STANDARD BUSHINGS ARE
MANUFACTURED TO UNITED AND ANSI STANDARDS.



For Quantity Discounts on all Liners shown,
see below.

MILLIMETER DRILL SIZES HAVE BEEN ADDED TO I.D. RANGE.
SPECIFY 'HLU' FOR **UNGROUND**.

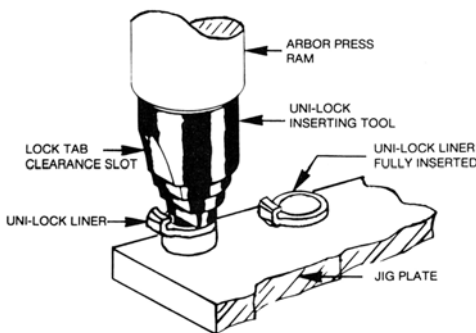
A I.D. DRILL RANGE		B O.D. SIZE		ANSI SYMBOL	C HL and HLU LENGTH OVERALL / ANSI LENGTH SYMBOL BY 16ths											HL-HLU HEAD				
IN. - METRIC NOM.	U.S.A. INCH DECIMAL	NOM.	U.S.A. INCH DECIMAL		5/16	3/8	1/2	3/4	1"	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"	DIMENSIONS				
					-5	-6	-8	-12	-16	-22	-24	-28	-34	-40	-48	F	G			
5/16	.3126- .3129	1/2	.5017 - .5014	HL-32	7.78	8.52	8.52	9.23	12.03	14.86						5/8	3/32			
* 8.00MM	.3150- .3154		.520 - .515	HLU-32																
1/2	.5002- .5005	3/4	.7518 - .7515	HL-48	8.20	8.52	8.52	9.23	10.58	12.35	13.41	14.33	16.71			7/8	3/32			
* 12.00MM	.4726- .4735		.770 - .765	HLU-48																
3/4	.7503- .7506	1"	1.0018 - 1.0015	HL-64			10.27	11.00	11.63	12.35	13.72	15.47	16.22	19.31	29.71	1-1/8	1/8			
* 18.00MM	.7090- .7095		1.020 - 1.015	HLU-64																
1"	1.0004- 1.0007	1-3/8	1.3772 - 1.3768	HL-88			13.81	12.35	13.81	15.06		17.55	19.81	22.86	39.87	1-1/2	1/8			
* 26.00MM	1.0239- 1.0244		1.395 - 1.390	HLU-88																
1-3/8	1.3756- 1.3760	1-3/4	1.7523 - 1.7519	HL-112	METRIC SIZES and SIZES WITHOUT PRICES ARE SPECIAL. PRICES ARE FOR FINISHED OR UNGROUND.				17.01	17.86	19.75	20.78	22.13	25.33	28.37	47.91	1-7/8	3/16		
* 35.00MM	1.3783- 1.3785		1.770 - 1.765	HLU-112																
1-3/4	1.7508- 1.7512	2-1/4	2.2525 - 2.2521	HL-144					24.42	22.54	24.73	25.73	27.02	29.71	33.66	49.52	2-3/8	3/16		
* 42.00MM	1.6534- 1.6545		2.270 - 2.265	HLU-144																
2-1/4	2.2510- 2.2515	2-3/4	2.7526 - 2.7522	HL-176			29.49	26.80	30.14		33.66	37.77	40.83	55.30	2-7/8	3/16				
55.00MM	2.1658- 2.1665		2.770 - 2.765	HLU-176																
I. D.		O. D.		ANSI	5/16	3/8	1/2	3/4	1"	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"	F	G			
RANGES		SIZES		SYMBOL	-5	-6	-8	-12	-16	-22	-24	-28	-34	-40	-48	HEAD DIM.				
* MILLIMETER SIZE WHICH ACCOMMODATES SFM O.D. PRICED AS SPECIAL					QTY DISCOUNT		1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%				

No Lock Screws or Weld On

This tool reduces set-up time dramatically. You are no longer required to locate, drill and tap Holes for Locking Devices.

UniLock LINERS for Slip Renewable Bushings eliminate the need for Lock Screws or Clamps.

UNI-LOCK INSERTING TOOL



PART NO. UDB-ULT-1

\$10.90

UniLock Inserting Tool UDB-ULT-1

The UniLock Inserting Tool makes installation of UniLock Liners a snap! This one tool fits all UniLock Liner I.D.s. Stepped shoulders correspond with Liner Head dimensions and the milled slot accommodates all Locking Tabs.

RC-61-65

CONCENTRICITY (LINERS GROUND TO PRESS FIT SIZE ONLY):

I.D. RANGE OF 3/16 TO 1/2 INCH (INCLUSIVE). Concentricity held to .0003 T.I.R.

I.D. RANGE OVER 1/2 INCH: Concentricity held to .0005 T.I.R.

HARDNESS: Rockwell C61-65 in the hole.

LEAD: UniLock Liners for press fit installation feature a 45° lead at the drill exit end. For ease of entrance into jig or fixture, liners with O.D.s Ground to Press Fit Size have a concentric ground lead, also at the drill exit end. If you purchase unground liners, we recommend you add a ground lead. Lead should be .001 to .002 inch smaller than finish ground O.D. of liner.

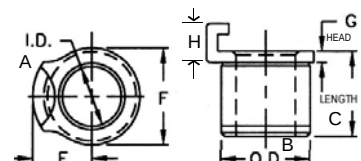
UniLock
Liners for
Plastic

ULD

With its integrated Lock Tab, the UniLock Liner serves as the Liner and Locking Device all in one!

UniLock
Liners
for Metal

UL - ULU



A I.D. DRILL RANGE		B O.D. SIZE		ANSI SYMBOL	C LENGTH OVERALL — EXCLUDING TAB										
IN. - METRIC NOMINAL	U.S.A. INCH DECIMAL	NOM.	U.S.A. INCH DECIMAL		5/16	3/8	1/2	3/4	1"	1-3/8	E	F	G	H	
3/16 * 5.00MM	.1876 - .1879 .1969 - .1972	5/16	.3141 - .3138 .327 - .322	UL-20 ULD-20	19.43 13.08	20.14 14.76	20.45 15.38	21.39 16.71			1/4	.365	.065	1/4	
5/16 * 8.00MM	.3126 - .3129 .3150 - .3154	1/2	.5017 - .5014 .520 - .515	UL-32 ULD-32		14.14 12.26	14.76 12.47	16.41 13.29			3/8	9/16	.093	5/16	
1/2 * 12.00MM	.5002 - .5005 .4726 - .4731	3/4	.7518 - .7515 .770 - .765	UL-48 ULD-48			17.33 15.59	19.63 17.66	22.23 19.43		1/2	13/16	.093	21/64	
3/4 * 18.00MM	.7503 - .7506 .7090 - .7095	1"	1.0018 - 1.0015 1.020 - 1.015	UL-64 ULD-64			24.93 17.66	26.50 20.14	34.08 22.86		21/32	1-1/16	.125	3/8	
1" * 26.00MM	1.0004 - 1.0007 1.0239 - 1.0244	1-3/8	1.3772 - 1.3768 1.395 - 1.390	UL-88 ULD-88			30.44 20.56	34.73 23.88	42.77 27.02	47.91 27.93	7/8	1-7/16	.125	29/64	
I. D. RANGES		O. D. SIZES		ANSI SYMBOL	5/16	3/8	1/2	3/4	1"	1-3/8	E	F	G	H	
					-5	-6	-8	-12	-16	-22					

* Metric O.D.s for SFM Bushings

* Specify ULU for UNGROUND - PRICES ARE SAME.

UNITED Locks in Value With the UniLock Liner's 2-in-1 Feature!

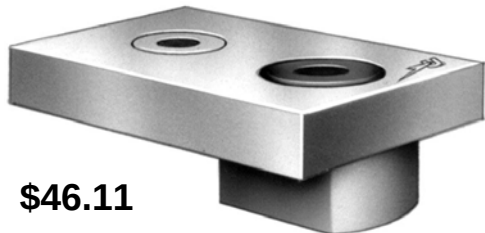
2-24-09

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800) 421-3466 IN CA / (800) 486-3466 • FAX (562) 803-6898 / (800) 486-3465
EMAIL united@ucc-udb.com WEBSITE www.ucc-udb.com

A13

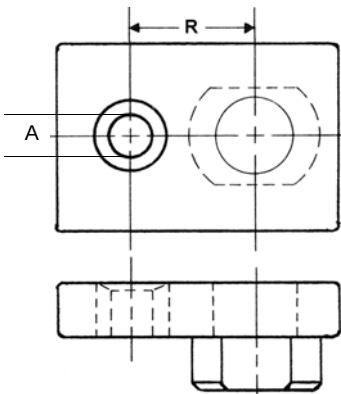
**LJ - LS - TLJ - HLS -
HTW - TW Lock Screws**

Lock Screw Locating Jigs for Lock Screws & Round Clamps



\$46.11

TLJ & LJ LOCK SCREW LOCATING JIGS



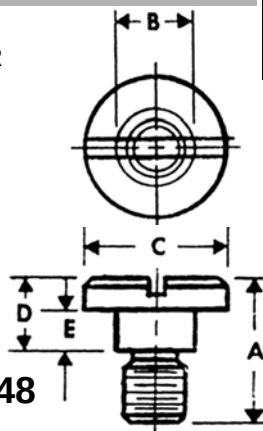
FOR CHART
DIMENSION
REFERENCE
AND
SF, SFX, SFTE,
SEE THIS
SECTION A..
ALL SIZES
\$46.11

**LOCK SCREWS
PROVIDE CLOSER
HOLE SPACING**

SLOTTED



\$0.48



ANSI AND
THIN WALL
LOCK
SCREWS

**LS LOCK SCREWS
TW (THIN WALL) LOCK SCREWS
LS-00 thru LS-5, TW-1 thru TW-7**

LS 48¢

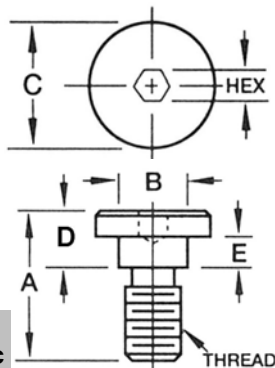
HEX



\$0.64

**HLS HEX LOCK SCREWS
HLS-0 thru HLS-5
HTW-1 thru HTW-7**

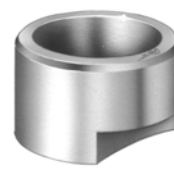
64¢



To properly locate lock
screws or round clamp
attaching screws, select
the correct **UNITED**
Locating Jig.



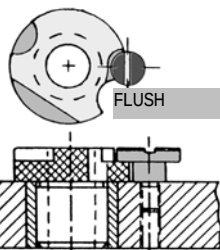
**LS, HLS, HTW
LARGER TYPE
LOCATING LOCK
SCREWS**



**RC
ROUND
CLAMPS**
See Page A15.

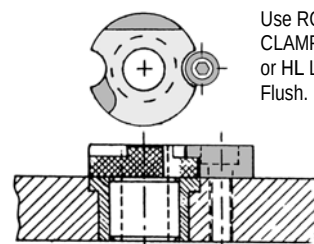
JIG NO.	A JIG LINER I.D.	F HEAD DIA	G HEAD THICKNESS	H LOCK STEP	J MILL DEPTH	L MILL ANGLE	X LOCATION FLAT CLAMP	R LOCATION LOCK SCREW	LOCK SCREWS	ROUND CLAMP	FLAT CLAMP
LJ-0	#29	5/16	3/16	3/32	3/32	55°		17/64	LS-0,HLS-0		
TLJ-1	#29	5/16	3/16	3/32	3/32	55°		17/64	LS-0,HLS-0		
TLJ-2	#21	7/16			9/64	30°		23/64	TW-2		
LJ-1	F	35/64			11/64	65°	5/8	1/2	LS-1,HLS-1		
TLJ-4	#21	5/8			15/64	30°	45/64	29/64	TW-2		
TLJ-5	#21	5/8	1/4	1/8	15/64	30°	47/64	29/64	TW-2	RC-1	F-1
LJ-2	F	51/64			19/64	65°	3/4	5/8	LS-1,HLS-1		
TLJ-6	#21	7/8			23/64	65°	51/64	37/64	TW-2		
TLJ-7	#21	7/8			23/64	30°	53/64	37/64	TW-2		
LJ-3	F	1-3/64			27/64	50°	57/64	3/4	LS-1,HLS-1		
TLJ-9	F	1-1/4			31/64	30°	1-1/64	53/64	TW-7		
LJ-4	F	1-27/64			19/32	35°	1-7/64	59/64	LS-2,HLS-2		
TLJ-11	F	1-1/2			39/64	30°	1-1/4	61/64	TW-7		
TLJ-12	F	1-5/8	3/8	3/16	43/64	30°	1-13/64	1-1/64	LS-2,HLS-2	RC-2	F-2
LJ-5	F	1-51/64			25/32	30°	1-19/64	1-7/64	LS-2,HLS-2		
TLJ-14	F	1-7/8			51/64	30°	1-21/64	1-9/64			
LJ-6	5/16	2-19/64			1"	30°	1-41/64	1-25/64	LS-3,HLS-3	RC-3	F-3
LJ-7	5/16	2-51/64			1-1/4	25°	1-57/64	1-41/64			

LOCK SCREW
WITH L
HEADLESS
LINER FOR
FLUSH
MOUNTING



L LINER WITH LS LOCK SCREW

Use ROUND
CLAMP with L
or HL Liners
Flush.



HL LINER WITH RC CLAMP

TW	HEX	LS	A	B	C	D	E	THD	HEX	O.D. SF
		LS-00	5/16	1/8	1/4	1/8	.063	4-40		5/32 Discontinued
		HLS-0	LS-0	7/16	3/16	5/16	3/16	.100	8-32	3/32
TW-1	HTW-1		7/16	3/16	5/16	3/16	.100	8-32	3/32	
TW-2	HTW-2		1/2	1/4	3/8	1/4	.138	10-32	1/8	1/4 - 3/8 - 7/16
TW-3	HTW-3		11/16	1/4	7/16	3/8	.200	10-32	1/8	
		HLS-1	LS-1	5/8	3/8	5/8	1/4	.138	5/16-18	3/16
TW-7	HTW-7		3/4	3/8	5/8	3/8	.200	5/16-18	3/16	7/8 - 1-1/4
TW-4	HTW-4		7/8	3/8	9/16	1/2	.263	5/16-18	3/16	
TW-5	HTW-5		1"	3/8	5/8	5/8	.325	5/16-18	3/16	
		HLS-2	LS-2	7/8	3/8	5/8	3/8	.200	5/16-18	3/16
		HLS-3	LS-3	1"	7/16	3/4	3/8	.200	3/8-16	7/32
		HLS-4	LS-4	1-1/16	7/16	3/4	7/16	.231	3/8-16	7/32
		HLS-5	LS-5	1-1/8	7/16	3/4	1/2	.263	3/8-16	7/32

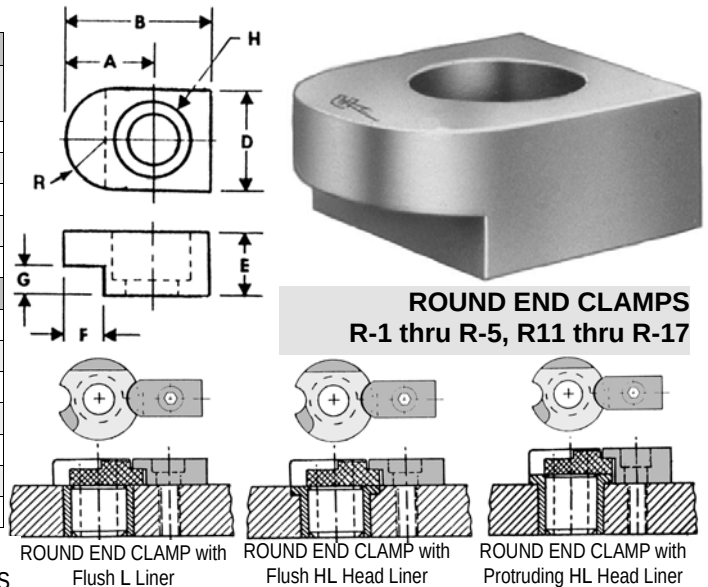
Secure Clamping for Renewable Bushings

Round End Clamps,
Flat & Round Clamps

ROUND END CLAMPS For Flush Mounting of Liners									
PART NO.	A	B	D	E	F	G	H	R	PRICE
R-1	7/16	3/4	5/8	5/16	3/16	1/8	1/4 S.H. CAP SCREW	5/16	2.55
R-2	1/2	3/4	5/8	3/8	1/4	3/16	1/4 S.H. CAP SCREW	5/16	2.55
R-3	5/8	1"	3/4	3/8	5/16	3/16	5/16 S.H. CAP SCREW	3/8	2.55
R-4	11/64	1-1/8	3/4	7/16	5/16	7/32	3/8 S.H. CAP SCREW	3/8	2.60
R-5	11/64	1-1/8	3/4	1/2	5/16	1/4	3/8 S.H. CAP SCREW	3/8	2.60
ROUND END CLAMPS For Projected Mounting of Shoulder Liners									
R-11	7/16	3/4	5/8	3/8	3/16	1/4	1/4 S.H. CAP SCREW	5/16	2.60
R-12	1/2	3/4	5/8	1/2	1/4	5/16	1/4 S.H. CAP SCREW	5/16	2.60
R-13	1/2	3/4	5/8	1/2	1/4	3/8	5/16 S.H. CAP SCREW	3/8	2.60
R-14	5/8	1"	3/4	1/2	5/16	3/8	3/8 S.H. CAP SCREW	3/8	2.72
R-15	11/16	1-1/8	3/4	5/8	5/16	13/32	3/8 S.H. CAP SCREW	3/8	2.72
R-16	11/16	1-1/8	3/4	5/8	5/16	7/16	3/8 S.H. CAP SCREW	3/8	2.72
R-17	11/16	1-1/8	3/4	3/4	5/16	15/32	3/8 S.H. CAP SCREW	3/8	2.72

ROUND END CLAMPS

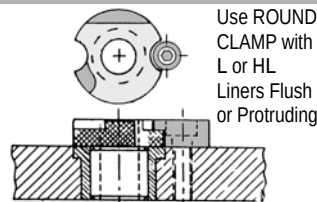
- LARGER BEARING SURFACE THAN ROUND CLAMPS OR LOCK SCREWS



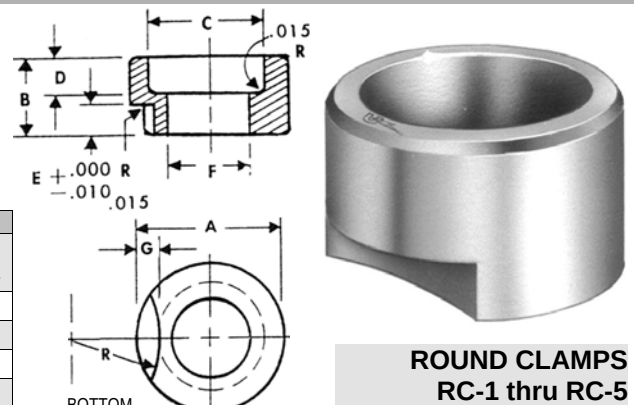
FLAT CLAMPS					For Flush Mounting of Liners						
PART NO.	NO. HOLES	A	B	C	D	E	F	G	H	PRICE	
F-1	1	1/2	7/8	5/16	5/8	5/16	3/16	1/8	1/4 S.H. CAP SCREW	2.55	
F-2	1	5/8	1"	1/2	1"	3/8	1/4	3/16	5/16 S.H. CAP SCREW	2.55	
F-3	1	5/8	1-1/8	1/2	1"	3/8	5/16	3/16	5/16 S.H. CAP SCREW	2.55	
F-4	1	51/64	1-11/64	5/8	1-1/4	3/8	27/64	7/32	3/8 S.H. CAP SCREW	2.83	
F-5	2	51/64	1-11/64	3/8	1-3/4	3/8	27/64	7/32	3/8 S.H. CAP SCREW	2.83	
F-6	1	51/64	1-11/64	5/8	1-1/4	1/2	27/64	1/4	3/8 S.H. CAP SCREW	2.83	
F-7	2	51/64	1-11/64	3/8	1-3/4	1/2	27/64	1/4	3/8 S.H. CAP SCREW	2.83	
FLAT CLAMPS					For Projected Mounting of Shoulder Liners						
F-11	1	1/2	7/8	5/16	5/8	3/8	3/16	1/4	1/4 S.H. CAP SCREW	2.60	
F-12	1	5/8	1"	1/2	1"	1/2	1/4	5/16	5/16 S.H. CAP SCREW	2.60	
F-13	1	5/8	1"	1/2	1"	1/2	1/4	3/8	5/16 S.H. CAP SCREW	2.60	
F-14	1	5/8	1-1/8	5/8	1-1/4	1/2	5/16	3/8	3/8 S.H. CAP SCREW	2.60	
F-15	2	5/8	1-1/8	3/8	1-3/4	1/2	5/16	3/8	3/8 S.H. CAP SCREW	2.83	
F-16	1	51/64	1-11/64	5/8	1-1/4	5/8	27/64	13/32	3/8 S.H. CAP SCREW	2.83	
F-17	2	51/64	1-11/64	3/8	1-3/4	5/8	27/64	13/32	3/8 S.H. CAP SCREW	2.83	
F-18	1	51/64	1-11/64	5/8	1-1/4	5/8	27/64	7/16	3/8 S.H. CAP SCREW	2.83	
F-19	2	51/64	1-11/64	3/8	1-3/4	5/8	27/64	7/16	3/8 S.H. CAP SCREW	2.83	
F-20	1	51/64	1-11/64	5/8	1-1/4	3/4	27/64	15/32	3/8 S.H. CAP SCREW	2.83	
F-21	2	51/64	1-11/64	3/8	1-3/4	3/4	27/64	15/32	3/8 S.H. CAP SCREW	2.83	

ROUND CLAMPS

- GREATER SECURITY THAN LOCK SCREWS
- A PRACTICAL STRONGER CLAMP THAN LOCK SCREWS
- SAME SPACING
- SIMPLE INSTALLATION



ROUND CLAMPS											
PART NO.	A	B	C	D	E	F	G	R	SOCKET SCREW SIZE	REPLACES LOCK SCREW	PRICE
RC-1	5/8	5/16	31/64	5/32	1/8	21/64	.109	35/64	5/16-18	LS-1	1.98
RC-2	5/8	7/16	31/64	7/32	3/16	21/64	.125	59/64	5/16-18	LS-2	1.98
RC-3	3/4	1/2	37/64	9/32	.1875	25/64	.156	1-13/32	3/8-16	LS-3	1.98
RC-4	3/4	17/32	37/64	1/4	.2187	25/64	.156	2-1/2	3/8-16	LS-4	1.98
RC-5	3/4	9/16	37/64	1/4	.2500	25/64	.156	2-1/2	3/8-16	LS-5	1.98



Sets of Slip Fit Drill & Reamer Bushings

Economical Slip Fit Bushings in SETS!



**UTK-SF-13
SET**

13
Drill or Reamer Bushings

SMALL SHOP SET
1/16 to 1/4 by 64ths

Set includes **THIRTEEN SF Bushings** all 1/2" long:
1 each
SF-20-8- 1/16, 5/64, 3/32, 7/64, 1/8, 9/64, 5/32, 11/64, 3/16
SF-32-8- 13/64, 7/32, 15/64, 1/4

Order as:
UTK-SFD-13 DRILL BUSHINGS SET
UTK-SFD-13-DB DRILL BUSHINGS WITH 1 DRILL BAR-5/16"-1/2"
UTK-SFR-13 REAMER BUSHINGS SET
UTK-SFR-13-DB REAMER BUSHINGS WITH 1 DRILL BAR-5/16"-1/2"
UTK-SFDR-26-DB ALL Drill & Reamer Bushings above with 1 DRILL BAR-5/16"-1/2"

**UNITED's
SF Drill &
Reamer
Bushings
available
in Sets!**

Preferred by:

- Mechanics
- Machinists
- Retrofitters
-

Toolmakers
• Specialists

**UNITED Sets
satisfy the
requirements
of any
metalworking
shop.**



**UTK-SF-15
SET**

15
Drill or Reamer Bushings

TOOL MAKERS SET
1/16 to 1/2 by 32nds

Set includes **FIFTEEN SF Bushings** all 1/2" long:
1 each
SF-20-8- 1/16, 3/32, 1/8, 5/32, 3/16
SF-32-8- 7/32, 1/4, 9/32, 5/16, 11/32
SF-48-8- 3/8, 13/32, 7/16, 15/32, 1/2

Order as:
UTK-SFD-15 DRILL BUSHINGS SET
UTK-SFD-15-DB DRILL BUSHINGS & 2 DRILL BARS-5/16"-1/2"-3/4"
UTK-SFR-15 REAMER BUSHINGS SET
UTK-SFR-15-DB REAMER BUSHINGS & 2 DRILL BARS-5/16"-1/2"-3/4"
UTK-SFDR-30-DB ALL Drill & Reamer Bushings above & 2 DRILL BARS-5/16-1/2-3/4"



**UTK-SF-21
SET**

21
Drill or Reamer Bushings

MID-RANGE SET
1/16 to 3/8 by 64ths

Set includes **TWENTY-ONE SF Bushings** all 1/2" long:
1 each
SF-20-8- 1/16, 5/64, 3/32, 7/64, 1/8, 9/64, 5/32, 11/64, 3/16
SF-32-8- 13/64, 7/32, 15/64, 1/4, 17/64, 9/32, 19/64, 5/16, 21/64
SF-48-8- 11/32, 23/64, 3/8

Order as:
UTK-SFD-21 DRILL BUSHINGS SET
UTK-SFD-21-DB DRILL BUSHINGS WITH 2 DRILL BARS-5/16-1/2-3/4"
UTK-SFR-21 REAMER BUSHINGS SET
UTK-SFR-21-DB REAMER BUSHINGS & 2 DRILL BARS-5/16-1/2-3/4"
UTK-SFDR-42-DB ALL Drill & Reamer Bushings above & 2 DRILL BARS-5/16-1/2-3/4"

**All Sets
provided in
attractive and
distinctive
black molded
cases 2 to 3"
thick—fits in
tool box.**

**UNITED SF DRILL & REAMER
BUSHINGS in Sets of the most popular
sizes!**

Sets available in **Drill Bushings (D)**, **Reamer Bushings (R)** and you can add a compact **Drill Bar (DB)**.

Specify **UTK-SF D, R** or add **DB** to Part No.

For All items, specify UTK-SFDR- # -DB.

TOLERANCES ON INSIDE DIAMETERS

For REAMER BUSHINGS		For DRILL BUSHINGS	
I. D. RANGE	TOLERANCE OVER NOM.	I. D. RANGE	TOLERANCE OVER NOM.
Up to .2500	+ .0005 to + .0008	Up to .2500	+ .0001 to + .0004
Over .2500 to 1.0000	+ .0006 to + .0010	Over .2500 to .7500	+ .0001 to + .0005
Over 1.0000	+ .0008 to + .0012	Over .7500 to 1.5000	+ .0002 to + .0006
		Over 1.5000 to 1.8750	+ .0003 to + .0007

Molded Custom Cases With Matching Drill Bars

Sets of SF Bushings
with Drill Bars Added

Simplify
your
location and
fixturing!

ADD
Double End
DRILL BARS
to your SF
Drill or
Reamer
Bushings
Set.

Drill Bars
provide
accurate
location and
alignment of
drilled
holes.

You get
UNITED'S
Best Bars!

UTK-SF-22
SET

22

MINI-WIRE SET
#80 to #61

Drill or Reamer Bushings

Set includes TWENTY-TWO SF Bushings all 1/2" long:
1 each

SF-20-8- #80, 79, 1/64, 78, 77, 76, 75, 74, 73, 72, 71,
70, 69, 68, 1/32, 67, 66, 65, 64, 63, 62, 61

Order as:

UTK-SFD-22 DRILL BUSHINGS SET

UTK-SFD-22-DB DRILL BUSHINGS WITH 1 DRILL BAR-1/2"-3/4"

UTK-SFR-22 REAMER BUSHINGS SET

UTK-SFR-22-DB REAMER BUSHINGS WITH 1 DRILL BAR-1/2"-3/4"

UTK-SFDR-44-DB ALL Drill & Reamer Bushings above with 1 DRILL BAR-1/2"-3/4"



UTK-SFM-
25
SET

25

METRIC SET

1mm to 13mm METRIC
(.0394 THRU .5118)

MM Drill or Reamer Bushings

Set includes TWENTY-FIVE SFM Bushings all 1/2" long:
1 each

SFM-20-8- 1.00mm, 1.50mm, 2.00mm, 2.50mm, 3.00mm,
3.50mm, 4.00mm, 4.50mm, 5.00mm (.0394 thru .1968)

SFM-32-8- 5.50mm, 6.00mm, 6.50mm, 7.00mm, 7.50mm,
8.00mm, 8.50mm (.2165 thru .3346)

SFM-48-8- 9.00mm, 9.50mm, 10.00mm, 10.50mm,
11.00mm, 11.50mm, 12.00mm, 12.50mm, 13.00mm
(.3543 thru .5188)

Order as:

UTK-SFMD-25 DRILL BUSHINGS SET

UTK-SFMD-25-DB DRILL BUSHINGS & 2 DRILL BARS-5/16-1/2-3/4"

UTK-SFMR-25 REAMER BUSHINGS SET

UTK-SFMR-25-DB REAMER BUSHINGS & 2 DRILL BARS-5/16-1/2-3/4"

UTK-SFMDR-50-DB ALL Drill & Reamer Bushings above & 2 DRILL BARS-5/16-1/2-3/4"



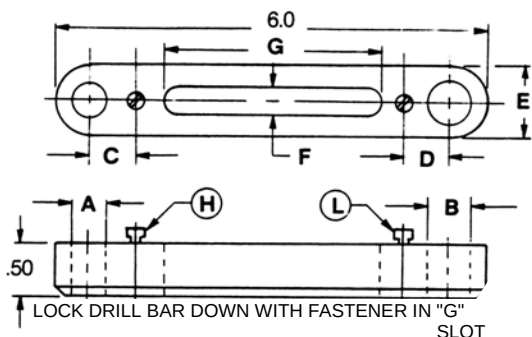
DOUBLE END DRILL BARS

Long Wear SF Drill & Reamer Bushings Sets!

- Premium Steel
- Durable
- Clearly labeled sizes for easy selection
- In quality custom molded cases only 2" to 3" thick
- Fits your tool box, rollaway, crib or shelf
- Organized
- Useful

UNITED Sets provide the most efficient way to keep your tools!

To get UNITED's best in matching size Drill Bars,
Simply add 'DB' to Part No. and we will do the rest!



DOUBLE END DRILL BARS



UNITED PART NO.	A +.0005 -.0000	B +.0005 -.0000	C	D	E	F	G Travel	Lockscrews included H L		Use with Bushings
DBL-20-32	.3126	.5003	.500	.625	3/4	3/8	3-1/8	LS-1	LS-1	SF20-8 / SF32-8
DBL-32-48	.5003	.7503	.625	.578	1-1/8	3/8	2-5/8	LS-1	LS-1	SF32-8 / SF48-8

7-24-98

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800) 421-3466 IN CA / 800-486-3466 • FAX (562) 803-6898 / (800) 486-3465

A17

Sets of Slip Fit Drill & Reamer Bushings

A Variety of Slip Fit Bushings in SETS!



UTK-SF-26
SET

26

LETTER SET
A thru Z

Drill or Reamer Bushings

Set includes TWENTY-SIX SF Bushings all 1/2" long:
1 each

SF-32-8- A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R

SF-48-8- S, T, U, V, W, X, Y, Z

Order as:

UTK-SFD-26 DRILL BUSHINGS SET

UTK-SFD-26-DB DRILL BUSHINGS WITH 1 DRILL BAR-1/2"-3/4"

UTK-SFR-26 REAMER BUSHINGS SET

UTK-SFR-26-DB REAMER BUSHINGS WITH 1 DRILL BAR-1/2"-3/4"

UTK-SFDR-52-DB ALL Drill & Reamer Bushings above with 1 DRILL BAR-1/2"-3/4"

**ADD
UNITED's
Double End
DRILL BARS
to your SF
Drill or
Reamer
Bushings
Set.**



UTK-SF-29
SET

29

COMPREHENSIVE SET
1/16 to 1/2 by 64ths

Drill or Reamer Bushings

Set includes TWENTY-NINE SF Bushings all 1/2" long:
1 each

SF-20-8- 1/16, 5/64, 3/32, 7/64, 1/8, 9/64, 5/32, 11/64, 3/16

SF-32-8- 13/64, 7/32, 15/64, 1/4, 17/64, 9/32, 19/64, 5/16, 21/64, 11/32

SF-48-8- 23/64, 3/8, 25/64, 13/32, 27/64, 7/16, 29/64, 5/32, 31/64, 1/2

Order as:

UTK-SFD-29 DRILL BUSHINGS SET

UTK-SFD-29-DB DRILL BUSHINGS & 2 DRILL BARS-5/16-1/2-3/4"

UTK-SFR-29 REAMER BUSHINGS SET

UTK-SFR-29-DB REAMER BUSHINGS & 2 DRILL BARS-5/16-1/2-3/4"

UTK-SFDR-58-DB ALL Drill & Reamer Bushings above & 2 DRILL BARS-5/16-1/2-3/4"

**Simplify
your
location and
fixturing!**

**Drill Bars
provide
accurate
location and
alignment of
drilled
holes.**

**You get
UNITED's
Best Bars!**

**UNITED Sets
satisfy the
requirements
of any
metalworking
shop.**



UTK-SF-60
SET

60

LARGE WIRE SET
#60 to #1

Drill or Reamer Bushings

Set includes SIXTY SF Bushings all 1/2" long:
1 each

SF-20-8- #60, 59, 58, 57, 56, 55, 54, 53, 52, 51, 50, 49, 48, 47, 46, 45, 44, 43, 42, 41, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21

SF-32-8- 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1

Order as:

UTK-SFD-60 DRILL BUSHINGS SET

UTK-SFD-60-DB DRILL BUSHINGS WITH 1 DRILL BAR-5/16"-1/2"

UTK-SFR-60 REAMER BUSHINGS SET

UTK-SFR-60-DB REAMER BUSHINGS WITH 1 DRILL BAR-5/16"-1/2"

UTK-SFDR-120-DB ALL Drill & Reamer Bushings above with 1 DRILL BAR-5/16"-1/2"

UNITED SF DRILL & REAMER BUSHINGS
in Sets of the most popular sizes!
Sets available in **Drill Bushings (D)**, **Reamer Bushings (R)** and you can add a compact **Drill Bar (DB)**.

Specify **UTK-SF D, R** or add **DB** to Part No.
For All items, specify **UTK-SFDR- # -DB**.

TOLERANCES ON INSIDE DIAMETERS

For REAMER BUSHINGS			For DRILL BUSHINGS		
I. D. RANGE	TOLERANCE OVER NOM.		I. D. RANGE	TOLERANCE OVER NOM.	
Up to .2500	+ .0005	to + .0008	Up to .2500	+ .0001	to + .0004
Over .2500 to 1.0000	+ .0006	to + .0010	Over .2500 to .7500	+ .0001	to + .0005
			Over .7500 to 1.5000	+ .0002	to + .0006
Over 1.0000	+ .0008	to + .0012	Over 1.5000 to 1.8750	+ .0003	to + .0007

Molded Custom Cases With Matching Drill Bars

Sets of SF Bushings
with Drill Bars Added

UTK-SF-
162
SET

162

Drill or Reamer
Bushings

COMPLETE SET
#80 thru 13MM

Set includes ONE HUNDRED SIXTY-TWO
SF Bushings all 1/2" long:

1 each:

SF-20-8- #80, 79, 1/64, 78, 77, 76, 75, 74, 73,
72, 71, 70, 69, 68, 1/32, 67, 66, 65, 64, 63, 62,
61, 1.00mm, #60, 59, 58, 57, 56, 55, 54,
1.50mm, 53, 1/16, 52, 51, 50, 49, 48, 5/64, 47,
2.00mm, 46, 45, 44, 43, 42, 3/32, 41, 40,
2.50mm, 39, 38, 37, 36, 7/64, 35, 34, 33, 32,
3.00mm, 31, 1/8, 30, 29, 3.50mm, 28, 9/64,
27, 26, 25, 24, 23, 5/32, 22, 4.00mm, 21, 20,
19, 18, 11/64

SF-32-8- 17, 16, 4.50mm, 15, 14, 13, 3/16, 12,
11, 10, 9, 5.00mm, 8, 7, 13/64, 6, 5, 4, 3,
5.50mm, 7/32, 2, 1, A, 15/64, 6.00mm, B, C,
D, E, 1/4, 6.50mm, F, G, 17/64, H, I, 7.00mm,
J, K, 9/32, L, M, 7.50mm, 19/64, N, 5/16,
8.00mm, O, P, 21/64, Q, 8.50mm, R, 11/32

SF-48-8- S, 9.00mm, T, 23/64, U, 9.50mm, 3/8, V, W,
25/64, 10.00mm, X, Y, 13/32, Z, 10.50mm, 27/64,
11.00mm, 7/16, 11.50mm, 29/64, 15/32, 12.00mm, 31/64,
12.50mm, 1/2, 13.00mm

Order as:

UTK-SFD-162 DRILL BUSHINGS SET

UTK-SFD-162-DB DRILL BUSHINGS & 2 DRILL
BARS 5/16"-1/2"-3/4"

UTK-SFR-162 REAMER BUSHINGS SET

UTK-SFR-162-DB REAMER BUSHINGS & 2 DRILL
BARS 5/16"-1/2"-3/4"

UTK-SFDR-324-DB ALL Drill & Reamer Bushings
above and 2 DRILL BARS 5/16"-1/2"-3/4"



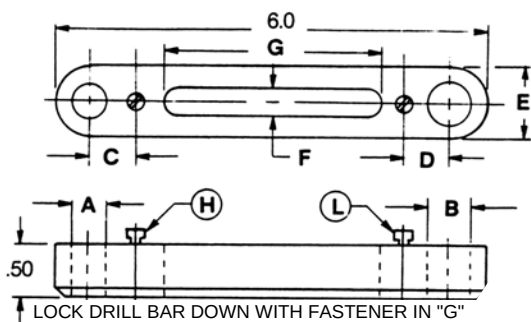
EVERY BUSHING YOU NEED IN A COMPACT
CUSTOM MOLDED CASE WITH
MATCHING DRILL BARS FROM **UNITED!**

Long Wear SF Drill & Reamer Bushings Sets!

- Premium Steel
- Durable
- Clearly labeled sizes for easy selection
- In quality custom molded cases only 2" to 3" thick
- Fits your tool box, rollaway, crib or shelf
- Organized
- Useful

UNITED Sets provide the most efficient way to keep your tools!

To get UNITED's best in matching size Drill Bars,
Simply add 'DB' to Part No. and we will do the rest!



DOUBLE END DRILL BARS

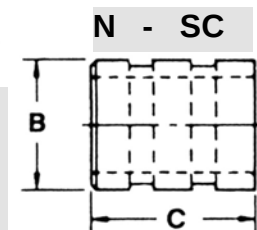
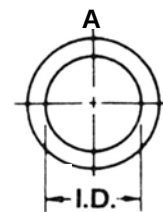
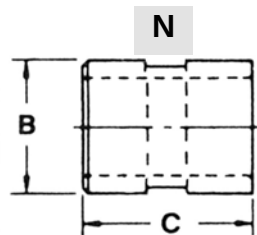
UNITED PART NO.	A +.0005 -.0000	B +.0005 -.0000	C	D	E	F	G Travel	Lockscrews included H L		Use with Bushings
DBL-20-32	.3126	.5003	.500	.625	3/4	3/8	3-1/8	LS-1	LS-1	SF20-8 / SF32-8
DBL-32-48	.5003	.7503	.625	.578	1-1/8	3/8	2-5/8	LS-1	LS-1	SF32-8 / SF48-8



Nurlock & Ser-Cast Bushings for Plastic

For Plastic Tooling

A.N.S.I. Standard N and SC Bushings
For Potting or Cast Tooling Installation



BLENDED RADIUS
COUNTERSINK



N NURLOCK

- 1 Groove: 1/4 thru 1/2 long
- 2 Grooves: 3/4 thru 1-1/2 long
- 3 Grooves: 1-3/4 thru 3" long

SC SER-CAST

N and SC Bushings For Plastic Tooling

For Potted or Cast installation. The Nurlock Diamond Knurls provide superior holding strength. They resist rotational and axial force.

UNITED's special Ser-Cast serrations allow pressing into soft materials or plastic fixtures while providing excellent holding strength.

MILLIMETER DRILL SIZES HAVE BEEN ADDED TO I.D. RANGE. RC-61-65 IN THE HOLE

SPECIFY 'N' FOR NURLOCK.

SPECIFY 'SC' FOR SER-CAST

ALL UNITED STANDARD BUSHINGS
ARE MANUFACTURED TO UNITED AND
ANSI STANDARDS.

For greatest accuracy, align and locate by I.D.

For Quantity Discount Pricing, see below.

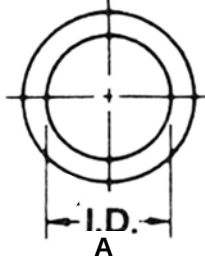
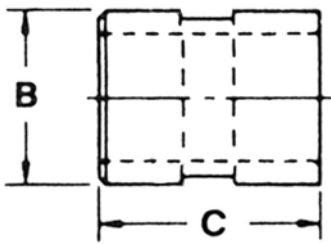
A I.D. DRILL RANGE				B O.D. SIZE		PICK	C OVERALL LENGTH / ANSI LENGTH SYMBOL BY 16ths											
INCH / METRIC NOMINAL		U.S.A. INCH DECIMAL		NOM.	ACTUAL	ANSI SYMBOL	1/4	5/16	3/8	1/2	3/4	1"	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"
							-4	-5	-6	-8	-12	-16	-22	-24	-28	-34	-40	-48
#55 - 1/16 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	13/64	.218 - .213	N-13 SC-13	8.71	9.23	9.76	9.99										
#52 - #39 1.65 - 2.50MM	.0635 - .0995 .0650 - .0984	13/64	.218 - .213	N-13 SC-13	8.71	9.23	9.76	9.99										
#40 - 9/64 2.35 - 4.90MM	.0980 - .1406 .0925 - .1929	1/4	.265 - .260	N-16 SC-16	6.24	6.43	6.94	7.16	8.94									
1/8 - #10 3.10 - 4.90MM	.1250 - .1935 .1220 - .1929	5/16	.327 - .322	N-20 SC-20	4.98	5.40	5.82	5.90	6.94	8.10								
5/32 - F 3.90 - 6.50MM	.1562 - .2570 .1535 - .2559	13/32	.421 - .416	N-26 SC-26	4.48	4.98	5.09	5.51	5.90	6.94								
5/32 - O 3.90 - 8.00MM	.1562 - .3160 .1535 - .3150	1/2	.515 - .510	N-32 SC-32		4.98	5.09	5.51	5.90	6.94								
5/16 - 7/16 8.80 - 11.00MM	.3125 - .4375 .3465 - .4331	5/8	.640 - .635	N-40 SC-40			4.48	4.48	5.40	5.82	6.94							
5/16 - 17/32 8.80 - 13.00MM	.3125 - .5312 .3465 - .5118	3/4	.765 - .760	N-48 SC-48			4.98	4.98	5.40	5.82	7.91							
1/2 - 21/32 12.50 - 16.50MM	.5000 - .6562 .4921 - .6496	7/8	.890 - .885	N-56 SC-56			7.53	6.64	6.94	7.16	7.78	8.94	9.86					
1/2 - 49/64 12.50 - 19.50MM	.5000 - .7656 .4921 - .7677	1"	1.015 - 1.010	N-64 SC-64				6.94	6.94	7.59	8.20	8.94	9.86					
1/2 - 1-1/32 12.50 - 26.00MM	.5000 - 1.0312 .4921 - 1.0236	1-3/8	1.390 - 1.385	N-88 SC-88				11.11	11.11	11.11	12.67	13.72	14.76	16.95	19.02	25.33		
I. D. RANGES				O. D. SIZES	ANSI SYMBOL	1/4	5/16	3/8	1/2	3/4	1"	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"	
						-4	-5	-6	-8	-12	-16	-22	-24	-28	-34	-40	-48	
NUMBER OF GROOVES						1	1	1	1	2	2	2	2	3	3	3	3	
						QTY DISCOUNT	1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%		

NL Nurlock Liners for Plastic Tooling

A.N.S.I. Standards

NL Nurlock Liners

Nurlock Liners' Diamond Grooves provide excellent holding strength!



FOR POTTED OR
CAST IN FIXTURES

When drilling, locate
the I.D. accurately
on a gauge pin
before potting or
casting for the best
in locations.



**NURLOCK LINER
FOR PLASTIC
NL**

HARDNESS — Rockwell RC-61-65 in the hole.

1 Groove: 1/4 thru 1/2 long

RADIUS COUNTERSINK — All Bushings feature
a radius countersink on the drill entrance end.

2 Grooves: 5/8 thru 1-1/2 long

3 Grooves: 1-3/4 thru 3" long

MILLIMETER DRILL SIZES HAVE BEEN ADDED TO I.D. RANGE.

For Quantity Discount Pricing, see below.

A I.D. DRILL RANGE		B O.D. SIZE		ANSI SYMBOL	C NL LENGTH OVERALL / ANSI LENGTH SYMBOL BY 16ths																
INCH/METRIC NOMINAL	U.S.A INCH. DECIMAL	U.S.A. INCH NOM. DECIMAL			1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2"	2-1/8	2-1/4	2-1/2	3"	
					-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-32	-34	-36	-40	-48	
3/32	.0938 - .0941	7/32	.233 - .228	NL-14	23.37	24.42	24.73	25.13	26.50	27.33											
1/8	.1251 - .1254	1/4	.265 - .260	NL-16	6.64	6.94	7.35	7.78	9.67	10.90	10.90										
5/32 4.00MM	.1563 - .1566 .1575	9/32	.296 - .291	NL-18	15.59	16.41	16.64	16.95	17.86	18.70	22.13										
3/16 5.00MM	.1876 - .1879 .1969	5/16	.327 - .322	NL-20	5.19	6.02	5.90	6.64	7.16	8.62	8.62	9.14	10.27								
5/16 6.00MM	.3126 - .3129 .2362	1/2	.515 - .510	NL-32	5.09	5.09	5.71	5.90	6.64	6.64	7.35	8.62	8.62	10.07	11.32						
5/16 8.00MM	.3126 - .3129 .3150	9/16	.577 - .572	NL-36	5.71	4.98	4.98	4.98	5.71	5.71	7.35	7.35	7.35	8.62	10.07						
3/8 10.00MM	.3751 - .3754 .3937	5/8	.640 - .635	NL-40	5.90	4.98	4.98	4.98	5.90	5.90	7.35	7.35	7.35	8.62	10.07	11.73	11.73				
7/16 12.00MM	.4377 - .4380 .4724	5/8	.640 - .635	NL-40	5.90	4.98	4.98	4.98	5.90	5.90	7.35	7.35	7.35	8.62	10.07	11.73	11.73				
1/2 12.00MM	.5002 - .5005 .4724	3/4	.765 - .760	NL-48	6.02	4.98	5.90	5.90	6.02	6.02	6.64	8.62	8.62	9.36	10.17	11.96	11.96	22.02	22.02		
9/16 15.00MM	.5627 - .5630 .5906	7/8	.890 - .885	NL-56	7.78	7.78	8.20	7.16	7.28	7.28	7.78	8.52	8.52	9.43	10.48	12.15	12.15	14.14	14.14	22.65	
5/8 15.00MM	.6252 - .6255 .5906	7/8	.890 - .885	NL-56		7.78	8.20	7.16	7.28	7.28	7.78	8.52	8.52	9.55	10.48	12.15	12.15	14.14	14.14	22.65	
3/4 18.00MM	.7503 - .7506 .7087	1"	1.015 - 1.010	NL-64		7.59	7.16	7.16	7.35	7.35	8.10	8.62	8.62	9.67	10.58	12.15	12.15	14.14	14.14	22.65	
7/8 22.00MM	.8754 - .8757 .8661	1-1/4	1.265 - 1.260	NL-80			11.42	11.42	11.83	9.76	11.42	13.08	13.08	14.02	15.38	17.86	17.86	20.45	20.45	27.02	
1" 26.00MM	1.0004 - 1.0007 1.0236	1-3/8	1.390 - 1.385	NL-88				11.42	11.42	9.76	11.42	13.08	13.08	14.02	15.38	17.86	17.86	20.45	20.45	27.02	
1-1/8 30.00MM	1.1255 - 1.1259 1.1811	1-1/2	1.515 - 1.510	NL-96				11.73	11.73	10.71	11.73	13.19	13.19	14.54	15.59	18.18	18.18	20.56	20.56	28.37	
1-1/4 30.00MM	1.2505 - 1.2509 1.1811	1-5/8	1.640 - 1.635	NL-104					11.73	10.71	11.73	13.19	13.19	14.54	15.59	18.18	18.18	20.45	20.45	28.37	
1-3/8 35.00MM	1.3756 - 1.3760 1.3780	1-3/4	1.765 - 1.760	NL-112					12.15	11.63	12.15	13.50	13.50	15.25	15.59	18.18	18.18	20.56	20.56	30.88	
1-1/2 35.00MM	1.5006 - 1.5010 1.3780	1-7/8	1.890 - 1.885	NL-120						11.63	12.15	13.50	13.50	15.25	15.59	18.18	18.18	20.56	20.56	30.88	
1-3/4 42.00MM	1.7508 - 1.7512 1.6535	2-1/4	2.265 - 2.260	NL-144						15.90	14.76	16.41	16.41	17.66	17.66	19.63	19.63	22.13	22.13	32.80	
2-1/4 55.00MM	2.2510 - 2.2515 2.1654	2-3/4	2.765 - 2.760	NL-176						19.63	17.66	20.25	20.25	21.28	21.28	24.10	24.10	27.02	27.02	36.34	
I. D. RANGES		O. D. SIZES		ANSI SYMBOL	1/4 -4	5/16 -5	3/8 -6	1/2 -8	5/8 -10	3/4 -12	1" -16	1-1/4 -20	1-3/8 -22	1-1/2 -24	1-3/4 -28	2" -32	2-1/8 -34	2-1/4 -36	2-1/2 -40	3" -48	
NUMBER OF GROOVES					1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	
					QTY DISCOUNT		1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%					

2-15-06

HG and FG Bushings for Plastic

Plastic Tooling Specials

A.N.S.I. Standard HG and FG Bushings



**HEXGRIP
ELIMINATES
MOST SPIN OUT**

BLENDED RADIUS

ALL UNITED STANDARD BUSHINGS
ARE MANUFACTURED TO UNITED
AND ANSI STANDARDS.

RC-61-65 in the hole

MILLIMETER DRILL SIZES HAVE
BEEN ADDED TO I.D. RANGE.



