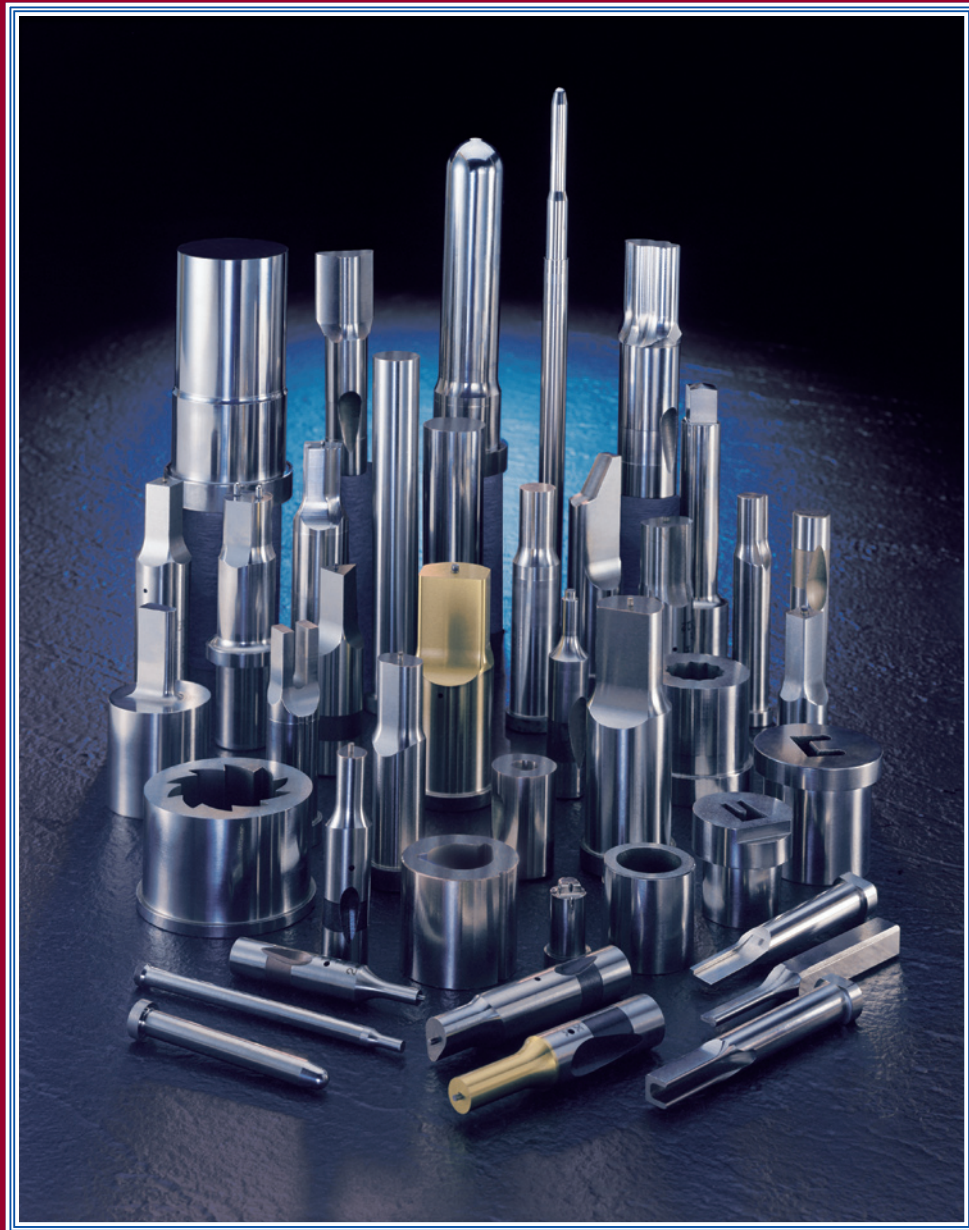




Inch Catalog 2006



ISO9002 Registered

NAPMA
North American Punch Manufacturers Association

COATINGS

Coating Material	Titanium Nitride (TiN) TG	Titanium Carbonitride (TiCN)	Chromium Nitride (CrN)	Titanium Aluminum Nitride (TiAlN)
Microhardness (HV 0.05)	2300	3000	1750	3300
Coefficient Of Friction Against Steel (Dry)	0.4	0.4	0.5	0.3-0.35
Coating Thickness	1-4 µm	1-4 µm	1-6/10 µm	1-5 µm
Oxidation Onset Temperature	600° C 1100° F	400° C 750° F	700° C 1300° F	800° C 1470° F
Coating Color	Gold-Yellow	Blue-Grey	Silver-Grey	Violet-Grey
Key Characteristics	Basic TiN hard coating	Enhanced hardness and wear resistance over TiN	Excellent adhesion, high toughness, good corrosion resistance	Nanolayered coating, high toughness & oxidation resistance
Primary Applications (HSS & Carbide Cutting Tools; Stamping & Forming Tools; Dies & Molds; Sliding Wear Components)	General purpose coating for cutting, forming, plastic molding	Cutting carbon steel, alloy steel and cast iron; cold forming & stamping tools	Machining copper; metal forming; plastic molding	Broad-based coating for cutting all steels, cast iron, stainless steel, dry machining possible; forming; die-casting

STEEL

	Hardness (HRC)	Abrasive Wear Resistance	Adhesive Wear Resistance	Chipping/Cracking Resistance
AISI M2 Molybdenum alloyed high speed steel widely used in place of D2 when improved chipping resistance is needed. AISI M2 has high wear resistance and moderate chipping resistance.	60-65			
VANADIS 4 EXTRA Powder metallurgical (P/M) tool steel that has an excellent combination of wear resistance and chipping resistance. Vanadis 4 Extra is very well suited for thick work materials and work materials that have a tendency to cause adhesive wear and chipping. Work materials that Vanadis 4 Extra is appropriate for are: ultra high strength, dual phase, high strength low alloy, low carbon steel, stainless alloys, copper, and aluminum.	58-63			
P/M – M4 Molybdenum alloyed high speed steel powder metallurgical (P/M) tool steel, which has a good chipping resistance and high wear resistance. P/M – M4 can be used for long production runs with work materials that have mixed tool wear (adhesive and abrasive wear).	60-65			
P/M – 10%V One of the most wear resistance powder metallurgical (P/M) tool steel produced. The P/M 10%V is suitable for long runs of stamping abrasive work materials.	58-64			

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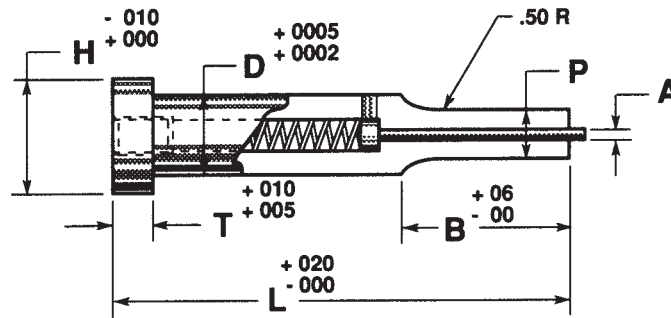
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Material: M2 Rc 60-62

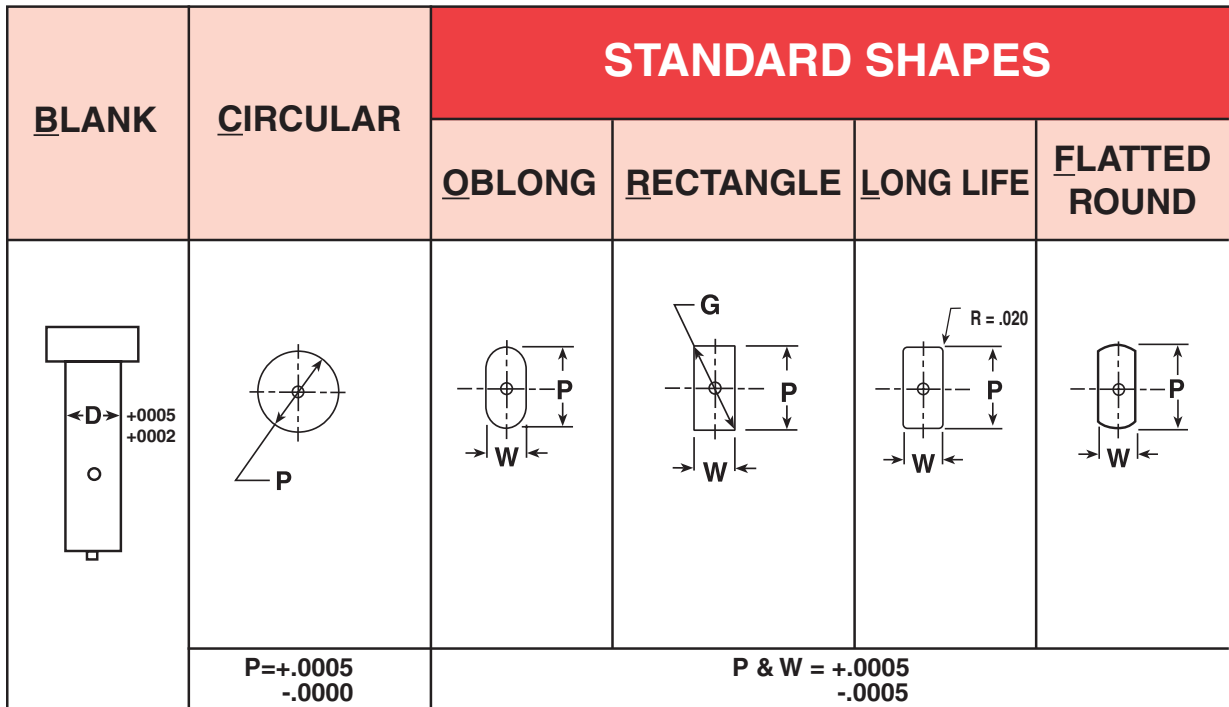
Tipco EJECTORS

TE



Cat. NO.	FIXED DIMENSIONS					STANDARD LENGTHS								
	CODE	D	H	T	A	B	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
18	.1875	.312	.125	.025	.43		175	200	225	250				
25	.2500	.375	.125	.032	.50		175	200	225	250				
31	.3125	.437	.125	.047	.56		175	200	225	250	275	300		
37	.3750	.500	.188	.063	.62		175	200	225	250	275	300	350	
50	.5000	.625	.188	.063	.81			200	225	250	275	300	350	
62	.6250	.750	.250	.063	.94			200	225	250	275	300	350	
75	.7500	.875	.250	.093	1.06				225	250	275	300	350	400
100	1.000	1.125	.250	.093	1.25					250	275	300	350	400

Longer lengths and alterations from published standards
Available on request!



TEB	TEC		TEO		TER		TEL		TEF		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	CODE
.1875	.062	.187	.062	.187	.062	.187	.062	.187	.062	.187	18
.2500	.093	.249	.093	.249	.093	.249	.093	.249	.093	.249	25
.3125	.125	.312	.125	.312	.125	.312	.125	.312	.125	.312	31
.3750	.187	.374	.187	.374	.187	.374	.187	.374	.187	.374	37
.5000	.250	.499	.187	.499	.187	.499	.187	.499	.187	.499	50
.6250	.375	.624	.250	.624	.250	.624	.250	.624	.250	.624	62
.7500	.500	.749	.312	.749	.312	.749	.312	.749	.312	.749	75
1.000	.687	.999	.375	.999	.375	.999	.375	.999	.375	.999	100

WHEN ORDERING SPECIFY:

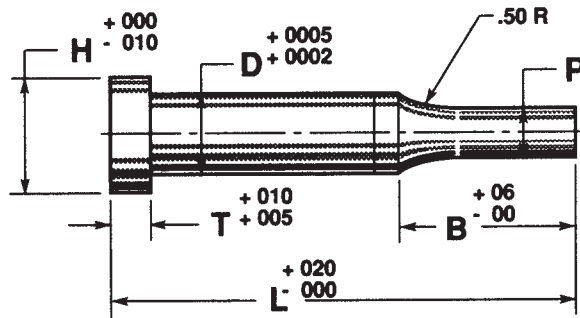
QTY. MAT. TYPE SHAPE CODE LENGTH P W SF*
 6 M2 TE O 50 X 250 X .450 X .210 SF*

* SPECIFY REQUIRED LOCKING METHOD- SEE PAGE 36



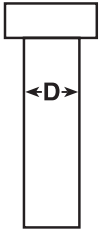
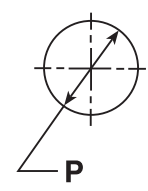
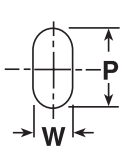
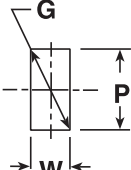
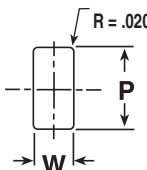
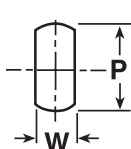
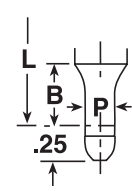
Tipco
PUNCHES

TP



Cat. NO.	FIXED DIMENSIONS				STANDARD LENGTHS								
	D	H	T	B	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
18	.1875	.312	.125	.43	150	175	200	225	250				
25	.2500	.375	.125	.50	150	175	200	225	250				
31	.3125	.437	.125	.56	150	175	200	225	250	275	300	350	
37	.3750	.500	.188	.62		175	200	225	250	275	300	350	400
50	.5000	.625	.188	.81			200	225	250	275	300	350	400
62	.6250	.750	.250	.94			200	225	250	275	300	350	400
75	.7500	.875	.250	1.06				225	250	275	300	350	400
100	1.000	1.125	.250	1.25					250	275	300	350	400

Longer lengths and alterations from published standards available on request!

