Quality
Punches,
Pilots,
Matrixes, &
Retainers

Ball Lock

Improved performance, less downtime, longer tool life

DAYTON

Global leader in providing fabrication and stamping solutions

Subsidiary Federal Signal Corporation

www.daytonprogress.com

Ball Lock Quality Products

Product Applications

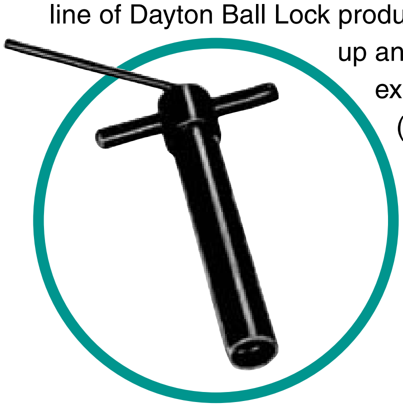
Dayton Ball Lock Punches, Retainers, Matrixes, and ***Accessories*** are mainstays in industries with high-demand applications, including automotive and major appliance manufacturing. Because there is no need to pull a die from the press, removal and replacement of worn punches can reduce downtime and improve profitability.

Dayton Ball Lock Punches add longer tool life and improve finished part quality. For example, *Dayton Jektole® Punches* (slug ejection punches) provide increased punch to matrix clearance; can triple the number of cycles between punch regrinds; and extend tool life.

Dayton Ball Lock Matrixes include *Ball Lock, Press Fit,* and *EDM Matrix Blanks.*

Dayton Ball Lock Retainers provide many features, functions, and benefits. For example, *Dayton True Position® Retainers* (the recognized industry standard) eliminate hand fitting; reduce mounting time, and are ideally suited for both round and complex-shaped products. Other Dayton Retainers include *Multi-Position™, End and Square, Single Punch,* and our unique line of *EZ Fit™ Retainers*—a simpler, better way to reconfigure and/or replace existing retainers.

Dayton Ball Lock Accessories (e.g., backing plugs, ball release tools, and urethane strippers) complete the full line of Dayton Ball Lock products, and can help speed up and improve production. For example, *Dayton Punch Pullers* (left photo) are simple and easy to use. Just slide the punch puller over the punch shank, rotate the built-in wrench until it is tight, release the ball, and pull down.

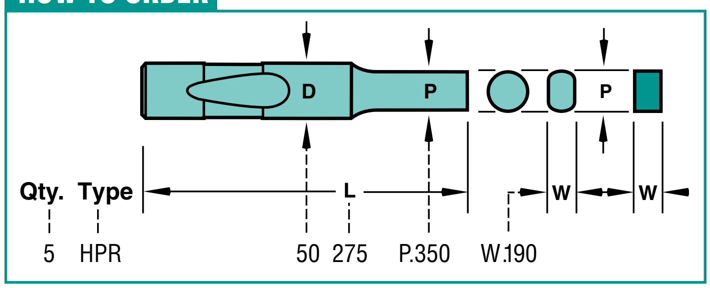


Ordering Information

Each page contains detailed instructions on how to order specific Dayton Ball Lock products. Individual product drawings completely define the product—including shape, dimensions, tolerances, and concentricity. When ordering, you are asked to specify quantity, product type, shank and length codes, and point or hole size (for example).

In the example below, the type specified is “HPR.” “H” stands for heavy duty, “P” stands for punch, and “R” stands for rectangle. 50 is the shank diameter, which is coded by the first two digits of the decimal equivalent (.500"). 275 is the overall length, which is coded by inches and quarter-inches (2.75"). Finally, P.350 and W.190 represent the point or hole size dimension.

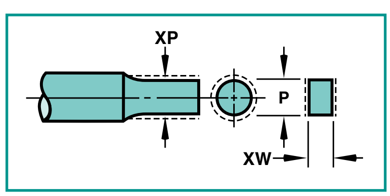
HOW TO ORDER



Standard Alterations

Punches, matrixes, and retainers are available in sizes other than those listed in the catalog.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an “X” is placed in front of the P or W dimension, e.g., “XP” and/or “XW.” If the point length is longer or shorter than standard, designate “XB” for the point length. See the foldout tabs in the individual product sections for these and other special order designations.



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™ Multi-Position, EZ Fit, and all Triliteral Designators are trademarks of Dayton Progress Corporation.

Contents

Product Designation

Each page contains detailed instructions on how to order specific Dayton Ball Lock products. In addition, use the following chart to define the product as a part number.

Example:

HPR — **Line Product Shape**
- **H** is for Heavy Duty
- **P** is for Punch (Regular)
- **R** is for Rectangle

50 — **Shank Dia. D** (shank diameter)
Coded by the first 2 digits of dec. equiv. (.500).

275 — **Overall Length L**
Coded by whole number and first two digits of dec. equiv. (2.750).

Product	Series	Length	Point or Hole Size
HPR	50	275	P.350, W.190
Type	Catalog Number		Dimensions, As Specified

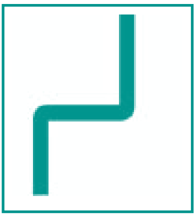
Diameter (D) is shown on the order as a two- or three-digit code. To convert the shank diameter to the appropriate code, use the following chart.

Code	D	Code	D	Code	D
12	.1250	50	.5000	150	1.5000
18	.1875	62	.6250	175	1.7500
25	.2500	75	.7500	200	2.0000
31	.3125	87	.8750	225	2.2500
37	.3750	100	1.0000	250	2.5000
43	.4375	125	1.2500	275	2.7500

Classified Shapes

Classified shapes (83 common shapes, no detailing required) are available on all punches, matrixes, and guide bushings, as indicated in this catalog. See pp. 32, 33 for more information and special instructions. Also, see individual product pages and p. 38 for additional information on orientation and views.

Clearance



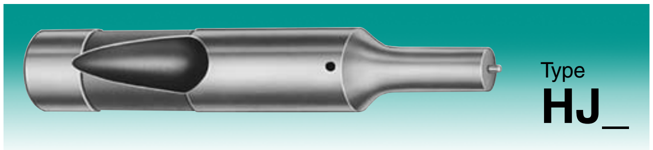
Normal grinding methods produce:

❶ .007 max. fillet on the punch—matching corner shape on the matrix.

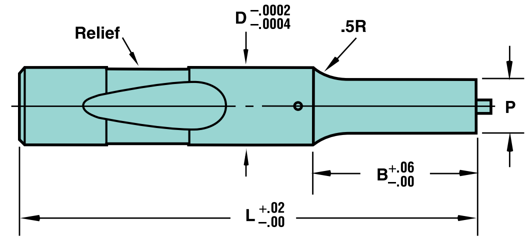
❷ .007 max. fillet on the matrix—matching corner shape on the punch.

Contents

Jektole® Punches
Heavy Duty



Type
HJ_

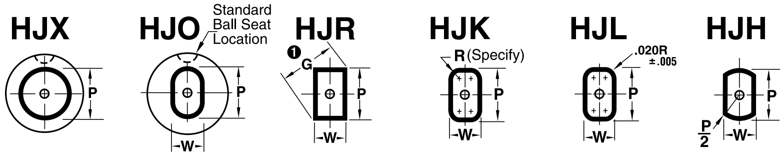


Material
Steel: A2, M2, PS4, RC 60-63
Round P + .0005 − .0000 ◎ .0005 P to D
Shape P, W ± .0005 ◎ .001 P to D

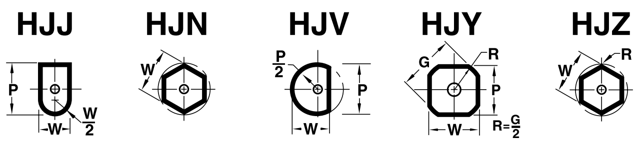
Shank		Point	Round		Shape		L									
D	Code	Lgth. B	Min. XP	Range P	Min. XW	Min. Max. W P/G	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75
.375	37	.625	.062	.062 - .374	.062	.062 - .374										
.500	50	.812	.158	.187 - .499	.158	.187 - .499	250									
.625	62	.937	.158	.312 - .624	.158	.250 - .624		275								
.750	75	1.062	.235	.437 - .749	.235	.312 - .749			300	325	350	375	400	425	450	475
.875	87	1.187	.300	.625 - .874	.235	.375 - .874										
1.000	100	1.250	.350	.750 - .999	.235	.437 - .999										
1.250	125	1.437	.450	1.000-1.249	.281	.500-1.249										
.375	37		.062	.125 - .374	.062	.125 - .374										
.500	50		.158	.187 - .499	.158	.187 - .499	B250									
.625	62		.158	.312 - .624	.158	.250 - .624		B275								
.750	75	.75	.235	.437 - .749	.235	.312 - .749			B300	B325	B350	B375	B400	B425	B450	B475
.875	87		.300	.625 - .874	.235	.375 - .874										
1.000	100		.350	.750 - .999	.235	.437 - .999										
1.250	125		.450	1.000-1.249	.281	.500-1.249										
.375	37		.081	.125 - .374	.081	.125 - .374										
.500	50		.158	.187 - .499	.158	.187 - .499	C250									
.625	62		.158	.312 - .624	.158	.250 - .624		C275								
.750	75	1.00	.235	.437 - .749	.235	.312 - .749			C300	C325	C350	C375	C400	C425	C450	C475
.875	87		.300	.625 - .874	.235	.375 - .874										
1.000	100		.350	.750 - .999	.235	.437 - .999										
1.250	125		.450	1.000-1.249	.281	.500-1.249										
.500	50		.158	.187 - .499	.158	.187 - .499										
.625	62		.158	.312 - .624	.158	.250 - .624		D275								
.750	75	1.25	.235	.437 - .749	.235	.312 - .749			D300	D325	D350	D375	D400	D425	D450	D475
.875	87		.300	.625 - .874	.235	.375 - .874										
1.000	100		.350	.750 - .999	.235	.437 - .999										
1.250	125		.450	1.000-1.249	.281	.500-1.249										

*J2 (P = .062 - .079), J3 (P = .080 - .1149), J4 (P>.1150)
**See p. 37 for additional information.

Jektole® Punches
Heavy Duty



❶ Check your P&W dimensions to be certain the diagonal G does not exceed the maximum shown.



Features/Benefits

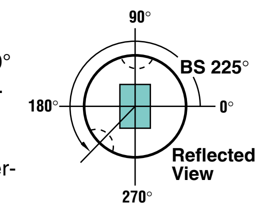
Jektole® punches permit doubling punch to matrix clearance; produce up to three times the number of hits between sharpenings; and reduce burr heights.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	25	HJX	37	C300	P.175	A2
	12	HJO	75	450	P.692, W.312	M2

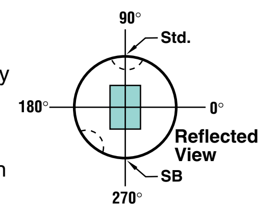
		L					
	Code	5.00	5.25	5.50	5.75	6.00	** Jektole® Group
	37 50 62 75 87 100 125	500	525	550	575	600	J2, J3, J4* J6 J6 J9 J9 J9 J12
	37 50 62 75 87 100 125	B500	B525	B550	B575	B600	J2, J3, J4* J6 J6 J9 J9 J9 J12
	37 50 62 75 87 100 125	C500	C525	C550	C575	C600	J2, J3, J4* J6 J6 J9 J9 J9 J12
	50 62 75 87 100 125	D500	D525	D550	D575	D600	J6 J6 J9 J9 J9 J12

Standard Ball Seat Locations
Standard Ball Seat Location is at 90°. Alternate locations of 0°, 180°, or 270° can be specified at no additional cost.



Custom Ball Seat Locations
Custom Ball Seat Locations can be specified as "BS" and degrees counter-clockwise from 0°. For additional information, see "Locking Devices" on p. 38.

Double Ball Seat
A second ball seat may be specified. Normally located 180° from the primary ball seat, these are used to minimize sharpening of notching punches by rotating the punch 180°. Specify "SB" and degree desired. A second ball can also be located 90° from the primary ball seat.



Not recommended for diameters under .750.

FIRM DELIVERY SCHEDULE
1 Day
PS4 +2 Days

Standard Alterations

Jektole® punches are available in sizes other than those shown in the chart to the left.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an "X" is placed in front of the P or W dimension, e.g., "XP" and/or "XW." If the point length is other than standard, designate "XB" as the point length. Also see "Standard Alterations" on the front of the pullout tab in this section for other special order designators.

Surface Coatings

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

DayTride® (XN)—a low-cost surface application that treats all exposed surfaces. Ideal for punches and matrixes. Provides high dimensional stability. Approx. hardness: RC73.

DayTiN® (XNT)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: *Vickers 2300.

DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

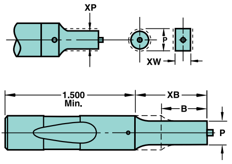
DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS4
XNT —DayTiN®	+ 3 days	M2 & PS4
XAN —DayTAN™	+ 4 days	M2 & PS4
XND —DayKote™	+ 8 days	M2 & PS4
XCN —TiCN	+ 3 days	M2 & PS4
XNM —MoST™	+ 7 days	M2 & PS4
XNP	+ 8 days	M2 & PS4
XCR —DayKool™	+ 1 day	M2 & PS4

*Vickers used when RC exceeds 80.

® DayTride and DayTiN are registered trademarks of Dayton Progress.
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations
Jektole® Punches—Heavy Duty



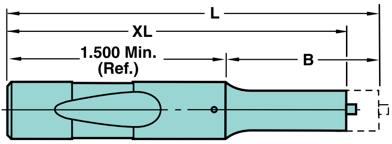
XP, XW P and W Dimensions Smaller than Standard

XB Point Length Other than Standard

For XBB, add three days to delivery.

	XB									XBB
Point Length	.5001-.6250	.6251-.7500	.7501-.8750	.8751-1.0000	1.0001-1.1250	1.1251-1.2500	1.2501-1.3750	1.3751-1.5000	1.5001-1.6250	1.6261-2.0001
Code Type	Min. P (Rounds)									
37 HJX	.062	.062	.080	.080	.115	.115	.115	.115	.115	
50 HJX		.158	.158	.158	.158	.158	.158	.158	.158	.187
62 HJX		.158	.158	.158	.158	.158	.158	.158	.158	.187
75 HJX		.235	.235	.235	.235	.235	.235	.235	.235	.281
87 HJX		.300	.300	.300	.300	.300	.300	.300	.300	.350
100 HJX		.350	.350	.350	.350	.350	.350	.350	.350	.350
125 HJX		.450	.450	.450	.450	.450	.450	.450	.450	.450
	Min. W (Shapes)									
37 HJ_	.062	.062	.080	.080	.115	.115	.115	.115	.115	
50 HJ_		.158	.158	.158	.158	.158	.158	.158	.158	.187
62 HJ_		.158	.158	.158	.158	.158	.158	.158	.158	.187
75 HJ_		.235	.235	.235	.235	.235	.235	.235	.235	.281
87 HJ_		.235	.235	.235	.235	.235	.235	.235	.235	.281
100 HJ_		.235	.235	.235	.235	.235	.235	.235	.235	.281
125 HJ_			.281	.281	.281	.281	.281	.281	.281	.281

XL **Overall Length Shortened**
Stock removal from point end which shortens B length.



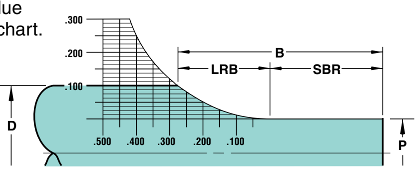
XJ **Smaller Jektole® Components**
See p. 37

XK **No sidehole**
For air injection. No cost.

SBR Straight Before Radius

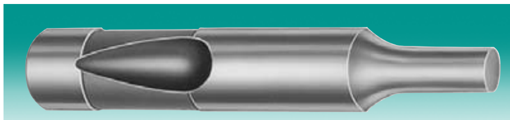
To determine Length of Radius Blend (LRB)

1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.

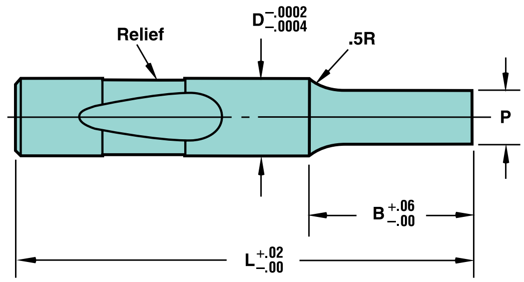


Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Regular Punches
Heavy Duty

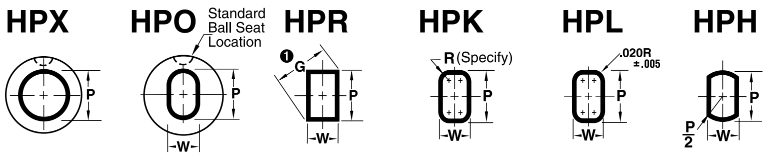


Type
HP_

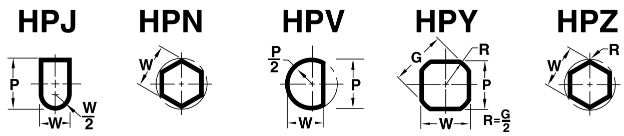


Material
Steel: A2, M2, PS4, RC 60-63
Round P + .0005 − .0000 | ◎ | .0005 | P to D |
Shape P, W ± .0005 | ◎ | .001 | P to D |

Shank D	Code	Point Lgth. B	Round Min. XP	Round Range P	Shape Min. XW	Shape Min. Max. W P/G	L 2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	
.375	37	.625	.050	.062 - .374	.050	.062 - .374	250	275	300	325	350	375	400	425	450	475	500	525	
.500	50	.812	.093	.187 - .449	.093	.187 - .499													
.625	62	.937	.125	.312 - .624	.125	.250 - .624													
.750	75	1.062	.235	.437 - .749	.235	.312 - .749													
.875	87	1.187	.300	.625 - .874	.235	.375 - .874													
1.000	100	1.250	.350	.750 - .999	.235	.437 - .999													
1.250	125	1.437	.450	1.000-1.249	.235	.500-1.249													
.375	37	.75	.050	.125 - .374	.050	.125 - .374	B250	B275	B300	B325	B350	B375	B400	B425	B450	B475	B500	B525	
.500	50		.093	.187 - .499	.093	.187 - .499													
.625	62		.125	.312 - .624	.125	.250 - .624													
.750	75		.235	.437 - .749	.235	.312 - .749													
.875	87		.300	.625 - .874	.235	.375 - .874													
1.000	100		.350	.750 - .999	.235	.437 - .999													
1.250	125		.450	1.000-1.249	.235	.500-1.249													
.375	37	1.00	.081	.125 - .374	.081	.125 - .374	C250	C275	C300	C325	C350	C375	C400	C425	C450	C475	C500	C525	
.500	50		.093	.187 - .499	.093	.187 - .499													
.625	62		.125	.312 - .624	.125	.250 - .624													
.750	75		.235	.437 - .749	.235	.312 - .749													
.875	87		.300	.625 - .874	.235	.375 - .874													
1.000	100		.350	.750 - .999	.235	.437 - .999													
1.250	125		.450	1.000-1.249	.235	.500-1.249													
.500	50	1.25	.125	.187 - .499	.125	.187 - .499		D275	D300	D325	D350	D375	D400	D425	D450	D475	D500	D525	
.625	62		.158	.312 - .624	.158	.250 - .624													
.750	75		.235	.437 - .749	.235	.312 - .749													
.875	87		.300	.625 - .874	.235	.375 - .874													
1.000	100		.350	.750 - .999	.235	.437 - .999													
1.250	125		.450	1.000-1.249	.235	.500-1.249													



❶ Check your P&W dimensions to be certain the diagonal G does not exceed the maximum shown.



		L						
	Code	5.50	5.75	6.00	6.25	6.50	6.75	7.00
	37 50 62 75 87 100 125	550	575	600	625	650	675	700
	37 50 62 75 87 100 125	B550	B575	B600	B625	B650	B675	B700
	37 50 62 75 87 100 125	C550	C575	C600	C625	C650	C675	C700
	50 62 75 87 100 125	D550	D575	D600	D625	D650	D675	D700

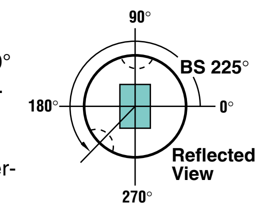
Features/Benefits

Regular punches provide three times better alignment than other major brands; offer longer tool life; and can significantly improve finished part quality.

HOW TO ORDER

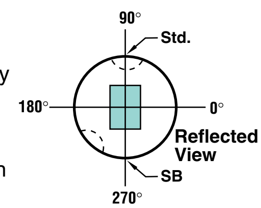
Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	16	HPX	62	B375	P.370	M2
	7	HPR	50	300	P.327, W.254	A2

Standard Ball Seat Locations
Standard Ball Seat Location is at 90°. Alternate locations of 0°, 180°, or 270° can be specified at no additional cost.



Custom Ball Seat Locations
Custom Ball Seat Locations can be specified as "BS" and degrees counter-clockwise from 0°. For additional information, see "Locking Devices" on p. 38.

Double Ball Seat
A second ball seat may be specified. Normally located 180° from the primary ball seat, these are used to minimize sharpening of notching punches by rotating the punch 180°. Specify "SB" and degree desired. A second ball can also be located 90° from the primary ball seat.



Not recommended for diameters under .500.

FIRM DELIVERY SCHEDULE
1 Day
PS4 +2 Days

Standard Alterations

Regular Ball Lock punches are available in sizes other than those shown in the chart to the left.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an "X" is placed in front of the P or W dimension, e.g., "XP" and/or "XW." If the point length is other than standard, designate "XB" as the point length. Also see "Standard Alterations" on the front of the pullout tab in this section for other special order designators.

Surface Coatings

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

DayTride® (XN)—a low-cost surface application that treats all exposed surfaces. Ideal for punches and matrixes. Provides high dimensional stability. Approx. hardness: RC73.

DayTiN® (XNT)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: *Vickers 2300.

DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

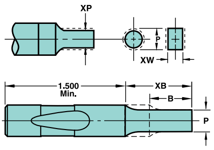
DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS4
XNT —DayTiN®	+ 3 days	M2 & PS4
XAN —DayTAN™	+ 4 days	M2 & PS4
XND —DayKote™	+ 8 days	M2 & PS4
XCN —TiCN	+ 3 days	M2 & PS4
XNM —MoST™	+ 7 days	M2 & PS4
XNP	+ 8 days	M2 & PS4
XCR —DayKool™	+ 1 day	M2 & PS4

*Vickers used when RC exceeds 80.

® DayTride and DayTiN are registered trademarks of Dayton Progress.
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations
Regular Punches—Heavy Duty



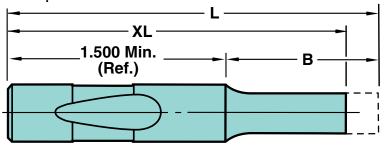
XP, XW P and W Dimensions Smaller than Standard

XB Point Length Other than Standard

For XBB and X3B, add three days to delivery.