**FLANGE
GROOVE
HAS
SUPERIOR
HOLD**

**FG FLANGE GROOVE
HAS ONE TO FOUR GROOVES**

3/8" LENGTH HAS 1 3/32" GROOVE

1/2" LENGTH HAS 1 1/8" GROOVE

3/4" LENGTH HAS 2 1/8" GROOVE

1" LENGTH HAS 3 1/8" GROOVE

1-3/8" LENGTH HAS 4 1/8" GROOVE

SPECIFY 'HG' FOR HEX GRIP

For Quantity Discount Pricing,
see below.

SPECIFY 'FG' FOR FLANGE GROOVE

A I.D. DRILL RANGE		B O.D. SIZE		HEX SIZE	SELECT APPROPRIATE ANSI SYMBOL	C OVERALL LENGTH ANSI LENGTH SYMBOL BY 16ths				
INCH / METRIC NOMINAL	U.S.A. INCH DECIMAL	U.S.A. INCH				3/8	1/2	3/4	1"	1-3/8
		NOM.	ACTUAL			-6	-8	-12	-16	-22
#55 - 1/16 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	9/32	.290 - .270	5/16	HG-18 FG-18	18.70	16.95	21.19	24.93	29.17
#52 - #39 1.65 - 2.50MM	.0635 - .0995 .0650 - .0984	9/32	.290 - .270	5/16	HG-18 FG-18	9.14	9.43	10.58	11.73	0.00
#38 - 9/64 2.55MM - 4.90MM	.1015 - .1406 .1004 - .1929	9/32	.290 - .270	5/16	HG-18 FG-18	7.78	9.43	10.58	11.32	0.00
#29 - #10 3.40MM - 4.90MM	.1360 - .1935 .1339 - .1929	7/16	.447 - .427	1/2	HG-28 FG-28	6.64	6.64	7.35	8.94	12.15
#9 - F 4.90MM - 6.50MM	.1960 - .2570 .1929 - .2559	7/16	.447 - .427	1/2	HG-28 FG-28	5.90	6.02	6.64	7.78	8.94
F - 5/16 6.50MM - 8.80	.2570 - .3125 .2559 - .3465	1/2	.510 - .490	5/8	HG-32 FG-32	5.90	6.02	6.64	7.78	8.94
G - 11/32 6.60MM - 8.70MM	.2610 - .3437 .2598 - .3425	5/8	.635 - .615	3/4	HG-40 FG-40	5.90	6.02	6.64	7.78	8.94
Q - 21/32 8.40MM - 16.50MM	.3320 - .6562 .3307 - .6496	7/8	.885 - .865	1"	HG-56 FG-56	8.31	7.35	6.94	7.78	8.62
41/64 - 49/64 16.00MM - 19.50MM	.6406 - .7656 .6299 - .7677	1-1/16	1.072 - 1.052	1-3/8	HG-68 FG-68		6.94	7.78	8.10	8.94
3/4 - 1-1/32 19.00MM - 26.00MM	.7500 - 1.0312 .7480 - 1.0236	1-3/8	1.385 - 1.365	1-3/4	HG-88 FG-88		11.73	10.07	11.73	13.29
I. D. RANGES		O. D. SIZES			ANSI SYMBOL	3/8	1/2	3/4	1"	1-3/8
						-6	-8	-12	-16	-22

QTY DISCOUNT	1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%
-----------------	-------------	------------	--------------	---------------	---------------	---------------	-----------------	-----------------	-----------------	-------------------

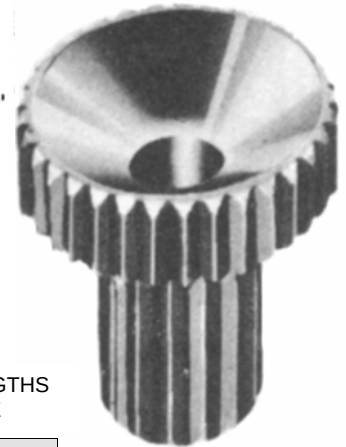
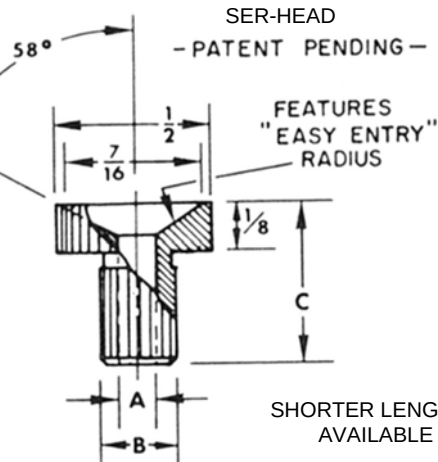
With UNITED You are Locked In With the Best!

Plastic Tooling Specials

A.N.S.I. Standard SH and SP Bushings

SH—SP
Bushings for Plastic

SER-HEAD with Easy Entry Radius —
Designed to prevent spin out or push out.
Great for template tooling.
“Can’t Miss”
Easy Entry Radius!



For Quantity Discount Pricing on both styles, see below.

SPECIFY 'SH' FOR SER-HEAD

RC-61-65

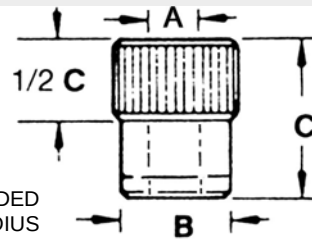
SHORTER LENGTHS AVAILABLE

A I.D. DRILL RANGE		B O.D. SIZE		ANSI SYMBOL	C OVERALL LENGTH / ANSI LENGTH 16ths				
INCH / METRIC NOMINAL	U.S.A. INCH DECIMAL	NOM.	ACTUAL		1/2	3/4	1"	1-3/8	1-3/4
#55 - 1/16 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	13/64	.218 - .213	SH-13	16.64	18.37	20.81		
#52 - #39 1.65 - 2.50MM	.0635 - .0995 .0650 - .0984	13/64	.218 - .213	SH-13	10.17	11.42	13.60		
#40 - 9/64 2.45 - 3.50MM	.0980 - .1406 .0965 - .1378	1/4	.265 - .260	SH-16	9.23	11.00	13.50		
1/8 - #10 3.10 - 4.90MM	.1250 - .1935 .1220 - .1929	5/16	.327 - .322	SH-20	9.03	10.39	12.47	13.59	
5/32 - F 3.90 - 6.50MM	.1562 - .2570 .1535 - .2559	13/32	.421 - .416	SH-26	8.52	9.86	11.11	12.15	13.08
I. D. RANGES		O. D. SIZES		ANSI SYMBOL	1/2	3/4	1"	1-3/8	1-3/4
					-8	-12	-16	-22	-28

SH
SER-HEAD

SER-PRESS prevents spin out
EASY PRESS IN — Used on steel,
aluminum, magnesium, masonite wood

Serrated diameter is .014 to .020 larger than ground body diameter. Ground diameter concentric .0005" T.I.R.



SP
SER-PRESS

SPECIFY 'SP' FOR SER-PRESS

RC-61-65

BLENDED RADIUS

A I.D. DRILL RANGE		B O.D. SIZE		SELECT ANSI SYMBOL	C OVERALL LENGTH / ANSI LENGTH SYMBOL BY 16ths						
INCH / METRIC NOMINAL	U.S.A. INCH DECIMAL	NOM.	ACTUAL		1/4	5/16	3/8	1/2	3/4	1"	1-3/8
#55 - 1/16 1.30 - 1.60MM	.0520 - .0625 .0512 - .0630	13/64	.2031 - .2029	SP-13	10.48	11.96	12.35	13.08			
#52 - #39 1.65 - 2.50MM	.0635 - .0995 .0650 - .0984	13/64	.2031 - .2029	SP-13	10.48	11.96	12.35	12.93			
#40 - 9/64 2.45 - 3.50MM	.0980 - .1406 .0965 - .1378	1/4	.2500 - .2498	SP-16	8.20	8.82	9.43	9.99			
1/8 - #10 3.10 - 4.90MM	.1250 - .1935 .1220 - .1929	5/16	.3125 - .3123	SP-20		7.16	7.59	7.91	8.62		
5/32 - F 3.90 - 6.50MM	.1562 - .2570 .1535 - .2559	13/32	.4062 - .4060	SP-26	6.02	6.13	6.64	6.94	7.59	8.82	
5/32 - O 3.90 - 8.00MM	.1562 - .3160 .1535 - .3150	1/2	.5000 - .4998	SP-32		6.13	6.64	6.94	7.59	8.82	
5/16 - 7/16 7.90 - 11.00MM	.3125 - .4375 .3110 - .4331	5/8	.6250 - .6248	SP-40			6.34	6.34	7.59	7.91	
5/16 - 17/32 7.90 - 13.00MM	.3125 - .5312 .3110 - .5118	3/4	.7500 - .7498	SP-48			6.94	6.94	7.16	7.91	
1/2 - 21/32 12.50 - 16.50MM	.5000 - .6562 .4921 - .6496	7/8	.8750 - .8748	SP-56			9.23	8.20	8.62	8.94	
1/2 - 49/64 12.50 - 19.00MM	.5000 - .7656 .4921 - .7480	1"	1.0000 - .9998	SP-64				8.62	8.62	9.14	9.67
I. D. RANGES		O. D. SIZES		ANSI SYMBOL	1/4	5/16	3/8	1/2	3/4	1"	1-3/8
					-4	-5	-6	-8	-12	-16	-22

QTY	1-2	3-5	6-11	12-23	24-49	50-99	100-199	200-499	500-999	1000 & UP
DISCOUNT	LIST	-6%	-23%	-30%	-35%	-42%	-47%	-51%	-53%	-56%

7-25-06

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800) 421-3466 IN CA / 800-486-3466 • FAX (562) 803-6898 / (800) 486-3465

A23

Metric Bushings Specifications

'M' is for Metric



METRIC SPECIFICATIONS and TECHNICAL INFORMATION

METRIC BUSHING INFORMATION		JIG BORE and JIG GRIND CHART for PRESS FIT BUSHINGS				
Application Information is listed on the specific page for each type of metric bushings.		NOM O.D. MM	ACTUAL O.D. MM	ACTUAL METRIC O.D. in INCHES	METRIC JIG BORE INSTALLATION HOLE SIZE	INSTALLATION HOLE SIZE in INCHES
UNITED Metric Bushings are manufactured to ANSI, Metric and UNITED standards. Most UNITED bushings are non-counterbored , adding critical guidance to insure precise location and eliminating "drill walk."		4	4.027 - 4.019	.1585 - .1582	4.000 - 4.012	.1575 - .1579
		5	5.027 - 5.019	.1979 - .1976	5.000 - 5.012	.1969 - .1973
		6	6.027 - 6.019	.2373 - .2370	6.000 - 6.012	.2362 - .2367
		7	7.032 - 7.023	.2769 - .2765	7.000 - 7.015	.2756 - .2761
		8	8.032 - 8.023	.3162 - .3159	8.000 - 8.015	.3150 - .3155
		10	10.032 - 10.023	.3950 - .3946	10.000 - 10.015	.3937 - .3943
		12	12.039 - 12.028	.4740 - .4735	12.000 - 12.018	.4725 - .4731
		15	15.039 - 15.028	.5921 - .5917	15.000 - 15.018	.5906 - .5913
		18	18.039 - 18.028	.7102 - .7098	18.000 - 18.018	.7087 - .7094
		22	22.048 - 22.035	.8680 - .8675	22.000 - 22.021	.8661 - .8670
Bushings generally assume the shape of the jig plate hole. Care must be taken to jig bore or ream size the hole to achieve hole roundness. Please use our Jig Bore Chart, shown on right, for all Metric Press Fit Bushings.		26	26.048 - 26.035	1.0255 - 1.0250	26.000 - 26.021	1.0236 - 1.0244
		30	30.048 - 30.043	1.1830 - 1.1825	30.000 - 30.021	1.1811 - 1.1819
		35	35.059 - 35.043	1.3803 - 1.3796	35.000 - 35.025	1.3780 - 1.3789
		42	42.059 - 42.043	1.6559 - 1.6552	42.000 - 42.025	1.6535 - 1.6545
		48	48.059 - 48.043	1.8921 - 1.8915	48.000 - 48.025	1.8890 - 1.8907
		55	55.072 - 55.053	2.1682 - 2.1674	55.000 - 55.030	2.1654 - 2.1665
		62	62.072 - 62.053	2.4438 - 2.4430	62.000 - 62.030	2.4409 - 2.4421
		70	70.078 - 70.059	2.7590 - 2.7582	70.000 - 70.030	2.7559 - 2.7571
		78	78.078 - 78.059	3.0739 - 3.0732	78.000 - 78.030	3.0709 - 3.0720
		85	85.093 - 85.071	3.3501 - 3.3493	85.000 - 85.035	3.3465 - 3.3478
Lubricated bushing O.D.s and lubricated mounting holes assure easier installation and removal. They prevent the bushing from picking up metal chips that may score the hole.		95	95.093 - 95.071	3.7438 - 3.7430	95.000 - 95.035	3.7402 - 3.7415
		105	105.101 - 105.079	4.1378 - 4.1370	105.000 - 105.035	4.1339 - 4.1352
		115	115.101 - 115.079	4.5315 - 4.5307	115.000 - 115.035	4.5276 - 4.5289
		125	125.117 - 125.092	4.9259 - 4.9249	125.000 - 125.040	4.9213 - 4.9228
Install PM, LM, HM, HLM and SPM Bushings with a hand arbor press or bushing installation assembly tools into your jig plates. Maintain perpendicularity to centerline. Locate the lead chamfer of the bushing in the hole carefully to direct the installation. Prepare your installation hole size consistently with our Jig Bore Chart for all Metric Press Fit type bushings. All Metric Press Fit bushings have a .02mm ground lead to automatically center your bushings.						

MINIMUM and MAXIMUM INSIDE DIAMETERS of Bushings in accordance with METRIC TOLERANCE CLASS G6.

- Inside Diameter (I.D.) is concentric to outside (O.D.) within .012 T.I.R. Metric or .0005 Inches.
- Surface Finish on I.D. is 0.4 micrometers or better.
- Hardness is 61-65 RC in the hole.
- Small I.D. Sizes thru 0.80 mm (.032 inch) may be counterbored to provide for lubrication and chip clearance.

METRIC DRILL SIZES	BUSHING AND DRILL I. D. TOLERANCES	EQUIVALENCY U.S.A. INCH	I. D. TOLERANCE FOR METRIC in INCHES	I. D. REAMER SIZES METRIC	U.S.A. INCH
Up to 3mm	Nominal +0.002mm / +0.008mm	Up to .1181	Nominal +.0001 / +.0003	+0.006mm / +0.012mm	+0.0002 / +.0005
3mm to 6mm	Nominal +0.004mm / +0.012mm	.1181 to .2362	Nominal +.0002 / +.0005	+0.010mm / +0.018mm	+0.0004 / +.0007
6mm to 10mm	Nominal +0.005mm / +0.014mm	.2362 to .3937	Nominal +.0002 / +.0006	+0.013mm / +0.027mm	+0.0005 / +.0010
10mm to 18mm	Nominal +0.006mm / +0.017mm	.3937 to .7087	Nominal +.0002 / +.0007	+0.016mm / +0.027mm	+0.0006 / +.0011
18mm to 30mm	Nominal +0.007mm / +0.020mm	.7087 to 1.1811	Nominal +.0003 / +.0008	+0.020mm / +0.033mm	+0.0008 / +.0014
30mm to 50mm	Nominal +0.009mm / +0.025mm	1.1811 to 1.9685	Nominal +.0004 / +.0010		
50mm to 80mm	Nominal +0.010mm / +0.029mm	1.9685 to 3.1496	Nominal +.0004 / +.0011		
80mm to 120mm	Nominal +0.012mm / +0.034mm	3.1496 to 4.7244	Nominal +.0005 / +.0013		

Standard Metric & Standard Inch Drill Sizes & Drill Bushing Sizes

THOSE NOT LISTED ARE SPECIALS IN METRIC & INCHES.

Metric-Inch I.D. Std. Drills
& Bushings Drill Sizes

METRIC	INCH	DECIMAL	METRIC	INCH	DECIMAL	METRIC	INCH	DECIMAL	METRIC	INCH	DECIMAL	METRIC	INCH	DECIMAL
	80	.0135		49	.0730	4.10		.1614		J	.2770	11.50		.4528
0.35		.0138	1.90		.0748	4.20		.1654	7.10		.2795		29/64	.4531
	79	.0145		48	.0760		19	.1660		K	.2810	11.80		.4646
0.38		.0150	1.95		.0768	4.25		.1673		9/32	.2812		15/32	.4687
	1/64	.0156		5/64	.0781	4.30		.1693	7.20		.2835	12.00		.4724
0.40		.0157		47	.0785		18	.1695	7.25		.2854	12.20		.4803
	78	.0160	2.00		.0787		11/64	.1719	7.30		.2874		31/64	.4843
0.42		.0165	2.05		.0807		17	.1730		L	.2900	12.50		.4921
0.45		.0177		46	.0810	4.40		.1732	7.40		.2913		1/2	.5000
	77	.0180		45	.0820		16	.1770		M	.2950	13.00		.5118
0.48		.0189	2.10		.0827	4.50		.1772	7.50		.2953		33/64	.5156
0.50		.0197	2.15		.0846		15	.1800		19/64	.2968		17/32	.5312
	76	.0200		44	.0860	4.60		.1811	7.60		.2992	13.50		.5315
	75	.0210	2.20		.0866		14	.1820		N	.3020		35/64	.5469
0.55		.0217	2.25		.0886	4.70	13	.1850	7.70		.3031	14.00		.5512
	74	.0225		43	.0890	4.75		.1870	7.75		.3051		9/16	.5625
0.60		.0236	2.30		.0906		3/16	.1875	7.80		.3071	14.50		.5709
	73	.0240	2.35		.0925	4.80	12	.1890	7.90		.3110		37/64	.5781
	72	.0250		42	.0935		11	.1910		5/16	.3125	15.00		.5906
0.65		.0256		3/32	.0937	4.90		.1929	8.00		.3150		19/32	.5937
	71	.0260	2.40		.0945		10	.1935		O	.3160		39/64	.6094
0.70		.0276		41	.0960		9	.1960	8.10		.3189	15.50		.6102
	70	.0280	2.45		.0965	5.00		.1969	8.20		.3228		5/8	.6250
	69	.0292		40	.0980		8	.1990		P	.3230	16.00		.6299
0.75		.0295	2.50		.0984	5.10		.2008	8.25		.3248		41/64	.6406
	68	.0310		39	.0995		7	.2010	8.30		.3268	16.50		.6496
	1/32	.0313	2.55		.1004		13/64	.2031		21/64	.3281		21/32	.6562
0.80		.0315		38	.1015		6	.2040	8.40		.3307	17.00		.6693
	67	.0320	2.60		.1024	5.20		.2047		Q	.3320		43/64	.6719
	66	.0330		37	.1040		5	.2055	8.50		.3346		11/16	.6875
0.85		.0335	2.65		.1043	5.25		.2067	8.60		.3386	17.50		.6890
	65	.0350	2.70		.1063	5.30		.2087		R	.3390		45/64	.7031
0.90		.0354		36	.1065		4	.2090	8.70		.3425	18.00		.7087
	64	.0360	2.75		.1083	5.40		.2126		11/32	.3437		23/32	.7187
	63	.0370		7/64	.1093		3	.2130	8.75		.3445	18.50		.7283
0.95		.0374		35	.1100	5.50		.2165	8.80		.3465		47/64	.7344
	62	.0380	2.80		.1102		7/32	.2187		S	.3480	19.00		.7480
	61	.0390		34	.1110	5.60		.2205	8.90		.3504		3/4	.7500
1.00		.0394		33	.1130		2	.2210	9.00		.3543		49/64	.7656
	60	.0400	2.90		.1142	5.70		.2244		T	.3580	19.50		.7677
	59	.0410		32	.1160	5.75		.2264	9.10		.3583		25/32	.7812
1.05		.0413	3.00		.1181		1	.2280		23/64	.3594	20.00		.7874
	58	.0420		31	.1200	5.80		.2283	9.20		.3622		51/64	.7969
	57	.0430	3.10		.1220	5.90		.2323	9.25		.3642	20.50		.8071
1.10		.0433		1/8	.1250		A	.2340	9.30		.3661		13/16	.8125
1.15		.0453	3.20		.1260		15/64	.2344		U	.3680	21.00		.8268
	56	.0465	3.25		.1280	6.00		.2362	9.40		.3701		53/64	.8281
	3/64	.0469		30	.1285		B	.2380	9.50		.3740		27/32	.8437
1.20		.0472	3.30		.1299	6.10		.2402		3/8	.3750	21.50		.8465
1.25		.0492	3.40		.1339		C	.2420		V	.3770		55/64	.8594
1.30		.0512		29	.1360	6.20		.2441	9.60		.3780	22.00		.8661
	55	.0520	3.50		.1378		D	.2460	9.70		.3819		7/8	.8750
1.35		.0531		28	.1405	6.25		.2461	9.75		.3839	22.50		.8858
	54	.0550		9/64	.1406	6.30		.2480	9.80		.3858		57/64	.8906
1.40		.0551	3.60		.1417		E	.2500		W	.3860	23.00		.9055
1.45		.0571		27	.1440		1/4	.2500	9.90		.3898		29/32	.9062
1.50		.0591	3.70		.1457	6.40		.2520		25/64	.3906		59/64	.9219
	53	.0595		26	.1470	6.50		.2559	10.00		.3937	23.50		.9252
1.55		.0610	3.75		.1476		F	.2570		X	.3970		15/16	.9375
	1/16	.0625		25	.1495	6.60		.2598	10.20		.4016	24.00		.9449
1.60		.0630	3.80		.1496		G	.2610		Y	.4040		61/64	.9531
	52	.0635		24	.1520	6.70		.2638		13/32	.4062	24.50		.9646
1.65		.0650	3.90		.1535		17/64	.2656		Z	.4130		31/32	.9687
1.70		.0669		23	.1540	6.75		.2657	10.50		.4134	25.00		.9843
	51	.0670		5/32	.1562		H	.2660		27/64	.4219		63/64	.9844
1.75		.0689		22	.1570	6.80		.2677	10.80		.4252		1"	1.0000
	50	.0700	4.00		.1575	6.90		.2717	11.00		.4331		1-1/64	1.0156
1.80		.0709		21	.1590		I	.2720		7/16	.4375	26.00		1.0236
1.85		.0728		20	.1610	7.00		.2756	11.20		.4409		1-1/32	1.0313

LARGER STANDARDS METRIC: Plus 1.00MM increments up to 50.00MM — Plus 5.00MM increments up to 125.00MM
INCHES: Plus 1/64" increments up to 2"—Plus 1/32" increments up to 3"—Plus 1/16" increments up to 4"—Plus 1/8" increments up to 5"
 5-11-06 Refer to page V59 for sizes over 26.00MM and Tap Bushings sizes. NON-STANDARD I.D.s are PRICED as SPECIALS.

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800)421-3466 IN CA / 800-486-3466 • FAX (562) 803-6898 / (800)486-3465

A25

PM - Headless Press Fit Metric

Headless Press Fit Type PM

For the METRIC World
Specify PM Ground or PUM Unground



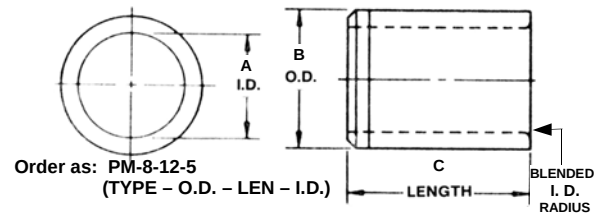
METRIC Headless Press Fit PM

RC-61-65 T.I.R. .012 (.0005 inch) MAX.

PM Bushings are the most popular and least

expensive. PM Bushings are pressed into fixtures or jig plates where replacement due to wear is not anticipated. Ideal for close hole spacing. Usually mounted flush to jig plate. PM Bushings have blended entrance radii, concentric ground leads, and are manufactured from long wear premium steel.

ALL UNITED STANDARD BUSHINGS ARE MANUFACTURED TO UNITED, U.S.A. ANSI AND METRIC STANDARDS.



A I.D. DRILL RANGE		METRIC NOM. O.D. MM.	B O.D. SIZE		ANSI SYMBOL	C PM LENGTH OVERALL / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM / ±.015")																I.D.	
METRIC (G6) MM SIZES INCH SIZES	U.S.A. INCH DECIMAL		METRIC (S6) MAX MIN	USA INCH MAX MIN		INCH:	.236	.315	.354	.394	.472	.630	.787	.984	1.102	1.181	1.378	1.417	1.772	1.772			
PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER TO METRIC/STD CHART.																					MIN		
																					MIN		
0.35 - 1.00 #80 - #61	.0138 - .0394 .0135 - .0390	4	4.027 - 4.019	.1585 - .1582	PM-4	32.80			34.73												0.4		
1.01 - 1.80 #60 - #50	.0398 - .0709 .0400 - .0700	4	4.027 - 4.019	.1585 - .1582	PM-4	28.77			30.88												0.4		
1.81 - 2.60 #49 - #38	.0713 - .1024 .0730 - .1015	5	5.027 - 5.019	.1979 - .1976	PM-5	10.79			12.67												0.4		
2.61 - 3.30 #37 - #30	.1028 - .1299 .1040 - .1285	6	6.027 - 6.019	.2373 - .2370	PM-6			10.48			12.03	13.41									0.4		
3.31 - 4.00 #29 - #22	.1303 - .1575 .1360 - .1570	7	7.032 - 7.023	.2769 - .2765	PM-7			8.62			9.43	10.27									0.4		
4.01 - 5.00 #22 - #9	.1579 - .1969 .1590 - .1960	8	8.032 - 8.023	.3162 - .3159	PM-8			8.62			9.43	10.27									0.8		
5.01 - 6.00 #8 - 15/64	.1972 - .2362 .1990 - .2344	10	10.032 - 10.023	.3950 - .3946	PM-10					7.97		8.20	9.03								0.8		
6.01 - 8.00 B - 5/16	.2366 - .3150 .2380 - .3125	12	12.039 - 12.028	.4740 - .4735	PM-12					7.97		8.20	9.03								0.8		
8.01 - 10.00 O - 25/64	.3154 - .3937 .3160 - .3906	15	15.039 - 15.028	.5921 - .5917	PM-15						7.59		8.20	8.62							1.2		
10.01 - 12.00 X - 15/32	.3941 - .4724 .3970 - .4687	18	18.039 - 18.028	.7102 - .7098	PM-18						8.20		8.62	9.43							1.2		
12.01 - 15.00 31/64 - 37/64	.4728 - .5906 .4923 - .5781	22	22.048 - 22.035	.8680 - .8675	PM-22							10.27			10.79				12.78		1.6		
15.01 - 18.00 19/32 - 45/64	.5909 - .7087 .5937 - .7031	26	26.048 - 26.035	1.0255 - 1.0250	PM-26							10.27			10.90				13.29		1.6		
18.01 - 22.00 23/32 - 55/64	.7091 - .8661 .7187 - .8594	30	30.048 - 30.035	1.1830 - 1.1825	PM-30								10.27						13.29	14.54	1.6		

FOR QUANTITY DISCOUNTS, SEE BELOW.

A I.D. DRILL RANGE		METRIC NOM. O.D. MM.	B O.D. SIZE				ANSI SYMBOL	C PM LENGTH OVERALL / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM / ±.015")																I.D.
METRIC (G6) MM SIZES INCH SIZES	U.S.A. INCH DECIMAL		METRIC (S6) MAX MIN		USA INCH MAX MIN			INCH:	.787	.984	1.181	1.378	1.417	1.575	1.772	2.205	2.638	3.071	3.504	4.134	4.409			
								METRIC:	-20	-25	-30	-35	-36	-40	-45	-56	-67	-78	-89	-105	-112			
								MIN																
22.01 - 26.00 7/8 - 1-1/64	.8665 - 1.0236 .8750 - 1.0156	35	35.059 - 35.043	1.3803 - 1.3796	PM-35	13.41					19.51		21.28		PM PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER to METRIC/STD CHART.							2.4		
26.01 - 30.00 1-1/32 - 1-11/64	1.0240 - 1.1811 1.0313 - 1.1719	42	42.059 - 42.043	1.6559 - 1.6552	PM-42		17.86						22.86	28.37							2.4			
30.01 - 35.00 1-3/16 - 1-3/8	1.1815 - 1.3780 1.1875 - 1.3750	48	48.059 - 48.043	1.8921 - 1.8915	PM-48		17.86						22.86	28.37							2.4			
35.01 - 42.00 1-25/64 - 1-41/64	1.3783 - 1.6535 1.3906 - 1.6406	55	55.072 - 55.053	2.1682 - 2.1674	PM-55			25.65						35.69	51.13						2.4			
42.01 - 48.00 1-21/32 - 1-7/8	1.6539 - 1.8898 1.6562 - 1.8750	62	62.072 - 62.053	2.4438 - 2.4430	PM-62			40.83						52.62	60.77						2.4			
48.01 - 55.00 1-57/64 - 2-5/32	1.8902 - 2.1654 1.8906 - 2.1562	70	70.078 - 70.059	2.7590 - 2.7582	PM-70			52.41						63.66	74.27						3.0			
55.01 - 63.00 2-5/32 - 2-15/32	2.1657 - 2.4803 2.1562 - 2.4687	78	78.078 - 78.059	3.0739 - 3.0732	PM-78				64.31						84.88	87.79					3.0			
63.01 - 70.00 2-31/64 - 2-3/4	2.4807 - 2.7559 2.4843 - 2.7500	85	85.093 - 85.071	3.3501 - 3.3493	PM-85				81.67						95.81	98.39					3.0			
70.01 - 78.00 2-3/4 - 3-1/16	2.7563 - 3.0709 2.7500 - 3.0625	95	95.093 - 95.071	3.7438 - 3.7430	PM-95							89.07				110.44		135.04			3.0			
78.01 - 85.00 3-1/16 - 3-11/32	3.0713 - 3.3465 3.0625 - 3.3437	105	105.101 - 105.079	4.1378 - 4.1370	PM-105							93.88				116.07		136.33			3.0			
85.01 - 95.00 3-11/32 - 3-47/64	3.3469 - 3.7402 3.3437 - 3.7344	115	115.101 - 115.079	4.5315 - 4.5307	PM-115								133.77				141.48		158.19		3.0			
95.01 - 105.00 3-47/64 - 4-1/8	3.7406 - 4.1339 3.7344 - 4.1250	125	125.117 - 125.092	4.9259 - 4.9249	PM-125								116.40				149.20		175.21		3.0			

QTY DISCOUNT: 1-2 LIST 3-5 -6% 6-11 -23% 12-23 -30% 24-49 -35% 50-99 -42% 100-199 -47% 200-499 -51% 500-999 -53% 1000 & UP -56%

A26

UNITED HAS ALL THE METRIC YOU REQUIRE IN BUSHINGS!

7-24-06

Head Press Fit Type HM

For the METRIC World

Specify HM Ground and HUM Unground

HM LENGTH MEASURED OVERALL—The USA inch standard specifies lengths for H Bushings *under* the head.

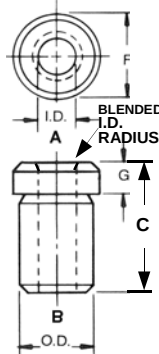
HEADLINERS HLM and HM have IDENTICAL HEAD DIMENSIONS

EXAMPLE Order as: HM-8-12-5 (TYPE - O.D. - LEN - I.D.)

RC-61-65 T.I.R. .012 (.0005 inch) MAX.

HM Bushings are preferred, if space permits, as heavy drilling will not force HM bushings out of the fixture.

ALL UNITED STANDARD BUSHINGS ARE MANUFACTURED TO UNITED, U.S.A. ANSI AND METRIC STANDARDS.



METRIC
Head
Press
Fit
HM



A I.D. DRILL RANGE		METRIC NOM. O.D. MM.	B O.D. SIZE				ANSI SYMBOL	C HM LENGTH <u>OVERALL</u> / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM = ±.015")																		
METRIC (G6)	U.S.A. INCH		METRIC (S6)		USA INCH			INCH:	.236	.315	.354	.394	.472	.630	.787	.984	1.102	1.181	1.378	1.417	1.772	F	G			
MM SIZES	DECIMAL		MAX	MIN	MAX	MIN		METRIC:	-6	-8	-9	-10	-12	-16	-20	-25	-28	-30	-35	-36	-45	MM	MM			
0.35 - 1.00 #80 - #61	.0138 - .0394 .0135 - .0390	4	4.027 - 4.019	.1585 - .1582	HM-4	34.08			35.69								HM PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER TO METRIC/STD CHART.				7	2				
1.01 - 1.80 #60 - #50	.0398 - .0709 .0400 - .0700	4	4.027 - 4.019	.1585 - .1582	HM-4	30.14			31.20												7	2				
1.81 - 2.60 #49 - #38	.0713 - .1024 .0730 - .1015	5	5.027 - 5.019	.1979 - .1976	HM-5	14.02			14.86												8	2				
2.61 - 3.30 #37 - #30	.1028 - .1299 .1040 - .1285	6	6.027 - 6.019	.2373 - .2370	HM-6		12.78				14.02	17.01									9	2.5				
3.31 - 4.00 #29 - #22	.1303 - .1575 .1360 - .1570	7	7.032 - 7.023	.2769 - .2765	HM-7		10.48				11.42	11.73									10	2.5				
4.01 - 5.00 #22 - #9	.1579 - .1969 .1590 - .1960	8	8.032 - 8.023	.3162 - .3159	HM-8		10.48				11.42	11.73									11	2.5				
5.01 - 6.00 #8 - 15/64	.1972 - .2362 .1990 - .2344	10	10.032 - 10.023	.3950 - .3946	HM-10					10.48		11.32	13.29								13	3				
6.01 - 8.00 B - 5/16	.2366 - .3150 .2380 - .3125	12	12.039 - 12.028	.4740 - .4735	HM-12					10.48		11.32	13.29								15	3				
8.01 - 10.00 O - 25/64	.3154 - .3937 .3160 - .3906	15	15.039 - 15.028	.5921 - .5917	HM-15						9.43		11.32	11.32							18	3				
10.01 - 12.00 X - 15/32	.3941 - .4724 .3970 - .4687	18	18.039 - 18.028	.7102 - .7098	HM-18						10.27		11.32	12.03							22	4				
12.01 - 15.00 31/64 - 37/64	.4728 - .5906 .4923 - .5781	22	22.048 - 22.035	.8680 - .8675	HM-22							12.67			14.54			16.22			26	4				
15.01 - 18.00 19/32 - 45/64	.5909 - .7087 .5937 - .7031	26	26.048 - 26.035	1.0255 - 1.0250	HM-26							12.78			14.02			17.33			30	4				
18.01 - 22.00 23/32 - 55/64	.7091 - .8661 .7187 - .8594	30	30.048 - 30.035	1.1830 - 1.1825	HM-30								18.70					24.61	26.18		34	5				

FOR QUANTITY DISCOUNTS, SEE BELOW.

A I.D. DRILL RANGE		METRIC NOM. O.D. MM.	B O.D. SIZE				ANSI SYMBOL	C HM LENGTH <u>OVERALL</u> / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM = ±.015")																		
METRIC (G6)	U.S.A. INCH		METRIC (S6)		USA INCH			INCH:	.787	.984	1.181	1.378	1.417	1.575	1.772	2.205	2.638	3.071	3.504	4.134	4.409	F	G			
MM SIZES	DECIMAL		MAX	MIN	MAX	MIN		METRIC:	-20	-25	-30	-35	-36	-40	-45	-56	-67	-78	-89	-105	-112	MM	MM			
22.01 - 26.00 7/8 - 1-1/64	.8665 - 1.0236 .8750 - 1.0156	35	35.059 - 35.043	1.3803 - 1.3796	HM-35	19.02					25.03		26.70			HM PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER TO METRIC/STD CHART.					39	5				
26.01 - 30.00 1-1/32 - 1-11/64	1.0240 - 1.1811 1.0313 - 1.1719	42	42.059 - 42.043	1.6559 - 1.6552	HM-42		25.45					30.88	39.23												46	5
30.01 - 35.00 1-3/16 - 1-3/8	1.1815 - 1.3780 1.1875 - 1.3750	48	48.059 - 48.043	1.8921 - 1.8915	HM-48		25.45					30.88	39.23												52	5
35.01 - 42.00 1-25/64 - 1-41/64	1.3783 - 1.6535 1.3906 - 1.6406	55	55.072 - 55.053	2.1682 - 2.1674	HM-55			36.34					49.21	63.03							59	5				
42.01 - 48.00 1-21/32 - 1-7/8	1.6539 - 1.8898 1.6562 - 1.8750	62	62.072 - 62.053	2.4438 - 2.4430	HM-62			42.77					55.30	62.38							66	6				
48.01 - 55.00 1-57/64 - 2-5/32	1.8902 - 2.1654 1.8906 - 2.1562	70	70.078 - 70.059	2.7590 - 2.7582	HM-70			61.73					71.06	76.52							74	6				
55.01 - 63.00 2-5/32 - 2-15/32	2.1657 - 2.4803 2.1562 - 2.4687	78	78.078 - 78.059	3.0739 - 3.0732	HM-78				68.82					82.17	85.85						82	6				
63.01 - 70.00 2-31/64 - 2-3/4	2.4807 - 2.7559 2.4843 - 2.7500	85	85.093 - 85.071	3.3501 - 3.3493	HM-85				92.28					116.40	121.87						90	6				
70.01 - 78.00 2-3/4 - 3-1/16	2.7563 - 3.0709 2.7500 - 3.0625	95	95.093 - 95.071	3.7438 - 3.7430	HM-95						98.39				127.66		158.19				100	6				
78.01 - 85.00 3-1/16 - 3-11/32	3.0713 - 3.3465 3.0625 - 3.3437	105	105.101- 105.079	4.1378 -4.1370	HM-105						108.36				133.77		158.19				110	6				
85.01 - 95.00 3-11/32 - 3-47/64	3.3469 - 3.7402 3.3437 - 3.7344	115	115.101- 115.079	4.5315 -4.5307	HM-115							119.42					154.35		181.65		120	6				
95.01 - 105.00 3-47/64 - 4-1/8	3.7406 - 4.1339 3.7344 - 4.1250	125	125.117- 125.092	4.9259 -4.9249	HM-125							135.04					172.64		203.51		130	6				

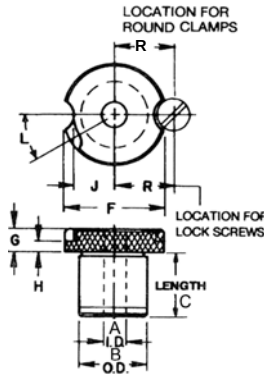
SFM Metric Slip Fit Renewable



METRIC Slip Fit Renewable SFM

Originated by **UNITED** Patent No. 3,606,566

ALL UNITED STANDARD BUSHINGS ARE MANUFACTURED TO UNITED, U.S.A. ANSI AND METRIC STANDARDS.



Three metric lengths are provided in most cases: Short, Medium and Long.

Slip Fit Renewable Type SFM Metric Bushings

For the Metric World

RC-61-65 T.I.R. .012 (.0005 inch) MAX.
Used with LM or HLM LINERS.

EXAMPLE Order as: SFM-8-16-4 (TYPE-O.D.-LEN-I.D.)

Easy and Quick to change sizes of drill, reamer, tap or countersink. SFM Bushings are ideal for long run tool changes.

Used in production lines where multiple operations are performed such as drilling, reaming, countersink and tapping. Knurled for non-slip easy installation.

SFM accommodates Lock Screws and Round Clamps.

SFM LENGTHS measured UNDER the head.

A I.D. DRILL RANGE		METRIC	B O.D. SIZE				ANSI SYMBOL	C SFM LENGTH <u>UNDER HEAD</u> / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM / ±.015")																	
METRIC (G6)		U.S.A. INCH	NOM. O.D.	METRIC (h5)		USA INCH		INCH:	.394	.472	.630	.787	.984	1.102	1.378	1.417	1.575	1.772	2.205	F	G				
MM SIZES		DECIMAL	MM.	MAX	MIN	MAX	MIN	METRIC:	-10	-12	-16	-20	-25	-28	-35	-36	-40	-45	-56	MM	MM				
0.35 - 1.00 #80 - #61	.0138 - .0394 .0315 - .0390		8	8.000 -	7.994	.3150 -	.3147	SFM-8	43.41		55.30					SFM PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER to METRIC/STD CHART.					15	6			
1.01 - 1.80 #60 - #50	.0398 - .0709 .0400 - .0700		8	8.000 -	7.994	.3150 -	.3147	SFM-8	39.23		49.21													15	6
1.81 - 4.00 #49 - #22	.0713 - .1575 .0730 - .1570		8	8.000 -	7.994	.3150 -	.3147	SFM-8	14.33		20.14													15	6
4.01 - 6.00 #21 - 15/64	.1579 - .2362 .1590 - .3125	10	10.000 -	9.994	.3937 -	.3935	SFM-10		12.03		12.78	14.54												18	6
6.01 - 8.00 B - 5/16	.2366 - .3150 .2380 - .3125		12	12.000 -	11.992	.4724 -	.4721	SFM-12		11.73		12.78	14.54							22	8				
8.01 - 10.00 O - 25/64	.3154 - .3937 .3160 - .3906		15	15.000 -	14.992	.5906 -	.5902	SFM-15			12.78			14.54		18.27				26	8				
10.01 - 12.00 X - 15/32	.3941 - .4724 .3970 - .4687		18	18.000 -	17.992	.7087 -	.7083	SFM-18			12.35			13.29		18.70				30	8				
12.01 - 15.00 31/64 - 37/64	.4728 - .5906 .4843 - .5781		22	22.000 -	21.991	.8661 -	.8658	SFM-22				16.22				19.63		19.63		34	10				
15.01 - 18.00 19/32 - 45/64	.5909 - .7087 .5937 - .7031		26	26.000 -	25.991	1.0236 -	1.0233	SFM-26				16.22				19.10		21.28		39	10				
18.01 - 22.00 23/32 - 55/64	.7091 - .8661 .7187 - .8594		30	30.000 -	29.991	1.1811 -	1.1807	SFM-30					25.03					31.20	47.07	46	10				
22.01 - 26.00 7/8 - 1-1/64	.8665 - 1.0236 .8750 - 1.0156		35	35.000 -	34.989	1.3780 -	1.3775	SFM-35					25.03					31.20	47.07	52	10				

FOR QUANTITY DISCOUNTS, SEE BELOW.

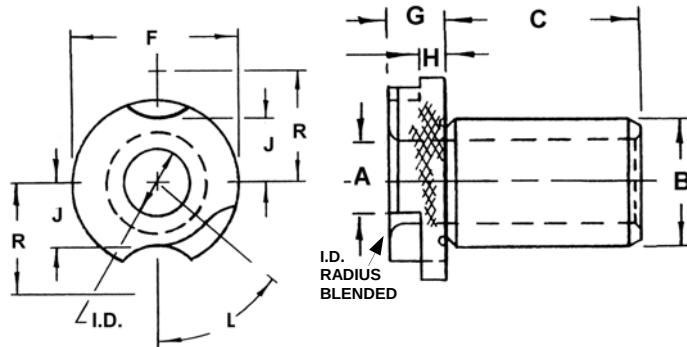
A I.D. DRILL RANGE		METRIC NOM. O.D. MM.	B O.D. SIZE				ANSI SYMBOL	C SFM LENGTH UNDER HEAD / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM / ±.015")														
METRIC (G6) MM SIZES	U.S.A. INCH DECIMAL		METRIC (h5) MAX MIN		USA INCH MAX MIN			INCH:	1.181	1.378	1.575	1.772	2.205	2.638	2.756	3.071	3.504	4.134	4.409	F	G	
																			MM	MM		
																			MM	MM		
26.01 - 30.00 1-1/32 - 1-11/64	1.0240 - 1.1811 1.0313 - 1.1719	42	42.000 - 41.989	1.6535 - 1.6531	SFM-42	32.47						50.81	62.38	SFM PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER to METRIC/STD CHART.						59	10	
30.01 - 35.00 1-3/16 - 1-3/8	1.1815 - 1.3780 1.1875 - 1.3750	48	48.000 - 47.989	1.8898 - 1.8893	SFM-48	47.91						63.66	68.82							66	12	
35.01 - 42.00 1-25/64 - 1-41/64	1.3783 - 1.6535 1.3906 - 1.6406	55	55.000 - 54.987	2.1654 - 2.1648	SFM-55	45.02						59.49	70.10							74	12	
42.01 - 48.00 1-21/32 - 1-7/8	1.6539 - 1.8898 1.6562 - 1.8750	62	62.000 - 61.987	2.4409 - 2.4404	SFM-62		77.49						97.11		100.00					82	12	
48.01 - 55.00 1-57/64 - 2-5/32	1.8902 - 2.1654 1.8906 - 2.1562	70	70.000 - 69.987	2.7559 - 2.7554	SFM-70		97.11						114.14		117.26					90	12	
55.01 - 62.00 2-5/32 - 2-7/16	2.1657 - 2.4409 2.1562 - 2.4375	78	78.000 - 77.987	3.0709 - 3.0704	SFM-78				106.43						130.41		158.19			100	12	
62.01 - 70.00 2-7/16 - 2-3/4	2.4413 - 2.7559 2.4375 - 2.7500	85	85.000 - 84.985	3.3465 - 3.3459	SFM-85				116.07						146.63		175.21			110	12	
70.01 - 78.00 2-3/4 - 3-1/16	2.7563 - 3.0709 2.7500 - 3.0625	95	95.000 - 94.985	3.7402 - 3.7396	SFM-95					125.41						165.92		192.07		120	12	
78.01 - 85.00 3-1/16 - 3-11/32	3.0713 - 3.3465 3.0625 - 3.3437	105	105.000 - 104.985	4.1339 - 4.1333	SFM-105					137.62						172.64		203.51		130	12	

QTY DISCOUNT: 1-2 LIST 3-5 -6% 6-11 -23% 12-23 -30% 24-49 -35% 50-99 -42% 100-199 -47% 200-499 -51% 500-999 -53% 1000 & UP -56%

Lock Screws and Round Clamps for SFM

For the Metric World

Slip Fixed Locking Dimensions



The Metric Bushing designed to please everyone!

Originated by **UNITED**
Patent No. 3,606,566

UNITED has the world's largest inventory of SF inch standards!

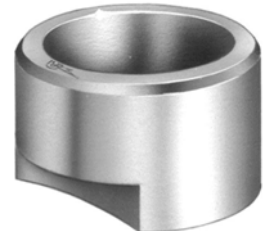


SFM

Locate Lock Screws and Round Clamps

**RCM METRIC
ROUND CLAMPS
RCM-1 thru RCM-8**

**Dependable
Designed to Hold
Perfect for SFMs!**



\$3.13 RCM

Please refer to Page A35 for complete specifications for Round Clamps and Lock Screws.

**LSM METRIC
LOCK SCREWS
LSM-1 thru LSM-8**

**For Close Hole Spacing
Black Oxide Finish**



**LSM
\$1.01**

DIA. O.D. (h5)	ENTRANCE RADII MIN	HEAD DIA. (±0.4)	HEAD THICK (±0.4)	SLOT HT. (±0.13)	SLOT DISTANCE (±0.4)	MOUNTING LOCATION (±0.4)	LOCK SCREWS	ROUND CLAMPS
B MM	D MM	F MM	G MM	H MM	J MM	L	R MM	
8	0.4	15	6	3	4.5	65°	11.5	LSM-1 & 2 RCM-1 & 2
10	0.8	18	6	3	6	65°	13	LSM-1 & 2 RCM-1 & 2
12	0.8	22	8	4	7.5	60°	16	LSM-3 & 4 RCM-3 & 4
15	1.2	26	8	4	9.5	50°	18	LSM-3 & 4 RCM-3 & 4
18	1.2	30	8	4	11.5	50°	20	LSM-3 & 4 RCM-3 & 4
22	1.6	34	10	5.5	13	35°	23.5	LSM-5 & 6 RCM-5 & 6
26	1.6	39	10	5.5	15.5	35°	26	LSM-5 & 6 RCM-5 & 6
30	1.6	46	10	5.5	19	30°	29.5	LSM-5 & 6 RCM-5 & 6
35	2.4	52	10	5.5	22	30°	32.5	LSM-5 & 6 RCM-5 & 6
42	2.4	59	10	5.5	25.5	30°	36	LSM-5 & 6 RCM-5 & 6
48	2.4	66	12	7	28.5	30°	41	LSM-7 & 8 RCM-7 & 8
55	2.4	74	12	7	32.5	25°	45	LSM-7 & 8 RCM-7 & 8
62	2.4	82	12	7	36.5	25°	49	LSM-7 & 8 RCM-7 & 8
70	2.4	90	12	7	40.5	25°	53	LSM-7 & 8 RCM-7 & 8
78	2.4	100	12	7	45.5	25°	58	LSM-7 & 8 RCM-7 & 8
85	2.4	110	12	7	50.5	20°	63	LSM-7 & 8 RCM-7 & 8
95	2.4	120	12	7	55.5	20°	68	LSM-7 & 8 RCM-7 & 8
105	2.4	130	12	7	60.5	20°	73	LSM-7 & 8 RCM-7 & 8

MINIMUM and MAXIMUM INSIDE DIAMETERS of Bushings in accordance with METRIC TOLERANCE CLASS G6.

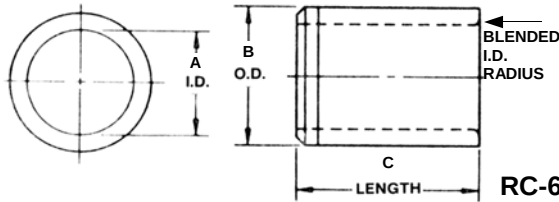
- Inside Diameter (I.D.) is concentric to outside (O.D.) within .012 T.I.R. Metric or .0005 Inches.
- Surface Finish on I.D. is 0.4 micrometers or better.
- Hardness is 61-65 RC in the hole.
- Small I.D. Sizes thru 0.80 mm (.032 inch) may be counterbored to provide for lubrication and chip clearance.

METRIC DRILL SIZES	BUSHING AND DRILL I. D. TOLERANCES	EQUIVALENCY U.S.A. INCH	I. D. TOLERANCE FOR METRIC IN INCHES	I. D. REAMER SIZES METRIC	U.S.A. INCH
Up to 3mm	Nominal +0.002mm / +0.008mm	Up to .1181	Nominal +.0001 / +.0003	+0.006mm / +0.012mm	+.0002 / +.0005
3mm to 6mm	Nominal +0.004mm / +0.012mm	.1181 to .2362	Nominal +.0002 / +.0005	+0.010mm / +0.018mm	+.0004 / +.0007
6mm to 10mm	Nominal +0.005mm / +0.014mm	.2362 to .3937	Nominal +.0002 / +.0006	+0.013mm / +0.027mm	+.0005 / +.0010
10mm to 18mm	Nominal +0.006mm / +0.017mm	.3937 to .7087	Nominal +.0002 / +.0007	+0.016mm / +0.027mm	+.0006 / +.0011
18mm to 30mm	Nominal +0.007mm / +0.020mm	.7087 to 1.1811	Nominal +.0003 / +.0008	+0.020mm / +0.033mm	+.0008 / +.0014
30mm to 50mm	Nominal +0.009mm / +0.025mm	1.1811 to 1.9685	Nominal +.0004 / +.0010		
50mm to 80mm	Nominal +0.010mm / +0.029mm	1.9685 to 3.1496	Nominal +.0004 / +.0011		
80mm to 120mm	Nominal +0.012mm / +0.034mm	3.1496 to 4.7244	Nominal +.0005 / +.0013		

LM - Press Fit Metric Liners

Metric Liners Type LM Headless Press Fit

For the Metric World
Use With Slip Fixed
Renewable Bushings - SFMs
Specify LM Ground or LUM



METRIC Headless Liners LM

RC-61-65 T.I.R. .012 (.0005 inch) MAX.