BLANK	CIRCULAR	STANDARD SHAPES				PILOTS
		OBLONG	RECTANGLE	LONG LIFE	FLATTED ROUND	
						
	P=+.0005 -.0000	P & W = +.0005 -.0005				P=+.0005 -.0000

TPB	TPC		TPO		TPR		TPL		TPF		TPP		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	MIN P	MAX P	CODE
.1875	.062	.187	.062	.187	.062	.187	.062	.187	.062	.187	.062	.1875	18
.2500	.062	.249	.062	.249	.062	.249	.062	.249	.062	.249	.062	.2500	25
.3125	.093	.312	.093	.312	.093	.312	.093	.312	.093	.312	.093	.3125	31
.3750	.125	.374	.125	.374	.125	.374	.125	.374	.125	.374	.125	.3750	37
.5000	.187	.499	.187	.499	.187	.499	.187	.499	.187	.499	.187	.5000	50
.6250	.375	.624	.250	.624	.250	.624	.250	.624	.250	.624	.250	.6250	62
.7500	.500	.749	.312	.749	.312	.749	.312	.749	.312	.749	.312	.7500	75
1.000	.687	.999	.375	.999	.375	.999	.375	.999	.375	.999	.375	1.000	100

WHEN ORDERING SPECIFY:

QTY. MAT. TYPE SHAPE CODE LENGTH P W SF*
 6 M2 TP O 50 X 225 X .450 X .210 SF*

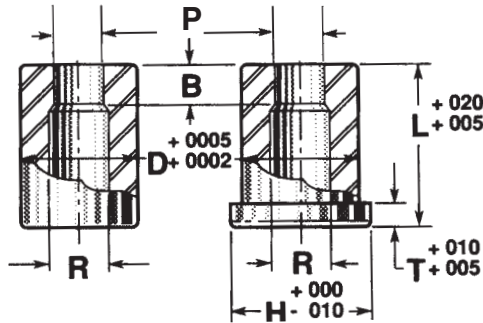
* SPECIFY REQUIRED LOCKING METHOD- SEE PAGE 36



Material: M2 Rc 60-62

Tipco DIE BUTTONS

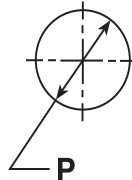
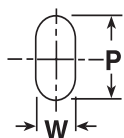
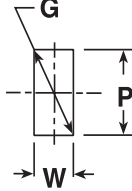
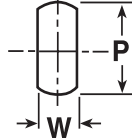
TD



TH

Cat. NO.	FIXED DIMENSIONS					STANDARD LENGTHS							
	D	H	T	B	R MAX	.750	.875	.937	1.000	1.125	1.250	1.375	1.500
25	.2500	.375	.188	.156	.156	75	87	93	100	112	125	137	
37	.3750	.500	.188	.156	.228	75	87	93	100	112	125	137	150
50	.5000	.625	.188	.188	.312	75	87	93	100	112	125	137	150
62	.6250	.750	.188	.188	.375	75	87	93	100	112	125	137	150
75	.7500	.875	.188	.188	.468	75	87	93	100	112	125	137	150
87	.8750	1.000	.188	.250	.578	75	87	93	100	112	125	137	150
100	1.000	1.125	.188	.250	.687	75	87	93	100	112	125	137	150
125	1.250	1.375	.188	.312	.812	75	87	93	100	112	125	137	150
150	1.500	1.625	.188	.312	1.062	75	87	93	100	112	125	137	150

Alterations from standard sizes available on request!

<u>C</u> IRCULAR	STANDARD SHAPES		
	<u>O</u> BLONG	<u>R</u> ECTANGLE	<u>F</u> LATTED ROUND
			
P=+.0005 -.0000	Tolerance for W & P +.0005 -.0005		

<u>C</u>		<u>O</u>		<u>R</u>		<u>F</u>		CAT NO.
MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX P	CODE
.064	.135							25
.064	.195	.062	.195	.062	.195	.062	.195	37
.064	.285	.062	.285	.062	.285	.062	.285	50
.136	.365	.095	.365	.095	.365	.095	.365	62
.136	.435	.118	.435	.118	.435	.118	.435	75
.276	.545	.127	.545	.127	.545	.127	.545	87
.356	.675	.158	.675	.158	.675	.158	.675	100
.500	.800	.189	.800	.189	.800	.189	.800	125
.616	1.050	.252	1.050	.252	1.050	.252	1.050	150

WHEN ORDERING SPECIFY:

QTY. MAT. TYPE SHAPE CODE LENGTH P W SF4*
 8 M2 TD O 50 X 100 X 265 X .185

* SPECIFY REQUIRED LOCKING METHOD- SEE PAGE 36

See page 13-14 for expanded ranges!

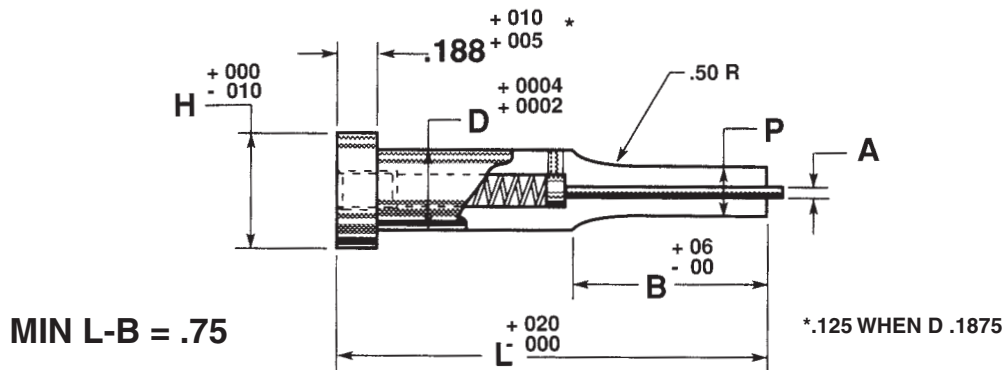


Material: M2 Rc 60-62

Also available in PM M4

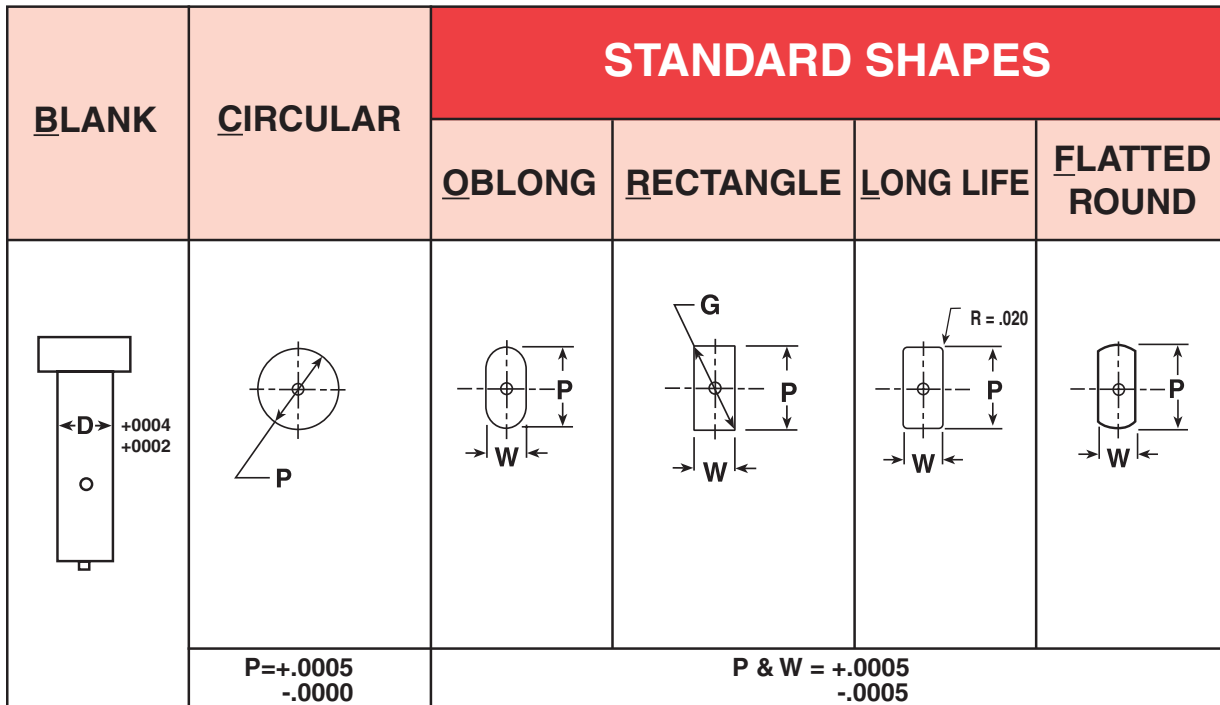
FLEXIBLE EJECTORS

FE



Cat. NO.	FIXED DIMENSIONS			B DIMENSION SPECIFY			STANDARD LENGTHS									
	D	H	A	.75	1.00	1.25	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
18	.1875	.312	.025	75	100		175	200	225	250	275					
25	.2500	.375	.032	75	100	125	175	200	225	250	275	300				
31	.3125	.437	.047	75	100	125	175	200	225	250	275	300				
37	.3750	.500	.063	75	100	125	175	200	225	250	275	300	325	350	375	400
43	.4375	.562	.063	75	100	125	175	200	225	250	275	300	325	350	375	400
50	.5000	.625	.063	75	100	125		200	225	250	275	300	325	350	375	400
62	.6250	.750	.063	75	100	125		200	225	250	275	300	325	350	375	400
75	.7500	.875	.093	75	100	125			225	250	275	300	325	350	375	400
100	1.000	1.125	.093	75	100	125			225	250	275	300	325	350	375	400

Longer lengths and alterations from published standards available on request!



FEB	FEC		FEO		FER		FEL		FEF		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	CODE
.1875	.062	.187	.062	.187	.062	.187	.062	.187	.062	.187	18
.2500	.093	.249	.093	.249	.093	.249	.093	.249	.093	.249	25
.3125	.125	.312	.125	.312	.125	.312	.125	.312	.125	.312	31
.3750	.187	.374	.187	.374	.187	.374	.187	.374	.187	.374	37
.4375	.187	.437	.187	.437	.187	.437	.187	.437	.187	.437	43
.5000	.225	.499	.250	.499	.250	.499	.250	.499	.250	.499	50
.6250	.310	.624	.282	.624	.282	.624	.282	.624	.282	.624	62
.7500	.390	.749	.312	.749	.312	.749	.312	.749	.312	.749	75
1.000	.485	.999	.375	.999	.375	.999	.375	.999	.375	.999	100

WHEN ORDERING SPECIFY:

QTY. MAT. TYPE SHAPE CODE LENGTH P W B
 6 M2 FE O 50 X 275 X .450 X .210 100 SF*

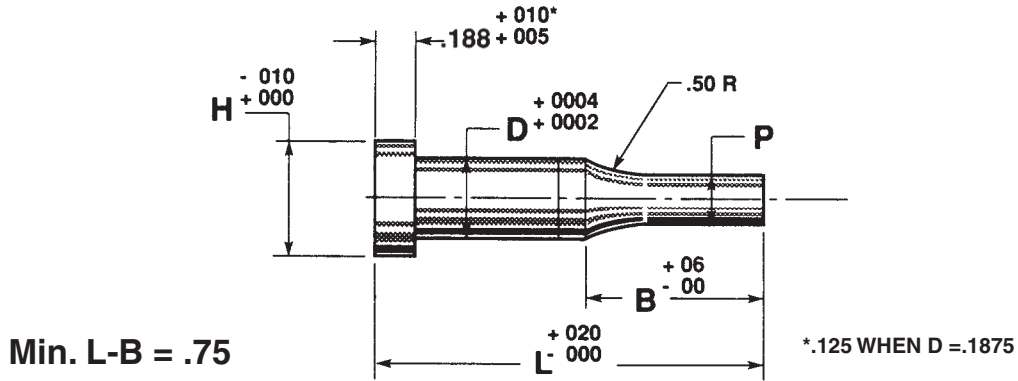
* SPECIFY REQUIRED LOCKING METHOD- SEE PAGE 36



Material: M2 Rc 60-62
Also available in PM M4

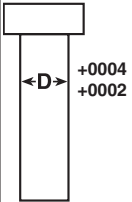
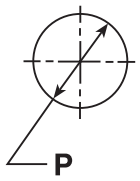
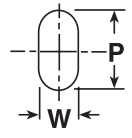
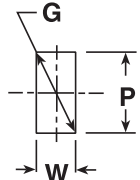
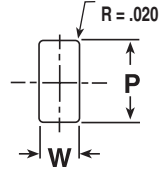
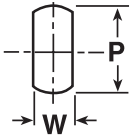
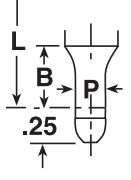
**FLEXIBLE
PUNCHES**

FP



Cat. NO.	FIXED DIMENSIONS		B DIMENSION SPECIFY			STANDARD LENGTHS										
	CODE	D	H	.75	1.00	1.25	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
12	.1250	.187	75	100	125	175	200	225	250							
18	.1875	.312	75	100	125	175	200	225	250	275						
25	.2500	.375	75	100	125	175	200	225	250	275	300					
31	.3125	.437	75	100	125	175	200	225	250	275	300	325	350			
37	.3750	.500	75	100	125	175	200	225	250	275	300	325	350	375	400	
43	.4375	.562	75	100	125	175	200	225	250	275	300	325	350	375	400	
50	.5000	.625	75	100	125	175	200	225	250	275	300	325	350	375	400	
62	.6250	.750	75	100	125		200	225	250	275	300	325	350	375	400	
75	.7500	.875	75	100	125			225	250	275	300	325	350	375	400	
100	1.000	1.125	75	100	125				250	275	300	325	350	375	400	

Longer lengths and alterations from published standards available on request!

BLANK	CIRCULAR	STANDARD SHAPES				PILOTS							
		OBLONG	RECTANGLE	LONG LIFE	FLATTED ROUND								
													
	P = +.0005 -.0000	P & W = +.0005 -.0005				P = +.0005 -.0000							
FPB	FPC		FPO		FPR		FPL		FPF		FPP		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	MIN P	MAX P	CODE
.1250	.062	.124	.062	.124	.062	.124	.062	.124	.062	.124	.061	.124	12
.1875	.062	.187	.062	.187	.062	.187	.062	.187	.062	.187	.061	.1875	18
.2500	.062	.249	.062	.249	.062	.249	.062	.249	.062	.249	.061	.250	25
.3125	.093	.312	.093	.312	.093	.312	.093	.312	.093	.312	.092	.3125	31
.3750	.125	.374	.125	.374	.125	.374	.125	.374	.125	.374	.124	.375	37
.4375	.187	.437	.187	.437	.187	.437	.187	.437	.187	.437	.186	.4375	43
.5000	.225	.499	.187	.499	.187	.499	.187	.499	.187	.499	.224	.500	50
.6250	.310	.624	.250	.624	.250	.624	.250	.624	.250	.624	.309	.625	62
.7500	.390	.749	.312	.749	.312	.749	.312	.749	.312	.749	.389	.750	75
1.000	.485	.999	.375	.999	.375	.999	.375	.999	.375	.999	.484	1.000	100

WHEN ORDERING SPECIFY:

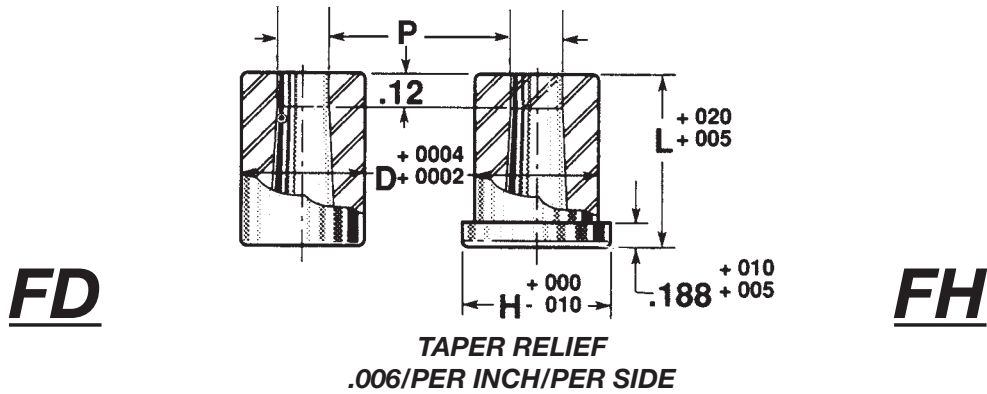
QTY. MAT. TYPE SHAPE CODE LENGTH P W B SF*
 6 M2 FP O 50 X 300 X .450 X .210 100 SF*

* SPECIFY REQUIRED LOCKING DEVICE- SEE PAGE 36



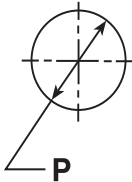
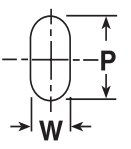
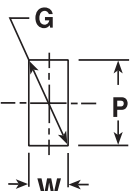
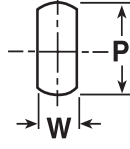
Material: M2 Rc 60-62
Also available in PM M4

FLEXIBLE SERIES DIE BUTTONS



Cat. NO.	FIXED DIMENSIONS		OVERALL LENGTH							
	D	H	.625	.750	.875	1.000	1.125	1.250	1.375	1.500
25	.250	.375	62	75	87	100	112			
31	.3125	.437	62	75	87	100	112	125		
37	.375	.500	62	75	87	100	112	125	137	150
43	.4375	.562	62	75	87	100	112	125	137	150
50	.500	.625	62	75	87	100	112	125	137	150
62	.625	.750	62	75	87	100	112	125	137	150
75	.750	.875	62	75	87	100	112	125	137	150
87	.875	1.000	62	75	87	100	112	125	137	150
100	1.000	1.125	62	75	87	100	112	125	137	150
125	1.250	1.375	62	75	87	100	112	125	137	150
150	1.500	1.625	62	75	87	100	112	125	137	150

Alterations from standard sizes available on request!