	XB									XBB	X3B	
Point Length	.5001-.6250	.6251-.7500	.7501-.8750	.8751-1.0000	1.0001-1.1250	1.1251-1.2500	1.2501-1.3750	1.3751-1.5000	1.5001-1.6250	1.6261-2.0001	2.0001-2.5000	2.5001-3.0000
Code Type	Min. P (Rounds)											
37 HPX	.050	.050	.080	.080	.106	.115	.115	.115	.115	.187	.250	.312
50 HPX	—	.093	.093	.093	.125	.125	.125	.125	.125	.187	.250	.312
62 HPX	—	.125	.125	.125	.158	.158	.158	.158	.158	.187	.250	.312
75 HPX	—	.235	.235	.235	.235	.235	.235	.235	.235	.281	.375	.375
87 HPX	—	.300	.300	.300	.300	.300	.300	.300	.300	.350	.375	.437
100 HPX	—	.350	.350	.350	.350	.350	.350	.350	.350	.350	.375	.437
125 HPX	—	.450	.450	.450	.450	.450	.450	.450	.450	.450	.450	.450
	Min. W (Shapes)											
37 HP_	.050	.050	.080	.080	.106	.115	.115	.115	.115	.156		
50 HP_	—	.093	.093	.093	.125	.125	.125	.125	.125	.156		
62 HP_	—	.125	.125	.125	.158	.158	.158	.158	.158	.187		
75 HP_	—	—	.235	.235	.235	.235	.235	.235	.235	.250		
87 HP_	—	—	.235	.235	.235	.235	.235	.235	.235	.250		
100 HP_	—	—	.235	.235	.235	.235	.235	.235	.235	.250		
125 HP_		—	—	.235	.235	.235	.235	.235	.235	.265		

XL Overall Length Shortened
Stock removal from point end which shortens B length.

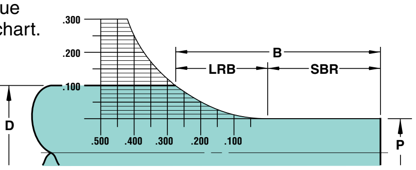


LL Precision Overall Length
Same as XL except overall length is held to ±.001.

SBR Straight Before Radius

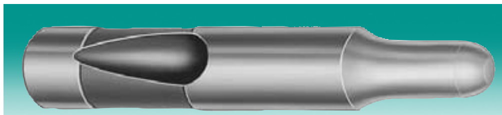
To determine Length of Radius Blend (LRB)

1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.

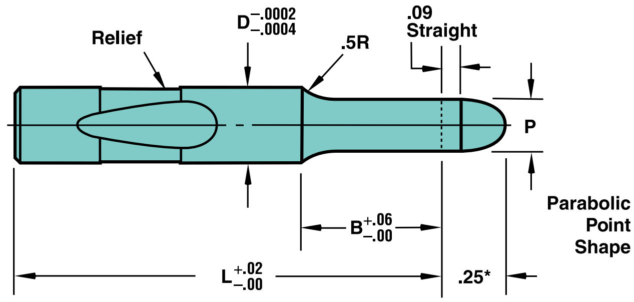


Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Regular Pilots
Heavy Duty



Type
HPT



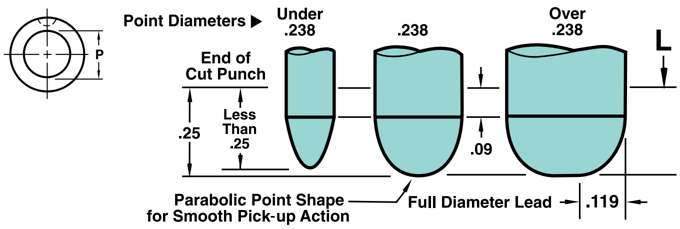
***Slightly less for diameters under .238.**

Material
Steel: A2, M2, PS4, RC 60-63
Round P $^{+.0005}_{-.0000}$ ◎ .0005 P to D
When P=D, shank tolerance applies.

Shank		Point	Round		L											
D	Code	Lgth. B	Min. XP	Range P	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25
.375	37	.625	.061	.092 - .375	250	275	300	325	350	375	400	425	450	475	500	525
.500	50	.812	.092	.186 - .500												
.625	62	.937	.124	.311 - .625												
.750	75	1.062	.234	.436 - .750												
.875	87	1.187	.299	.624 - .875												
1.000	100	1.250	.349	.749-1.000												
1.250	125	1.437	.449	.999-1.250												
.375	37	.75	.061	.124 - .375	B250	B275	B300	B325	B350	B375	B400	B425	B450	B475	B500	B525
.500	50		.092	.186 - .500												
.625	62		.124	.311 - .625												
.750	75		.234	.436 - .750												
.875	87		.299	.624 - .875												
1.000	100		.349	.749-1.000												
1.250	125		.449	.999-1.250												
.375	37	1.00	.079	.124 - .375	C250	C275	C300	C325	C350	C375	C400	C425	C450	C475	C500	C525
.500	50		.092	.186 - .500												
.625	62		.124	.311 - .625												
.750	75		.234	.436 - .750												
.875	87		.299	.624 - .875												
1.000	100		.349	.749-1.000												
1.250	125		.449	.999-1.250												
.500	50	1.25	.124	.186 - .500		D275	D300	D325	D350	D375	D400	D425	D450	D475	D500	D525
.625	62		.157	.311 - .625												
.750	75		.234	.436 - .750												
.875	87		.299	.624 - .875												
1.000	100		.349	.749-1.000												
1.250	125		.449	.999-1.250												

Regular Pilots
Heavy Duty

HPT



		L						
	Code	**5.50**	**5.75**	**6.00**	**6.25**	**6.50**	**6.75**	**7.00**
	37 50 62 75 87 100 125	550	575	600	625	650	675	700
	37 50 62 75 87 100 125	B550	B575	B600	B625	B650	B675	B700
	37 50 62 75 87 100 125	C550	C575	C600	C625	C650	C675	C700
	50 62 75 87 100 125	D550	D575	D600	D625	D650	D675	D700

Features/Benefits

Regular pilots are built to exact tolerances; the parabolic point shape allows for smooth pick-up action; and pilots offer a wide range of unique punching and fabrication applications.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P	Steel
Example:	13	HPT	37	300	P.175	A2

FIRM DELIVERY SCHEDULE

1 Day
PS4 +2 Days

Standard Alterations

Regular Ball Lock pilots are available in sizes other than those shown in the chart to the left.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P dimension is outside the standard range, an “X” is placed in front of the P dimension, e.g., “XP.” If the point length is other than standard, designate “XB” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.

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DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS4
XNT —DayTiN®	+ 3 days	M2 & PS4
XAN —DayTAN™	+ 4 days	M2 & PS4
XND —DayKote™	+ 8 days	M2 & PS4
XCN —TiCN	+ 3 days	M2 & PS4
XNM —MoST™	+ 7 days	M2 & PS4
XNP	+ 8 days	M2 & PS4
XCR —DayKool™	+ 1 day	M2 & PS4

*Vickers used when RC exceeds 80.

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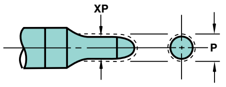
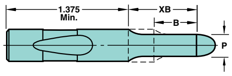
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations
Regular Pilots—Heavy Duty



XP **P Dimensions Smaller than Standard**

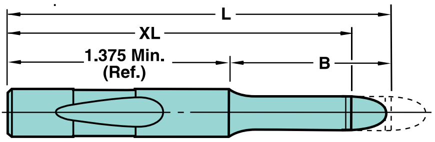


XB **Point Length Other than Standard**

For XBB and X3B, add three days to delivery.

	XB									XBB	X3B	
Point Length	**.5001-.6250**	**.6251-.7500**	**.7501-.8750**	**.8751-1.0000**	**1.0001-1.1250**	**1.1251-1.2500**	**1.2501-1.3750**	**1.3751-1.5000**	**1.5001-1.6250**	**1.6261-2.0000**	**2.0001-2.5000**	**2.5001-3.0000**
Code Type	**Min. P (Rounds)**											
37 HPT	.061	.061	.079	.079	.105	.114	.114			.186	.249	.311
50 HPT		.092	.092	.092	.124	.124	.124	.124	.124	.186	.249	.311
62 HPT		.124	.124	.124	.157	.157	.157	.157	.157	.186	.249	.311
75 HPT		.234	.234	.234	.234	.234	.234	.234	.234	.280	.311	.405
87 HPT		.299	.299	.299	.299	.299	.299	.299	.299	.349	.374	.436
100 HPT		.349	.349	.349	.349	.349	.349	.349	.349	.349	.374	.436
125 HPT		.449	.449	.449	.449	.449	.449	.449	.449	.449	.449	.449

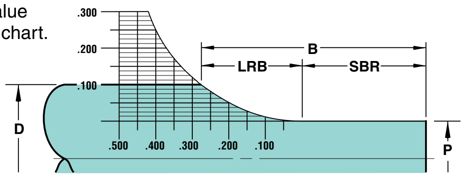
XL **Overall Length Shortened**
Stock removal from point end which shortens B length.



SBR Straight Before Radius

To determine Length of Radius Blend (LRB)

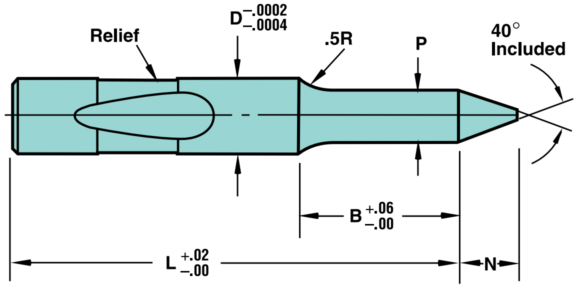
1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.



Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Positive Pick-Up Pilots
Heavy Duty

Type
HPA



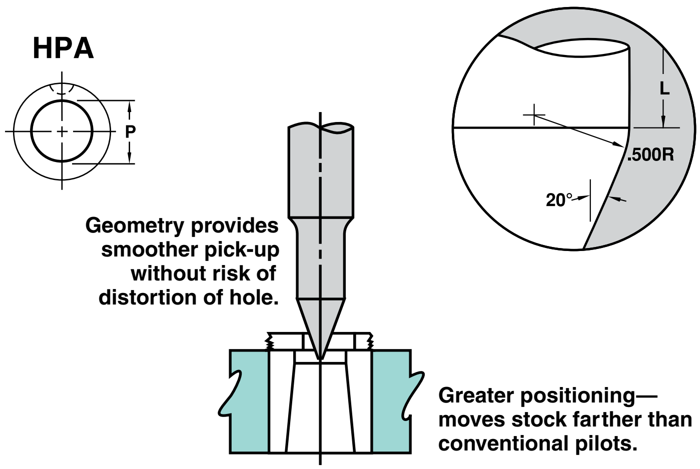
Material
Steel: M2, PS4, RC 60-63
All heads are drawn to RC 40-55.
Round P $^{+.0005}_{-.0000}$ ◎ .0005 P to D
When P=D, shank tolerance applies.

Order any length shown. If you require a length between those shown, designate "XL."
Example: You require a length of 3.600. Order 375, then show XL 3.600. See "How to Order" example on the next page. XL is available down to 1.375. Note shank length limitation of .75.
(B length may be shorter than shown when XL is under the shortest length shown.)
There is no additional charge for XL.

Shank D	Code	Point Lgth. B	Round Min. XP	Round Range P	*N	Pn	L 2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25
.375	37	.625	.083	.186 - .375	.37	.2342	250	275	300	325	350	375	400	425	450	475	500	525
.500	50	.812	.092	.249 - .500	.50	.3252												
.625	62	.937	.124	.311 - .625	.62	.4162												
.750	75	1.062	.234	.436 - .750	.75	.5072												
.875	87	1.187	.299	.624 - .875	.87	.5982												
1.000	100	1.250	.349	.749-1.000	1.00	.6892												
1.250	125	1.437	.449	.999-1.250	1.25	.8712												
.375	37	.75	.083	.186 - .375	.37	.2342	B250	B275	B300	B325	B350	B375	B400	B425	B450	B475	B500	B525
.500	50		.092	.249 - .500	.50	.3252												
.625	62		.124	.311 - .625	.62	.4162												
.750	75		.234	.436 - .750	.75	.5072												
.875	87		.299	.624 - .875	.87	.5982												
1.000	100		.349	.749-1.000	1.00	.6892												
1.250	125		.449	.999-1.250	1.25	.8712												
.375	37	1.00	.083	.186 - .375	.37	.2342	C250	C275	C300	C325	C350	C375	C400	C425	C450	C475	C500	C525
.500	50		.092	.249 - .500	.50	.3252												
.625	62		.124	.311 - .625	.62	.4162												
.750	75		.234	.436 - .750	.75	.5072												
.875	87		.299	.624 - .875	.87	.5982												
1.000	100		.349	.749-1.000	1.00	.6892												
1.250	125		.449	.999-1.250	1.25	.8712												
.500	50	1.25	.124	.249 - .500	.50	.3252		D275	D300	D325	D350	D375	D400	D425	D450	D475	D500	D525
.625	62		.157	.311 - .625	.62	.4162												
.750	75		.234	.436 - .750	.75	.5072												
.875	87		.299	.624 - .875	.87	.5982												
1.000	100		.349	.749-1.000	1.00	.6892												
1.250	125		.449	.999-1.250	1.25	.8712												

*N =[(P-.057)/.728]+.132 when "P" dimension is less than "Pn" shown in chart.

Positive Pick-Up Pilots
Heavy Duty



Features/Benefits

Positive pick-up pilots provide smoother pick-up without the risk of distorting the hole; in addition, the unique design moves the stock farther than conventional pilots.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P	Steel
Example:	3	HPA	75	275	P.624	M2

FIRM DELIVERY SCHEDULE

1 Day
PS4 +2 Days

		L						
	Code	5.50	5.75	6.00	6.25	6.50	6.75	7.00
	37 50 62 75 87 100 125	550	575	600	625	650	675	700
	37 50 62 75 87 100 125	B550	B575	B600	B625	B650	B675	B700
	37 50 62 75 87 100 125	C550	C575	C600	C625	C650	C675	C700
	50 62 75 87 100 125	D550	D575	D600	D625	D650	D675	D700

Standard Alterations

Ball Lock positive pick-up pilots are available in sizes other than those shown in the chart to the left.

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Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

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DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery			Material
XN	—DayTride®	+ 3 days	M2 & PS4
XNT	—DayTiN®	+ 3 days	M2 & PS4
XAN	—DayTAN™	+ 4 days	M2 & PS4
XND	—DayKote™	+ 8 days	M2 & PS4
XCN	—TiCN	+ 3 days	M2 & PS4
XNM	—MoST™	+ 7 days	M2 & PS4
XNP		+ 8 days	M2 & PS4
XCR	—DayKool™	+ 1 day	M2 & PS4

*Vickers used when RC exceeds 80.

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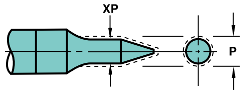
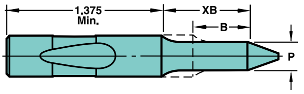
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations

Positive Pick-Up Pilots—Heavy Duty





XP P Dimensions Smaller than Standard

XB Point Length Other than Standard

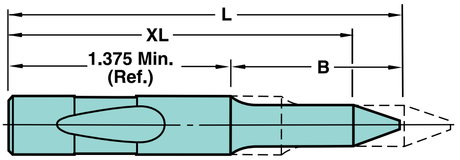
Specify XB, XBB, or X3B and length (see chart below).

For XBB and X3B, add three days to delivery.

		XB									XBB	X3B	
Point Length		.5001-.6250	.6251-.7500	.7501-.8750	.8751-1.0000	1.0001-1250	1.1251-1.2500	1.2501-1.3750	1.3751-1.5000	1.5001-1.6250	1.6251-2.0001	2.0001-2.5000	2.5001-2.0000
Code	Type	Min. P (Rounds)											
37	HPA	.083	.083	.083	.083	.105	.114	.114	.114	.114	.186	.249	.311
50	HPA	.092	.092	.092	.092	.124	.124	.124	.124	.124	.186	.249	.311
62	HPA	.124	.124	.124	.124	.155	.155	.155	.155	.155	.186	.249	.311
75	HPA	.234	.234	.234	.234	.234	.234	.234	.234	.234	.280	.311	.374
87	HPA	.299	.299	.299	.299	.299	.299	.299	.299	.299	.349	.374	.436
100	HPA	.349	.349	.349	.349	.349	.349	.349	.349	.349	.349	.374	.436
125	HPA	.449	.449	.449	.449	.449	.449	.449	.449	.449	.449	.449	.449

XL Overall Length Shortened

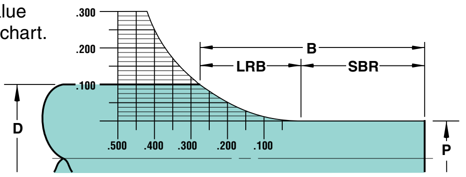
Stock removal from point end. B length is maintained.
Available at no charge within catalog range.



SBR Straight Before Radius

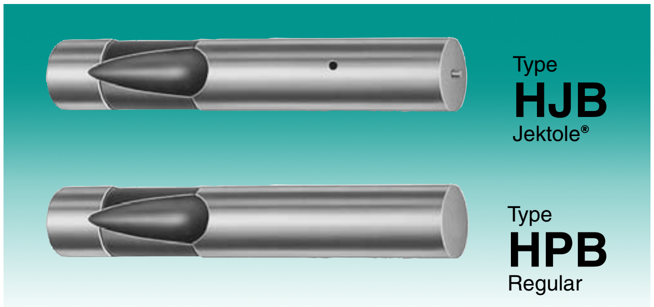
To determine Length of Radius Blend (LRB)

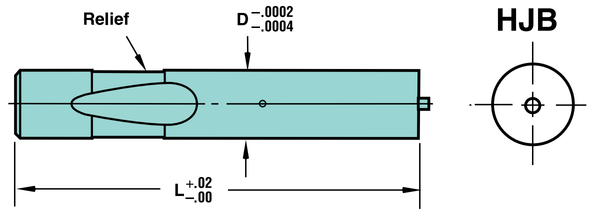
1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.

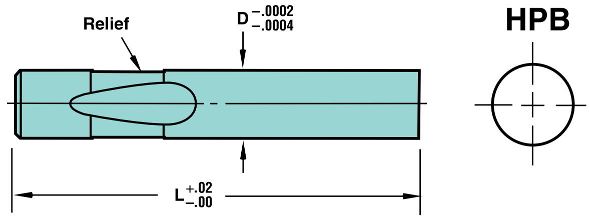


Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Punch Blanks Jektole® & Regular
Heavy Duty







Material
Steel: A2, M2, PS4, RC 60-63

<table>
<tr><th rowspan="2">Type</th><th>Shank</th><th></th><th colspan="15">L</th><th rowspan="2">* Jektole® Group</th></tr>
<tr><th>D</th><th>Code</th><th>2.50</th><th>2.75</th><th>3.00</th><th>3.25</th><th>3.50</th><th>3.75</th><th>4.00</th><th>4.25</th><th>4.50</th><th>4.75</th><th>5.00</th><th>5.25</th><th>5.50</th><th>5.75</th><th>6.00</th></tr>
<tr><td rowspan="7">HJB</td><td>.375</td><td>37</td><td rowspan="4">250</td><td rowspan="5">275</td><td rowspan="7">300</td><td rowspan="7">325</td><td rowspan="7">350</td><td rowspan="7">375</td><td rowspan="7">400</td><td rowspan="7">425</td><td rowspan="7">450</td><td rowspan="7">475</td><td rowspan="7">500</td><td></td><td></td><td></td><td></td><td>J4</td></tr>
<tr><td>.500</td><td>50</td><td rowspan="6">525</td><td rowspan="6">550</td><td rowspan="6">575</td><td rowspan="6">600</td><td>J6</td></tr>
<tr><td>.625</td><td>62</td><td>J6</td></tr>
<tr><td>.750</td><td>75</td><td>J9</td></tr>
<tr><td>.875</td><td>87</td><td></td><td>J9</td></tr>
<tr><td>1.000</td><td>100</td><td></td><td></td><td>J9</td></tr>
<tr><td>1.250</td><td>125</td><td></td><td></td><td>J12</td></tr>
</table>

<table>
<tr><th rowspan="2">Type</th><th>Shank</th><th></th><th colspan="19">L</th></tr>
<tr><th>D</th><th>Code</th><th>2.50</th><th>2.75</th><th>3.00</th><th>3.25</th><th>3.50</th><th>3.75</th><th>4.00</th><th>4.25</th><th>4.50</th><th>4.75</th><th>5.00</th><th>5.25</th><th>5.50</th><th>5.75</th><th>6.00</th><th>6.25</th><th>6.50</th><th>6.75</th><th>7.00</th></tr>
<tr><td rowspan="7">HPB</td><td>.375</td><td>37</td><td rowspan="4">250</td><td rowspan="5">275</td><td rowspan="7">300</td><td rowspan="7">325</td><td rowspan="7">350</td><td rowspan="7">375</td><td rowspan="7">400</td><td rowspan="7">425</td><td rowspan="7">450</td><td rowspan="7">475</td><td rowspan="7">500</td><td rowspan="7">525</td><td rowspan="7">550</td><td rowspan="7">575</td><td rowspan="7">600</td><td></td><td></td><td></td><td></td></tr>
<tr><td>.500</td><td>50</td><td rowspan="6">625</td><td rowspan="6">650</td><td rowspan="6">675</td><td rowspan="6">700</td></tr>
<tr><td>.625</td><td>62</td></tr>
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<tr><td>.875</td><td>87</td><td></td></tr>
<tr><td>1.000</td><td>100</td><td></td><td></td></tr>
<tr><td>1.250</td><td>125</td><td></td><td></td></tr>
</table>

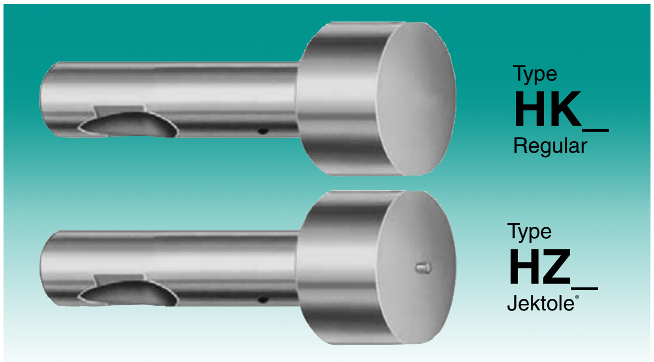
*See p. 37 for additional information.