LM Bushings are permanently pressed into fixtures or jig plates. Liners maintain precision permanent locations for SFM Slip Fixed Renewable Bushings, Slip Fit Locating Pins and Alignment Pins. Liners reduce wear on jig or fixture and are precision ground.

LM Bushings have blended entrance radii, concentric ground leads, and are manufactured from long wear premium steel for ease of press fit installation.

ALL UNITED STANDARD BUSHINGS ARE MANUFACTURED TO UNITED, U.S.A. ANSI AND METRIC STANDARDS.

EXAMPLE Order as: **LM-18-20-12** (TYPE - O.D. - LEN - I.D.)

STANDARD METRIC LINER I.D.TOLERANCES		U.S.A. INCHES
6 to 10 MM	+0.005 / +0.014 MM	+0.0002 +.0006
10 to 18 MM	+0.006 / +0.017 MM	+0.0002 +.0007
18 to 30 MM	+0.007 / +0.020 MM	+0.0003 +.0008
30 to 50 MM	+0.009 / +0.025 MM	+0.0004 +.0010
50 to 80 MM	+0.010 / +0.029 MM	+0.0004 +.0011
80 to 120 MM	+0.012 / +0.034 MM	+0.0005 +.0013

A I.D. LINER			MET.	B O.D. SIZE				ANSI SYMBOL	C LM LENGTH OVERALL / ANSI LENGTH SYMBOL FOR METRIC ±0.4 MM = ±.015"														
NOM.	METRIC G6	U.S.A. INCH		NOM. O.D.	METRIC s6		USA INCH		INCH:	.394	.472	.630	.787	.984	1.102	1.181	1.378	1.417	1.575	1.772	2.205	2.638	FITS SFM
MM	ACTUAL	DECIMAL	MM	MAX	MIN	MAX	MIN	METRIC:	-10	-12	-16	-20	-25	-28	-30	-35	-36	-40	-45	-56	-67	BUSH	
8	8.005 - 8.014	.3152 - .3156	12	12.039 - 12.028		.4740 - .4735		LM-12	7.97			8.20											8
10	10.005 - 10.014	.3939 - .3943	15	15.039 - 15.028		.5921 - .5917		LM-15		7.59		8.20	8.62										10
12	12.006 - 12.017	.4726 - .4731	18	18.039 - 18.028		.7102 - .7098		LM-18		8.20		8.62	9.43										12
15	15.006 - 15.017	.5908 - .5913	22	22.048 - 22.035		.8680 - .8675		LM-22			10.27			10.71			12.78						15
18	18.006 - 18.017	.7089 - .7094	26	26.048 - 26.035		1.0255 - 1.0250		LM-26			10.27			10.90			13.29						18
22	22.007 - 22.020	.8664 - .8669	30	30.048 - 30.035		1.1830 - 1.1825		LM-30				10.27					13.29		14.54				22
26	26.007 - 26.020	1.0239 - 1.0244	35	35.059 - 35.043		1.3803 - 1.3796		LM-35				13.41					19.51		21.19				26
30	30.007 - 30.020	1.1814 - 1.1818	42	42.059 - 42.043		1.6559 - 1.6552		LM-42					17.86						22.86	28.37			30
35	35.009 - 35.025	1.3784 - 1.3790	48	48.059 - 48.043		1.8921 - 1.8915		LM-48					17.86						22.86	28.37			35
42	42.009 - 42.025	1.6539 - 1.6545	55	55.072 - 55.053		2.1682 - 2.1674		LM-55							25.65					35.69	51.13		42
48	48.009 - 48.025	1.8902 - 1.8908	62	62.072 - 62.053		2.4438 - 2.4430		LM-62							40.83					52.41	60.77		48

FOR QUANTITY DISCOUNTS, SEE BELOW.

A I.D. LINER			MET.	B O.D. SIZE				ANSI SYMBOL	C LM LENGTH OVERALL / ANSI LENGTH SYMBOL FOR METRIC ±0.4 MM = ±.015"														
NOM.	METRIC G6	U.S.A. INCH		NOM. O.D.	METRIC s6		USA INCH		INCH:	.984	1.102	1.181	1.378	1.417	1.575	1.772	2.205	2.638	3.071	3.504	4.134	4.409	FITS SFM BUSH
MM	ACTUAL	DECIMAL	MM	MAX	MIN	MAX	MIN	METRIC:	-25	-28	-30	-35	-36	-40	-45	-56	-67	-78	-89	-105	-112		
55	55.010 - 55.029	2.1657 - 2.1665	70	70.078 - 70.059		2.7590 - 2.7582		LM-70				50.81					61.10	71.39					55
62	62.010 - 62.029	2.4413 - 2.4420	78	78.078 - 78.059		3.0739 - 3.0732		LM-78					64.31					84.88	87.79				62
70	70.010 - 70.029	2.7563 - 2.7570	85	85.093 - 85.071		3.3501 - 3.3493		LM-85					81.67					95.81	98.39				70
78	78.010 - 78.029	3.0712 - 3.0719	95	95.093 - 95.071		3.7438 - 3.7430		LM-95							86.50				107.08		131.20		78
85	85.012 - 85.034	3.3469 - 3.3478	105	105.101 - 105.079		4.1378 - 4.1370		LM-105	LM PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER to METRIC/STD CHART.						90.68				112.55		136.33		85
95	95.012 - 95.034	3.7406 - 3.7415	115	115.101 - 115.079		4.5315 - 4.5307		LM-115								100.65				129.90		153.06	95
105	105.012 - 105.034	4.1343 - 4.1350	125	125.117 - 125.092		4.9259 - 4.9249		LM-125								116.40				149.20		175.21	105

QTY DISCOUNT: 1-2 LIST 3-5 -6% 6-11 -23% 12-23 -30% 24-49 -35% 50-99 -42% 100-199 -47% 200-499 -51% 500-999 -53% 1000 & UP -56%

A30

UNITED HAS ALL THE METRIC YOU REQUIRE IN BUSHINGS!

7-27-06

HLM - Press Fit Metric Liners

BLENDED
 I.D.
 RADIUS

Technical drawing of a pipe showing side and end views. The side view on the left shows a cylinder with dimensions: LENGTH (total length), C (length of the main body), G (thickness of the end flange), O.D. B (outer diameter), and A I.D. (inner diameter). The end view on the right shows the circular cross-section with dimensions: F (outer diameter) and K (inner diameter).



METRIC Head
Liners HLM

STANDARD METRIC LINER I . D . TOLERANCES		U.S.A. INCHES
6 to 10 MM	+0.005 / +0.014 MM	+0.0002 +0.0006
10 to 18 MM	+0.006 / +0.017 MM	+0.0002 +0.0007
18 to 30 MM	+0.007 / +0.020 MM	+0.0003 +0.0008
30 to 50 MM	+0.009 / +0.025 MM	+0.0004 +0.0010
50 to 80 MM	+0.010 / +0.029 MM	+0.0004 +0.0011
80 to 120 MM	+0.012 / +0.034 MM	+0.0005 +0.0013

A I.D. LINER					B O.D. SIZE		ANSI SYMBOL	C HLM LENGTH OVERALL / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM = ±.015")																				
NOM	METRIC (G6)		U.S.A. INCH		NOM O.D.		METRIC (S6)		USA INCH		INCH:	.394	.472	.630	.787	.984	1.102	1.181	1.378	1.417	1.575	1.772	2.205	2.638	F	G	FITS	
MM	ACTUAL		DECIMAL		MM		MAX MIN		MAX MIN		METRIC:	-10	-12	-16	-20	-25	-28	-30	-35	-36	-40	-45	-56	-67	MM	MM	SFM	
8	8.005	8.014	.3152 - .3156		12	12.039	12.028	.4740 - .4735		HLM-12	10.48			11.32							HLM PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER to METRIC/STD CHART.				15	3	8	
10	10.005	10.014	.3939 - .3943		15	15.039	15.028	.5921 - .5917		HLM-15		9.43			11.32	11.32									18	3	10	
12	12.006	12.017	.4726 - .4731		18	18.039	18.028	.7102 - .7098		HLM-18		10.27			11.32	13.08									22	4	12	
15	15.006	15.017	.5908 - .5913		22	22.048	22.035	.8680 - .8675		HLM-22				12.58			14.02			17.33					26	4	15	
18	18.006	18.017	.7089 - .7094		26	26.048	26.035	1.0255 - 1.0250		HLM-26				12.78			14.02			17.33					30	4	18	
22	22.007	22.020	.8664 - .8669		30	30.048	30.035	1.1830 - 1.1825		HLM-30					18.70					24.61		26.37			34	5	22	
26	26.007	26.020	1.0239 - 1.0244		35	35.059	35.043	1.3803 - 1.3796		HLM-35					19.02					25.03		26.70			39	5	26	
30	30.007	30.020	1.1814 - 1.1818		42	42.059	42.043	1.6559 - 1.6552		HLM-42						25.45						30.88	39.23		46	5	30	
35	35.009	35.025	1.3784 - 1.3790		48	48.059	48.043	1.8921 - 1.8915		HLM-48						25.45						30.88	39.23		52	5	35	
42	42.009	42.025	1.6539 - 1.6545		55	55.072	55.053	2.1682 - 2.1674		HLM-55								36.34					49.21	63.03	59	5	42	
48	48.009	48.025	1.8902 - 1.8908		62	62.072	62.053	2.4438 - 2.4430		HLM-62									42.77					54.44	62.38	66	6	48

FOR QUANTITY DISCOUNTS, SEE BELOW.

COUPLER DIMENSIONS - SEE TABLE																								
A I.D. LINER			B O.D. SIZE				ANSI SYMBOL	C HLM LENGTH OVERALL / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM = ±.015")																
NOM	METRIC (G6)	U.S.A. INCH	NOM O.D.	METRIC (S6)		USA INCH		INCH:	.984	1.102	1.181	1.378	1.417	1.575	1.772	2.205	2.638	3.071	3.504	4.134	4.409	F	G	FITS
MM	ACTUAL	DECIMAL	MM	MAX	MIN	MAX	MIN	METRIC:	-25	-28	-30	-35	-36	-40	-45	-56	-67	-78	-89	-105	-112	MM	MM	SFM
55	55.010 - 55.029	2.1657 - 2.1665	70	70.078 - 70.059	70.059	2.7590 - 2.7582		HLM-70			59.49					68.82	73.63					74	6	55
62	62.010 - 62.029	2.4413 - 2.4420	78	78.078 - 78.059	78.059	3.0739 - 3.0732		HLM-78				68.82					82.17	85.85				82	6	62
70	70.010 - 70.029	2.7563 - 2.7570	85	85.093 - 85.071	85.071	3.3501 - 3.3493		HLM-85				92.28					116.40	121.54				90	6	70
78	78.010 - 78.029	3.0712 - 3.0719	95	95.093 - 95.071	95.071	3.7438 - 3.7430		HLM-95						98.39				127.66		158.19		100	6	78
85	85.012 - 85.034	3.3469 - 3.3478	105	105.101 - 105.079	105.079	4.1378 - 4.1370		HLM-105	HLM					108.36				135.04		164.63		110	6	85
95	95.012 - 95.034	3.7406 - 3.7415	115	115.101 - 115.079	115.079	4.5315 - 4.5307		HLM-115	PRICES ARE FOR STANDARD METRIC SIZES ONLY. REFER to METRIC/STD CHART.						119.42				153.06		181.65	120	6	95
105	105.012 - 105.034	4.1343 - 4.1350	125	125.117 - 125.092	125.092	4.9259 - 4.9249		HLM-125							135.04				172.64		203.51	130	6	105

QTY DISCOUNT: 1-2 LIST 3-5 -6% 6-11 -23% 12-23 -30% 24-49 -35% 50-99 -42% 100-199 -47% 200-499 -51% 500-999 -53% 1000 & UP -56%											
---	--	--	--	--	--	--	--	--	--	--	--

Metric NM and SCM Bushings for Plastic

Nurlock and Ser-Cast Metric

For the Metric World

NM and SCM Bushings for Potting, Cast Tooling, Plastic and Soft Materials Installation



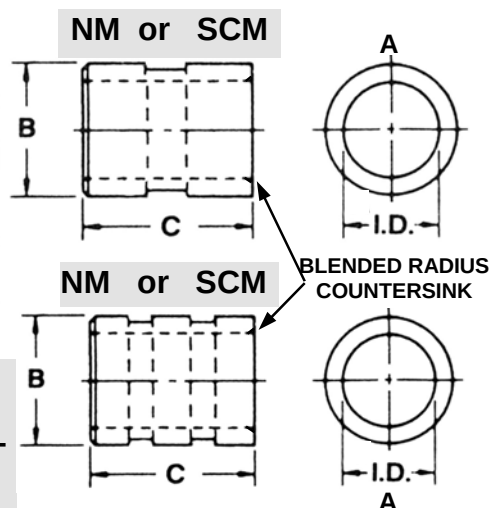
NM METRIC NURLOCK

1 Groove: 6 MM thru 16 MM long
2 Grooves: 20 MM thru 36 MM long
SPECIFY 'NM' FOR METRIC NURLOCK.



SCM

METRIC SER-CAST
SPECIFY 'SCM' FOR METRIC SER-CAST



NM and SCM METRIC Bushings For Plastic Tooling

UNITED's special **Nurlock Diamond Knurls** provide superior holding strength for Potted or Cast installation. They resist rotational and axial forces.



UNITED's special **Ser-Cast Serrations** allow pressing into aluminum, magnesium, masonite, soft materials or plastic fixtures while providing excellent holding strength.

For greatest accuracy, align and locate by I.D. for RC-61-65 IN THE HOLE

ALL UNITED STANDARD BUSHINGS ARE MANUFACTURED TO UNITED,

Order as: NM-8-12-5 (TYPE-O.D.-LEN-I.D.)

A I.D. BUSHING		B O.D. SIZE				SELECT ANSI SYMBOL	C NM & SCM LENGTH OVERALL / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM / ±.015")											
METRIC (G6) ACTUAL	U.S.A. INCH	NOM. O.D. MM	METRIC (s6) MAX	MIN	USA INCH MAX	MIN	INCH:	.236	.315	.354	.394	.472	.630	.787	.984	1.102	1.417	
METRIC SIZE	DECIMAL						METRIC:	-6	-8	-9	-10	-12	-16	-20	-25	-28	-36	
1.00 - 1.80 #61 - #50	.0394 - .0709 .0390 - .0700	5	5.50 - 5.25		.217 - .207		NM-5 SCM-5	25.65		28.52					NM & SCM SPECIFY TYPE. For PLASTIC Applications			
1.81 - 2.60 #49 - #38	.0713 - .1024 .0730 - .1015	5	5.50 - 5.25		.217 - .207		NM-5 SCM-5	10.58		11.83								
2.61 - 3.30 #37 - #30	.1028 - .1299 .1040 - .1285	6	6.65 - 6.25		.262 - .246		NM-6 SCM-6		8.20			8.62	10.79					
3.31 - 4.00 #29 - #22	.1303 - .1575 .1360 - .1570	7	7.68 - 7.25		.302 - .285		NM-7 SCM-7		7.06			7.28	8.20					
4.01 - 5.00 #21 - #9	.1579 - .1969 .1590 - .1960	8	8.65 - 8.25		.341 - .325		NM-8 SCM-8		6.24			6.64	7.28					
5.01 - 6.00 #8 - 15/64	.1972 - .2362 .1990 - .2344	10	10.65 - 10.25		.419 - .404		NM-10 SCM-10				6.64		7.28	8.20				
6.01 - 8.00 B - 5/16	.2366 - .3150 .2380 - .3125	12	12.65 - 12.25		.498 - .482		NM-12 SCM-12				6.64		7.28	8.20				
8.01 - 10.00 O - 25/64	.3154 - .3937 .3160 - .3906	15	15.65 - 15.25		.616 - .600		NM-15 SCM-15					5.40		6.64	7.06			
10.01 - 12.00 X - 15/32	.3941 - .4724 .3970 - .4687	18	18.65 - 18.25		.734 - .719		NM-18 SCM-18					5.82		6.64	7.28			
12.01 - 15.00 31/64 - 37/64	.4728 - .5906 .4843 - .5781	22	22.65 - 22.25		.892 - .876		NM-22 SCM-22						8.20				8.62	9.43
15.01 - 18.00 19/32 - 45/64	.5909 - .7087 .5937 - .7031	26	26.65 - 26.25		1.049 - 1.033		NM-26 SCM-26						8.20				9.76	10.90
METRIC:							-6	-8	-9	-10	-12	-16	-20	-25	-28	-36		
NUMBER of GROOVES:							1	1	1	1	1	1	2	2	2	2		

QTY DISCOUNT: 1-2 LIST 3-5 -6% 6-11 -23% 12-23 -30% 24-49 -35% 50-99 -42% 100-199 -47% 200-499 -51% 500-999 -53% 1000 & UP -56%

Ser-Press Metric

For the Metric World
SPM Bushings for Potting, Cast Tooling, Plastic
and Soft Materials Installation

**Metric Ser-Press
Bushings for Plastic**

SER-PRESS prevents spin out EASY PRESS IN — On Soft Materials

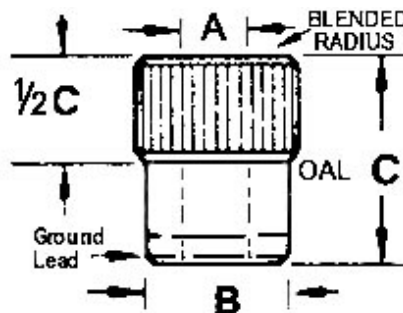
UNITED's SPM Ser-Press Bushing was designed to be pressed into plastic jigs and fixtures. Simultaneously the outside diameter has a ground finish, creating ideal pressing into aluminum, magnesium, masonite and wood.

UNITED's special **Ser-Press Serrations** hold firmly and prevent rotation while resisting axial forces. Serrations are .25MM to .65MM larger than ground O.D. diameter.

One-half of the SPM Bushing consists of serrations, and one-half is Press Fit.

Ser-Press Bushings are often used in holes drilled in imbedments. Allow adequate interference in your hole preparation to hold the SPM firmly. Allow for chip clearance in your standoff.

Refer to our Jig Bore Chart on page A24.



SPM

METRIC SER-PRESS
SPECIFY 'SPM' FOR
METRIC SER-PRESS

EXAMPLE Order as:
SPM-12-16-8 (TYPE-O.D.-LEN-I.D.)

ALL UNITED STANDARD BUSHINGS ARE
MANUFACTURED TO UNITED, U.S.A. ANSI AND
METRIC STANDARDS.

FOR QUANTITY DISCOUNTS, SEE BELOW.

SPM METRIC Bushings For Plastic Tooling

RC-61-65 IN THE HOLE

T.I.R. .012 Max (.0005 inch)

A I.D. BUSHING		B O.D. SIZE				ANSI	C SPM LENGTH OVERALL / ANSI LENGTH SYMBOL FOR METRIC (±0.4 MM / ±.015")											
							INCH:	.236	.315	.354	.394	.472	.630	.787	.984	1.102	1.417	
METRIC (G6) ACTUAL	U.S.A. INCH	NOM. O.D.	METRIC (s6)	USA INCH			METRIC:	-6	-8	-9	-10	-12	-16	-20	-25	-28	-36	
METRIC SIZE	DECIMAL	MM	MAX	MIN	MAX	MIN												
1.00 - 1.80 #61 - #50	.0394 - .0709 .0390 - .0700	5	5.000 - 4.995	.1969 - .1967			SPM-5	29.71		34.91								
1.81 - 2.60 #49 - #38	.0713 - .1024 .0730 - .1015	5	5.000 - 4.995	.1969 - .1967			SPM-5	12.26		14.54								
2.61 - 3.30 #37 - #30	.1028 - .1299 .1040 - .1285	6	6.000 - 5.995	.2362 - .2360			SPM-6		10.27			11.73	13.08					
3.31 - 4.00 #29 - #22	.1303 - .1575 .1360 - .1570	7	7.000 - 6.995	.2756 - .2754			SPM-7		8.31			9.14	9.99					
4.01 - 5.00 #21 - #9	.1579 - .1969 .1590 - .1960	8	8.000 - 7.994	.3150 - .3147			SPM-8		8.38			9.14	9.99					
5.01 - 6.00 #8 - 15/64	.1972 - .2362 .1990 - .2344	10	10.000 - 9.994	.3937 - .3935			SPM-10				7.97		8.71	9.99				
6.01 - 8.00 B - 5/16	.2366 - .3150 .2380 - .3125	12	12.000 - 11.992	.4724 - .4721			SPM-12				7.97		8.71	9.99				
8.01 - 10.00 O - 25/64	.3154 - .3937 .3160 - .3906	15	15.000 - 14.992	.5906 - .5902			SPM-15					7.35		8.31	8.71			
10.01 - 12.00 X - 15/32	.3941 - .4724 .3970 - .4687	18	18.000 - 17.992	.7087 - .7083			SPM-18					7.97		9.14	10.27			
12.01 - 15.00 31/64 - 37/64	.4728 - .5906 .4843 - .5781	22	22.000 - 21.991	.8661 - .8658			SPM-22						9.99			10.27	12.47	
15.01 - 18.00 19/32 - 45/64	.5909 - .7087 .5937 - .7031	26	26.000 - 25.991	1.0236 - 1.0233			SPM-26						9.99			10.58	11.32	

QTY DISCOUNT: 1-2 LIST | 3-5 -6% | 6-11 -23% | 12-23 -30% | 24-49 -35% | 50-99 -42% | 100-199 -47% | 200-499 -51% | 500-999 -53% | 1000 & UP -56%

7-31-06

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800) 421-3466 IN CA / 800-486-3466 • FAX (562) 803-6898 / (800) 486-3465

A33

HGM and FGM Bushings for Plastic

Plastic Tooling Specialty Metric Bushings

For the Metric World



HGM
HEXGRIP
HAS ONLY
ONE FLANGE

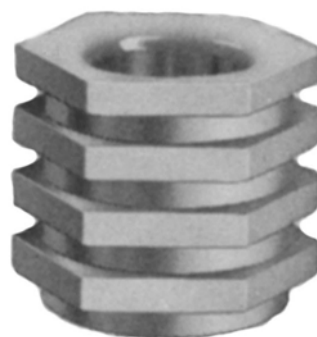
**METRIC
HEXGRIP
ELIMINATES
MOST SPIN OUT**

BLENDED RADIUS

ALL UNITED STANDARD BUSHINGS
ARE MANUFACTURED TO UNITED, U.
S.A. ANSI AND METRIC STANDARDS.

RC-61-65 in the hole

EXAMPLE Order As:
HGM-12-16-8
(TYPE-O.D.-LEN-I.D.)



**METRIC
FLANGE
GROOVE
HAS
SUPERIOR
HOLD**

FGM FLANGE GROOVE
HAS ONE TO FOUR GROOVES

10MM LENGTH HAS 1 .093" GROOVE

12MM LENGTH HAS 1 .125" GROOVE

19MM LENGTH HAS 2 .125" GROOVES

25MM LENGTH HAS 3 .125" GROOVES

35MM LENGTH HAS 4 .125" GROOVES

SPECIFY 'HGM' FOR HEX GRIP

SPECIFY 'FGM' FOR FLANGE GROOVE

FOR QUANTITY DISCOUNTS, SEE BELOW.

*The Best Hold
Out in Potted
Bushings!*

A I.D. DRILL RANGE				B Body O.D. SIZE		FLANGE O.D. HEX*	ANSI SYMBOL	C OVERALL LENGTH ANSI LENGTH SYMBOL ±.50MM (±.020")				
METRIC (G6)		U.S.A INCH		METRIC (S6)	U.S.A INCH	±0.50 MM (SEE BELOW)	INCH: 3/8 1/2 3/4 1" 1-3/8	-10	-12	-20	-25	-35
NOMINAL	DECIMAL	NOMINAL	DECIMAL	NOM.	DECIMAL							
1.30MM - 1.60MM	.0512 - .0630	#55 - 1/16	.0520 - .0625	7MM	.290 - .270	8MM	HGM-8 OR FGM-8	21.08	18.70	23.68	28.37	32.47
1.65MM - 2.50MM	.0650 - .0984	#52 - #39	.0635 - .0995	7MM	.290 - .270	8MM	HGM-8 OR FGM-8	10.17	10.39	11.63	12.91	
2.55MM - 4.90MM	.1004 - .1929	#38 - 9/64	.1015 - .1406	7MM	.290 - .270	8MM	HGM-8 OR FGM-8	8.62	10.48	11.63	12.47	
3.40MM - 4.90MM	.1339 - .1929	#29 - #10	.1360 - .1935	11MM	.447 - .427	12MM	HGM-12 OR FGM-12	7.28	7.28	8.10	9.86	13.41
4.90MM - 6.50MM	.1929 - .2559	#9 - F	.1960 - .2570	11MM	.447 - .427	12MM	HGM-12 OR FGM-12	6.64	6.74	7.35	8.62	9.86
6.50MM - 8.80MM	.2559 - .3465	F - 5/16	.2570 - .3125	12MM	.510 - .490	16MM	HGM-16 OR FGM-16	6.64	6.74	7.35	8.62	9.86
6.60MM - 8.70MM	.2598 - .3425	G - 11/32	.2610 - .3437	16MM	.635 - .615	20MM	HGM-20 OR FGM-20	6.64	6.74	7.35	8.62	9.86
8.40MM - 16.50MM	.3307 - .6496	Q - 21/32	.3320 - .6562	22MM	.885 - .865	25MM	HGM-25 OR FGM-25	9.14	8.10	7.72	8.62	9.86
16.00MM - 19.50MM	.6299 - .7677	41/64 - 49/64	.6406 - .7656	27MM	1.072 - 1.052	35MM	HGM-35 OR FGM-35		7.91	8.62	8.94	9.86
19.00MM - 26.00MM	.7480 - 1.0236	3/4 - 1-1/32	.7500 - 1.0312	35MM	1.385 - 1.365	45MM	HGM-45 OR FGM-45		13.08	11.11	13.08	14.86
I. D.				O. D.			ANSI	-10	-12	-20	-25	-35

*HEX INCH STOCK IS READILY AVAILABLE IN THE U.S.A.

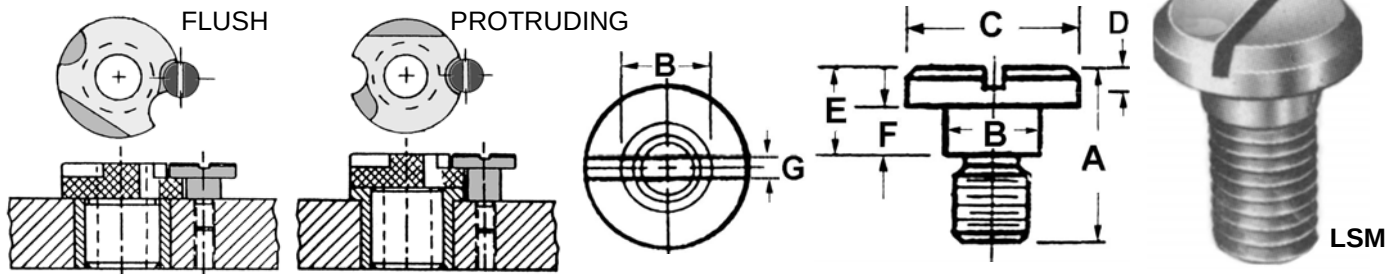
METRIC HEX BAR STOCK IS NOT READILY AVAILABLE!

QTY DISCOUNT:	1-2 LIST	3-5 -6%	6-11 -23%	12-23 -30%	24-49 -35%	50-99 -42%	100-199 -47%	200-499 -51%	500-999 -53%	1000 & UP -56%
---------------	----------	---------	-----------	------------	------------	------------	--------------	--------------	--------------	----------------

Metric Lock Screws and Round Clamps

**Metric Lock Screws
Metric Round Clamps**

METRIC LOCK SCREWS for Slip-Fixed Renewable



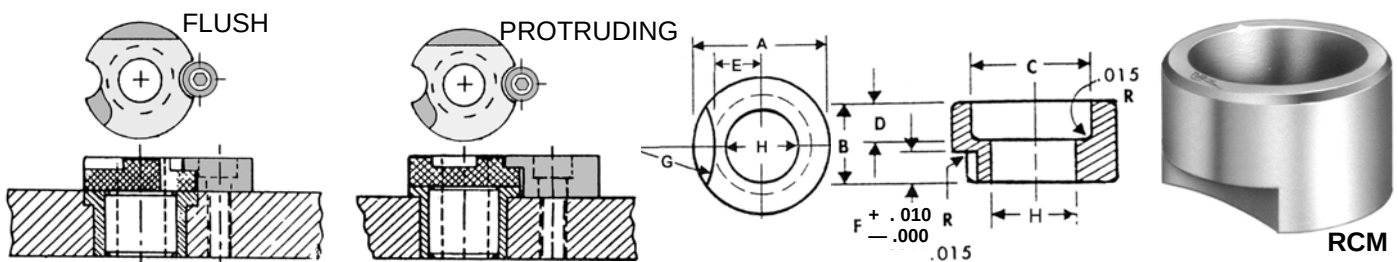
METRIC LOCK SCREWS for STANDARD MOUNTING of Slip-Fixed Renewable Bushings \$ 0.80

LOCK SCREW	SFM BUSHING BODY DIAMETER		A OVERALL LENGTH (± 0.4) MM (± 0.015) IN.		B SHOULDER DIAMETER (± 0.4) MM (± 0.015) IN.		C HEAD DIAMETER (± 0.4) MM (± 0.015) IN.		D SLOT DEPTH (± 0.4) MM (± 0.015) IN.		E HEIGHT INCL HEAD (± 0.4) MM (± 0.015) IN.		F HEIGHT UNDER HD ($+0.4/+0.2$) MM ($+0.015/+0.008$) IN.		G SLOT WIDTH (± 0.4) MM (± 0.015) IN.		THREAD
NUMBER	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	SIZE
LSM-1	8 to 10	.3150 to .3937	15	.591	7.5	.295	13	.512	2	.079	6	.236	3	.118	1.6	.063	M5 x 0.8
LSM-3	12 to 18	.4724 to .7087	18	.709	9.5	.374	16	.630	2.5	.098	8	.315	4	.157	2	.079	M6 x 1
LSM-5	22 to 42	.8661 to 1.6535	22	.866	12	.472	20	.787	3	.118	10	.394	5.5	.217	2.5	.098	M8 x 1.25
LSM-7	48 to 55	1.8898 to 2.1654	32	1.260	15	.591	24	.945	3	.118	12	.472	7	.276	2.5	.098	M10 x 1.5

METRIC LOCK SCREWS for PROJECTED MOUNTING of Slip-Fixed Renewable Bushings \$ 0.90

LSM-2	8 to 10	.3150 to .3937	18	.709	7.5	.295	13	.512	2	.079	9	.354	6	.236	1.6	.063	M5 x 0.8
LSM-4	12 to 18	.4724 to .7087	22	.866	9.5	.374	16	.630	2.5	.098	12	.472	8	.315	2	.079	M6 x 1
LSM-6	22 to 42	.8661 to 1.6535	27	1.063	12	.472	20	.787	3	.118	15	.591	10.5	.413	2.5	.098	M8 x 1.25
LSM-8	48 to 55	1.8898 to 2.1654	38	1.496	15	.591	24	.945	3	.118	18	.709	13	.512	2.5	.098	M10 x 1.5

METRIC ROUND CLAMPS for Slip-Fixed Renewable Bushings



METRIC ROUND CLAMPS for STANDARD MOUNTING of Slip-Fixed Renewable Bushings \$ 3.13

ROUND CLAMP	SFM BUSHING BODY DIAMETER		A OUTSIDE DIAMETER (± 0.4) MM (± 0.015) IN.		B OVERALL HEIGHT (± 0.4) MM (± 0.015) IN.		C COUNTER- BORE DIA. (± 0.4) MM (± 0.015) IN.		D COUNTER- BORE DEPTH (± 0.4) MM (± 0.015) IN.		E SLOT DISTANCE (± 0.4) MM (± 0.015) IN.		F CLAMPING HEIGHT ($+0.00/-0.25$) MM ($+0.010/-0.000$) IN.		G RADIUS (± 0.4) MM (± 0.015) IN.		H HOLE DIAMETER (± 0.2) MM (± 0.008) IN.		USE WITH SOCKET HEAD CAP SCREW
NUMBER	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	THD SIZE
RCM-1	8 to 10	.3150 to .3937	13	.512	8	.315	10	.394	4	.157	3.7	.146	3	.118	9.5	.375	5.4	.213	M5 x 0.8
RCM-3	12 to 18	.4724 to .7087	16	.630	10	.394	12	.472	5	.197	4.7	.185	4	.157	15	.591	6.4	.252	M6 x 1
RCM-5	22 to 42	.8661 to 1.6535	20	.787	12	.472	15	.591	5	.197	6.2	.244	5.5	.217	30	1.181	8.4	.331	M8 x 1.25
RCM-7	48 to 55	1.8898 to 2.1654	24	.945	16	.630	18	.709	7	.276	7.5	.295	7	.276	80	3.150	10.5	.413	M10 x 1.5

METRIC ROUND CLAMPS for PROJECTED MOUNTING of Slip-Fixed Renewable Bushings \$ 3.13

RCM-2	8 to 10	.3150 to .3937	13	.512	11	.433	10	.394	4	.157	3.7	.146	6	.236	9.5	.375	5.4	.213	M5 x 0.8
RCM-4	12 to 18	.4724 to .7087	16	.630	14	.551	12	.472	5	.197	4.7	.185	8	.315	15	.591	6.4	.252	M6 x 1
RCM-6	22 to 42	.8661 to 1.6535	20	.787	17	.669	15	.591	5	.197	6.2	.244	10.5	.413	30	1.181	8.4	.331	M8 x 1.25
RCM-8	48 to 55	1.8898 to 2.1654	24	.945	22	.866	18	.709	7	.276	7.5	.295	13	.512	80	3.150	10.5	.413	M10 x 1.5

5-22-09

UNITED E-X-T-E-N-D-E-D Range

**Extended Range
Drill Jig Bushings**

For Heavy Duty Applications requiring Bushings of standardized dimensions larger than those provided by the A.N.S.I. standard Bushings.



P-PU
HEADLESS
PRESS FIT



H-HU
HEAD
PRESS FIT



SF
SLIP-FIXED

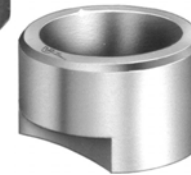


SFX
SLIP RENEWABLE

LOCK SCREWS and
ROUND CLAMPS
USED WITH SF and SFX



LS
LOCK
SCREW



RC 1-5
ROUND
CLAMP



HL-HLU
HEAD LINER



L-LU
LINER

ALL BUSHINGS SHOWN ARE IN THIS SECTION

STANDARD SIZES: All Extended Range Bushing inside diameters in 1/64 increments are Standard *UNITED* sizes.

SPECIAL SIZES: All other sizes are *Special*. When changing any Catalog Standard, please add the suffix 'SP.'

IDENTIFICATION: Special identification or marking can be stamped or etched on request.

HARDNESS: Rockwell RC-61-65 in the hole.

CONCENTRICITY: Extended Range Finished Ground Press Fit Bushings are held to a concentricity of .0005 T.I. R.

TOLERANCE: I.D. Tolerance is nominal +.0003 +.0007.

LEAD: All Finished Ground Extended Range Bushings feature a concentric

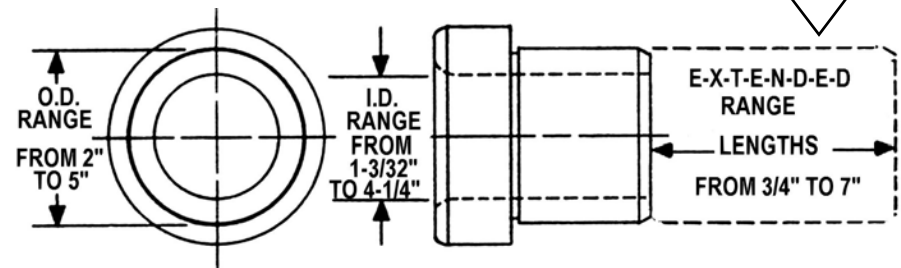
Specify suffix U for **UNGROUND** with
O.D. Tolerances of **+.015 to +.020**
GROUND O.D. Tolerances are shown.

Manufactured as ordered from semi-finished.

EXTENDED RANGE BUSHINGS
ARE NOT RETURNABLE FOR CREDIT.

ORDERING EXAMPLE: **4—P—288—48—3-3/8 (3.3750)** Specify:

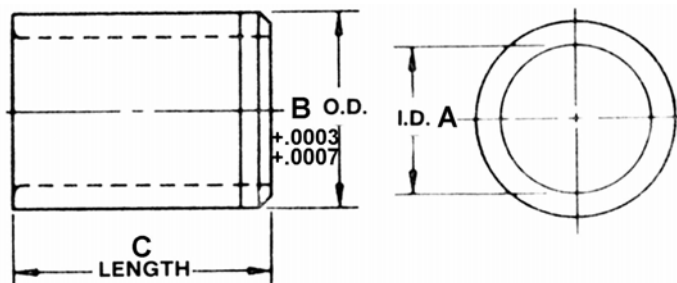
QUANTITY	BUSHING TYPE	O.D.	LENGTH	I.D. TO 4 DECIMAL PLACES
4	Press Fit P	4-1/2 288	3" 48	3-3/8" 3.3750



P - PU Headless Press Fit Bushings

For HEAVY DUTY Applications

Best Precision - Best Prices Anywhere!



QUANTITY DISCOUNT FOR SAME SIZE AND TYPE:						
1 - 3	4 - 6	7 - 12	13 - 24	25 - 49	50 - 99	100 & Up
List	-8%	-18%	-25%	-30%	-33%	-35%

STANDARD SIZES: All Extended Range Bushing inside diameters in 1/64 increments are Standard *UNITED* sizes.

SPECIAL SIZES: All other sizes are *Special*. When changing any Catalog Standard, please add the suffix 'SP.'

IDENTIFICATION: Special identification or marking can be stamped or etched on request.

HARDNESS: Rockwell C61-65 in the hole.

CONCENTRICITY: Extended Range Finished Ground Bushings are held to a concentricity of .0005 T.I.R.

TOLERANCE: I.D. Tolerance is nominal +.0003 +.0007.

LEAD: All Finished Ground Extended Range Bushings feature a concentric ground lead.

EXTENDED RANGE BUSHINGS ARE NOT RETURNABLE FOR CREDIT.

**EXTENDED
Headless
Press Fit
P and PU**

BIG - TOUGH

SPECIFY 'P' FOR GROUND
SPECIFY 'PU' FOR UNGROUND

Specify suffix U for UNGROUND with
O.D. Tolerances of +.015 to +.020.
GROUND O.D. Tolerances are shown.



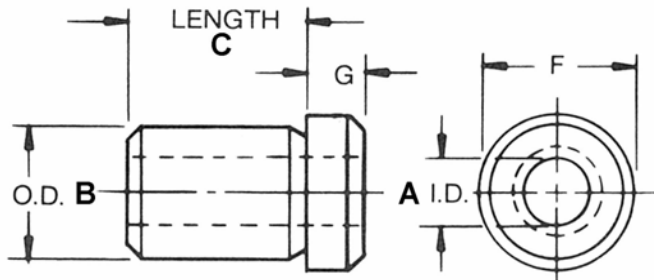
A I.D. RANGE				B O.D. SIZE			ANSI SYMBOL	C FRACTIONAL LENGTH / ANSI LENGTH SYMBOL BY 16ths																											
METRIC REF. ONLY NOM. / METRIC FROM - TO		U.S.A. INCH DECIMAL FROM - TO		U.S.A. INCH ACTUAL NOM. MAX - MIN				3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/8	2-1/4	2-1/2	2-3/4	3"	3-1/4	3-1/2	3-3/4	4"	4-1/4	4-1/2	4-3/4	5"	5-1/2	6"	6-1/2	7"					
								-12	-16	-20	-24	-28	-32	-34	-36	-40	-44	-48	-52	-56	-60	-64	-68	-72	-76	-80	-88	-96	-104	-112					
1-1/2 - 2 38.00MM - 50.00MM		1.5000 - 2.0000 1.4961 - 1.9685		2-3/8 2.3775 - 2.3771			P-152	29.98	31.64	33.86	36.35	38.02	39.96	40.98	42.90	45.23	50.23	58.55	60.50	62.16	63.55	64.66	66.55	68.82	71.04	73.26									
1-1/2 - 2-1/8 38.00MM - 50.00MM		1.5000 - 2.1250 1.4961 - 1.9685		2-1/2 2.5025 - 2.5021			P-160	30.80	33.55	34.13	37.13	38.85	41.07	42.18	44.40	47.88	51.15	59.39	61.33	62.99	66.67	65.45	67.99	70.21	72.43	74.53									
1-1/2 - 2-3/8 38.00MM - 60.00MM		1.5000 - 2.3750 1.4961 - 2.3622		2-3/4 2.7525 - 2.7521			P-176	39.27	40.77	42.37	45.19	46.46	48.13	49.30	51.23	53.96	60.22	65.32	69.58	71.60	73.03	74.65	76.87	78.81	81.03	83.05									
1-3/4 - 2-1/2 44.00MM - 62.00MM		1.7500 - 2.5000 1.7323 - 2.4409		3" 3.0028 - 3.0023			P-192	47.96	48.68	50.88	52.45	53.90	55.28		59.11	61.05	68.75	71.60	73.70	76.31	77.00	78.81	82.42	85.19	87.69	91.30									
2-1/4 - 2-3/4 55.00MM - 65.00MM		2.2500 - 2.7500 2.1654 - 2.5591		3-1/4 3.2528 - 3.2523			P-208	61.33	63.27	64.10	64.90	67.00	67.93		71.78	73.70	76.59	78.81	81.03	83.25	84.70	86.90	89.10	92.13	94.35	97.35									
2-1/4 - 2-7/8 55.00MM - 70.00MM		2.2500 - 2.8750 2.1654 - 2.7559		3-3/8 3.3778 - 3.3773			P-216	62.43	64.31	65.21	66.60	68.20	69.65		73.54	75.08	77.55	80.20	82.70	84.15	86.86	88.55	90.75	93.80	96.29	99.90	104.06								
2-1/2 - 3 60.00MM - 75.00MM		2.5000 - 3.0000 2.3622 - 2.9528		3-1/2 3.5028 - 3.5023			P-224	64.94	65.21	66.60	68.82	69.93	73.98		77.98	81.03	84.36	88.25	91.58	96.02	100.18	104.06	107.12	110.00	114.33	117.43	122.38								
2-1/2 - 3-1/8 60.00MM - 75.00MM		2.5000 - 3.1250 2.3622 - 2.9528		3-3/4 3.7528 - 3.7523			P-240	65.73	67.10	68.82	72.33	75.48	78.53		80.85	82.23	87.69	90.19	94.63	97.68	102.12	106.28	109.45	114.89	118.77	122.93	131.26	138.60							
2-3/4 - 3-3/8 65.00MM - 85.00MM		2.7500 - 3.3750 2.5591 - 3.3465		4" 4.0028 - 4.0023			P-256	67.99	69.03	72.15	74.65	76.87	79.37		81.95	84.70	88.25	91.85	95.46	99.07	102.68	106.56	111.56	115.50	121.27	126.26	136.25	145.69	155.12						
3 - 3-5/8 75.00MM - 90.00MM		3.0000 - 3.6250 2.9528 - 3.5433		4-1/4 4.2530 - 4.2525			P-272	69.38	71.60	73.82	75.90	79.37	81.95		84.70	88.25	91.30	94.63	97.96	101.84	106.01	110.17	115.16	119.88	124.60	129.87	139.86	149.85	159.84						
3 - 3-3/4 75.00MM - 95.00MM		3.0000 - 3.7500 2.9528 - 3.7402		4-3/8 4.3780 - 4.3775			P-280	71.60	73.54	76.59	78.81	81.31	83.05		85.80	90.19	93.52	97.13	101.29	105.17	109.89	114.33	119.33	124.04	129.04	134.03	144.58	155.12	164.84	172.33					
3-3/8 - 3-7/8 80.00MM - 95.00MM		3.3750 - 3.8750 3.1496 - 3.7402		4-1/2 4.5030 - 4.5025			P-288	74.65	76.04	79.20	81.40	84.36	85.80		90.19	93.24	96.85	100.18	104.34	107.95	112.94	117.66	122.66	127.93	133.20	138.47	149.30	159.84	170.39	182.60					
3-3/8 - 4-1/8 80.00MM - 100.00MM		3.3750 - 4.1250 3.1496 - 3.9370		4-3/4 4.7530 - 4.7525			P-304	78.26	80.03	82.50	84.70	87.69	90.19		93.24	96.57	100.18	103.51	107.67	111.56	116.27	120.99	126.54	131.81	137.64	143.19	153.74	165.11	175.38	189.81					
3-5/8 - 4-1/4 90.00MM - 105.00MM		3.6250 - 4.2500 3.5433 - 4.1339		5" 5.0030 - 5.0025			P-320	82.70	85.25	88.25	91.85	95.18	98.70		102.12	105.45	109.34	112.67	116.55	121.27	125.40	131.54	137.64	152.90	148.74	154.29	165.11	175.94	187.31	199.52					

UNITED's Highly Popular and Practical Extended Range Bushings!

H - HU Head Press Fit Bushings

For HEAVY DUTY Applications

Best Precision - Best Prices Anywhere!



QUANTITY DISCOUNT FOR SAME SIZE AND TYPE:

1 - 3	4 - 6	7 - 12	13 - 24	25 - 49	50 - 99	100 & Up
List	-8%	-18%	-25%	-30%	-33%	-35%

STANDARD SIZES: All Extended Range Bushing inside diameters in 1/64 increments are Standard *UNITED* sizes.

SPECIAL SIZES: *All other sizes are Special.*
When changing any Catalog Standard, please
add the suffix 'SP.'

IDENTIFICATION: Special identification or marking can be stamped or etched on request.

HARDNESS: Rockwell C61-65 in the hole.

CONCENTRICITY: Extended Range Finished Ground Bushings are held to a concentricity of .0005 T.I.R.

TOLERANCE: I.D. Tolerance is nominal
+0.0003 +0.0007.

LEAD: All Finished Ground Extended Range Bushings feature a concentric ground lead.

**EXTENDED RANGE BUSHINGS ARE NOT
RETURNABLE FOR CREDIT.**

Extended Range Head Press Fit

EXTENDED Head Press Fit H and HU

BIG — TOUGH

SPECIFY 'H' FOR **GROUND**
SPECIFY 'HU' FOR **UNGROUND**

**Specify suffix U for UNGROUND with
O.D. Tolerances of +.015 to +.020.
GROUND O.D. Tolerances are shown.**



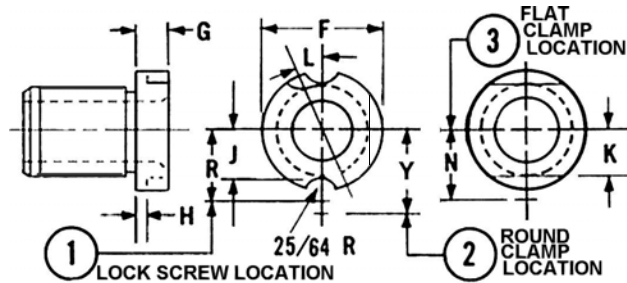
A I.D. RANGE				B O.D. SIZE			ANSI SYMBOL	C FRACTIONAL LENGTH UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths																											
METRIC REF. ONLY NOM. / METRIC		U.S.A. INCH DECIMAL		U.S.A. INCH ACTUAL		3/4		1"	1-1/4	1-1/2	1-3/4	2"	2-1/8	2-1/4	2-1/2	2-3/4	3"	3-1/4	3-1/2	3-3/4	4"	4-1/4	4-1/2	4-3/4	5"	5-1/2	6"	6-1/2	7"	TECHNICAL					
FROM -	TO	FROM -	TO	NOM.	MAX -																									MIN	-12	-16	-20	-24	-28
1-1/2 - 38.00MM	2 50.00MM	1.5000 - 1.4961	2.0000 1.9685	2-3/8	2.3775 -	2.3771	H-152	31.08	33.30	34.97	38.02	39.38	41.25	42.35	45.10	47.18	52.17	60.50	62.16	64.10	65.49	66.88	68.82	71.60	73.26	76.04					2-3/4	3/8			
1-1/2 - 38.00MM	2-1/8 50.00MM	1.5000 - 1.4961	2.1250 1.9685	2-1/2	2.5025 -	2.5021	H-160	31.63	33.83	35.48	38.50	39.88	42.08	43.18	45.93	47.58	53.00	61.50	63.30	65.21	66.00	67.99	69.58	72.05	74.65	77.00					2-3/4	3/8			
1-1/2 - 38.00MM	2-3/8 60.00MM	1.5000 - 1.4961	2.3750 2.3622	2-3/4	2.7525 -	2.7521	H-176	46.90	49.12	50.31	51.10	52.45	55.50	56.41	58.08	60.77	62.44	64.64	67.06	69.00	70.76	72.98	75.00	77.50	80.00	83.81					3"	3/8			
1-3/4 - 44.00MM	2-1/2 60.00MM	1.7500 - 1.7323	2.5000 2.3622	3"	3.0028 -	3.0023	H-192	50.23	52.00	54.30	56.06	58.00	61.05		63.27	65.77	67.16	70.01	72.15	75.40	76.59	78.53	80.48	83.20	85.45	89.08					3-1/4	3/8			
2-1/4 - 55.00MM	2-3/4 65.00MM	2.2500 - 2.1654	2.7500 2.5591	3-1/4	3.2528 -	3.2523	H-208	65.49	66.60	67.51	68.54	70.49	72.15		75.48	77.70	80.75	82.97	84.92	87.14	89.63	92.13	94.35	96.29	99.07	102.68					3-1/2	3/8			
2-1/4 - 55.00MM	2-7/8 70.00MM	2.2500 - 2.1654	2.8750 2.7559	3-3/8	3.3778 -	3.3773	H-216	66.05	67.43	68.54	69.60	71.32	72.98		76.59	78.81	81.31	83.81	86.03	88.25	90.40	92.69	95.18	97.13	100.18	103.51	107.95					3-5/8	3/8		
2-1/2 - 60.00MM	3 75.00MM	2.5000 - 2.3622	3.0000 2.9528	3-1/2	3.5028 -	3.5023	H-224	67.99	68.82	71.60	72.00	78.81	82.70		86.58	90.19	95.18	99.62	104.34	110.17	115.44	120.16	124.32	128.48	132.09	136.81	141.25					3-7/8	1/2		
2-1/2 - 60.00MM	3-1/8 75.00MM	2.5000 - 2.3622	3.1250 2.9528	3-3/4	3.7528 -	3.7523	H-240	70.21	73.26	76.50	80.40	84.36	88.52		92.41	95.74	99.62	104.06	108.70	113.22	118.22	122.93	127.65	132.37	137.64	142.36	152.07	161.51				4-1/8	1/2		
2-3/4 - 65.00MM	3-3/8 85.00MM	2.7500 - 2.5591	3.3750 3.3465	4"	4.0028 -	4.0023	H-256	78.53	80.48	83.25	86.03	89.08	92.13		95.46	98.70	102.40	106.28	110.40	114.33	119.05	123.77	129.04	134.59	140.42	145.97	157.07	168.17	179.27			4-3/8	1/2		
3 - 75.00MM	3-5/8 90.00MM	3.0000 - 2.9528	3.6250 3.5433	4-1/4	4.2530 -	4.2525	H-272	79.92	82.97	85.47	88.25	92.69	95.46		98.70	101.84	105.73	109.34	113.22	117.66	122.38	127.65	133.20	138.75	144.30	150.41	161.78	173.44	184.82			4-5/8	1/2		
3 - 75.00MM	3-3/4 95.00MM	3.0000 - 2.9528	3.7500 3.7402	4-3/8	4.3780 -	4.3775	H-280	82.97	85.75	87.69	91.02	93.52	96.57		100.18	104.34	108.78	112.39	117.38	121.82	127.10	132.09	137.64	143.19	149.45	155.40	167.06	178.71	190.92	203.13	4-3/4	1/2			
3-3/8 - 80.00 MM	3-7/8 95.00MM	3.3750 - 3.1496	3.8750 3.7402	4-1/2	4.5030 -	4.5025	H-288	86.58	89.08	89.63	95.18	97.40	100.46		104.34	108.23	111.83	116.00	120.71	125.43	130.70	136.25	142.08	147.91	150.13	153.46	172.61	184.82	204.24	210.90	4-7/8	1/2			
3-3/8 - 80.00MM	4-1/8 100.00MM	3.3750 - 3.1496	4.1250 3.9370	4-3/4	4.7530 -	4.7525	H-304	90.47	92.96	95.74	98.51	101.57	104.34		108.23	111.56	115.72	119.88	124.60	129.04	132.92	139.86	146.52	152.63	159.01	165.11	178.16	191.20	202.52	219.78	5-1/8	1/2			
3-5/8 - 90.00MM	4-1/4 105.00MM	3.6250 - 3.5433	4.2500 4.1339	5"	5.0030 -	5.0025	H-320	95.74	99.07	102.40	106.28	109.89	113.78		117.66	122.10	126.26	130.15	134.59	140.69	146.52	151.79	159.01	165.67	172.05	178.71	189.81	203.13	216.17	231.16	5-3/8	1/2			

SF Slip Fit Renewable Bushings

For HEAVY DUTY Applications

Extended Range
SF Slip Fit

Best Precision - Best Prices Anywhere!