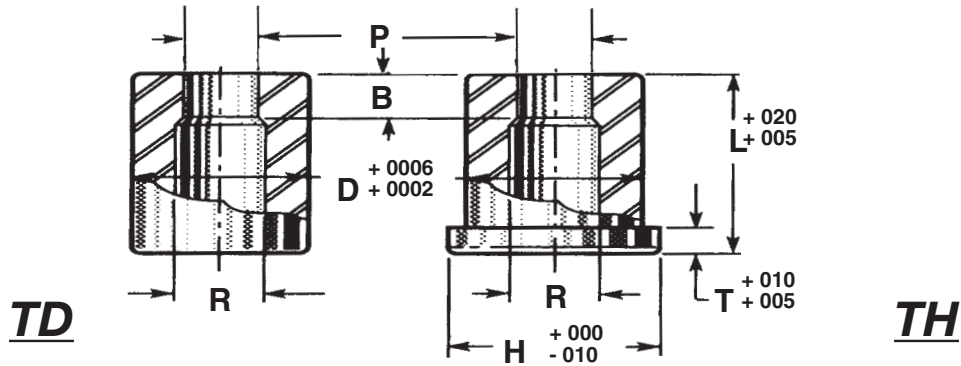
<u>C</u> IRCULAR	STANDARD SHAPES								
	<u>O</u> BLONG		<u>R</u> ECTANGLE		<u>F</u> LATTED ROUND				
									
P = +.0005 -.0000		P & W = +.0005 -.0005							
<u>C</u>	<u>O</u>	<u>R</u>	<u>F</u>	CAT NO.					
MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX P	CODE	
.062	.170	.062	.170	.062	.170	.062	.170	25	
.062	.212	.062	.212	.062	.212	.062	.212	31	
.075	.255	.062	.255	.062	.255	.062	.255	37	
.130	.297	.075	.297	.075	.297	.075	.297	43	
.150	.344	.075	.344	.075	.344	.075	.344	50	
.188	.425	.075	.425	.075	.425	.075	.425	62	
.225	.510	.075	.510	.075	.510	.075	.510	75	
.300	.595	.075	.595	.075	.595	.075	.595	87	
.400	.680	.075	.680	.075	.680	.075	.680	100	
.500	.850	.075	.850	.075	.850	.075	.850	125	
.600	1.050	.075	1.050	.075	1.050	.075	1.050	150	

WHEN ORDERING SPECIFY:

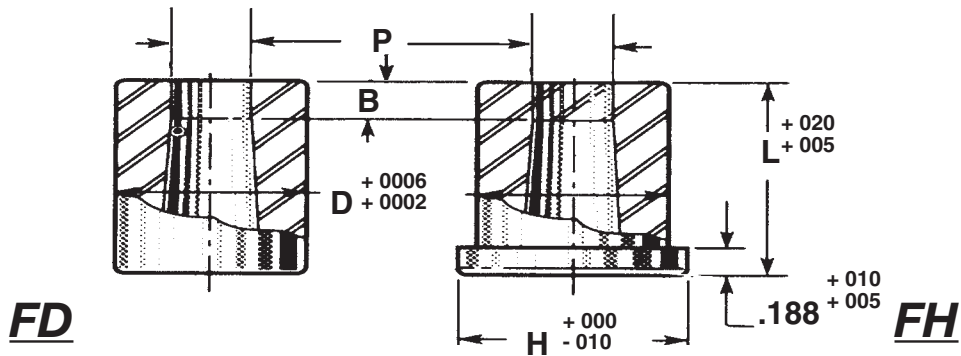
See page 13-14 for expanded ranges!

QTY 6 MAT. M2 TYPE FD SHAPE O CODE 37 X LGTH 150 X P .188 X W .132

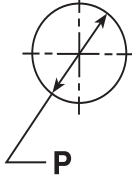
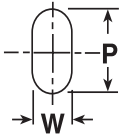
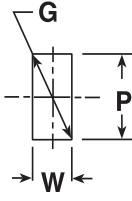
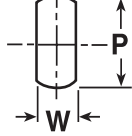
EXPANDED RANGE DIE BUTTONS



Cat.No.	FIXED DIMENSIONS					OVERALL LENGTH								
CODE	D	H	T	B	R.Max	.750	.875	.937	1.000	1.125	1.250	1.375	1.500	
175	1.750	1.875	.188	.375	1.400	75	87	93	100	112	125	137	150	
200	2.000	2.125	.188	.375	1.600	75	87	93	100	112	125	137	150	
225	2.250	2.375	.188	.375	1.800	75	87	93	100	112	125	137	150	
250	2.500	2.625	.188	.375	2.000	75	87	93	100	112	125	137	150	
275	2.750	2.875	.188	.375	2.200	75	87	93	100	112	125	137	150	
300	3.000	3.125	.188	.375	2.400	75	87	93	100	112	125	137	150	



Cat.No.	FIXED DIMENSIONS				OVERALL LENGTH								
CODE	D	H	T	B	.750	.875	.937	1.000	1.125	1.250	1.375	1.500	
175	1.750	1.875	.188	.375	75	87	93	100	112	125	137	150	
200	2.000	2.125	.188	.375	75	87	93	100	112	125	137	150	
225	2.250	2.375	.188	.375	75	87	93	100	112	125	137	150	
250	2.500	2.625	.188	.375	75	87	93	100	112	125	137	150	
275	2.750	2.875	.188	.375	75	87	93	100	112	125	137	150	
300	3.000	3.125	.188	.375	75	87	93	100	112	125	137	150	

<u>C</u> R <u>CULAR</u>	STANDARD SHAPES		
	<u>O</u> B <u>L</u> ONG	<u>R</u> E <u>C</u> T <u>A</u> N <u>G</u> L <u>E</u>	<u>F</u> L <u>A</u> T <u>T</u> E <u>D</u> <u>R</u> O <u>U</u> ND
			
P = +.0005 -.0000	TOLERANCE FOR P & W = +.0005 -.0005		

TD & TH

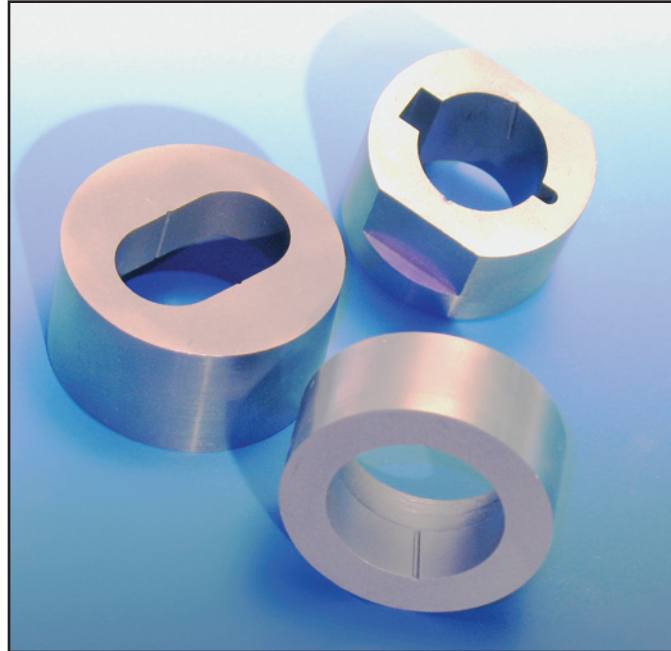
<u>C</u>		<u>O</u>		<u>R</u>		<u>F</u>		CAT NO.
MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX P	CODE
.750	1.400	.190	1.400	.190	1.400	.190	1.400	175
.875	1.600	.252	1.600	.252	1.600	.252	1.600	200
1.000	1.800	.314	1.800	.314	1.800	.314	1.800	250
1.125	2.000	.377	2.000	.377	2.000	.377	2.000	225
1.250	2.200	.439	2.200	.439	2.200	.439	2.200	275
1.375	2.400	.501	2.400	.501	2.400	.501	2.400	300

FD & FH

<u>C</u>		<u>O</u>		<u>R</u>		<u>F</u>		CAT NO.
MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX P	CODE
.750	1.400	.130	1.400	.130	1.400	.130	1.400	175
.875	1.600	.130	1.600	.130	1.600	.130	1.600	200
1.000	1.800	.130	1.800	.130	1.800	.130	1.800	225
1.125	2.000	.130	2.000	.130	2.000	.130	2.000	250
1.250	2.200	.130	2.200	.130	2.200	.130	2.200	275
1.375	2.400	.130	2.400	.130	2.400	.130	2.400	300



Tipco SLUG KEEPERS



Any experienced tool and die operator knows the cost of pulling a slug. A pulled slug can crash an entire die, shutting down your press operations for expensive die repairs and lost production on the line!

Tipco's Slug Keeper™ solves the problem of pulling slugs with its unique design. The Slug Keeper's™ strategically placed grooves capture the slug and virtually eliminate the possibility of the slug coming back out of the die button. This machined groove guards your bottom line and keeps your high production presses running.

Slug Keeper™ causes no engineering or part quality concerns, yet provides the value-added reassurance that slugs will stay firmly in the die button. No pulled slugs. No down time. No problems.

The next time you order a die button, make sure you have Slug Keeper™ watching over YOUR bottom line.

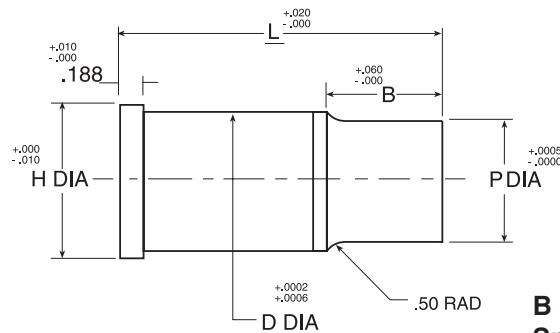
(Note - When placing your next order, simply add the letters TSK to the end of the Tipco part number for the Slug Keeper™ feature.)

WHEN ORDERING SPECIFY:

QTY	MAT.	TYPE	SHAPE	CODE		LGTH		P		W		
6	M2	FD	O	37	X	150	X	.188	X	.132		TSK

EXPANDED RANGE HEAD TYPE PUNCHES

Material
M2 Rc 60-62



B = 1.25 OR 1.50
Specify

AVAILABLE WITH EJECTORS, SPECIFY FE

STANDARD SHAPES										
CIRCULAR		OBLONG		RECTANGLE		LONG LIFE		FLATTED ROUND		
FPC		FPO		FPR		FPL		FPF		
FEC		FEO		FER		FEL		FEF		
CAT. NO.	D	H	LENGTH				CIRCULAR		SHAPES	
			2.50	3.00	3.50	4.00	MIN. P	MAX. P	MIN. W	MAX. P/G
125	1.250	1.375	250	300	350	400	.625	1.249	.282	1.249
150	1.500	1.625	250	300	350	400	.750	1.499	.300	1.499
175	1.750	1.875	250	300	350	400	1.000	1.749	.350	1.749
200	2.000	2.125	250	300	350	400	1.187	1.999	.400	1.999
225	2.250	2.375	250	300	350	400	1.375	2.249	.450	2.249
250	2.500	2.625	250	300	350	400	1.625	2.499	.500	2.499
275	2.75	2.875	250	300	350	400	1.900	2.749	.550	2.749

WHEN ORDERING SPECIFY:

QTY. MAT. TYPE SHAPE CODE LENGTH P. W. SF*
6 M2 FP O 225 X 350 X 1.500 X .985 SF*

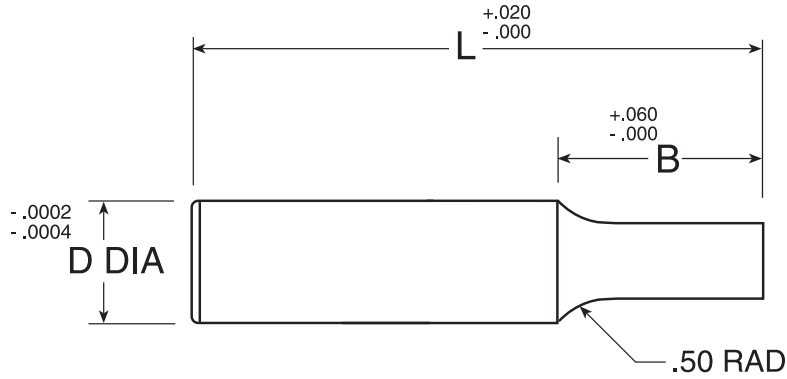
* SPECIFY REQUIRED LOCKING DEVICE- SEE PAGE 36



Material: M2 Rc 60-62

HEADLESS PUNCHES


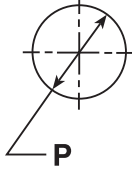
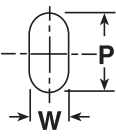
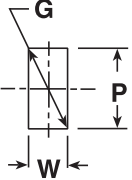
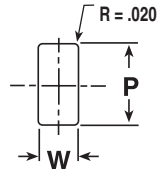
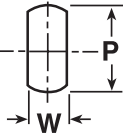
HL



Cat. NO.	FIXED DIMENSIONS		STANDARD LENGTHS							
	CODE	D	B	2.00	2.25	2.50	2.75	3.00	3.50	4.00
25	.250	.50	200	225	250	275	300			
37	.375	.62	200	225	250	275	300	350		
50	.500	.75	200	225	250	275	300	350	400	
62	.625	.87	200	225	250	275	300	350	400	
75	.750	.93	200	225	250	275	300	350	400	
87	.875	.93	200	225	250	275	300	350	400	
100	1.000	.93		225	250	275	300	350	400	
125	1.250	.93			250	275	300	350	400	

Longer lengths and alterations from published standards available on request!

