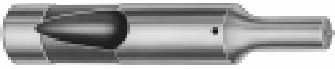







# Contents




## Punches

		Heavy Duty	Light Duty
Jektole® 	Round/Shape	2/3	12/13
	Blanks	11	21
	Point Larger than Shank	10	20
Regular 	Round/Shape	4/5	14/15
	Blanks	11	21
	Point Larger than Shank	10	20
Pilots  	Positive Pick-Up	8/9	18/19
	Regular	6/7	16/17

## Matrixes

Ball Lock 	Round/Shape	28/29
Press-Fit 	Round/Shape	28/29
Blanks 	EDM Matrix Blanks	32

## Retainers

   	True Position®	23	23
	End/Square	26	26
	Multi-Position™	24/25	24/25
	Accessories		27
	Ball Release Tools		27
	Backing/Shim Plates		23

## Miscellaneous

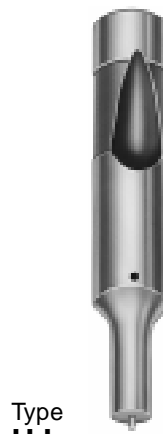
Alterations:		
Punches	3/5/10	13/15/20
Pilots	7/9	17/19
Matrixes		29
Classified Shapes		32/33
Jektole® Data		22
Locking Devices		31
Punch Gages		37
Punch Pullers		36
Templates		22
Urethane Strippers		35

# Heavy Duty Jektol<sup>®</sup> Punches

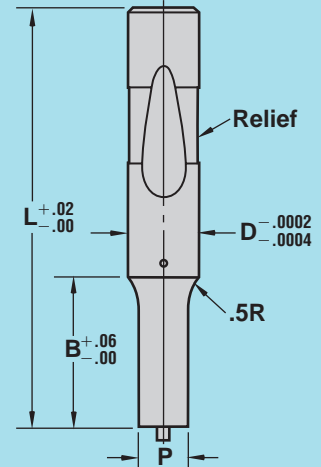
ANSI/ASME B94.18-1987

**NEW** Particle Steel  
PS4 with 4% vanadium  
provides higher wear  
resistance and toughness  
than M2.

**FDS**  
FIRM DELIVERY SCHEDULE  
Round 1 Day, Shape 2 Days,  
PS4 +2 Days



Type  
HJ\_



Steel: A2, M2, PS4 Rc 60-63

Round P  $\pm .0005$   $\text{P to D}$

Shape P,W  $\pm .0005$   $\text{P to D}$

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

## How to Order:

Specify: Quantity

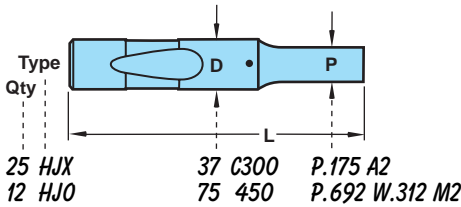
Type

Shank & Length Codes

P or P & W dimensions

Steel

Standard Alterations



### 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

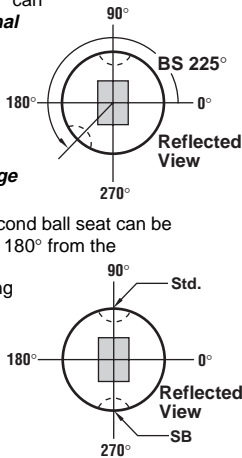
Custom Ball Seat Locations can be specified as BS and degrees counter-clockwise from 0°. **See page 31 for more information.**

**Double Ball Seat** A second ball seat can 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. Can also be located 90° from primary ball seat. **Not recommended for diameters under .750.**

### Example:

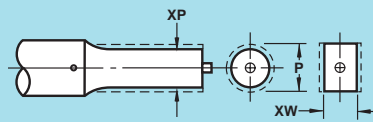
HJR 87, B 325, P .675, W .380, SB 270°



## Standard Alterations

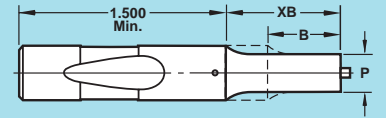
Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge. Does not add to delivery unless noted.

### XP, XW P & W Dimensions Smaller than Standard



### XB Point Length Longer than Standard

For point lengths over 1.625 thru 2.000, specify **XBB** and dimensions. Limitations are the same as 1.625 as shown in the chart below.



**XBB adds 3 days to delivery.**

Point Length	.5001	.6251	.7501	.8751	1.0001	1.1251	1.2501	1.3751	1.5001	1.6250	Jektole Pin
<b>Code</b>											
<b>Type</b>											
	<b>Min. P (Rounds)</b>										
37	HJX	.062	.062	.080	.080	.115	.115	.115	.115	.115	J2, J4*
50	HJX	—	.158	.158	.158	.158	.158	.158	.158	.158	J6
62	HJX	—	.158	.158	.158	.158	.158	.158	.158	.158	J6
75	HJX	—	.235	.235	.235	.235	.235	.235	.235	.235	J9
87	HJX	—	.300	.300	.300	.300	.300	.300	.300	.300	J9
100	HJX	—	.350	.350	.350	.350	.350	.350	.350	.350	J9
125	HJX	—	.450	.450	.450	.450	.450	.450	.450	.450	J12

		<b>Min. W (Shapes)</b>									
37	HJ_	.062	.062	.080	.080	.115	.115	.115	.115	.115	J4*
50	HJ_	—	—	.158	.158	.158	.158	.158	.158	.158	J6
62	HJ_	—	—	.158	.158	.158	.158	.158	.158	.158	J6
75	HJ_	—	—	.235	.235	.235	.235	.235	.235	.235	J9
87	HJ_	—	—	.235	.235	.235	.235	.235	.235	.235	J9
100	HJ_	—	—	.235	.235	.235	.235	.235	.235	.235	J9
125	HJ_	—	—	.281	.281	.281	.281	.281	.281	.281	J12

\*J2 (P = .062-.1149) J4 (P ≥ .115)

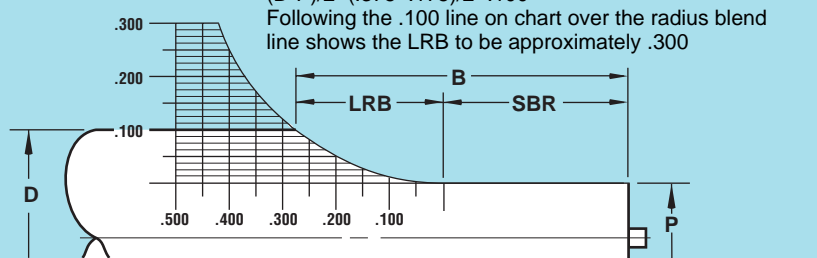
## SBR Straight Before Radius

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

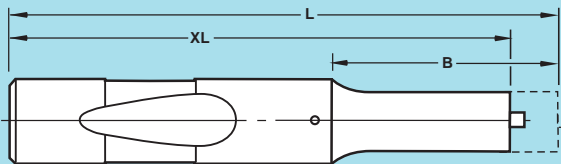
**Example:** D=.375 P=.175  
(D-P)/2 = (.375-.175)/2 = .100

Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300



## XL Overall Length Shortened (2.00 min.)

Stock removal from point end which shortens B length.