QUANTITY DISCOUNT FOR SAME SIZE AND TYPE:

1 - 3	4 - 6	7 - 12	13 - 24	25 - 49	50 - 99	100 & Up
List	-8%	-18%	-25%	-30%	-33%	-35%

STANDARD SIZES: All Extended Range Bushing inside diameters in 1/64 increments are Standard *UNITED* sizes.

SPECIAL SIZES: All other sizes are *Special*. When changing any Catalog Standard, please add the suffix 'SP.'

IDENTIFICATION: Special identification or marking can be stamped or etched on request.

HARDNESS: Rockwell C61-65 in the hole.

CONCENTRICITY: Extended Range Finished Ground Bushings are held to a concentricity of .0005 T.I.R.

TOLERANCE: I.D. Tolerance is nominal +.0003 +.0007.

LEAD: All Finished Ground Extended Range Bushings feature a concentric ground lead.

EXTENDED RANGE BUSHINGS ARE NOT RETURNABLE FOR CREDIT.

**EXTENDED
Slip Fit
Renewable
SF**

**BIG — TOUGH
SPECIFY 'SF' FOR
SLIP FIT RENEWABLE
SEE THIS SECTION
FOR TECHNICAL DATA.**



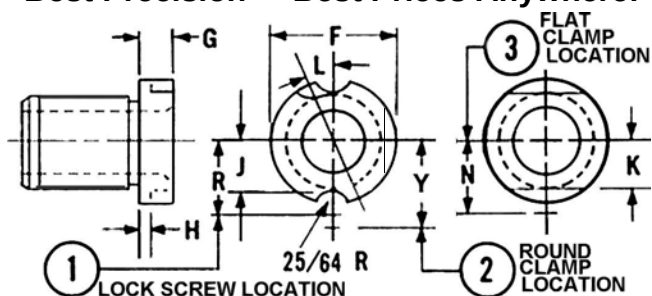
A I.D. RANGE				B O.D. SIZE			ANSI	C FRACTIONAL LENGTH UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths																											
METRIC REF. ONLY NOM. / METRIC		U.S.A. INCH DECIMAL		U.S.A. INCH ACTUAL																															
FROM -	TO	FROM -	TO	NOM.	MAX -	MIN		SYMBOL	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/8	2-1/4	2-1/2	2-3/4	3"	3-1/4	3-1/2	3-3/4	4"	4-1/4	4-1/2	4-3/4	5"	5-1/2	6"	6-1/2	7"				
FROM -	TO	FROM -	TO	NOM.	MAX -	MIN	SYMBOL	-12	-16	-20	-24	-28	-32	-34	-36	-40	-44	-48	-52	-56	-60	-64	-68	-72	-76	-80	-88	-96	-104	-112					
1-3/32 -	1-17/32	1.0937 -	1.5312	2"	2.0000 -	1.9996	SF-128	33.86	34.13	36.30	38.57	40.43	44.96	46.62	48.29	51.06	53.90	60.50	64.94	67.20	68.82	72.71	74.65	76.00	78.38	81.03									
27.00MM -	38.00MM	1.0630 -	1.4961																																
1-1/2 -	2-1/32	1.5000 -	2.0312	2-1/2	2.5000 -	2.4996	SF-160	54.50	56.61	59.11	61.61	64.38	68.32	71.68	74.39	76.84	79.38	81.93	84.19	87.01	88.21	91.53	94.36	97.18	101.46	106.02									
38.00MM -	50.00MM	1.4961 -	1.9685																																
1-1/2 -	2-9/32	1.5000 -	2.2812	2-3/4	2.7500 -	2.7496	SF-176	67.71	71.04	72.76	76.16	77.97	80.64	83.06	85.32	88.14	90.72	93.24	96.05	99.47	103.04	105.66	108.02	110.98	114.29	117.88									
38.00MM -	55.00MM	1.4961 -	2.1654																																
1-3/4 -	2-17/32	1.7500 -	2.5312	3"	3.0000 -	2.9996	SF-192	76.16	79.03	82.14	84.08	87.41	89.65			92.96	96.32	101.84	105.37	108.76	113.00	117.24	121.76	126.56	131.93	137.58	142.38								
44.00MM -	60.00MM	1.7323 -	2.3622																																
2-1/4 -	2-5/8	2.2500 -	2.6250	3-1/4	3.2500 -	3.2496	SF-208	77.70	82.37	84.75	88.35	91.25	94.92			100.05	103.21	103.13	107.25	116.00	121.90	126.79	130.25	134.81	138.14	143.64	148.47								
55.00MM -	65.00MM	2.1654 -	2.5591																																
2-1/4 -	2-7/8	2.2500 -	2.8750	3-3/8	3.3750 -	3.3746	SF-216	79.09	82.60	87.01	90.68	94.64	100.34			104.94	109.25	113.85	118.74	124.20	129.66	135.41	138.51	143.46	146.21	150.20	153.90	161.88							
55.00MM -	70.00MM	2.1654 -	2.7559																																
2-5/8 -	2-7/8	2.6250 -	2.8750	3-1/2	3.5000 -	3.4996	SF-224	83.66	84.84	89.27	92.94	97.18	102.64			107.53	111.55	116.44	121.61	126.79	132.25	136.80	142.60	146.49	151.05	156.18	161.31	172.04							
65.00MM -	70.00MM	2.5591 -	2.7559																																
2-1/2 -	3-1/8	2.5000 -	3.1250	3-3/4	3.7500 -	3.7496	SF-240	84.19	87.86	91.25	94.36	100.91	105.51			109.83	114.43	118.74	122.55	129.09	134.55	140.30	146.05	150.48	156.47	161.31	167.87	177.98	190.38						
60.00MM -	75.00MM	2.3622 -	2.9528																																
2-3/4 -	3-1/4	2.7500 -	3.2500	4"	4.0000 -	3.9996	SF-256	91.81	94.07	98.90	102.35	106.09	109.25			113.28	117.30	121.90	126.21	131.10	135.99	141.45	147.20	153.81	160.14	167.33	172.14	185.25	198.36	198.75					
65.00MM -	80.00MM	2.5591 -	3.1496																																
3 -	3-1/2	3.0000 -	3.5000	4-1/4	4.2500 -	4.2496	SF-272	93.79	96.62	101.78	104.94	108.30	113.56			117.59	121.33	125.64	127.11	135.13	139.73	145.76	150.48	158.41	164.74	171.93	178.83	190.96	204.35	218.03					
75.00MM -	85.00MM	2.9528 -	3.3465																																
3 -	3-5/8	3.0000 -	3.6250	4-3/8	4.3750 -	4.3746	SF-280	96.90	101.78	105.23	108.68	111.84	115.00			119.60	123.12	127.68	133.40	139.15	144.90	151.23	157.55	164.16	170.78	177.65	183.86	196.94	211.47	225.15	237.30				
75.00MM -	90.00MM	2.9528 -	3.5433																																
3-3/8 -	3-3/4	3.3750 -	3.7500	4-1/2	4.5000 -	4.4996	SF-288	102.93	105.45	107.81	112.29	116.15	118.45			123.91	128.51	133.11	138.29	143.75	149.21	155.25	162.15	167.58	175.95	182.85	190.61	203.21	218.31	232.56	247.19				
80.00MM -	95.00MM	3.1496 -	3.7402																																
3-3/8 -	4"	3.3750 -	4.0000	4-3/4	4.7500 -	4.7496	SF-304	107.24	110.69	113.15	117.30	120.75	123.91			128.51	131.68	137.71	142.60	148.06	153.81	159.85	166.75	172.71	180.12	187.53	194.94	209.76	223.18	239.40	256.79				
80.00MM -	100.00MM	3.1496 -	3.9370																																
3-5/8 -	4-1/4	3.6250 -	4.2500	5"	5.0000 -	4.9996	SF-320	113.85	117.88	121.90	126.50	128.54	136.50			140.30	145.48	150.08	155.25	160.71	166.32	172.71	179.55	184.52	195.51	203.70	210.33	225.15	239.15	255.08	269.79				
90.00MM -	105.00MM	3.5433 -	4.1339																																

UNITED's Highly Popular and Practical Extended Range Bushings!

Milled Flat Slip Fit Bushings

For HEAVY DUTY Applications

Best Precision - Best Prices Anywhere!



QUANTITY DISCOUNT FOR SAME SIZE AND TYPE:

1 - 3	4 - 6	7 - 12	13 - 24	25 - 49	50 - 99	100 & Up
List	-8%	-18%	-25%	-30%	-33%	-35%

STANDARD SIZES: All Extended Range Bushing inside diameters in 1/64 increments are Standard *UNITED* sizes.

SPECIAL SIZES: All other sizes are *Special*. When changing any Catalog Standard, please add the suffix 'SP.'

IDENTIFICATION: Special identification or marking can be stamped or etched on request.

HARDNESS: Rockwell C61-65 in the hole.

CONCENTRICITY: Extended Range Finished Ground Bushings are held to a concentricity of .0005 T.I.R.

TOLERANCE: I.D. Tolerance is nominal +.0003 +.0007.

LEAD: All Finished Ground Extended Range Bushings feature a concentric ground lead.

EXTENDED RANGE BUSHINGS ARE NOT RETURNABLE FOR CREDIT.

**EXTENDED
Milled Flat
Slip Fit
SFX**

SPECIFY 'SFX' FOR
MILLED FLAT SLIP FIT
SEE NEXT PAGE FOR **TECHNICAL DATA.**

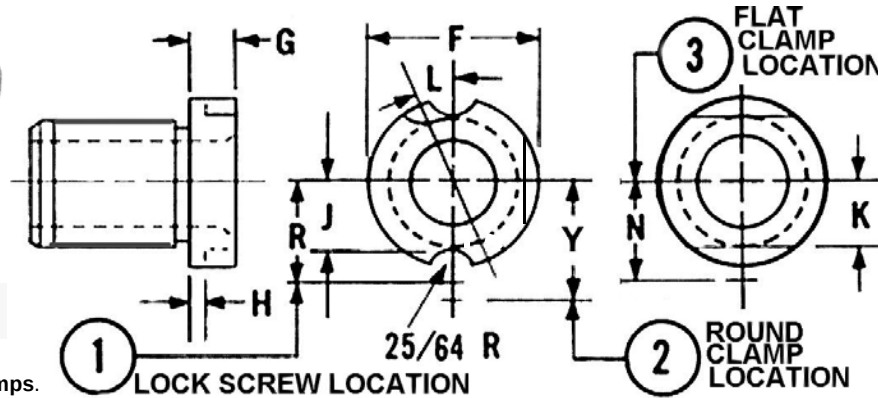
SEE FOLLOWING PAGES
FOR **HL** and **L** LINERS.



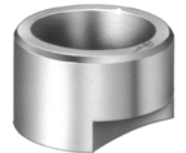
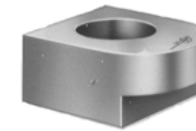
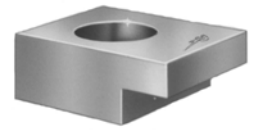
A I.D. RANGE				B O.D. SIZE			ANSI SYMBOL	C FRACTIONAL LENGTH UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths																											
METRIC REF. ONLY NOM. / METRIC		U.S.A. INCH		U.S.A. INCH ACTUAL				3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/8	2-1/4	2-1/2	2-3/4	3"	3-1/4	3-1/2	3-3/4	4"	4-1/4	4-1/2	4-3/4	5"	5-1/2	6"	6-1/2	7"					
FROM -	TO	FROM -	TO	NOM.	MAX -	MIN		-12	-16	-20	-24	-28	-32	-34	-36	-40	-44	-48	-52	-56	-60	-64	-68	-72	-76	-80	-88	-96	-104	-112					
1-3/32 27.00MM	1-17/32 38.00MM	1.0937 - 1.0630	1.5312 1.4961	2"	2.0000	1.9996	SFX-128	33.38	34.25	36.45	38.55	40.25	44.85	46.60	48.32	51.03	54.50	60.58	65.03	67.50	69.53	72.80	74.80	76.30	78.80	81.13									
1-1/2 38.00MM	2-1/32 50.00MM	1.5000 - 1.4961	2.0312 1.9685	2-1/2	2.5000	2.4996	SFX-160	54.60	56.70	59.48	61.68	65.63	68.93	71.93	74.58	77.00	78.00	82.04	84.28	87.08	89.10	91.56	94.75	97.50	102.75	106.88									
1-1/2 38.00MM	2-9/32 55.00MM	1.5000 - 1.4961	2.2812 2.1654	2-3/4	2.7500	2.7496	SFX-176	68.00	71.23	72.75	77.00	78.25	81.00	83.25	85.40	88.25	91.25	93.25	96.25	100.75	103.50	106.20	108.50	110.87	114.30	118.72									
1-3/4 44.00MM	2-17/32 60.00MM	1.7500 - 1.7323	2.5312 2.3622	3"	3.0000	2.9996	SFX-192	77.00	79.40	82.23	84.28	87.45	90.20		93.40	97.00	102.75	106.30	110.20	113.90	118.24	123.08	128.00	133.00	138.00	143.28									
2-1/4 55.00MM	2-5/8 65.00MM	2.2500 - 2.1654	2.6250 2.5591	3-1/4	3.2500	3.2496	SFX-208	78.25	81.76	85.00	88.42	91.80	94.92		100.91	104.08	107.73	112.01	116.85	121.70	126.54	131.10	134.47	137.76	144.50	148.31									
2-1/4 55.00MM	2-7/8 70.00MM	2.2500 - 2.1654	2.8750 2.7559	3-3/8	3.3750	3.3746	SFX-216	80.64	83.44	87.08	90.72	94.64	100.32		104.88	109.16	113.72	118.56	123.98	129.39	135.09	139.37	143.07	147.06	149.73	154.76	161.31								
2-5/8 65.00MM	2-7/8 70.00MM	2.6250 - 2.5591	2.8750 2.7559	3-1/2	3.5000	3.4996	SFX-224	82.32	84.92	89.32	92.96	97.16	103.50		107.45	111.44	117.30	121.41	126.54	131.96	137.66	142.22	147.30	151.91	157.00	162.05	172.89								
2-1/2 60.00MM	3-1/8 75.00MM	2.5000 - 2.3622	3.1250 2.9528	3-3/4	3.7500	3.7496	SFX-240	84.28	87.92	91.28	95.20	100.01	105.45		109.73	114.29	118.56	123.41	128.82	135.00	139.94	145.64	151.34	157.00	162.17	167.24	178.82	189.56							
2-3/4 65.00MM	3-1/4 80.00MM	2.7500 - 2.5591	3.2500 3.1496	4"	4.0000	3.9996	SFX-256	91.84	94.08	99.76	102.32	106.02	109.16		114.14	117.14	121.70	127.08	130.82	135.66	141.08	146.78	153.33	159.60	166.73	173.00	186.11	197.47	210.75						
3 75.00MM	3-1/2 85.00MM	3.0000 - 2.9528	3.5000 3.3465	4-1/4	4.2500	4.2496	SFX-272	93.80	96.60	101.75	104.88	108.20	114.43		117.42	122.19	126.50	127.97	135.99	140.59	146.68	151.14	159.28	165.60	171.29	178.13	191.80	205.20	218.88						
3 75.00MM	3-5/8 90.00MM	3.0000 - 2.9528	3.6250 3.5433	4-3/8	4.3750	4.3746	SFX-280	96.88	102.65	106.09	108.59	112.70	115.86		119.42	123.98	128.54	133.10	140.01	145.76	152.09	158.41	165.03	170.15	176.99	184.11	197.79	212.33	226.01	238.15					
3-3/8 80.00MM	3-3/4 95.00MM	3.3750 - 3.1496	3.7500 3.7402	4-1/2	4.5000	4.4996	SFX-288	102.89	106.31	107.73	113.15	117.01	118.28		124.78	129.38	133.98	139.15	144.61	150.08	156.11	163.01	168.44	175.28	183.71	189.81	204.06	217.24	231.37	248.04					
3-3/8 80.00MM	4" 100.00MM	3.3750 - 3.1496	4.0000 3.9370	4-3/4	4.7500	4.7496	SFX-304	107.16	111.55	115.00	118.16	121.61	124.78		129.38	132.54	138.58	143.46	148.93	153.33	160.71	166.16	173.57	180.98	188.39	195.80	210.62	226.01	240.26	259.92					
3-5/8 90.00MM	4-1/4 105.00MM	3.6250 - 3.5433	4.2500 4.1339	5"	5.0000	4.9996	SFX-320	113.72	117.71	121.70	126.26	130.53	135.38		141.16	146.34	150.94	156.11	161.58	168.19	173.57	181.99	183.71	198.09	205.56	211.19	226.01	241.11	255.93	270.64					

E-X-T-E-N-D-E-D Range Slip Fit Renewable Technical Data

**Extended Range
SF and SFX Slip Fit**

**SF****SFX****LOCK SCREW**

See
Bushing
Pages for
Lock
Screws and
Clamps.

**ROUND CLAMP****ROUND END CLAMP****FLAT CLAMP**

PATENT # 3,606,566

See Bushing Pages for **Lock Screws** and **Clamps**.

See following Pages for **HL** and **L** Liners.

A I.D. RANGE				B O.D. SIZE			SELECT ANSI	TECHNICAL DATA FOR SF AND SFX EXTENDED RANGE									LOCK	ROUND	ROUND END	SFX ONLY
METRIC: REFERENCE ONLY NOM. / METRIC		U.S.A. INCH DECIMAL		U.S.A. INCH ACTUAL																FLAT
FROM -	TO	FROM -	TO	NOM.	MAX -	MIN	SYMBOL	F	G	H	J	K	L	Y	N	R	SCREWS	CLAMPS	CLAMPS	CLAMPS
1-3/32 - 27.00MM -	1-17/32 38.00MM	1.0937 - 1.0630 -	1.5312 1.4961	2"	2.0000 -	1.9996	SF-128	2-9/16	3/8	3/16	1-1/8	1"	30°	1-49/64	1-41/64	1-33/64	LS-3	RC-3	R-3, R-14	F-3, F-14, F-15
1-1/2 - 38.00MM -	2-1/32 50.00MM	1.5000 - 1.4961 -	2.0312 1.9685	2-1/2	2.5000 -	2.4996	SF-160	3-1/16	3/8	3/16	1-3/8	1-1/4	25°	2-1/64	1-57/64	1-49/64	LS-3	RC-3	R-3, R-14	F-3, F-14, F-15
1-1/2 - 38.00MM -	2-9/32 55.00MM	1.5000 - 1.4961 -	2.2812 2.1654	2-3/4	2.7500 -	2.7496	SF-176	3-7/16	7/16	7/32	1-35/64	1-3/8	25°	2-1/4	2-3/16	1-15/16	LS-4	RC-4	R-4, R-15	F-4, F-5, F-16, F-17
1-3/4 - 44.00MM -	2-17/32 60.00MM	1.7500 - 1.7323 -	2.5312 2.3622	3"	3.0000 -	2.9996	SF-192	3-11/16	7/16	7/32	1-43/64	1-1/2	25°	2-3/8	2-5/16	2-1/16	LS-4	RC-4	R-4, R-15	F-4, F-5, F-16, F-17
2-1/4 - 55.00MM -	2-5/8 65.00MM	2.2500 - 2.1654 -	2.6250 2.5591	3-1/4	3.2500 -	3.2496	SF-208	3-15/16	7/16	7/32	1-51/64	1-5/8	25°	2-1/2	2-7/16	2-3/16	LS-4	RC-4	R-4, R-15	F-4, F-5, F-16, F-17
2-1/4 - 55.00MM -	2-7/8 70.00MM	2.2500 - 2.1654 -	2.8750 2.7559	3-3/8	3.3750 -	3.3746	SF-216	4-1/16	7/16	7/32	1-55/64	1-11/16	25°	2-9/16	2-1/2	2-1/4	LS-4	RC-4	R-4, R-15	F-4, F-5, F-16, F-17
2-5/8 - 65.00MM -	2-7/8 70.00MM	2.6250 - 2.5591 -	2.8750 2.7559	3-1/2	3.5000 -	3.4996	SF-224	4-3/16	7/16	7/32	1-59/64	1-3/4	25°	2-5/8	2-9/16	2-5/16	LS-4	RC-4	R-4, R-15	F-4, F-5, F-16, F-17
2-1/2 - 60.00MM -	3-1/8 75.00MM	2.5000 - 2.3622 -	3.1250 2.9528	3-3/4	3.7500 -	3.7496	SF-240	4-9/16	7/16	7/32	2-7/64	1-7/8	25°	2-13/16	2-11/16	2-1/2	LS-4	RC-4	R-4, R-16	F-4, F-5, F-18, F-19
2-3/4 - 65.00MM -	3-1/4 80.00MM	2.7500 - 2.5591 -	3.2500 3.1496	4"	4.0000 -	3.9996	SF-256	4-13/16	1/2	1/4	2-15/64	2"	25°	2-15/16	2-13/16	2-5/8	LS-5	RC-5	R-5, R-17	F-6, F-7, F-20, F-21
3 - 75.00MM -	3-1/2 85.00MM	3.0000 - 2.9528 -	3.5000 3.3465	4-1/4	4.2500 -	4.2496	SF-272	5-1/16	1/2	1/4	2-23/64	2-1/8	20°	3-1/16	3-1/16	2-3/4	LS-5	RC-5	R-5, R-17	F-6, F-7, F-20, F-21
3 - 75.00MM -	3-5/8 90.00MM	3.0000 - 2.9528 -	3.6250 3.5433	4-3/8	4.3750 -	4.3746	SF-280	5-3/16	1/2	1/4	2-27/64	2-3/16	20°	3-1/8	3"	2-13/16	LS-5	RC-5	R-5, R-17	F-6, F-7, F-20, F-21
3-3/8 - 80.00MM -	3-3/4 95.00MM	3.3750 - 3.1496 -	3.7500 3.7402	4-1/2	4.5000 -	4.4996	SF-288	5-5/16	1/2	1/4	2-31/64	2-1/4	20°	3-3/16	3-1/16	2-7/8	LS-5	RC-5	R-5, R-17	F-6, F-7, F-20, F-21
3-3/8 - 80.00MM -	4" 100.00MM	3.3750 - 3.1496 -	4.0000 3.9370	4-3/4	4.7500 -	4.7496	SF-304	5-9/16	1/2	1/4	2-39/64	2-3/8	20°	3-5/16	3-3/16	3"	LS-5	RC-5	R-5, R-17	F-6, F-7, F-20, F-21
3-5/8 - 90.00MM -	4-1/4 105.00MM -	3.6250 - 3.5433 -	4.2500 4.1339	5"	5.0000 -	4.9996	SF-320	5-13/16	1/2	1/4	2-47/64	2-1/2	20°	3-7/16	3-5/16	3-1/8	LS-5	RC-5	R-5, R-17	F-6, F-7, F-20, F-21

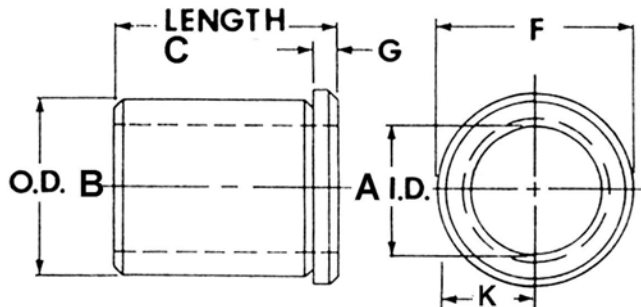
UNITED's Highly Popular and Practical Extended Range Bushings!

HL - HLU Head Liner Bushings

For HEAVY DUTY Applications

Extended Range Head Liner

Best Precision - Best Prices Anywhere!



STANDARD SIZES: All Extended Range Bushing inside diameters in 1/64 increments are Standard *UNITED* sizes.

SPECIAL SIZES: *All other sizes are Special.*
When changing any Catalog Standard, please
add the suffix 'SP.'

IDENTIFICATION: Special identification or marking can be stamped or etched on request.

HARDNESS: Rockwell C61-65 in the hole.

CONCENTRICITY: Extended Range Finished Ground Bushings are held to a concentricity of .0005 T.I.R.

TOLERANCE: I.D. Tolerance is nominal
+.0003 +.0007.

LEAD: All Finished Ground Extended Range Bushings feature a concentric ground lead.

**EXTENDED RANGE BUSHINGS ARE NOT
RETURNABLE FOR CREDIT.**

**Specify suffix U for UNGROUND with
O.D. Tolerances of +.015 to +.020.
GROUND O.D. Tolerances are shown.**



QUANTITY DISCOUNT FOR SAME SIZE AND TYPE:

1 - 3	4 - 6	7 - 12	13 - 24	25 - 49	50 - 99	100 & Up
List	-8%	-18%	-25%	-30%	-33%	-35%

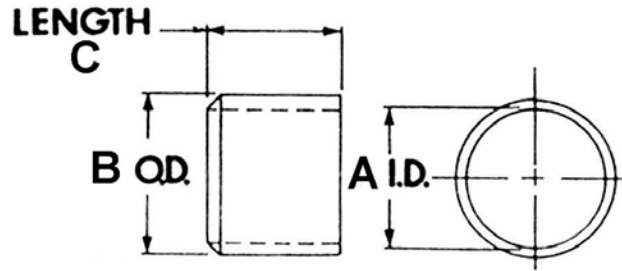
A I.D. RANGE		B O.D. SIZE			ANSI	C FRACTIONAL LENGTH OVERALL / ANSI LENGTH SYMBOL BY 16ths																											
METRIC: REF.	U.S.A. INCH DECIMAL	U.S.A. INCH ACTUAL				SYMBOL	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/8	2-1/4	2-1/2	2-3/4	3"	3-1/4	3-1/2	3-3/4	4"	4-1/4	4-1/2	4-3/4	5"	5-1/2	6"	6-1/2	7"	TECHNICAL DATA			
NOMMETRIC	MAX - MIN	NOM.	MAX -	MIN			-12	-16	-20	-24	-28	-32	-34	-36	-40	-44	-48	-52	-56	-60	-64	-68	-72	-76	-80	-88	-96	-104	-112	F	G	K	
2" 50.00MM	2.0010 - 2.0015 1.9685	2-1/2	2.5025 -	2.5021	HL-160	26.90	27.20	30.10	32.19	34.00	35.52	37.10	39.41	41.25	45.79	48.84	61.51	62.99	64.24	66.70	68.54	70.66	72.15	74.30					2-5/8	3/16			
2-1/2 60.00MM	2.5010 - 2.5015 2.3622	3"	3.0028 -	3.0023	HL-192	51.06	51.89	54.29	55.50	56.33	59.74	61.00	62.40	64.94	66.40	69.20	71.32	73.26	75.10	77.15	79.37	81.86	84.36	88.25					3-1/8	3/16			
2-3/4 65.00MM	2.7510 - 2.7515 2.5591	3-3/8	3.3778 -	3.3773	HL-216	61.05	63.27	64.10	64.85	66.88	68.27	69.85	72.15	74.30	76.59	78.81	81.03	83.25	85.40	87.41	89.80	92.13	94.35	98.24					3-1/2	3/16			
3" 75.00MM	3.0010 - 3.0015 2.9528	3-5/8	3.6278 -	3.6273	HL-232	64.94	66.88	68.82	71.32	73.82	76.31		78.81	81.13	84.36	87.69	91.02	94.35	98.24	101.84	106.28	110.72	115.16	119.33					3-7/8	3/16	1-27/32		
3-1/4 75.00MM	3.2510 - 3.2515 2.9528	3-7/8	3.8778 -	3.8773	HL-248	66.60	68.82	71.60	74.37	77.15	79.92		83.25	86.30	89.91	93.24	97.13	101.29	105.73	109.34	112.67	116.55	120.71	124.60					4-1/8	3/16	1-31/32		
3-3/8 85.00MM	3.3760 - 3.3765 3.3465	4"	4.0028 -	4.0023	HL-256	67.99	70.49	73.54	77.15	79.92	83.25		87.14	90.74	94.35	98.51	102.95	107.67	112.67	115.72	119.33	122.38	125.43	129.04	135.98				4-1/4	3/16	2-1/32		
3-1/2 85.00MM	3.5010 - 3.5015 3.3465	4-1/8	4.1280 -	4.1275	HL-264	70.21	72.98	76.04	77.42	81.86	85.25		89.91	93.24	96.85	102.40	105.45	110.17	115.16	118.22	124.32	127.37	130.43	134.05	140.69				4-3/8	3/16	2-3/32		
3-3/4 95.00MM	3.7510 - 3.7515 3.7402	4-1/2	4.5030 -	4.5025	HL-288	71.60	74.37	77.15	80.75	83.81	87.69		91.02	95.18	98.51	102.68	107.12	111.83	116.55	121.27	125.99	130.98	135.98	140.69	149.85	159.84			4-3/4	7/32	2-9/32		
4" 100.00MM	4.0010 - 4.0015 3.9370	4-3/4	4.7530 -	4.7525	HL-304	77.70	79.37	82.14	85.19	87.97	90.74		94.35	97.40	101.29	104.90	108.78	112.94	117.66	122.10	127.65	133.20	138.47	144.02	155.12	165.95	177.60		5"	7/32	2-13/32		
4-1/4 105.00MM	4.2510 - 4.2515 4.1339	5"	5.0030 -	5.0025	HL-320	79.37	81.59	84.36	86.86	90.47	93.24		97.40	101.01	104.62	108.23	111.83	116.00	120.99	125.99	131.54	136.81	142.91	148.19	159.84	171.22	182.60		5-1/4	7/32	2-17/32		
4-3/8 105.00MM	4.3760 - 4.3765 4.1339	5-1/8	5.1280 -	5.1275	HL-328	81.86	84.36	87.41	90.19	92.16	95.74		99.62	102.68	106.84	111.00	115.44	120.44	125.43	130.43	136.25	141.53	147.63	153.46	165.11	177.05	188.70	200.36	5-3/8	7/32	2-19/32		
4-1/2 105.00MM	4.5010 - 4.5015 4.1339	5-1/4	5.2530 -	5.2525	HL-336	85.47	88.25	91.02	93.52	96.57	99.62		102.95	106.56	110.90	114.89	119.33	124.04	129.04	134.31	140.69	147.63	152.07	158.45	170.39	182.60	194.53	208.40	5-1/2	7/32	2-21/32		
4-3/4 115.00MM	4.7510 - 4.7515 4.5276	5-1/2	5.5030 -	5.5025	HL-352	89.08	92.13	94.63	97.40	100.18	102.95		106.56	110.45	114.33	119.42	122.93	127.65	132.92	138.20	144.58	150.68	156.79	163.45	173.99	188.70	200.63	215.90	5-3/4	7/32	2-25/32		
5" 125.00MM	5.0010 - 5.0015 4.9213	5-3/4	5.7530 -	5.7525	HL-368	99.07	100.18	101.29	104.90	108.78	112.67		116.27	120.71	124.60	128.76	133.48	138.47	144.58	149.85	157.34	163.73	169.83	176.21	188.70	201.19	213.68	228.11	6"	7/32	2-29/32		

L - LU Headless Liner Bushings

For HEAVY DUTY Applications

Extended Range
Headless Liner

Best Precision - Best Prices Anywhere!



STANDARD SIZES: All Extended Range Bushing inside diameters in 1/64 increments are Standard **UNITED** sizes.

SPECIAL SIZES: All other sizes are Special. When changing any Catalog Standard, please add the suffix 'SP.'

IDENTIFICATION: Special identification or marking can be stamped or etched on request.

HARDNESS: Rockwell C61-65 in the hole.

CONCENTRICITY: Extended Range Finished Ground Bushings are held to a concentricity of .0005 T.I.R.

TOLERANCE: I.D. Tolerance is nominal +.0003 +.0007.

LEAD: All Finished Ground Extended Range Bushings feature a concentric ground lead.

EXTENDED RANGE BUSHINGS ARE NOT RETURNABLE FOR CREDIT.

**EXTENDED
Headless Liner
L and LU**

BIG — TOUGH
SPECIFY 'L' FOR GROUND
SPECIFY 'LU' FOR UNGROUND

Specify suffix U for UNGROUND with
O.D. Tolerances of +.015 to +.020.
GROUND O.D. Tolerances are shown.

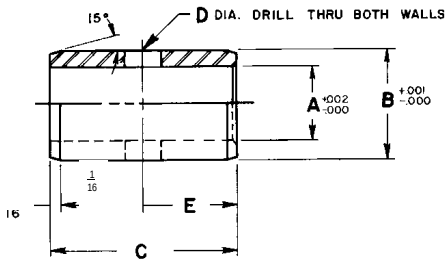


QUANTITY DISCOUNT FOR SAME SIZE AND TYPE:						
1 - 3	4 - 6	7 - 12	13 - 24	25 - 49	50 - 99	100 & Up
List	-8%	-18%	-25%	-30%	-33%	-35%

A I.D. RANGE			B O.D. SIZE			ANSI	C FRACTIONAL LENGTH OVERALL / ANSI LENGTH SYMBOL BY 16ths																											
METRIC: REF. ONLY	U.S.A. INCH DECIMAL		U.S.A. INCH ACTUAL				SYMBOL	3/4	1"	1-1/4	1-1/2	1-3/4	2"	2-1/8	2-1/4	2-1/2	2-3/4	3"	3-1/4	3-1/2	3-3/4	4"	4-1/4	4-1/2	4-3/4	5"	5-1/2	6"	6-1/2	7"				
NOM./METRIC	MAX -	MIN	NOM.	MAX -	MIN	SYMBOL		-12	-16	-20	-24	-28	-32	-34	-36	-40	-44	-48	-52	-56	-60	-64	-68	-72	-76	-80	-88	-96	-104	-112				
2" 50.00MM	2.0010 - 2.0015 1.9685		2-1/2	2.5025 - 2.5021		L-160	22.83	23.10	25.58	27.27	29.15	30.53	31.63	33.28	34.93	42.90	47.85	51.98	53.35	55.00	57.20	58.85	61.05	62.98	64.35									
2-1/2 60.00MM	2.5010 - 2.5015 2.3622		3"	3.0028 - 3.0023		L-192	48.84	49.40	51.06	52.17	54.11	55.50	57.44	59.11	61.33	64.10	66.88	68.82	70.95	73.26	74.80	77.00	79.75	82.50	85.80									
2-3/4 65.00MM	2.7510 - 2.7515 2.5591		3-3/8	3.3778 - 3.3773		L-216	58.83	60.50	61.33	63.27	65.21	66.60	67.65	69.58	71.50	73.70	75.90	78.10	80.30	82.50	85.80	86.90	88.83	92.13	94.88									
3" 75.00MM	3.0010 - 3.0015 2.9528		3-5/8	3.6278 - 3.6273		L-232	63.27	64.63	67.16	69.10	71.50	73.70		75.04	79.37	81.95	84.70	88.00	91.85	94.88	98.73	103.13	107.25	111.83	115.23									
3-1/4 75.00MM	3.2510 - 3.2515 2.9528		3-7/8	3.8778 - 3.8773		L-248	64.66	67.16	69.93	69.93	74.93	77.70		80.30	83.05	86.90	90.20	94.33	97.90	101.75	105.33	109.18	112.75	116.60	120.18									
3-3/8 85.00MM	3.3760 - 3.3765 3.3465		4"	4.0028 - 4.0023		L-256	66.05	68.82	70.95	73.98	77.55	80.58		84.43	87.45	91.30	94.88	99.55	104.23	108.63	112.20	115.23	118.25	121.55	124.85	138.33								
3-1/2 85.00MM	3.5010 - 3.5015 3.3465		4-1/8	4.1280 - 4.1275		L-264	67.65	70.13	73.43	76.45	79.75	80.85		86.58	90.47	94.35	98.51	102.95	107.39	111.83	115.72	118.80	123.20	126.78	130.90	143.00								
3-3/4 95.00MM	3.7510 - 3.7515 3.7402		4-1/2	4.5030 - 4.5025		L-288	71.23	71.50	74.53	77.83	81.13	84.70		88.00	91.58	94.88	99.00	103.68	107.80	112.75	117.43	121.83	126.50	130.90	135.58	145.20	154.28							
4" 100.00MM	4.0010 - 4.0015 3.9370		4-3/4	4.7530 - 4.7525		L-304	76.84	78.82	79.92	84.19	85.75	88.25		91.85	95.18	98.51	101.20	105.33	109.89	113.85	119.05	123.20	128.70	133.93	139.43	149.88	161.78	172.88						
4-1/4 105.00MM	4.2510 - 4.2515 4.1339		5"	5.0030 - 5.0025		L-320	76.45	78.65	81.40	84.43	87.45	90.20		94.05	97.35	100.65	104.50	108.35	112.20	117.94	121.55	127.05	132.28	138.75	144.86	155.96	166.78	169.58						
4-3/8 105.00MM	4.3760 - 4.3765 4.1339		5-1/8	5.1280 - 5.1275		L-328	78.93	81.95	84.43	86.90	89.65	92.40		95.70	99.28	103.40	107.25	111.65	116.05	121.83	126.23	131.18	136.95	140.25	147.95	160.95	172.33	183.98	193.33					
4-1/2 105.00MM	4.5010 - 4.5015 4.1339		5-1/4	5.2530 - 5.2525		L-336	82.50	85.53	87.73	90.48	94.60	95.70		99.28	103.13	107.95	110.55	114.95	119.63	124.85	129.80	137.64	141.35	147.91	154.29	165.95	178.16	189.81	201.30					
4-3/4 115.00MM	4.7510 - 4.7515 4.5276		5-1/2	5.5030 - 5.5025		L-352	85.80	89.10	91.58	94.33	96.53	99.28		103.79	106.15	110.28	114.13	119.60	124.04	130.20	133.38	140.69	145.75	152.90	157.58	171.22	183.71	195.08	209.28					
5" 125.00MM	5.0010 - 5.0015 4.9213		5-3/4	5.7530 - 5.7525		L-368	91.30	94.60	97.90	101.20	104.78	108.63		112.75	116.60	120.45	124.30	129.87	134.87	140.69	147.84	153.46	158.13	164.18	170.23	183.98	191.50	206.25	220.00					

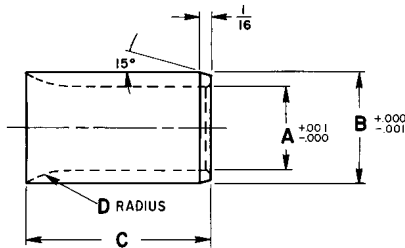
UNITED's Highly Popular and Practical Extended Range Bushings!

New From United For Swing Hangars, Frames and Truck Brake Riggings:



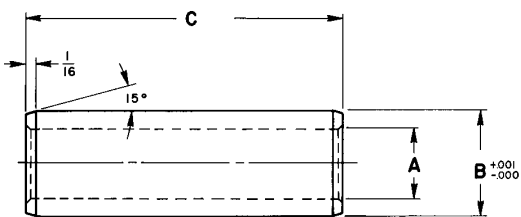
TYPE GPA

UNITED PART NO.	A	B	C	D	E
GPA-112-19-1 1/4	1-1/4	1.758	1-3/16	1/2	9/16
GPA-112-20-1 3/8	1-3/8	1.758	1-1/4	9/16	1/2



TYPE GPB

UNITED PART NO.	A	B	C	D
GPB-94-11-1.128	1.128	1.484	11/16	1/8
GPB-136-34-1 3/4	1-3/4	2.125	2-1/8	9/32
GPB-138-34-1 47/64	1-47/64	2.140	2-9/64	9/32
GPB-152-22-2	2	2.375	1-3/4	1/4
GPB-154-27-1 63/64	1-63/64	2.390	1-11/16	9/32
GPB-161-48-2 1/8	2-1/8	2.531	3-1/64	3/8
GPB-192-62-2.654	2.654	3.046	3-27/32	5/16



TYPE GPC

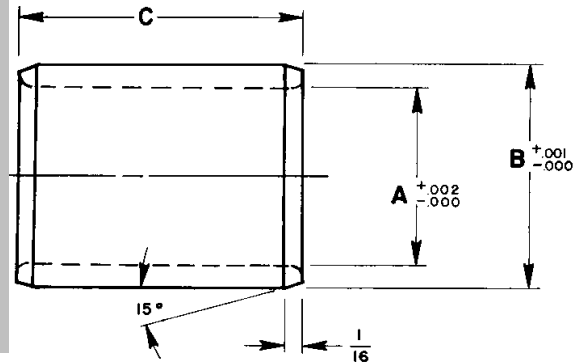
UNITED PART NO.	A	B	C
GPC-94-137-15/16	15/16	1.485	8-19/32
GPC-94-157-15/16	15/16	1.485	9-13/16
GPC-102-124-15/16	15/16	1.609	7-25/32
GPC-102-127-15/16	15/16	1.609	7-31/32
GPC-115-128-15/16	15/16	1.796	8

**NEW!
RAILROAD
BUSHINGS**

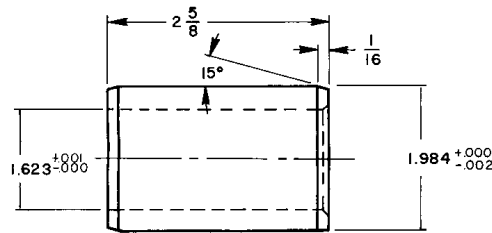
**UNIFORMLY
CASE
HARDENED**

**HIGH
QUALITY
STEEL**

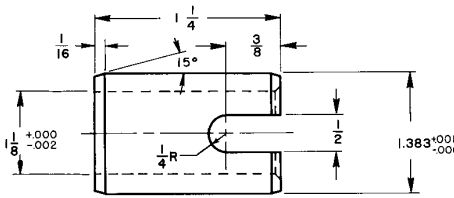
General Purpose GP
Series GP-XXX (See page A45) →



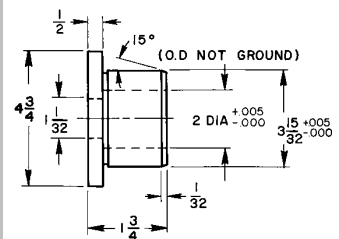
SPECIALIZED and GENERAL PURPOSE TYPES



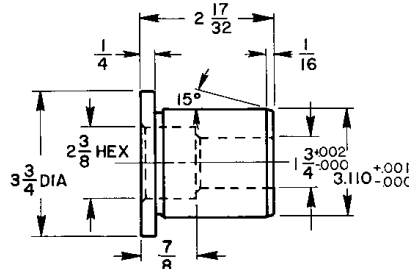
GPD-125-42-1.623



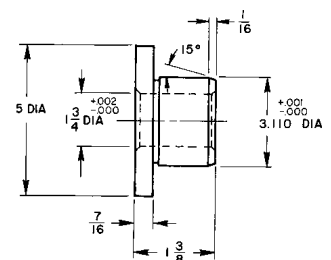
GPE-89-32-1-1/8



GPF-222-28-1-1/32



GPG-200-40-1-3/4



GPH-200-22-1-3/4

Precision Ground Railroad Bushings

GP PART NO.	A	B	C
GP-89-8-1	1	1.383	1/2
GP-89-12-1	1	1.383	3/4
GP-89-16-1	1	1.383	1
GP-89-24-1	1	1.383	1-1/2
GP-89-8-1 1/8	1-1/8	1.383	1/2
GP-95-10-1 1/8	1-1/8	1.490	5/8
GP-95-12-1 1/8	1-1/8	1.490	3/4
GP-95-15-1 1/8	1-1/8	1.490	15/16
GP-95-16-1 1/8	1-1/8	1.490	1
GP-95-20-1 1/8	1-1/8	1.490	1-1/4
GP-95-24-1 1/8	1-1/8	1.490	1-1/2
GP-95-28-1 1/8	1-1/8	1.490	1-3/4
GP-95-32-1 1/8	1-1/8	1.490	2
GP-95-36-1 1/8	1-1/8	1.490	2-1/4
GP-95-40-1 1/8	1-1/8	1.490	2-1/2
GP-95-41-1 1/8	1-1/8	1.490	2-9/16
GP-95-44-1 1/8	1-1/8	1.490	2-3/4
GP-96-14-1	1	1.508	7/8
GP-96-16-1	1	1.508	1
GP-96-8-1 1/8	1-1/8	1.508	1/2
GP-96-10-1 1/8	1-1/8	1.508	5/8
GP-96-12-1 1/8	1-1/8	1.508	3/4
GP-96-15-1 1/8	1-1/8	1.508	15/16
GP-96-16-1 1/8	1-1/8	1.508	1
GP-96-18-1 1/8	1-1/8	1.508	1-1/8
GP-96-20-1 1/8	1-1/8	1.508	1-1/4
GP-96-24-1 1/8	1-1/8	1.508	1-1/2
GP-96-32-1 1/8	1-1/8	1.508	2
GP-96-32-1 1/4	1-1/4	1.508	2
GP-103-10-1 1/4	1-1/4	1.615	5/8
GP-103-12-1 1/4	1-1/4	1.615	3/4
GP-103-14-1 1/4	1-1/4	1.615	29/32
GP-103-16-1 1/4	1-1/4	1.615	1
GP-103-18-1 1/4	1-1/4	1.615	1-3/32
GP-103-20-1 1/4	1-1/4	1.615	1-1/4
GP-103-24-1 1/4	1-1/4	1.615	1-1/2
GP-103-28-1 1/4	1-1/4	1.615	1-3/4
GP-103-30-1 1/4	1-1/4	1.615	1-29/32
GP-103-32-1 1/4	1-1/4	1.615	2
GP-103-33-1 1/4	1-1/4	1.615	2-1/32
GP-103-36-1 1/4	1-1/4	1.615	2-1/4
GP-103-38-1 1/4	1-1/4	1.615	2-3/8
GP-103-40-1 1/4	1-1/4	1.615	2-1/2
GP-103-44-1 1/4	1-1/4	1.615	2-3/4
GP-103-45-1 1/4	1-1/4	1.615	2-13/16
GP-105-20-1 1/8	1-1/8	1.633	1-1/4
GP-105-8-1 1/4	1-1/4	1.633	1/2
GP-105-10-1 1/4	1-1/4	1.633	5/8
GP-105-12-1 1/4	1-1/4	1.633	3/4
GP-105-13-1 1/4	1-1/4	1.633	13/16
GP-105-14-1 1/4	1-1/4	1.633	29/32
GP-105-16-1 1/4	1-1/4	1.633	1
GP-105-18-1 1/4	1-1/4	1.633	1-1/8
GP-105-20-1 1/4	1-1/4	1.633	1-1/4
GP-105-24-1 1/4	1-1/4	1.633	1-1/2
GP-105-26-1 1/4	1-1/4	1.633	1-5/8
GP-105-30-1 1/4	1-1/4	1.633	1-29/32
GP-105-32-1 1/4	1-1/4	1.633	2
GP-105-36-1 1/4	1-1/4	1.633	2-1/4
GP-111-10-1 3/8	1-3/8	1.740	5/8
GP-111-12-1 3/8	1-3/8	1.740	3/4
GP-111-16-1 3/8	1-3/8	1.740	1
GP-111-18-1 3/8	1-3/8	1.740	1-1/8
GP-111-20-1 3/8	1-3/8	1.740	1-1/4
GP-111-24-1 3/8	1-3/8	1.740	1-1/2
GP-111-28-1 3/8	1-3/8	1.740	1-3/4
GP-111-32-1 3/8	1-3/8	1.740	2
GP-112-12-1 1/4	1-1/4	1.758	3/4
GP-112-14-1 1/4	1-1/4	1.758	7/8
GP-112-15-1 1/4	1-1/4	1.758	15/16
GP-112-16-1 1/4	1-1/4	1.758	1
GP-112-17-1 1/4	1-1/4	1.758	1-1/16
GP-112-18-1 1/4	1-1/4	1.758	1-1/8
GP-112-22-1 1/4	1-1/4	1.758	1-3/8
GP-112-54-1 1/4	1-1/4	1.758	3-3/8