For ejector specify HLE

BLANK	CIRCULAR	STANDARD SHAPES			
		OBLONG	RECTANGLE	LONG LIFE	FLATTED ROUND
					
	P = +.0005 -.0000	P & W = +.0005 -.0005			

HLB	HLC		HLO		HLR		HLL		HLF		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	CODE
.250	.062	.249	.062	.249	.062	.249	.062	.249	.062	.249	25
.375	.125	.374	.125	.374	.125	.374	.125	.374	.125	.374	37
.500	.187	.499	.187	.499	.187	.499	.187	.499	.187	.499	50
.625	.312	.624	.250	.624	.250	.624	.250	.624	.250	.624	62
.750	.437	.749	.312	.749	.312	.749	.312	.749	.312	.749	75
.875	.625	.874	.375	.874	.375	.874	.375	.874	.375	.874	87
1.000	.750	.999	.437	.999	.437	.999	.437	.999	.437	.999	100
1.250	1.000	1.249	.500	1.249	.500	1.249	.500	1.249	.500	1.249	125

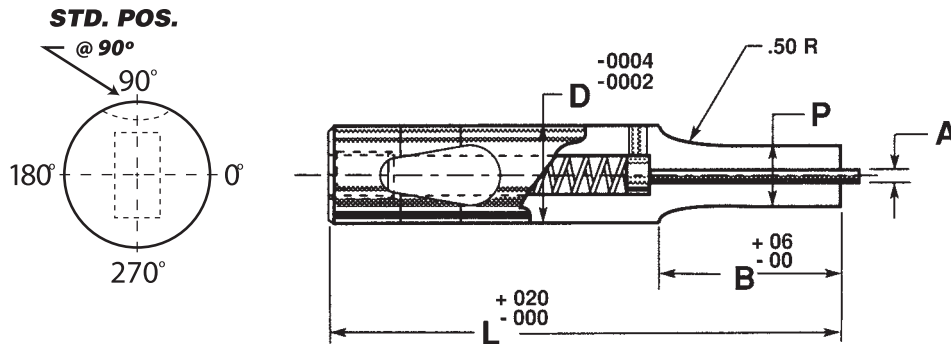
WHEN ORDERING SPECIFY:

QTY. MAT. TYPE SHAPE CODE LENGTH P W
 6 M2 HL O 50 X 225 X .450 X .210



**BALL LOCK
HEAVY DUTY
EJECTORS**

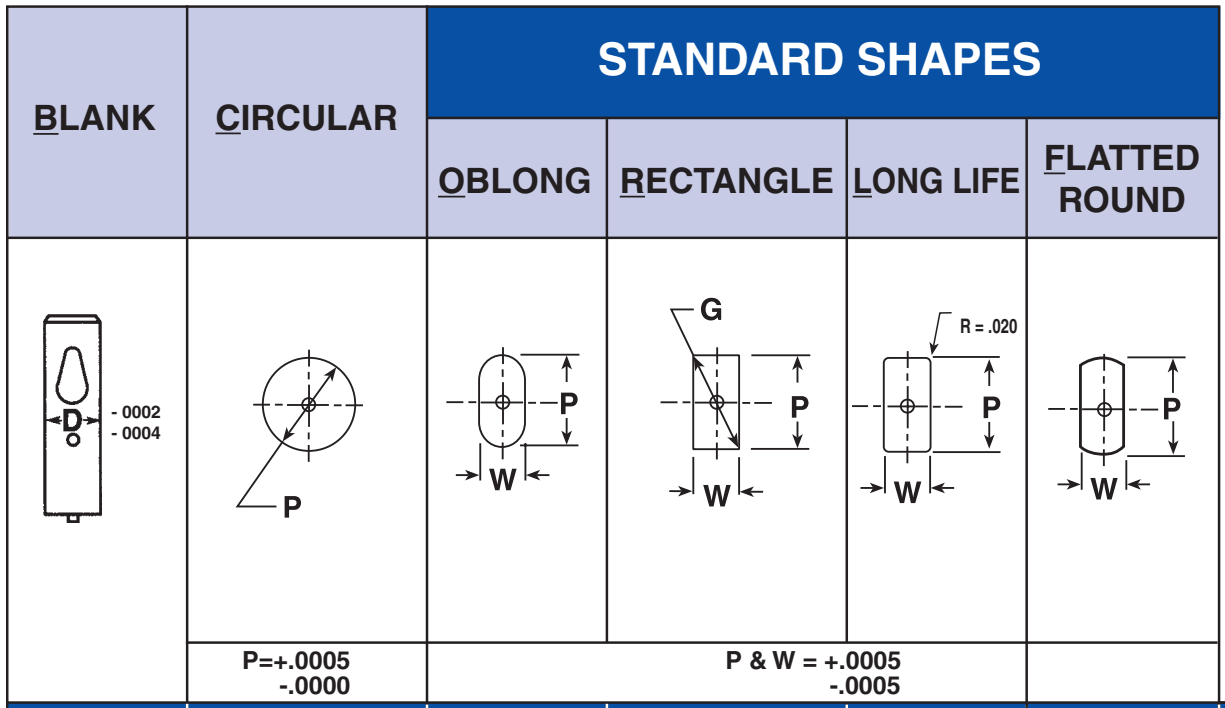
BHE



Cat. NO.	FIXED DIMENSIONS			STANDARD LENGTHS									OPTIONAL B			
	CODE	D	A	B	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.50	5.00	.75	1.00	1.25*
37	.375	.047	.62	250	275	300	325	350	375	400				75	100	125
50	.500	.063	.81	250	275	300	325	350	375	400	450	500		75	100	125
62	.625	.063	.94	250	275	300	325	350	375	400	450	500		75	100	125
75	.750	.093	1.06	250	275	300	325	350	375	400	450	500		75	100	125
87	.875	.093	1.18		275	300	325	350	375	400	450	500		75	100	125
100	1.000	.093	1.25			300	325	350	375	400	450	500		75	100	125
125	1.250	.093	1.44			300	325	350	375	400	450	500		75	100	125

Longer lengths and alterations from published standards available on request!

*Min L-B = 1.50



BHEB	BHEC		BHEO		BHER		BHEL		BHEF		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	CODE
.375	.125	.374	.125	.374	.125	.374	.125	.374	.125	.374	37
.500	.187	.499	.187	.499	.187	.499	.187	.499	.187	.499	50
.625	.312	.624	.250	.624	.250	.624	.250	.624	.250	.624	62
.750	.437	.749	.312	.749	.312	.749	.312	.749	.312	.749	75
.875	.625	.874	.375	.874	.375	.874	.375	.874	.375	.874	87
1.000	.750	.999	.437	.999	.437	.999	.437	.999	.437	.999	100
1.250	1.000	1.249	.500	1.249	.500	1.249	.500	1.249	.500	1.249	125

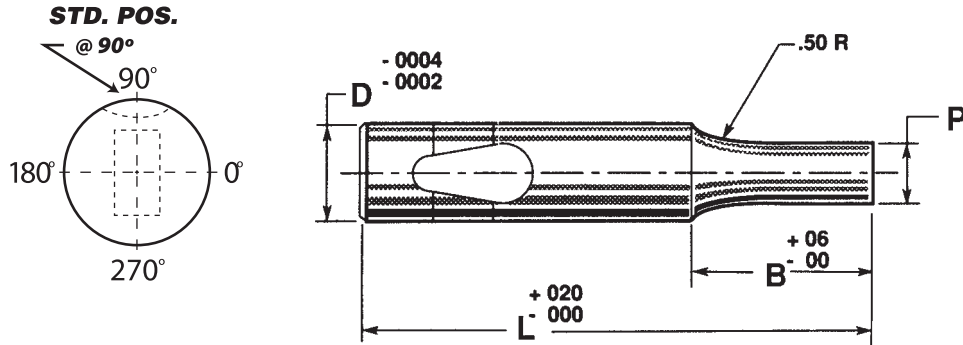
WHEN ORDERING SPECIFY:

QTY. MAT. TYPE SHAPE CODE LENGTH P W
 6 M2 BHE O 50 X 400 X .385 X .235



BALL LOCK
HEAVY DUTY
PUNCHES

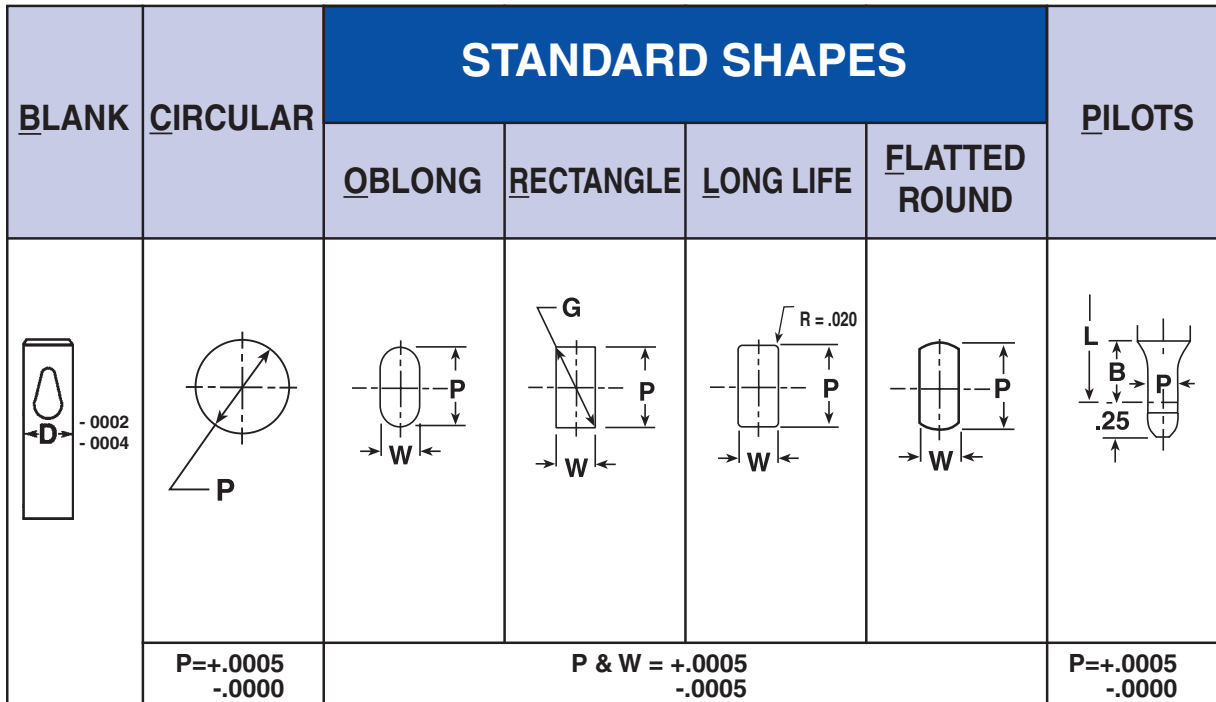
BH



Cat. NO.	FIXED DIMENSIONS		STANDARD LENGTHS									OPTIONAL B		
	D	B	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.50	5.00	.75	1.00	1.25*
37	.375	.62	250	275	300	325	350	375	400			75	100	125
50	.500	.81	250	275	300	325	350	375	400	450	500	75	100	125
62	.625	.94	250	275	300	325	350	375	400	450	500	75	100	125
75	.750	1.06	250	275	300	325	350	375	400	450	500	75	100	125
87	.875	1.18		275	300	325	350	375	400	450	500	75	100	125
100	1.000	1.25			300	325	350	375	400	450	500	75	100	125
125	1.250	1.43			300	325	350	375	400	450	500	75	100	125

Longer lengths and alterations from published standards available on request!

*Min L-B = 1.50



BHB	BHC		BHO		BHR		BHL		BHF		BHP		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	MIN P	MAX P	CODE
.375	.125	.374	.125	.374	.125	.374	.125	.374	.125	.374	.124	.375	37
.500	.187	.499	.187	.499	.187	.499	.187	.499	.187	.499	.186	.500	50
.625	.312	.624	.250	.624	.250	.624	.250	.624	.250	.624	.311	.625	62
.750	.437	.749	.312	.749	.312	.749	.312	.749	.312	.749	.436	.750	75
.875	.625	.874	.375	.874	.375	.874	.375	.874	.375	.874	.624	.875	87
1.000	.750	.999	.437	.999	.437	.999	.437	.999	.437	.999	.749	1.000	100
1.250	1.000	1.249	.500	1.249	.500	1.249	.500	1.249	.500	1.249	.999	1.250	125

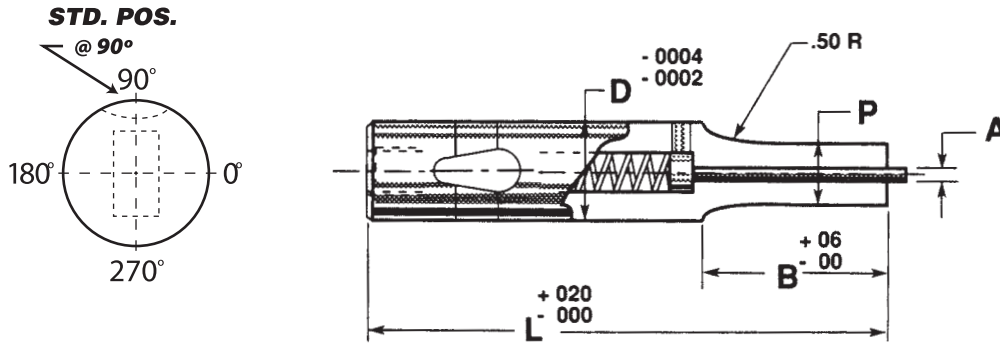
WHEN ORDERING SPECIFY:

QTY. 6 MAT. M2 TYPE BH SHAPE O CODE 62 LENGTH X 450 P X .535 W X .382 B125



**BALL LOCK
LIGHT DUTY
EJECTORS**

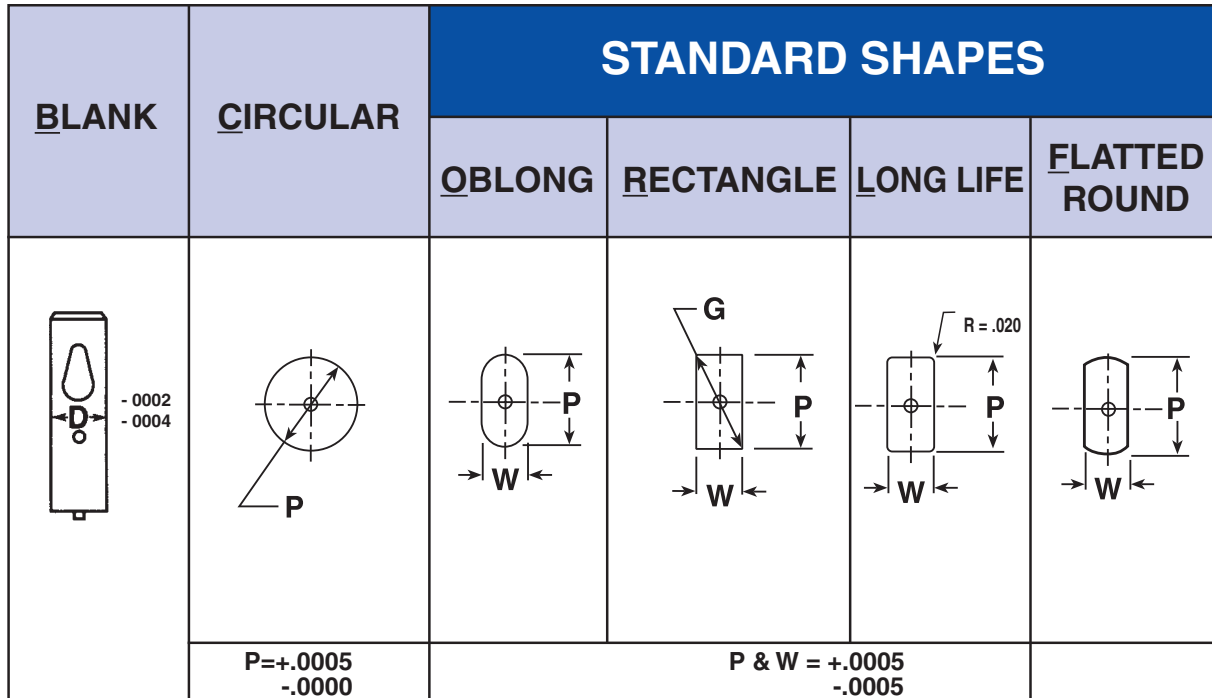
BLE



Cat. NO.	FIXED DIMENSIONS			STANDARD LENGTHS								OPTIONAL B			
	CODE	D	B	A	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	.75	1.00	1.25*
25	.250	.50	.032	225	250	275	300	325	350				75	100	125
37	.375	.62	.047	225	250	275	300	325	350	375	400		75	100	125
50	.500	.75	.063	225	250	275	300	325	350	375	400		75	100	125
62	.625	.87	.063	225	250	275	300	325	350	375	400		75	100	125
75	.750	.93	.093	225	250	275	300	325	350	375	400		75	100	125
87	.875	.93	.093	225	250	275	300	325	350	375	400		75	100	125
100	1.000	.93	.093	225	250	275	300	325	350	375	400		75	100	125
125	1.250	.93	.093		250	275	300	325	350	375	400		75	100	125

**LONGER LENGTHS AND ALTERATIONS FROM PUBLISHED STANDARDS
AVAILABLE ON REQUEST!**

***MIN L-B = 1.25**



BLEB	BLEC		BLEO		BLER		BLEL		BLEF		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	CODE
.250	.070	.249	.070	.249	.070	.249	.070	.249	.070	.249	25
.375	.125	.374	.125	.374	.125	.374	.125	.374	.125	.374	37
.500	.187	.499	.187	.499	.187	.499	.187	.499	.187	.499	50
.625	.312	.624	.250	.624	.250	.624	.250	.624	.250	.624	62
.750	.437	.749	.312	.749	.312	.749	.312	.749	.312	.749	75
.875	.625	.874	.375	.874	.375	.874	.375	.874	.375	.874	87
1.000	.750	.999	.437	.999	.437	.999	.437	.999	.437	.999	100
1.250	1.000	1.249	.500	1.249	.500	1.249	.500	1.249	.500	1.249	125

WHEN ORDERING SPECIFY:

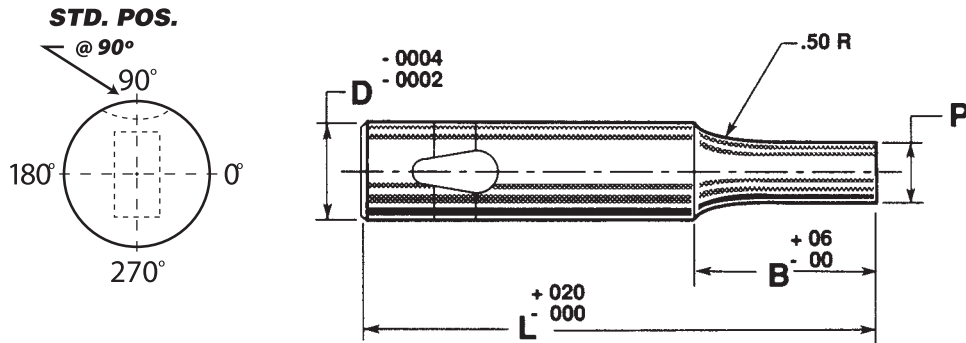
QTY. MAT. TYPE SHAPE CODE LENGTH P W
 6 M2 BLE O 37 X 350 X .285 X .187



Material: M2 Rc 60-62

**BALL LOCK
LIGHT DUTY
PUNCHES**

BL



Cat. NO.	FIXED DIMENSIONS		STANDARD LENGTHS								OPTIONAL B			
	CODE	D	B	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	.75	1.00	1.25*
25	.250	.50	225	250	275	300	325	350				75	100	125
37	.375	.62	225	250	275	300	325	350	375	400		75	100	125
50	.500	.75	225	250	275	300	325	350	375	400		75	100	125
62	.625	.87	225	250	275	300	325	350	375	400		75	100	125
75	.750	.93	225	250	275	300	325	350	375	400		75	100	125
87	.875	.93	225	250	275	300	325	350	375	400		75	100	125
100	1.000	.93	225	250	275	300	325	350	375	400		75	100	125
125	1.250	.93		250	275	300	325	350	375	400		75	100	125

Longer lengths and alterations from published standards available on request!

*Min L-B = 1.25

BLANK	CIRCULAR	STANDARD SHAPES				PILOTS
		OBLONG	RECTANGLE	LONG LIFE	FLATTED ROUND	
	P=+.0005 -.0000	P & W = +.0005 -.0005				P=+.0005 -.0000

BLB	BLC		BLO		BLR		BLL		BLF		BLP		CAT NO.
D	MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX G	MIN W	MAX P	MIN P	MAX P	CODE
.250	.060	.249	.062	.249	.062	.249	.062	.249	.062	.249	.061	.249	25
.375	.125	.374	.125	.374	.125	.374	.125	.374	.125	.374	.124	.374	37
.500	.187	.499	.187	.499	.187	.499	.187	.499	.187	.499	.186	.499	50
.625	.312	.624	.250	.624	.250	.624	.250	.624	.250	.624	.311	.624	62
.750	.437	.749	.312	.749	.312	.749	.312	.749	.312	.749	.436	.749	75
.875	.624	.874	.375	.874	.375	.874	.375	.874	.375	.874	.623	.874	87
1.000	.750	.999	.437	.999	.437	.999	.437	.999	.437	.999	.749	.999	100
1.250	1.000	1.249	.500	1.249	.500	1.249	.500	1.249	.500	1.249	.999	1.249	125

WHEN ORDERING SPECIFY:

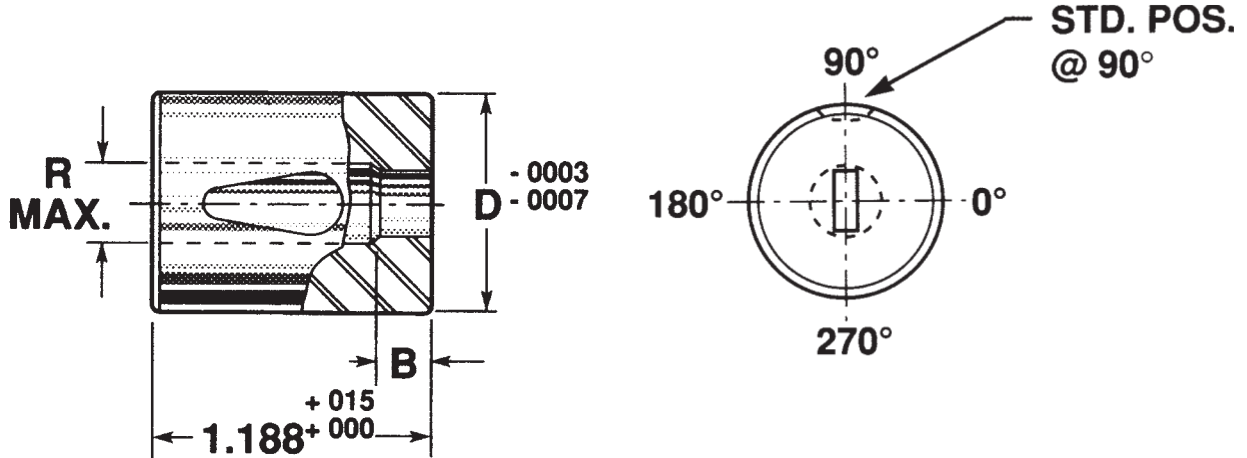
QTY. MAT. TYPE SHAPE CODE LENGTH P
 6 M2 BL C 50 X 225 X .450



Material: M2 Rc 60-62

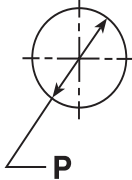
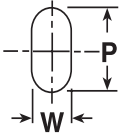
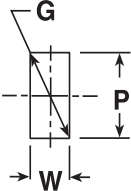
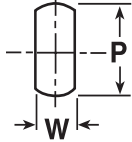
BLD

BALL LOCK
LIGHT DUTY
DIE BUTTONS



CAT. NO.	FIXED DIMENSIONS		
	CODE	D	B
50	.500	.156	.228
62	.625	.188	.312
75	.750	.188	.375
87	.875	.250	.468
100	1.000	.250	.578
125	1.250	.250	.687
150	1.500	.312	.812
175	1.750	.312	1.062

Alterations from published sizes available on request!

<u>CIRCULAR</u>	STANDARD SHAPES							
	<u>OBLONG</u>		<u>RECTANGLE</u>		<u>FLATTED ROUND</u>			
								
P=+.0005 -.0000	Tolerance for W & P +.0005 -.0005							
<u>BLDC</u>		<u>BLDO</u>		<u>BLDR</u>		<u>BLDF</u>		<u>CAT NO.</u>
MIN P	MAX P	MIN W	MAX P	MIN W	MAX G	MIN W	MAX P	CODE
.064	.195	.062	.195	.062	.195	.062	.195	50
.126	.285	.095	.285	.095	.285	.095	.285	62
.196	.345	.125	.345	.125	.345	.125	.345	75
.286	.435	.125	.435	.125	.435	.125	.435	87
.346	.545	.158	.545	.158	.545	.158	.545	100
.436	.655	.189	.655	.189	.655	.189	.655	125
.546	.780	.220	.780	.220	.780	.220	.780	150
.656	1.035	.312	1.035	.312	1.035	.312	1.035	175

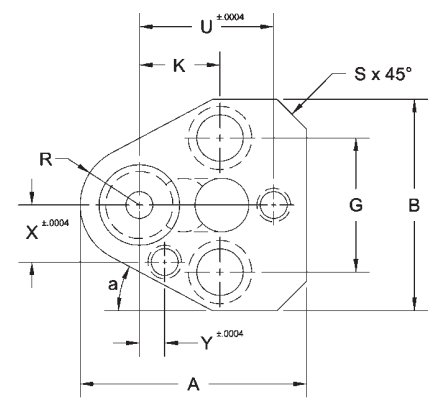
WHEN ORDERING SPECIFY:

QTY. MAT. TYPE SHAPE CODE P X W
 10 M2 BLD O 87 X .390 X .128



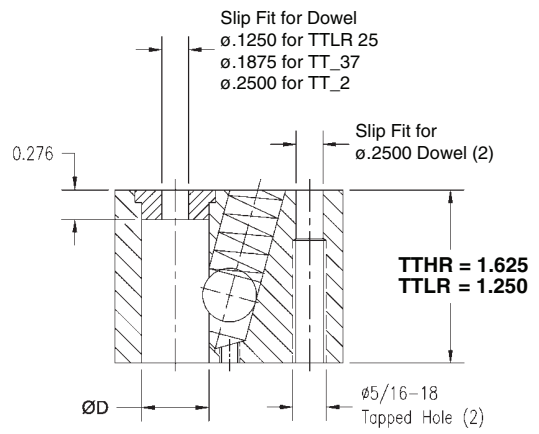
STANDARD BALL LOCK PUNCH RETAINERS

INCH



- Retainer Set Includes:**
- 1 Ball
 - 1 Spring
 - 2 Screws
 - 2 Dowels
 - 1 Ball Release
 - 1 Set Screw

Material:
 Retainer: SAE 4140/43 - 43-48 HRc.
 Backing Plug: SAE S1 / 50 - 54 HRc.



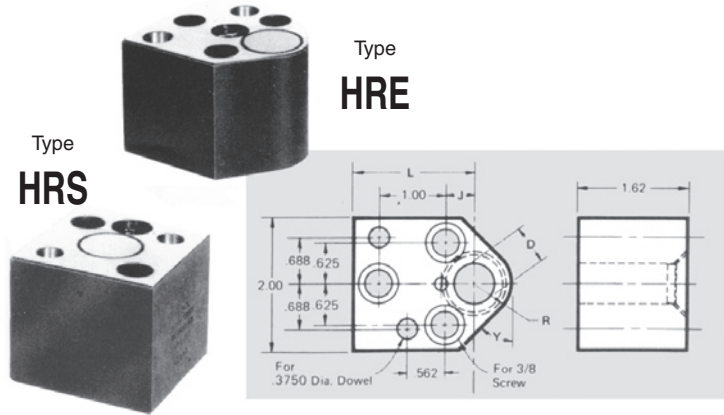
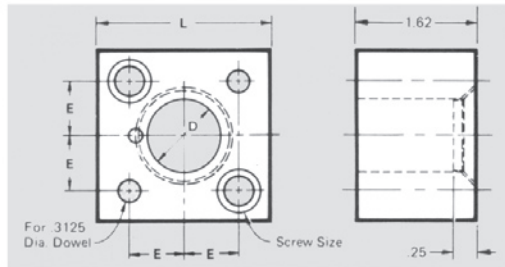
INCH

Catalog Number	ØD	A	B	U	Y	K	G	X	R	S	a°	Screw Size
LIGHT DUTY												
TTLR25	0.250	1.744	1.614	1.060	0.295	0.750	0.876	0.354	0.37	0.197	30°	5/16-18
TTLR37	0.375	1.744	1.614	1.060	0.295	0.750	0.876	0.354	0.37	0.197	30°	5/16-18
TTLR50	0.500	1.984	1.850	1.180	0.256	0.750	1.124	0.472	0.49	0.256	28°	3/8-16
TTLR62	0.625	2.106	1.969	1.250	0.236	0.750	1.250	0.532	0.55	0.276	29°	3/8-16
TTLR75	0.750	2.366	2.165	1.320	0.197	0.750	1.376	0.650	0.69	0.315	28°	3/8-16
TTLR87	0.875	2.492	2.291	1.400	0.197	0.750	1.376	0.728	0.75	0.433	28°	3/8-16
TTLR100	1.000	2.744	2.480	1.600	0.276	0.938	1.562	0.866	0.87	0.354	28°	1/2-13
HEAVY DUTY												
TTHR 37	0.375	1.744	1.614	1.060	0.295	0.750	0.876	0.354	0.37	0.197	30°	5/16-18
TTHR 50	0.500	1.984	1.850	1.180	0.256	0.750	1.124	0.472	0.49	0.256	28°	3/8-16
TTHR 62	0.625	2.106	1.969	1.250	0.236	0.750	1.250	0.532	0.55	0.276	28°	3/8-16
TTHR 75	0.750	2.366	2.165	1.320	0.197	0.750	1.376	0.650	0.69	0.315	28°	3/8-16
TTHR 87	0.875	2.492	2.291	1.400	0.197	0.750	1.376	0.728	0.75	0.433	28°	3/8-16
TTHR 100	1.000	2.744	2.480	1.600	0.276	0.938	1.562	0.866	0.87	0.354	28°	1/2-13
TTHR 125	1.250	2.744	2.480	1.600	0.276	0.938	1.562	0.866	0.87	0.3.54	28°	1/2-13

END AND SQUARE TYPE RETAINERS

Heavy Duty

Backing Plug, Ball, Spring, Screws, Dowels furnished with each retainer



CAT NO. HRS	D	L	E	SCREW SIZE
HRS 50	.5000	1.88	.562	3/8-16
HRS 62	.6250	2.00	.625	3/8-16
HRS 75	.7500	2.12	.688	3/8-16
HRS 87	.8750	2.38	.750	1/2-13
HRS 100	1.0000	2.38	.750	1/2-13
HRS 125	1.2500	2.62	.812	1/2-13

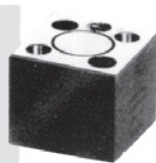
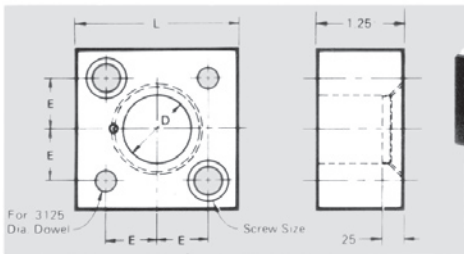
CAT NO. HRE	D	L	J	R	Y
HRE 50	.5000	1.75	.375	.50	40°
HRE 62	.6250	1.81	.438	.56	45°
HRE 75	.7500	1.88	.500	.69	60°
HRE 87	.8750	1.94	.562	.75	60°
HRE 100	1.0000	2.00	.625	.81	60°
HRE 125	1.2500	2.12	.750	1.00	-

*Square and end type retainers can be furnished with Backing Plate instead of Backing Plug. ON REQUEST ONLY. Not manufactured by Dayton Progress Corporation.