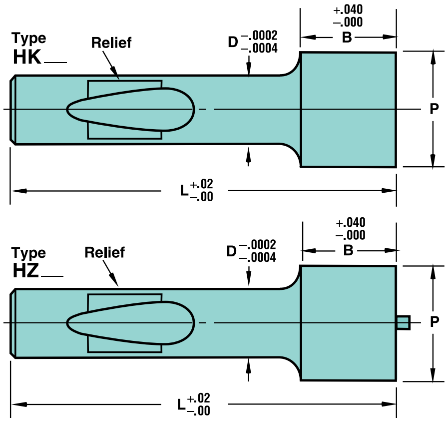
HOW TO ORDER

Specify:	Qty.	Type	D Code	L	Steel
Example:	12	HJB	50	300	M2
	5	HPB	75	400	A2

FIRM DELIVERY SCHEDULE
1 Day
PS4 +2 Days

Point Larger than Shank Jektole® & Regular
Heavy Duty





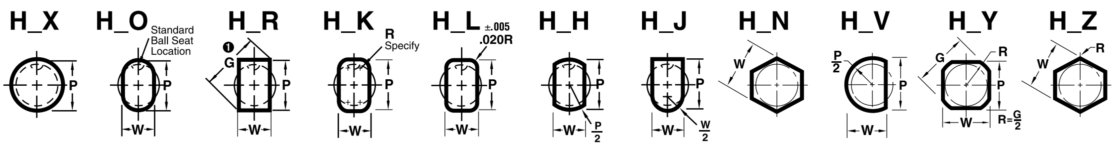
Material

Steel: A2, M2, RC 60-63.

Round P + .0005 − .0000 | ◎ | .0005 | P to D

Shape P, W ± .0005 | ◎ | .001 | P to D

❶ Check your P&W dimensions to be certain the diagonal G does not exceed the maximum shown.



Type	Shank D	Code	Point Lgth. B	Round Range P	Shape Min. W	Shape Max. P/G	L 2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	* Jektole® Group
HK_ Regular HZ_ Jektole®	.375	37	.62	.376 - .875	.125 -	.875	250	275	300	325	350	375	400	425	450	J4
	.500	50	.75	.501-1.250	.188-	1.250										J6
	.625	62	.88	.626-1.500	.250-	1.500										J6
	.750	75	.94	.751-1.500	.312-	1.500										J9
	.875	87	.94	.876-1.750	.375-	1.750										J9
	1.000	100	.94	1.001-1.750	.437-	1.750										J9
	1.250	125	1.25	1.251-2.000	.500-	2.000										J12

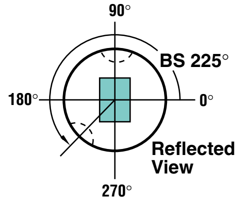
*See p. 37 for additional information.

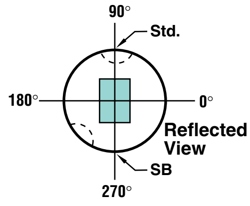
Standard Ball Seat Locations
Standard Ball Seat Location is at 90°. Alternate locations of 0°, 180°, or 270° can be specified at no additional cost.

Custom Ball Seat Locations
Custom Ball Seat Locations can be specified as "BS" and degrees counter-clockwise from 0°. For additional information, see "Locking Devices" on p. 38.

Double Ball Seat
A second ball seat may be specified. Normally located 180° from the primary ball seat, these are used to minimize sharpening of notching punches by rotating the punch 180°. Specify "SB" and degree desired. A second ball can also be located 90° from the primary ball seat.

Not recommended for diameters under .750 for HZ__ and .500 for HK__.





FIRM DELIVERY SCHEDULE
1-4 pcs., 2 Days
5-19 pcs., 3 Days

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	2	HKR	100	350	P1.350, W.500	M2

Standard Alterations

Point Larger than Shank Ball Lock punches are available in sizes other than those shown in the chart above.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an "X" is placed in front of the P or W dimension, e.g., "XP" and/or "XW." If the point length is other than standard, designate "XB" as the point length. Also see "Standard Alterations" on the front of the pullout tab in this section for other special order designators.

Surface Coatings

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

DayTride® (XN)—a low-cost surface application that treats all exposed surfaces. Ideal for punches and matrixes. Provides high dimensional stability. Approx. hardness: RC73.

DayTiN® (XNT)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: *Vickers 2300.

DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

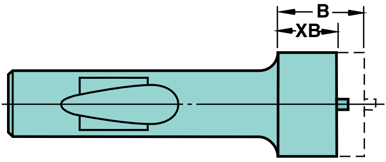
XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

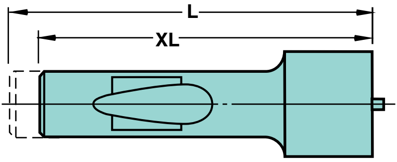
Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS4
XNT —DayTiN®	+ 3 days	M2 & PS4
XAN —DayTAN™	+ 4 days	M2 & PS4
XND —DayKote™	+ 8 days	M2 & PS4
XCN —TiCN	+ 3 days	M2 & PS4
XNM —MoST™	+ 7 days	M2 & PS4
XNP	+ 8 days	M2 & PS4
XCR —DayKool™	+ 1 day	M2 & PS4

*Vickers used when RC exceeds 80.

Standard Alterations
Point Larger than Shank—Heavy Duty



XB Point Length Other than Standard
(Shortens punch from the point end.)



XL Overall Length Shortened
Stock removal from ***shank end***. Minimum shank length is $1\frac{9}{16}$". Does not alter ball seat location.

Dayton Slug Control

Dayton Slug Control is a patented, guaranteed method for reducing the risk of pulling slugs to the die surface during withdrawal of the punch. A series of grooves is designed inside the matrix (see drawing). There, the slugs are trapped until they fall freely through the relief. The use of Dayton Slug Control has no effect on hole size, and will not require any changes in current regrind practices.

Our guarantee: *Use Dayton Slug Control in a stamping die now pulling slugs. If, for any reason, you are not completely satisfied, we will refund the full cost of the Slug Control alteration.* (We cannot guarantee the retention of slugs when clearance exceeds 10% per side.)

Ordering

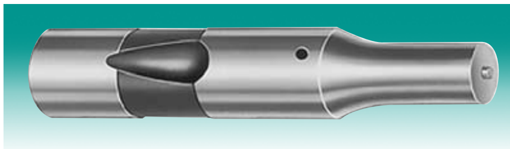
Dayton Slug Control is easy to specify and order. Simply add the information that is unique to your application to the matrix catalog number. Please specify XSC for alteration and show material thickness (inches) and clearance per side (percentage).

HOW TO ORDER

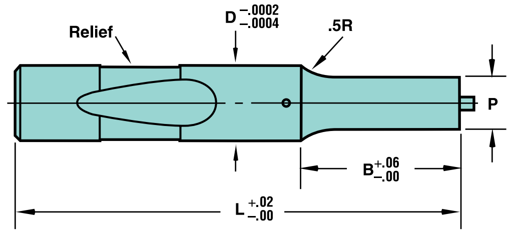
	Catalog Number				Your Specs		
Inch	KDX	62	100	P.250	XSC	MT.0625	CS 5
	Type	**D**	**L**	**P**	**Alt. Code**	**Mat'l Thickness (inches)**	**Clear Per Side (%)**

For additional information, contact your Dayton distributor.

Jektole® Punches
Light Duty



Type
LJ_



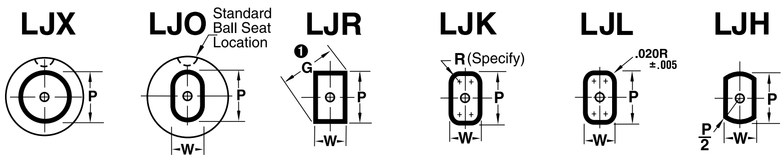
Material
Steel: A2, M2, PS4, RC 60-63

Round P $^{+.0005}_{-.0000}$	◎ .0005	P to D
Shape P, W ± .0005	◎ .001	P to D

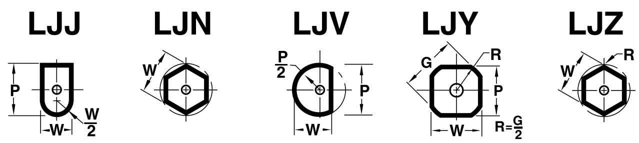
Shank			Round		Shape		L										
D	Code	Point Lgth. B	Min. XP	Range P	Min. XW	Min. Max. W P/G	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
.250	25	.500	.050	.062-.249	.050	.062-.249	200	225	250	275	300	325	350	375	400	425	450
.375	37	.625	.115	.125-.374	.115	.125-.374											
.500	50	.750	.158	.187-.499	.158	.187-.499											
.625	62	.875	.158	.312-.624	.158	.250-.624											
.750	75	.937	.235	.437-.749	.235	.312-.749											
.875	87	.937	.300	.625-.874	.235	.375-.874											
1.000	100	.937	.350	.750-.999	.235	.437-.999											
.250	25	.75	.050	.093-.249	.050	.093-.249		B225	B250	B275	B300	B325	B350	B375	B400	B425	B450
.375	37		.115	.125-.374	.115	.125-.374											
.500	50		.158	.187-.499	.158	.187-.499											
.625	62		.158	.312-.624	.158	.250-.624											
.750	75		.235	.437-.749	.235	.312-.749											
.875	87		.300	.625-.874	.235	.375-.874											
1.000	100		.350	.750-.999	.235	.437-.999											
.375	37	1.00	.115	.125-.374	.115	.125-.374		C225	C250	C275	C300	C325	C350	C375	C400	C425	C450
.500	50		.158	.187-.499	.158	.187-.499											
.625	62		.158	.312-.624	.158	.250-.624											
.750	75		.235	.437-.749	.235	.312-.749											
.875	87		.300	.625-.874	.235	.375-.874											
1.000	100		.350	.750-.999	.235	.437-.999											
.500	50	1.25	.158	.187-.499	.158	.187-.499			D250	D275	D300	D325	D350	D375	D400	D425	D450
.625	62		.158	.312-.624	.158	.250-.624											
.750	75		.235	.437-.749	.235	.312-.749											
.875	87		.300	.625-.874	.235	.375-.874											
1.000	100		.350	.750-.999	.235	.437-.999											

*J2 (P=.050-.0799) J3 (P ≥ .080)
**See p. 37 for additional information.

Jektole® Punches
Light Duty



❶ Check your P&W dimensions to be certain the diagonal G does not exceed the maximum shown.



	Code	L 4.75	5.00	5.25	5.50	5.75	6.00	** Jektole® Group
	25							J2, J3*
	37							J4
	50							J6
	62	475	500					J6
	75			525	550	575	600	J9
	87							J9
	100							J9
	25							J2, J3*
	37							J4
	50							J6
	62	B475	B500					J6
	75			B525	B550	B575	B600	J9
	87							J9
	100							J9
	37							J4
	50							J6
	62	C475	C500					J6
	75			C525	C550	C575	C600	J9
	87							J9
	100							J9
	50							J6
	62							J6
	75	D475	D500	D525	D550	D575	D600	J9
	87							J9
	100							J9

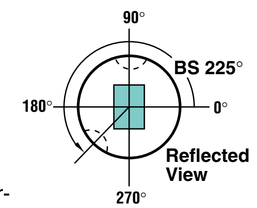
Features/Benefits

Jektole® punches permit doubling punch to matrix clearance; produce up to three times the number of hits between sharpenings; and reduce burr heights.

HOW TO ORDER

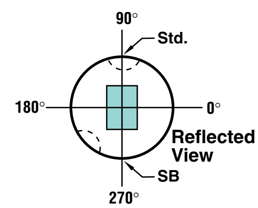
Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	21	LJX	37	325	P.175	A2
	15	LJR	50	400	P.327, W.254	M2

Standard Ball Seat Locations
Standard Ball Seat Location is at 90°. Alternate locations of 0°, 180°, or 270° can be specified at no additional cost.



Custom Ball Seat Locations
Custom Ball Seat Locations can be specified as "BS" and degrees counter-clockwise from 0°. For additional information, see "Locking Devices" on p. 38.

Double Ball Seat
A second ball seat may be specified. Normally located 180° from the primary ball seat, these are used to minimize sharpening of notching punches by rotating the punch 180°. Specify "SB" and degree desired. A second ball can also be located 90° from the primary ball seat.



Not recommended for diameters under .625.

FIRM DELIVERY SCHEDULE

1 Day
PS4 +2 Days

Standard Alterations

Jektole® punches are available in sizes other than those shown in the chart to the left.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an "X" is placed in front of the P or W dimension, e.g., "XP" and/or "XW." If the point length is other than standard, designate "XB" as the point length. Also see "Standard Alterations" on the front of the pullout tab in this section for other special order designators.

Surface Coatings

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

DayTride® (XN)—a low-cost surface application that treats all exposed surfaces. Ideal for punches and matrixes. Provides high dimensional stability. Approx. hardness: RC73.

DayTiN® (XNT)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: *Vickers 2300.

DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

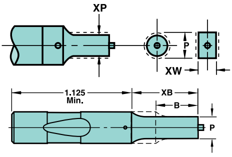
DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS4
XNT —DayTiN®	+ 3 days	M2 & PS4
XAN —DayTAN™	+ 4 days	M2 & PS4
XND —DayKote™	+ 8 days	M2 & PS4
XCN —TiCN	+ 3 days	M2 & PS4
XNM —MoST™	+ 7 days	M2 & PS4
XNP	+ 8 days	M2 & PS4
XCR —DayKool™	+ 1 day	M2 & PS4

*Vickers used when RC exceeds 80.

® DayTride and DayTiN are registered trademarks of Dayton Progress.
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations
Jektole® Punches—Light Duty



XP, XW P and W Dimensions Smaller than Standard

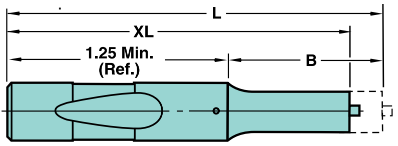
XB Point Length Other than Standard

For XBB, add three days to delivery.

		XB								XBB
Point Length		.5001-.6250	.6251-.7500	.7501-.8750	.8751-1.0000	1.0001-1.1250	1.1251-1.2500	1.2501-1.3750	1.3751-1.5000	1.5001-1.6250	1.6261-2.0001
Code	Type	Min. P (Rounds)									
25	LJX	.050	.050	.080	.080						
37	LJX	.115	.115	.115	.115	.115	.115	.115	.115	.115	
50	LJX		.158	.158	.158	.158	.158	.158	.158	.158	.187
62	LJX		.158	.158	.158	.158	.158	.158	.158	.158	.188
75	LJX		.235	.235	.235	.235	.235	.235	.235	.235	.281
87	LJX		.300	.300	.300	.300	.300	.300	.300	.300	.312
100	LJX		.350	.350	.350	.350	.350	.350	.350	.350	.350
		Min. W (Shapes)									
25	LJ_		.050	.050	.080	.080					
37	LJ_		.115	.115	.115	.115	.115	.115	.115	.115	
50	LJ_				.158	.158	.158	.158	.158	.158	.187
62	LJ_				.158	.158	.158	.158	.158	.158	.188
75	LJ_				.235	.235	.235	.235	.235	.235	.250
87	LJ_			.235	.235	.235	.235	.235	.235	.235	.250
100	LJ_			.235	.235	.235	.235	.235	.235	.235	.250

XL Overall Length Shortened

Stock removal from point end which shortens B length.



LL Precision Overall Length

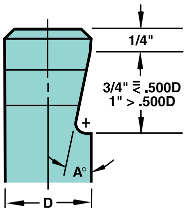
Same as XL except overall length is held to ±.001.

WS

Whistle Stop See table for standard angles. The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations.

Example: LJX50 400, P.327, M2, WS, XA 7.5°

D	A°
25,37	5°
50	7.5°
62-100	10°



Angles of 5° and 7.5° also available on .625 and larger diameters. (Specify **XA** and angle after **WS**.)

XJ Smaller Jektole® Components

See p. 37.

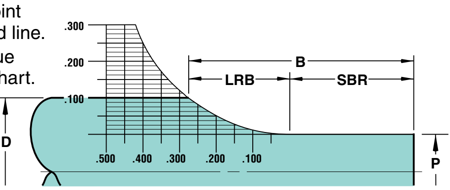
XK No Side Hole

For air ejection. No cost.

SBR Straight Before Radius

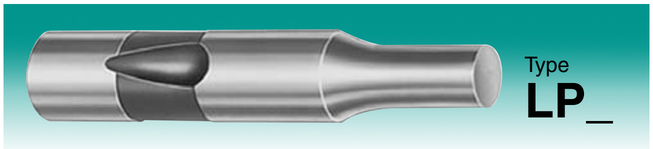
To determine Length of Radius Blend (LRB)

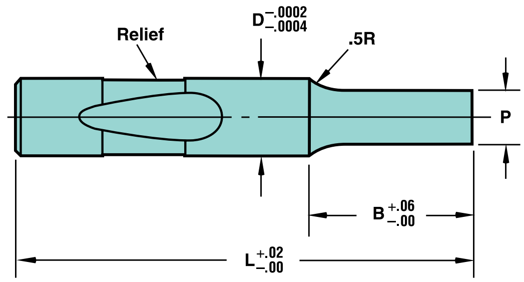
1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.



Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Regular Punches
Light Duty



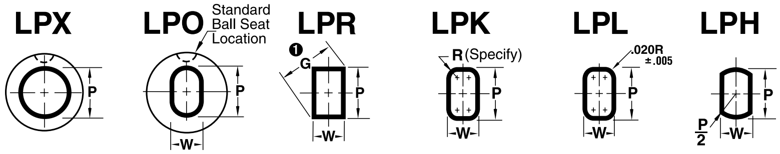


Material
Steel: A2, M2, PS4, RC 60-63

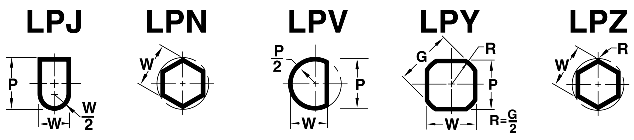
Round P $^{+.0005}_{-.0000}$ | ◎ | .0005 | P to D |
Shape P, W $\pm .0005$ | ◎ | .001 | P to D |

Shank D	Code	Point Lgth. B	Round Min. XP	Round Range P	Shape Min. XW	Shape Min. W Max. P/G	L 2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00
.250	25	.500	.040	.062-.249	.040	.062-.249													
.375	37	.625	.050	.125-.374	.050	.125-.374	200												
.500	50	.750	.093	.187-.499	.093	.187-.499													
.625	62	.875	.125	.312-.624	.125	.250-.624		225	250	275	300	325	350	375	400	425	450	475	500
.750	75	.937	.235	.437-.749	.235	.312-.749													
.875	87	.937	.300	.625-.874	.235	.375-.874													
1.000	100	.937	.350	.750-.999	.235	.437-.999													
.250	25		.040	.093-.249	.040	.093-.249													
.375	37		.050	.125-.374	.050	.125-.374													
.500	50		.093	.187-.499	.093	.187-.499													
.625	62	.75	.125	.312-.624	.125	.250-.624		B225	B250	B275	B300	B325	B350	B375	B400	B425	B450	B475	B500
.750	75		.235	.437-.749	.235	.312-.749													
.875	87		.300	.625-.874	.235	.375-.874													
1.000	100		.350	.750-.999	.235	.437-.999													
.375	37		.080	.125-.374	.080	.125-.374													
.500	50		.093	.187-.499	.093	.187-.499													
.625	62	1.00	.125	.312-.624	.125	.250-.624		C225	C250	C275	C300	C325	C350	C375	C400	C425	C450	C475	C500
.750	75		.235	.437-.749	.235	.312-.749													
.875	87		.300	.625-.874	.235	.375-.874													
1.000	100		.350	.750-.999	.235	.437-.999													
.500	50		.125	.187-.499	.125	.187-.499													
.625	62		.158	.312-.624	.158	.250-.624													
.750	75	1.25	.235	.437-.749	.235	.312-.749			D250	D275	D300	D325	D350	D375	D400	D425	D450	D475	D500
.875	87		.300	.625-.874	.235	.375-.874													
1.000	100		.350	.750-.999	.235	.437-.999													

Regular Punches
Light Duty



❶ Check your P&W dimensions to be certain the diagonal G does not exceed the maximum shown.



Features/Benefits

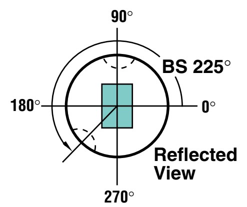
Regular punches provide three times better alignment than other major brands; offer longer tool life; and can significantly improve finished part quality.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	25	LPX	87	B275	P.740	M2
	12	LPO	100	B350	P.937, W.475	A2

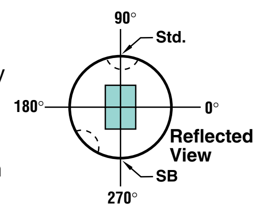
<table>
<tr><th></th><th></th><th colspan="8">L</th></tr>
<tr><th></th><th>Code</th><th>5.25</th><th>5.50</th><th>5.75</th><th>6.00</th><th>6.25</th><th>6.50</th><th>6.75</th><th>7.00</th></tr>
<tr><td rowspan="7"></td><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>37</td><td rowspan="6">525</td><td rowspan="6">550</td><td rowspan="6">575</td><td rowspan="6">600</td><td></td><td></td><td></td><td></td></tr>
<tr><td>50</td><td rowspan="5">625</td><td rowspan="5">650</td><td rowspan="5">675</td><td rowspan="5">700</td></tr>
<tr><td>62</td></tr>
<tr><td>75</td></tr>
<tr><td>87</td></tr>
<tr><td>100</td></tr>
<tr><td rowspan="7"></td><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>37</td><td rowspan="6">B525</td><td rowspan="6">B550</td><td rowspan="6">B575</td><td rowspan="6">B600</td><td></td><td></td><td></td><td></td></tr>
<tr><td>50</td><td rowspan="5">B625</td><td rowspan="5">B650</td><td rowspan="5">B675</td><td rowspan="5">B700</td></tr>
<tr><td>62</td></tr>
<tr><td>75</td></tr>
<tr><td>87</td></tr>
<tr><td>100</td></tr>
<tr><td rowspan="6"></td><td>37</td><td rowspan="6">C525</td><td rowspan="6">C550</td><td rowspan="6">C575</td><td rowspan="6">C600</td><td></td><td></td><td></td><td></td></tr>
<tr><td>50</td><td rowspan="5">C625</td><td rowspan="5">C650</td><td rowspan="5">C675</td><td rowspan="5">C700</td></tr>
<tr><td>62</td></tr>
<tr><td>75</td></tr>
<tr><td>87</td></tr>
<tr><td>100</td></tr>
<tr><td rowspan="5"></td><td>50</td><td rowspan="5">D525</td><td rowspan="5">D550</td><td rowspan="5">D575</td><td rowspan="5">D600</td><td rowspan="5">D625</td><td rowspan="5">D650</td><td rowspan="5">D675</td><td rowspan="5">D700</td></tr>
<tr><td>62</td></tr>
<tr><td>75</td></tr>
<tr><td>87</td></tr>
<tr><td>100</td></tr>
</table>

Standard Ball Seat Locations
Standard Ball Seat Location is at 90°. Alternate locations of 0°, 180°, or 270° can be specified at no additional cost.