## XCN

**XN** DayTride® A unique wear-resistant surface treatment for M2 only.

**XNT** DAYTiN® Titanium Nitride coating for extra wear. Available on M2 only.

**XK** No Side Hole For air ejection. No cost.

**XJ** Smaller Jektole® Components See page 22.

	Code	4.25	4.50	5.00	Jektole® Pin
	37				J2, J4*
	50	425	450	500	J6
	62	425	450	500	J6
	75	425	450	500	J9
	87	425	450	500	J9
	100	425	450	500	J9
	125	425	450	500	J12
	37				J2, J4*
	50	B425	B450	B500	J6
	62	B425	B450	B500	J6
	75	B425	B450	B500	J9
	87	B425	B450	B500	J9
	100	B425	B450	B500	J9
	125	B425	B450	B500	J12
	37				J2, J4*
	50	C425	C450	C500	J6
	62	C425	C450	C500	J6
	75	C425	C450	C500	J9
	87	C425	C450	C500	J9
	100	C425	C450	C500	J9
	125	C425	C450	C500	J12
	50	D425	D450	D500	J6
	62	D425	D450	D500	J6
	75	D425	D450	D500	J9
	87	D425	D450	D500	J9
	100	D425	D450	D500	J9
	125	D425	D450	D500	J12

\*J2 (P = .062-.1149) J4 (P ≥ .115)

# Heavy Duty Regular Punches

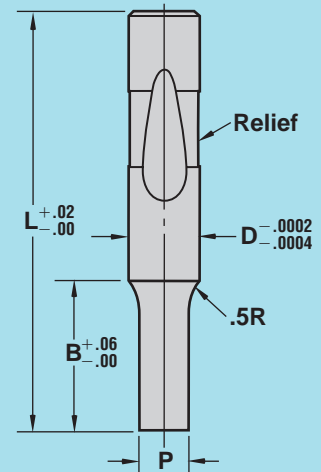
ANSI/ASME B94.18-1987

**NEW** Particle Steel  
PS4 with 4% vanadium  
provides higher wear  
resistance and toughness  
than M2.

**FDS**  
FIRM DELIVERY SCHEDULE  
Round 1 Day, Shape 2 Days,  
PS4 +2 Days

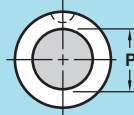
Steel: A2, M2, PS4 Rc 60-63

Type  
HP\_\_

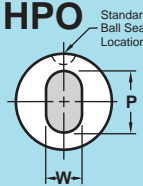


Round P  $\pm .0005$   $\text{P to D}$   
Shape P,W  $\pm .0005$   $\text{P to D}$

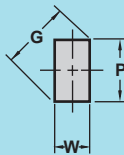
HPX



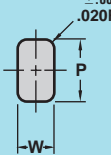
HPO



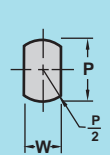
HPR



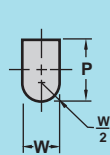
HPL  $\pm .005$   
 $.020R$



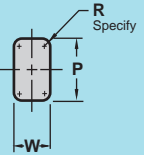
HPH



HPJ



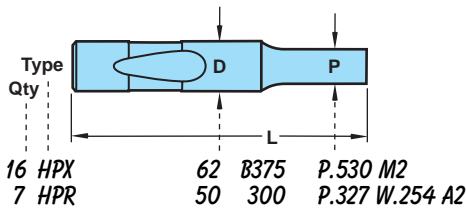
HPK



Type	Shank		Point Length B	Round			Shape			Overall Length L						
	D	Code		Min. XP	Range P		Min. XW	Min. W	Max. P/G	2.50	2.75	3.00	3.25	3.50	3.75	4.00
HP_	.375	37	.625	.050	.062-	.374	.050	.062-	.374	250	275	300	325	350	375	400
	.500	50	.812	.093	.187-	.499	.093	.187-	.499	250	275	300	325	350	375	400
	.625	62	.937	.125	.312-	.624	.125	.250-	.624	250	275	300	325	350	375	400
	.750	75	1.062	.235	.437-	.749	.235	.312-	.749	250	275	300	325	350	375	400
	.875	87	1.187	.300	.625-	.874	.235	.375-	.874		275	300	325	350	375	400
	1.000	100	1.250	.350	.750-	.999	.235	.437-	.999			300	325	350	375	400
1.250	125	1.437	.450	1.000-	1.249	.235	.500-	1.249			300	325	350	375	400	
HP_	.375	37	.75	.050	.125-	.374	.050	.125-	.374	B250	B275	B300	B325	B350	B375	B400
	.500	50		.093	.187-	.499	.093	.187-	.499	B250	B275	B300	B325	B350	B375	B400
	.625	62		.125	.312-	.624	.125	.250-	.624	B250	B275	B300	B325	B350	B375	B400
	.750	75		.235	.437-	.749	.235	.312-	.749	B250	B275	B300	B325	B350	B375	B400
	.875	87		.300	.625-	.874	.235	.375-	.874		B275	B300	B325	B350	B375	B400
	1.000	100		.350	.750-	.999	.235	.437-	.999			B300	B325	B350	B375	B400
1.250	125	.450	1.000-	1.249	.235	.500-	1.249			B300	B325	B350	B375	B400		
HP_	.375	37	1.00	.081	.125-	.374	.081	.125-	.374	C250	C275	C300	C325	C350	C375	C400
	.500	50		.093	.187-	.499	.093	.187-	.499	C250	C275	C300	C325	C350	C375	C400
	.625	62		.125	.312-	.624	.125	.250-	.624	C250	C275	C300	C325	C350	C375	C400
	.750	75		.235	.437-	.749	.235	.312-	.749	C250	C275	C300	C325	C350	C375	C400
	.875	87		.300	.625-	.874	.235	.375-	.874		C275	C300	C325	C350	C375	C400
	1.000	100		.350	.750-	.999	.235	.437-	.999			C300	C325	C350	C375	C400
1.250	125	.450	1.000-	1.249	.235	.500-	1.249			C300	C325	C350	C375	C400		
HP_	.500	50	1.25	.125	.187-	.499	.125	.187-	.499		D275	D300	D325	D350	D375	D400
	.625	62		.158	.312-	.624	.158	.250-	.624		D275	D300	D325	D350	D375	D400
	.750	75		.235	.437-	.749	.235	.312-	.749		D275	D300	D325	D350	D375	D400
	.875	87		.300	.625-	.874	.235	.375-	.874		D275	D300	D325	D350	D375	D400
	1.000	100		.350	.750-	.999	.235	.437-	.999			D300	D325	D350	D375	D400
	1.250	125		.450	1.000-	1.249	.235	.500-	1.249			D300	D325	D350	D375	D400