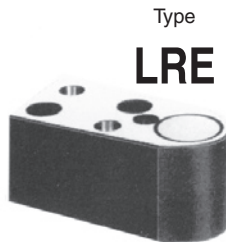
MANUFACTURED BY DAYTON PROGRESS CORPORATION.

Light Duty

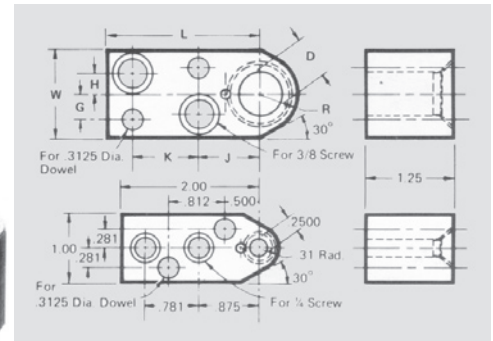
Backing Plug, Ball, Spring, Screws, Dowels furnished with each retainer



Type LRS



Type LRE



CAT NO. HRS	D	L	E	SCREW SIZE
LRS 25	.2500	1.25	.312	1/4-20
LRS 38	.3750	1.38	.375	5/16-18
LRS 50	.5000	1.50	.438	5/16-18
LRS 62	.6250	1.62	.500	5/16-16
LRS 75	.7500	1.88	.562	3/8-16
LRS 87	.8750	2.00	.625	3/8-16
LRS 100	1.0000	2.25	.750	3/8-16
*LRS 125	1.2500	2.25	.750	3/8-16
*LRS 150	1.5000	2.75	1.000	3/8-16
*LRS 175	1.7500	2.75	1.000	3/8-16

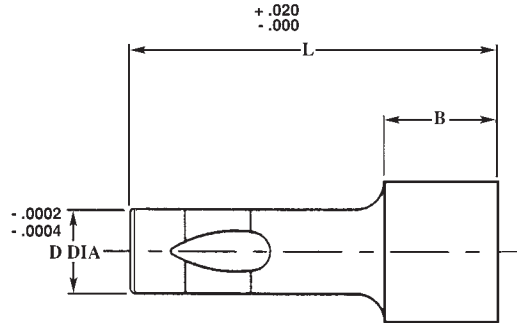
CAT NO. LRE	D	G	H	J	K	L	R	W
LRE 25	.2500			SEE DRAWING				
LRE 37	.3750	.375	.281	.906	.969	2.25	.38	1.25
LRE 50	.5000	.375	.281	.906	.969	2.25	.50	1.25
LRE 62	.6250	.375	.281	.906	.969	2.25	.56	1.25
LRE 75	.7500	.438	.344	1.125	1.000	2.50	.69	1.38
LRE 87	.8750	.438	.344	1.125	1.000	2.50	.75	1.50
LRE 100	1.0000	.438	.344	1.125	1.000	2.50	.81	1.62

*Furnished with Backing Plate instead of Backing Plug.



Material: M2 Rc 60-62

**BALL LOCK
HEAVY DUTY
KNOB STYLE**



WITH EJECTOR
SPECIFY BHEK

LIGHT DUTY
"SPECIFY "BLK" OR "BLEK"

CIRCULAR		STANDARD SHAPES													
Std. Ball Seat		OBLONG	RECTANGLE	LONG LIFE	FLATTED ROUND										
P=+.0005 -.0000		TOLERANCE FOR P & W = +.0005 -.0005													
CAT. NO.	FIXED DIMENSIONS		LENGTH			BHKC		BHKO		BHKR		BHKL		BHKF	
	D	B	3.00	3.50	4.00	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
CODE	D	B	3.00	3.50	4.00	P	P	W	P	W	G	W	G	W	P
50	.5000	.75	300	350	400	.501	1.250	.188	1.250	.188	1.250	.188	1.250	.188	1.250
62	.6250	.88	300	350	400	.626	1.500	.250	1.500	.250	1.500	.250	1.500	.250	1.500
75	.7500	.93	300	350	400	.751	1.500	.312	1.500	.312	1.500	.312	1.500	.312	1.500
87	.8750	.93	300	350	400	.876	1.750	.375	1.750	.375	1.750	.375	1.750	.375	1.750
100	1.000	1.13	300	350	400	1.001	1.750	.437	1.750	.437	1.750	.437	1.750	.437	1.750
125	1.250	1.13	300	350	400	1.251	2.500	.500	2.500	.500	2.750	.500	2.750	.500	2.750

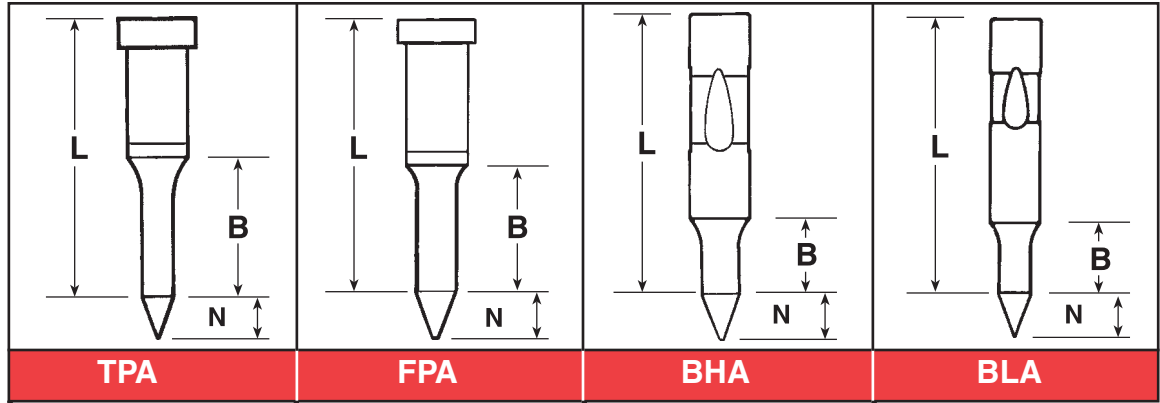
Alterations, including longer lengths, are available on request!

WHEN ORDERING SPECIFY:

QTY. MAT. TYPE SHAPE CODE LENGTH P W
5 M2 BHEK O 75 X 350 X 1.410 X .625

ANGLE POINT PILOT

Material: M2 Rc 60-62



CODE	B	P. RANGE	B	P. RANGE	B	P. RANGE	B	P. RANGE
37	.62	.186 - .375	.75	.186 - .375	.75	.186 - .374	.75	.186 - .374
43	NA		.75	.186 - .4375				
50	.81	.224 - .500	.75	.224 - .500	.75	.249 - .499	.75	.249 - .499
62	.94	.309 - .625	.75	.309 - .625	.75	.311 - .624	.75	.311 - .624
75	1.06	.389 - .750	.75	.389 - .750	.75	.436 - .749	.75	.436 - .749
87	NA		.75		.75	.624 - .874	.75	.624 - .874
100	1.25	.749 - 1.000	.75	.484 - 1.000	.75	.749 - .999	.75	.749 - .999
125	NA				.75	.999 - 1.240	.75	.999 - 1.240

37	1.00	.186 - .375	1.00	.186 - .375	1.00	.186 - .374	1.00	.186 - .374
43	NA		1.00	.186 - .4375				
50	1.00	.224 - .500	1.00	.224 - .500	1.00	.249 - .499	1.00	.249 - .499
62	1.00	.309 - .625	1.00	.309 - .625	1.00	.311 - .624	1.00	.311 - .624
75	1.00	.389 - .750	1.00	.389 - .750	1.00	.436 - .749	1.00	.436 - .749
87	NA				1.00	.624 - .874	1.00	.624 - .874
100	1.00	.749 - 1.000	1.00	.484 - 1.000	1.00	.749 - .999	1.00	.749 - .999
125	NA				1.00	.999 - 1.240	1.00	.999 - 1.240

37	1.25	.186 - .375	1.25	.186 - .375	1.25	.186 - .374	1.25	.186 - .374
43	NA		1.25	.186 - .4375				
50	1.25	.224 - .500	1.25	.224 - .500	1.25	.249 - .499	1.25	.249 - .499
62	1.25	.309 - .625	1.25	.309 - .625	1.25	.311 - .624	1.25	.311 - .624
75	1.25	.389 - .750	1.25	.389 - .750	1.25	.436 - .749	1.25	.436 - .749
87	NA				1.25	.624 - .874	1.25	.624 - .874
100	1.25	.749 - 1.000	1.25	.484 - 1.000	1.25	.749 - .999	1.25	.749 - .999
125	NA				1.25	.999 - 1.240	1.25	.999 - 1.240

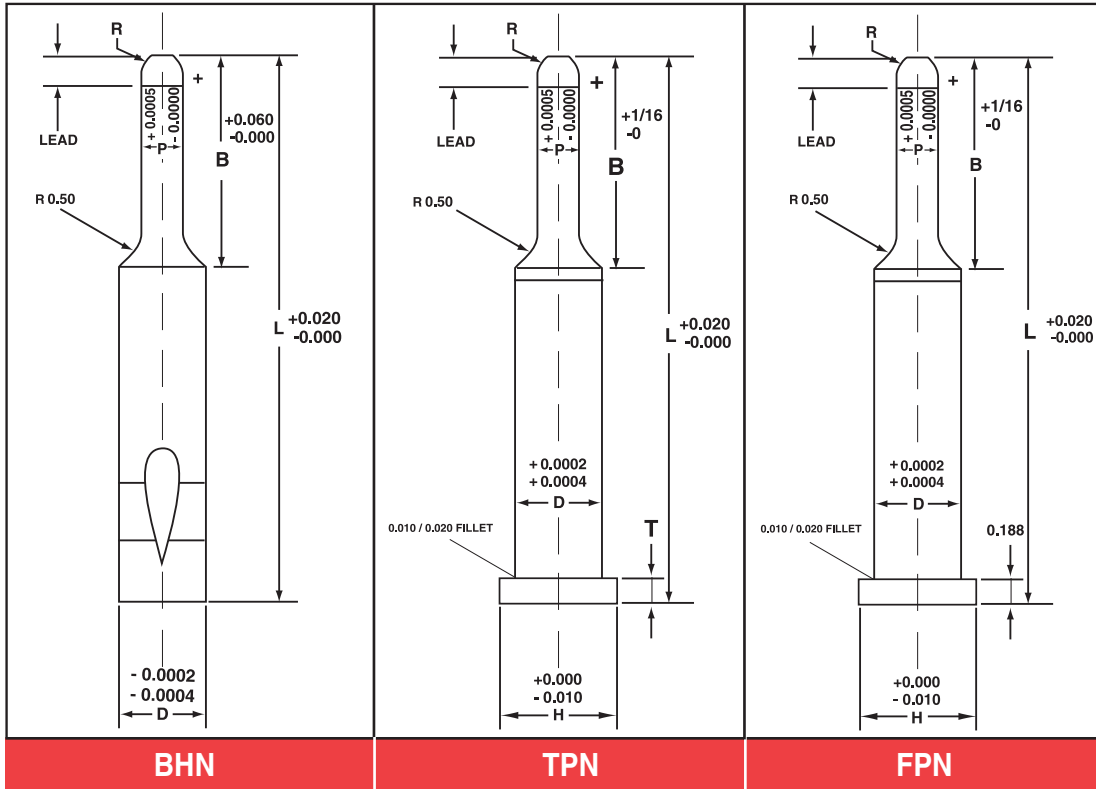
WHEN ORDERING SPECIFY:
 QTY. MAT. TYPE SHANK LENGTH P. B
 6 M2 BHA 62 X 300 X .375 X 100
 Note: Standard length availability same as parabolic pilot.
 Longer lengths available on request.