Custom Ball Seat Locations
Custom Ball Seat Locations can be specified as "BS" and degrees counter-clockwise from 0°. For additional information, see "Locking Devices" on p. 38.

Double Ball Seat
A second ball seat may be specified. Normally located 180° from the primary ball seat, these are used to minimize sharpening of notching punches by rotating the punch 180°. Specify "SB" and degree desired. A second ball can also be located 90° from the primary ball seat.



Not recommended for diameters under .375.

FIRM DELIVERY SCHEDULE

1 Day
PS4 +2 Days

Standard Alterations

Regular punches are available in sizes other than those shown in the chart to the left.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an "X" is placed in front of the P or W dimension, e.g., "XP" and/or "XW." If the point length is other than standard, designate "XB" as the point length. Also see "Standard Alterations" on the front of the pullout tab in this section for other special order designators.

Surface Coatings

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

DayTride® (XN)—a low-cost surface application that treats all exposed surfaces. Ideal for punches and matrixes. Provides high dimensional stability. Approx. hardness: RC73.

DayTiN® (XNT)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: *Vickers 2300.

DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

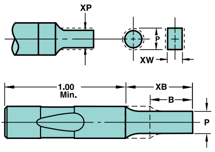
DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS4
XNT —DayTiN®	+ 3 days	M2 & PS4
XAN —DayTAN™	+ 4 days	M2 & PS4
XND —DayKote™	+ 8 days	M2 & PS4
XCN —TiCN	+ 3 days	M2 & PS4
XNM —MoST™	+ 7 days	M2 & PS4
XNP	+ 8 days	M2 & PS4
XCR —DayKool™	+ 1 day	M2 & PS4

*Vickers used when RC exceeds 80.

® DayTride and DayTiN are registered trademarks of Dayton Progress.
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations
Regular Punches—Light Duty



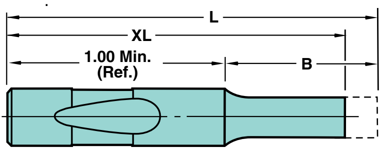
XP, XW P and W Dimensions Smaller than Standard

XB Point Length Other than Standard

For XBB and X3B, add three days to delivery.

		XB								XBB	X3B	
Point Length		.5001-.6250	.6251-.7500	.7501-.8750	.8751-1.0000	1.0001-1.1250	1.1251-1.2500	1.2501-1.3750	1.3751-1.5000	1.5001-1.6250	1.6261-2.0001	2.0001-2.5000	2.5001-3.0000
Code	Type	Min. P (Rounds)											
25	LPX	.040	.040	.080	.080	.106	.115						
37	LPX	.050	.050	.080	.080	.106	.115	.115	.115	.115	.187	.250	.312
50	LPX		.093	.093	.093	.125	.125	.125	.125	.125	.187	.250	.312
62	LPX		.125	.125	.125	.156	.156	.156	.156	.156	187	.250	.312
75	LPX		.235	.235	.235	.235	.235	.235	.235	.235	.281	.312	.375
87	LPX		.300	.300	.300	.300	.300	.300	.300	.300	.350	.375	.437
100	LPX		.350	.350	.350	.350	.350	.350	.350	.350	.350	.375	.437
		Min. W (Shapes)											
25	LP_		.040	.040	.080	.080	.106	.115					
37	LP_		.050	.050	.080	.080	.106	.115	.115	.115	.156		
50	LP_			.093	.093	.093	.125	.125	.125	.125	.187		
62	LP_			.125	.125	.125	.156	.156	.156	.156	.187		
75	LP_			.235	.235	.235	.235	.235	.235	.235	.250		
87	LP_				.235	.235	.235	.235	.235	.235	.250		
100	LP_				.235	.235	.235	.235	.235	.235	.250		

XL Overall Length Shortened
Stock removal from point end which shortens B length.



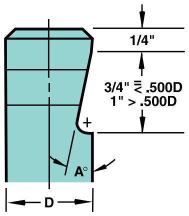
LL Precision Overall Length
Same as XL except overall length is held to ±.001.

WS
Whistle Stop See table for standard angles. The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations.

Example: LPX37 400, P.327, M2, WS, XA 5°

D	A°
25,37	5°
50	7.5°
62-100	10°

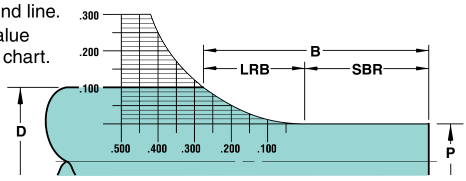
Angles of 5° and 7.5° also available on .625 and larger diameters. (Specify **XA** and angle after **WS**.)



SBR Straight Before Radius

To determine Length of Radius Blend (LRB)

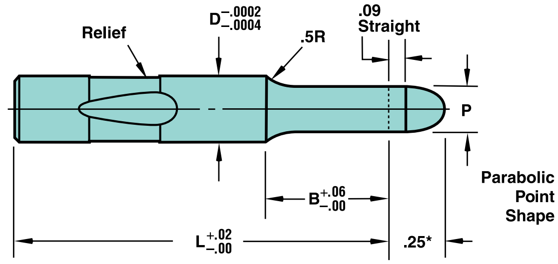
1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.



Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Regular Pilots
Light Duty

Type
LPT

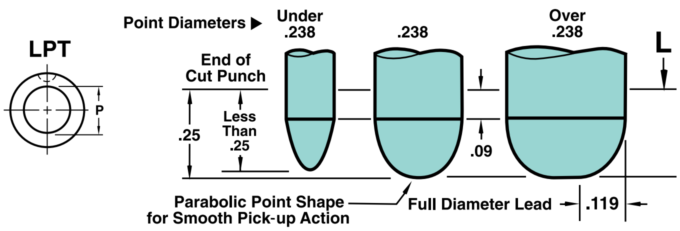


*Slightly less for diameters under .238.

Material
Steel: A2, M2, PS4, RC 60-63
Round P + .0005 − .0000 ◎ .0005 P to D
When P=D, shank tolerance applies.

Shank D	Code	Point Lgth. B	Round Min. XP	Round Range P	L 2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00
.250	25	.500	.050	.061 - .250													
.375	37	.625	.061	.124 - .375	200												
.500	50	.750	.092	.186 - .599													
.625	62	.875	.124	.311 - .625		225	250	275	300	325	350	375	400	425	450	475	500
.750	75	.937	.234	.436 - .750													
.875	87	.937	.299	.624 - .875													
1.000	100	.937	.349	.749-1.000													
.250	25		.050	.092 - .250													
.375	37		.061	.124 - .375													
.500	50		.092	.186 - .500													
.625	62	.75	.124	.311 - .625		B225	B250	B275	B300	B325	B350	B375	B400	B425	B450	B475	B500
.750	75		.234	.436 - .750													
.875	87		.299	.624 - .875													
1.000	100		.349	.749-1.000													
.375	37		.079	.124 - .375													
.500	50		.092	.186 - .500													
.625	62	1.00	.124	.311 - .625		C225	C250	C275	C300	C325	C350	C375	C400	C425	C450	C475	C500
.750	75		.234	.436 - .750													
.875	87		.299	.624 - .875													
1.000	100		.349	.749-1.000													
.500	50		.124	.186 - .500													
.625	62		.157	.311 - .625													
.750	75	1.25	.234	.436 - .750			D250	D275	D300	D325	D350	D375	D400	D425	D450	D475	D500
.875	87		.299	.624 - .875													
1.000	100		.349	.749-1.000													

Regular Pilots
Light Duty



Features/Benefits

Regular pilots are built to exact tolerances; the parabolic point shape allows for smooth pick-up action; and pilots offer a wide range of unique punching and fabrication applications.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P	Steel
Example:	25	LPT	37	300	P.175	A2

		L							
	Code	**5.25**	**5.50**	**5.75**	**6.00**	**6.25**	**6.50**	**6.75**	**7.00**
	25 37 50 62 75 87 100	525	550	575	600	625	650	675	700
	25 37 50 62 75 87 100	B525	B550	B575	B600	B625	B650	B675	B700
	37 50 62 75 87 100	C525	C550	C575	C600	C625	C650	C675	C700
	50 62 75 87 100	D525	D550	D575	D600	D625	D650	D675	D700

FIRM DELIVERY SCHEDULE

1 Day
PS4 +2 Days

Standard Alterations

Regular pilots are available in sizes other than those shown in the chart to the left.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P dimension is outside the standard range, an “X” is placed in front of the P dimension, e.g., “XP.” If the point length is other than standard, designate “XB” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.

Surface Coatings

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

DayTride*® *(XN)—a low-cost surface application that treats all exposed surfaces. Ideal for punches and matrixes. Provides high dimensional stability. Approx. hardness: RC73.

DayTiN*® *(XNT)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: *Vickers 2300.

DayTAN*™ *(XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote*™ *(XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST*™ *(XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

DayKool*™ *(XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS4
XNT —DayTiN®	+ 3 days	M2 & PS4
XAN —DayTAN™	+ 4 days	M2 & PS4
XND —DayKote™	+ 8 days	M2 & PS4
XCN —TiCN	+ 3 days	M2 & PS4
XNM —MoST™	+ 7 days	M2 & PS4
XNP	+ 8 days	M2 & PS4
XCR —DayKool™	+ 1 day	M2 & PS4

*Vickers used when RC exceeds 80.

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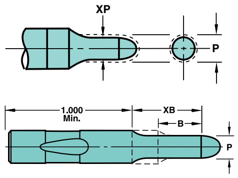
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations
Regular Pilots—Light Duty



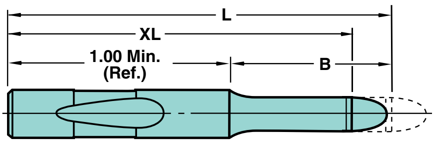
XP P Dimensions Smaller than Standard

XB Point Length Other than Standard

For XBB and X3B, add three days to delivery.

Point Length	XB									XBB	X3B	
	.5001-.6250	.6251-.7500	.7501-.8750	.8751-1.0000	1.0001-1.1250	1.1251-1.2500	1.2501-1.3750	1.3751-1.5000	1.5001-1.6250	1.6261-2.0001	2.0001-2.5000	2.5001-3.0000
Code Type	**Min. P (Rounds)**											
25 LPT	.050	.050	.079	.079	.105	.114						
37 LPT	.061	.061	.079	.079	.105	.114	.114	.114	.114	.186	.249	.311
50 LPT		.092	.092	.092	.124	.124	.124	.124	.124	.186	.249	.311
62 LPT		.124	.124	.124	.155	.155	.155	.155	.155	.186	.249	.311
75 LPT		.234	.234	.234	.234	.234	.234	.234	.234	.280	.311	.374
87 LPT		.299	.299	.299	.299	.299	.299	.299	.299	.349	.374	.436
100 LPT		.349	.349	.349	.349	.349	.349	.349	.349	.349	.374	.436

XL **Overall Length Shortened**
Stock removal from point end which shortens B length.

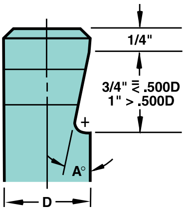


WS **Whistle Stop** See table for standard angles. The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations.

Example: LPT62 400, P.327, M2, WS, XA 10°

D	A°
25,37	5°
50	7.5°
62-100	10°

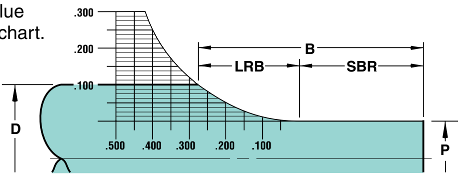
Angles of 5° and 7.5° also available on .625 and larger diameters. (Specify **XA** and angle after **WS**.)



SBR Straight Before Radius

To determine Length of Radius Blend (LRB)

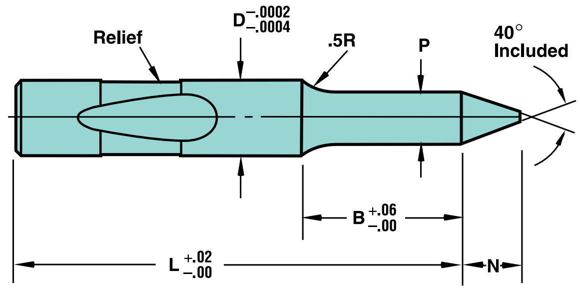
1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.



Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Positive Pick-Up Pilots
Light Duty

Type
LPA



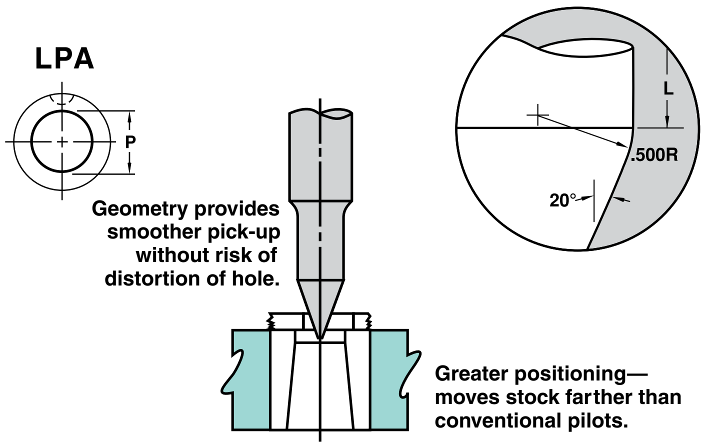
Material
Steel: M2, PS4, RC 60-63
Round P +.0005 −.0000 ◎ .0005 P to D
When P=D, shank tolerance applies.

Order any length shown. If you require a length between those shown, designate "XL."
Example: You require a length of 3.600. Order 375, then show XL 3.600. See "How to Order" example on the next page. XL is available down to 1.375. Note shank length limitation of .75.
(B length may be shorter than shown when XL is under the shortest length shown.)
There is no additional charge for XL.

Shank		Point Lgth.	Round				L											
D	Code	B	Min. XP	Range P	*N		2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25
.375	37	.625	.083	.186 - .375	.37	.2342	250	275	300	325	350	375	400	425	450	475	500	525
.500	50	.750	.092	.249 - .500	.50	.3252												
.625	62	.875	.124	.311 - .625	.62	.4162												
.750	75	.937	.234	.436 - .750	.75	.5072												
.875	87	.937	.299	.624 - .875	.87	.5982												
1.000	100	.937	.349	.749-1.000	1.00	.6892												
.375	37	.75	.083	.186 - .375	.37	.2342	B250	B275	B300	B325	B350	B375	B400	B425	B450	B475	B500	B525
.500	50		.092	.249 - .500	.50	.3252												
.625	62		.124	.311 - .625	.62	.4162												
.750	75		.234	.436 - .750	.75	.5072												
.875	87		.299	.624 - .875	.87	.5982												
1.000	100		.349	.749-1.000	1.00	.6892												
.375	37	1.00	.083	.186 - .375	.37	.2342	C250	C275	C300	C325	C350	C375	C400	C425	C450	C475	C500	C525
.500	50		.092	.249 - .500	.50	.3252												
.625	62		.124	.311 - .625	.62	.4162												
.750	75		.234	.436 - .750	.75	.5072												
.875	87		.299	.624 - .875	.87	.5982												
1.000	100		.349	.749-1.000	1.00	.6892												
.500	50	1.25	.124	.249 - .500	.50	3252		D275	D300	D325	D350	D375	D400	D425	D450	D475	D500	D525
.625	62		.157	.311 - .625	.62	.4162												
.750	75		.234	.436 - .750	.75	.5072												
.875	87		.299	.624 - .875	.87	.5982												
1.000	100		.349	.749-1.000	1.00	.6892												

*N =[(P-.057)/.728]+.132 when "P" dimension is less than "Pn" shown in chart.

Positive Pick-Up Pilots
Light Duty



Features/Benefits

Positive pick-up pilots provide smoother pick-up without the risk of distorting the hole; in addition, the unique design moves the stock farther than conventional pilots.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P	Steel
Example:	5	LPA	50	300	P.375	M2

	L						
Code	5.50	5.75	6.00	6.25	6.50	6.75	7.00
37	550	575	600				
50				625	650	675	700
62							
75							
87							
100							
37	B550	B575	B600				
50				B625	B650	B675	B700
62							
75							
87							
100							
37	C550	C575	C600				
50				C625	C650	C675	C700
62							
75							
87							
100							
50	D550	D575	D600	D625	D650	D675	D700
62							
75							
87							
100							

FIRM DELIVERY SCHEDULE
1 Day
PS4 +2 Days

Standard Alterations

Ball Lock positive pick-up pilots are available in sizes other than those shown in the chart to the left.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P dimension is outside the standard range, an “X” is placed in front of the P dimension, e.g., “XP.” If the point length is other than standard, designate “XB” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.

Surface Coatings

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

DayTride® (XN)—a low-cost surface application that treats all exposed surfaces. Ideal for punches and matrixes. Provides high dimensional stability. Approx. hardness: RC73.

DayTiN® (XNT)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: *Vickers 2300.

DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

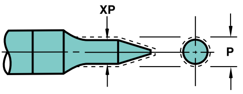
Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS4
XNT —DayTiN®	+ 3 days	M2 & PS4
XAN —DayTAN™	+ 4 days	M2 & PS4
XND —DayKote™	+ 8 days	M2 & PS4
XCN —TiCN	+ 3 days	M2 & PS4
XNM —MoST™	+ 7 days	M2 & PS4
XNP	+ 8 days	M2 & PS4
XCR —DayKool™	+ 1 day	M2 & PS4

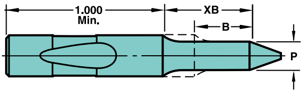
*Vickers used when RC exceeds 80.

® DayTride and DayTiN are registered trademarks of Dayton Progress.
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations

Positive Pick-Up Pilots—Light Duty





XP **P Dimensions Smaller than Standard**

XB **Point Length Other than Standard**

Specify XB, XBB, or X3B and length (see chart below).

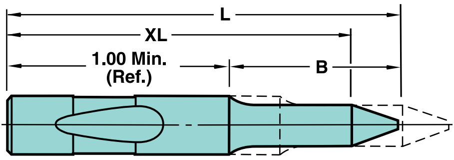
For XBB and X3B, add three days to delivery.

		XB									XBB	X3B	
Point Length		.5001-.6250	.6251-.7500	.7501-.8750	.8751-1.0000	1.0001-1.1250	1.1251-1.2500	1.2501-1.3750	1.3751-1.5000	1.5001-1.6250	1.6251-2.0001	2.0001-2.5000	2.5001-3.0000
Code	Type	Min. P (Rounds)											
37	LPA	.083	.083	.083	.083	.105	.114	.114	.114	.114	.186	.249	.311
50	LPA	.092	.092	.092	.092	.124	.124	.124	.124	.124	.186	.249	.311
62	LPA	.124	.124	.124	.124	.155	.155	.155	.155	.155	.186	.249	.311
75	LPA	.234	.234	.234	.234	.234	.234	.234	.234	.234	.280	.311	.374
87	LPA	.299	.299	.299	.299	.299	.299	.299	.299	.299	.349	.374	.436
100	LPA	.349	.349	.349	.349	.349	.349	.349	.349	.349	.349	.374	.436

XL **Overall Length Shortened**

Stock removal from point end. B length is maintained.

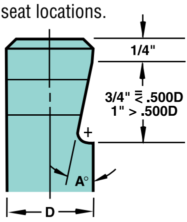
Available at no charge within catalog range.



WS **Whistle Stop** See table for standard angles. The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations.

Example: LPA50 400, P.327, M2, WS, XA 7.5°

D	A°
25,37	5°
50	7.5°
62-100	10°

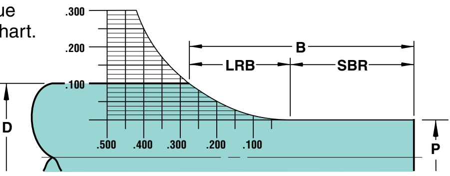


Angles of 5° and 7.5° also available on .625 and larger diameters. (Specify **XA** and angle after **WS**.)

SBR **Straight Before Radius**

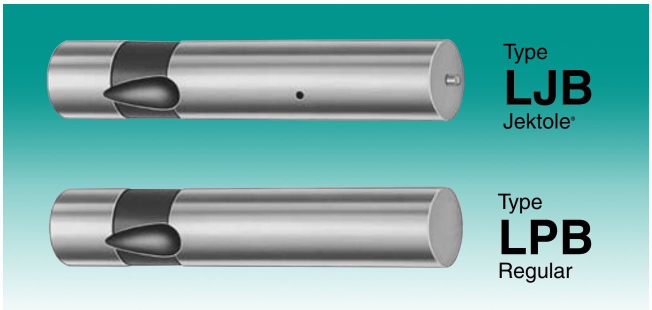
To determine Length of Radius Blend (LRB)

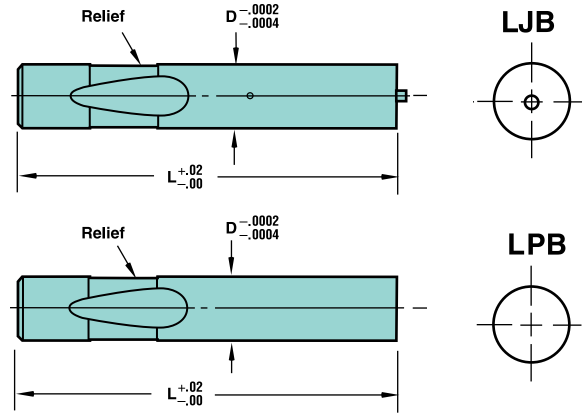
1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.



Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Punch Blanks Jektole® & Regular
Light Duty





Material
Steel: A2, M2, PS4, RC 60-63

<table>
<tr><th rowspan="2">Type</th><th>Shank</th><th></th><th colspan="17">L</th><th rowspan="2">* Jektole® Group</th></tr>
<tr><th>D</th><th>Code</th><th>2.00</th><th>2.25</th><th>2.50</th><th>2.75</th><th>3.00</th><th>3.25</th><th>3.50</th><th>3.75</th><th>4.00</th><th>4.25</th><th>4.50</th><th>4.75</th><th>5.00</th><th>5.25</th><th>5.50</th><th>5.75</th><th>6.00</th></tr>
<tr><td rowspan="7">LJB</td><td>.250</td><td>25</td><td rowspan="3">200</td><td rowspan="7">225</td><td rowspan="7">250</td><td rowspan="7">275</td><td rowspan="7">300</td><td rowspan="7">325</td><td rowspan="7">350</td><td rowspan="7">375</td><td rowspan="7">400</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>J3</td></tr>
<tr><td>.375</td><td>37</td><td rowspan="6">425</td><td rowspan="6">450</td><td rowspan="6">475</td><td rowspan="6">500</td><td></td><td></td><td></td><td></td><td>J4</td></tr>
<tr><td>.500</td><td>50</td><td rowspan="5">525</td><td rowspan="5">550</td><td rowspan="5">575</td><td rowspan="5">600</td><td>J6</td></tr>
<tr><td>.625</td><td>62</td><td rowspan="4"></td><td>J9</td></tr>
<tr><td>.750</td><td>75</td><td>J9</td></tr>
<tr><td>.875</td><td>87</td><td>J9</td></tr>
<tr><td>1.000</td><td>100</td><td>J9</td></tr>
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<table>
<tr><th rowspan="2">Type</th><th>Shank</th><th></th><th colspan="21">L</th></tr>
<tr><th>D</th><th>Code</th><th>2.00</th><th>2.25</th><th>2.50</th><th>2.75</th><th>3.00</th><th>3.25</th><th>3.50</th><th>3.75</th><th>4.00</th><th>4.25</th><th>4.50</th><th>4.75</th><th>5.00</th><th>5.25</th><th>5.50</th><th>5.75</th><th>6.00</th><th>6.25</th><th>6.50</th><th>6.75</th><th>7.00</th></tr>
<tr><td rowspan="7">LPB</td><td>.250</td><td>25</td><td rowspan="3">200</td><td rowspan="7">225</td><td rowspan="7">250</td><td rowspan="7">275</td><td rowspan="7">300</td><td rowspan="7">325</td><td rowspan="7">350</td><td rowspan="7">375</td><td rowspan="7">400</td><td rowspan="7">425</td><td rowspan="7">450</td><td rowspan="7">475</td><td rowspan="7">500</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.375</td><td>37</td><td rowspan="6">525</td><td rowspan="6">550</td><td rowspan="6">575</td><td rowspan="6">600</td><td></td><td></td><td></td><td></td></tr>
<tr><td>.500</td><td>50</td><td rowspan="5">625</td><td rowspan="5">650</td><td rowspan="5">675</td><td rowspan="5">700</td></tr>
<tr><td>.625</td><td>62</td><td rowspan="4"></td></tr>
<tr><td>.750</td><td>75</td></tr>
<tr><td>.875</td><td>87</td></tr>
<tr><td>1.000</td><td>100</td></tr>
</table>

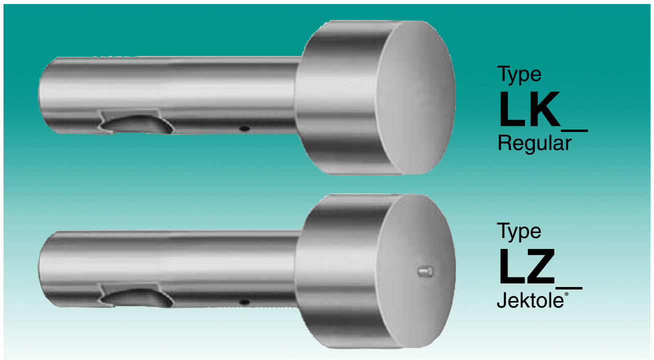
*See p. 37 for additional information.

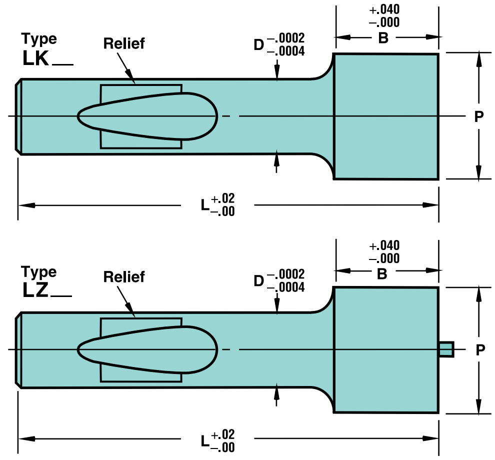
HOW TO ORDER

Specify:	Qty.	Type	D Code	L	Steel
Example:	12	LJB	50	300	M2

FDS®
FIRM DELIVERY SCHEDULE
1 Day
PS4 +2 Days

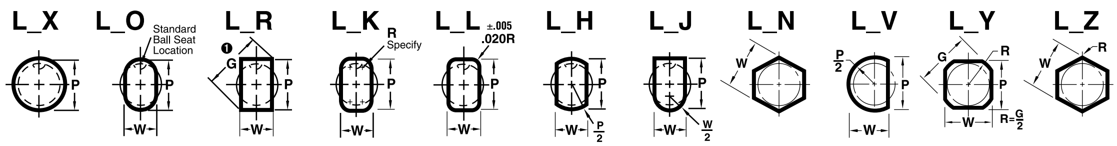
Point Larger than Shank Jektole® & Regular
Light Duty





Material
Steel: A2, M2, RC 60-63
Round P $^{+.0005}_{-.0000}$ | ◎ | .0005 | P to D |
Shape P, W ± .0005 | ◎ | .001 | P to D |

❶ Check your P&W dimensions to be certain the diagonal G does not exceed the maximum shown.



Type	Shank D	Code	Point Lgth. B	Round Range P	Shape Min. W	Shape Max. P/G	L 2.50	L 2.75	L 3.00	L 3.25	L 3.50	L 3.75	L 4.00	L 4.25	L 4.50	* Jektole® Group
LK_ Regular LZ_ Jektole®	.375 .500 .625 .750 .875 1.000	37 50 62 75 87 100	.62 .75 .88 .94 .94 .94	.376 - .875 .501-1.250 .626-1.500 .751-1.500 .876-1.750 1.001-1.750	.125 - .875 .188-1.250 .250-1.500 .312-1.500 .375-1.750 .437-1.750		250	275	300	325	350	375	400	425	450	J4 J6 J6 J9 J9 J9

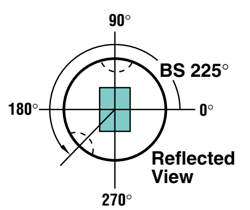
*See p. 37 for additional information.

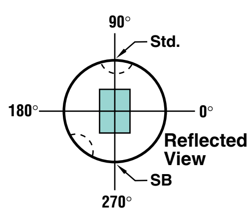
Standard Ball Seat Locations
Standard Ball Seat Location is at 90°. Alternate locations of 0°, 180°, or 270° can be specified at no additional cost.

Custom Ball Seat Locations
Custom Ball Seat Locations can be specified as "BS" and degrees counter-clockwise from 0°. For additional information, see "Locking Devices" on p. 38.

Double Ball Seat
A second ball seat may be specified. Normally located 180° from the primary ball seat, these are used to minimize sharpening of notching punches by rotating the punch 180°. Specify "SB" and degree desired. A second ball can also be located 90° from the primary ball seat.

Not recommended for diameters under .625 for LZ__ and .500 for LK__.





FIRM DELIVERY SCHEDULE
1-4 pcs., 2 Days
5-19 pcs., 3 Days

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	2	LKX	100	400	P1.300	M2

Standard Alterations

Point Larger than Shank Ball Lock punches are available in sizes other than those shown in the chart above.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an "X" is placed in front of the P or W dimension, e.g., "XP" and/or "XW." If the point length is other than standard, designate "XB" as the point length. Also see "Standard Alterations" on the front of the pullout tab in this section for other special order designators.

Surface Coatings

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. The available coatings are listed below. Also, see the chart at the bottom of this page for delivery times.

DayTride® (XN)—a low-cost surface application that treats all exposed surfaces. Ideal for punches and matrixes. Provides high dimensional stability. Approx. hardness: RC73.

DayTiN® (XNT)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: *Vickers 2300.

DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: *Vickers 3400.

DayKote™ (XND)—used for extrusion/forming applications. Should not be used with a lubricant. Not recommended for stainless steel, copper, or nickel. Tolerance is ± .0002". Approx. hardness: *Vickers 2300.

TiCN (XCN)—very hard PVD, thin film. Provides ultra hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: *Vickers 3000.

MoST™ (XNM)—PVD, solid film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: *Vickers 2000.

XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

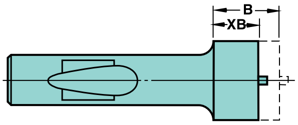
DayKool™ (XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery			Material
XN	—DayTride®	+ 3 days	M2 & PS4
XNT	—DayTiN®	+ 3 days	M2 & PS4
XAN	—DayTAN™	+ 4 days	M2 & PS4
XND	—DayKote™	+ 8 days	M2 & PS4
XCN	—TiCN	+ 3 days	M2 & PS4
XNM	—MoST™	+ 7 days	M2 & PS4
XNP		+ 8 days	M2 & PS4
XCR	—DayKool™	+ 1 day	M2 & PS4

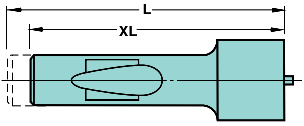
*Vickers used when RC exceeds 80.

® DayTride and DayTiN are registered trademarks of Dayton Progress.
™ DayTAN, DayKote, and DayKool are trademarks of Dayton Progress.
MoST is a trademark of IonBond® Inc.

Standard Alterations
Point Larger than Shank—Light Duty



XB **Point Length Other than Standard**
(Shortens punch from the point end.)

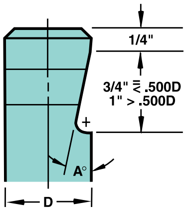


XL **Overall Length Shortened**
Stock removal from ***shank end***.
Minimum shank length is 1$\frac{3}{16}$".
Does not alter ball seat location.

WS **Whistle Stop** See table for standard angles. The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations.

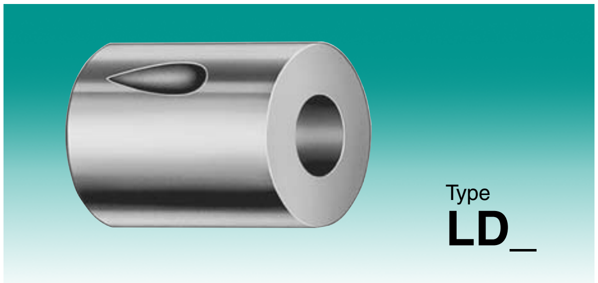
Example: LZX75 400, P1.250, M2, WS, XA 10°
LKR75 400, P1.250, W.350, M2, WS, XA 10°

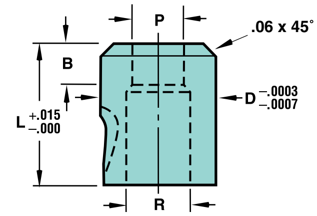
D	A°
37	5°
50	7.5°
62-100	10°



Angles of 5° and 7.5° also available on .625 and larger diameters.
(Specify **XA** and angle after **WS**.)

Matrixes
Ball Lock



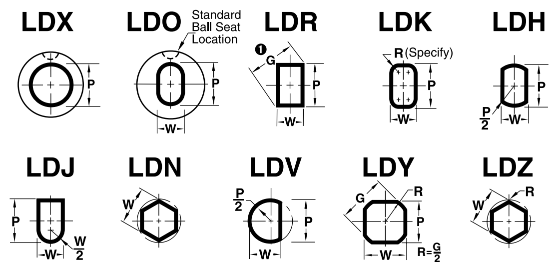


Material

Steel: A2, M2, RC 60-63

Round P $^{+.0005}_{-.0000}$ | ◎ | .0005 | P to D |

Shape P, W $^{+.001}_{-.000}$ | ◎ | .001 | P to D |



Body				Round	Shape	L
D	Code	Min. B	Max. R	Range P	Min. W Max. P/G	1.187
.5000	50	.156	.228	.064 - .195	.048 - .195	118
.6250	62	.187	.312	.126 - .285	.064 - .285	118
.7500	75	.187	.375	.196 - .345	.095 - .345	118
.8750	87	.187	.468	.286 - .435	.125 - .435	118
1.0000	100	.250	.578	.346 - .545	.125 - .545	118
1.2500	125	.250	.687	.436 - .655	.187 - .655	118
1.5000	150	.250	.812	.546 - .780	.187 - .780	118
1.7500	175	.312	1.062	.656-1.035	.187-1.035	118

❶ Check your P&W dimensions to be certain the diagonal G does not exceed the maximum shown.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	10	LDX	125	118	P.625	A2

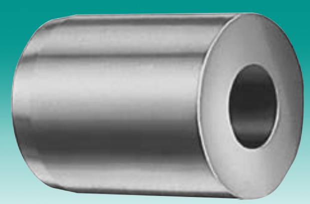
Note: The standard ball seat location is at 90°. Alternate locations of 0°, 180°, or 270° can be specified at no additional cost.
For additional information, see "Locking Devices" on p. 38.

FIRM DELIVERY SCHEDULE

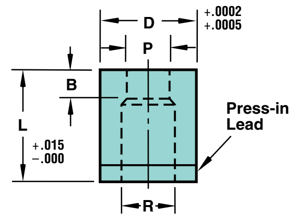
Up to 1.5000 Dia. 2 Days

1.7500 and larger Dia. 4 Days

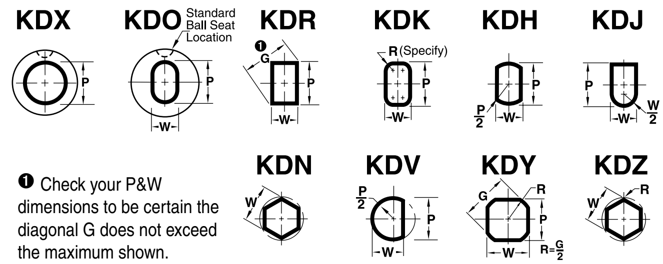
Matrixes
Press Fit



Type
KD_



Material
Steel: A2, M2, RC 60-63
Round P $^{+.0005}_{-.0000}$ ◎ .0005 P to D
Shape P, W $^{+.001}_{-.000}$ ◎ .001 P to D
D $\gtreqless$ 1.75 $^{+.0002}_{+.0006}$



➊ Check your P&W dimensions to be certain the diagonal G does not exceed the maximum shown.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	5	KDR	50	100	P.250, W.093	A2

<table>
<tr><th>Body</th><th></th><th></th><th></th><th>Round</th><th>Shape</th><th colspan="9">L</th></tr>
<tr><th>D</th><th>Code</th><th>Min. B</th><th>Max. R</th><th>Range P</th><th>Min. W Max. P/G</th><th>.750</th><th>.875</th><th>.937</th><th>1.000</th><th>1.125</th><th>1.187</th><th>1.250</th><th>1.375</th><th>1.500</th></tr>
<tr><td>.2500</td><td>25</td><td>.156</td><td>.156</td><td>.064 - .135</td><td>.048 - .135</td><td rowspan="14">75</td><td rowspan="14">87</td><td rowspan="14">93</td><td rowspan="14">100</td><td rowspan="14">112</td><td rowspan="9"></td><td rowspan="14">125</td><td rowspan="14">137</td><td></td></tr>
<tr><td>.3750</td><td>37</td><td>.156</td><td>.228</td><td>.064 - .195</td><td>.048 - .195</td><td rowspan="13">150</td></tr>
<tr><td>.5000</td><td>50</td><td>.156</td><td>.312</td><td>.064 - .285</td><td>.064 - .285</td></tr>
<tr><td>.6250</td><td>62</td><td>.187</td><td>.390</td><td>.136 - .365</td><td>.095 - .365</td></tr>
<tr><td>.7500</td><td>75</td><td>.187</td><td>.468</td><td>.136 - .435</td><td>.118 - .435</td></tr>
<tr><td>.8750</td><td>87</td><td>.187</td><td>.578</td><td>.276 - .545</td><td>.125 - .545</td></tr>
<tr><td>1.0000</td><td>100</td><td>.250</td><td>.703</td><td>.356 - .675</td><td>.125 - .675</td></tr>
<tr><td>1.2500</td><td>125</td><td>.250</td><td>.828</td><td>.500 - .800</td><td>.187 - .800</td></tr>
<tr><td>1.5000</td><td>150</td><td>.250</td><td>1.093</td><td>.616-1.050</td><td>.187-1.050</td></tr>
<tr><td>1.7500</td><td>175</td><td>.312</td><td>1.430</td><td>.750-1.400</td><td>.187-1.400</td><td rowspan="5">118</td></tr>
<tr><td>2.0000</td><td>200</td><td>.312</td><td>1.630</td><td>.875-1.600</td><td>.187-1.600</td></tr>
<tr><td>2.2500</td><td>225</td><td>.312</td><td>1.830</td><td>1.000-1.800</td><td>.187-1.800</td></tr>
<tr><td>2.5000</td><td>250</td><td>.312</td><td>2.030</td><td>1.125-2.000</td><td>.187-2.000</td></tr>
<tr><td>2.7500</td><td>275</td><td>.312</td><td>2.230</td><td>1.250-2.200</td><td>.187-2.200</td></tr>
</table>

FIRM DELIVERY SCHEDULE

Up to 1.5000 Dia. 2 Days
1.7500 and larger Dia. 4 Days

Standard Alterations

Ball Lock press fit matrixes are available in sizes other than those shown in the chart above.

When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an “X” is placed in front of the P or W dimension, e.g., “XP” and/or “XW.” If the point length is other than standard, designate “XB” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.

Dayton Slug Control

Dayton Slug Control is a patented, guaranteed method for reducing the risk of pulling slugs to the die surface during withdrawal of the punch. A series of grooves is designed inside the matrix (see drawing). There, the slugs are trapped until they fall freely through the relief. The use of Dayton Slug Control has no effect on hole size, and will not require any changes in current regrind practices.

Our guarantee: *Use Dayton Slug Control in a stamping die now pulling slugs. If, for any reason, you are not completely satisfied, we will refund the full cost of the Slug Control alteration.* (We cannot guarantee the retention of slugs when clearance exceeds 10% per side.)

Ordering
Dayton Slug Control is easy to specify and order. Simply add the information that is unique to your application to the matrix catalog number. Please specify XSC for alteration and show material thickness (inches) and clearance per side (percentage).

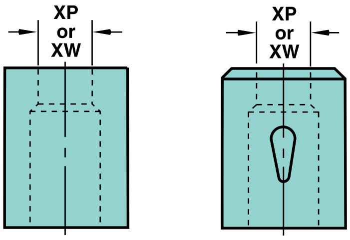
HOW TO ORDER

	Catalog Number				Your Specs		
Inch	KDX	62	100	P.250	XSC	MT.0625	CS 5
	Type	**D**	**L**	**P**	**Alt. Code**	**Mat'l Thickness (inches)**	**Clear Per Side (%)**

For additional information, contact your Dayton distributor.

Standard Alterations
Matrixes

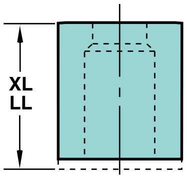
XP, XW P and W Dimensions Larger or Smaller than Standard



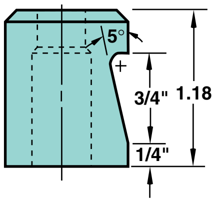
Body Code	Press Fit				Ball Lock			
	Min. P	Min. W	Max. P/G	R	Min. P	Min. W	Max. P/G	R
25	.064	.048	.167	.191				
37	.064	.048	.250	.281				
50	.064	.064	.344	.375	.064	.048	.250	.281
62	.136	.095	.453	.500	.126	.064	.344	.375
75	.136	.118	.562	.594	.150	.095	.453	.500
87	.276	.125	.656	.703	.175	.125	.562	.594
100	.356	.125	.750	.781	.200	.125	.656	.703
125	.500	.187	.935	.969	.250	.187	.750	.781
150	.616	.187	1.200	1.230	.300	.187	.935	.969
175	.750	.187	1.400	1.430	.350	.187	1.200	1.230
200	.875	.187	1.600	1.630				
225	1.000	.187	1.800	1.830				
250	1.125	.187	2.000	2.030				
275	1.250	.187	2.200	2.230				

XL **Overall Length Shortened**
Stock removal does not alter land length on KD__.
Minimum overall length = .25
Not available on Ball Lock Matrixes.

LL **Precision Overall Length**
Same as XL except overall length is held to ±.001.
Not available on Ball Lock Matrixes.

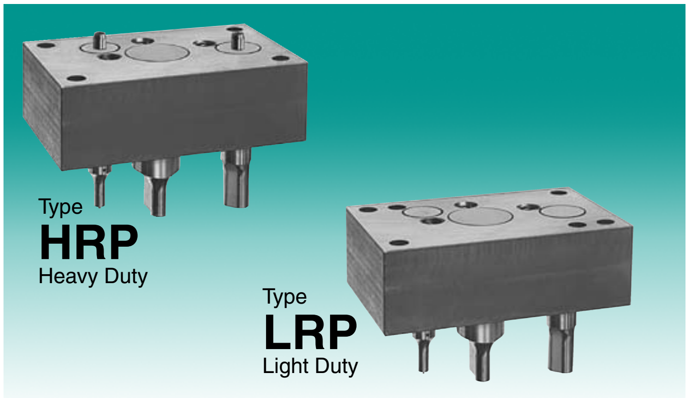


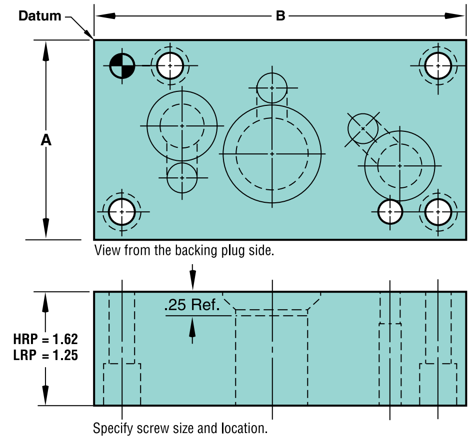
WS **Whistle Stop (5° standard angle)**
See table for standard angles. The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations. The XP alteration is not available with the WS alteration.
Example: LDX75, 118, P.328, M2, WS.



See p.36 for Matrix Blanks.

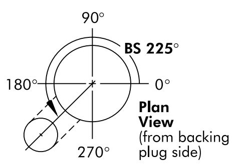
Multi-Position™ Retainers
Heavy Duty/Light Duty





Type	W	L 2.50	2.75	3.00	3.25	3.50	3.75	4.00	5.00	6.00	7.00	8.00	9.00	10.00	12.00
HRP LRP	2.00	2025	2027	2030	2032	2035	2037	2040	2050	2060	2070	2080	2090	2010	2012
	2.75		2727	2730	2732	2735	2737	2740	2750	2760	2770	2780	2790	2710	2712
	3.00		3027	3030	3032	3035	3037	3040	3050	3060	3070	3080	3090	3010	3012
	4.00							4040	4050	4060	4070	4080	4090	4010	4012
	6.00									6060	6070	6080	6090	6010	6012
	8.00											8080	8090	8010	8012

Ball Hole Locations



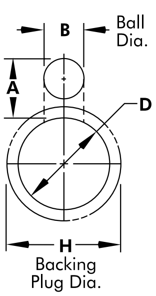
Specify radial location in degrees counterclockwise from 0°.