GP PART NO.	A	B	C
GP-112-5-1 3/8	1-3/8	1.758	5/16
GP-112-8-1 3/8	1-3/8	1.758	1/2
GP-112-10-1 3/8	1-3/8	1.758	5/8
GP-112-12-1 3/8	1-3/8	1.758	3/4
GP-112-14-1 3/8	1-3/8	1.758	7/8
GP-112-16-1 3/8	1-3/8	1.758	1
GP-112-18-1 3/8	1-3/8	1.758	1-1/8
GP-112-20-1 3/8	1-3/8	1.758	1-1/4
GP-112-24-1 3/8	1-3/8	1.758	1-1/2
GP-112-32-1 3/8	1-3/8	1.758	2
GP-119-10-1	1-1/2	1.865	5/8
GP-119-12-1	1-1/2	1.865	3/4
GP-119-13-1 1/2	1-1/2	1.865	27/32
GP-119-16-1 1/2	1-1/2	1.865	1
GP-119-18-1 1/2	1-1/2	1.865	1-3/32
GP-119-20-1 1/2	1-1/2	1.865	1-1/4
GP-119-24-1 1/2	1-1/2	1.865	1-1/2
GP-119-28-1 1/2	1-1/2	1.865	1-3/4
GP-119-32-1 1/2	1-1/2	1.865	2
GP-119-36-1 1/2	1-1/2	1.865	2-1/4
GP-119-40-1 1/2	1-1/2	1.865	2-1/2
GP-119-44-1 1/2	1-1/2	1.865	2-3/4
GP-120-32-1 1/2	1.508	1.878	2
GP-121-16-1 3/8	1-3/8	1.883	1
GP-121-18-1 3/8	1-3/8	1.883	1-1/8
GP-121-10-1 1/2	1-1/2	1.883	5/8
GP-121-12-1 1/2	1-1/2	1.883	3/4
GP-121-14-1 1/2	1-1/2	1.883	7/8
GP-121-16-1 1/2	1-1/2	1.883	1
GP-121-18-1 1/2	1-1/2	1.883	1-3/32
GP-121-20-1 1/2	1-1/2	1.883	1-1/4
GP-121-24-1 1/2	1-1/2	1.883	1-1/2
GP-121-32-1 1/2	1-1/2	1.883	2
GP-121-42-1 1/2	1-1/2	1.883	2-5/8
GP-127-10-1 5/8	1-5/8	1.990	5/8
GP-127-20-1 5/8	1-5/8	1.990	1-1/4
GP-128-16-1 1/2	1-1/2	2.008	1
GP-128-18-1 1/2	1-1/2	2.008	1-1/8
GP-128-20-1 1/2	1-1/2	2.008	1-1/4
GP-128-10-1 5/8	1-5/8	2.008	5/8
GP-128-12-1 5/8	1-5/8	2.008	3/4
GP-128-16-1 5/8	1-5/8	2.008	1
GP-128-18-1 5/8	1-5/8	2.008	1-1/8
GP-128-24-1 5/8	1-5/8	2.008	1-1/2
GP-128-32-1 43/64	1-43/64	2.008	2
GP-135-10-1 1/4	1-3/4	2.115	5/8
GP-135-12-1 3/4	1-3/4	2.115	3/4
GP-135-16-1 3/4	1-3/4	2.115	1
GP-135-17-1 3/4	1-3/4	2.115	1-1/16
GP-135-18-1 3/4	1-3/4	2.115	1-1/8
GP-135-20-1 3/4	1-3/4	2.115	1-1/4
GP-135-24-1 3/4	1-3/4	2.115	1-1/2
GP-135-28-1 3/4	1-3/4	2.115	1-3/4
GP-135-32-1 3/4	1-3/4	2.115	2
GP-135-36-1 3/4	1-3/4	2.115	2-1/4
GP-135-40-1 3/4	1-3/4	2.115	2-1/2
GP-135-44-1 3/4	1-3/4	2.115	2-3/4
GP-135-47-1 3/4	1-3/4	2.115	2-15/16
GP-135-63-1 3/4	1-3/4	2.115	3-15/16
GP-137-36-1 5/8	1-5/8	2.133	2-1/4
GP-137-10-1 3/4	1-3/4	2.133	5/8
GP-137-12-1 3/4	1-3/4	2.133	3/4
GP-137-14-1 3/4	1-3/4	2.133	7/8
GP-137-16-1 3/4	1-3/4	2.133	1
GP-137-17-1 3/4	1-3/4	2.133	1-1/16
GP-137-18-1 3/4	1-3/4	2.133	1-1/8
GP-137-20-1 3/4	1-3/4	2.133	1-1/4
GP-137-24-1 3/4	1-3/4	2.133	1-1/2
GP-137-32-1 3/4	1-3/4	2.133	2
GP-137-44-1 3/4	1-3/4	2.133	2-3/4
GP-137-47-1 3/4	1-3/4	2.133	2-15/16
GP-137-48-1 3/4	1-3/4	2.133	3
GP-137-29-1 13/16	1-13/16	2.133	1-13/16
GP-137-31-1 13/16	1-13/16	2.133	1-31/32
GP-141-10-1 13/16	1-13/16	2.195	5/8

GP PART NO.	A	B	C
GP-143-69-1 3/4	1.751	2.254	4-5/16
GP-144-15-1 3/4	1-3/4	2.258	15/16
GP-144-18-1 3/4	1-3/4	2.258	1-1/8
GP-144-20-1 3/4	1-3/4	2.258	1-1/4
GP-144-24-1 3/4	1-3/4	2.258	1-1/2
GP-144-32-1 3/4	1-3/4	2.258	2
GP-144-32-1 13/16	1-13/16	2.258	2
GP-151-24-2	2	2.365	1-1/2
GP-152-28-2	2	2.375	1-3/4
GP-153-14-2	2	2.383	7/8
GP-153-20-2	2	2.383	1-1/4
GP-153-24-2	2	2.383	1-1/2
GP-153-26-2	2	2.383	1-5/8
GP-153-28-2	2	2.383	1-3/4
GP-153-32-2	2	2.383	2
GP-160-16-2	2	2.508	1
GP-160-18-2	2	2.508	1-1/8
GP-160-20-2	2	2.508	1-1/4
GP-160-24-2	2	2.508	1-1/2
GP-160-32-2	2	2.508	2
GP-160-36-2	2	2.508	2-1/4
GP-160-48-2	2	2.508	3
GP-160-52-2	2	2.508	3-1/4
GP-160-64-2	2	2.508	4
GP-160-24-2 1/16	2-1/16	2.508	1-1/2
GP-160-28-2 1/16	2-1/16	2.508	1-3/4
GP-160-32-2 1/16	2-1/16	2.508	2
GP-160-32-2 11/16	2-11/16	2.508	2-1/32
GP-175-26-2 27/64	2-27/64	2.740	1-5/8
GP-176-22-2 1/4	2-1/4	2.758	1-3/8
GP-176-24-2 1/4	2-1/4	2.758	1-1/2
GP-176-34-2 1/4	2-1/4	2.758	2-1/8
GP-176-36-2 1/4	2-1/4	2.758	2-1/4
GP-176-60-2 1/4	2-1/4	2.758	3-3/4
GP-176-26-2 13/32	2-13/32	2.758	1-5/8
GP-176-26-2 27/32	2-27/64	2.758	1-5/8
GP-181-27-2 5/16	2-5/16	2.820	1-23/32
GP-181-32-2 5/16	2-5/16	2.820	2
GP-181-38-2 5/16	2-5/16	2.820	2-3/8
GP-183-32-2 3/8	2-3/8	2.883	2
GP-192-25-2 7/16	2-7/16	3.008	1-9/16
GP-192-24-2 1/2	2-1/2	3.008	1-1/2
GP-192-32-2 1/2	2-1/2	3.008	2
GP-192-36-2 1/4	2-1/2	3.008	2-1/4
GP-192-32-2 9/16	2-9/16	3.008	2
GP-192-36-2 9/16	2-9/16	3.008	2-1/4
GP-192-48-2 9/16	2-9/16	3.008	3
GP-197-43-2 5/16	2-5/16	3.070	2-11/16
GP-197-24-2 9/16	2-9/16	3.070	1-1/2
GP-197-28-2 9/16	2-9/16	3.070	1-3/4
GP-197-30-2 9/16	2-9/16	3.070	1-7/8
GP-197-32-2 9/16	2-9/16	3.070	2
GP-208-12-2 3/4	2-3/4	3.258	3/4
GP-208-24-2 3/4	2-3/4	3.258	1-1/2
GP-208-28-2 3/4	2-3/4	3.258	1-3/4
GP-208-29-2 3/4	2-3/4	3.258	1-13/16
GP-208-32-2 3/4	2-3/4	3.258	2
GP-208-33-2 3/4	2-3/4	3.258	2-1/16
GP-208-34-2 3/4	2-3/4	3.258	2-1/8
GP-208-36-2 3/4	2-3/4	3.258	2-1/4
GP-224-28-3	3	3.508	1-3/4
GP-224-35-3	3	3.508	2-3/16
GP-224-41-3	3	3.508	2-9/16
GP-227-15-3	3.067	3.552	31/32
GP-229-15-3 1/16	3-1/16	3.570	31/32
GP-230-32-3 3/32	3-3/32	3.586	2
GP-231-17-3 1/8	3-1/8	3.615	1-3/32
GP-233-32-3 3/32	3-3/32	3.633	2
GP-233-17-3 1/8	3-1/8	3.633	1-3/32
GP-236-94-3 1/16	3-1/16	3.696	5-7/8
GP-247-18-3 1/2	3-1/2	3.865	1-1/8
GP-249-18-3 1/2	3-1/2	3.883	1-1/8
GP-260-31-3 9/16	3-9/16	4.195	1-15/16
GP-260-39-3 9/16	3-9/16	4.195	2-7/16
GP-285-41-3 9/16	3-9/16	4.445	2-9/16

Precision Bushings

***If It Has Anything To Do
With Bushings, We Build It
Better At UNITED!***

**BUSHINGS
GALORE!**



**AND
THERE'S
MORE...
CALL *UNITED*
TODAY!**

**PRECISION SPECIAL GUN DRILL BUSHINGS
FOR
DRILLMATION, DeHOFF, ELDORADO, LAHR,
PRATT WHITNEY
AND YOUR MACHINES!**

Avoid Set Up Delays

UNITED GUN DRILL MASTER LINER SETS

With a **UNITED GDL MASTER GUN DRILL LINER SET** you avoid set up delays and increase your gun drill guiding capacity.

Each set covers minimum to maximum GDI Insert ranges.

Liners store easily in a durable polyethylene case.

**Gun Drill Master
Liners Sets in Cases**



**GUN DRILL MASTER LINER
SETS in CASES
AVAILABLE: CASES ONLY**

SELECT YOUR O.D.

1" O.D. SET: GDL-64	1-3/8 O.D. SET: GDL-88	1-3/4 O.D. SET: GDL-112	2-1/4 O.D. SET: GDL-144
Set of FIVE 1" O.D. by 1" long GDL Gun Drill Bushing Master Liners.	Set of SIX 1-3/8 O.D. by 1-3/8 long GDL Gun Drill Bushing Master Liners.	Set of SEVEN 1-3/4 O.D. by 1-3/4 long GDL Gun Drill Bushing Master Liners.	Set of FOUR 2-1/4 O.D. by 2-1/8 long GDL Gun Drill Bushing Master Liners.
GD MASTER LINER USE WITH 1/2" LONG INSERTS GDL-64-16-13 13/64 O.D. GDL-64-16-16 1/4 O.D. GDL-64-16-20 5/16 O.D. GDL-64-16-32 1/2 O.D. GDL-64-16-48 3/4 O.D.	GD MASTER LINER USE WITH 3/4" LONG INSERTS GDL-88-22-13 13/64 O.D. GDL-88-22-16 1/4 O.D. GDL-88-22-20 5/16 O.D. GDL-88-22-32 1/2 O.D. GDL-88-22-48 3/4 O.D. GDL-88-22-64 1" O.D.	GD MASTER LINER USE WITH 1" LONG INSERTS GDL-112-28-13 13/64 O.D. GDL-112-28-16 1/4 O.D. GDL-112-28-20 5/16 O.D. GDL-112-28-32 1/2 O.D. GDL-112-28-48 3/4 O.D. GDL-112-28-64 1" O.D. GDL-112-28-88 1-3/8 O.D.	GD MASTER LINER USE WITH 1-1/4" LONG INSERTS GDL-144-34-48 3/4 O.D. GDL-144-34-64 1" O.D. GDL-144-34-88 1-3/8 O.D. GDL-144-34-112 1-3/4 O.D.
Order as: GDL-64	Order as: GDL-88	Order as: GDL-112	Order as: GDL-144
CASES ONLY MOLDED CASE WITHOUT BUSHINGS HANDSOME, DURABLE BLACK MOLDED POLYETHYLENE CASE. ORGANIZE YOUR GUN DRILL BUSHINGS IN THE CASE THAT HAS A PLACE FOR EVERYTHING. ORDER BY SIZE BELOW.			
CASE ONLY NO.	FOR GDL SIZES	NO. of BUSHINGS	CASE DIMENSIONS
GDL-64B	1" O.D. x 1" Long	5	6-1/2 x 4-1/2 x 2
GDL-88B	1-3/8 O.D. x 1-3/8 Long	6	10-1/4 x 7-1/2 x 3-1/2
GDL-112B	1-3/4 O.D. x 1-3/4 Long	7	13-1/2 x 9 x 4-1/4
GDL-144B	2-1/4 O.D. x 2-1/8 Long	4	13-1/2 x 9 x 4-1/4
GDL-176B	2-3/4 O.D. x 2-1/2 Long	5	13-1/2 x 9 x 4-1/4

ALL O.D.s SET: GDL-176
Set of FIVE by 2-1/2 long GDL Gun Drill Bushing Master Liners.
GD MASTER LINER USE WITH 2-1/2" LONG INSERTS GDL-176-40-48 3/4 O.D. GDL-176-40-64 1" O.D. GDL-176-40-88 1-3/8 O.D. GDL-176-40-112 1-3/4 O.D. GDL-176-40-144 2-1/4 O.D.
Order as: GDL-176

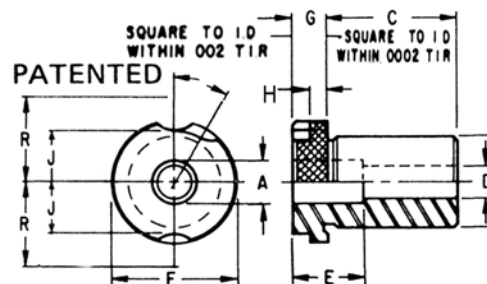
Gun Drill Liner Bushings GDL

Expanded Gun Drill Bushings

GUN DRILL LINER BUSHINGS

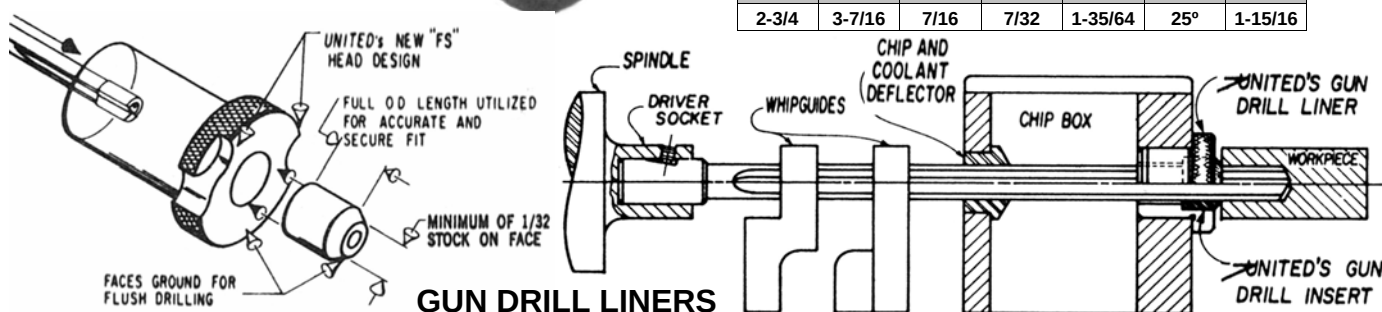
GUN DRILL INSERTS

STYLE GDL



See this Section for Inserts.

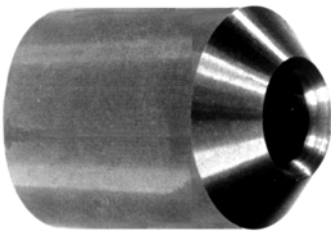
O. D.	F	G	H	J	L	R
1"	1-27/64	3/8	3/16	19/32	35°	59/64
1-3/8	1-51/64	3/8	3/16	25/32	30°	1-7/64
1-3/4	2-19/64	3/8	3/16	1"	30°	1-25/64
2-1/4	2-51/64	3/8	3/16	1-1/4	25°	1-41/64
2-3/4	3-7/16	7/16	7/32	1-35/64	25°	1-15/16



A I.D. SIZES			B O.D. SIZES		C LENGTHS - UNDER HEAD						D	E
NOM.	ACTUAL	INSERT	NOM	ACTUAL	1"	1-3/8	1-3/4	2-1/8	2-1/2	3"		
13/64	.2045 - .2047	GDI-13-8	1"	1.0000- .9998	GDL-64-16-13	GDL-64-22-13	GDL-64-28-13	GDL-64-34-13	GDL-64-40-13	GDL-64-48-13	1/8	7/16
1/4	.2515 - .2517	GDI-16-8			GDL-64-16-16	GDL-64-22-16	GDL-64-28-16	GDL-64-34-16	GDL-64-40-16	GDL-64-48-16	5/32	
5/16	.3140 - .3142	GDI-20-8			GDL-64-16-20	GDL-64-22-20	GDL-64-28-20	GDL-64-34-20	GDL-64-40-20	GDL-64-48-20	7/32	
1/2	.5016 - .5018	GDI-32-8			GDL-64-16-32	GDL-64-22-32	GDL-64-28-32	GDL-64-34-32	GDL-64-40-32	GDL-64-48-32	11/32	
3/4	.7517 - .7519	GDI-48-8			GDL-64-16-48	GDL-64-22-48	GDL-64-28-48	GDL-64-34-48	GDL-64-40-48	GDL-64-48-48	9/16	
13/64	.2045 - .2047	GDI-13-12	1-3/8	1.3750- 1.3747	GDL-88-16-13	GDL-88-22-13	GDL-88-28-13	GDL-88-34-13	GDL-88-40-13	GDL-88-48-13	1/8	5/8
1/4	.2515 - .2517	GDI-16-12			GDL-88-16-16	GDL-88-22-16	GDL-88-28-16	GDL-88-34-16	GDL-88-40-16	GDL-88-48-16	5/32	
5/16	.3140 - .3142	GDI-20-12			GDL-88-16-20	GDL-88-22-20	GDL-88-28-20	GDL-88-34-20	GDL-88-40-20	GDL-88-48-20	7/32	
1/2	.5016 - .5018	GDI-32-12			GDL-88-16-32	GDL-88-22-32	GDL-88-28-32	GDL-88-34-32	GDL-88-40-32	GDL-88-48-32	11/32	
3/4	.7517 - .7519	GDI-48-12			GDL-88-16-48	GDL-88-22-48	GDL-88-28-48	GDL-88-34-48	GDL-88-40-48	GDL-88-48-48	9/16	
1"	1.0017- 1.0019	GDI-64-12			GDL-88-16-64	GDL-88-22-64	GDL-88-28-64	GDL-88-34-64	GDL-88-40-64	GDL-88-48-64	51/64	
13/64	.2045 - .2047	GDI-13-16	1-3/4	1.7500- 1.7497			GDL-112-28-13	GDL-112-34-13	GDL-112-40-13	GDL-112-48-13	1/8	3/4
1/4	.2515 - .2517	GDI-16-16					GDL-112-28-16	GDL-112-34-16	GDL-112-40-16	GDL-112-48-16	5/32	
5/16	.3140 - .3142	GDI-20-16					GDL-112-28-20	GDL-112-34-20	GDL-112-40-20	GDL-112-48-20	7/32	
1/2	.5016 - .5018	GDI-32-16					GDL-112-28-32	GDL-112-34-32	GDL-112-40-32	GDL-112-48-32	11/32	
3/4	.7517 - .7519	GDI-48-16					GDL-112-28-48	GDL-112-34-48	GDL-112-40-48	GDL-112-48-48	9/16	
1"	1.0017- 1.0019	GDI-64-16					GDL-112-28-64	GDL-112-34-64	GDL-112-40-64	GDL-112-48-64	51/64	
1-3/8	1.3771- 1.3773	GDI-88-16					GDL-112-28-88	GDL-112-34-88	GDL-112-40-88	GDL-112-48-88	1-3/64	
3/4	.7517 - .7519	GDI-48-20	2-1/4	2.2500- 2.2497			GDL-144-28-48	GDL-144-34-48	GDL-144-40-48	GDL-144-48-48	9/16	1"
1"	1.0017- 1.0019	GDI-64-20					GDL-144-28-64	GDL-144-34-64	GDL-144-40-64	GDL-144-48-64	51/64	
1-3/8	1.3771- 1.3773	GDI-88-20					GDL-144-28-88	GDL-144-34-88	GDL-144-40-88	GDL-144-48-88	1-1/16	
1-3/4	1.7522- 1.7524	GDI-112-20					GDL-144-28-112	GDL-144-34-112	GDL-144-40-112	GDL-144-48-112	1-27/64	
3/4	.7517 - .7519	GDI-48-24	2-3/4	2.7500- 2.7497			GDL-176-28-48	GDL-176-34-48	GDL-176-40-48	GDL-176-48-48	9/16	1-1/4
1"	1.0017- 1.0019	GDI-64-24					GDL-176-28-64	GDL-176-34-64	GDL-176-40-64	GDL-176-48-64	51/64	
1-3/8	1.3771- 1.3773	GDI-88-24					GDL-176-28-88	GDL-176-34-88	GDL-176-40-88	GDL-176-48-88	1-1/16	
1-3/4	1.7522- 1.7524	GDI-112-24					GDL-176-28-112	GDL-176-34-112	GDL-176-40-112	GDL-176-48-112	1-27/64	
2-1/4	1.2525- 2.2527	GDI-144-24					GDL-176-28-144	GDL-176-34-144	GDL-176-40-144	GDL-176-48-144	1-51/64	

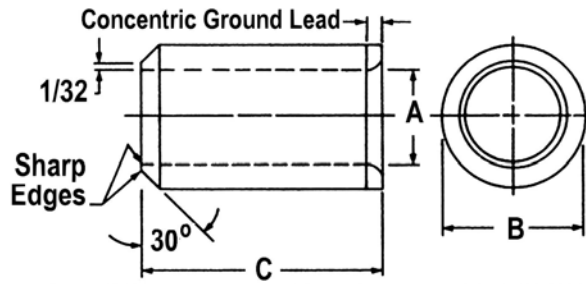
Standard and Ultra II Inserts for GD Liners

Gun Drill Inserts GDI and Ultra II GDI-UII

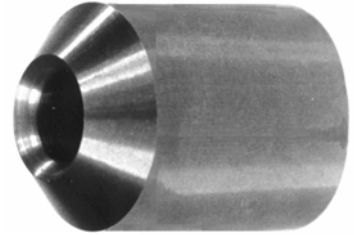


STYLE
GDI

STANDARD
Material
RC-61-65



Note: A and B Diameters concentric and square within .0002 T.I.R.



ULTRA II
Material
RC-64-68

STYLE
GDI-UII

Type GDI - Standard Gun Drill Inserts

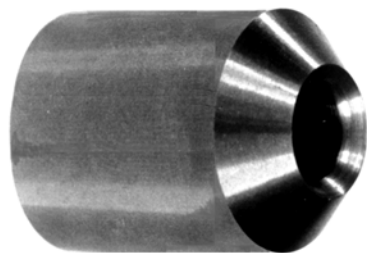
A I.D. SIZES			B O.D. SIZES		C LENGTH					LINER USED IN
NOM.	ACTUAL		NOM	ACTUAL	1/2	3/4	1"	1-1/4	1-1/2	
52 - 39	.0635 - .0995		13/64	.2046 - .2043	GDI-13-8					GDL-64
40 - 9/64	.0980 - .1406		1/4	.2516 - .2513	GDI-16-8					
1/8 - 10	.1250 - .1935		5/16	.3141 - .3138	GDI-20-8					
3/16 - 0	.1875 - .3160		1/2	.5017 - .5014	GDI-32-8					
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515	GDI-48-8					
52 - 39	.0635 - .0995		13/64	.2046 - .2043		GDI-13-12				GDL-88
40 - 9/64	.0980 - .1406		1/4	.2516 - .2513		GDI-16-12				
1/8 - 10	.1250 - .1935		5/16	.3141 - .3138		GDI-20-12				
3/16 - 0	.1875 - .3160		1/2	.5017 - .5014		GDI-32-12				
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515		GDI-48-12				
1/2 - 49/64	.5000 - .7656		1"	1.0018 - 1.0015		GDI-64-12				GDL-112
52 - 39	.0635 - .0995		13/64	.2046 - .2043			GDI-13-16			
40 - 9/64	.0980 - .1406		1/4	.2516 - .2513			GDI-16-16			
1/8 - 10	.1250 - .1935		5/16	.3141 - .3138			GDI-20-16			
3/16 - 0	.1875 - .3160		1/2	.5017 - .5014			GDI-32-16			
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515			GDI-48-16			GDL-144
1/2 - 49/64	.5000 - .7656		1"	1.0018 - 1.0015			GDI-64-16			
5/8 - 1-1/32	.6250 - 1.0312		1-3/8	1.3772 - 1.3768			GDI-88-16			
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515				GDI-48-20		
1/2 - 49/64	.5000 - .7656		1"	1.0018 - 1.0015				GDI-64-20		
5/8 - 1-1/32	.6250 - 1.0312		1-3/8	1.3772 - 1.3768				GDI-88-20		GDL-176
1" - 1-25/64	1.0000 - 1.3906		1-3/4	1.7523 - 1.7519				GDI-112-20		
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515					GDI-48-24	
1/2 - 49/64	.5000 - .7656		1"	1.0018 - 1.0015					GDI-64-24	
5/8 - 1-1/32	.6250 - 1.0312		1-3/8	1.3772 - 1.3768					GDI-88-24	
1" - 1-25/64	1.0000 - 1.3906		1-3/4	1.7523 - 1.7519					GDI-112-24	GDL-176
1-3/8 - 1-49/64	1.3750 - 1.7656		2-1/4	2.2525 - 2.2521					GDI-144-24	

5 to 10 TIMES LONGER WEAR! Type GDI-UII - Ultra II Material Gun Drill Inserts

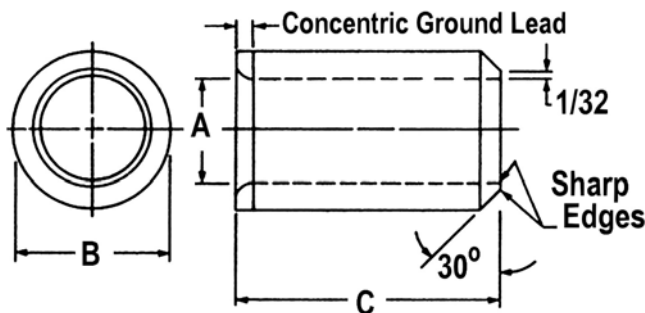
A I.D. SIZES			B O.D. SIZES		C LENGTH					LINER USED IN
NOM.	ACTUAL		NOM	ACTUAL	1/2	3/4	1"	1-1/4	1-1/2	
52 - 39	.0635 - .0995		13/64	.2046 - .2043	GDI-13-8U2					GDL-64
40 - 9/64	.0980 - .1406		1/4	.2516 - .2513	GDI-16-8U2					
1/8 - 10	.1250 - .1935		5/16	.3141 - .3138	GDI-20-8U2					
3/16 - 0	.1875 - .3160		1/2	.5017 - .5014	GDI-32-8U2					
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515	GDI-48-8U2					
52 - 39	.0635 - .0995		13/64	.2046 - .2043		GDI-13-12U2				GDL-88
40 - 9/64	.0980 - .1406		1/4	.2516 - .2513		GDI-16-12U2				
1/8 - 10	.1250 - .1935		5/16	.3141 - .3138		GDI-20-12U2				
3/16 - 0	.1875 - .3160		1/2	.5017 - .5014		GDI-32-12U2				
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515		GDI-48-12U2				
1/2 - 49/64	.5000 - .7656		1"	1.0018 - 1.0015		GDI-64-12U2				GDL-112
52 - 39	.0635 - .0995		13/64	.2046 - .2043			GDI-13-16U2			
40 - 9/64	.0980 - .1406		1/4	.2516 - .2513			GDI-16-16U2			
1/8 - 10	.1250 - .1935		5/16	.3141 - .3138			GDI-20-16U2			
3/16 - 0	.1875 - .3160		1/2	.5017 - .5014			GDI-32-16U2			
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515			GDI-48-16U2			GDL-144
1/2 - 49/64	.5000 - .7656		1"	1.0018 - 1.0015			GDI-64-16U2			
5/8 - 1-1/32	.6250 - 1.0312		1-3/8	1.3772 - 1.3768			GDI-88-16U2			
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515				GDI-48-20U2		
1/2 - 49/64	.5000 - .7656		1"	1.0018 - 1.0015				GDI-64-20U2		
5/8 - 1-1/32	.6250 - 1.0312		1-3/8	1.3772 - 1.3768				GDI-88-20U2		GDL-176
1" - 1-25/64	1.0000 - 1.3906		1-3/4	1.7523 - 1.7519				GDI-112-20U2		
5/16 - 17/32	.3125 - .5312		3/4	.7518 - .7515					GDI-48-24U2	
1/2 - 49/64	.5000 - .7656		1"	1.0018 - 1.0015					GDI-64-24U2	
5/8 - 1-1/32	.6250 - 1.0312		1-3/8	1.3772 - 1.3768					GDI-88-24U2	
1" - 1-25/64	1.0000 - 1.3906		1-3/4	1.7523 - 1.7519					GDI-112-24U2	GDL-176
1-3/8 - 1-49/64	1.3750 - 1.7656		2-1/4	2.2525 - 2.2521					GDI-144-24U2	

**Gun Drill Inserts and
Bushings GDIC, GDC**

Carbide Inserts & Press Fit GD Bushings



**STYLE
GDIC**



Note: A and B Diameters concentric and square within .0002 T.I.R.
All I.D. sizes are held to +.0002 - .0000 unless otherwise specified.

Type GDIC - Carbide Gun Drill Inserts

MANUFACTURED AS ORDERED FROM SEMI FINISHED

**SOLID
TUNGSTEN
CARBIDE
RC - 76 - 79**

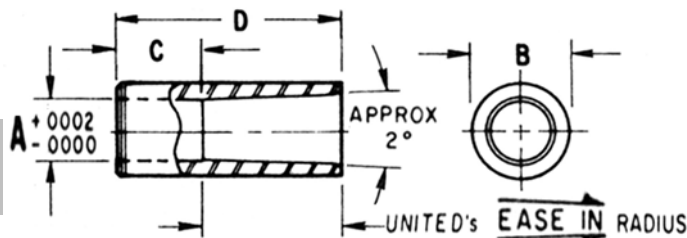
**10 to 50
Times the Wear!**

A I.D. SIZES			B O.D. SIZES		C LENGTH			LINER
NOM.		ACTUAL	NOM	ACTUAL	1/2	3/4	1"	USED IN
52 -	39	.0635 - .0995	13/64	.2046 - .2043	GDIC-13-8			GDL-64
40 -	9/64	.0980 - .1406	1/4	.2516 - .2513	GDIC-16-8			
1/8 -	10	.1250 - .1935	5/16	.3141 - .3138	GDIC-20-8			
3/16 -	0	.1875 - .3160	1/2	.5017 - .5014	GDIC-32-8			
5/16 -	17/32	.3125 - .5312	3/4	.7518 - .7515	GDIC-48-8			
52 -	39	.0635 - .0995	13/64	.2046 - .2043		GDIC-13-12		GDL-88
40 -	9/64	.0980 - .1406	1/4	.2516 - .2513		GDIC-16-12		
1/8 -	10	.1250 - .1935	5/16	.3141 - .3138		GDIC-20-12		
3/16 -	0	.1875 - .3160	1/2	.5017 - .5014		GDIC-32-12		
5/16 -	17/32	.3125 - .5312	3/4	.7518 - .7515		GDIC-48-12		
1/2 -	49/64	.5000 - .7656	1"	1.0018 - 1.0015		GDIC-64-12		GDL-112
52 -	39	.0635 - .0995	13/64	.2046 - .2043			GDIC-13-16	
40 -	9/64	.0980 - .1406	1/4	.2516 - .2513			GDIC-16-16	
1/8 -	10	.1250 - .1935	5/16	.3141 - .3138			GDIC-20-16	
3/16 -	0	.1875 - .3160	1/2	.5017 - .5014			GDIC-32-16	
5/16 -	17/32	.3125 - .5312	3/4	.7518 - .7515			GDIC-48-16	
1/2 -	49/64	.5000 - .7656	1"	1.0018 - 1.0015			GDIC-64-16	
5/8 -	1-1/32	.6250 - 1.0312	1-3/8	1.3772 - 1.3768			GDIC-88-16	

Type GDC - Carbide Press Fit Gun Drill Bushings



**STYLE
GDC**



**SOLID TUNGSTEN CARBIDE
RC - 76 - 79**

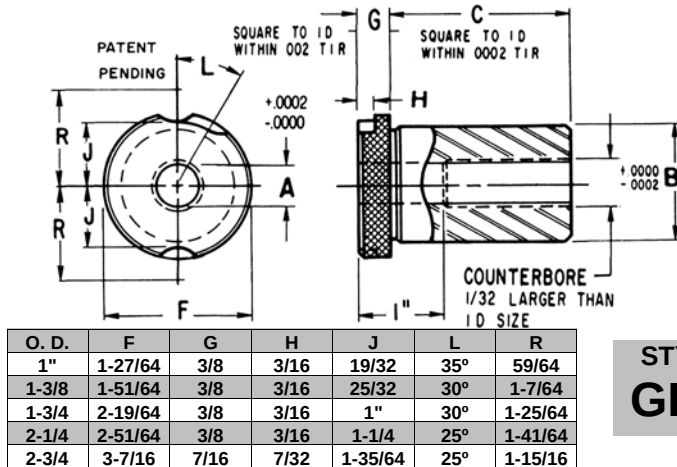
10 to 50 Times the Wear!

All I.D. sizes are held to +.0002 - .0000 unless otherwise specified.

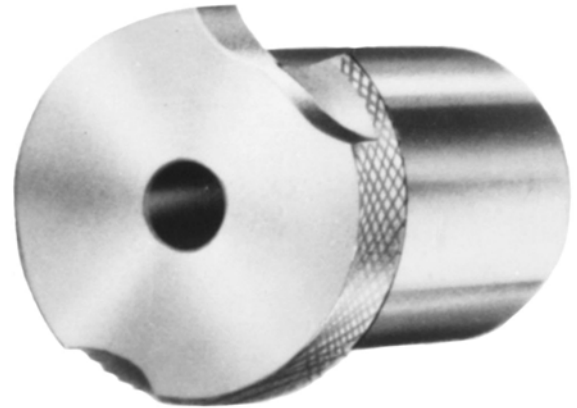
A I.D. SIZES		B O.D. SIZES		C	D LENGTH OVERALL	GDC PART NO.
NOM.	ACTUAL	NOM	ACTUAL			
1/8 - 15	.1250 - .1800	1/2	.5017 - .5014	5/16	1-1/2	GDC-32-24
15 - D	.1800 - .2460			3/8		GDC-32-24A
D - 23/64	.2460 - .3594	3/4	.7518 - .7515	1/2	1-3/4	GDC-48-28
23/64 - 27/64	.3594 - .4219			5/8		GDC-48-28A
27/64 - 1/2	.4219 - .5000	1"	1.0018- 1.0015	3/4	2"	GDC-64-32
1/2 - 5/8	.5000 - .6250			7/8		GDC-64-32A
5/8 - 11/16	.6250 - .6875			1"		GDC-64-32B
11/16 - 13/16	.6875 - .8125	1-1/4	1.2520- 1.2517	1-1/4	2-1/4	GDC-80-36
13/16 - 1"	.8125 - 1.0000	1-1/2	1.5022- 1.5018	1-1/2	2-1/2	GDC-96-40

De Hoff and General Gun Drill Bushings

GDH & GD
Gun Drill Bushings



STYLE
GDH



All I.D. sizes are held to +.0002 - .0000 unless otherwise specified.
Manufactured as ordered from semi finished. O.D. sizes 2-1/4 and 2-3/4 are also available.
Note: Renewable Bushings with overall lengths longer than one inch are counterbored from exit end forward.

Type GDH - For De Hoff Type Gun Drilling Machines



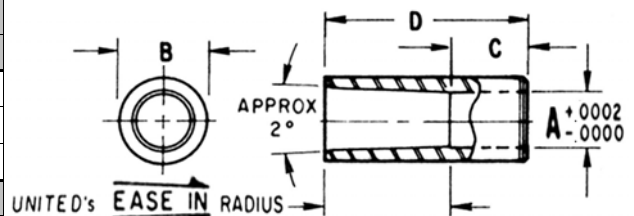
A I.D. SIZES		B O.D. SIZES		C LENGTHS - UNDER HEAD							LOCK SCREWS
NOM.	ACTUAL	NOM	ACTUAL	3/4	1"	1-3/8	1-3/4	2-1/8	2-1/2	3"	
1/8 - 3/16	.1250 - .1875	1"	1.0000 - .9998	GDH-64-12	GDH-64-16	GDH-64-22	GDH-64-28				LS-2
12 - 11/32	.1890 - .3437			GDH-64-12	GDH-64-16	GDH-64-22	GDH-64-28	GDH-64-34			
9/32 - 9/16	.2812 - .5625			GDH-64-12	GDH-64-16	GDH-64-22	GDH-64-28	GDH-64-34	GDH-64-40		
15/32 - 25/32	.4687 - .7812			GDH-64-12	GDH-64-16	GDH-64-22	GDH-64-28	GDH-64-34	GDH-64-40	GDH-64-48	
1/8 - 3/16	.1250 - .1875	1-3/8	1.3750 - 1.3747		GDH-88-16	GDH-88-22	GDH-88-28				LS-2
12 - 11/32	.1890 - .3437				GDH-88-16	GDH-88-22	GDH-88-28	GDH-88-34			
9/32 - 9/16	.2812 - .5625				GDH-88-16	GDH-88-22	GDH-88-28	GDH-88-34	GDH-88-40		
15/32 - 23/32	.4687 - .7187				GDH-88-16	GDH-88-22	GDH-88-28	GDH-88-34	GDH-88-40	GDH-88-48	
47/64 - 1-1/16	.7344 - 1.0625				GDH-88-16	GDH-88-22	GDH-88-28	GDH-88-34	GDH-88-40	GDH-88-48	

Type GD - General Purpose Press Fit Applications

STYLE
GD

All I.D. sizes are held to +.0002 - .0000 unless otherwise specified.

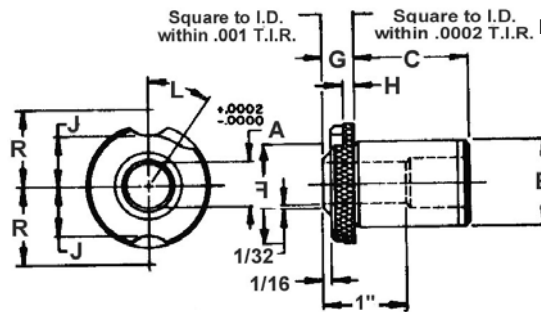
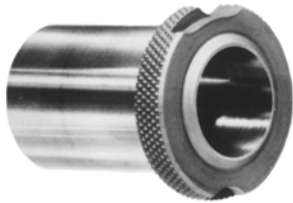
A I.D. SIZES		B O.D. SIZES		C	D LENGTH OVERALL	GD PART NO.
NOM.	ACTUAL	NOM	ACTUAL			
1/8 - 15	.1250 - .1800	1/2	.5017 - .5014	5/16	1-1/2	GD-32-24
15 - D	.1800 - .2460			3/8		GD-32-24A
D - 23/64	.2460 - .3594	3/4	.7518 - .7515	1/2	1-3/4	GD-48-28
23/64 - 27/64	.3594 - .4219			5/8		GD-48-28A
27/64 - 1/2	.4219 - .5000	1"	1.0018 - 1.0015	3/4	2"	GD-64-32
1/2 - 5/8	.5000 - .6250			7/8		GD-64-32A
5/8 - 11/16	.6250 - .6875			1"		GD-64-32B
11/16 - 13/16	.6875 - .8125	1-1/4	1.2520 - 1.2517	1-1/4	2-1/4	GD-80-36
13/16 - 1"	.8125 - 1.0000	1-1/2	1.5022 - 1.5018	1-1/2	2-1/2	GD-96-40



Gun Drill Bushings GDE - GDD - GDLR

Gun Drill Bushings Eldorado & Lahr Types

Type GDE for Eldorado type



MANUFACTURED AS ORDERED FROM SEMI FINISHED

ALL I.D. sizes are held to +.0002 — .0000 unless otherwise specified.

For Eldorado Type
Gun Drilling Machines

O.D.	F	G	H	J	L	R
1"	1-27/64	3/8	3/16	19/32	35°	59/64
1-3/8	1-51/64	3/8	3/16	25/32	30°	1-7/64

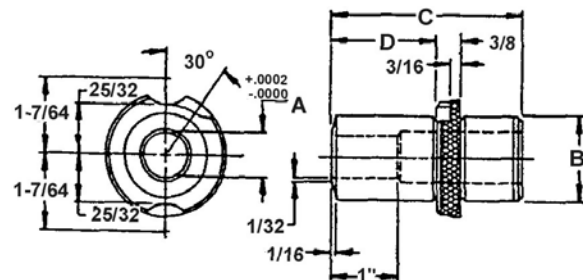
A I.D. RANGE (STANDARD DRILL SIZES)		B O.D. SIZE		C LENGTHS (BODY ONLY)							LOCK SCREWS
NOMINAL	ACTUAL	NOM.	ACTUAL	3/4	1"	1-3/8	1-3/4	2-1/8	2-1/2	3"	
1/8 — 3/16	.1250 — .1875	1"	1.000 — .9998	GDE-64-12	GDE-64-16	GDE-64-22	GDE-64-28				LS-2
#12 — 11/32	.1890 — .3437			GDE-64-12	GDE-64-16	GDE-64-22	GDE-64-28	GDE-64-34			
9/32 — 9/16	.2812 — .5625			GDE-64-12	GDE-64-16	GDE-64-22	GDE-64-28	GDE-64-34	GDE-64-40		
15/32 — 25/32	.4687 — .7812			GDE-64-12	GDE-64-16	GDE-64-22	GDE-64-28	GDE-64-34	GDE-64-40	GDE-64-48	
1/8 — 3/16	.1250 — .1875	1-3/8	1.3750 — 1.3747		GDE-88-16	GDE-88-22	GDE-88-28				LS-2
#12 — 11/32	.1890 — .3437				GDE-88-16	GDE-88-22	GDE-88-28	GDE-88-34			
9/32 — 9/16	.2812 — .5625				GDE-88-16	GDE-88-22	GDE-88-28	GDE-88-34	GDE-88-40		
15/32 — 1-1/16	.4687 — 1.0625				GDE-88-16	GDE-88-22	GDE-88-28	GDE-88-34	GDE-88-40	GDE-88-48	

Type GDD for Eldorado type Deep Drilling



For
Eldorado Type
Gun Drilling
Machines

Deep Drilling



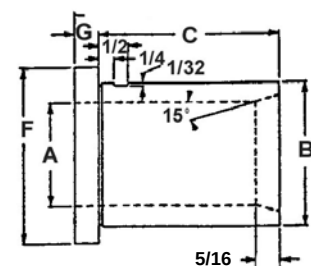
A I.D. RANGE (STANDARD DRILL SIZES)		B O.D. SIZE		C LENGTHS (OVERALL)				LOCK SCREWS
NOMINAL	ACTUAL	NOM.	ACTUAL	1-7/8	2-3/8	2-7/8	3-3/8	
1/8 — 1-1/16	.1250 — 1.0625	1-3/8	1.3750 — 1.3747	GDD-88-30	GDD-88-38	GDD-88-46	GDD-88-54	LS-2
'D' Dimension →				1/2	1"	1-1/2	2"	

Type GDLR for Lahr type Heavy Duty Drilling



For
Lahr Type
Gun Drilling
Machines

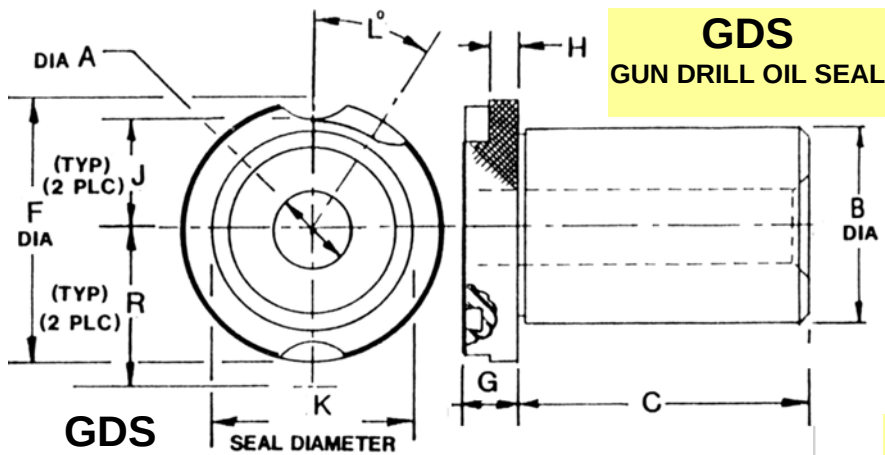
Heavy Duty Drilling



A I.D. RANGE (STANDARD DRILL SIZES)		B O.D. SIZE		C LENGTHS (OVERALL)				PART NO.
NOMINAL	ACTUAL	NOM.	ACTUAL	C	F	G	H	
22/32—1-1/16	.7187 — 1.0625	1-3/8	1.3770 — 1.3768	3"	1-5/8	3/8		GDLR-88-48
31/32—1-13/32	.9687 — 1.4062	1-3/4	1.7521 — 1.7519	3"	2"	3/8		GDLR-112-48
1-11/32—1-7/8	1.3437 — 1.8750	2-1/4	2.2523 — 2.2521	3"	2-1/2	3/8		GDLR-144-48
1-1/2—2-1/32	1.5000 — 2.0312	2-1/2	2.5025 — 2.5022	3"	2-3/4	3/8		GDLR-160-48
1-1/2—2-9/32	1.5000 — 2.2812	2-3/4	2.7525 — 2.7522	3"	3"	3/8		GDLR-176-48

Seal It With 'GDS' Oil Seal Gun Drill Bushings!

Oil Seal Gun Drill Bushings



GDS — FOR GUN DRILLING MACHINES

O-Ring Sizes

ANSI STANDARD TOLERANCES

PART NO.	O. D.	F	G	H	J	K	L	R
GDSR-64	1"	1-27/64	3/8	3/16	19/32	15/1	35°	59/64
GDSR-88	1-3/8	1-51/64	3/8	3/16	25/32	1-1/4	30°	1-7/64
GDSR-112	1-3/4	2-19/64	3/8	3/16	1"	1-3/4	30°	1-25/64
GDSR-144	2-1/4	2-51/64	3/8	3/16	1-1/4	2-1/4	25°	1-41/64
GDSR-176	2-3/4	4-13/16	1/2	1/4	2-15/64	4"	25°	2-5/8

Positive sealing using O-Rings against the workpiece allows your gun drill machine to maintain the oil pressure required for optimum speeds and feeds.

These tools eliminate the 'overworked' condition of your coolant pressure systems. Keep gun drill sharpened. Do not use worn out or eccentric bushings.

Straight and accurate holes can only be achieved with adequate and constant oil pressures.

GUN DRILL SEAL BUSHINGS

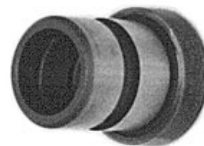
A I.D. RANGE STANDARD DRILL SIZES				B O.D. SIZE				ANSI SYMBOL	C LENGTH UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths							LOCK
NOMINAL		ACTUAL		NOM.	ACTUAL		3/4		1"	1-3/8	1-3/4	2-1/8	2-1/2	3"	SCREWS USED	
							-12		-16	-22	-28	-34	-40	-48		
1/8 -	3/16	.1250-	.1875	1"	1.0000-	.9998	GDS-64	GDS-64-12	GDS-64-16	GDS-64-22	GDS-64-28				LS-2	
12 -	11/32	.1890-	.3437	1"	1.0000-	.9998	GDS-64	GDS-64-12	GDS-64-16	GDS-64-22	GDS-64-28	GDS-64-34			LS-2	
9/32 -	9/16	.2812-	.5625	1"	1.0000-	.9998	GDS-64	GDS-64-12	GDS-64-16	GDS-64-22	GDS-64-28	GDS-64-34	GDS-64-40		LS-2	
15/32 -	25/32	.4687-	.7812	1"	1.0000-	.9998	GDS-64	GDS-64-12	GDS-64-16	GDS-64-22	GDS-64-28	GDS-64-34	GDS-64-40	GDS-64-48	LS-2	
1/8 -	3/16	.1250-	.1875	1-3/8	1.3750	1.3747	GDS-88		GDS-88-16	GDS-88-22	GDS-88-28				LS-2	
12 -	11/32	.1890-	.3437	1-3/8	1.3750	1.3747	GDS-88		GDS-88-16	GDS-88-22	GDS-88-28	GDS-88-34			LS-2	
9/32 -	9/16	.2812--	.5625	1-3/8	1.3750	1.3747	GDS-88		GDS-88-16	GDS-88-22	GDS-88-28	GDS-88-34	GDS-88-40		LS-2	
15/32 -	23/32	.4687-	.7187	1-3/8	1.3750	1.3747	GDS-88		GDS-88-16	GDS-88-22	GDS-88-28	GDS-88-34	GDS-88-40	GDS-88-48	LS-2	
47/64 -	1-1/16	.7344-	1.0625	1-3/8	1.3750	1.3747	GDS-88		GDS-88-16	GDS-88-22	GDS-88-28	GDS-88-34	GDS-88-40	GDS-88-48	LS-2	
31/32 -	1-13/32	.9687-	1.4062	1-3/4	1.7500-	1.7497	GDS-112				GDS-112-28	GDS-112-34	GDS-112-40	GDS-112-48	LS-3	
31/32 -	1-13/32	.9687-	1.4062	1-3/4	1.7500-	1.7497	GDS-112				GDS-112-28	GDS-112-34	GDS-112-40	GDS-112-48	LS-3	
31/32 -	1-13/32	.9687-	1.4062	1-3/4	1.7500-	1.7497	GDS-112				GDS-112-28	GDS-112-34	GDS-112-40	GDS-112-48	LS-3	
31/32 -	1-13/32	.9687-	1.4062	1-3/4	1.7500-	1.7497	GDS-112				GDS-112-28	GDS-112-34	GDS-112-40	GDS-112-48	LS-3	
31/32 -	1-13/32	.9687-	1.4062	1-3/4	1.7500-	1.7497	GDS-112				GDS-112-28	GDS-112-34	GDS-112-40	GDS-112-48	LS-3	
31/32 -	1-13/32	.9687-	1.4062	1-3/4	1.7500-	1.7497	GDS-112				GDS-112-28	GDS-112-34	GDS-112-40	GDS-112-48	LS-3	
31/32 -	1-13/32	.9687-	1.4062	1-3/4	1.7500-	1.7497	GDS-112				GDS-112-28	GDS-112-34	GDS-112-40	GDS-112-48	LS-3	
1-11/32 -	1-7/8	1.3437-	1.8750	2-1/4	2.2500-	2.2497	GDS-144				GDS-144-28	GDS-144-34	GDS-144-40	GDS-144-48	LS-3	
1-11/32 -	1-7/8	1.3437-	1.8750	2-1/4	2.2500-	2.2497	GDS-144				GDS-144-28	GDS-144-34	GDS-144-40	GDS-144-48	LS-3	
1-11/32 -	1-7/8	1.3437-	1.8750	2-1/4	2.2500-	2.2497	GDS-144				GDS-144-28	GDS-144-34	GDS-144-40	GDS-144-48	LS-3	
1-11/32 -	1-7/8	1.3437-	1.8750	2-1/4	2.2500-	2.2497	GDS-144				GDS-144-28	GDS-144-34	GDS-144-40	GDS-144-48	LS-3	
1-1/2 -	2-9/32	1.5000-	2.2812	2-3/4	2.7500-	2.7497	GDS-176				GDS-176-28	GDS-176-34	GDS-176-40	GDS-176-48	LS-4	
1-1/2 -	2-9/32	1.5000-	2.2812	2-3/4	2.7500-	2.7497	GDS-176				GDS-176-28	GDS-176-34	GDS-176-40	GDS-176-48	LS-4	
1-1/2 -	2-9/32	1.5000-	2.2812	2-3/4	2.7500-	2.7497	GDS-176				GDS-176-28	GDS-176-34	GDS-176-40	GDS-176-48	LS-4	
1-1/2 -	2-9/32	1.5000-	2.2812	2-3/4	2.7500-	2.7497	GDS-176				GDS-176-28	GDS-176-34	GDS-176-40	GDS-176-48	LS-4	
1-1/2 -	2-9/32	1.5000-	2.2812	2-3/4	2.7500-	2.7497	GDS-176				GDS-176-28	GDS-176-34	GDS-176-40	GDS-176-48	LS-4	

**Oil Groove
Bushings**

Increase Your Up Time



**The Friendly *UNITED* Guys'
Precisionability Increases Wear Life For
New and Used Machine Tools!**



Oil Groove Bushings—48 Styles

UNITED Oil Grooves are available in I.D. sizes from 1/2" to 16" maximum. I.D. sizes from 1/2" to 2" have approximately 7" of Groove length. I.D. sizes from 2" to 16" have approximately 14" of Groove length.