BODY	N	Min. P =
37	.375	.210
43	.4375	.250
50	.500	.300
62	.625	.390
75	.750	.480
87	.875	.570
100	1.000	.660
125	1.250	.840

If "P" is below minimum,
 N=1.2xP



BULLET NOSE PILOT



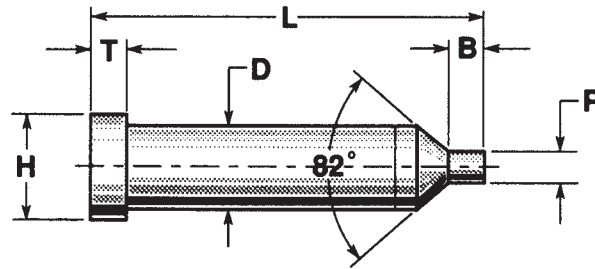
POINT LEAD	
.037 to .077	1/16
.078 to .171	1/8
.172 to .295	3/16
.296 to .405	1/4
.406 to .514	5/16
.515 to .639	3/8
.640 to .936	7/16
.937 to .999	1/2
1	9/16

Cat. NO.	Fixed Dimensions						Min P	Max P	Optional B or specify for FPN		
	D	BHN	TPN		FPN						
CODE	D	B	B	H	T	H					
12	0.125	N/A	N/A	N/A	N/A	0.187	0.061	0.125	0.75	1	1.25
18	0.188	N/A	0.430	0.312	0.125	0.312	0.062	0.188	0.75	1	1.25
25	0.250	N/A	0.500	0.375	0.125	0.375	0.062	0.250	0.75	1	1.25
31	0.313	N/A	0.560	0.437	0.125	0.437	0.093	0.313	0.75	1	1.25
37	0.375	0.620	0.620	0.500	0.188	0.500	0.124	0.375	0.75	1	1.25
43	0.438	N/A	N/A	N/A	N/A	0.562	0.186	0.438	0.75	1	1.25
50	0.500	0.810	0.810	0.625	0.188	0.625	0.186	0.500	0.75	1	1.25
62	0.625	0.940	0.940	0.750	0.250	0.750	0.311	0.625	0.75	1	1.25
75	0.750	1.060	1.060	0.875	0.250	0.875	0.436	0.750	0.75	1	1.25
87	0.875	1.180	N/A	N/A	N/A	N/A	0.624	0.875	0.75	1	1.25
100	1.000	1.250	1.250	1.125	0.250	1.125	0.749	1.000	0.75	1	1.25
125	1.250	1.430	N/A	N/A	N/A	N/A	0.999	1.250	0.75	1	1.25

WHEN ORDERING SPECIFY:
 QTY. TYPE CODE LENGTH P.
 5 BHN 1.00 X 400 X .898

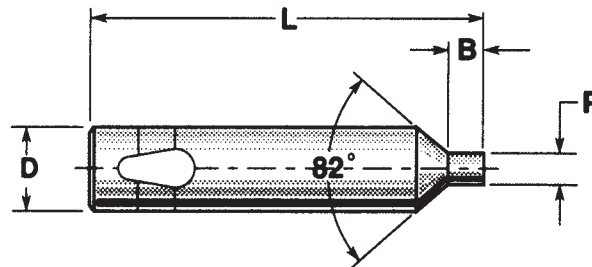
COUNTER SINK PUNCHES

TIPCO HEAD TYPE



CAT NO.	D	H	T	B	P	LENGTHS - L								
						1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
TPCS25	.250	.37	.125	.125	.055 - .125	150	175	200	225	250				
TPCS31	.3125	.43	.125	.125	.078 - .140	150	175	200	225	250	275			
TPCS37	.375	.50	.188	.156	.090 - .187		175	200	225	250	275	300		
TPCS50	.500	.62	.188	.188	.140 - .250			200	225	250	275	300	350	
TPCS62	.625	.75	.250	.188	.203 - .281			200	225	250	275	300	350	
TPCS75	.750	.87	.250	.250	.265 - .359				225	250	275	300	350	400

BALL LOCK



LIGHT DUTY											HEAVY DUTY	
CAT NO.	D	B	P	LENGTHS						HD	CATALOGUE NUMBER	
				2.00	2.25	2.50	2.75	3.00	3.50			4.00
BLCS25	.250	.125	.060 - .125	200	225	250						
BLCS37	.375	.156	.090 - .187		225	250	275	300	350	400		BHCS37
BLCS50	.500	.188	.140 - .250			250	275	300	350	400		BHCS50
BLCS62	.625	.188	.203 - .281			250	275	300	350	400		BHCS62
BLCS75	.750	.250	.265 - .359			250	275	300	350	400		BHCS75

WHEN ORDERING SPECIFY:

QTY. MAT. CAT. NO. CODE LGTH P.
 6 M2 TPCS 50 X 250 X .187



ALTERATIONS

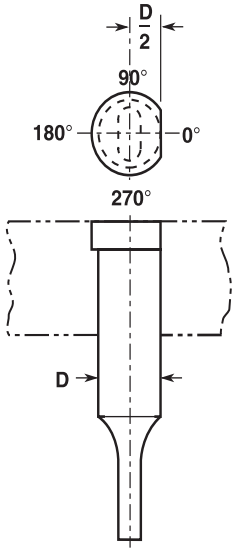
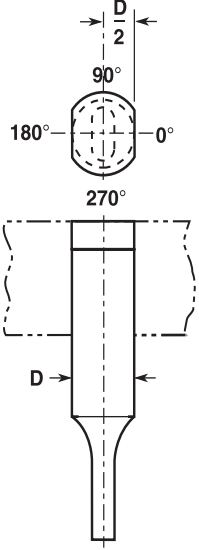
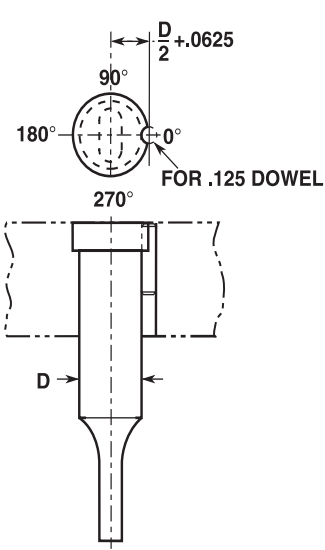
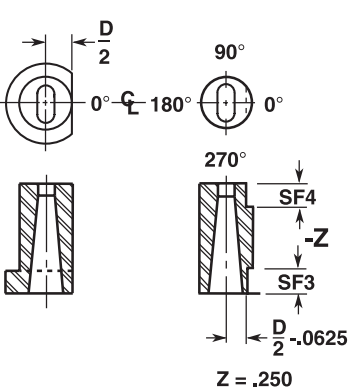
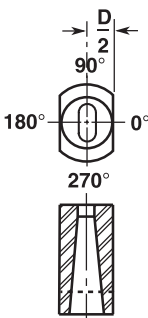
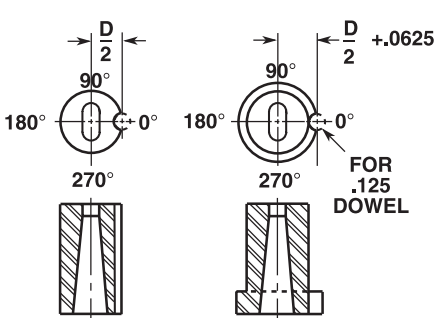
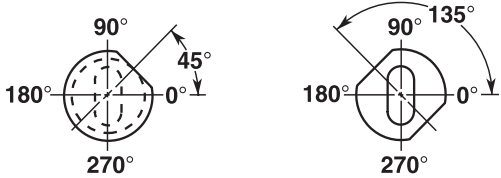
<p>ALTERED "B" POINT LENGTH - NON STANDARD</p>	<p>ALTERED "P* & W" BELOW STANDARD CATALOG RANGE</p>	<p>ALTERED "H" REDUCED HEAD DIAMETER PUNCHES OR DIES</p>
<p>ALTERED "I" REDUCED HEAD THICKNESS ON PUNCHES OR DIES ATX PRECISION HEAD THICKNESS ± .0005</p>	<p>ALTERED "L" SHORTENED OVER-ALL LENGTH ALX PRECISION OVERALL LENGTH ± .0005</p>	<p>ALTERED "D" SHANK DIAMETER SMALLER THAN CATALOG DIMENSIONS PUNCHES OR DIES</p>
<p>ALTERNATE EJECTOR - NON STANDARD EJECTOR</p>	<p>CONICAL POINT</p>	<p>ANGLE SHEAR</p>
<p>TIPCO GOLD COATING - TITANIUM NITRIDE COATING FOR GREATER WEAR RESISTANCE</p>	<p>ROOFTOP SHEAR</p>	<p>BACK TAPER</p>

AHP	
Heavy Press Fit Die Buttons	
Shank	Tol.
.375 - .500	+.0005/+ .0008
.625 - .750	+.0010/+ .0014
.875 - 1.000	+.0010/.0014
1.250	+.0015/+ .0020
1.500	+.0015/+ .0020

OFFSET EJECTOR WITH HEEL	
<p>OE</p>	<p>A (OFFSET EJECTOR)</p>

LOCATING METHODS

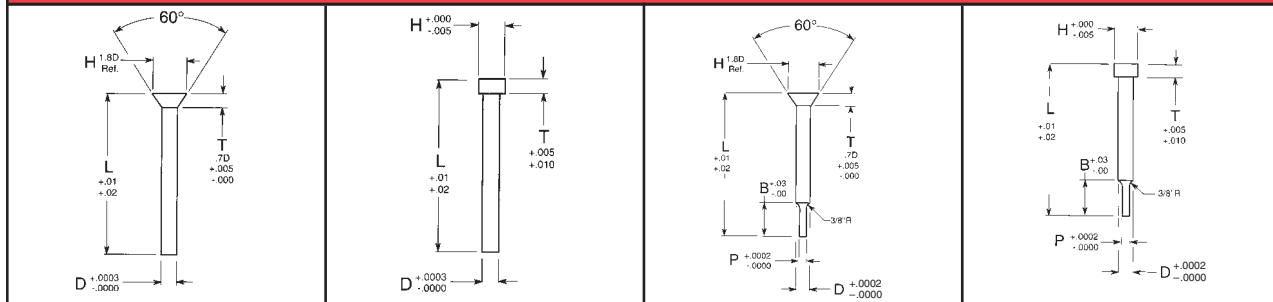
Standard Locations:

SF	DF	DS
		
		
FL		<h3>Special Locations:</h3>  <p>Punch</p> <p>Die</p>



CLOSE SPACE PUNCHES

STANDARD LENGTHS AVAILABLE IN 1.50 1.75 2.00 2.25 2.50 INCHES



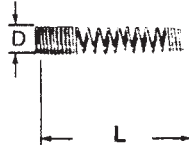
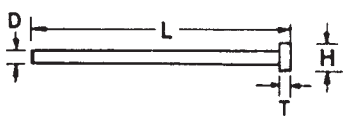
CSA		CSB			CSAP			CSBP				
CODE	D	CODE	D	H	T	D	MIN. P.	MAX. P.	D	MIN. P.	MAX. P.	B
	.010-.014		.010-.014	1/32	1/16							
	.015-.019		.015-.019	1/32	1/16							
	.020-.029		.020-.029	3/64	1/16							
	.030-.036		.030-.036	1/16	1/16							
	.037-.046		.037-.046	5/64	1/16							
	.047-.055		.047-.055	3/32	3/32							
06	.0625*	06	.0625	1/8	1/8	.0625	.031	.0624	.0625	.031	.0624	.187
	.056-.064		.056-.064	7/64	3/32							
	.065-.078		.065-.078	1/8	3/32							
	.079-.087		.079-.087	9/64	3/32							
09	.0938*	09	.0938	5/32	1/8	.0938	.062	.0937	.0938	.062	.0937	.250
	.088-.099		.088-.099	5/32	3/32							
	.100-.120		.100-.120	11/64	3/32							
12	.125*	12	.125	3/16	1/8	.125	.093	.1249	.125	.093	.1249	.312
	.121-.131		.121-.131	3/16	1/8							
	.132-.147		.132-.147	13/64	1/8							
15	.1562*	15	.1562	7/32	1/8	.1562	.125	.1561	.1562	.125	.1561	.375
	.148-.163		.148-.163	7/32	1/8							
	.164-.179		.164-.179	15/64	1/8							
18	.1875*	18	.1875	1/4	1/8	.1875	.156	.1874	.1875	.156	.1874	.438
	.180-.194		.180-.194	1/4	1/8							
	.195-.210		.195-.210	17/64	1/8							
21	.2188*	21	.2188	9/32	1/8	.2188	.182	.2187	.2188	.182	.2187	.500
	.211-.225		.211-.225	9/32	1/8							
	.226-.241		.226-.241	19/64	1/8							
	.242-.249		.242-.249	5/16	3/16							
25	.250*	25	.250	5/16	1/8	.250	.218	.2499	.250	.218	.2499	.438

* +.0002/-0.0000

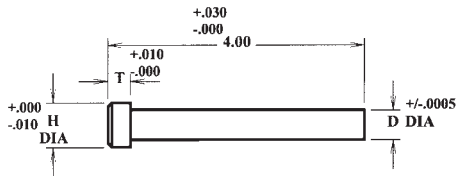
	QTY	CODE		LENGTH	P	
EXAMPLE #1	25	CSA06	X	2.00		
EXAMPLE #2	10	CSB.030	X	2.00		
EXAMPLE #3	15	CSAP12	X	2.50	X	.113
EXAMPLE #4	14	CSBP15	X	1.75	X	.128

EJECTOR KITS

	PIN				SPRING		SET SCREW	
	D	H	T	L	D	L	D	L
E25	.022	.048	.031	1.11	.082	2.38	3-48	.188
E32	.027	.073	.047	1.38	.104	2.38	5-40	.188
E47	.041	.094	.062	2.00	.130	2.66	5-40	.188
E63	.058	.120	.062	2.00	.165	3.00	10-32	.188
E93	.089	.156	.094	2.25	.198	3.00	1/4-28	.188
E125	.120	.188	.094	2.22	.270	2.56	5/16-24	.250



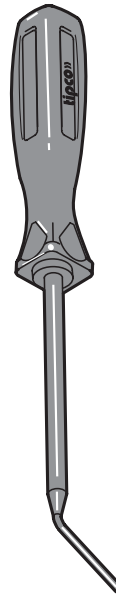
TIPCO EJECTOR PINS



0-1 TOOL STEEL
RC 58-60

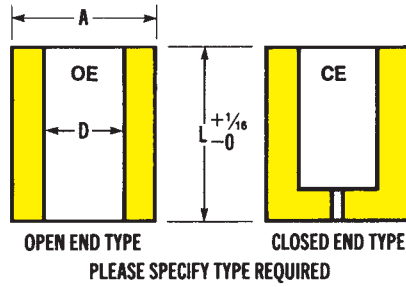
CODE #	D	H	T
TEE093	3/32	5/32	5/64
TEE12	1/8	7/32	3/32
TEE18	3/16	5/16	9/64
TEE25	1/4	7/16	3/16
TEE31	5/16	1/2	1/4
TEE37	3/8	5/8	1/4

Retainer Ball Release Tool
(Specify angle or straight)





URETHANE STRIPPERS



QUICKLY AND EASILY MOUNTED

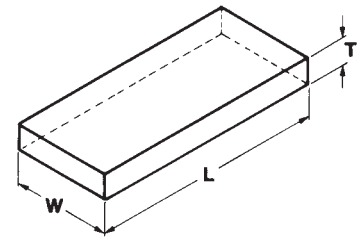
CAT. NO.	PUNCH BODY D	OUTSIDE DIA. A	LENGTH L	APPROXIMATE STRIPPING PRESSURE AVAILABLE AT DEFLECTION INDICATED		
				1/8	1/4	3/8
U25	.250	3/4	125	280	475	640
			150	265	465	610
			175	225	375	490
U31	.3125	13/16	125	320	500	675
			150	300	450	630
			175	270	400	580
U37	.375	7/8	125	420	690	930
			150	385	620	850
			175	355	570	750
			200	310	510	660
U50	.500	1	125	510	785	1000
			150	450	725	940
			175	435	685	880
			200	310	515	660
U62	.625	1 1/8	125	600	920	1200
			150	520	830	1000
			175	480	770	960
			200	440	730	930
U75	.750	1 1/2	175	450	720	1070
			200	360	635	980
			225	310	580	900
			250	290	545	820
			275	270	505	730
U87	.875	1 3/4	175	1125	1650	2220
			200	965	1420	2050
			225	850	1260	1900
			250	760	1150	1720
			275	650	980	1450
U100	1.00	2	175	1800	2800	3200
			200	1400	2400	3000
			225	1300	2200	2850
			250	1100	1800	2650
			275	950	1600	2450

WILL FIT ALL STANDARD COMMERCIAL PUNCHES. STD DUROMETER 95A

WHEN ORDERING SPECIFY:

QUAN. CAT. NO. LENGTH
 2 U-25 X 125 CE

URETHANE SHEETS



THICKNESS

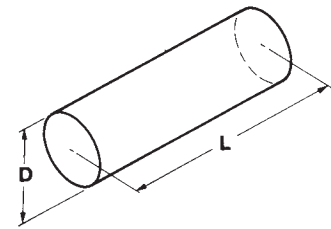
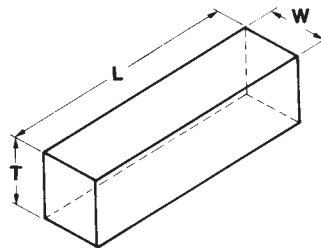
L / W	1/16	1/8	3/16	1/4	3/8	1/2	5/8	3/4	1	1-1/4	1-1/2	2	2-1/2	3
12 X 12	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12 X 24	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24 X 24		X	X	X	X	X	X	X	X	X	X	X	X	X
36 X 36		X	X	X	X	X	X	X	X	X	X	X		

URETHANE BARS

LENGTHS

T / W	12	24	36
1 X 1	X	X	X
1 X 1.5	X	X	X
1 X 2	X	X	X
1 X 2.5	X	X	X
1 X 3	X	X	X
1 X 4	X	X	X
1.5 X 1.5	X	X	X
1.5 X 2	X	X	X
1.5 X 3	X	X	X
1.5 X 4	X	X	X
2 X 2	X	X	X
2 X 3	X	X	X

SHORE HARDNESS	TIPCO COLOUR CODE	MAXIMUM DEFLECTION
70A	YELLOW	35%
80A	ORANGE	35%
90A	RED	30%
95A	GREEN	25%
75D	BLACK	5%



URETHANE RODS / TUBES

STD LENGTH 12.0 INCHES

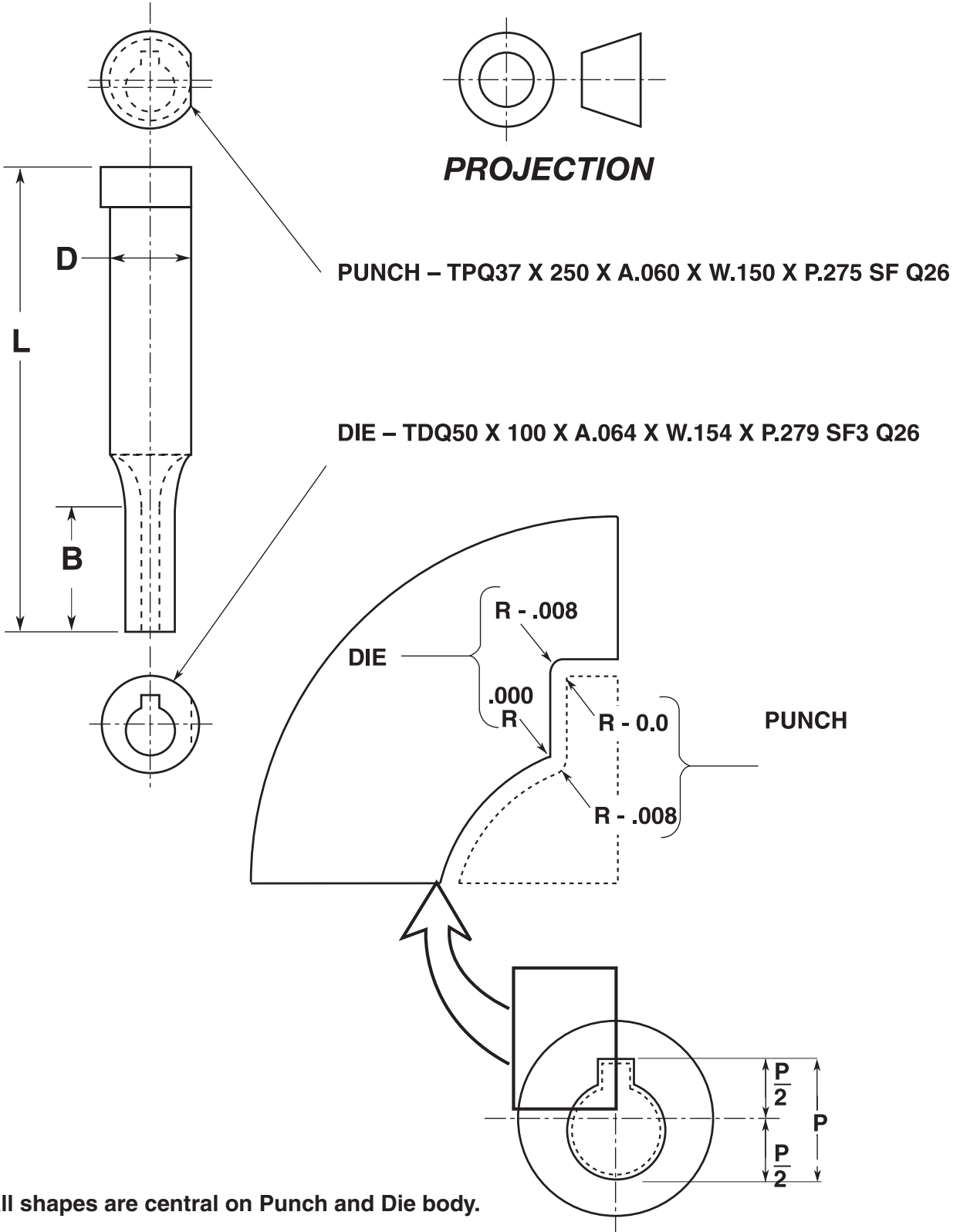
I.D. AVAILABLE

O.D.	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2
3/8														
1/2														
5/8														
3/4	X	X	X											
7/8	X	X	X											
13/16	X	X	X	X										
1	X	X	X	X	X	X								
1-1/8	X	X	X	X	X	X	X							
1-1/4	X	X	X	X	X	X	X	X						
1-1/2	X	X	X	X	X	X	X	X	X					
1-5/8	X	X	X	X	X	X	X	X	X	X				
1-3/4	X	X	X	X	X	X	X	X	X	X	X			
2	X	X	X	X	X	X	X	X	X	X	X	X		
2-1/4	X	X	X	X	X	X	X	X	X	X	X	X		
2-1/2	X	X	X	X	X	X	X	X	X	X	X	X		
3	X	X	X	X	X	X	X	X	X	X	X	X	X	
3-1/2	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4-1/2	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X

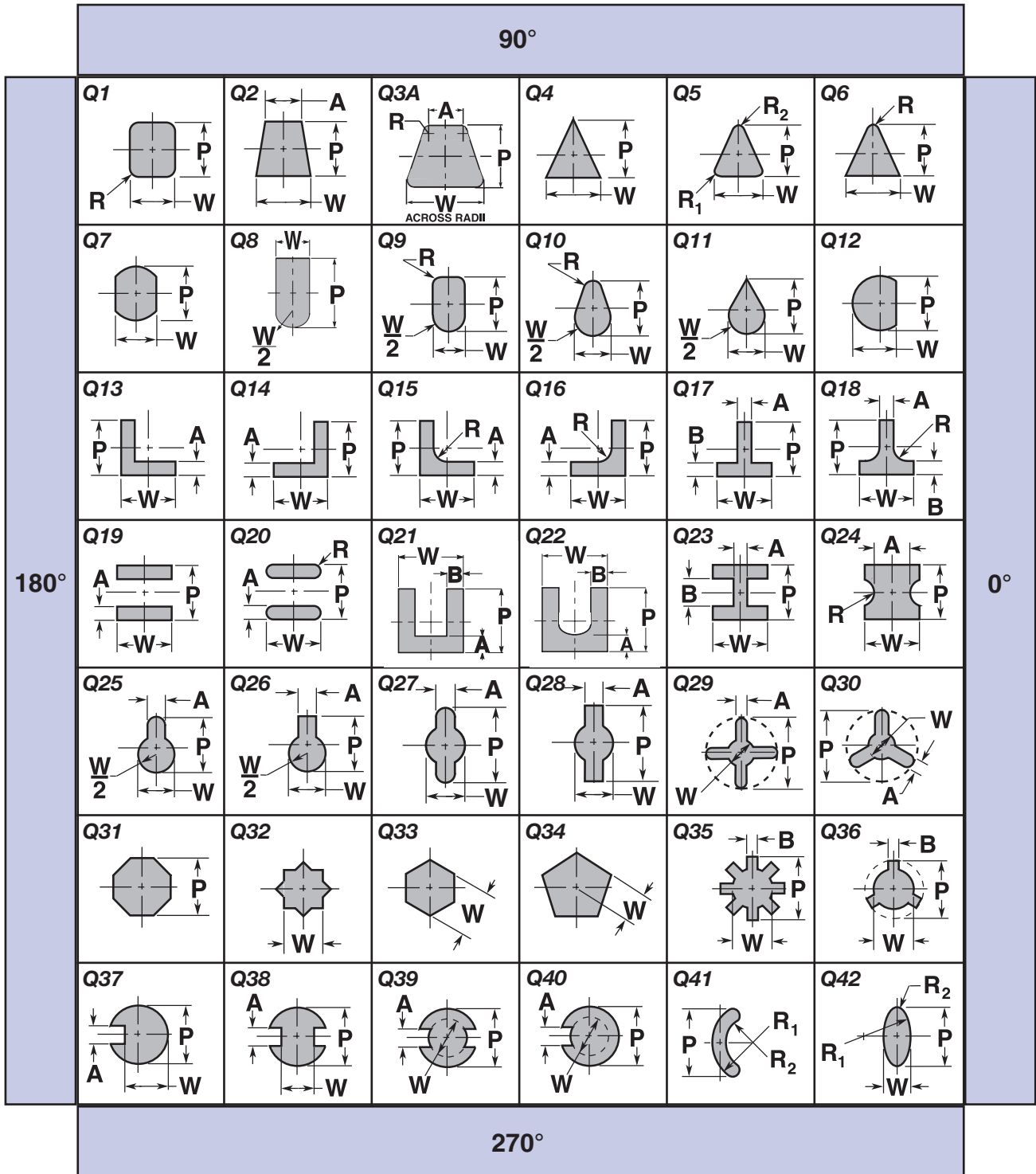


When ordering specify Punch or Die Type

EXAMPLE



QUALIFIED SHAPES



For key-flats, and other locating methods see page 36.

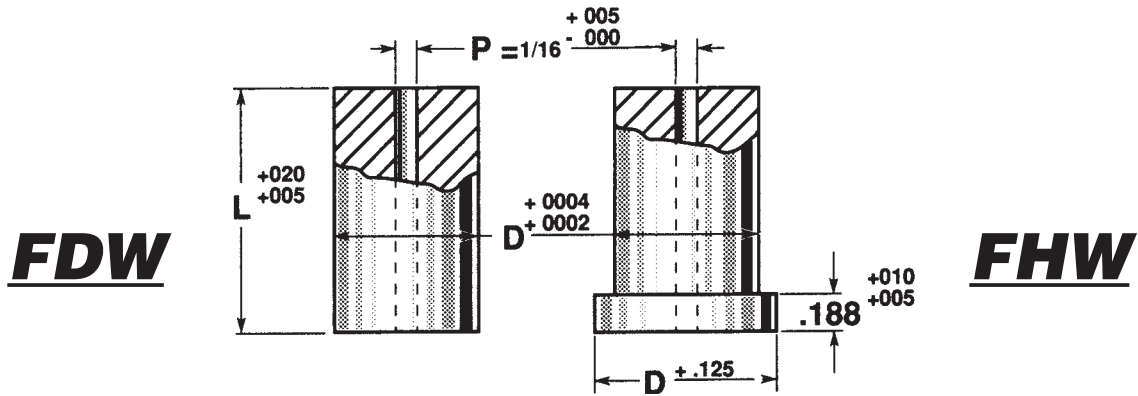
Ballseat Std. Pos. @ 90°

Views are from above shank on punches and cutting edge of die button.



**WIRE
EDM BLANKS**

CONCENTRICITY P TO D .005



CAT. NO.	D	L
25	.2500	1.125
31	.3125	1.250
37	.3750	1.500
43	.4375	1.500
50	.5000	1.500
62	.6250	1.500
75	.7500	1.500
100	1.0000	1.500
125	1.2500	1.500

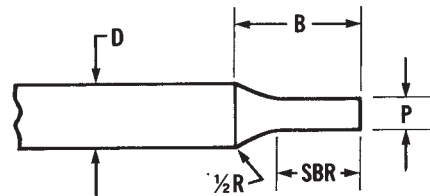
WHEN ORDERING SPECIFY:

QTY. 6
CAT.NO. FDW50

CHARTS FOR DETERMINING APPROXIMATE "SBR" DIMENSIONS (STRAIGHT BEFORE RADIUS)

TO DETERMINE APPROXIMATE POINT LENGTH "SBR" of any catalogue range punch, refer to table for its body diameter and read across from nearest point size to find "SBR". Tables apply to standard "B" dimensions for regular point length punches.

EXAMPLE: When Body Diameter "D" is 1/2" and Point Size "P" is .234" "SBR" is approximately 31/64."



SBR - STRAIGHT BEFORE RADIUS										MANUFACTURERS' STANDARD GAGE FOR SHEET STEEL	
D-1/8"	B-5/16"	D-3/16"	B-7/16"	D-1/4"	B-1/2"	D-5/16"	B-9/16"	D-3/8"	B-5/8"	STANDARD GAGE NO.	THICKNESS IN DECIMALS
Point Size P	Approx. SBR	Point Size P	Approx. SBR	Point Size P	Approx. SBR	Point Size P	Approx. SBR	Point Size P	Approx. SBR		
.031	7/64	.031	11/64	.062	13/64	.093	1/4	.125	19/64	3	0.2391
.062	9/64	.062	13/64	.093	15/64	.125	9/32	.156	5/16	4	.2242
.093	3/16	.093	7/32	.125	17/64	.156	19/64	.187	11/32	5	.2092
.125	5/16	.125	17/64	.156	19/64	.187	21/64	.218	23/64	6	.1943
		.156	5/16	.187	21/64	.218	11/32	.250	25/64	7	.1793
		.187	7/16	.218	3/8	.250	25/64	.281	27/64	8	.1644
				.250	1/2	.281	7/16	.312	29/64	9	.1495
						.312	9/16	.343	33/64	10	.1345
								.375	5/8	11	.1196
										12	.1046
										13	.0897
										14	.0747
										15	.0673
										16	.0598
										17	.0538
										18	.0478
										19	.0418
										20	.0359
										21	.0329
										22	.0299
										23	.0269
										24	.0239
										25	.0209
										26	.0179
										27	.0164
										28	.0149
										29	.0135
										30	.0120
										31	.0105
										32	.0097
										33	.0090
										34	.0082
										35	.0075
										36	.0067
										37	.0064
										38	.0060
PUNCH AND DIE CLERANCES EXPRESSED AS A PERCENTAGE OF STOCK THICKNESS											
Material	Chrome, Nickel, Steel-Stainless	Magnesium, Phenolics, Glass, Laminates	Copper, Brass, Chrome	Hard Bronze, Mild Steel	Hard Steel	Aluminum					
Total Clearance For Average Work	15%	4%	10%	15%	15%	10%					

These values represent the difference between diameter of a round punch and that of the die opening.

tipco»



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