## How to Order:

Specify: Quantity  
 Type  
 Shank & Length Codes  
 P or P & W dimensions  
 Steel  
 Standard Alterations



### 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°. **See page 31 for more information.**

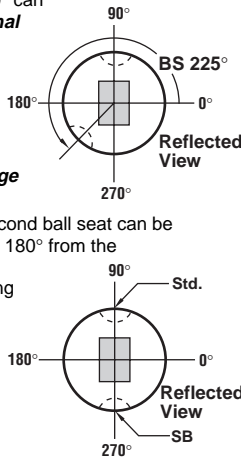
### Double Ball Seat

A second ball seat can 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. Can also be located 90° from primary ball seat. **Not recommended for diameters under .375.**

### Example:

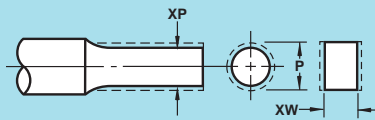
HPR 87, B 325, P .675, W .380, SB 270°



## Standard Alterations

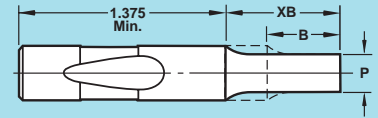
Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge. Does not add to delivery unless noted.

### XP, XW P & W Dimensions Smaller than Standard



### XB Point Length Longer than Standard

For point lengths over 1.625 thru 2.000, specify **XBB** and dimensions. Limitations are the same as 1.625 as shown in the chart below.



**XBB adds 3 days to delivery.**

Point Length	.5001	.6251	.7501	.8751	1.0001	1.1251	1.2501	1.3751	1.5001	
	.6250	.7500	.8750	1.0000	1.1250	1.2500	1.3750	1.5000	1.6250	
Code	Type	Min. P (Rounds)								
37	HPX	.050	.050	.080	.080	.106	.115	.115	.115	.115
50	HPX	—	.093	.093	.093	.125	.125	.125	.125	.125
62	HPX	—	.125	.125	.125	.158	.158	.158	.158	.158
75	HPX	—	.235	.235	.235	.235	.235	.235	.235	.235
87	HPX	—	.300	.300	.300	.300	.300	.300	.300	.300
100	HPX	—	.350	.350	.350	.350	.350	.350	.350	.350
125	HPX	—	.450	.450	.450	.450	.450	.450	.450	.450
		Min. W (Shapes)								
37	HP	.050	.050	.080	.080	.106	.115	.115	.115	.115
50	HP	—	.093	.093	.093	.125	.125	.125	.125	.125
62	HP	—	.125	.125	.125	.158	.158	.158	.158	.158
75	HP	—	—	.235	.235	.235	.235	.235	.235	.235
87	HP	—	—	.235	.235	.235	.235	.235	.235	.235
100	HP	—	—	.235	.235	.235	.235	.235	.235	.235
125	HP	—	—	.235	.235	.235	.235	.235	.235	.235

## SBR Straight Before Radius

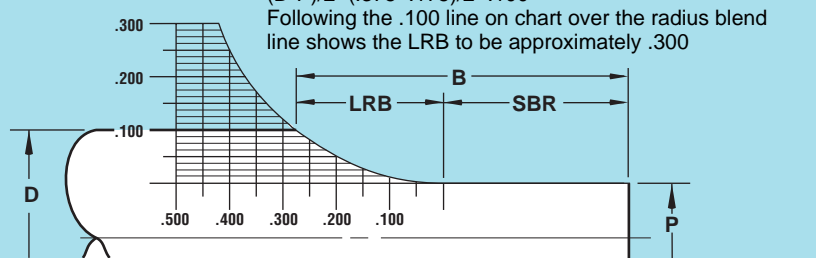
To determine Length of Radius Blend (LRB)

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

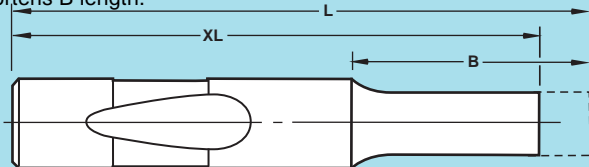
$$(D-P)/2 = (.375 - .175)/2 = .100$$

Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300



## XL Overall Length Shortened (2.00 min.)

Stock removal from point end which shortens B length.



**XN** DayTride® A unique wear-resistant surface treatment for M2 only.

**XNT** DAYTiN® Titanium Nitride coating for extra wear. Available on M2 only.

## XCN

	Code	4.25	4.50	5.00
	37			
	50	425	450	500
	62	425	450	500
	75	425	450	500
	87	425	450	500
	100	425	450	500
	125	425	450	500
	37			
	50	B425	B450	B500
	62	B425	B450	B500
	75	B425	B450	B500
	87	B425	B450	B500
	100	B425	B450	B500
	125	B425	B450	B500
	37			
	50	C425	C450	C500
	62	C425	C450	C500
	75	C425	C450	C500
	87	C425	C450	C500
	100	C425	C450	C500
	125	C425	C450	C500
	50	D425	D450	D500
	62	D425	D450	D500
	75	D425	D450	D500
	87	D425	D450	D500
	100	D425	D450	D500
	125	D425	D450	D500