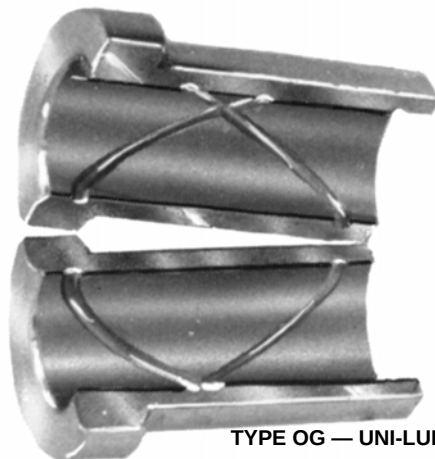
Groove sizes are 1/16" wide by 1/32" deep. Bushing I.D.s smaller than 1/2" will be grooved with appropriate width and depth sizes.

O.D. styles feature Holes and Grooves that are centrally located on the underhead length. Typical Holes are 1/4" diameter and Grooves 5/16" wide by 3/64" deep. When either the I.D. or O.D. or Length is less than 1", Holes will be 1/8" dia. and grooves will be 3/16" wide by 1/32" deep.

USES:

- ★ **FOR LUBRICATION BUSHINGS**
- ★ **DIE SET LUBE BUSHINGS**
- ★ **PROBE BAR LUBE BUSHINGS**
- ★ **DIE CASTING LUBE BUSHINGS**
- ★ **TOGGLE LUBE BUSHINGS**
- ★ **HYDRAULIC PRESS BUSHINGS**
- ★ **FOR CHIP & DIRT ELIMINATION**

Oil Groove Bushings

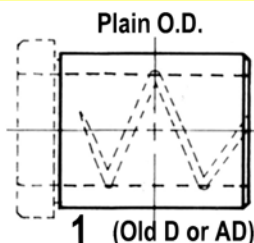


UNITED's 48 Styles listed here and on the following pages

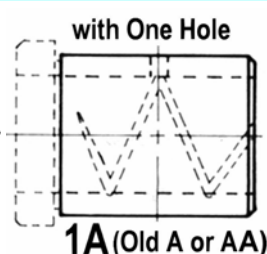
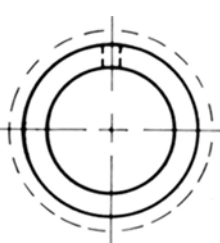
Used for Vertical Shafts

STYLE 1

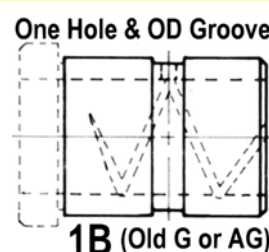
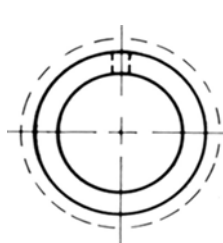
HELIX SPIRAL - OUT ONE END



Vertical shaft type bushing as on a boring bar.



Oil hole must be set into position

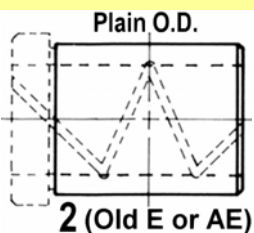


Does not require positioning for oil hole as the O.D. groove picks up oil flow

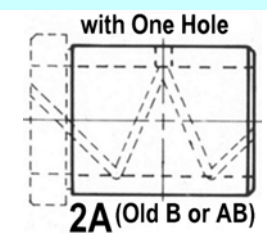
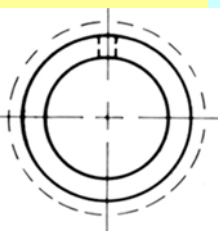
Used for Horizontal Shafts

STYLE 2

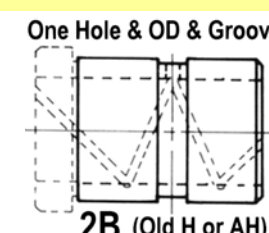
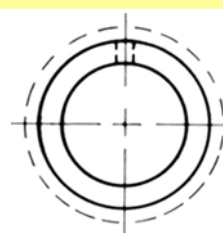
HELIX SPIRAL - OUT BOTH ENDS



Used for horizontal shafts in motion or grooved for lubrication



Oil hole must be set into position

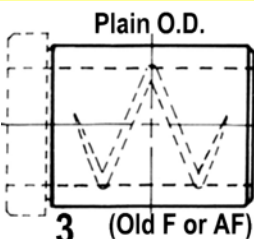


Does not require positioning because of oil groove

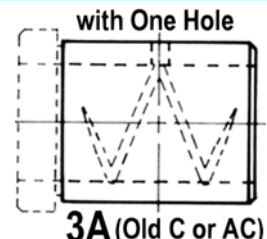
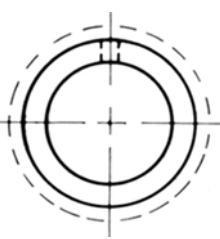
Used for Shafts in Motion

STYLE 3

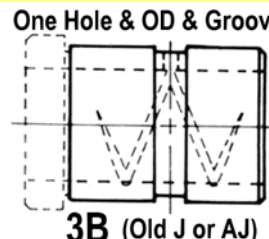
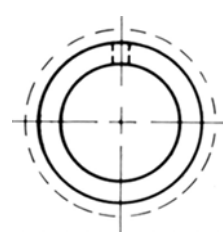
HELIX SPIRAL - INSIDE



For shaft in motion as transfer machines. Oil enters through shaft



Oil hole must be set into position



Does not require positioning because of oil groove

Styles 4-8 Oil Grooves

Oil Groove Bushings

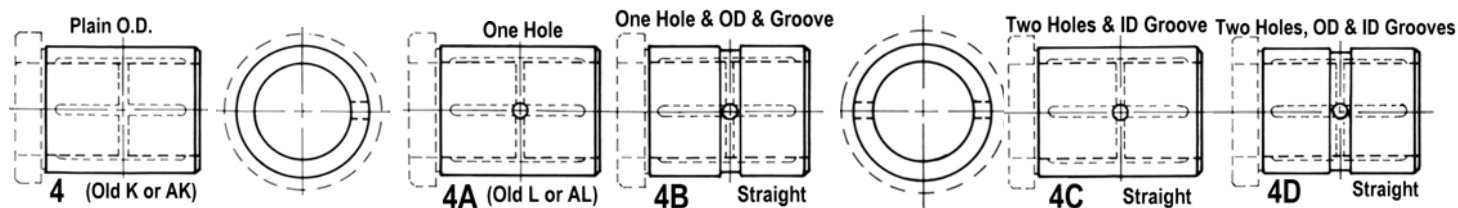
AVAILABLE IN BRONZE AND TOOL STEELS
48 Styles — Pages A55 thru A59

SLOTS and RING GROOVE

STYLE 4

Used for Rotary Motion

Shaft in a Rotary Motion — No Break Out

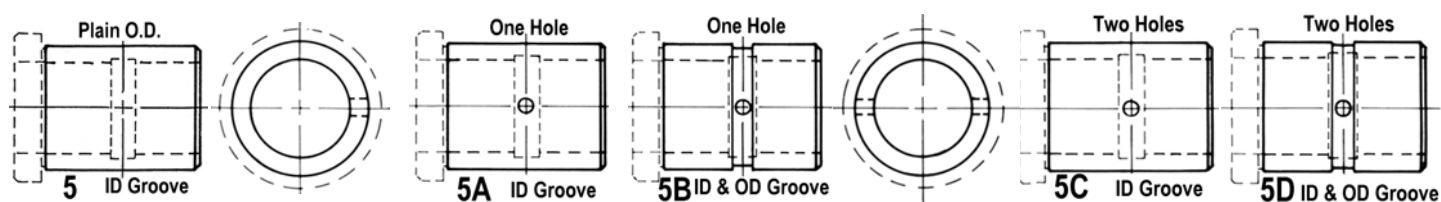


RING GROOVE — Internal

STYLE 5

Used for Minimum Lubrication

Style 5 Lubrication Thru Shaft—Styles 5A, 5B, 5C, 5D Thru Fixture—For Minimum Lubrication



SPIRAL and RING GROOVE

STYLE 6

Used for Maximum Lubrication

HELIX —For Maximum Continuous Lubrication — Oil Does Not break Out

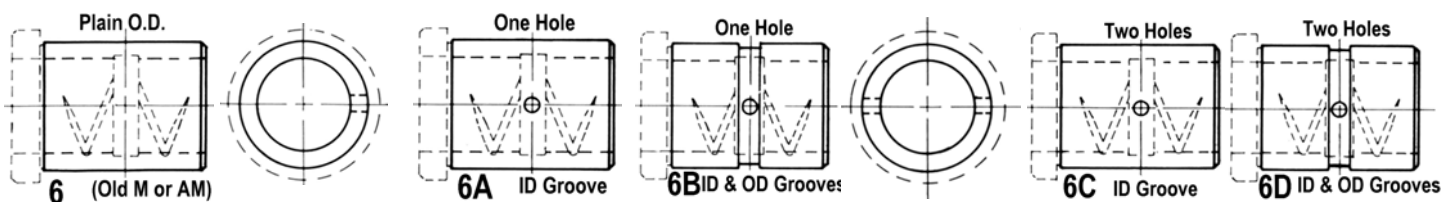
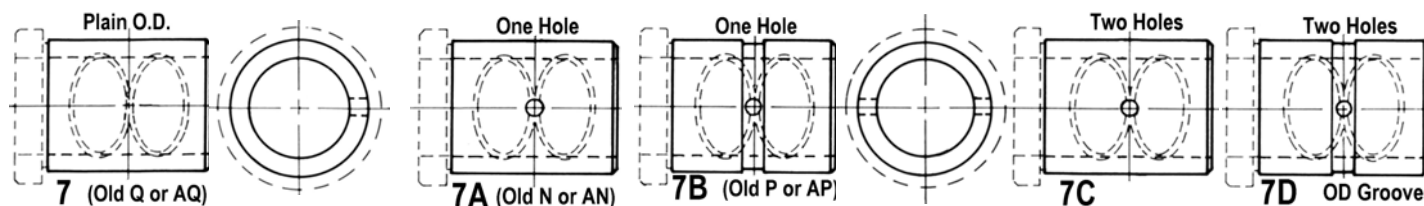


FIGURE EIGHT

STYLE 7

Used for Conventional Lubrication

For Conventional Groove with Short Strokes — Modest Lubrication

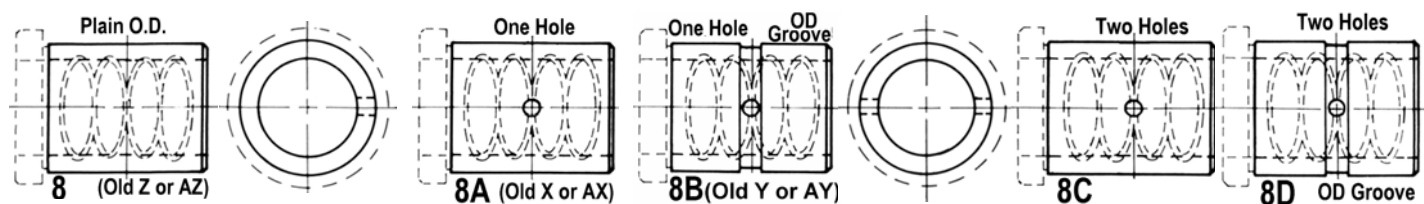


DOUBLE FIGURE EIGHT

STYLE 8

Used for Maximum Lubrication

For Shafts with Short Strokes — Maximum Lubrication — Oil Does Not Break Out



UNITED's 48 Oil Grooves

MANUFACTURED AS ORDERED FROM SEMI FINISHED

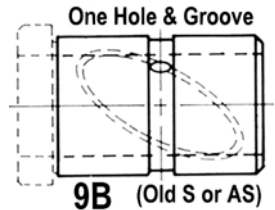
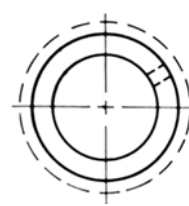
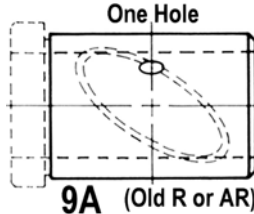
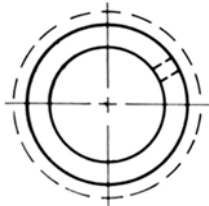
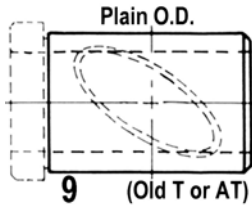
Styles 9-12 Oil Grooves

Used for Less Lubrication

STYLE 9

SINGLE LOOP

For Shafts Requiring Less Lubrication than Figure 8 Styles — Oil Does Not Break Out

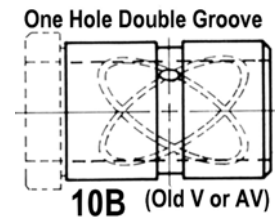
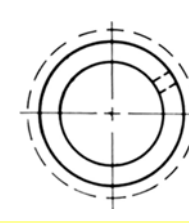
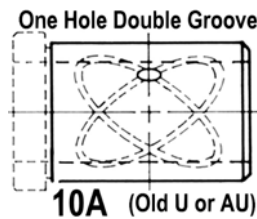
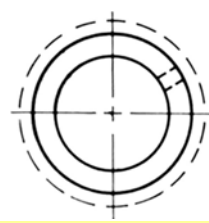
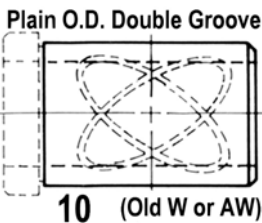


Moderate to Maximum Lube

STYLE 10

DOUBLE LOOP

Provides Maximum Lubrication Across Bushing Area

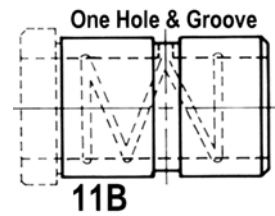
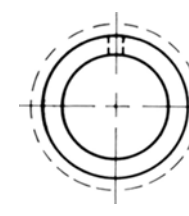
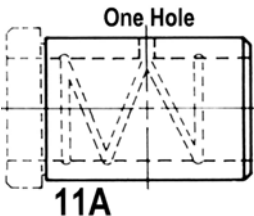
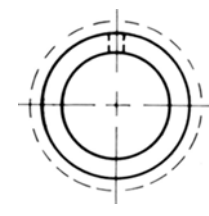
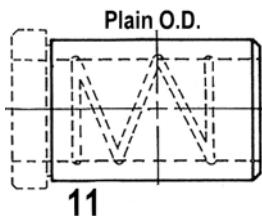


Concentrates Lube in Bush

STYLE 11

SPIRAL & TWO RING GROOVES

Excellent for Very Short Strokes

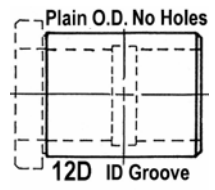
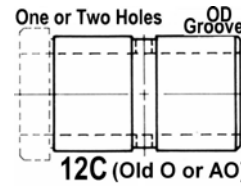
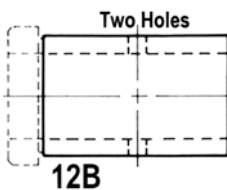
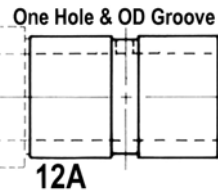
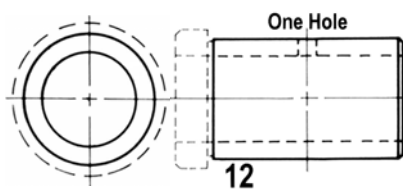


Induces Lube for Drilling

STYLE 12

O.D. GROOVING ONLY

Flow is Induced Thru Fixture, Coolant Drill or Coolant Slip Fit Bushing

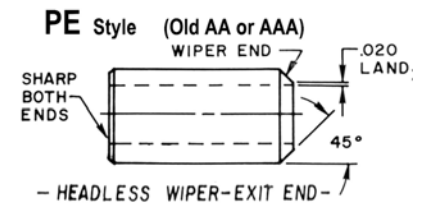
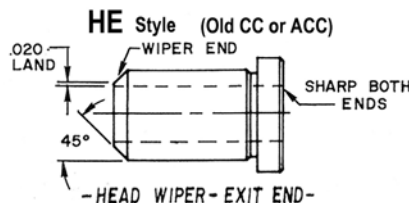
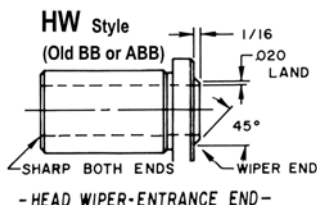


WIPER END SPECIFICATIONS — OIL GROOVE DOES NOT RUN OUT ON WIPER END

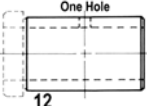
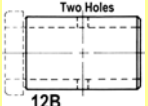
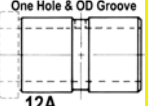
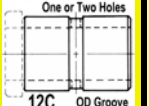
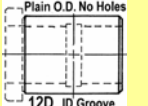
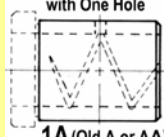
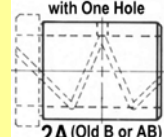
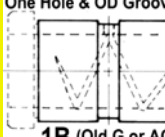
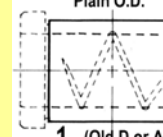
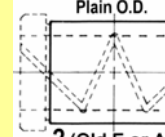
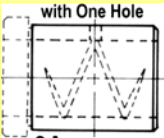
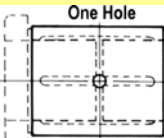
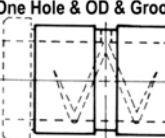
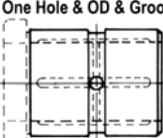
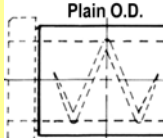
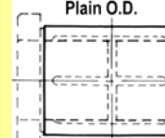
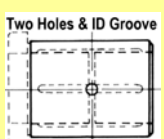
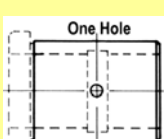
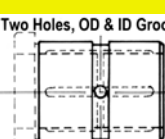
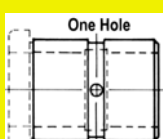
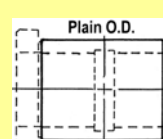
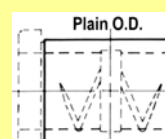
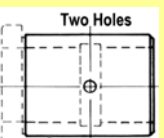
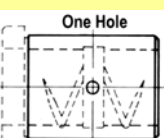
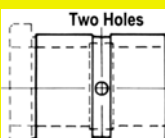
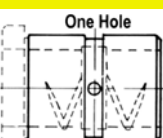
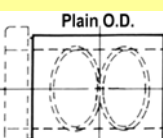
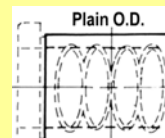
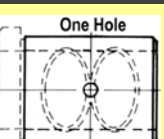
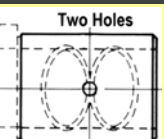
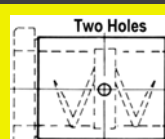
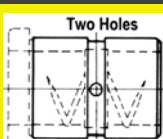
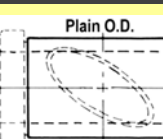
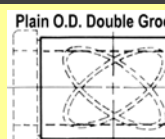
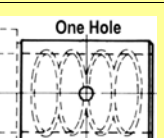
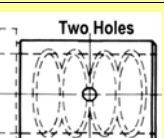
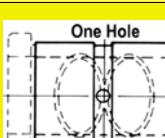
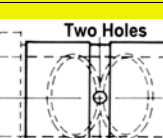
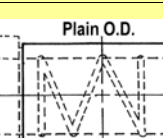
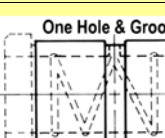
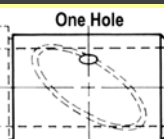
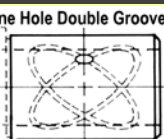
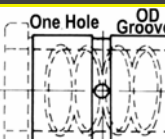
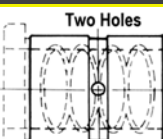
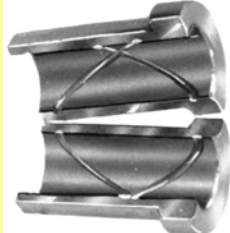
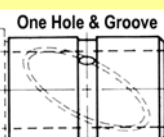
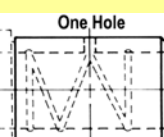
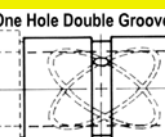
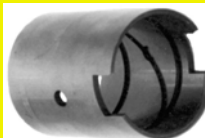
Ordering Example:

P - 48 - 16 - .5000 - OG 10A - PE

BUSHING STYLE O.D. LENGTH I.D. (4 Decimal Places) OIL GROOVE No. WIPER Style



Oil Groove Selection By 3 Principal Types

OIL GROOVE BUSHINGS WITH 1 OR 2 OIL FEED HOLES		OIL GROOVE BUSHINGS WITH 1 OR 2 OIL FEED HOLES and WITH EXTERNAL O.D. GROOVES		OIL GROOVE BUSHINGS WITH INTERNAL GROOVES and WITHOUT OIL FEED HOLES OR WITHOUT O.D. GROOVES	
1. COOLANT FLOWS FROM MANIFOLD PASSAGE TO INTERNAL OIL GROOVES  12  12B		2. COOLANT FLOWS FROM MANIFOLD PASSAGE FROM INSIDE TO INTERNAL OIL GROOVES  12A  12C OD Groove FLOWS FROM INSIDE OR OUTSIDE		3. COOLANT ENTERS FROM TOP OF BUSHING OR PACKED WITH GREASE  12D ID Groove FLOWS FROM TOP	
 1A (Old A or AA) HELIX OPEN BOTTOM	 2A (Old B or AB) HELIX OPEN BOTH ENDS	 1B (Old G or AG) HELIX OPEN BOTTOM	 2B (Old H or AH) HELIX OPEN BOTH ENDS	 1 (Old D or AD) HELIX OPEN BOTTOM	 2 (Old E or AE) HELIX OPEN BOTH ENDS
 3A (Old C or AC) HELIX INSIDE	 4A (Old L or AL) STRAIGHT	 3B (Old J or AJ) HELIX INSIDE	 4B Straight STRAIGHT	 3 (Old F or AF) HELIX INSIDE	 4 (Old K or AK) STRAIGHT
 4C Straight STRAIGHT	 5A ID Groove INTERNAL RING GROOVE	 4D Straight STRAIGHT	 5B ID & OD Groove MINIMUM LUBE	 5 ID Groove INTERNAL GROOVE	 6 (Old M or AM) HELIX WITH I.D. GROOVE
 5C ID Groove INTERNAL RING GROOVE	 6A ID Groove HELIX ID GROOVE	 5D ID & OD Groove MINIMUM LUBRICATION	 6B ID & OD Grooves CONTINUOUS LUBE	 7 (Old Q or AQ) FIGURE EIGHT	 8 (Old Z or AZ) DOUBLE FIGURE EIGHT
 7A (Old N or AN) FIGURE EIGHT	 7C FIGURE EIGHT	 6C ID Groove HELIX	 6D ID & OD Grooves MAX LUBE HELIX	 9 (Old T or AT) MIN LUBE LOOP	 10 (Old W or AW) DOUBLE LOOP
 8A (Old X or AX) MAXIMUM LUBRICATION	 8C DOUBLE FIGURE EIGHT	 7B (Old P or AP) FIGURE EIGHT	 7D OD Groove FIGURE EIGHT	 11 RETAINS LUBRICATION	 11B RETAINS LUBRICATION
 9A (Old R or AR) MIN LUBE LOOP	 10A (Old U or AU) DOUBLE LOOP	 8B (Old Y or AY) MAXIMUM LUBRICATION	 8D OD Groove MAXIMUM LUBRICATION	 WIPERS Styles HW, HE and PE See Page A57 this Section.	
 9B (Old S or AS) MIN LUBE LOOP	 11A SHORT STROKES	 10B (Old V or AV) DOUBLE LOOP	 OIL GROOVES		

Complete Conversion & Listing of Oil Grooves

Oil Groove Bushing Conversion Chart

UNITED OIL GROOVE CONVERSION CHART

ACE	ACME	ALL AMERICAN CARR LANE	AMERICAN	BRINEY, ECONOMY, UNIVERSAL, WELCH	UNITED
Type 1	Style 5	Style AA	Style 1	Style A	Style 1A
Type 2	Style 8	Style AB	Style 2	Style B	Style 2A
Type 3	Style 2	Style AC	Style 3	Style C	Style 3A
Type 4	Style 4	Style AD	Style 4	Style D	Style 1
Type 5	Style 7	Style AE	Style 5	Style E	Style 2
Type 6	Style 1	Style AF	Style 6	Style F	Style 3
Type 7	Style 6	Style AG	Style 7	Style G	Style 1B
Type 8	Style 9	Style AH	Style 8	Style H	Style 2B
Type 9	Style 3	Style AJ	Style 9	Style J	Style 3B
Type 10	Style 10	Style AK	Style 10	Style K	Style 4
Type 11	Style 11	Style AL	Style 11	Style L	Style 4A
					Style 4B
					Style 4C
					Style 4D
					Style 5
					Style 5A
					Style 5B
					Style 5C
					Style 5D
Type 12		Style AM	Style 12	Style M	Style 6
					Style 6A
					Style 6B
					Style 6C
					Style 6D
Type 14	Style 20	Style AN	Style 13	Style N	Style 7A
Type 13	Style 12	Style AO	Style 14	Style O	Style 12C
Type 15	Style 21	Style AP	Style 15	Style P	Style 7B
					Style 7C
					Style 7D
Type 16	Style 19	Style AQ	Style 16	Style Q	Style 7
Type 17	Style 14	Style AR	Style 17	Style R	Style 9A
Type 18	Style 15	Style AS	Style 18	Style S	Style 9B
Type 19	Style 13	Style AT	Style 19	Style T	Style 9
Type 20	Style 17	Style AU	Style 20	Style U	Style 10A
Type 21	Style 18	Style AV	Style 21	Style V	Style 10B
Type 22	Style 16	Style AW	Style 22	Style W	Style 10
Type 23	Style 23	Style AX	Style 23	Style X	Style 8A
Type 24	Style 24	Style AY	Style 24	Style Y	Style 8B
Type 25	Style 22	Style AZ	Style 25	Style Z	Style 8
					Style 8C
					Style 8D
					Style 11
					Style 11A
					Style 11B
					Style 12
					Style 12A
					Style 12B
					Style 12D

UNITED WIPER CONVERSION CHART See Page A57 in this Section.

ACE	ACME	ALL AMERICAN CARR LANE	AMERICAN	BRINEY, ECONOMY, UNIVERSAL, WELCH	UNITED
Type WEA	Style WA	Style AAA	Style A	Style AA	Style PE
Type WEB	Style WC	Style ABB	Style B	Style BB	Style HW
Type WEC	Style WB	Style ACC	Style C	Style CC	Style HE

1-26-99

SF Coolant Chipbreaker Bushings

Slip Fit Renewed Direct Coolant Bushings with Chipbreakers

MANUFACTURED AS ORDERED FROM SEMI-FINISHED
RC-61-65

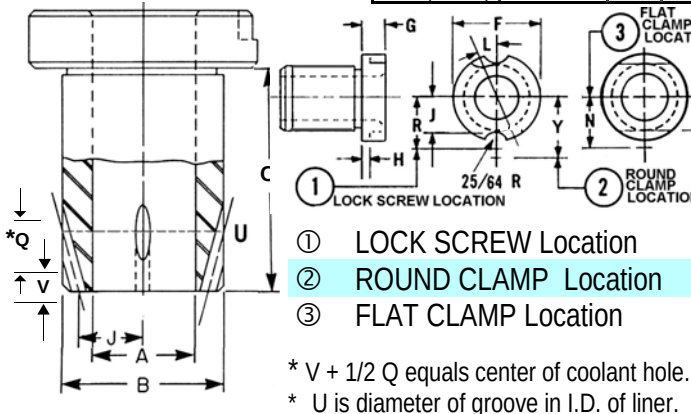
SF-DC DIRECTED COOLANT



SF-DCB DIRECTED COOLANT CHIPBREAKER



A I.D. RANGE	B O.D. BODY	C LEN UNDER HEAD	SF COOLANT BUSHING	SF CHIPBREAKER BUSHING	*V	*Q	*U	4 HOLES	J	ADD 'U' for UNGROUND HEAD- LESS —LINERS TO USE—	WITH HEAD
1/16 (.0625) TO #43 (.0890)	NOM 5/16 ACTUAL .3125/.3123	3/4 1"	SF-20-12-DC SF-20-16-DC	SF-20-12-DCB SF-20-16-DCB	5/32 5/32	3/16 3/16	25/64 25/64	#51 #51	5/64 5/64	L-32-8-DC L-32-12-DC	HL-32-8-DC HL-32-12-DC
#42 (.0935) TO #10 (.1935)	NOM 5/16 ACTUAL .3125/.3123	3/4 1"	SF-20-12-DC SF-20-16-DC	SF-20-12-DCB SF-20-16-DCB	5/32 5/32	3/16 3/16	25/64 25/64	#51 #51	5/64 5/64	L-32-8-DC L-32-12-DC	HL-32-8-DC HL-32-12-DC
#28 (.1405) TO 11/32 (.3437)	NOM 1/2 ACTUAL .5000/.4998	3/4 1"	SF-20-22-DC SF-32-12-DC	SF-20-22-DCB SF-32-12-DCB	5/32 5/32	3/16 3/16	25/64 39/64	#51 3/32	5/64 9/64	L-32-16-DC L-48-8-DC	HL-32-16-DC HL-48-8-DC
		1"	SF-32-16-DC	SF-32-16-DCB	7/32	5/16	19/32	3/32	9/64	L-48-12-DC	HL-48-12-DC
		1-3/8	SF-32-22-DC	SF-32-22-DCB	7/32	5/16	19/32	3/32	9/64	L-48-16-DC	HL-48-16-DC
		1-3/4	SF-32-28-DC	SF-32-28-DCB	7/32	5/16	19/32	3/32	9/64	L-48-22-DC	HL-48-22-DC
		2-1/8	SF-32-34-DC	SF-32-34-DCB	7/32	5/16	19/32	3/32	9/64	L-48-28-DC	HL-48-28-DC
		1"	SF-48-16-DC	SF-48-16-DCB	7/32	5/16	55/64	#37	17/64	L-64-12-DC	HL-64-12-DC
		1-3/8	SF-48-22-DC	SF-48-22-DCB	7/32	5/16	55/64	#37	17/64	L-64-16-DC	HL-64-16-DC
		1-3/4	SF-48-28-DC	SF-48-28-DCB	7/32	5/16	55/64	#37	17/64	L-64-22-DC	HL-64-22-DC
		2-1/8	SF-48-34-DC	SF-48-34-DCB	7/32	5/16	55/64	#37	17/64	L-64-28-DC	HL-64-28-DC
		2-1/2	SF-48-40-DC	SF-48-40-DCB	7/32	5/16	55/64	#37	17/64	L-64-34-DC	HL-64-34-DC
		1"	SF-64-16-DC	SF-64-16-DCB	7/32	5/16	1-5/32	1/8	23/64	L-88-12-DC	HL-88-12-DC
		1-3/8	SF-64-22-DC	SF-64-22-DCB	7/32	5/16	1-5/32	1/8	23/64	L-88-16-DC	HL-88-16-DC
		1-3/4	SF-64-28-DC	SF-64-28-DCB	7/32	5/16	1-5/32	1/8	23/64	L-88-22-DC	HL-88-22-DC
		2-1/8	SF-64-34-DC	SF-64-34-DCB	7/32	5/16	1-5/32	1/8	23/64	L-88-28-DC	HL-88-28-DC
		2-1/2	SF-64-40-DC	SF-64-40-DCB	7/32	5/16	1-5/32	1/8	23/64	L-88-34-DC	HL-88-34-DC
		3"	SF-64-48-DC	SF-64-48-DCB	7/32	5/16	1-5/32	1/8	23/64	L-88-40-DC	HL-88-40-DC
		1"	SF-88-16-DC	SF-88-16-DCB	9/32	7/16	1-17/32	#26	17/32	L-112-12-DC	HL-112-12-DC
		1-3/8	SF-88-22-DC	SF-88-22-DCB	9/32	7/16	1-17/32	#26	17/32	L-112-16-DC	HL-112-16-DC
		1-3/4	SF-88-28-DC	SF-88-28-DCB	9/32	7/16	1-17/32	#26	17/32	L-112-22-DC	HL-112-22-DC
		2-1/8	SF-88-34-DC	SF-88-34-DCB	9/32	7/16	1-17/32	#26	17/32	L-112-28-DC	HL-112-28-DC
		2-1/2	SF-88-40-DC	SF-88-40-DCB	9/32	7/16	1-17/32	#26	17/32	L-112-34-DC	HL-112-34-DC
		3"	SF-88-48-DC	SF-88-48-DCB	9/32	7/16	1-17/32	#26	17/32	L-112-40-DC	HL-112-40-DC
		1-3/8	SF-112-22-DC	SF-112-22-DCB	9/32	7/16	1-31/32	#17	11/16	L-144-16-DC	HL-144-16-DC
		1-3/4	SF-112-28-DC	SF-112-28-DCB	9/32	7/16	1-31/32	#17	11/16	L-144-22-DC	HL-144-22-DC
		2-1/8	SF-112-34-DC	SF-112-34-DCB	9/32	7/16	1-31/32	#17	11/16	L-144-28-DC	HL-144-28-DC
		2-1/2	SF-112-40-DC	SF-112-40-DCB	9/32	7/16	1-31/32	#17	11/16	L-144-34-DC	HL-144-34-DC
		3"	SF-112-48-DC	SF-112-48-DCB	9/32	7/16	1-31/32	#17	11/16	L-144-40-DC	HL-144-40-DC
		1-3/8	SF-144-22-DC	SF-144-22-DCB	9/32	7/16	2-15/32	#17	7/8	L-176-16-DC	HL-176-16-DC
		1-3/4	SF-144-28-DC	SF-144-28-DCB	9/32	7/16	2-15/32	#17	7/8	L-176-22-DC	HL-176-22-DC
		2-1/8	SF-144-34-DC	SF-144-34-DCB	9/32	7/16	2-15/32	#17	7/8	L-176-28-DC	HL-176-28-DC
		2-1/2	SF-144-40-DC	SF-144-40-DCB	9/32	7/16	2-15/32	#17	7/8	L-176-34-DC	HL-176-34-DC
		3"	SF-144-48-DC	SF-144-48-DCB	9/32	7/16	2-15/32	#17	7/8	L-176-40-DC	HL-176-40-DC



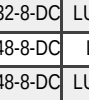
BODY O.D.	BUSHING HEAD DIMENSIONS							
	F	G	H	J	R	N	K	Y
3/16	5/16	3/16	3/32	3/32	17/64			
5/16	35/64	1/4	1/8	11/64	1/2	5/8	11/64	11/16
1/2	51/64	1/4	1/8	19/64	5/8	3/4	17/64	25/32
3/4	1-3/64	1/4	1/8	27/64	3/4	13/16	3/8	57/64
1"	1-27/64	3/8	3/16	19/32	59/64	1-7/64	1/2	1-9/64
1-3/8	1-51/64	3/8	3/16	25/32	1-7/64	1-19/64	11/16	1-21/64
1-3/4	2-19/64	3/8	3/16	1"	1-25/64	1-41/64	7/8	1-33/64
2-1/4	2-51/64	3/8	3/16	1-1/4	1-41/64	1-57/64	1-1/8	1-49/64

Increase Cutting Tool Life with UNITED Coolant Liners

Coolant Liners

MANUFACTURED AS ORDERED FROM SEMI-FINISHED

RC-61-65

A I.D. SIZE	B O. NOM	B O.D. ACTUAL	C OVERALL LENGTH			HEADLESS TYPE COOLANT LINER					L-DC STYLE		
			1/2	3/4	1"	1-3/8	1-3/4	2-1/8	2-1/2	3"	Q	V	U
5/16	.3129/.3126	1/2 .5017/.5014	L-32-8-DC	L-32-12-DC	L-32-16-DC				L-DC Or LU-DC Styles		3/16	5/32	25/64
5/16	.3129/.3126	1/2 .5200/.5150	LU-32-8-DC	LU-32-12-DC	LU-32-16-DC						3/16	5/32	25/64
1/2	.5005/.5002	3/4 .7518/.7515	L-48-8-DC	L-48-12-DC	L-48-16-DC	L-48-22-DC	L-48-28-DC				3/16	5/32	39/64
1/2	.5005/.5002	3/4 .7700/.7650	LU-48-8-DC	LU-48-12-DC	LU-48-16-DC	LU-48-22-DC	LU-48-28-DC				3/16	5/32	19/32
3/4	.7506/.7503	1" 1.0018/1.0015	L-64-8-DC	L-64-12-DC	L-64-16-DC	L-64-22-DC	L-64-28-DC	L-64-34-DC			5/16	7/32	55/64
3/4	.7506/.7503	1" 1.0200/1.0150	LU-64-8-DC	LU-64-12-DC	LU-64-16-DC	LU-64-22-DC	LU-64-28-DC	LU-64-34-DC			5/16	7/32	55/64
1"	1.0007/1.0003	1-3/8 1.3772/1.3768		L-88-12-DC	L-88-16-DC	L-88-22-DC	L-88-28-DC	L-88-34-DC	L-88-40-DC		5/16	7/32	1-5/32
1"	1.0007/1.0003	1-3/8 1.3950/1.3900		LU-88-12-DC	LU-88-16-DC	LU-88-22-DC	LU-88-28-DC	LU-88-34-DC	LU-88-40-DC		5/16	7/32	1-5/32
1-3/8	1.3760/1.3756	1-3/4 1.7523/1.7519		L-112-12-DC	L-112-16-DC	L-112-22-DC	L-112-28-DC	L-112-34-DC	L-112-40-DC		7/16	9/32	1-17/32
1-3/8	1.3760/1.3756	1-3/4 1.7700/1.7650		LU-112-12-DC	LU-112-16-DC	LU-112-22-DC	LU-112-28-DC	LU-112-34-DC	LU-112-40-DC		7/16	9/32	1-17/32
1-3/4	1.7512/1.7508	2-1/4 2.2525/2.2521			L-144-16-DC	L-144-22-DC	L-144-28-DC	L-144-34-DC	L-144-40-DC	L-144-48-DC	7/16	9/32	1-31/32
1-3/4	1.7512/1.7508	2-1/4 2.2700/2.2650			LU-144-16-DC	LU-144-22-DC	LU-144-28-DC	LU-144-34-DC	LU-144-40-DC	LU-144-48-DC	7/16	9/32	1-31/32
2-1/4	2.2515/2.2510	2-3/4 2.7526/2.7522			L-176-16-DC	L-176-22-DC	L-176-28-DC	L-176-34-DC	L-176-40-DC	L-176-48-DC	7/16	9/32	2-15/32
2-1/4	2.2515/2.2510	2-3/4 2.7700/2.7650			LU-176-16-DC	LU-176-22-DC	LU-176-28-DC	LU-176-34-DC	LU-176-40-DC	LU-176-48-DC	7/16	9/32	2-15/32

• **UNITED's** Coolant Bushings direct coolant to the cutting area, washing away chips and reducing heat and friction.

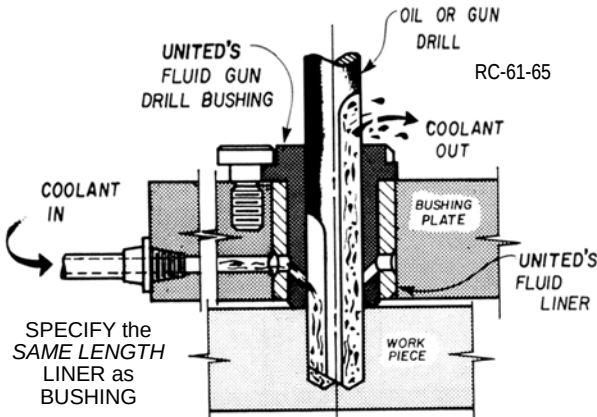
• Coolant allows faster cutting speeds while reducing tool breakage and increasing cutting edge life.

• Coolant Bushings may be substituted for expensive coolant drills on some applications.
• Coolant Bushings should always be used with coolant drills and reamers to reduce wear.

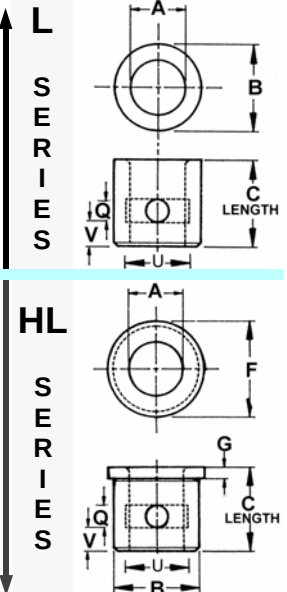
• Low cost manifold bushing plates are accomplished by drilling coolant plate holes to the bushing locations and using standard quick connector fitting. The cost of coolant bushings are more than offset by increased tool life and increased cutting action.

• **DO NOT** install Coolant Bushings flush or tight to the workpiece because that reduces and sometimes cuts off coolant flow. We recommend that the customary one and one half times drill diameter be used. Vary according to your feeds and speeds.

DIRECT the COOLANT to the ACTION!
UNITED COOLANT BUSHINGS and COOLANT LINERS
are MATCHED EXACTLY to INSURE HOLE ALIGNMENTS!