Hole Reference Re Datum Point	
Dowel Holes	±.0003
Screw Holes	±.0050
Component Holes	±.0003

Punch Shape	Ball Hole Class	Radial Tolerance
Round	B	±5°
Shape	BB	±0°5'

The Ball Hole Class B is standard, unless otherwise specified.

Space Requirements



TYPE	D	A	B	H
HRP	.375	.57	.375	.625
	.500	.69	.500	.750
	.625	.69	.500	.875
	.750	.69	.500	1.000
	.875	.69	.500	1.125
	1.000	.69	.500	1.250
	1.250	.69	.500	1.500
LRP	.250	.44	.250	.500
	.375	.44	.250	.625
	.500	.50	.312	.750
	.625	.50	.312	.875
	.750	.57	.375	1.000
	.875	.57	.375	1.125
	1.000	.57	.375	1.250

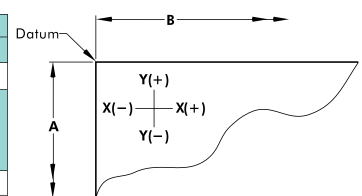
HOW TO ORDER

Example:

Retainer		Catalog No.	Special Size				
☑ HRP	☐ LRP	3070	A ________		B ________		
Multi-Position™ Retainers							
Hole No.	Component Type	Size	Location X Axis	Y Axis	Ball Hole Location	Class	Backing Plug Type
1	Dowel	5/16 S.F.*	.375	– .375	—	—	—
2	S.H.C.S	5/16	1.000	– .375	—	—	—
3	HJR	62	2.090	–1.375	90°	BB	C
4	Clear	1.281	4.250	–1.062	—	—	—
5	Jackscr.	STD.	0.687	– .937	—	—	—

*Slip Fit

*Slip Fit



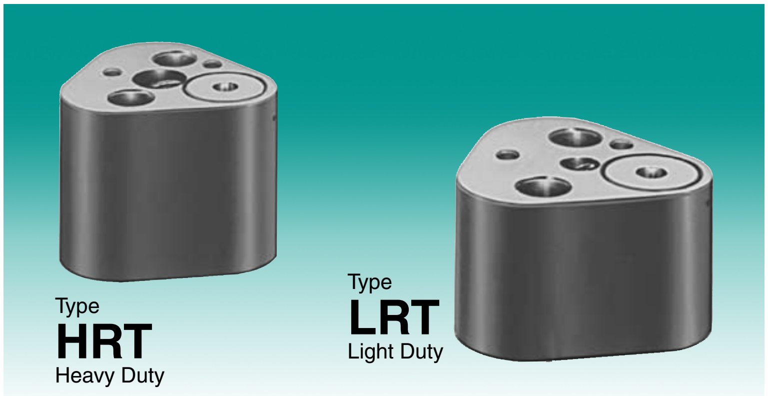
See the back of the pullout tab for additional information on Backing Plugs.

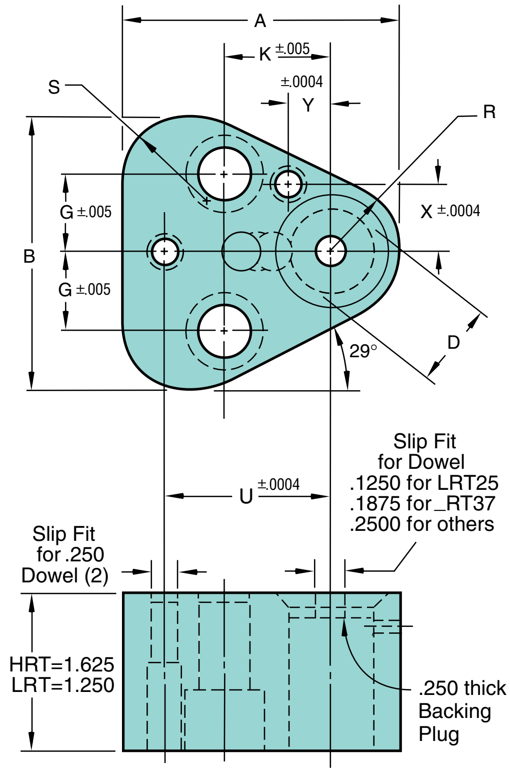
Multi-Position™ Retainers require special order forms, which are available on request. Specify all dimensions from the datum: Use the drawing above for reference.

FIRM DELIVERY SCHEDULE

1-6 holes, 5 Days
7+ holes, 8 Days

True Position® Retainers
Heavy Duty/Light Duty





TRUE POSITION®

The industry standard interchangeable retainer

True Position® Retainer sets include:
- 1 Ball
- 1 Spring
- 2 Screws
- 2 Dowels
- 1 Ball Release Set Screw

HOW TO ORDER

Specify:	Qty.	Type	D
Example:	23	HRT	37
	13	LRT	62

Catalog Number

Heavy Duty	Light Duty	D	A	B	G	K	R	S	U	X	Y	Screw Size
—	LRT	.2500	1.75	1.72	.438	.750	.38	.47	1.060	.354	.294	5/16-18
HRT	LRT	.3750	1.75	1.72	.438	.750	.38	.47	1.060	.354	.295	5/16-18
HRT	LRT	.5000	2.00	1.97	.562	.750	.50	.60	1.180	.472	.256	3/8-16
HRT	LRT	.6250	2.12	2.09	.625	.750	.56	.55	1.250	.532	.236	3/8-16
HRT	LRT	.7500	2.38	2.34	.688	.750	.69	.79	1.320	.650	.197	3/8-16
HRT	LRT	.8750	2.50	2.47	.688	.750	.75	.85	1.400	.728	.197	3/8-16
HRT	LRT	1.0000	2.75	2.72	.781	.938	.88	.97	1.600	.866	.276	1/2-13
HRT	—	1.2500	2.75	2.72	.781	.938	.88	.97	1.600	.866	.276	1/2-13

FDS®
FIRM DELIVERY SCHEDULE
1 Day

Features/Benefits

The ***in-line dowel*** assures precise punch-to-matrix alignment, giving you higher quality parts, longer punch life, and reduced production downtime.

The True Position® Retainer ***eliminates hand fitting***, cutting mounting time by nearly 50%. Simply pull the retainer from its box, and screw it into the die set. True Position® gives you true dimensional accuracy every time.

Only ***one dowel is required for round punches***, which reduces machining time by up to 50%. Shaped punches use the secondary dowel for precise alignment.

The ***precision-ground ball hole*** assures perfect alignment of any punch shape, even if the retainer is replaced.

The True Position® Retainer allows ***complete interchangeability between Heavy Duty and Light Duty retainers*** in the event of an engineering change.

Use of the True Position® Retainer can ***cut retainer inventory requirements by 50%***.

Backing Plugs

TYPE A
In-Line Dowel

TYPE B
For Matrixes

TYPE C
Solid

The three Backing Plugs shown above are used with Multi-Position™, True Position®, and End and Square Retainers—both heavy duty and light duty. To determine which backing plug is used with a specific type of retainer, see "Accessories—Retainers" on p. 34.

The Type C Solid Backing Plug is standard with all Multi-Position™ Retainers. The Type A Backing Plug with dowels for location can be specified; this eliminates the need for dowels in the retainer. Matrix Retainers require a detailed drawing.

True Position® Retainers

Don't waste time and money building a retainer for just one punch. Fitting isolated punches or pilots onto a die set is quick and easy with True Position® Retainers. These cost-effective time-savers can be mounted with screws from either top or bottom, eliminating the need to build and fit one-of-a-kind retainers.

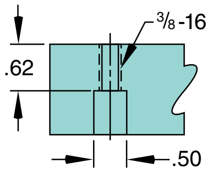
True Position® Retainers are recognized as the standard in the industry for interchangeable retainers. All are quality built; ground top to bottom; and hardened to approximately RC42.

True Position® gives you true dimensional accuracy each and every time!

Standard Alterations
Multi-Position™ Retainers

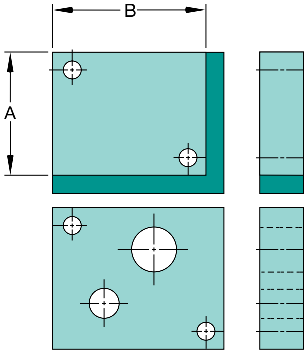
Standard Jackscrew Hole

Jackscrews make it easier to pull retainers off the dowels.



Special Size
Any amount of material can be removed from the sides of the retainer for a custom size. Edges are saw cut ±.03.

Clearance Holes
Clearance holes or tapped holes can be detailed, as shown in the order example.



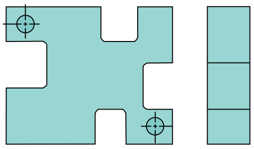
Holes are drilled through the retainer unless otherwise specified.

Location ±.010

Diameter $^{+.015}_{-.000}$

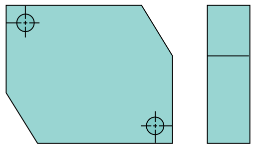
The following alterations require detailed drawings:

Notches
Notches to clear other tooling can be added to any side of the retainer. Notches are saw cut ±.03.



Angles

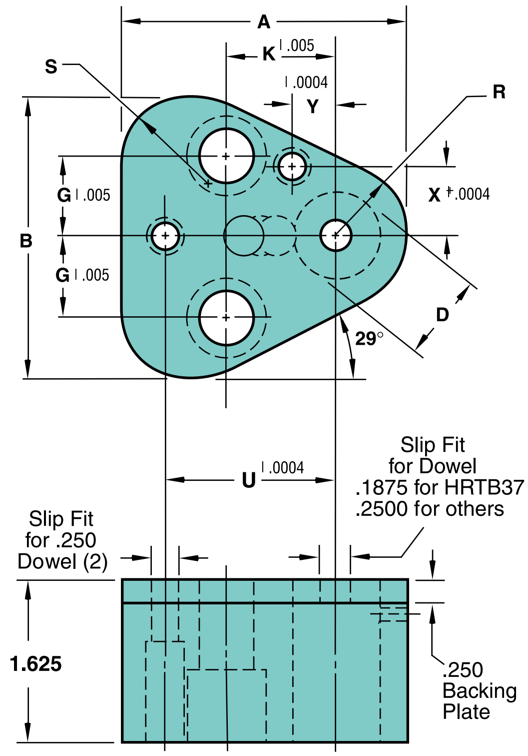
As with notches, angles can be added to clear other tooling in the die. Angles are saw cut ±.03.



Single Punch Retainer
with Backing Plate

True Position®

Type
HRTB
Heavy Duty



HOW TO ORDER

Specify:	Qty.	Code	D
Example:	23	HRTB	37

HRTB True Position® Retainer sets include:

- 1 Ball
- 1 Spring
- 2 Screws
- 2 Dowels
- 1 Ball Release Set Screw

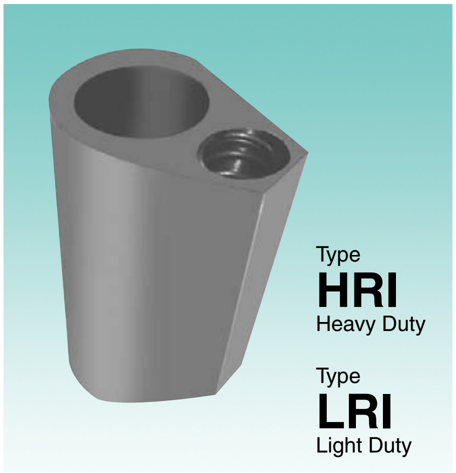
Heavy Duty	Code	D	A	B	G	K	R	S	U	X	Y	Screw Size
HRTB	37	.3750	1.75	1.72	.438	.750	.38	.47	1.060	.354	.295	5/16-18
	50	.5000	2.00	1.97	.562	.750	.50	.60	1.180	.472	.256	3/8-16
	62	.6250	2.12	2.09	.625	.750	.56	.66	1.250	.532	.236	3/8-16
	75	.7500	2.38	2.34	.688	.750	.69	.79	1.320	.650	.197	3/8-16
	87	.8750	2.50	2.47	.688	.750	.75	.85	1.400	.728	.197	3/8-16
	100	1.0000	2.75	2.72	.781	.938	.88	.97	1.600	.866	.276	1/2-13
	125	1.2500	2.75	2.72	.781	.938	.88	.97	1.600	.866	.276	1/2-13

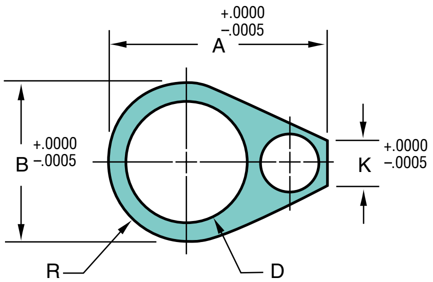
Features/Benefits

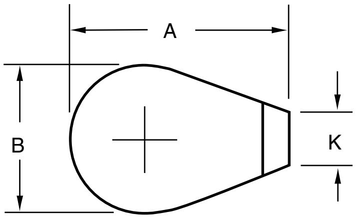
HRTB True Position® Retainers come complete with an ***integrated, hardened backing plate***. With all the features of the original True Position® Retainer, the HRTB satisfies the needs of applications where more bearing surface is desired. True Position® gives you true dimensional accuracy each and every time!

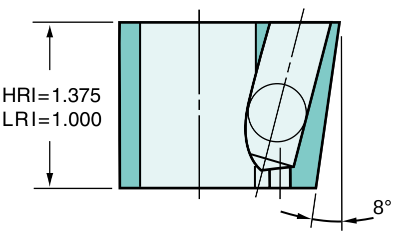
FIRM DELIVERY SCHEDULE
1 Day

EZ Fit™ Retainer Inserts









The shape shown above can be easily cut using wire EDM to assure a proper fit. The insert (utilizing both the straight and 8° angled sides) fits securely and is designed to clear the retainer by a small amount, making assembly and disassembly easier.

Each insert comes complete with wire cutting instructions that show recommended dimensions and tolerances for optimum performance.

HOW TO ORDER

Specify:	Qty.	Type	Code
Example:	5	HRI	37
	12	LRI	62

Heavy Duty

Type	Punch Hole Dia. D	Code	A	B	K
HRI	0.3750	37	1.0630	0.6250	0.3882
	0.5000	50	1.3190	0.7500	0.5250
	0.6250	62	1.4570	0.9000	0.4698
	0.7500	75	1.6040	1.0600	0.4202
	0.8750	87	1.7320	1.1950	0.4182
	1.0000	100	1.8700	1.3200	0.4111
	1.2500	125	2.1260	1.5700	0.3951

Light Duty

Type	Punch Hole Dia. D	Code	A	B	K
LRI	0.2500	25	0.7750	0.4375	0.3125
	0.3750	37	0.9000	0.5625	0.3125
	0.5000	50	1.1200	0.7500	0.3125
	0.6250	62	1.2500	0.8750	0.3125
	0.7500	75	1.4700	1.0700	0.3125
	0.8750	87	1.6000	1.1950	0.3125
	1.0000	100	1.7200	1.3200	0.3125

Features/Benefits

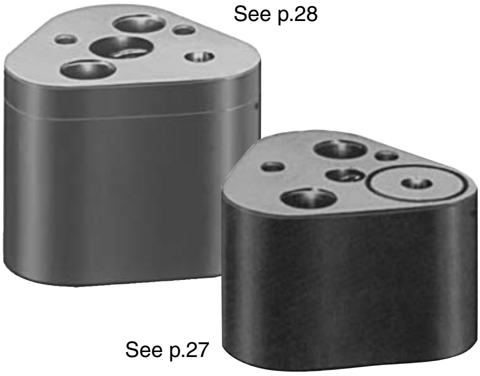
Dayton EZ Fit™ Ball Lock Retainer Inserts give you the ability to build, reconfigure, and custom-make retainers in-house as die specifications change.
In addition, the unique single-piece teardrop shape, combined with both a straight and an angled wedge side, holds your ball lock punch securely in place.

EZ Fit™ reduces costs and downtime—and simplifies tooling changeover.

FDS®
FIRM DELIVERY SCHEDULE
1 Day

™ EZ Fit is a trademark of Dayton Progress Corporation.
Mfg. under Patent No. 6,679,147.

True Position® Retainers


See p.28
See p.27

The ***in-line dowel assures precise punch-to-matrix alignment***, giving you higher quality parts, longer punch life, and reduced production downtime.

The True Position® Retainer ***eliminates hand fitting***, cutting mounting time by nearly 50%. Simply pull the retainer from its box, and screw it into the die set.

Only ***one dowel is required for round punches***, which reduces machining time by up to 50%. Shaped punches use the secondary dowel for precise alignment.

The ***precision-ground ball hole assures perfect alignment of any punch shape***, even if the retainer is replaced.

The True Position® Retainer allows complete ***inter-changeability between Heavy Duty and Light Duty retainers*** in the event of an engineering change.

Use of the True Position® Retainer can ***cut retainer inventory requirements by 50%***.

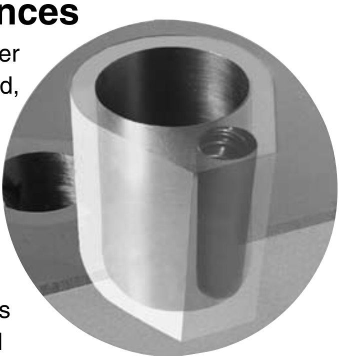
Backing Plates

The Backing Plates are standard with Dayton's HRTB True Position® Single Punch Retainers. The Backing Plate has the same function as the backing plug model True Position® Retainer, i.e., to prevent the punch shank from penetrating the punch plate.

For optimum resistance on impact HRTB Retainers have integrated, hardened Backing Plates. The Backing Plates cover the entire surface of the retainer, spreading the load over a large area.

E-Z Fit™ Retainer Inserts

Tighter Tolerances



Dayton EZ Fit™ Retainer Inserts utilize a patented, state-of-the-art design that assures tighter, more precise tolerances than other retainer inserts on the market. The unique teardrop shape provides a single, tightly secured receptacle for the punch. One side of the piece (the flat side) is cut at an 8° angle to create a wedge shape. The hole in the retainer is wire cut to create a snug fit. (See cutaway.)

EZ Fit™ Retainer Inserts are also ideal for repairing or making engineering changes.

Repair/Engineering Changes

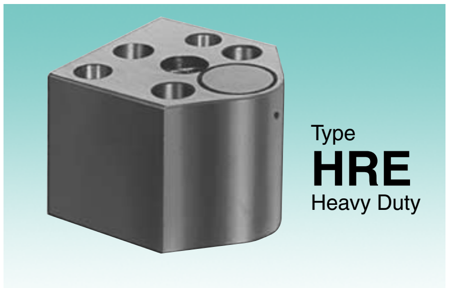
When job specifications change, the location(s) of the punches in the die set change, and reconfigured retainers are required. This means ordering new retainers or modifying existing retainers in-house. This can slow the process; often requires specialized equipment and knowledge; and the integrity of the original retainer can be compromised.

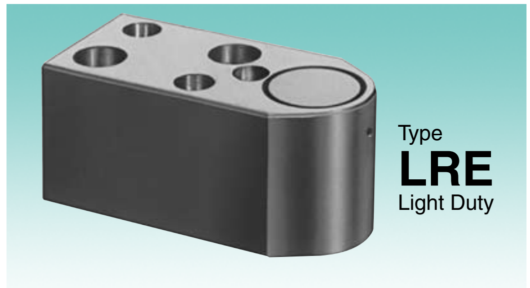
Now—with the help of the all-new Dayton EZ Fit™ Ball Lock Retainer Insert—this process can be simplified and completed in-house at a fraction of the cost of replacing existing retainers.

In-house Modifications

To retrofit the EZ Fit™ Insert, simply wire cut the hole to the specified size and install. (See instructions at www.daytonprogress.com/ezfit for EDM wire cutting.) The process is quick, easy, effective, and far less expensive than part replacement costs.

End Retainers
Heavy Duty/Light Duty

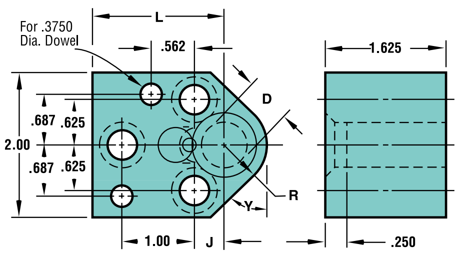


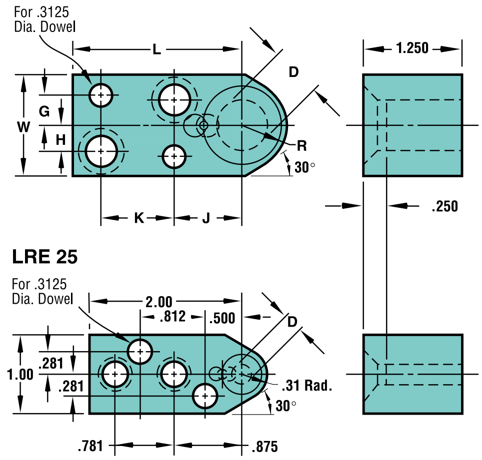


HOW TO ORDER

Specify:	Qty.	Type	D
Example:	15	HRE	100
	12	LRE	87

Retainer sets include:
- Backing Plug
- Ball
- Spring
- Screws
- Dowels





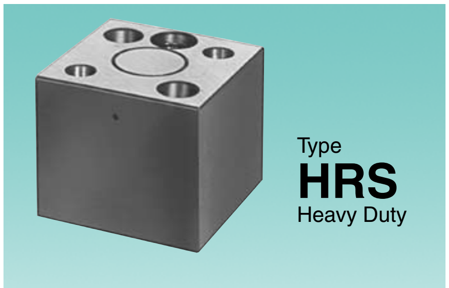
Catalog Number						
Type	D	L	J	R	Y	Screw Size
HRE	.5000	1.75	.375	.50	40°	3/8-16
	.6250	1.81	.438	.56	45°	3/8-16
	.7500	1.88	.500	.69	60°	3/8-16
	.8750	1.94	.562	.75	60°	3/8-16
	1.0000	2.00	.625	.81	60°	3/8-16
	1.2500	2.12	.750	1.00	—	3/8-16

Catalog Number									
Type	D	G	H	J	K	L	R	W	Screw Size
LRE	.2500	See Drawing							1/4-20
	.3750	.375	.281	.906	.969	2.25	.38	1.25	3/8-16
	.5000	.375	.281	.906	.969	2.25	.50	1.25	3/8-16
	.6250	.375	.281	.906	.969	2.25	.56	1.25	3/8-16
	.7500	.438	.344	1.125	1.000	2.50	.69	1.38	3/8-16
	.8750	.438	.344	1.125	1.000	2.50	.75	1.50	3/8-16
	1.0000	.438	.344	1.125	1.000	2.50	.81	1.62	3/8-16

FDS®
FIRM DELIVERY SCHEDULE
1 Day

Note: Screw and Dowel Locations ± .005.