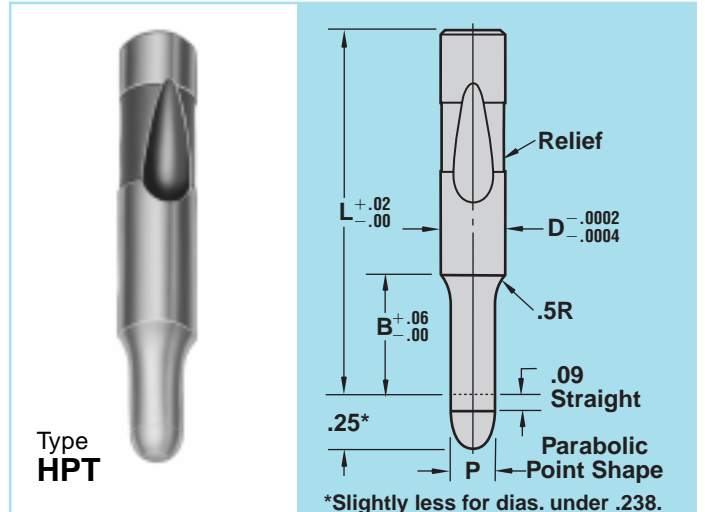
# Heavy Duty Regular Pilots

ANSI/ASME B94.18-1987

**NEW** Particle Steel  
PS4 with 4% vanadium  
provides higher wear  
resistance and toughness  
than M2.

**FDS**  
FIRM DELIVERY SCHEDULE  
1 Day, PS4 +2 Days

Steel: A2, M2, PS4 Rc 60-63

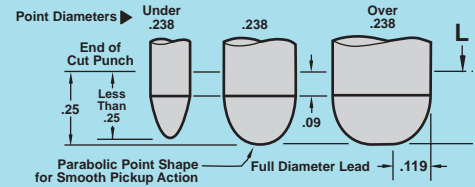
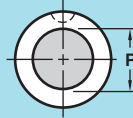


Type  
**HPT**

Round P  $\begin{matrix} +.0005 \\ -.0000 \end{matrix}$   $\text{\textcircled{C}}$  .0005 P to D

When P=D Shank Tolerance Applies

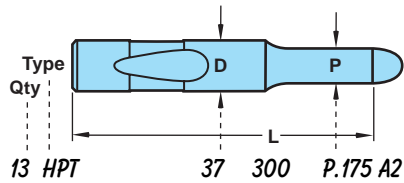
## HPT



Type	Shank		Point Length B	Round		Overall Length L							
	D	Code		Min. XP	Range P	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25
HPT	.375	37	.625	.061	.092- .375	250	275	300	325	350	375	400	
	.500	50	.812	.092	.186- .500	250	275	300	325	350	375	400	425
	.625	62	.937	.124	.311- .625	250	275	300	325	350	375	400	425
	.750	75	1.062	.234	.436- .750	250	275	300	325	350	375	400	425
	.875	87	1.187	.299	.624- .875		275	300	325	350	375	400	425
	1.000	100	1.250	.349	.749-1.000			300	325	350	375	400	425
1.250	125	1.437	.449	.999-1.250			300	325	350	375	400	425	
HPT	.375	37	.75	.061	.124- .375	B250	B275	B300	B325	B350	B375	B400	
	.500	50		.092	.186- .500	B250	B275	B300	B325	B350	B375	B400	B425
	.625	62		.124	.311- .625	B250	B275	B300	B325	B350	B375	B400	B425
	.750	75		.234	.436- .750	B250	B275	B300	B325	B350	B375	B400	B425
	.875	87		.299	.624- .875		B275	B300	B325	B350	B375	B400	B425
	1.000	100		.349	.749-1.000			B300	B325	B350	B375	B400	B425
1.250	125	.449	.999-1.250			B300	B325	B350	B375	B400	B425		
HPT	.375	37	1.00	.080	.124- .375	C250	C275	C300	C325	C350	C375	C400	
	.500	50		.092	.186- .500	C250	C275	C300	C325	C350	C375	C400	C425
	.625	62		.124	.311- .625	C250	C275	C300	C325	C350	C375	C400	C425
	.750	75		.234	.436- .750	C250	C275	C300	C325	C350	C375	C400	C425
	.875	87		.299	.624- .875		C275	C300	C325	C350	C375	C400	C425
	1.000	100		.349	.749-1.000			C300	C325	C350	C375	C400	C425
1.250	125	.449	.999-1.250			C300	C325	C350	C375	C400	C425		
HPT	.500	50	1.25	.124	.186- .500		D275	D300	D325	D350	D375	D400	D425
	.625	62		.157	.311- .625		D275	D300	D325	D350	D375	D400	D425
	.750	75		.234	.436- .750		D275	D300	D325	D350	D375	D400	D425
	.875	87		.299	.624- .875		D275	D300	D325	D350	D375	D400	D425
	1.000	100		.349	.749-1.000			D300	D325	D350	D375	D400	D425
	1.250	125		.449	.999-1.250			D300	D325	D350	D375	D400	D425

## How to Order:

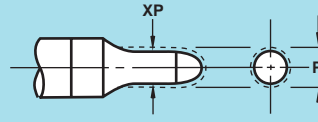
Specify: Quantity  
 Type  
 Shank & Length Codes  
 P Dimension  
 Steel  
 Standard Alterations



## Standard Alterations

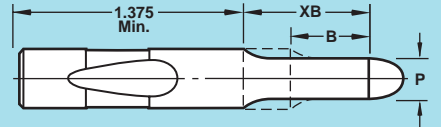
Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge. Does not add to delivery unless noted.

### XP P Dimensions Smaller than Standard



### XB Point Length Longer than Standard

For point lengths over 1.625 thru 2.000, specify **XBB** and dimensions. Limitations are the same as 1.625 as shown in the chart below.



**XBB adds 3 days to delivery.**

Point Length	.5001	.6251	.7501	.8751	1.0001	1.1251	1.2501	1.3751	1.5001	
	.6250	.7500	.8750	1.0000	1.1250	1.2500	1.3750	1.5000	1.6250	
Code	Type	Min. P (Rounds)								
37	HPX	.061	.061	.079	.079	.105	.114	.114	—	—
50	HPT	—	.092	.092	.092	.124	.124	.124	.124	.124
62	HPT	—	.124	.124	.124	.157	.157	.157	.157	.157
75	HPT	—	.234	.234	.234	.234	.234	.234	.234	.234
87	HPT	—	.299	.299	.299	.299	.299	.299	.299	.299
100	HPT	—	.349	.349	.349	.349	.349	.349	.349	.349
125	HPT	—	.449	.449	.449	.449	.449	.449	.449	.449