The Coolant-In Coolant-Out Process



A		B	B O.D.	F HD	G	C			OVERALL LENGTH			HEAD TYPE			COOLANT LINER	HL-DC STYLE		
I.D. SIZE		NOM	ACTUAL	DIA	THICK NESS	1/2	3/4	1"	1-3/8	1-3/4	2-1/8	2-1/2	3"	Q	V	U		
5/16	.3129/.3126	1/2	.5017/.5014	5/8	3/32	HL-32-8-DC	HL-32-12-DC	HL-32-16-DC				HL-DC Or HLU-DC Styles		3/16	5/32	25/64		
5/16	.3129/.3126	1/2	.5200/.5150	5/8	3/32	HLU-32-8-DC	HLU-32-12-DC	HLU-32-16-DC						3/16	5/32	25/64		
1/2	.5005/.5002	3/4	.7518/.7515	7/8	3/32	HL-48-8-DC	HL-48-12-DC	HL-48-16-DC	HL-48-22-DC	HL-48-28-DC				3/16	5/32	39/64		
1/2	.5005/.5002	3/4	.7700/.7650	7/8	3/32	HLU-48-8-DC	HLU-48-12-DC	HLU-48-16-DC	HLU-48-22-DC	HLU-48-28-DC				3/16	5/32	19/32		
3/4	.7506/.7503	1"	1.0018/1.0015	1-1/8	1/8	HL-64-8-DC	HL-64-12-DC	HL-64-16-DC	HL-64-22-DC	HL-64-28-DC	HL-64-34-DC			5/16	7/32	55/64		
3/4	.7506/.7503	1"	1.0200/1.0150	1-1/8	1/8	HLU-64-8-DC	HLU-64-12-DC	HLU-64-16-DC	HLU-64-22-DC	HLU-64-28-DC	HLU-64-34-DC			5/16	7/32	55/64		
1"	1.0007/1.0003	1-3/8	1.3772/1.3768	1-1/2	1/8		HL-88-12-DC	HL-88-16-DC	HL-88-22-DC	HL-88-28-DC	HL-88-34-DC	HL-88-40-DC		5/16	7/32	1-5/32		
1"	1.0007/1.0003	1-3/8	1.3950/1.3900	1-1/2	1/8		HLU-88-12-DC	HLU-88-16-DC	HLU-88-22-DC	HLU-88-28-DC	HLU-88-34-DC	HLU-88-40-DC		5/16	7/32	1-5/32		
1-3/8	1.3760/1.3756	1-3/4	1.7523/1.7519	1-7/8	3/16		HL-112-12-DC	HL-112-16-DC	HL-112-22-DC	HL-112-28-DC	HL-112-34-DC	HL-112-40-DC		7/16	9/32	1-17/32		
1-3/8	1.3760/1.3756	1-3/4	1.7700/1.7650	1-7/8	3/16		HLU-112-12-DC	HLU-112-16-DC	HLU-112-22-DC	HLU-112-28-DC	HLU-112-34-DC	HLU-112-40-DC		7/16	9/32	1-17/32		
1-3/4	1.7512/1.7508	2-1/4	2.2525/2.2521	2-3/8	3/16			HL-144-16-DC	HL-144-22-DC	HL-144-28-DC	HL-144-34-DC	HL-144-40-DC	HL-144-48-DC	7/16	9/32	1-31/32		
1-3/4	1.7512/1.7508	2-1/4	2.2700/2.2650	2-3/8	3/16			HLU-144-16-DC	HLU-144-22-DC	HLU-144-28-DC	HLU-144-34-DC	HLU-144-40-DC	HLU-144-48-DC	7/16	9/32	1-31/32		
2-1/4	2.2515/2.2510	2-3/4	2.7526/2.7522	2-7/8	3/16			HL-176-16-DC	HL-176-22-DC	HL-176-28-DC	HL-176-34-DC	HL-176-40-DC	HL-176-48-DC	7/16	9/32	2-15/32		
2-1/4	2.2515/2.2510	2-3/4	2.7700/2.7650	2-7/8	3/16			HLU-176-16-DC	HLU-176-22-DC	HLU-176-28-DC	HLU-176-34-DC	HLU-176-40-DC	HLU-176-48-DC	7/16	9/32	2-15/32		

7-11-07

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800)421-3466 IN CA / 800-486-3466 • FAX (562) 803-6898 / (800)486-3465

A61

SFC Carbide Coolant Chipbreaker Bushings

Solid Tungsten Carbide SF Direct Coolant & Chipbreaker Bushings with Steel Head

MANUFACTURED AS ORDERED FROM SEMI-FINISHED
RA-89-91 RC-72-79

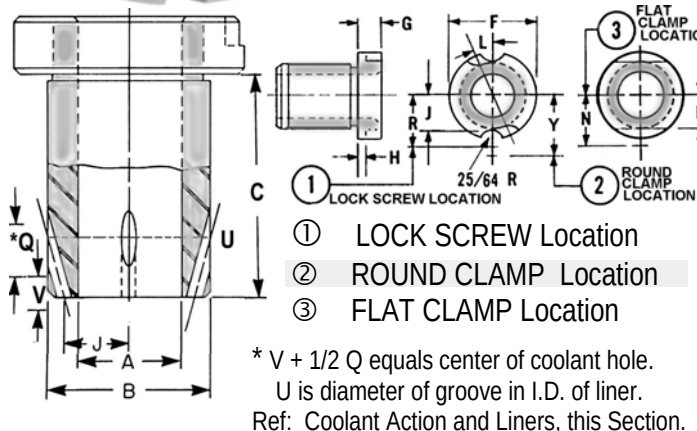
SFC-DC CARBIDE DIRECTED COOLANT



SFC-DCB CARBIDE DIRECTED COOLANT CHIPBREAKER



A I.D. RANGE	B O.D. BODY	C LEN UNDER HEAD	SFC COOLANT BUSHING	SFC CHIPBREAKER BUSHING	*V	*Q	*U	4 HOLES	J	ADD 'U' for UNGROUND HEAD- LESS —LINERS TO USE— WITH HEAD	
1/16 (.0625) TO #43 (.0890)	NOM 5/16 ACTUAL .3125/.3123	3/4 1"	SFC-20-12-DC SFC-20-16-DC	SFC-20-12-DCB SFC-20-16-DCB	5/32 5/32	3/16 3/16	25/64 25/64	#51 #51	5/64 5/64	L-32-8-DC L-32-12-DC	HL-32-8-DC HL-32-12-DC
#42 (.0935) TO #10 (.1935)	NOM 5/16 ACTUAL .3125/.3123	3/4 1"	SFC-20-12-DC SFC-20-16-DC	SFC-20-12-DCB SFC-20-16-DCB	5/32 5/32	3/16 3/16	25/64 25/64	#51 #51	5/64 5/64	L-32-8-DC L-32-12-DC	HL-32-8-DC HL-32-12-DC
#28 (.1405) TO 11/32 (.3437)	NOM 1/2 ACTUAL .5000/.4998	3/4 1"	SFC-32-12-DC SFC-32-16-DC	SFC-32-12-DCB SFC-32-16-DCB	5/32 7/32	3/16 5/16	25/64 19/32	#51 3/32	5/64 9/64	L-48-8-DC L-48-12-DC	HL-48-8-DC HL-48-12-DC
		1-3/8	SFC-32-22-DC SFC-32-28-DC	SFC-32-22-DCB SFC-32-28-DCB	7/32 7/32	5/16 5/16	19/32 19/32	3/32 3/32	9/64 9/64	L-48-16-DC L-48-22-DC	HL-48-16-DC HL-48-22-DC
		2-1/8	SFC-32-34-DC SFC-32-40-DC	SFC-32-34-DCB SFC-32-40-DCB	7/32 7/32	5/16 5/16	19/32 19/32	3/32 3/32	9/64 9/64	L-48-28-DC L-48-34-DC	HL-48-28-DC HL-48-34-DC
9/32 (.2812) TO 9/16 (.5625)	NOM 3/4 ACTUAL .7500/.7498	1-3/8 1-3/4 2-1/8 2-1/2	SFC-48-16-DC SFC-48-22-DC SFC-48-28-DC SFC-48-34-DC	SFC-48-16-DCB SFC-48-22-DCB SFC-48-28-DCB SFC-48-34-DCB	7/32 7/32 7/32 7/32	5/16 5/16 5/16 5/16	55/64 55/64 55/64 55/64	#37 #37 #37 #37	17/64 17/64 17/64 17/64	L-64-12-DC L-64-16-DC L-64-22-DC L-64-28-DC	HL-64-12-DC HL-64-16-DC HL-64-22-DC HL-64-28-DC
		2-1/2	SFC-48-40-DC SFC-64-16-DC	SFC-48-40-DCB SFC-64-16-DCB	7/32 7/32	5/16 5/16	55/64 1-5/32	#37 1/8	17/64 23/64	L-64-34-DC L-88-12-DC	HL-64-34-DC HL-88-12-DC
15/32 (.4687) TO 25/32 (.7812)	NOM 1" ACTUAL 1.0000 / .9998	1-3/8 1-3/4 2-1/8 2-1/2 3"	SFC-64-22-DC SFC-64-28-DC SFC-64-34-DC SFC-64-40-DC SFC-64-48-DC	SFC-64-22-DCB SFC-64-28-DCB SFC-64-34-DCB SFC-64-40-DCB SFC-64-48-DCB	7/32 7/32 7/32 7/32 7/32	5/16 5/16 5/16 5/16 5/16	1-5/32 1-5/32 1-5/32 1-5/32 1-5/32	1/8 1/8 1/8 1/8 1/8	23/64 23/64 23/64 23/64 23/64	L-88-16-DC L-88-22-DC L-88-28-DC L-88-34-DC L-88-40-DC	HL-88-16-DC HL-88-22-DC HL-88-28-DC HL-88-34-DC HL-88-40-DC
23/32 (.7187) TO 1-1/16 (1.0625)	NOM 1-3/8 ACTUAL 1.3750 / 1.3747	1-3/8 1-3/4 2-1/8 2-1/2 3"	SFC-88-16-DC SFC-88-22-DC SFC-88-28-DC SFC-88-34-DC SFC-88-40-DC	SFC-88-16-DCB SFC-88-22-DCB SFC-88-28-DCB SFC-88-34-DCB SFC-88-40-DCB	9/32 9/32 9/32 9/32 9/32	7/16 7/16 7/16 7/16 7/16	1-17/32 1-17/32 1-17/32 1-17/32 1-17/32	#26 #26 #26 #26 #26	17/32 17/32 17/32 17/32 17/32	L-112-12-DC L-112-16-DC L-112-22-DC L-112-28-DC L-112-34-DC	HL-112-12-DC HL-112-16-DC HL-112-22-DC HL-112-28-DC HL-112-34-DC
		3"	SFC-88-48-DC SFC-112-22-DC	SFC-88-48-DCB SFC-112-22-DCB	9/32 9/32	7/16 7/16	1-17/32 1-31/32	#26 #17	17/32 11/16	L-112-40-DC L-144-16-DC	HL-112-40-DC HL-144-16-DC
31/32 (.9687) TO 1-13/32 (1.4062)	NOM 1-3/4 ACTUAL 1.7500 / 1.7497	1-3/8 1-3/4 2-1/8 2-1/2 3"	SFC-112-28-DC SFC-112-34-DC SFC-112-40-DC SFC-112-48-DC	SFC-112-28-DCB SFC-112-34-DCB SFC-112-40-DCB SFC-112-48-DCB	9/32 9/32 9/32 9/32	7/16 7/16 7/16 7/16	1-31/32 1-31/32 1-31/32 1-31/32	#17 #17 #17 #17	11/16 11/16 11/16 11/16	L-144-22-DC L-144-28-DC L-144-34-DC L-144-40-DC	HL-144-22-DC HL-144-28-DC HL-144-34-DC HL-144-40-DC
1-11/32 (1.3437) TO 1-7/8 (1.8750)	NOM 2-1/4 ACTUAL 2.2500 / 2.2496	1-3/8 1-3/4 2-1/8 2-1/2 3"	SFC-144-22-DC SFC-144-28-DC SFC-144-34-DC SFC-144-40-DC SFC-144-48-DC	SFC-144-22-DCB SFC-144-28-DCB SFC-144-34-DCB SFC-144-40-DCB SFC-144-48-DCB	9/32 9/32 9/32 9/32 9/32	7/16 7/16 7/16 7/16 7/16	2-15/32 2-15/32 2-15/32 2-15/32 2-15/32	#17 #17 #17 #17 #17	7/8 7/8 7/8 7/8 7/8	L-176-16-DC L-176-22-DC L-176-28-DC L-176-34-DC L-176-40-DC	HL-176-16-DC HL-176-22-DC HL-176-28-DC HL-176-34-DC HL-176-40-DC

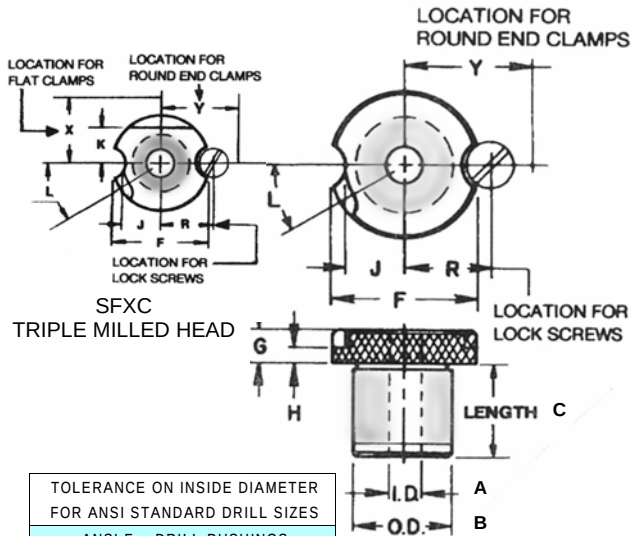


BODY O.D.	BUSHING HEAD DIMENSIONS							
	F	G	H	J	R	N	K	Y
3/16	5/16	3/16	3/32	3/32	17/64			
5/16	35/64	1/4	1/8	11/64	1/2	5/8	11/64	11/16
1/2	51/64	1/4	1/8	19/64	5/8	3/4	17/64	25/32
3/4	1-3/64	1/4	1/8	27/64	3/4	13/16	3/8	57/64
1"	1-27/64	3/8	3/16	19/32	59/64	1-7/64	1/2	1-9/64
1-3/8	1-51/64	3/8	3/16	25/32	1-7/64	1-19/64	11/16	1-21/64
1-3/4	2-19/64	3/8	3/16	1"	1-25/64	1-41/64	7/8	1-33/64
2-1/4	2-51/64	3/8	3/16	1-1/4	1-41/64	1-57/64	1-1/8	1-49/64

Solid Tungsten Carbide SFC Slip Fixed Renewable with Steel Head and SFXC Milled Flat

A.N.S.I. Standards

SFC - SFXC Slip Fixed Renewable Bushings



RA-89-91 RC-72-79



**SLIP
FIXED**

RENEWABLE

**MILLED FLAT
SFXC**

**TUNGSTEN
CARBIDE**

**SLIP FIXED
SFC**

Originated by **UNITED**

PATENT No. 3,606,566

ALL UNITED STANDARD BUSHINGS ARE MANUFACTURED TO UNITED AND ANSI STANDARDS.

USE THESE DIAGRAMS FOR REFERENCE TO SEE THIS SECTION FOR SFC AND SFXC HEAD DIMENSIONS, LOCK SCREWS AND CLAMPS.

TOLERANCE ON INSIDE DIAMETER FOR ANSI STANDARD DRILL SIZES	
ANSI For DRILL BUSHINGS	
NOM. I. D. RANGE	TOLERANCE
#80 to 1/4"	+0.001 to +0.004
Over 1/4" to 3/4"	+0.001 to +0.005
Over 3/4" to 1-1/2"	+0.002 to +0.006
Over 1-1/2"	+0.003 to +0.007
ANSI For REAMER BUSHINGS	
Up to 1/4"	+0.005 to +0.008
Over 1/4" to 1"	+0.006 to +0.010
Over 1"	+0.008 to +0.012

A I.D. DRILL RANGE				B O.D. SIZE		SELECT ANSI SYMBOL	C LENGTH SFC/SFXC - UNDER HEAD / ANSI LENGTH SYMBOL BY 16ths																																																	
INCH — METRIC		U.S.A. INCH		U.S.A. INCH			1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"																																				
NOMINAL		DECIMAL		NOM.	DECIMAL		-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-34	-40	-48																																				
#80 - .35	#70 .70MM	.0135 - .0138	.0280 .0276	3/16	.1875 - .1873	SFC-12 SFXC-12	12-4	12-5			12-12			* NEW STANDARD I.D.s <table><tr><th colspan="2">I . D .</th><th colspan="2">O . D .</th></tr><tr><td>* .2510</td><td colspan="3">1/2</td></tr><tr><td>* .3760</td><td colspan="3">3/4</td></tr><tr><td>* .5010</td><td colspan="3">3/4</td></tr><tr><td>* .5010</td><td colspan="3">1"</td></tr><tr><td>* .7510</td><td colspan="3">1"</td></tr><tr><td>* .7510</td><td colspan="3">1-3/8</td></tr></table>	I . D .		O . D .		* .2510	1/2			* .3760	3/4			* .5010	3/4			* .5010	1"			* .7510	1"			* .7510	1-3/8																
I . D .		O . D .																																																						
* .2510	1/2																																																							
* .3760	3/4																																																							
* .5010	3/4																																																							
* .5010	1"																																																							
* .7510	1"																																																							
* .7510	1-3/8																																																							
#69 - .75	3/64 1.25MM	.0292 - .0295	.0469 .0492	3/16	.1875 - .1873	SFC-12 SFXC-12	12-4	12-5			12-12																																													
#55 - 1.30	1/16 1.60MM	.0520 - .0512	.0625 .0630	3/16	.1875 - .1873	SFC-12 SFXC-12	12-4	12-5			12-12																																													
#55 - 1.30	1/16 1.60MM	.0520 - .0512	.0625 .0630	5/16	.3125 - .3123	SFC-20 SFXC-20		20-5	20-6	20-8	20-12																																													
#52 - 1.65	#43 2.25MM	.0635 - .0650	.0890 .0886	5/16	.3125 - .3123	SFC-20 SFXC-20		20-5	20-6	20-8	20-12	20-16																																												
#42 - 2.35	#10 4.90MM	.0935 - .0925	.1935 .1929	5/16	.3125 - .3123	SFC-20 SFXC-20		20-5	20-6	20-8	20-10	20-12	20-16		20-22																																									
#28 - 3.50	3/16 4.75MM	.1405 - * .1378 -	.1875 .1870	1/2	.5000 - .4998	SFC-32 SFXC-32		32-5	32-6	32-8		32-12	32-16		32-22	32-24	32-28																																							
#12 - 4.80	11/32 8.70MM	.1890 - .1890 -	.3437 .3425	1/2	.5000 - .4998	SFC-32 SFXC-32		32-5	32-6	32-8		32-12	32-16		32-22	32-24	32-28	32-34																																						
9/32 - 7.10	9/16 14.00MM	.2812 - * .2795 -	.5625 .5512	3/4	.7500 - .7498	SFC-48 SFXC-48			48-6	48-8		48-12	48-16		48-22	48-24	48-28	48-34	48-40	48-48																																				
15/32 - 11.80	25/32 19.50MM	.4688 - * .4646 -	.7812 .7677	1"	1.0000 - .9998	SFC-64 SFXC-64				64-8		64-12	64-16		64-22	64-24	64-28	64-34	64-40	64-48																																				
23/32 - 18.00	1-1/16 26.00MM	.7187 - * .7087 -	1.0625 1.0236	1-3/8	1.3750 - 1.3747	SFC-88 SFXC-88						88-12	88-16		88-22	88-24	88-28	88-34	88-40	88-48																																				
31/32 - 24.50	1-13/32 35.00MM	.9687 - .9646 -	1.4062 1.3780	1-3/4	1.7500 - 1.7497	SFC-112 SFXC-112						112-12	112-16		112-22	112-24	112-28	112-34	112-40	112-48																																				
1-11/32 - 34.00	1-7/8 47.00MM	1.3437 - 1.3386 -	1.8750 1.8504	2-1/4	2.2500 - 2.2496	SFC-144 SFXC-144						144-12	144-16		144-22	144-24	144-28	144-34	144-40	144-48																																				
I . D . RANGES				O . D . SIZES		ANSI SYMBOL	1/4	5/16	3/8	1/2	5/8	3/4	1"	1-1/4	1-3/8	1-1/2	1-3/4	2-1/8	2-1/2	3"																																				
							-4	-5	-6	-8	-10	-12	-16	-20	-22	-24	-28	-34	-40	-48																																				

* SEE SMALL CHARTS FOR ADDITIONAL I.D. STANDARDS.
ALSO SEE SECTION A FOR LONG HEAD SFX UNALLOY.

PRICES AVAILABLE ON REQUEST.

11-7-06

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800)421-3466 IN CA / 800-486-3466 • FAX (562) 803-6898 / (800)486-3465

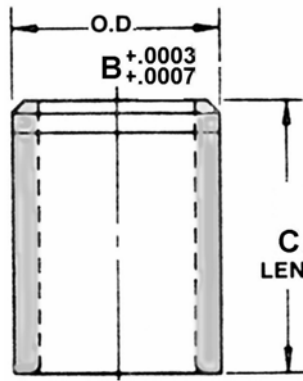
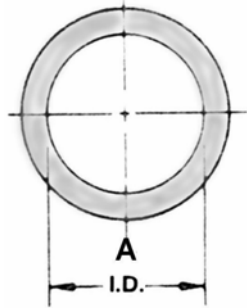
A63

PC - Carbide Press Fit

Solid Tungsten Carbide Headless Press Fit

A.N.S.I. Standards

RA-89-91 RC-72-79



PC TUNGSTEN CARBIDE HEADLESS PRESS FIT

TOLERANCE ON INSIDE DIAMETER FOR ANSI STANDARD DRILL SIZES	
ANSI For DRILL BUSHINGS	
NOM. I. D. RANGE	TOLERANCE
#80 to 1/4"	+0.001 to +0.004
Over 1/4" to 3/4"	+0.001 to +0.005
Over 3/4" to 1-1/2"	+0.002 to +0.006
Over 1-1/2"	+0.003 to +0.007
ANSI For REAMER BUSHINGS	
Up to 1/4"	+0.005 to +0.008
Over 1/4" to 1"	+0.006 to +0.010
Over 1"	+0.008 to +0.012

PRICES
AVAILABLE
ON
REQUEST

All Carbide Bushings are manufactured non-counterbored unless specified otherwise.

CONCENTRICITY — T.I.R. (Total Indicator Reading):

1/8" to 1/2" I.D. — .0003" max.
All other sizes are T.I.R. .0005" max.
T.I.R. met at drill exit end.

HARDNESS: Rockwell RA-89-91 RC-72-79 in the hole.

RADIUS COUNTERSINK: UNITED features a radius countersink at the drill exit end.

LEAD: Concentric ground lead .001 to .002 smaller than O.D. +45° chamfer.

A I.D. DRILL RANGE		B O.D. SIZE		C	UNITED
INCH / METRIC NOMINAL	U.S.A. INCH DECIMAL	NOM.	U.S.A. INCH DECIMAL	LENGTH OVERALL	ANSI SYMBOL
#80 - 1/16	.0135 - .0280	5/32	.1578 - .1575	1/4	PC-10-4
.35 - 1.60MM	.0138 - .0630		.166 - .161	5/16	PC-10-5
				3/8	PC-10-6
				1/2	PC-10-8
1/16 - #39	.0625 - .0995	13/64	.2046 - .2043	1/4	PC-13-4
1.60 - 2.50MM	.0630 - .0984		.213 - .208	5/16	PC-13-5
				3/8	PC-13-6
#40 - 9/64	.0980 - .1406	1/4	.2516 - .2513	1/4	PC-16-4
2.35 - 4.90MM	.0925 - .1929		.265 - .260	5/16	PC-16-5
				3/8	PC-16-6
				1/2	PC-16-8
				3/4	PC-16-12
1/8 - #10	.1250 - .1935	5/16	.3141 - .3138	1/4	PC-20-4
3.10 - 4.90MM	.1220 - .1929		.327 - .322	5/16	PC-20-5
				3/8	PC-20-6
				1/2	PC-20-8
				3/4	PC-20-12
3/16 - F	.1875 - .2570	13/32	.4078 - .4075	1/4	PC-26-4
4.75 - 6.50MM	.1870 - .2559		.421 - .416	5/16	PC-26-5
				3/8	PC-26-6
				1/2	PC-26-8
				3/4	PC-26-12
				1"	PC-26-16
3/16 - O	.1875 - .3160	1/2	.5017 - .5014	3/8	PC-32-6
4.75 - 8.00MM	.1870 - .3150		.520 - .515	1/2	PC-32-8
				3/4	PC-32-12
				1"	PC-32-16
				1-3/8	PC-32-22
5/16 - 7/16	.3125 - .4375	5/8	.6267 - .6264	3/8	PC-40-6
8.80 - 11.00MM	.3465 - .4331		.645 - .640	1/2	PC-40-8
				3/4	PC-40-12
				1"	PC-40-16
				1-3/8	PC-40-22
				1-3/4	PC-40-28
3/8 - 17/32	.3750 - .5312	3/4	.7518 - .7515	1/2	PC-48-8
9.60 - 14.00MM	.3780 - .5512		.770 - .765	3/4	PC-48-12
				1"	PC-48-16
				1-3/8	PC-48-22
				1-3/4	PC-48-28
1/2 - 21/32	.5000 - .6562	7/8	.8768 - .8765	1/2	PC-56-8
12.50 - 16.50MM	.4921 - .6496		.895 - .890	3/4	PC-56-12
				1"	PC-56-16
				1-3/8	PC-56-22
				1-3/4	PC-56-28
1/2 - 49/64	.5000 - .7656	1"	1.0018 - 1.0015	1/2	PC-64-8
12.50 - 19.50MM	.4921 - .7677		1.020 - 1.015	3/4	PC-64-12
				1"	PC-64-16
				1-3/8	PC-64-22
				1-3/4	PC-64-28
				2-1/8	PC-64-34
5/8 - 1-1/32	.6250 - 1.0312	1-3/8	1.3772 - 1.3768	3/4	PC-88-12
15.50 - 26.00MM	.6102 - 1.0236		1.395 - 1.390	1"	PC-88-16
				1-3/8	PC-88-22
				1-3/4	PC-88-28
				2-1/8	PC-88-34
1" - 1-25/64	1.0000 - 1.3906	1-3/4	1.7523 - 1.7519	1"	PC-112-16
25.00 - 34.00MM	.9843 - 1.3386		1.770 - 1.765	1-3/8	PC-112-22
				1-3/4	PC-112-28
				2-1/8	PC-112-34
				2-1/2	PC-112-40
1-3/8 - 1-49/64	1.3750 - 1.7656	2-1/4	2.2525 - 2.2521	1"	PC-144-16
34.00 - 44.00MM	1.3386 - 1.7323		2.270 - 2.265	1-3/8	PC-144-22
				1-3/4	PC-144-28
				2-1/8	PC-144-34
				2-1/2	PC-144-40
I. D. RANGES		O. D. SIZES		OVERALL LENGTH	ANSI SYMBOL

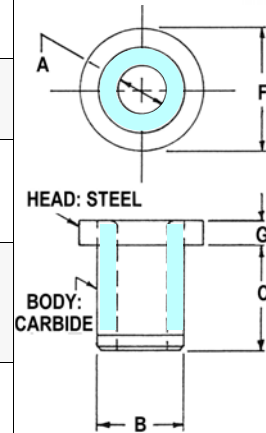
HC - Solid Tungsten Carbide With Steel Head

A.N.S.I. Standards

HC - Carbide Head Press Fit

A I.D. DRILL RANGE		B O.D. SIZE		C	UNITED	F	G
INCH / METRIC NOMINAL	U.S.A. INCH DECIMAL	NOM.	U.S.A. INCH DECIMAL	LENGTH OVERALL	A N S I SYMBOL	HEAD DIAMETER	HEAD THICKNESS
#80 - 1/16 .35 - 1.60MM	.0135 - .0280 .0138 - .0630	5/32	.1578 - .1575 .166 - .161	1/4 5/16 3/8 1/2	HC-10-4 HC-10-5 HC-10-6 HC-10-8	1/4	3/32
1/16 - #39 1.60 - 2.50MM	.0625 - .0995 .0630 - .0984	13/64	.2046 - .2043 .213 - .208	1/4 5/16 3/8	HC-13-4 HC-13-5 HC-13-6	19/64	3/32
#40 - 9/64 2.35 - 4.90MM	.0980 - .1406 .0925 - .1929	1/4	.2516 - .2513 .265 - .260	1/4 5/16 3/8 1/2 3/4	HC-16-4 HC-16-5 HC-16-6 HC-16-8 HC-16-12	23/64	3/32
1/8 - #10 3.10 - 4.90MM	.1250 - .1935 .1220 - .1929	5/16	.3141 - .3138 .327 - .322	1/4 5/16 3/8 1/2 3/4	HC-20-4 HC-20-5 HC-20-6 HC-20-8 HC-20-12	27/64	1/8
3/16 - F 4.75 - 6.50MM	.1875 - .2570 .1870 - .2559	13/32	.4078 - .4075 .421 - .416	1/4 5/16 3/8 1/2 3/4 1"	HC-26-4 HC-26-5 HC-26-6 HC-26-8 HC-26-12 HC-26-16	1/2	5/32
3/16 - O 4.75 - 8.00MM	.1875 - .3160 .1870 - .3150	1/2	.5017 - .5014 .520 - .515	3/8 1/2 3/4 1" 1-3/8	HC-32-6 HC-32-8 HC-32-12 HC-32-16 HC-32-22	39/64	7/32
5/16 - 7/16 8.80 - 11.00MM	.3125 - .4375 .3465 - .4331	5/8	.6267 - .6264 .645 - .640	3/8 1/2 3/4 1" 1-3/8 1-3/4	HC-40-6 HC-40-8 HC-40-12 HC-40-16 HC-40-22 HC-40-28	51/64	7/32
3/8 - 17/32 9.60 - 14.00MM	.3750 - .5312 .3780 - .5512	3/4	.7518 - .7515 .770 - .765	1/2 3/4 1" 1-3/8 1-3/4	HC-48-8 HC-48-12 HC-48-16 HC-48-22 HC-48-28	59/64	7/32
1/2 - 21/32 12.50 - 16.50MM	.5000 - .6562 .4921 - .6496	7/8	.8768 - .8765 .895 - .890	1/2 3/4 1" 1-3/8 1-3/4	HC-56-8 HC-56-12 HC-56-16 HC-56-22 HC-56-28	1-7/64	1/4
1/2 - 49/64 12.50 - 19.50MM	.5000 - .7656 .4921 - .7677	1"	1.0018 - 1.0015 1.020 - 1.015	1/2 3/4 1" 1-3/8 1-3/4 2-1/8	HC-64-8 HC-64-12 HC-64-16 HC-64-22 HC-64-28 HC-64-34	1-15/64	5/16
5/8 - 1-1/32 15.50 - 26.00MM	.6250 - 1.0312 .6102 - 1.0236	1-3/8	1.3772 - 1.3768 1.395 - 1.390	3/4 1" 1-3/8 1-3/4 2-1/8	HC-88-12 HC-88-16 HC-88-22 HC-88-28 HC-88-34	1-39/64	3/8
1" - 1-25/64 25.00 - 34.00MM	1.0000 - 1.3906 .9843 - 1.3386	1-3/4	1.7523 - 1.7519 1.770 - 1.765	1" 1-3/8 1-3/4 2-1/8 2-1/2	HC-112-16 HC-112-22 HC-112-28 HC-112-34 HC-112-40	1-63/64	3/8
1-3/8 - 1-49/64 34.00 - 44.00MM	1.3750 - 1.7656 1.3386 - 1.7323	2-1/4	2.2525 - 2.2521 2.270 - 2.265	1" 1-3/8 1-3/4 2-1/8 2-1/2	HC-144-16 HC-144-22 HC-144-28 HC-144-34 HC-144-40	2-31/64	3/8
I. D. RANGES		O. D. SIZES		OVER- ALL LENGTH	A N S I SYMBOL	F	G

RA-89-91 RC-72-79



**HC
TUNGSTEN
CARBIDE BODY**

**STEEL HEAD
PRESS FIT**

PRICES
AVAILABLE
ON REQUEST

TOLERANCE ON INSIDE DIAMETER FOR ANSI STANDARD DRILL SIZES	
ANSI For DRILL BUSHINGS	
NOM. I. D. RANGE	TOLERANCE
#80 to 1/4"	+0.0001 to +0.0004
Over 1/4" to 3/4"	+0.0001 to +0.0005
Over 3/4" to 1-1/2"	+0.0002 to +0.0006
Over 1-1/2"	+0.0003 to +0.0007
ANSI For REAMER BUSHINGS	
Up to 1/4"	+0.0005 to +0.0008
Over 1/4" to 1"	+0.0006 to +0.0010
Over 1"	+0.0008 to +0.0012

All Carbide Bushings are manufactured non-counterbored unless specified otherwise.

CONCENTRICITY — T.I.R.

(Total Indicator Reading):

1/8" to 1/2" I.D. — .0003" max.

All other sizes are T.I.R. .0005" max.

T.I.R. met at drill exit end.

HARDNESS: Rockwell RA 89-91 RC 72-79.

RADIUS COUNTERSINK: UNITED features a radius countersink at the drill exit end.

LEAD: Concentric ground lead .001 to .002 smaller than O.D. +45° chamfer.

Circuit Board Bushings-Standard

UNITED's Circuit Board Bushings

Type CBD

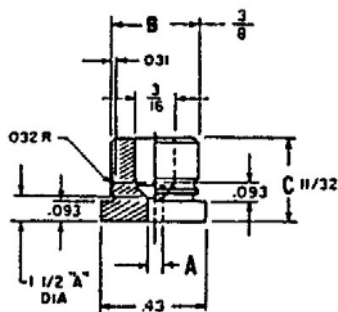


For A

To Order, specify Type & I.D.

Example:
CBD-1/16"

Standard Bushings are Oil Hardened Tool Steel.



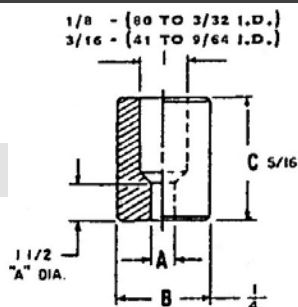
FOR DIGITAL SYSTEMS TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B O.D. SIZE	C (OAL) LENGTH
NOMINAL	DECIMAL		
80 - 78	.0135 - .0160	.3749 .3747	11/32
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		
27 - 11	.1440 - .1910		
10 - 1/4	.1935 - .2500		

Type CBE



Wide

I.D. Tolerance is Nominal +.0001 +.0004.



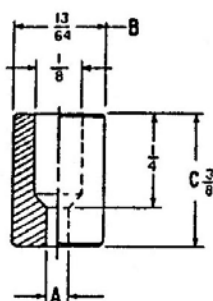
FOR EXCELLON TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B O.D. SIZE	C (OAL) LENGTH
NOMINAL	DECIMAL		
80 - 78	.0135 - .0160	.2516 .2513	5/16
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		

Type CBH



Variety

Concentricity is .0005 T.I.R. Maximum at Exit End.



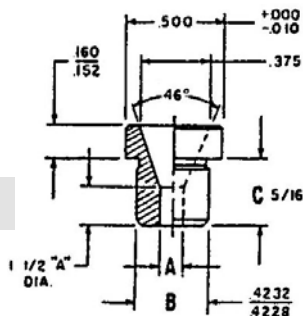
FOR HUGHES TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B O.D. SIZE	C (OAL) LENGTH
NOMINAL	DECIMAL		
80 - 78	.0135 - .0160	.2042 .2040	3/8
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		

Type CBL



of

Specify Quantity and Type Desired.



FOR LELAND-GIFFORD TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B O.D. SIZE	C under Hd LENGTH
NOMINAL	DECIMAL		
80 - 78	.0135 - .0160	.4232 .4228	5/16
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		
27 - 11	.1440 - .1910		
10 - 1/4	.1935 - .2500		

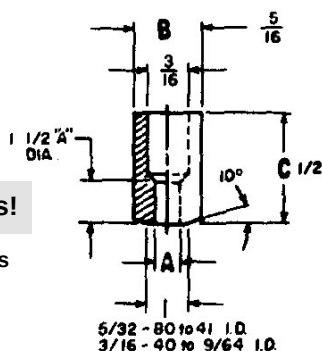
Type CBM



Machines!

See Pages A67, A68 & A69.

To Order Include Inside Dia. 'A' or Drill Size Required.



FOR ELECTRO-MECHANO TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B O.D. SIZE	C (OAL) LENGTH
NOMINAL	DECIMAL		
80 - 78	.0135 - .0160	.3125 .3123	1/2
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		

Circuit Board Bushings are not returnable for Credit.

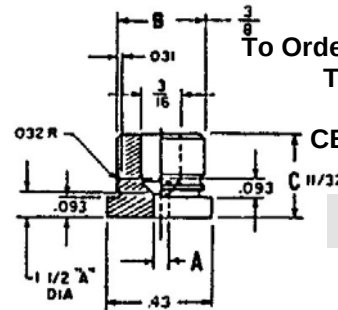
UNITED's Circuit Board Bushings

Circuit Board Bushings-Carbide

FOR DIGITAL SYSTEMS TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.3749 .3747	11/32
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		
27 - 11	.1440 - .1910		
10 - 1/4	.1935 - .2500		

New from UNITED...TUNGSTEN CARBIDE

Carbide Bushings are Tungsten Carbide.



To Order, specify Type & I.D.
Example: CBDC-1/16"

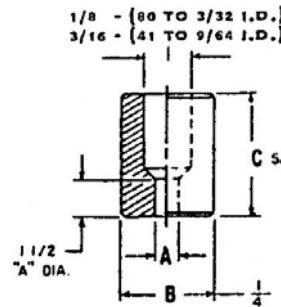
For A

Type CBDC



FOR EXCELLON TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.2516 .2513	5/16
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		

I.D. Tolerance is Nominal
+.0001
+.0004.



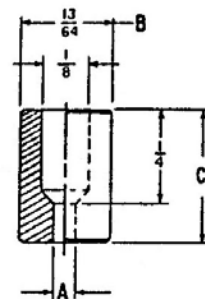
Wide

Type CBEC



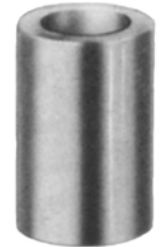
FOR HUGHES TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.2042 .2040	3/8
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		

Concentricity is .0005 T.I.R. Maximum at Exit End.



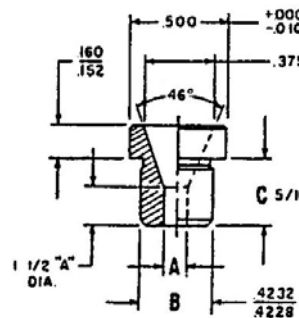
Variety

Type CBHC



FOR LELAND-GIFFORD TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C under Hd
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.4232 .4228	5/16
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		
27 - 11	.1440 - .1910		
10 - 1/4	.1935 - .2500		

Specify Quantity and Type Desired.



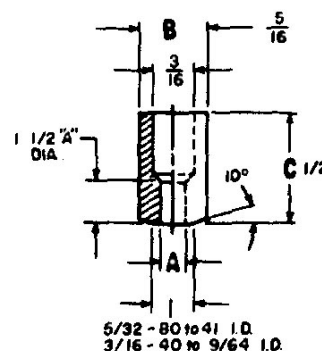
of

Type CBLC



FOR ELECTRO-MECHANO TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.3125 .3123	1/2
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		

To Order Include Inside Dia. 'A' or Drill Size Required.



Machines!

See Pages A66, A68 & A69.

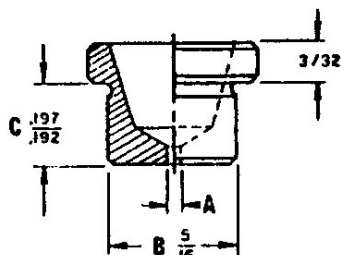
Type CBMC



Circuit Board Bushings are not returnable for Credit.

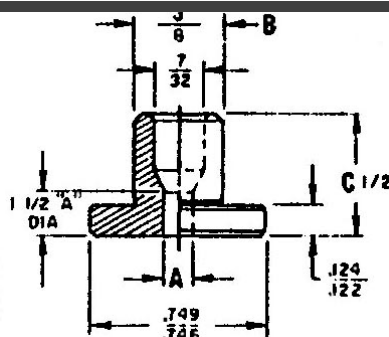
UNITED's Circuit Board Bushings

To Order, specify Type & I.D.
Example: CBN-1/16"



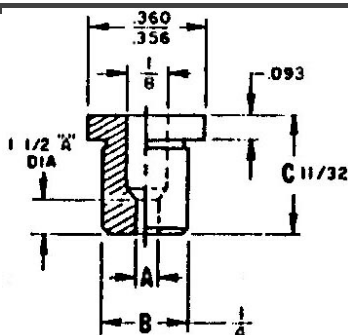
Standard Bushings are Oil Hardened Tool Steel.

FOR NATIONWIDE TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C under Hd
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160		
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625	.3125	.197
52 - 3/32	.0635 - .0937	.3123	.192
41 - 9/64	.0960 - .1406		
27 - 11	.1440 - .1910		



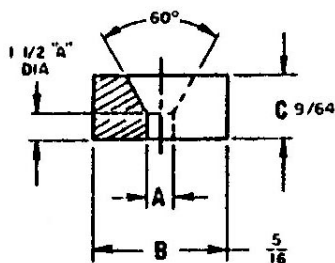
I.D.
Tolerance
is
Nominal
+.0001
+.0004.

FOR PALOMAR TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.3750 .3748	1/2
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		



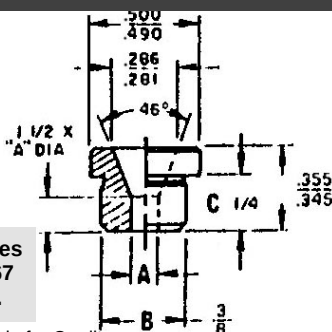
Concentricity
is
.0005 T.I.R.
Maximum
at
Exit End.

FOR RAPIDRILL TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.2500 .2498	11/32
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		



Specify
Quantity
and
Type
Desired.

FOR RELIABLE TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.3125 .3123	9/64
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		



**See Pages
A66, A67
& A69.**

To Order
Include
Inside Dia.
'A'
or Drill Size
Required.

FOR TEKTRONICS & EDLUND TYPE MACHINES			
A I.D. RANGE (STD. DRILL SIZES)		B	C under H
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160		
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625	.3766	1/4
52 - 3/32	.0635 - .0937	.3763	
41 - 9/64	.0960 - .1406		
27 - 11	.1440 - .1910		
10 - 1/4	.1935 - .2500		

Circuit Board Bushings are not returnable for Credit.

UNITED's Circuit Board Bushings

Circuit Board Bushings-Carbide

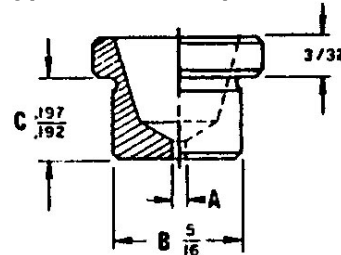
New from UNITED...TUNGSTEN CARBIDE

To Order, specify
Type & I.D. Example: CBNC-1/16"

Type CBNC

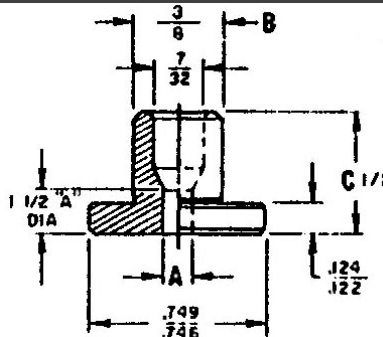
FOR NATIONWIDE TYPE MACHINES			
A	I.D. RANGE (STD. DRILL SIZES)	B	C under Hd
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.3125 .3123	.197 .192
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		
27 - 11	.1440 - .1910		

Carbide Bushings are Tungsten Carbide.



FOR PALOMAR TYPE MACHINES			
A	I.D. RANGE (STD. DRILL SIZES)	B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.3750 .3748	1/2
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		

I.D. Tolerance is Nominal +.0001 +.0004.

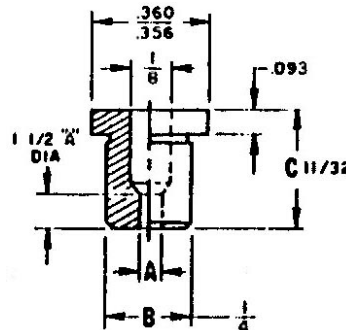


Type CBPC



FOR RAPIDRILL TYPE MACHINES			
A	I.D. RANGE (STD. DRILL SIZES)	B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.2500 .2498	11/32
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		

Concentricity is .0005 T.I.R. Maximum at Exit End.

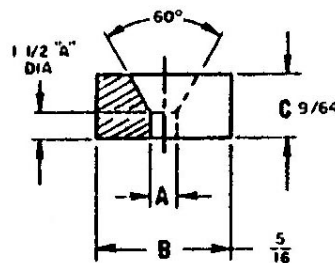


Type CBRC



FOR RELIABLE TYPE MACHINES			
A	I.D. RANGE (STD. DRILL SIZES)	B	C (OAL)
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.3125 .3123	9/64
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		

Specify Quantity and Type Desired.

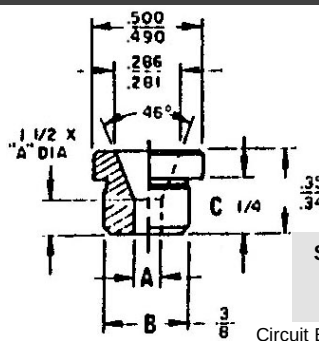


Type CBREC



FOR TEKTRONICS & EDLUND TYPE MACHINES			
A	I.D. RANGE (STD. DRILL SIZES)	B	C under Hd
NOMINAL	DECIMAL	O.D. SIZE	LENGTH
80 - 78	.0135 - .0160	.3766 .3763	1/4
77 - 70	.0180 - .0280		
69 - 3/64	.0292 - .0469		
55 - 1/16	.0520 - .0625		
52 - 3/32	.0635 - .0937		
41 - 9/64	.0960 - .1406		
27 - 11	.1440 - .1910		
10 - 1/4	.1935 - .2500		

To Order Include Inside Dia. 'A' or Drill Size Required.



Type CBTEC



See Pages A66, A67 & A68.

Circuit Board Bushings are not returnable for Credit.

**Tool Holder
Bushings**

UNITED's Tool Holder Bushings and Accessories

You Will Want to Hold With These!

HTC — Tool Holder Bushing with Long Slots



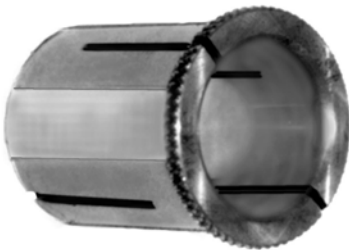
HB — Split Bushing With Flat



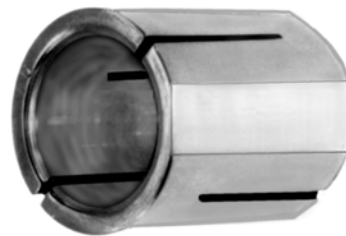
HJ — With 4 Clearance Holes



HBH — Knurled Head Collet



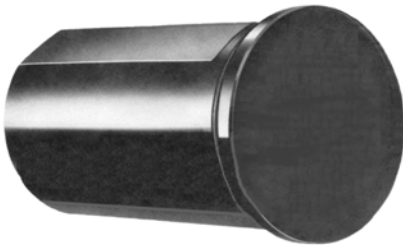
HBP — Headless Collet



HBJ — With Clearance Holes



HS — Plain Soft Condition for Custom Holes



LHB — Liner Bushing



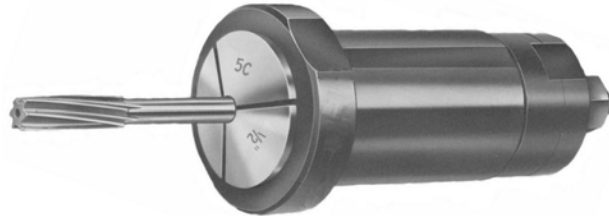
UCC-THB — Tap Holder



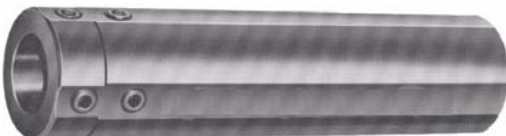
UCC-TC — Tool Collar



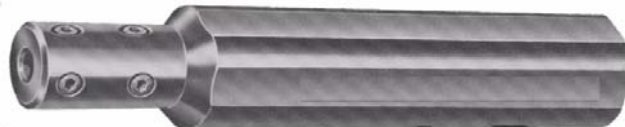
CHB — Collet Holder Bushing



BBS — Boring Bar Sleeve



BBS — Necked Down for Coolant



Collet Bushings Single Piece Construction

Tool Holder Collet Bushings - HBH - HBP

For All Screw Machines, Automatic CNC, Turrets and Second Operation Machines

There is a Solution to your lost rings, bushings and missing parts!

Simply specify **UNITED'S SINGLE PIECE** solid construction, precision ground, close tolerance **TOOL HOLDER BUSHINGS** with **4 SPLITS — TWO WAYS.**

They collapse concentrically and grip tools 360° in solid or floating holders.

Does your Tool Holder Bushings Inventory resemble this?

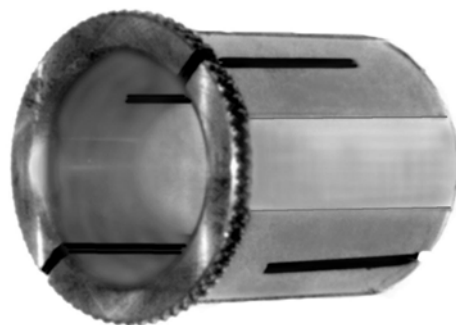
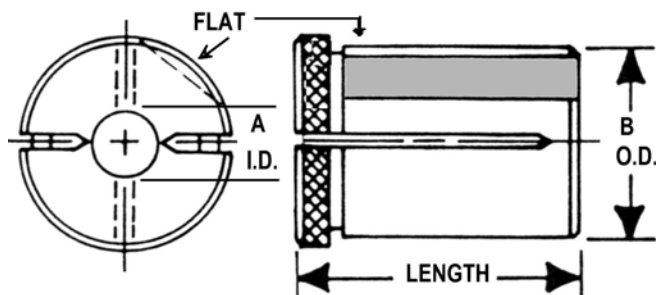


If so, take that stuff and shelf it!

Reduce the searching and assembly costs with perfect alignment bushings for your Brown & Sharpe, Acme, Hardinge, Automatic CNC Machines, Turrets and Lathes.

HBH

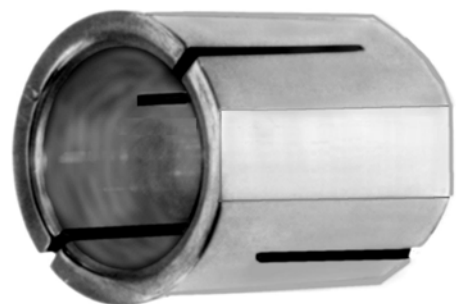
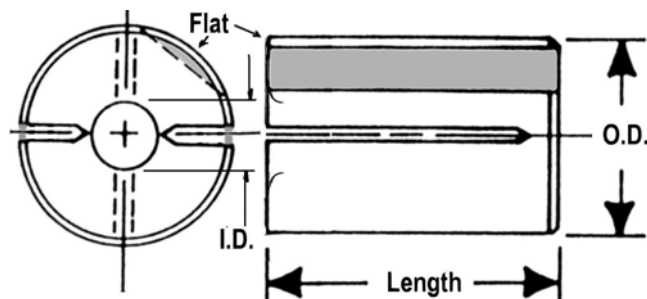
Knurled Head Type



Available in complete size ranges in both Knurled Head and Plain Headless Styles.