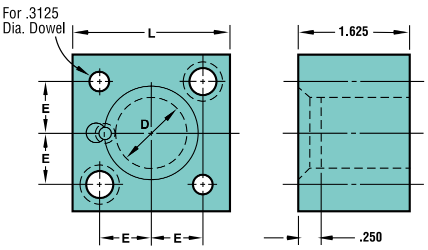
Square Retainers
Heavy Duty/Light Duty

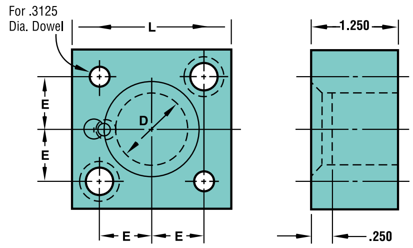


HOW TO ORDER

Specify:	Qty.	Type	D
Example:	12	HRS	62
	8	LRS	37

Retainer sets include:
- Backing Plug
- Ball
- Spring
- Screws
- Dowels





Catalog Number

Type	D	L	E	Screw Size
HRS	.5000	1.88	.562	$\frac{3}{8}$-16
	.6250	2.00	.625	$\frac{3}{8}$-16
	.7500	2.12	.688	$\frac{3}{8}$-16
	.8750	2.38	.750	$\frac{1}{2}$-13
	1.0000	2.38	.750	$\frac{1}{2}$-13
	1.2500	2.62	.812	$\frac{1}{2}$-13

Catalog Number

Type	D	L	E	Screw Size
LRS	.2500	1.25	.312	$\frac{1}{4}$-20
	.3750	1.38	.375	$\frac{5}{16}$-18
	.5000	1.50	.438	$\frac{5}{16}$-18
	.6250	1.62	.500	$\frac{5}{16}$-16
	.7500	1.88	.562	$\frac{3}{8}$-16
	.8750	2.00	.625	$\frac{3}{8}$-16
	1.0000	2.25	.750	$\frac{3}{8}$-16
***LRS**	1.2500	2.25	.750	$\frac{3}{8}$-16
	1.5000	2.75	1.000	$\frac{3}{8}$-16
	1.7500	2.75	1.000	$\frac{3}{8}$-16

*May be furnished with Backing Plate instead of Backing Plug.

FDS®
FIRM DELIVERY SCHEDULE
1 Day

Note: Screw and Dowel Locations ± .005.

Classified Shapes

Classified shapes (83 common shapes, no detailing required) are available on all punches and matrixes, as indicated in this catalog. The 83 available common shapes are shown here and on p. 33. Also, see the outside of the pullout tab for notes and drawing references.

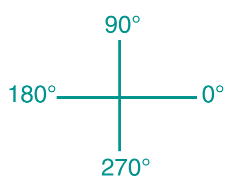
Ordering Information

*Corner Dimensions

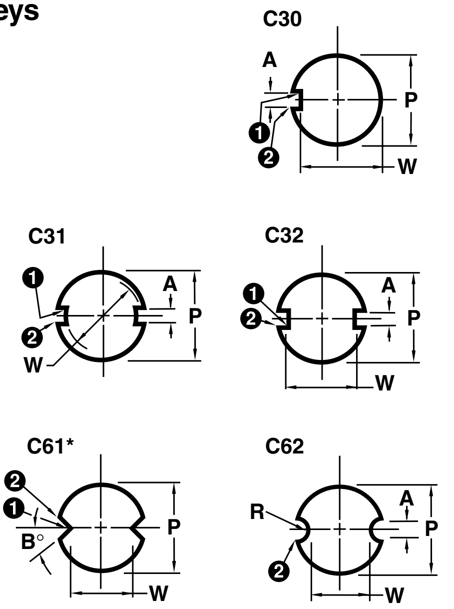
Dimensions should be the theoretical sharp corners for shapes C22, C24, C34, C61, and C88. However, some reduction of these dimensions will result from fitting the punch and matrix under conditions where the clearance is .0025 or less per side.

†Shape Center

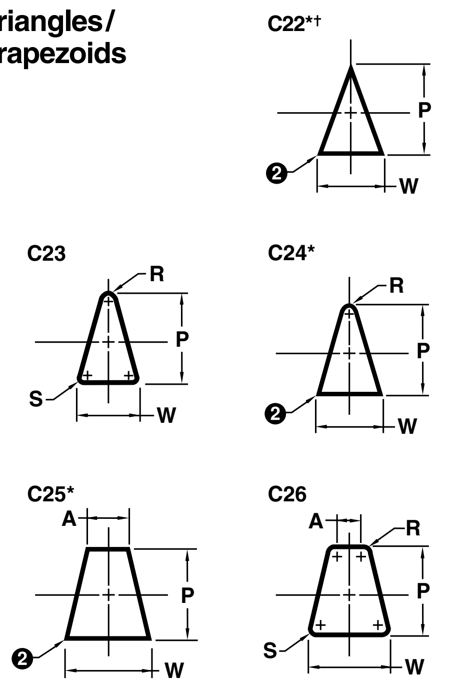
Shapes are centered on the punch shanks as shown. Shapes in guide bushings and matrixes are also centered as shown with the exception of shapes C22 and C34. Due to clearance, the P dimension on these shapes will not be centered.



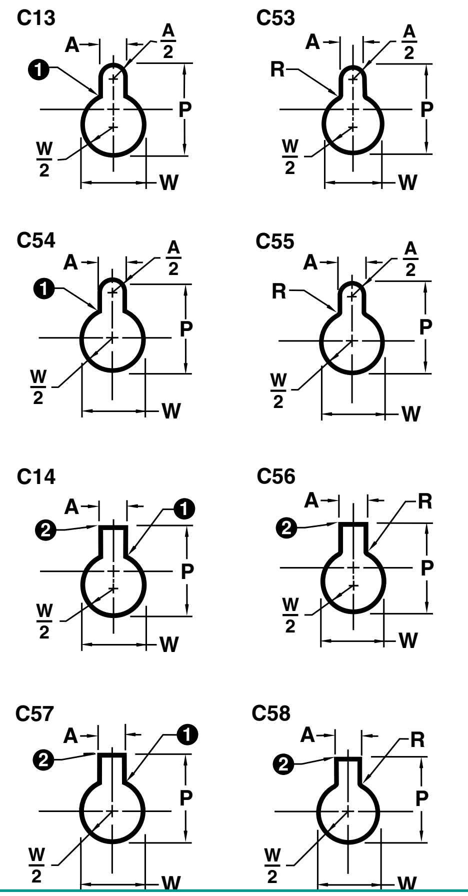
Keys



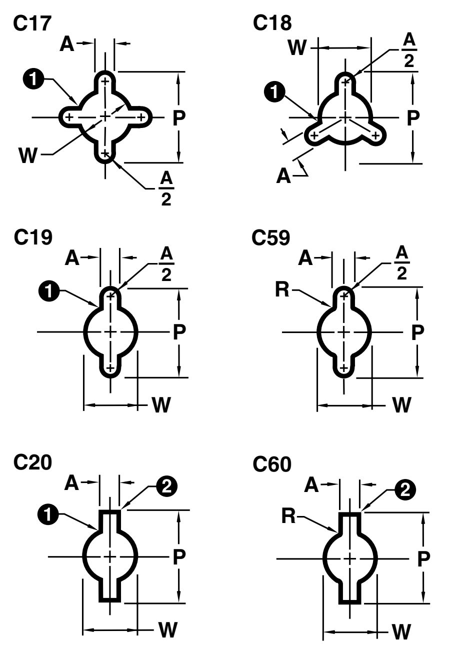
Triangles / Trapezoids



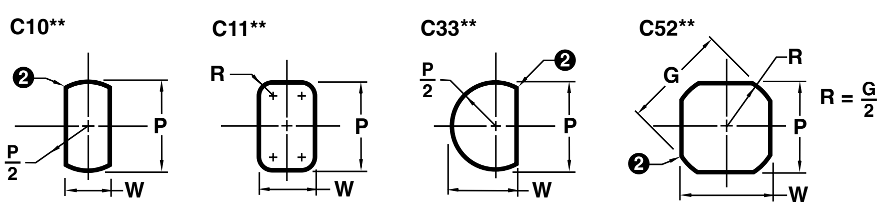
Mono Lobes



Multi Lobes



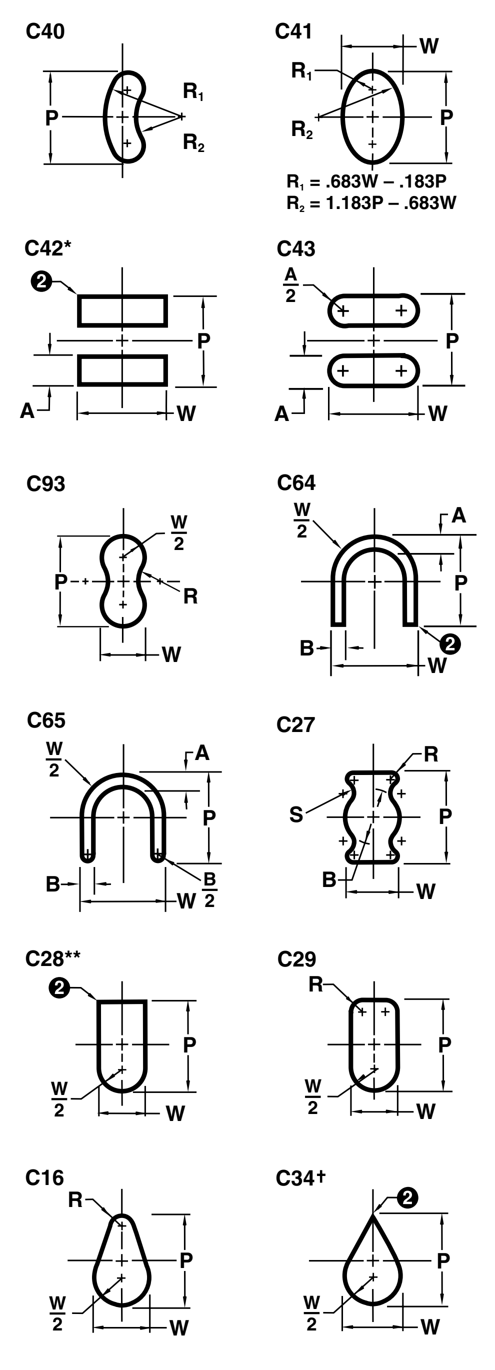
Flatted Rounds



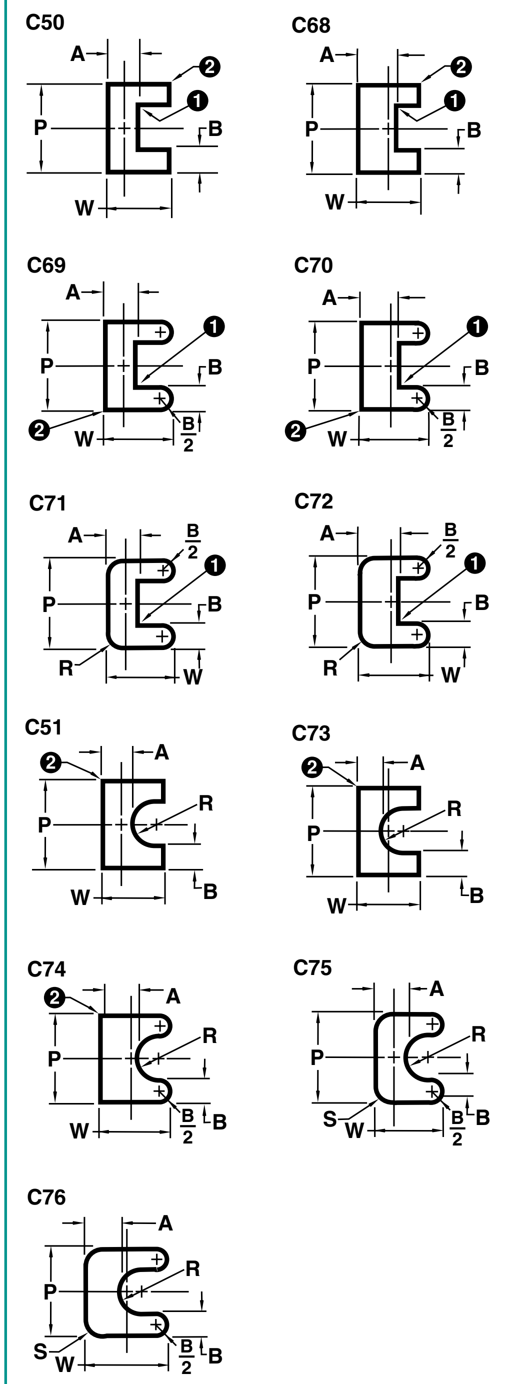
** Now standard. See product pages.

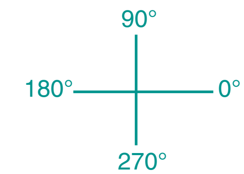
Classified Shapes

Miscellaneous

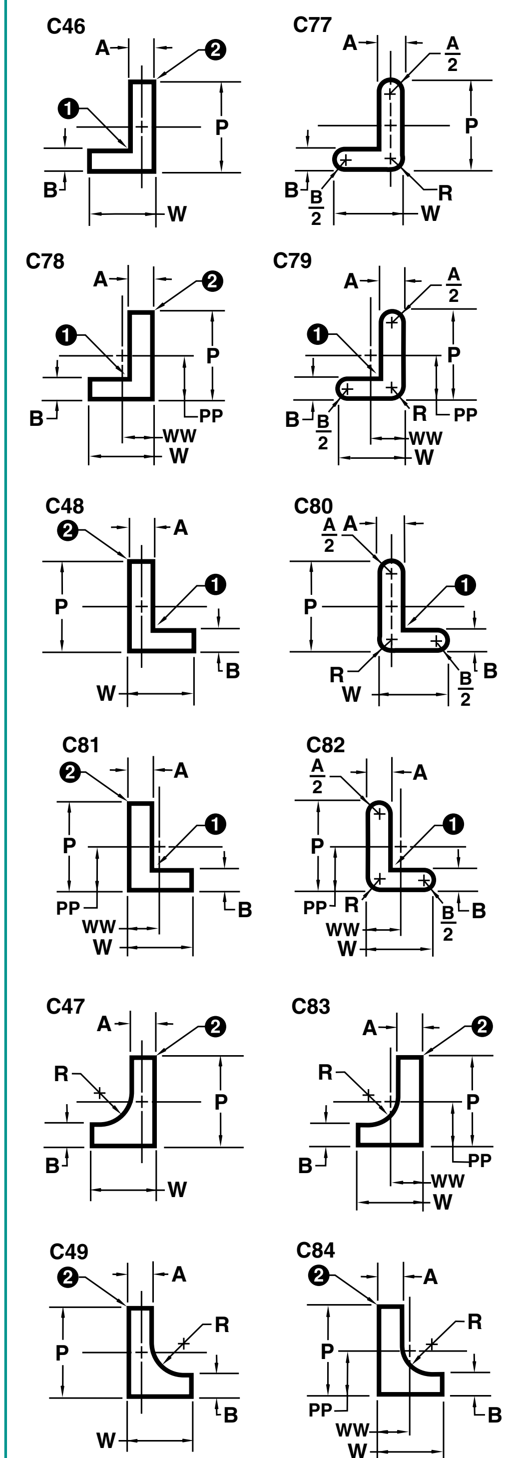


Us

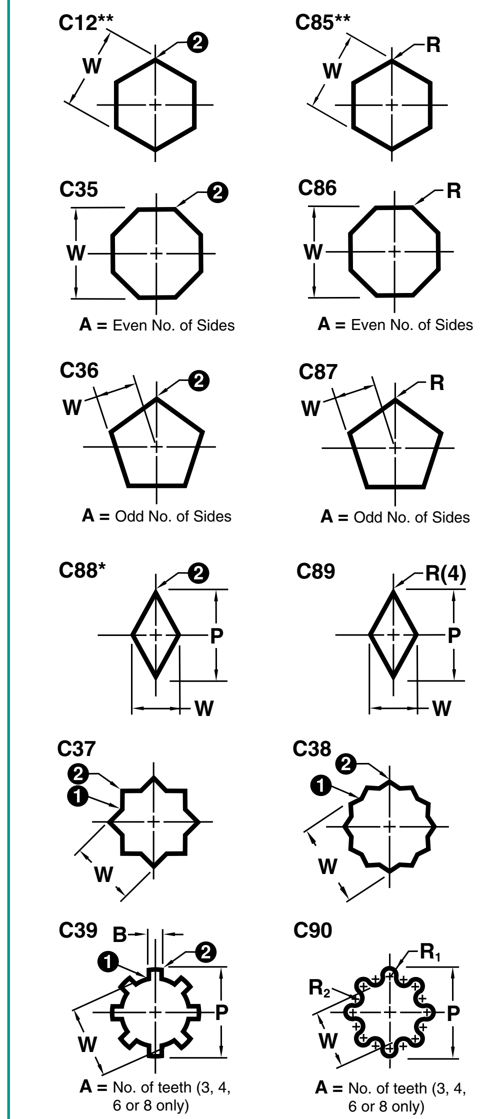




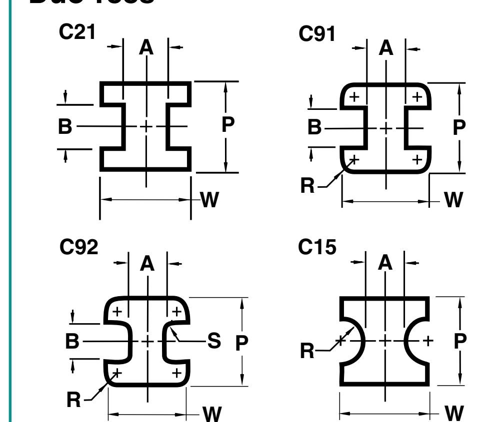
Ls



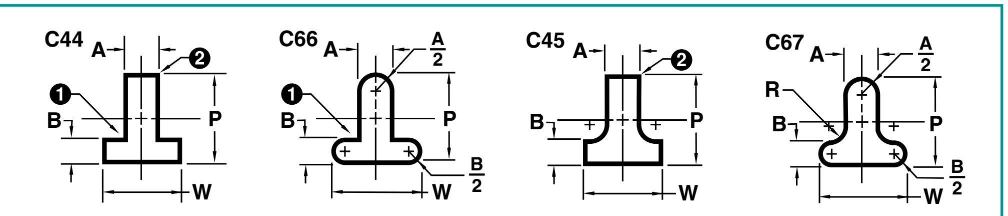
Polygons



Duo Tees

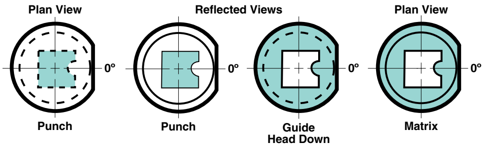


Ts



*See "Corner Dimensions" note on p. 32.

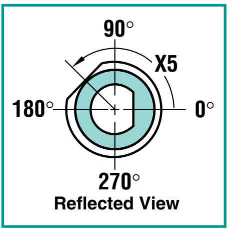
Reflected View—Punches and Guides



The reflected view is used for punches and guides. It is the view as seen in a mirror held below a punch or guide in its operating position. It is the same as a plan view from the head end, in which the point shape is shown dotted. A reflected view is shown with solid lines.

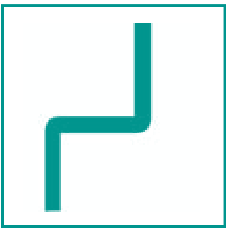
Orientation and Locking

The locking device orientation is standard at 0°. For types of locking methods and custom locations, see p.38.



Clearance

Normal grinding methods produce ❶ .007 max fillet on the punch and ❷ .007 max fillet on the matrix with matching corner shape on the matrix and punch, respectively. When ordering matrixes, please specify punch dimensions and clearance per side (Δ).



Accessories

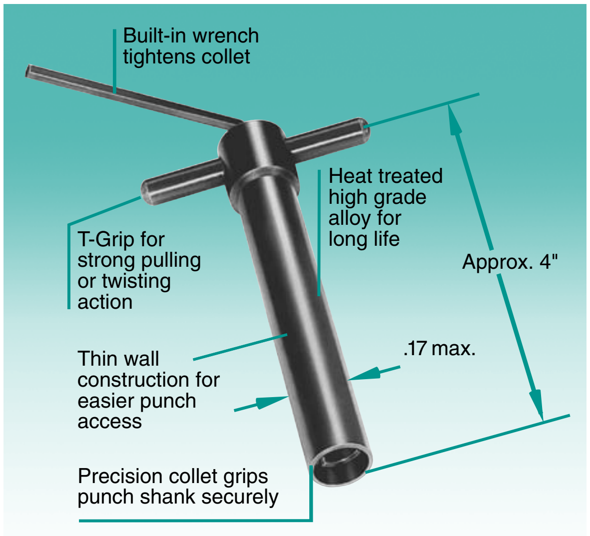
Retainers

Reg. U.S. Pat. & TM Office		Backing Plugs: Type A Standard in Single-hole Retainers 	Backing Plugs: Type B Optional for Matrixes 	Backing Plugs: Type C Standard in Multi-Position™ Retainers 	Socket Head Cap Screw 	Retainer Nut 	Dowel 	Ball Release Screw 	Ball 	Standard Spring 	Extra Heavy Duty Spring 	Booster Spring 	Retainer Drill Bushing 
Heavy Duty **HRT** 	37	573345			574112 5/16-18x1 3/4	574953 5/16-18	574015 3/16 x 3/4	575275 10-24 x 1	813109 3/8 Dia.	573922	573981	269026	572683
	50	573426			574198 3/8-16 x 2	830097 3/8-16	574031 1/4 x 3/4		813168 1/2 Dia.	573949	574007	269042	572756
	62	573493											572837
	75	573566											572918
	87	573647											572985
	100	573728			574279 1/2-13 x 2	830127 1/2-13							573051
	125	573795											573124
HRS 	50			573434	574198 3/8-16 x 2	830097 3/8-16	817007 5/16 x 1 1/2		813168 1/2 Dia.	573949	574007	269042	
	62			573507									
	75			573574									
	87			573655									
	100			573736	574279 1/2-13 x 2	830127 1/2-13							
	125			573809									
HRE 	50			573434	574198 3/8-16 x 2	830097 3/8-16	817015 3/8 x 1 1/2		813168 1/2 Dia.	573949	574007	269042	
	62			573507									
	75			573574									
	87			573655									
	100			573736									
	125			573809									
Light Duty **LRT** 	25	573264			505439 5/16-18x1 1/2	574953 5/16-18	573973 1/8 x 3/4	57525 8-32 x 1	813028 1/4 Dia.	573876			572616
	37	573345					574015 3/16 x 3/4						572683
	50	573426	573442		574163 3/8-16 x 1 1/2	830097 3/8-16	574031 1/4 x 3/4		813052 5/16 Dia.	573892			572756
	62	573493	573515										572837
	75	573566	573582						813109 3/8 Dia.	573914			572918
	87	573647	573664										572985
	100	573728	573744		574252 1/2-13 x 1 3/4	830127 1/2-13							573051
LRS 	25			573272	505226 1/4-20 x 1 1/2	830038 1/4-20	817007 5/16 x 1 1/2		813028 1/4 Dia.	573876			
	37			573353	505439 5/16-18x1 1/2	574953 5/16-18							
	50		573442	573434					813052 5/16 Dia.	573892			
	62		573515	573507									
	75		573582	573574	574163 3/8-16 x 1 1/2	830097 3/8-16			813109 3/8 Dia.	573914			
	87		573663	573655									
	100		573744	573736									
	125									814105			
	150												
	175												
LRE 	25			573272	505226 1/4-20 x 1 1/2	830038 1/4-20	817007 5/16 x 1 1/2		813028 1/4 Dia.	573876			
	37			573353	574163 3/8-16 x 1 1/2	830097 3/8-16							
	50		573442	573434					813052 5/16 Dia.	573892			
	62		573515	573507									
	75		573582	573574					813109 3/8 Dia.	573914			
	87		573663	573655									
	100		573744	573736									

HOW TO ORDER

Specify:	**Qty.**	**Product #**
Example:	150	813109 (Ball for HRT with .3750 dia.)
	28	817007 (Dowel for HRS)
	43	573876 (Spring for LRE with .2500 dia.)