### SBR Straight Before Radius

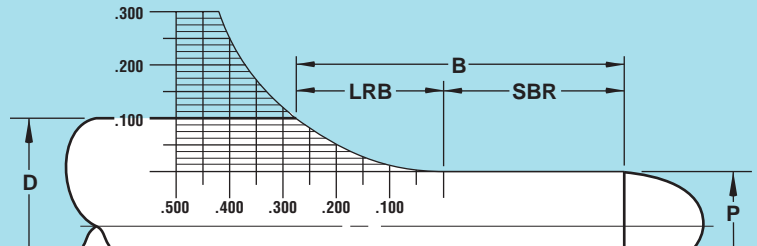
To determine Length of Radius Blend (LRB)

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

$$(D-P)/2 = (.375 - .175)/2 = .100$$

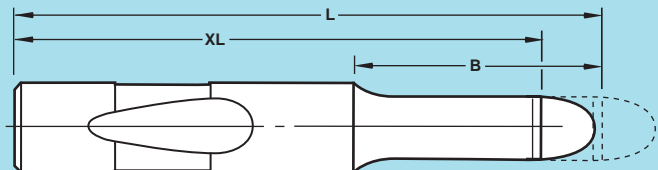
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300



Code	4.50	5.00
37		
50	450	500
62	450	500
75	450	500
87	450	500
100	450	500
125	450	500
37		
50	B450	B500
62	B450	B500
75	B450	B500
87	B450	B500
100	B450	B500
125	B450	B500
37		
50	C450	C500
62	C450	C500
75	C450	C500
87	C450	C500
100	C450	C500
125	C450	C500
50	D450	D500
62	D450	D500
75	D450	D500
87	D450	D500
100	D450	D500
125	D450	D500

### XL Overall Length Shortened (2.00 min.)

Stock removal from point end which shortens B length.



**XN** DayTride® A unique wear-resistant surface treatment for M2 only.

**XNT** DAYTiN® Titanium Nitride coating for extra wear. Available on M2 only.

## XCN



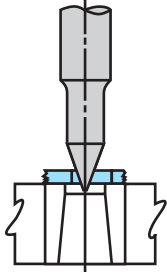
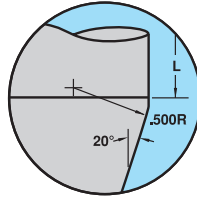
# Heavy Duty Positive Pick-Up Pilots

Order any length from 2.50 through 5.50

**NEW** Particle Steel  
PS4 with 4% vanadium  
provides higher wear  
resistance and toughness  
than M2.

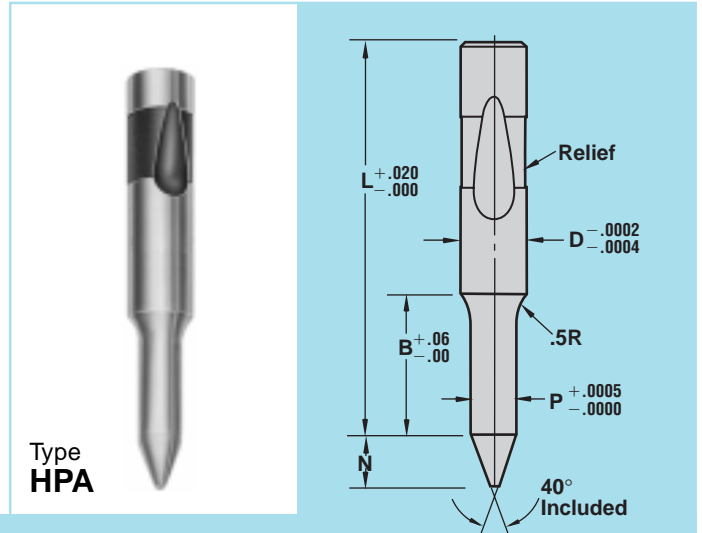
**FDS**  
FIRM DELIVERY SCHEDULE  
1 Day, PS4 +2 Days

Geometry provides smoother  
pick-up without the risk of  
distorting the hole.



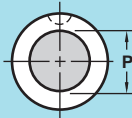
Greater Positioning — moves the  
stock further than conventional pilots.

Steel: M2, PS4 Rc 60-63



Type  
HPA

## HPA



Round P  $\pm .0005$   $\text{P to D}$

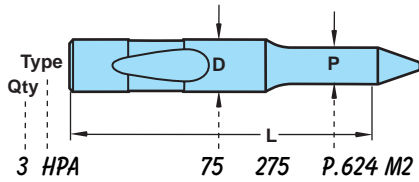
When P=D Shank Tolerance

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



## How to Order:

Specify: Quantity  
 Type  
 Shank & Length Codes  
 P Dimension  
 Steel  
 Standard Alterations



## Standard Alterations

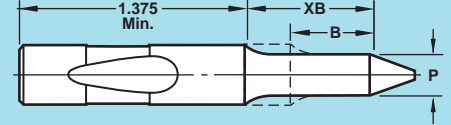
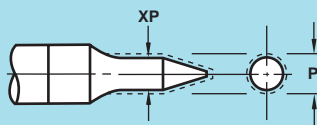
Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge. Does not add to delivery unless noted.

### XP P Dimensions Smaller than Standard

XP < .186 Pilot is 1.5P in length.  
 XP < .083 Pilot needs to be > 1.5P in length, therefore special.

### XB Point Length Longer than Standard

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



**XBB and X3B adds 3 days to delivery.**

Point Length	XB										XBB	X3B
	.5001	.6251	.7501	.8751	1.0001	1.1251	1.2501	1.3751	1.5001	1.6251	2.0001	2.5001
	.6250	.7500	.8750	1.0000	1.1250	1.2500	1.3750	1.5000	1.6250	2.0000	2.5000	3.0000
Code Type	Min. P (Rounds)											
37 HPA	.061	.061	.079	.079	.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

## SBR Straight Before Radius

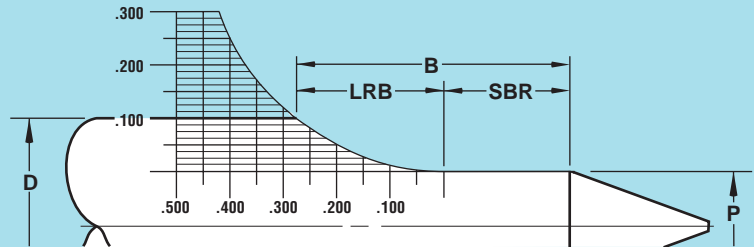
To determine Length of Radius Blend (LRB)

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

$$(D-P)/2 = (.375 - .175)/2 = .100$$

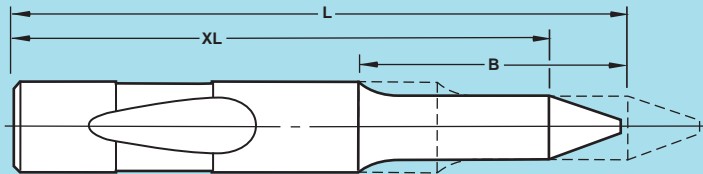
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300



## XL Overall Length Shortened (2.00 min.)

Stock removal from point end which shortens B length maintained.