HBP

Plain Headless Type



- 1 Single Piece Construction
- 2 Collapses Concentrically T.I.R. .0005 MAX
- 3 Grips Tool 360°
- 4 Precision Ground Nominal O.D. -.0005 -.0010
- 5 Precision Ground I.D. Nominal - See chart:

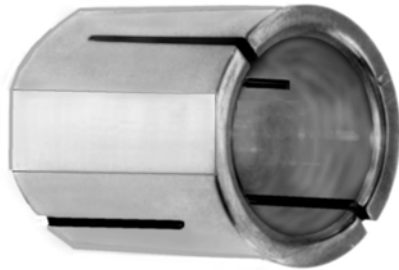
I. D. TOLERANCES FOR COLLET TOOL HOLDER BUSHINGS

Up to 1/4	+.0005 to +.0008
1/4 to 1.000	+.0006 to +.0010
Over 1.000	+.0008 to +.0012

- 6 Heat Treated Alloy Steel
- 7 Perfect Alignment
- 8 Sizes Clearly Marked
- 9 Flatted Entire Length to Fit Set Screw
- 10 Long Life

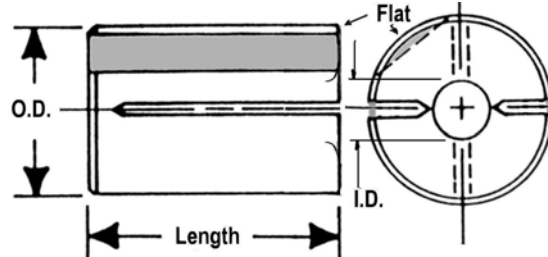
Tool Holder Collet Bushings Type HBP

**4 SPLITS TWO WAYS
360° GRIP Concentric
HBP**



**Holds Gun Drills,
Counterbores, Taps,
Center Drill Reamers,
Step Drills, End Mills
and Chamfer Tools**

Plain Headless



- 1 Single Piece Construction
- 2 Collapses Concentrically T.I.R. .0005 MAX
- 3 Grips Tool 360°
- 4 Precision Ground Nominal O.D. -.0005 -.0010
- 5 Precision Ground I.D. Nominal -- See inset chart.
- 6 Heat Treated Alloy Steel
- 7 Perfect Alignment
- 8 Sizes Clearly Marked
- 9 Flatted Entire Length to Fit Set Screw
- 10 Long Life

A complete range of sizes from #80 to 1-1/2"

A I.D. DRILL RANGE STANDARD DRILL SIZE		B O.D. SIZE ANSI O.D. BY 64ths		ANSI SYMBOL	C LENGTH OVERALL/LENGTH by 16ths					
NOMINAL	DECIMAL	NOM.	DECIMAL		1/2	3/4	15/16	1-1/4	2"	2-1/2
					-8	-12	-15	-20	-32	-40
#80 - #69	.0135 - .0292	1/2	.4995 - .4990	HBP-32	32-8					
#68 - 3/64	.0310 - .0469	1/2	.4995 - .4990	HBP-32	32-8	32-12				
#55 - 1/16	.0520 - .0625	1/2	.4995 - .4990	HBP-32	32-8	32-12				
#52 - #43	.0635 - .0890	1/2	.4995 - .4990	HBP-32	32-8	32-12				
#42 - #10	.0935 - .1935	1/2	.4995 - .4990	HBP-32		32-12				
#9 - L	.1960 - .2900	1/2	.4995 - .4990	HBP-32		32-12				
M - 11/32	.2950 - .3437	1/2	.4995 - .4990	HBP-32		32-12				
S - 7/16	.3480 - .4375	1/2	.4995 - .4990	HBP-32		32-12				
3/32 - #10	.0937 - .1406	5/8	.6245 - .6240	HBP-40			40-15			
#9 - L	.1960 - .2900	5/8	.6245 - .6240	HBP-40			40-15			
M - 7/16	.2950 - .4375	5/8	.6245 - .6240	HBP-40			40-15			
29/64 - 1/2	.4531 - .5000	5/8	.6245 - .6240	HBP-40			40-15			
1/16 - #43	.0625 - .0890	3/4	.7495 - .7490	HBP-48				48-20		
#42 - #10	.0935 - .1935	3/4	.7495 - .7490	HBP-48				48-20		
#9 - L	.1960 - .2900	3/4	.7495 - .7490	HBP-48				48-20		
M - 11/32	.2950 - .3437	3/4	.7495 - .7490	HBP-48				48-20		
S - 5/8	.3480 - .6250	3/4	.7495 - .7490	HBP-48				48-20		
1/8 - #1	.1250 - .2280	1"	.9995 - .9990	HBP-64				64-20		
A - 11/32	.2340 - .3437	1"	.9995 - .9990	HBP-64				64-20		
S - 13/16	.3480 - .8125	1"	.9995 - .9990	HBP-64				64-20		
5/16 - 1"	.3125 - 1.0000	1-1/4	1.2495 - 1.2490	HBP-80					80-32	
3/8 - 1-1/8	.3750 - 1.1250	1-1/2	1.4995 - 1.4990	HBP-96					96-32	
1/2 - 1-1/4	.5000 - 1.2500	1-3/4	1.7495 - 1.7490	HBP-112					112-32	
5/8 - 1-1/2	.6250 - 1.5000	2"	1.9995 - 1.9990	HBP-128						128-40

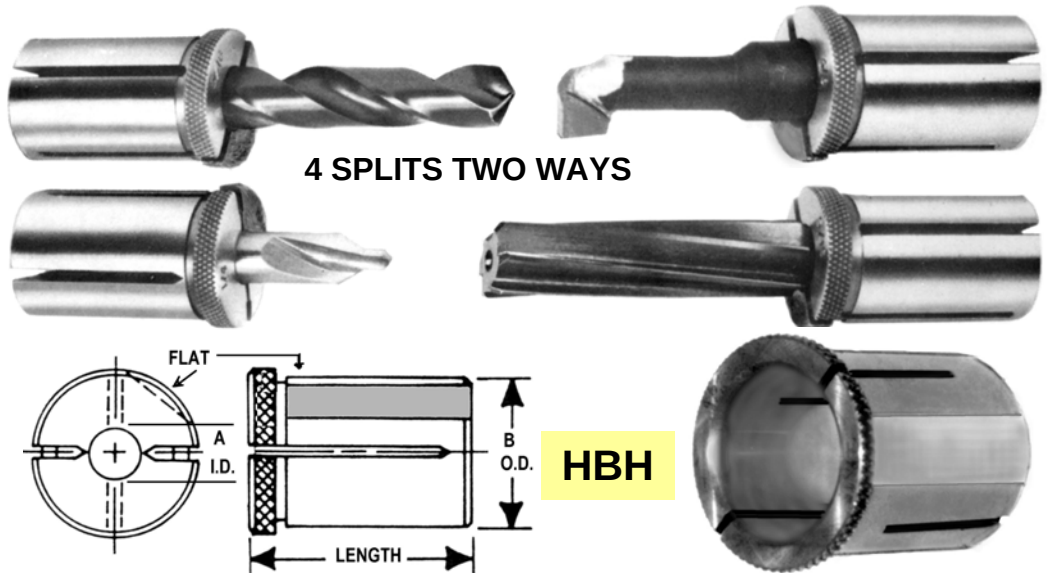
I.D. TOLERANCES FOR COLLET TOOL HOLDER BUSHINGS	
Up to 1/4	+.0005 to +.0008
1/4 to 1.000	+.0006 to +.0010
Over 1.000	+.0008 to +.0012

Standard Drill & Reamer Sizes			
INCH	DECIMAL	INCH	DECIMAL
80	.0135	7	.2010
79	.0145	13/64	.2031
1/64	.0156	6	.2040
78	.0160	5	.2055
77	.0180	4	.2090
76	.0200	3	.2130
75	.0210	7/32	.2187
74	.0225	2	.2210
73	.0240	1	.2280
72	.0250	A	.2340
71	.0260	15/64	.2344
70	.0280	B	.2380
69	.0292	C	.2420
68	.0310	D	.2460
1/32	.0313	E	.2500
67	.0320	1/4	.2500
66	.0330	F	.2570
65	.0350	G	.2610
64	.0360	17/64	.2656
63	.0370	H	.2660
62	.0380	I	.2720
61	.0390	J	.2770
60	.0400	K	.2810
59	.0410	9/32	.2812
58	.0420	L	.2900
57	.0430	M	.2950
56	.0465	19/64	.2968
3/64	.0469	N	.3020
55	.0520	5/16	.3125
54	.0550	O	.3160
53	.0595	P	.3230
1/16	.0625	21/64	.3281
52	.0635	Q	.3320
51	.0670	R	.3390
50	.0700	11/32	.3437
49	.0730	S	.3480
48	.0760	T	.3580
5/64	.0781	23/64	.3594
47	.0785	U	.3680
46	.0810	3/8	.3750
45	.0820	V	.3770
44	.0860	W	.3860
43	.0890	25/64	.3906
42	.0935	X	.3970
3/32	.0937	Y	.4040
41	.0960	13/32	.4062
40	.0980	Z	.4130
39	.0995	27/64	.4219
38	.1015	7/16	.4375
37	.1040	29/64	.4531
36	.1065	15/32	.4687
7/64	.1093	31/64	.4843
35	.1100	1/2	.5000
34	.1110	33/64	.5156
33	.1130	17/32	.5312
32	.1160	35/64	.5469
31	.1200	9/16	.5625
1/8	.1250	37/64	.5781
30	.1285	19/32	.5937
29	.1360	39/64	.6094
28	.1405	5/8	.6250
9/64	.1406	41/64	.6406
27	.1440	21/32	.6562
26	.1470	43/64	.6719
25	.1495	11/16	.6875
24	.1520	45/64	.7031
23	.1540	23/32	.7187
5/32	.1562	47/64	.7344
22	.1570	3/4	.7500
21	.1590	49/64	.7656
20	.1610	25/32	.7812
19	.1660	51/64	.7969
18	.1695	13/16	.8125
11/64	.1719	53/64	.8281
17	.1730	27/32	.8437
16	.1770	55/64	.8594
15	.1800	7/8	.8750
14	.1820	57/64	.8906
13	.1850	29/32	.9062
3/16	.1875	59/64	.9219
12	.1890	15/16	.9375
11	.1910	61/64	.9531
10	.1935	31/32	.9687
9	.1960	63/64	.9844
8	.1990	1"	1.0000

Standard Drill & Reamer Sizes			
INCH	DECIMAL	INCH	DECIMAL
80	.0135	7	.2010
79	.0145	13/64	.2031
1/64	.0156	6	.2040
78	.0160	5	.2055
77	.0180	4	.2090
76	.0200	3	.2130
75	.0210	7/32	.2187
74	.0225	2	.2210
73	.0240	1	.2280
72	.0250	A	.2340
71	.0260	15/64	.2344
70	.0280	B	.2380
69	.0292	C	.2420
68	.0310	D	.2460
1/32	.0313	E	.2500
67	.0320	1/4	.2500
66	.0330	F	.2570
65	.0350	G	.2610
64	.0360	17/64	.2656
63	.0370	H	.2660
62	.0380	I	.2720
61	.0390	J	.2770
60	.0400	K	.2810
59	.0410	9/32	.2812
58	.0420	L	.2900
57	.0430	M	.2950
56	.0465	19/64	.2968
3/64	.0469	N	.3020
55	.0520	5/16	.3125
54	.0550	O	.3160
53	.0595	P	.3230
1/16	.0625	21/64	.3281
52	.0635	Q	.3320
51	.0670	R	.3390
50	.0700	11/32	.3437
49	.0730	S	.3480
48	.0760	T	.3580
5/64	.0781	23/64	.3594
47	.0785	U	.3680
46	.0810	3/8	.3750
45	.0820	V	.3770
44	.0860	W	.3860
43	.0890	25/64	.3906
42	.0935	X	.3970
3/32	.0937	Y	.4040
41	.0960	13/32	.4062
40	.0980	Z	.4130
39	.0995	27/64	.4219
38	.1015	7/16	.4375
37	.1040	29/64	.4531
36	.1065	15/32	.4687
7/64	.1093	31/64	.4843
35	.1100	1/2	.5000
34	.1110	33/64	.5156
33	.1130	17/32	.5312
32	.1160	35/64	.5469
31	.1200	9/16	.5625
1/8	.1250	37/64	.5781
30	.1285	19/32	.5937
29	.1360	39/64	.6094
28	.1405	5/8	.6250
9/64	.1406	41/64	.6406
27	.1440	21/32	.6562
26	.1470	43/64	.6719
25	.1495	11/16	.6875
24	.1520	45/64	.7031
23	.1540	23/32	.7187
5/32	.1562	47/64	.7344
22	.1570	3/4	.7500
21	.1590	49/64	.7656
20	.1610	25/32	.7812
19	.1660	51/64	.7969
18	.1695	13/16	.8125
11/64	.1719	53/64	.8281
17	.1730	27/32	.8437
16	.1770	55/64	.8594
15	.1800	7/8	.8750
14	.1820	57/64	.8906
13	.1850	29/32	.9062
3/16	.1875	59/64	.9219
12	.1890	15/16	.9375
11	.1910	61/64	.9531
10	.1935	31/32	.9687
9	.1960	63/64	.9844
8	.1990	1"	1.0000

HBH Holds Drills, Reamers, Center Drills, Burr Tools

Tool Holder Collet Head Bushings - HBH



ONE-PIECE PRECISION CONCENTRIC SPLIT BUSHINGS TOOL HOLDER COLLET BUSHINGS FOR A WIDE VARIETY OF JOBS

A I.D. DRILL RANGE STANDARD DRILL SIZE NOMINAL DECIMAL		B O.D. SIZE ANSI O.D. BY 64ths NOM. DECIMAL		ANSI SYMBOL	C LENGTH OVERALL/LENGTH by 16ths					
					1/2 -8	3/4 -12	15/16 -15	1-1/4 -20	2" -32	2-1/2 -40
#80 - #69	.0135 - .0292	1/2	.4995 - .4990	HBH-32	32-8					
#68 - 3/64	.0310 - .0469	1/2	.4995 - .4990	HBH-32	32-8	32-12				
#55 - 1/16	.0520 - .0625	1/2	.4995 - .4990	HBH-32	32-8	32-12				
#52 - #43	.0635 - .0890	1/2	.4995 - .4990	HBH-32	32-8	32-12				
#42 - #10	.0935 - .1935	1/2	.4995 - .4990	HBH-32		32-12				
#9 - L	.1960 - .2900	1/2	.4995 - .4990	HBH-32		32-12				
M - 11/32	.2950 - .3437	1/2	.4995 - .4990	HBH-32		32-12				
S - 7/16	.3480 - .4375	1/2	.4995 - .4990	HBH-32		32-12				
3/32 - #10	.0937 - .1406	5/8	.6245 - .6240	HBH-40			40-15			
#9 - L	.1960 - .2900	5/8	.6245 - .6240	HBH-40			40-15			
M - 7/16	.2950 - .4375	5/8	.6245 - .6240	HBH-40			40-15			
29/64 - 1/2	.4531 - .5000	5/8	.6245 - .6240	HBH-40			40-15			
1/16 - #43	.0625 - .0890	3/4	.7495 - .7490	HBH-48				48-20		
#42 - #10	.0935 - .1935	3/4	.7495 - .7490	HBH-48				48-20		
#9 - L	.1960 - .2900	3/4	.7495 - .7490	HBH-48				48-20		
M - 11/32	.2950 - .3437	3/4	.7495 - .7490	HBH-48				48-20		
S - 5/8	.3480 - .6250	3/4	.7495 - .7490	HBH-48				48-20		
1/8 - #1	.1250 - .2280	1"	.9995 - .9990	HBH-64				64-20		
A - 11/32	.2340 - .3437	1"	.9995 - .9990	HBH-64				64-20		
S - 13/16	.3480 - .8125	1"	.9995 - .9990	HBH-64				64-20		
5/16 - 1"	.3125 - 1.0000	1-1/4	1.2495 - 1.2490	HBH-80					80-32	
3/8 - 1-1/8	.3750 - 1.1250	1-1/2	1.4995 - 1.4990	HBH-96					96-32	
1/2 - 1-1/4	.5000 - 1.2500	1-3/4	1.7495 - 1.7490	HBH-112					112-32	
5/8 - 1-1/2	.6250 - 1.5000	2"	1.9995 - 1.9990	HBH-128						128-40

I. D. TOLERANCES FOR COLLET TOOL HOLDER	
Up to .2500	+ .0005 to
Over .2500 to 1.000	+ .0006 to
Over 1.000	+ .0008 to

Tool Holder Bushings HBJ and HB Styles

Tool Holder Bushings

STYLES HBJ and HB



STYLE HBJ

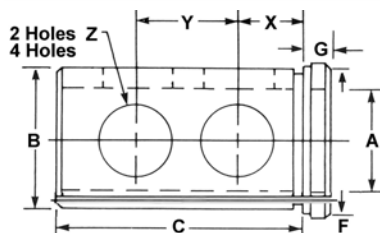
HBJ FEATURES:

- COMBINATION OF HB AND HJ STYLES
- CLEARANCE HOLES FOR SET SCREWS
- SPLIT WITH MILLED FLAT
- STOCKED IN STANDARD BORE SIZES



SETS—Style HBJ shown.

Styles HB and HJ are also available in Sets, furnished with wooden storage blocks.



UNITED combined the standard "B" style split bushing and "J" set screw clearance bushing for the new **DUAL PURPOSE HBJ TOOL HOLDER BUSHINGS.**

The improved Tool Holder with clearance holes and split milled flat is for either "B" or "J" style and is now the industry leader!

Select your machine O.D. size and tool I.D. size to order from chart.

TOOL HOLDER BUSHING SETS

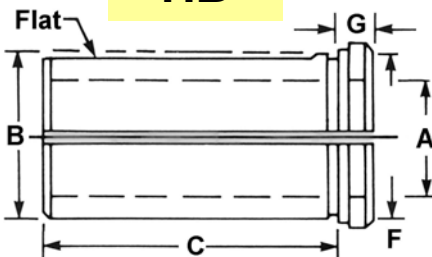
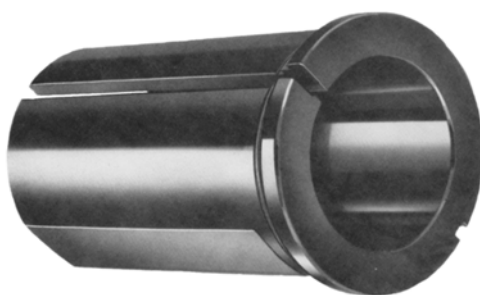
UNITED	O.D.	NO. of	INSIDE DIAMETERS
UDB-HBJ-96	1-1/2	6	1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4
UDB-HBJ-112	1-3/4	7	1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4 - 1-1/2
UDB-HBJ-128	2	6	3/4 - 7/8 - 1 - 1-1/4 - 1-1/2 - 1-3/4
UDB-HBJ-160	2-1/2	8	3/4 - 7/8 - 1 - 1-1/4 - 1-1/2 - 1-3/4 - 2 - 2-1/4

UNITED HBJ PART NO.	A I.D. STANDARD BORE SIZES	SPECIAL SIZES		B O.D. BUSH DIA.	C LENGTH Under HEAD	F HEAD DIA.	G HEAD THICKNESS	X UNDER HEAD to Center Line	Y HOLE C to Center Line	Z HOLE SIZE	NO. OF HOLES
		MIN BORE	MAX BORE								
UDB-HBJ-64-28	1/4, 5/16, 3/8, 1/2, 3/4 (7 thru 20mm)	.250	.750	1	1-3/4	1-3/16	3/16	1/2	3/4	5/8	2
UDB-HBJ-80-36	3/8, 1/2, 5/8, 3/4, 7/8, 1 (10 thru 26mm)	.375	1.000	1-1/4	2-1/4	1-7/16	1/4	9/16	1	3/4	2
UDB-HBJ-96-40	1/2, 5/8, 3/4, 7/8, 1, 1-1/4 (13-33mm)	.500	1.250	1-1/2	2-1/2	1-11/16	1/4	11/16	1-1/8	7/8	2
UDB-HBJ-112-48	1/2, 5/8, 3/4, 7/8, 1, 1-1/4, 1-1/2 (13-39mm)	.500	1.500	1-3/4	3	2-1/8	5/16	3/4	1-1/4	7/8	2
UDB-HBJ-128-56	3/4, 7/8, 1, 1-1/4, 1-1/2, 1-3/4 (20-45mm)	.750	1.750	2	3-1/2	2-3/8	5/16	3/4	1-1/2	1	2
UDB-HBJ-160-64	3/4, 7/8, 1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4 (20-58mm)	.750	2.250	2-1/2	4	2-7/8	3/8	7/8	1-3/4	1-1/4	2
UDB-HBJ-192-72	1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4, 2-1/2 (26-64mm)	1.000	2.500	3	4-1/2	3-5/8	7/16	1	2	1-1/4	4
UDB-HBJ-224-84	1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4, 2-1/2, 3 (26-77mm)	1.000	3.000	3-1/2	5-1/4	4	1/2	1-1/4	2-1/2	1-1/4	4
ORDERING EXAMPLE: FOR HBJ (SPLIT TYPE) WITH 1-1/2" O.D. AND 1" I.D., SPECIFY: UDB-HBJ-96-40-1" BUSHING Black Oxide, Hardened and Ground											

STYLE HB

HB Split Bushings were manufactured for versatile systems and all sizes of CNC Lathes, Turrets and Chuckers. Heat treated and precision ground concentric, the HB Tool Holder adapts drills, boring bars and all shank tools.

Select your machine size O.D. and tool size I.D. and order from chart.



HB FEATURES:

- SPLIT TYPE
- MILLED FLAT
- ADAPTS ROUND SHANK TOOLS to STANDARD TURRET or TOOL HOLDERS

UNITED HB PART NO.	A I.D. STANDARD BORE SIZES	SPECIAL SIZES		B O.D. BUSH DIA.	C LENGTH Under HEAD	F HEAD DIA.	G HEAD THICKNESS	X UNDER HEAD to Center Line	Y HOLE C to Center Line	Z HOLE SIZE	NO. OF HOLES
		MIN BORE	MAX BORE								
UDB-HB-48-24	1/4, 5/16, 3/8, 1/2 (7 thru 13mm)	.250	.500	3/4	1-1/2	1	3/16	N/A	N/A	N/A	N/A
UDB-HB-64-28	1/4, 5/16, 3/8, 1/2, 3/4 (7 thru 20mm)	.250	.750	1	1-3/4	1-3/16	3/16	N/A	N/A	N/A	N/A
UDB-HB-80-36	3/8, 1/2, 5/8, 3/4, 7/8, 1 (10-26mm)	.375	1.000	1-1/4	2-1/4	1-7/16	1/4	N/A	N/A	N/A	N/A
UDB-HB-96-40	1/2, 5/8, 3/4, 7/8, 1, 1-1/4 (13-33mm)	.500	1.250	1-1/2	2-1/2	1-11/16	1/4	N/A	N/A	N/A	N/A
UDB-HB-112-48	1/2, 5/8, 3/4, 7/8, 1, 1-1/4, 1-1/2 (13-39mm)	.500	1.500	1-3/4	3	2-1/8	5/16	N/A	N/A	N/A	N/A
UDB-HB-128-56	3/4, 7/8, 1, 1-1/4, 1-1/2, 1-3/4 (20-45mm)	.750	1.750	2	3-1/2	2-3/8	5/16	N/A	N/A	N/A	N/A
UDB-HB-160-64	3/4, 7/8, 1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4 (20-58mm)	.750	2.250	2-1/2	4	2-7/8	3/8	N/A	N/A	N/A	N/A
UDB-HB-192-72	1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4, 2-1/2 (26-64mm)	1.000	2.500	3	4-1/2	3-5/8	7/16	N/A	N/A	N/A	N/A
UDB-HB-224-84	1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4, 2-1/2, 3 (26-77mm)	1.000	3.000	3-1/2	5-1/4	4	1/2	N/A	N/A	N/A	N/A
ORDERING EXAMPLE: FOR HB (SPLIT TYPE) WITH 1-1/2" O.D. AND 1" I.D., SPECIFY: UDB-HB-96-40-1" BUSHING Black Oxide, Hardened and Ground											

Tool Holder Bushings

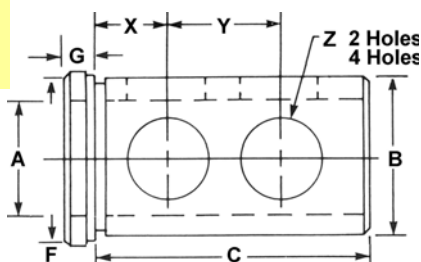
STYLES HJ and HS

Tool Holder Bushings HJ and HS Styles

STYLE HJ

HJ FEATURES:

- NO-SPLIT TYPE
- CLEARANCE HOLES FOR SET SCREWS
- STOCKED IN STANDARD BORE SIZES



UNITED HJ BUSHINGS WITH 2 OR 4 HOLES

HJ Bushings clamp directly on the tool through the clearance holes for positive alignment of your cutting tool edges. Hardened and ground concentric.

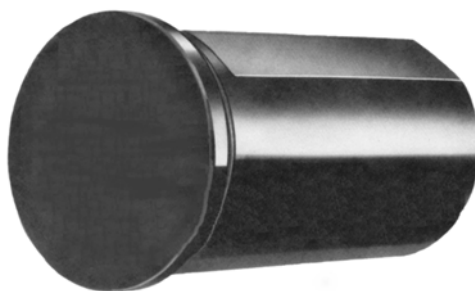
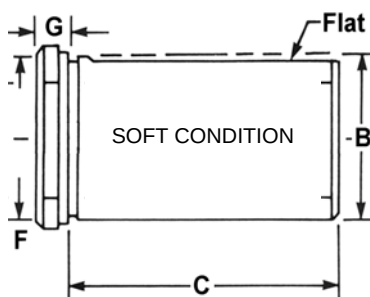
UNITED HJ PART NO.	A I.D. STANDARD BORE SIZES	SPECIAL SIZES		B O.D. BUSH DIA.	C LENGTH Under HEAD	F HEAD DIA.	G HEAD THICKNESS	X UNDER HEAD to Center Line	Y HOLE C to Center Line	Z HOLE SIZE	NO. OF HOLES
		MIN BORE	MAX BORE								
UDB-HJ-48-24	1/4, 5/16, 3/8, 1/2 (7 thru 13mm)	.250	.500	3/4	1-1/2	1	3/16	1/2	3/4	1/2	2
UDB-HJ-64-28	1/4, 5/16, 3/8, 1/2, 3/4 (7 thru 20mm)	.250	.750	1	1-3/4	1-3/16	3/16	1/2	3/4	5/8	2
UDB-HJ-80-36	3/8, 1/2, 5/8, 3/4, 7/8, 1 (10 thru 26mm)	.375	1.000	1-1/4	2-1/4	1-7/16	1/4	9/16	1	3/4	2
UDB-HJ-96-40	1/2, 5/8, 3/4, 7/8, 1, 1-1/4 (13-33mm)	.500	1.250	1-1/2	2-1/2	1-11/16	1/4	11/16	1-1/8	7/8	2
UDB-HJ-112-48	1/2, 5/8, 3/4, 7/8, 1, 1-1/4, 1-1/2 (13-39mm)	.500	1.500	1-3/4	3	2-1/8	5/16	3/4	1-1/4	7/8	2
UDB-HJ-128-56	3/4, 7/8, 1, 1-1/4, 1-1/2, 1-3/4 (20-45mm)	.750	1.750	2	3-1/2	2-3/8	5/16	3/4	1-1/2	1	2
UDB-HJ-160-64	3/4, 7/8, 1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4 (20-45mm)	.750	2.250	2-1/2	4	2-7/8	3/8	7/8	1-3/4	1-1/4	2
UDB-HJ-192-72	1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4, 2-1/2 (26-64mm)	1.000	2.500	3	4-1/2	3-5/8	7/16	1	2	1-1/4	4
UDB-HJ-224-84	1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4, 2-1/2, 3 (26-45mm)	1.000	3.000	3-1/2	5-1/4	4	1/2	1-1/4	2-1/2	1-1/4	4
ORDERING EXAMPLE: FOR HJ WITH 1-1/2" O.D. AND 1" I.D., SPECIFY: UDB-HJ-96-40-1" BUSHING Black Oxide, Hardened and Ground											

STYLE HS

HS FEATURES:

- SOFT CONDITION BLANK (No Hole)
- PRECISION GROUND O.D.
- CENTERS — BOTH ENDS
- MILLED FLAT

YOU
SPECIFY I.D.
DIMENSION!



UNITED "DO IT YOURSELF" TOOL HOLDER BUSHINGS

HS Bushings have no holes so you can drill them to your special needs.

Centers are soft solid ready to fit to odd size requirements or last minute need. We can ship the same day as you call. Ideal for all sizes of drills, reamers, bucking bars and shank tools. Ready to machine to your specifications.

UNITED HS PART NO.	I.D. SOLID - NO HOLE STANDARD BORE SIZES	SPECIAL SIZES		B O.D. BUSH DIA.	C LENGTH Under HEAD	F HEAD DIA.	G HEAD THICKNESS	X UNDER HEAD to Center Line	Y HOLE C to Center Line	Z HOLE SIZE	NO. OF HOLES
		MIN BORE	MAX BORE								
UDB-HS-48-24	SOFT SOLID NO HOLE — DO IT YOURSELF!			3/4	1-1/2	1	3/16	N/A	N/A	N/A	N/A
UDB-HS-64-28	SOFT SOLID NO HOLE — DO IT YOURSELF!			1	1-3/4	1-3/16	N/A	N/A	N/A	N/A	N/A
UDB-HS-80-36	SOFT SOLID NO HOLE — DO IT YOURSELF!			1-1/4	2-1/4	1-7/16	3/16	N/A	N/A	N/A	N/A
UDB-HS-96-40	SOFT SOLID NO HOLE — DO IT YOURSELF!			1-1/2	2-1/2	1-11/16	1/4	N/A	N/A	N/A	N/A
UDB-HS-112-48	SOFT SOLID NO HOLE — DO IT YOURSELF!			1-3/4	3	2-1/8	5/16	N/A	N/A	N/A	N/A
UDB-HS-128-56	SOFT SOLID NO HOLE — DO IT YOURSELF!			2	3-1/2	2-3/8	5/16	N/A	N/A	N/A	N/A
UDB-HS-160-64	SOFT SOLID NO HOLE — DO IT YOURSELF!			2-1/2	4	2-7/8	3/8	N/A	N/A	N/A	N/A
UDB-HS-192-72	SOFT SOLID NO HOLE — DO IT YOURSELF!			3	4-1/2	3-5/8	7/16	N/A	N/A	N/A	N/A
UDB-HS-224-84	SOFT SOLID NO HOLE — DO IT YOURSELF!			3-1/2	5-1/4	4	1/2	N/A	N/A	N/A	N/A
ORDERING EXAMPLE: FOR HS WITH 1-1/2" O.D., SPECIFY: UDB-HS-96-40 BUSHING Black Oxide, Hardened and Ground											

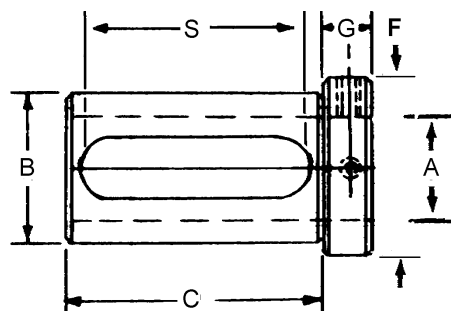
HZ - HC Tool Holder Bushings

Tool Holder Bushings

With Elongated Slots
Made by **UNITED** USA — Built to Last!



**STYLE
HZ**



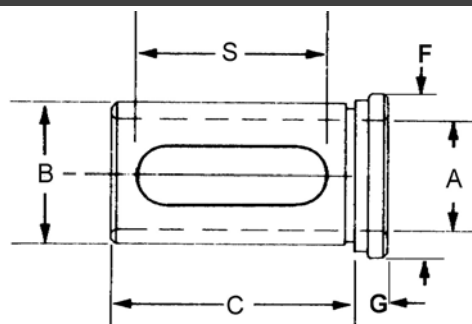
Fits all Turrets — Chuckers — CNC — NC — Machines. Hardened Precision Ground Concentric — Universally accepted

UNITED PART NO.	I.D. STANDARD BORE SIZES A		O.D. BUSH DIA. B		LENGTH Under HEAD C	HEAD DIA F	G HEAD THICKNESS	LENGTH of SLOT S
	INCH	MM	INCH	MM				
UDB-HZ-80-48	3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1	10, 12, 16, 20, 25	1-1/4	32	3	1-7/16	5/8	2-5/8
UDB-HZ-96-52	3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4	10, 12, 16, 20, 25, 32	1-1/2	40	3-1/4	1-3/4	3/4	2-7/8
UDB-HZ-112-56	1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4 - 1-1/2	12, 16, 20, 25, 32	1-3/4	45	3-1/2	2-1/8	3/4	3-1/8
UDB-HZ-128-60	1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4 - 1-1/2 - 1-3/4	12, 16, 20, 25, 32, 40, 45	2	50	3-3/4	2-3/8	3/4	3-3/8
UDB-HZ-160-68	5/8 - 3/4 - 1 - 1-1/4 - 1-1/2 - 1-3/4 - 2 - 2-1/4	16, 20, 25, 32, 40, 45, 50	2-1/2	65	4-1/4	2-7/8	3/4	3-7/8
UDB-HZ-192-76	1 - 1-1/4 - 1-1/2 - 1-3/4 - 2 - 2-1/4 - 2-1/2	25, 32, 40, 50, 65	3	80	4-3/4	3-5/8	3/4	4-3/8
UDB-HZ-224-88	1-1/4 - 1-1/2 - 1-3/4 - 2 - 2-1/4 - 2-1/2 - 3	25, 32, 40, 50, 65	3-1/2	90	5-1/2	4	1	5-1/8
UDB-HZ-256-190	1-1/2 - 1-3/4 - 2 - 2-1/4 - 2-1/2 - 3	40, 50, 60, 65, 80	4	100	6-1/4	4-1/2	1	5-7/8



LONG SLOTS ALLOW
SET SCREWS TO
HOLD TOOL FIRMLY

**STYLE
HTC**



Precision Concentrically Ground — Black Oxidized — Adapts to all Drills, Reamers and Boring Bars

UNITED PART NO.	I.D. STANDARD BORE SIZES A		O.D. BUSH DIA. B		LENGTH Under HEAD C	HEAD DIA F	HEAD THICKNESS G	LENGTH of SLOT S
	INCH	MM	INCH	MM				
UDB-HTC-64-44	1/4 - 5/16 - 3/8 - 1/2 - 5/8 - 3/4	8, 10, 12, 16, 20	1	25	2-3/4	1-3/16	3/16	2-3/8
UDB-HTC-80-52	3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1	10, 12, 16, 20, 25	1-1/4	32	3-1/4	1-7/16	1/4	2-7/8
UDB-HTC-96-54	3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4	10, 12, 16, 20, 25, 32	1-1/2	40	3-3/8	1-11/16	1/4	3
UDB-HTC-112-56	1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4 - 1-1/2	12, 16, 20, 25, 32, 40	1-3/4	45	3-1/2	2-1/8	5/16	3-1/8
UDB-HTC-128-64	1/2 - 5/8 - 3/4 - 1 - 1-1/4 - 1-1/2 - 1-3/4	12, 16, 20, 25, 32, 40, 45	2	50	4	2-3/8	5/16	3-5/8
UDB-HTC-160-72	3/4 - 1 - 1-1/4 - 1-1/2 - 1-3/4 - 2 - 2-1/4	20, 25, 32, 40, 45, 50	2-1/2	65	4-1/2	2-7/8	3/8	4-1/8
UDB-HTC-192-80	1 - 1-1/4 - 1-1/2 - 1-3/4 - 2 - 2-1/4 - 2-1/2	25, 32, 40, 50, 60, 65	3	80	5	3-1/8	7/16	4-5/8
UDB-HTC-224-92	1 - 1-1/4 - 1-1/2 - 1-3/4 - 2 - 2-1/4 - 2-1/2 - 3	25, 32, 40, 50, 60, 65	3-1/2	100	5-3/4	3-5/8	7/16	5

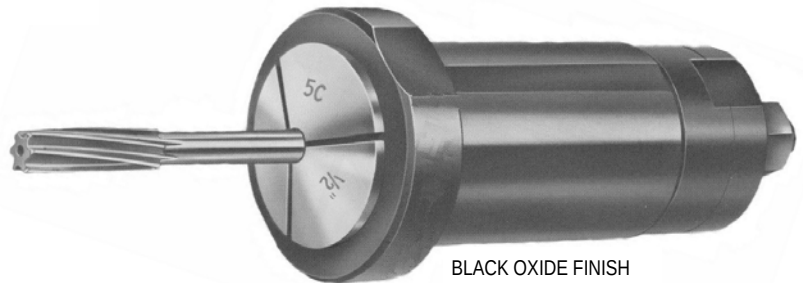
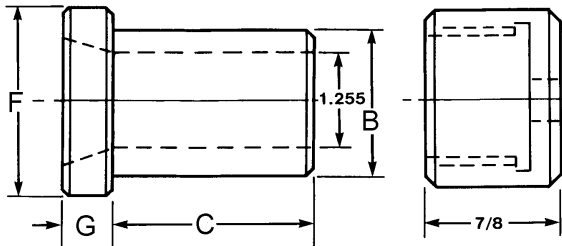
New Collet Holder Bushing

UNITED's Superior Quality by Design

CHB Collet Holder
Bushing

Fits all screw machines, lathes, turrets.
Ideal for CNC
Accommodates all drills, reamers, counterbores, end mills

CHB 5C-Collet Holder Bushing

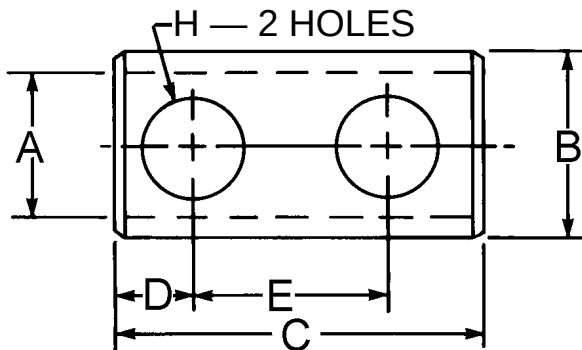


This unique tool holds all sizes of 5C Collets for every conceivable drill, reamer, counterbore, end mill, core drill and countersink. Provides clean concentric grip and location — Complete flexibility to your machines!

UNITED PART NO.	O.D. BUSH DIA. B		LENGTH C	HEAD DIA F	HEAD THICKNESS G	LOCK NUT O.D.
	INCH	MM				
UCC-CHB-96-40	1-1/2	40	2-1/4	2	1/2	1-7/16 x 7/8
UCC-CHB-112-40	1-3/4	45	2-1/4	2-1/4	1/2	1-11/16 x 7/8
UCC-CHB-128-40	2	50	2-1/4	2-1/2	1/2	1-15/16 x 7/8
UCC-CHB-192-40	2-1/2	65	2-1/4	3	1/2	2-7/16 x 7/8

Screw Holes Clearance
Split with O.D. Flat
Adapts with all tools

LHB Tool Holder Liner Bushing



BLACK OXIDE FINISH

Convenient — Easily used — Most important — To Hold — Let UNITED's Liner Do It!

UNITED PART NO.	SPECIFY I.D. STANDARD BORE SIZES A		O.D. BUSH DIA. B		OVERALL LENGTH C	LENGTH DIMENSIONS D E		HOLES H SIZE NO.		SPECIAL BORE SIZE MIN MAX	
	INCH	MM	INCH	MM							
UCC-LHB-96-48	3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4	10, 12, 16, 20, 25, 32	1-1/2	40	3	3/4	1-5/8	7/8	2	3/8	1-1/4
UCC-LHB-112-48	1/2 - 5/8 - 3/4 - 7/8 - 1 - 1-1/4 - 1-1/2	12, 16, 20, 25, 32, 40	1-3/4	45	3	5/8	1-5/8	7/8	2	3/8	1-1/2
UCC-LHB-144-72	5/8 - 3/4 - 1 - 1-1/4 - 1-1/2 - 1-3/4 - 2	16, 20, 25, 32, 40, 45, 50	2-1/4	60	4-1/2	7/8	2	1	2	1/2	2
UCC-LHB-176-72	3/4 - 1 - 1-1/4 - 1-1/2 - 1-3/4 - 2 - 2-1/4	20, 25, 32, 40, 50	2-3/4	70	4-1/2	7/8	2	1	2	1/2	2-1/4

Tap Tool Holder Bushings

Tap Holder Bushings

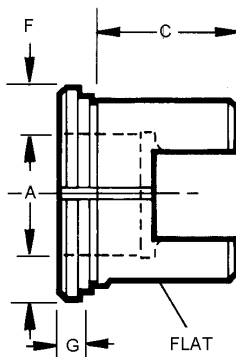
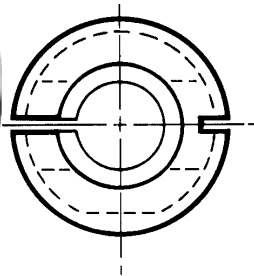
Precision Made by UNITED USA — Quality to Last!

UCC-THB

TAP HOLDER BUSHINGS



SPECIFY TAP SIZE



Sometimes referred to as 'K' type Tap Holder Bushings.

UNITED's precision milled bushings are hard ground and concentric.

Manufactured to close tolerances for maximum grip and minimum slippage.

UNITED PART NO.	INDUSTRY BUSH TYPE	BUSHING DIA. O.D.	MIN TAP I.D.	MAX TAP I.D.	MAX PIPE TAP	BUSHING LENGTH	F HEAD DIA	G HEAD THICKNESS	TAP SIZES AVAILABLE SPECIFY WHEN ORDERING
UCC-THB-64-15	K	1	8	5/8	1/8 PIPE	15/16	1-3/16	3/16	8-10-12-1/8-1/4-5/16-3/8-7/16-1/2-9/16-5/8
UCC-THB-96-19	K	1-1/4	1/4	1-1/4	1 PIPE	1-3/16	1-7/16	1/4	1/4 thru 5/8-11/16-3/4-13/16-7/8-15/16-1- 1-1/8- 1-1/4
UCC-THB-112-21	K	1-1/2	1/4	1-1/4	1 PIPE	1-5/16	1-11/16	1/4	1/4 thru 5/8-11/16-3/4-13/16-7/8-15/16-1- 1-1/8- 1-1/4

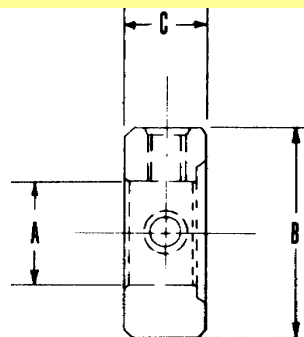
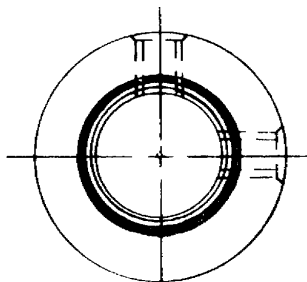
ORDERING EXAMPLE INCLUDES TAP SIZE: UCC-THB-64-15-1/4-20

UCC-TC

TOOL COLLARS



SCREWS ARE PROVIDED



UNITED Tool Collars are designed for use with Boring Bars, Boring Bar Sleeves, Spindle shaft leveling collars, and preset type tooling.

Collars are hardened and ground with black oxide finish.

Excellent Stop Jam collar nuts for all leveling tools and leveling pad threaded shanks.

Special sizes and metric sizes are available on request.

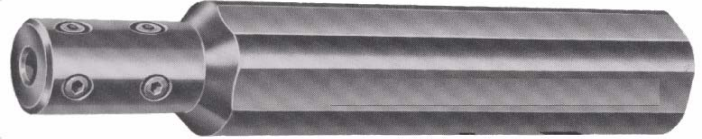
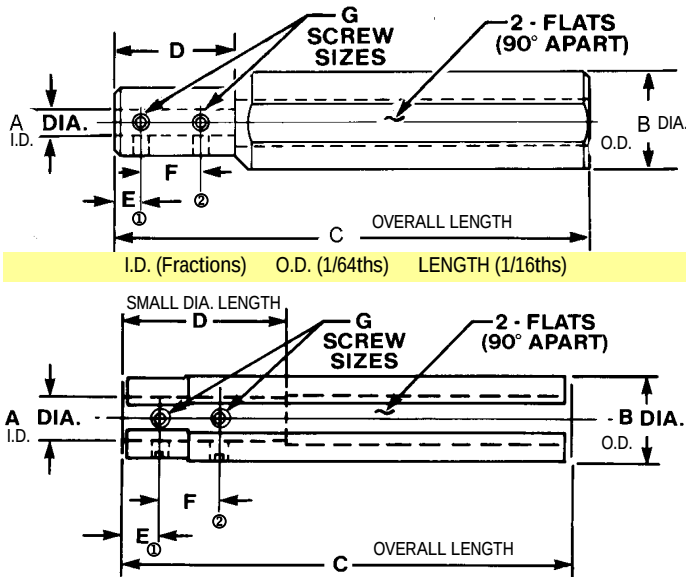
UNITED PART NO.	I.D. STANDARD BORE SIZES A		O.D. BUSH DIA. B	THICKNESS C
	INCH	MM		
UCC-TC-128-12	1	25	2	3/4
UCC-TC-144-12	1-1/4	32	2-1/4	3/4
UCC-TC-160-12	1-1/2	40	2-1/2	3/4
UCC-TC-176-12	1-3/4	45	2-3/4	3/4
UCC-TC-192-12	2	50	3	3/4
UCC-TC-208-12	2-1/2	60	3-1/4	3/4
UCC-TC-324-12	2-1/2	60	3-1/2	3/4
UCC-TC-240-12	2-3/4	40	3-3/4	3/4
UCC-TC-256-16	3	80	4	1
UCC-TC-288-16	3-1/2	90	4-1/2	1
UCC-TC-320-16	4	100	5	1

Boring Bar Sleeves

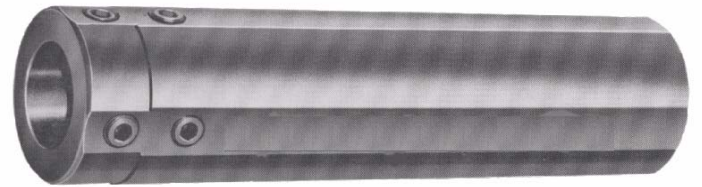
For CNC -- NC -- TURRETS -- LATHES -- CHUCKERS
TOUGH and WEAR RESISTANT -- YEARS OF DEPENDABILITY

Boring Bar Sleeves
UCC-BBS

BBS BORING BAR SLEEVES



Necked Down allowing coolant to pass
Precision Ground, Concentrically Hardened and Ground



Black Oxide Finish

UNITED Boring Bar Sleeves adapt to and support most all Boring Bars, Shank type tools, Drills, Reamers, and Counterbores to any CNC Machines and conventional Turrets and Lathes. They are the extensions for hard to reach areas. 90° Spacing between flat and set screws, allowing clamping from top or bottom — assures aligned clamping. The necked down boring bar

UNITED PART NO.	A IN.	MM	B IN.	MM	C LENGT H	D LEN.	E Ø 1ST	F Ø 2ND	G SCREW	UNITED PART NO.	A IN.	MM I.D.	B IN.	MM O.D.	C LENGTH OVERALL	D LEN. LOC.	E Ø 1ST SCREW	F Ø 2ND SCREW	G SCREW SIZE
UCC-BBS-48-80-1/4	1/4	6	3/4	20	5	1-1/2	3/8	3/4	10-32	UCC-BBS-112-128-7/8	7/8	22	1-3/4	45	8	3	7/16	1	3/8-24
UCC-BBS-48-80-5/6	5/16	8	3/4	20	5	1-1/2	3/8	3/4	10-32	UCC-BBS-112-128-1	1	25	1-3/4	45	8	3	7/16	1	3/8-24
UCC-BBS-48-80-3/8	3/8	10	3/4	20	5	1-1/2	3/8	3/4	10-32	UCC-BBS-128-144-5/8	5/8	16	2	50	9	2	7/16	1	7/16-20
UCC-BBS-48-80-1/2	1/2	12	3/4	20	5	2	3/8	3/4	10-32	UCC-BBS-128-144-3/4	3/4	20	2	50	9	2-3/4	1/2	1	7/16-20
UCC-BBS-64-96-5/16	5/16	8	1	25	6	1-3/4	7/16	7/8	1/4-28	UCC-BBS-128-144-7/8	7/8	22	2	50	9	2	7/16	1	7/16-20
UCC-BBS-64-96-3/8	3/8	10	1	25	6	1-3/4	7/16	7/8	1/4-28	UCC-BBS-128-144-1	1	25	2	50	9	3	1/2	1	1/2-20
UCC-BBS-64-96-1/2	1/2	12	1	25	6	2	7/16	7/8	1/4-28	UCC-BBS-128-144-1-1/4	1-1/4	32	2	50	9	3	1/2	1	1/2-20
UCC-BBS-80-104-3/8	3/8	10	1-1/4	32	6-1/2	1-1/2	3/8	7/8	1/4-28	UCC-BBS-160-160-5/8	5/8	16	2-1/2	65	10	2-1/2	1/2	1	1/2-20
UCC-BBS-80-104-1/2	1/2	12	1-1/4	32	6-1/2	2	7/16	1	1/4-28	UCC-BBS-160-160-3/4	3/4	20	2-1/2	65	10	3	1/2	1	1/2-20
UCC-BBS-80-104-5/8	5/8	16	1-1/4	32	6-1/2	2	7/16	1	1/4-28	UCC-BBS-160-160-1	1	25	2-1/2	65	10	3-1/2	1/2	1	1/2-20
UCC-BBS-80-104-3/4	3/4	20	1-1/4	32	6-1/2	2	7/16	1	1/4-28	UCC-BBS-160-160-1-1/4	1-1/4	32	2-1/2	65	10	4	1/2	1	1/2-20
UCC-BBS-80-104-7/8	7/8	22	1-1/4	32	6-1/2	2	7/16	1	10-32	UCC-BBS-160-160-1-1/2	1-1/2	40	2-1/2	65	10	4	1/2	1	1/2-20
UCC-BBS-80-104-1	1	25	1-1/4	32	6-1/2	2	7/16	1	10-32	UCC-BBS-192-184-1	1	25	3	80	11-1/2	3-1/2	1/2	1	1/2-20
UCC-BBS-96-112-3/8	3/8	10	1-1/2	40	7	1-1/2	3/8	7/8	1/4-28	UCC-BBS-192-184-1-1/4	1-1/4	32	3	80	11-1/2	4	1/2	1	1/2-20
UCC-BBS-96-112-1/2	1/2	12	1-1/2	40	7	2	7/16	1	5/16-24	UCC-BBS-192-184-1-1/2	1-1/2	40	3	80	11-1/2	4	1/2	1	1/2-20
UCC-BBS-96-112-5/8	5/8	16	1-1/2	40	7	2	7/16	1	5/16-24	UCC-BBS-192-184-1-3/4	1-3/4	45	3	80	11-1/2	4	5/8	1-1/4	1/2-20
UCC-BBS-96-112-3/4	3/4	20	1-1/2	40	7	2-1/2	7/16	1	5/16-24	UCC-BBS-192-184-2	2	50	3	80	11-1/2	4	1/2	1	1/2-20
UCC-BBS-96-128-7/8	7/8	22	1-1/2	40	8	2-1/2	7/16	1	5/16-24	UCC-BBS-256-224-1-1/2	1-1/2	40	4	100	14	4	19/32	1-7/8	5/8-18
UCC-BBS-96-128-1	1	25	1-1/2	40	8	3	7/16	1	5/16-24	UCC-BBS-256-224-1-3/4	1-3/4	45	4	100	14	4	5/8	1-7/8	5/8-18
UCC-BBS-112-128-1/2	1/2	12	1-3/4	45	8	2-1/2	7/16	1	5/16-24	UCC-BBS-256-224-2	2	50	4	100	14	4	19/32	1-3/4	5/8-18
UCC-BBS-112-128-5/8	5/8	16	1-3/4	45	8	2-1/2	7/16	1	5/16-24	UCC-BBS-256-224-2-1/2	2-1/2	65	4	100	14	5	5/8	2	5/8-18
UCC-BBS-112-128-3/4	3/4	20	1-3/4	45	8	2-1/2	7/16	1	3/8-24	UCC-BBS-256-224-3	3	80	4	100	14	5	3/4	1-1/4	5/8-18

**Spacer Bushings
With NEW P/Ns**

Arbor Spacing Collar Bushings

ARBOR SPACING COLLAR BUSHINGS

UNITED ARBOR SPACER BUSHINGS
assure accurate positioning
of milling cutters.

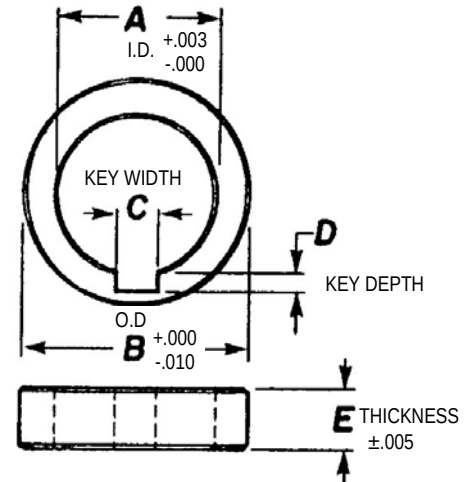
These close-tolerance
Collar Bushings are furnished with
Standard Keyways.

Hardened and ground.
Rockwell 35-48

Edges are chamfered.

Faces are ground parallel.

Ends parallel & flat within .0005
Ends square to I.D. within .001 T.I.R.



Also known as Collar Bushings

Sold in Sets of 15 from 1/8" to 3"

(SEE ITEMS LISTED BY COLUMNS BELOW.)

NEW PART NUMBERS BELOW:

Specials are available on request.

or Separately

C WIDTH	KEYWAY SIZES							
	1/8	1/8	1/8	1/4	5/16	3/8	1/2	1/2
D DEPTH	1/16	1/16	1/16	3/32	1/8	5/32	3/16	3/16
E THICKNESS BELOW	A x B 5/8 x 1" I.D. O.D.	A x B 3/4 x 1-1/8 I.D. O.D.	A x B 7/8 x 1-3/8 I.D. O.D.	A x B 1" x 1-1/2 I.D. O.D.	A x B 1-1/4 x 1-3/4 I.D. O.D.	A x B 1-1/2 x 2-1/8 I.D. O.D.	A x B 2" x 2-3/4 I.D. O.D.	A x B 2-1/2 x 3-1/4 I.D. O.D.
1/8	ASB-101602	ASB-121802	ASB-142202	ASB-162402	ASB-202802	ASB-243402	ASB-324402	ASB-405202
3/16	ASB-101603	ASB-121803	ASB-142203	ASB-162403	ASB-202803	ASB-243403	ASB-324403	ASB-405203
1/4	ASB-101604	ASB-121804	ASB-142204	ASB-162404	ASB-202804	ASB-243404	ASB-324404	ASB-405204
5/16	ASB-101605	ASB-121805	ASB-142205	ASB-162405	ASB-202805	ASB-243405	ASB-324405	ASB-405205
3/8	ASB-101606	ASB-121806	ASB-142206	ASB-162406	ASB-202806	ASB-243406	ASB-324406	ASB-405206
7/16	ASB-101607	ASB-121807	ASB-142207	ASB-162407	ASB-202807	ASB-243407	ASB-324407	ASB-405207
1/2	ASB-101608	ASB-121808	ASB-142208	ASB-162408	ASB-202808	ASB-243408	ASB-324408	ASB-405208
5/8	ASB-101610	ASB-121810	ASB-142210	ASB-162410	ASB-202810	ASB-243410	ASB-324410	ASB-405210
3/4	ASB-101612	ASB-121812	ASB-142212	ASB-162412	ASB-202812	ASB-243412	ASB-324412	ASB-405212
7/8	ASB-101614	ASB-121814	ASB-142214	ASB-162414	ASB-202814	ASB-243414	ASB-324414	ASB-405214
1"	ASB-101616	ASB-121816	ASB-142216	ASB-162416	ASB-202816	ASB-243416	ASB-324416	ASB-405216
1-1/4	ASB-101620	ASB-121820	ASB-142220	ASB-162420	ASB-202820	ASB-243420	ASB-324420	ASB-405220
1-1/2	ASB-101624	ASB-121824	ASB-142224	ASB-162424	ASB-202824	ASB-243424	ASB-324424	ASB-405224
2"	ASB-101632	ASB-121832	ASB-142232	ASB-162432	ASB-202832	ASB-243432	ASB-324432	ASB-405232
3"	ASB-101648	ASB-121848	ASB-142248	ASB-162448	ASB-202848	ASB-243448	ASB-324448	ASB-405248
COMPLETE SETS BY P/N INCLUDE →	ASB-101650 ALL ABOVE	ASB-121850 ALL ABOVE	ASB-142250 ALL ABOVE	ASB-162450 ALL ABOVE	ASB-202850 ALL ABOVE	ASB-243450 ALL ABOVE	ASB-324450 ALL ABOVE	ASB-405250 ALL ABOVE