Accessories
Miscellaneous



Punch Pullers

Dayton Punch Pullers simplify and speed the removal of ball lock punches from retainers. You no longer have to improvise with vise grips or other tools that can slip from the punch, making removal difficult or hazardous.

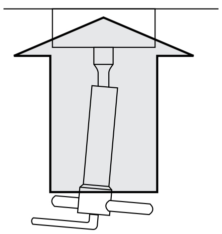
Dayton Punch Pullers are made of high-grade alloy steel and are heat-treated and precision machined for long, reliable service. Dayton Punch Pullers, which can improve performance and save downtime, are available in shank sizes from .250" to 1.250".

HOW TO ORDER

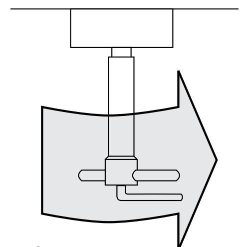
Specify:	Qty.	Product #
Example:	3	818097 (.250 shank diameter with 1.12 max point length)

Catalog Number	Shank Diameter In Inches	Max. Point Length
818097	.250	1.12
818119	.375	1.31
818127	.500	1.56
818135	.625	1.56
818143	.750	1.56
818151	.875	1.56
818178	1.000	1.81
818186	1.250	1.81

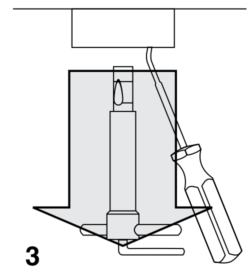
Removes ball lock punches quickly and easily



1
Slide Punch Puller over the shank.



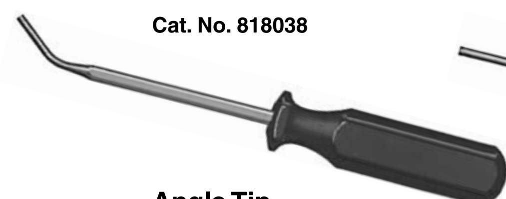
2
Rotate the built-in wrench until tight.



3
Insert release tool and pull down.

Ball Release Tools

Cat. No. 818038



Angle Tip
(for all retainers)

Cat. No. 818046

Straight Tip
(for all retainers)

Cat. No. 818054 Light Duty
Cat. No. 818062 Heavy Duty

Threaded Tip
(for True Position® Retainers)

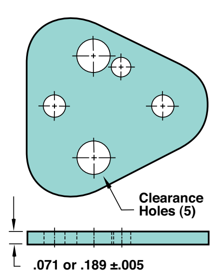
HOW TO ORDER

Specify:	Qty.	Product #
Example:	2	818046 (Straight Tip)

Shim/Backing Plate

HOW TO ORDER

Specify:	Qty.	Product #
Example:	2	URSP 1318



	Thickness T	
D	**.189 (Rc54-56)**	**.071 (Soft)**
25	URBP 0648	URSP 0618
37	URBP 1048	URSP 1018
50	URBP 1348	URSP 1318
62	URBP 1648	URSP 1618
75	URBP 2048	URSP 2018
85	URBP 2248	URSP 2218
100	URBP 2548	URSP 2548
125	URBP 3248	URSP 3248

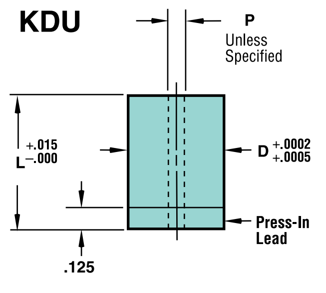
EDM Matrix Blanks

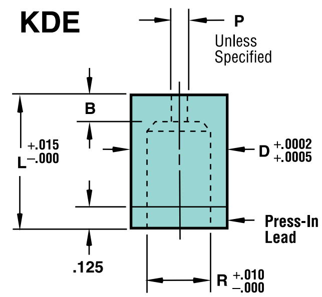
Type
KD_

HOW TO ORDER

Specify:	**Qty.**	**Type**	**D Code**	**L**	**P**	**Steel**
Example:	6	KDE	37	100	XP.020	M2
	5	KDU	50	112		M2

Standard "P" will be provided, unless otherwise specified.





Material
Steel: M2, RC 60-63
Round P ±.005 | ◎ | .005 | P to D |
D ⩳ Tolerance +.0006 +.0002

Body		K_U			K_E											
Dia.	**Std. P**	**Optional P**		**Std. P**	**Optional P**		**B**	**R**	**.75**	**.87**	**.93**	**1.00**	**1.12**	**1.25**	**1.37**	**1.50**
.2500	.031	.020	—	.031	.020	—	.15	.156								
.3125	.031	.020	—	.031	.020	—	.25	.191								
.3750	.031	.020	—	.031	.020	—	.25	.228								
.4375	.031	.020	—	.031	.020	—	.25	.281								
.5000	.062	.020	—	.031	.020	—	.25	.312								
.6250	.062	.020	.031	.093	.020	.031	.25	.391								
.7500	.062	.020	.031	.093	.020	.031	.31	.468								
.8750	.062	.020	.031	.093	.020	.031	.31	.578								
1.0000	.062	.020	.031	.093	.020	.031	.31	.703	75	87	93	100	112	125	137	
1.2500	.062	.020	.031	.125	.020	.031	.37	.828								150
1.5000	.062	.020	.031	.125	.020	.031	.37	1.093								
1.7500	.125	.020	.031	.125	.020	.031	.37	1.430								
2.0000	.125	.020	.031	.125	.020	.031	.37	1.630								
2.2500	.125	.020	.031	.125	.020	.031	.37	1.830								
2.5000	.125	.020	.031	.125	.020	.031	.37	2.030								
2.7500	.125	.020	.031	.125	.020	.031	.37	2.230								

FIRM DELIVERY SCHEDULE
Standard P 1 Day
Larger P 3 Days
1.7500 and up (any P) 4 Days

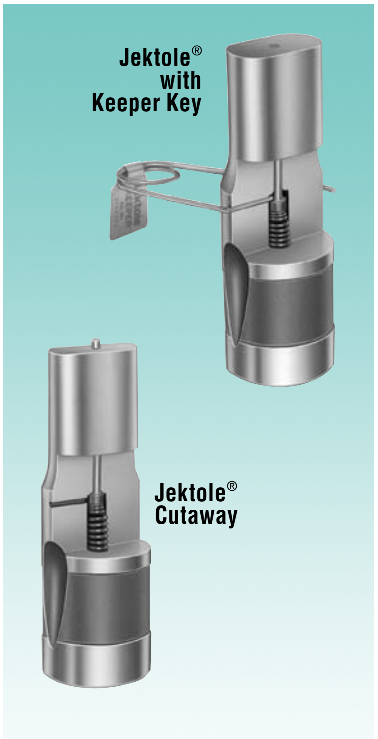
Features/Benefits

Select either round ***KDU EDM Matrix Blanks*** or round ***KDE Matrix Blanks***. Relief hole (P) provides sufficient clearance for slug removal during the stamping process in both types.

KDU Blanks are provided with a small straight through hole. They are commonly used for wire and vertical EDM operations. There are two key advantages with this type of blank: in wire cutting, a tapered relief can be cut instead of a round straight relief; in conventional EDM applications, you can customize the size of the relief to the shape you are cutting.

KDE Blanks are used with conventional (vertical) EDM machines. The hole (P) is used to introduce dielectric to the spark gap for flushing away eroded particles of steel. For the fastest delivery, use the hole (P) dimension given in the chart. If another hole is desired, simply specify "XP," and indicate the dimension.

Jektole® Data



The Engineered Clearance

Perforating punch-to-matrix clearances in metal stamping dies has been universally expressed as a percentage of stock thickness, and for clarity should be articulated as percent per side (Δ=clearance per side).

Standard practice has called for Δ 5%, and is commonly known as "regular clearance." Regular clearance has been applied almost universally to all applications involving the perforation of ferrous materials.

Jektole®, the ***Engineered Clearance***, is approximately twice regular clearance, i.e., Δ 10-12%. This means greater productivity, improved maintenance, and a better return on your tooling investment.

In addition, clearances of up to Δ 50% are not uncommon with some hard materials. Clearance tests have been performed by Dayton Progress to prove that increasing the clearance does not lessen hole quality—a common thought by some designers and engineers. Dayton clearance tests do, in fact, prove that the Jektole® ***Engineered Clearance*** provides many advantages and benefits.

Jektole® In Production

- Requires less press tonnage
- Reduces the pressure required to strip the punch, which, in turn, reduces punch wear
- Produces minimal burr
- Doubles—often triples—piece output per grind
- Reduces total punch costs

Jektole® In Maintenance

- Keeper Key holds pin in retracted position (see photo at left)
- Eliminates the need for disassembly before grinding
- Helps maintain proper pin extension
- Reduces downtime for regrinding

Standard Jektole® Data

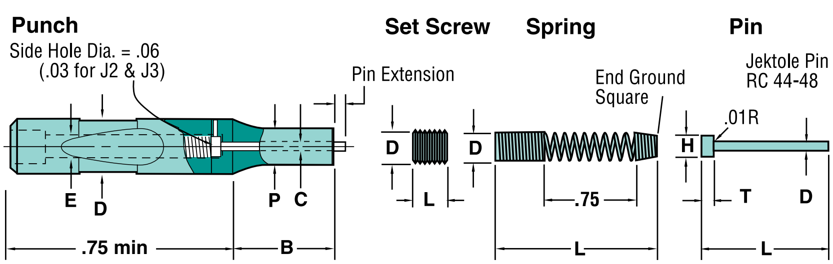
DIMENSION		J2*	J3	J4	J6	J9	J12
Std. Shank Dia.	D	.250	.250	.375	.500 .625	.750 .875 1.000	1.250
Point Hole Dia.	C	.020	.032	.046	.063	.094	.125
Shank Hole Dia.	E	.086	.109	.141	.172	.221	.275
Pin Extension		.030	.030	.060	.060	.060	.060
Keeper Key No.		920045			920053		**

* Point Diameters < .080" ** Keeper Key not available

Jektole® Design Limits

DIMENSION		J2	J3	J4	J6	J9	J12
Min. Shank Dia.	D	.172	.218	.382	.344	.442	.552
Min. Point Dia.	P	.040	.064	.092	.126	.188	.250
Max. Point Lgth.	B	1.25	1.50	1.62	1.62	1.62	1.62

Jektole® Components



Universal Jektole® Components

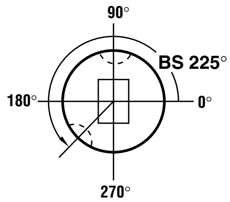
EJECTOR PINS		J2	J3	J4	J6	J9	J12
Overall Length	L	1.11	1.38	1.94	1.94	2.22	2.22
Pin Diameter	D	.017	.027	.041	.058	.089	.120
Head Diameter	H	.048	.073	.094	.120	.156	.188
Hd. Thickness	T	.031	.047	.062	.062	.094	.094
SPRINGS		J2	J3	J4	J6	J9	J12
Outside Dia.	D	.081	.104	.136	.167	.216	.270
Free Length	L	2.38	2.38	3.19	3.00	3.03	2.56
Pressure (.12" Preload)	lbs.	.5	.75	1	1.5	2	2.5
SCREWS		J2	J3	J4	J6	J9	J12
Screw Size	D	#3-48	#5-40	#8-32	#10-32	1/4-28	5/16-24
Screw Length	L	.19	.19	.19	.19	.25	.25

Locking Devices

Orientation

The standard ball seat location is at 90°. Alternate locations of 0°, 180°, or 270° may be specified at no extra cost.

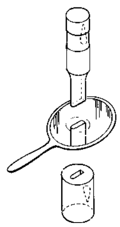
Custom ball seat locations may be specified as "BS" and at the degree required counter-clockwise from 0°. (See drawing on right.)



Views

A plan view is used for the matrix, and a reflected view is used for the punch. The reflected view, a mirror image (see p. 31, "Classified Shapes"), simplifies orientation: All locking devices are in the same position.

Identify as "reflected view" on the punch drawing.



How to Specify

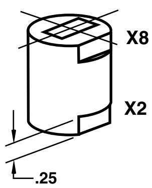
This page shows the most common locking devices available for press-fit matrixes—single flat, double flat, and dowel. Select the type, then add the code to the component description. (See "how to order" box on right.)

Single Flats X2, X5, X8, X9

The standard key flat locking device is at 0°. Specify "X2" (bottom) or "X8" (top) for matrixes.

Alternate locations of 90°, 180°, or 270° may be specified at no additional cost. Specify "X2" or "X8" and the degree required.

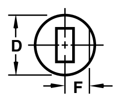
Example: X2—90°.



Custom Location

Specify "X5" (bottom) or "X9" (top) and the degree required counter-clockwise from 0°.

Example: X5—135°.

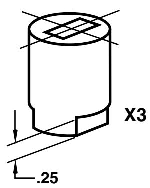


Double Flats X3, X6

The double key flat locking device is at 0°. Specify "X3" for matrixes.

Alternate locations of 90°, 180°, and 270° may be specified at no additional cost. Specify "X3" and the degree required.

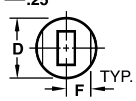
Example: X3—90°.



Custom Location

Specify "X6" for matrixes and the degree required counter-clockwise from 0°.

Example: X6—135°.



F Dimension for Flats

for Press-Fit Matrixes

Body Dia.	25	37	50	62	75	87	100
F	.110	.165	.220	.270	.325	.380	.435
Body Dia.	**125**	**150**	**175**	**200**	**225**	**250**	**275**
F	.540	.650	.775	.900	1.025	1.150	1.275

Location Tolerance

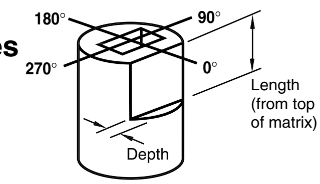
Flat		Dowel	
F	Radial	F	Radial
+ .0005 – .0000	.001/ inch	+ .0005 – .0000	0°-4'

HOW TO ORDER

Specify:	Qty.	Type	D Code	P (or P&W)	Steel	Alteration
Example:	5	LAO	87-100	P.394, W.209	A2	X2
	9	LAR	50-125	P.275, W.092	M2	X83

Additional Flat For Punches and Matrixes

The depth of the flat is taken from the shank, not the head, on punches.



	Code	Depth	Length
Standard Location	X81	.060	.500
	X82	.060	.625
	X83	.060	.750
	X84	.060	Full Length
	X85	.093	.500
	X86	.093	.625
	X87	.093	.750
	X88	.093	Full Length
	X89	Specify Dimensions	
Custom Location	X91	.060	.500
	X92	.060	.625
	X93	.060	.750
	X94	.060	Full Length
	X95	.093	.500
	X96	.093	.625
	X97	.093	.750
	X98	.093	Full Length
	X99	Specify Dimensions	

Dowel Slots X0, X1, X4, X7, X41, X71

The standard dowel locking device is at 0°. Specify "X4" (.125 dowel) or "X41" (.1875 dowel) for matrixes. Specify "X0" (F=.5D) for matrixes only.

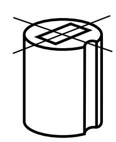
Alternate locations of 90°, 180°, or 270° may be specified at no additional cost. Specify "X0," "X4," or "X41" and the degree required.

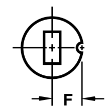
Example: X4—90°.

Custom Location

Specify "X7" (.125 dowel) or "X71" (.1875 dowel) for matrixes. Specify "X1" (F=.5D) for matrixes only. Specify "X1," "X7," or "X71," and the degree required counter-clockwise from 0°.

Example: X71—135°.





F Dimension for Dowels

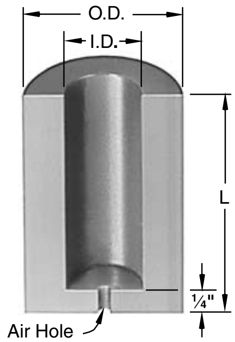
for Press-Fit Matrixes

Body Dia.		25	31	37	43	50	62-275
X0, X1	F	.1250	.1562	.1875	.2188	.2500	D/2
X4, X7		.1625	.1875	.2125	.2375	.2625	D/2
X41, X71		.1938	.2188	.2438	.2688	.2938	D/2

Order example:

X0, X1, X4, & X7 — .1250 Dowel **X41 & X71** — .1875 Dowel

Urethane Strippers



Air Hole	I.D.
1/16	3/16-¼
3/32	5/16
⅛	⅜-1

Features/Benefits

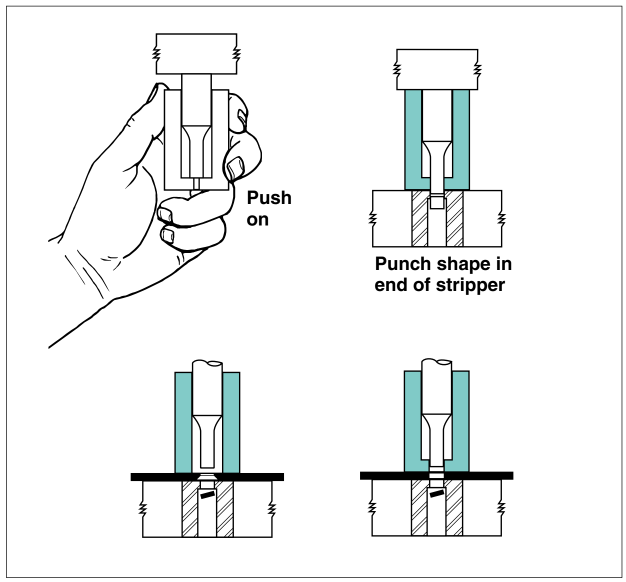
Dayton's durable, yet flexible, Urethane Strippers provide superior stripping over conventional strippers; develop higher load-bearing capacity due to the use of a unique curing agent; are tear- and oil-resistant; provide exceptional dampening of the punch, thus eliminating premature punch failure due to vibration; and are easy to install and replace.

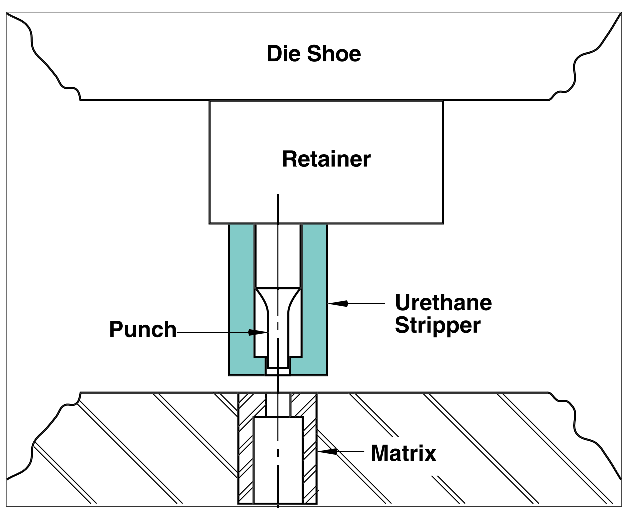
Strip-shape Dayton Urethane Strippers assure positive stripping and dampen punch vibration by gripping around the punch point. The closed-end feature holds the thin stock flat during the stripping cycle, and helps eliminate the potential for rejected parts.

HOW TO ORDER

Specify:	Qty.	Type	I.D.	L
Example:	12	USE	37	125

Catalog Number	I.D.	O.D.	L	Pressure at Deflection of		
				⅛	¼	⅜
USE18-125	3/16	11/16	1¼	250	400	—
USE18-150			1½	230	350	—
USE25-125	¼	¾	1¼	280	475	—
USE25-150			1½	275	465	—
USE25-175			1¾	220	375	490
USE31-125	5/16	13/16	1¼	320	500	—
USE31-150			1½	300	450	—
USE31-175			1¾	270	400	575
USE31-200			2	240	370	600
USE37-125	⅜	⅞	1¼	420	695	—
USE37-150			1½	385	625	—
USE37-175			1¾	355	575	760
USE37-200			2	310	515	670
USE50-125	½	1	1¼	520	790	—
USE50-150			1½	450	725	—
USE50-175			1¾	435	680	875
USE50-200			2	315	510	650
USE50-225			2¼	275	475	600
USE62-125	⅝	1⅛	1¼	600	925	—
USE62-150			1½	520	835	—
USE62-175			1¾	480	775	1000
USE62-200			2	440	730	935
USE75-175	¾	1½	1¾	500	800	1200
USE75-200			2	400	700	1100
USE75-225			2¼	350	650	1000
USE75-250			2½	325	600	900
USE75-275			2¾	300	550	800
USE87-175	⅞	1¾	1¾	1500	2200	3400
USE87-200			2	1200	1900	2800
USE87-225			2¼	1150	1850	2400
USE87-250			2½	900	1450	1900
USE87-275			2¾	850	1350	1800
USE100-175	1	2	1¾	2000	3000	3500
USE100-200			2	1600	2600	3400
USE100-225			2¼	1400	2300	3200
USE100-250			2½	1200	2000	3000
USE100-275			2¾	1000	1800	2800





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Global leader in providing fabrication and stamping solutions

Form 920 11/06

Subsidiary Federal Signal Corporation