*Available at no charge within catalog range.*



**XN** DayTride® A unique wear-resistant surface treatment for M2 only.

**XNT** DAYTiN® Titanium Nitride coating for extra wear. Available on M2 only.

## XCN

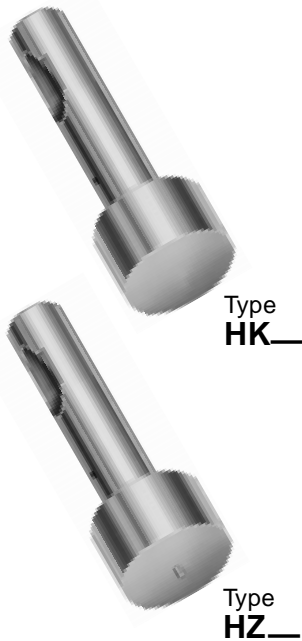
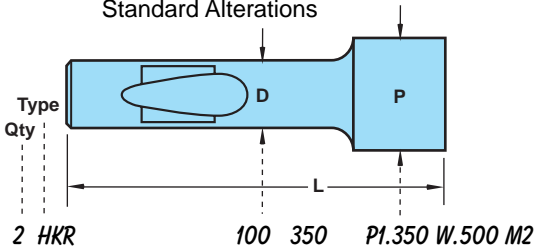
Code	5.00	5.25	5.50
37			
50	500	525	550
62	500	525	550
75	500	525	550
87	500	525	550
100	500	525	550
125	500	525	550
37			
50	B500	B525	B550
62	B500	B525	B550
75	B500	B525	B550
87	B500	B525	B550
100	B500	B525	B550
125	B500	B525	B550
37			
50	C500	C525	C550
62	C500	C525	C550
75	C500	C525	C550
87	C500	C525	C550
100	C500	C525	C550
125	C500	C525	C550
50	D500	D525	D550
62	D500	D525	D550
75	D500	D525	D550
87	D500	D525	D550
100	D500	D525	D550
125	D500	D525	D550

# Heavy Duty Point Larger than Shank Punches

**FDS**  
FIRM DELIVERY SCHEDULE  
3 Days 1-5 pcs.  
5 Days 6-19 pcs.

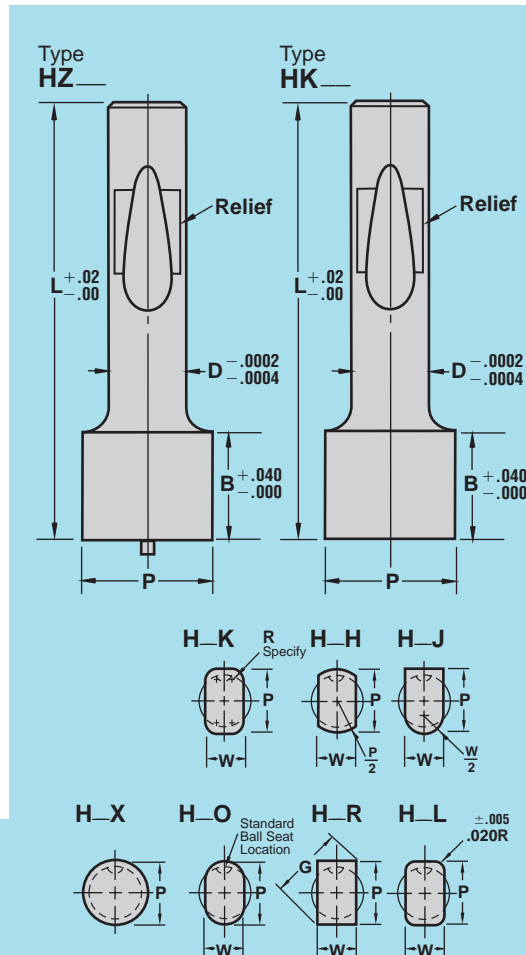
## How to Order:

Specify: Quantity  
Type  
Shank & Length Codes  
P or P & W Dimensions  
Steel  
Standard Alterations



Steel: A2, M2 Rc 60-63

Round P  $\pm .0005$  to  $\pm .0000$   $\text{P to D}$   
Shape P,W  $\pm .0005$   $\text{P to D}$



## Standard Ball Seat Locations

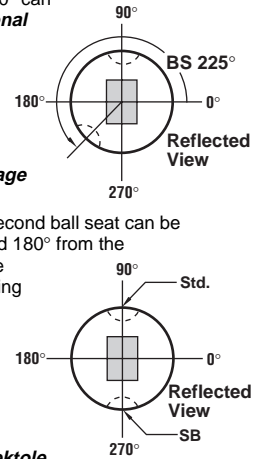
Standard Ball Seat Location is at 90°. Alternate locations of 0°, 180° or 270° can be specified **at no additional cost.**

**Custom Ball Seat Locations** Custom Ball Seat Locations can be specified as BS and degrees counter-clockwise from 0°. See page 31 for more information.

**Double Ball Seat** A second ball seat can 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. Can also be located 90° from primary ball seat. **Not recommended for diameters under .750. Jektole and under .375 Solid.**

## Example:

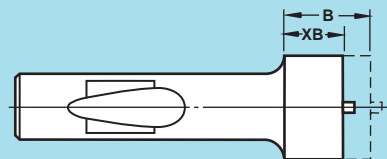
HZR 87, B 350, P1.500, W .900, SB 270°



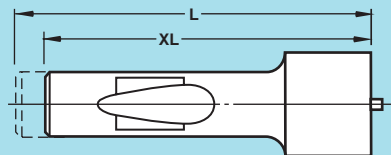
## Standard Alterations

Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge.

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



### **XL** Overall Length Shortened (2.00 min.) Stock removal from shank end. Minimum shank length is 1 1/16". Does not alter ball seat location.



**XN** DayTride® A unique wear-resistant surface treatment for M2 only.

**XNT** DAYTiN® Titanium Nitride coating for extra wear. Available on M2 only.

**XJ** Smaller Jektole® Components. See page 22.

**XCN**

Type	Shank		Point Length B	Round Range P	Shape Min. W Max. P/G	Overall Length L				Jektole Pin
	D	Code				2.50	3.00	3.50	4.00	
HZ_ Jektole	.500	50	.75	.501-1.250	.188-.1250	250	300	350	400	J6
HK_ Regular	.625	62	.88	.626-1.150	.250-1.500	250	300	350	400	J6
	.750	75	.94	.751-1.500	.312-1.500	250	300	350	400	J9
	.875	87	.94	.876-1.750	.375-1.750	250	300	350	400	J9
	1.000	100	.94	1.001-1.750	.437-1.750	250	300	350	400	J9
	1.250	125	1.25	1.251-2.000	.500-2.000		300	350	400	J9

# Heavy Duty Jektole®/Regular Punch Blanks

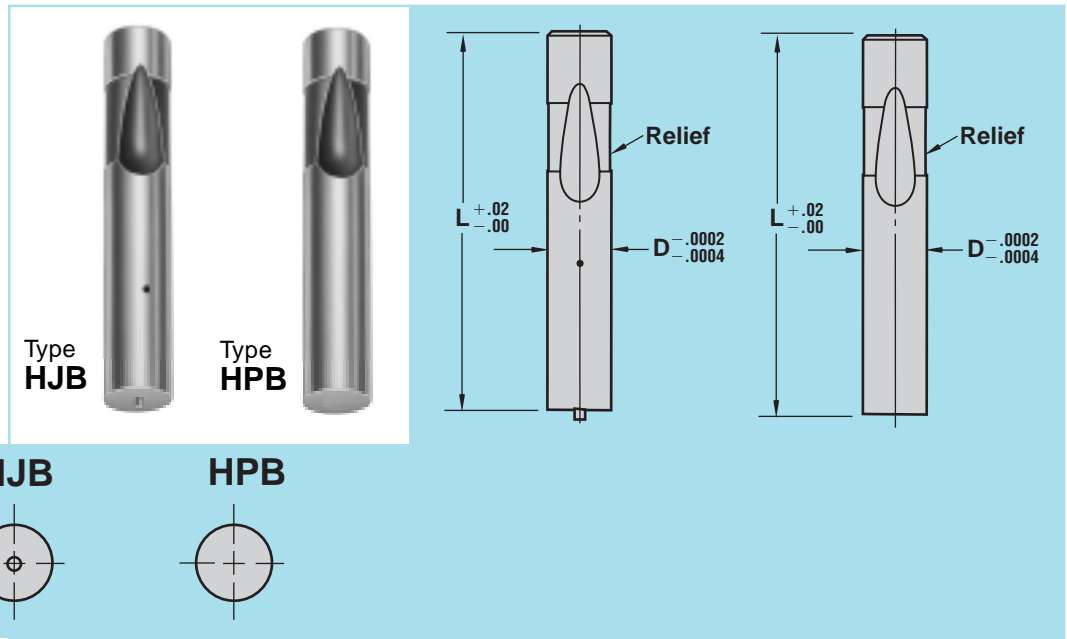
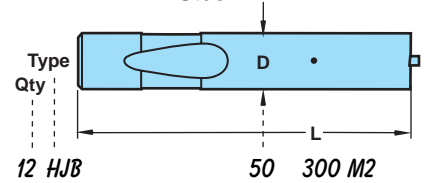


ANSI/ASME B94.18-1987

**NEW** Particle Steel PS4 with 4% vanadium provides higher wear resistance and toughness than M2.

**How to Order:**

Specify: Quantity  
Type  
Shank & Length Codes  
Steel



Steel: A2, M2, PS4 Rc 60-63

Type	Shank		Overall Length L										Jektole® Pin
	D	Code	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	5.00	
HJB	.375	37	250	275	300	325	350	375	400				J4
	.500	50	250	275	300	325	350	375	400	425	450	500	J6
	.625	62	250	275	300	325	350	375	400	425	450	500	J6
	.750	75	250	275	300	325	350	375	400	425	450	500	J9
	.875	87		275	300	325	350	375	400	425	450	500	J9
	1.000	100			300	325	350	375	400	425	450	500	J9
1.250	125			300	325	350	375	400	425	450	500	J12	

Type	Shank		Overall Length L									
	D	Code	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	5.00
HPB	.375	37	250	275	300	325	350	375	400			
	.500	50	250	275	300	325	350	375	400	425	450	500
	.625	62	250	275	300	325	350	375	400	425	450	500
	.750	75	250	275	300	325	350	375	400	425	450	500
	.875	87		275	300	325	350	375	400	425	450	500
	1.000	100			300	325	350	375	400	425	450	500
1.250	125			300	325	350	375	400	425	450	500	

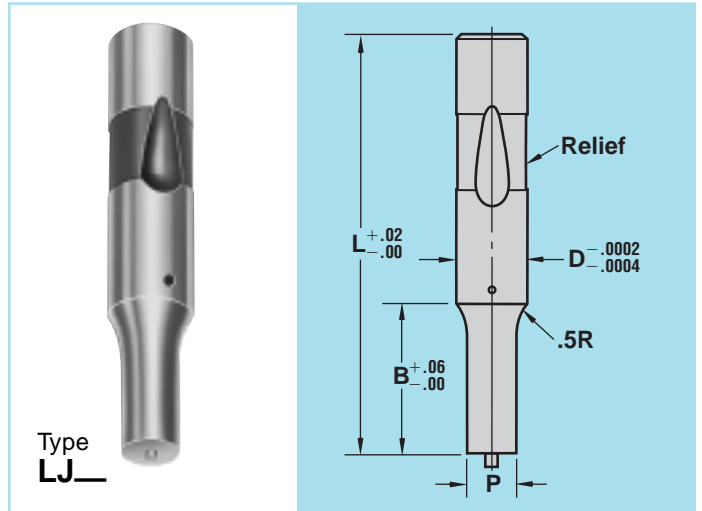
For lengths longer than 5.25 contact the factory for availability (M2 HPB only).

# Light Duty Jektol® Punches

ANSI/ASME B94.18-1987

**NEW** Particle Steel  
PS4 with 4% vanadium  
provides higher wear  
resistance and toughness  
than M2.

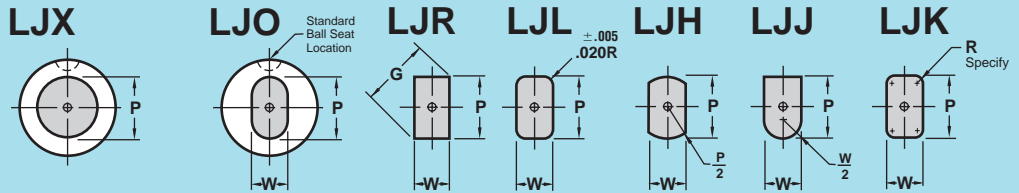
**FDS**  
FIRM DELIVERY SCHEDULE  
Round 1 Day, Shape 2 Days,  
PS4 +2 Days



Type  
LJ\_

Steel: A2, M2, PS4 Rc 60-63

Round P  $\pm .0005$   $\text{P to D}$   
Shape P,W  $\pm .0005$   $\text{P to D}$



Type	Shank		Point Length B	Round		Shape			Overall Length L						
	D	Code		Min. XP	Range P	Min. XW	Min. W	Max. P/G	2.00	2.25	2.50	2.75	3.00	3.25	3.50
LJ_	.250	25	.500	.050	.062- .249	.050	.062- .249		200	225	250	275	300	325	350
	.375	37	.625	.115	.125- .374	.115	.125- .374		200	225	250	275	300	325	350
	.500	50	.750	.158	.187- .499	.158	.187- .499		200	225	250	275	300	325	350
	.625	62	.875	.158	.312- .624	.158	.250- .624			225	250	275	300	325	350
	.750	75	.937	.235	.437- .749	.235	.312- .749			225	250	275	300	325	350
	.875	87	.937	.300	.625- .874	.235	.375- .874			225	250	275	300	325	350
1.000	100	.937	.350	.750- .999	.235	.437- .999			225	250	275	300	325	350	
LJ_	.250	25	.75	.050	.093- .249	.050	.093- .249			B225	B250	B275	B300	B325	B350
	.375	37		.115	.125- .374	.115	.125- .374			B225	B250	B275	B300	B325	B350
	.500	50		.158	.187- .499	.158	.187- .499			B225	B250	B275	B300	B325	B350
	.625	62		.158	.312- .624	.158	.250- .624			B225	B250	B275	B300	B325	B350
	.750	75		.235	.437- .749	.235	.312- .749			B225	B250	B275	B300	B325	B350
	.875	87		.300	.625- .874	.235	.375- .874			B225	B250	B275	B300	B325	B350
1.000	100	.350	.750- .999	.235	.437- .999			B225	B250	B275	B300	B325	B350		
LJ_	.375	37	1.00	.115	.125- .374	.115	.125- .374			C225	C250	C275	C300	C325	C350
	.500	50		.158	.187- .499	.158	.187- .499			C225	C250	C275	C300	C325	C350
	.625	62		.158	.312- .624	.158	.250- .624			C225	C250	C275	C300	C325	C350
	.750	75		.235	.437- .749	.235	.312- .749			C225	C250	C275	C300	C325	C350
	.875	87		.300	.625- .874	.235	.375- .874			C225	C250	C275	C300	C325	C350
	1.000	100		.350	.750- .999	.235	.437- .999			C225	C250	C275	C300	C325	C350
LJ_	.500	50	1.25	.158	.187- .499	.158	.187- .499				D250	D275	D300	D325	D350
	.625	62		.158	.312- .624	.158	.250- .624				D250	D275	D300	D325	D350
	.750	75		.235	.437- .749	.235	.312- .749				D250	D275	D300	D325	D350
	.875	87		.300	.625- .874	.235	.375- .874				D250	D275	D300	D325	D350
	1.000	100		.350	.750- .999	.235	.437- .999				D250	D275	D300	D325	D350

## How to Order:

Specify: Quantity

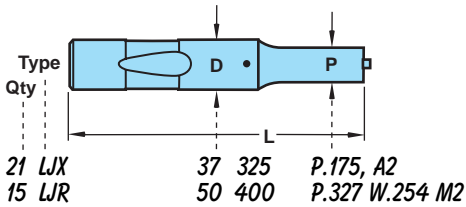
Type

Shank & Length Codes

P or P & W dimensions

Steel

Standard Alterations



### 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°. See page 31 for more information.

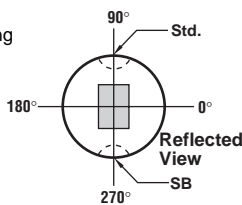
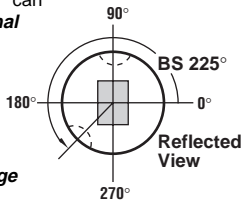
**Double Ball Seat** A second ball seat can be specified. Normally located 180° from the primary ball seat these are used to minimize sharpening of notching punches by rotating the punch 180°. Specify SB and degree desired.

Can also be located 90° from primary ball seat.

**Not recommended for diameters under .625.**

**Example:**

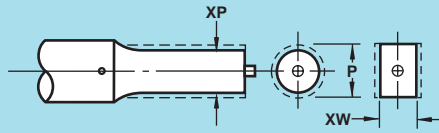
LJR 87, B 325, P .675, W .380, SB 270°



## Standard Alterations

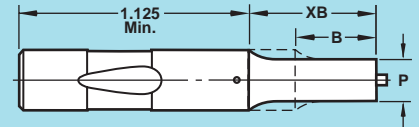
Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge. Does not add to delivery unless noted.

### XP, XW P & W Dimensions Smaller than Standard



### XB Point Length Longer than Standard

For point lengths over 1.625 thru 2.000, specify **XBB** and dimensions. Limitations are the same as 1.625 as shown in the chart below.



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	Jektole Pin
<b>Code Type</b>	<b>Min. P (Rounds)</b>									
25 LJX	.050	.050	.080	.080	—	—	—	—	—	J2, J3*
37 LJX	.115	.115	.115	.115	.115	.115	.115	.115	.115	J4
50 LJX	—	.158	.158	.158	.158	.158	.158	.158	.158	J6
62 LJX	—	.158	.158	.158	.158	.158	.158	.158	.158	J6
75 LJX	—	.235	.235	.235	.235	.235	.235	.235	.235	J9
87 LJX	—	.300	.300	.300	.300	.300	.300	.300	.300	J9
100 LJX	—	.350	.350	.350	.350	.350	.350	.350	.350	J9

Code Type	<b>Min. W (Shapes)</b>									Jektole Pin
25 LJ__	.050	.050	.080	.080	—	—	—	—	—	J2, J3*
37 LJ__	.062	.115	.115	.115	.115	.115	.115	.115	.115	J4
50 LJ__	—	.158	.158	.158	.158	.158	.158	.158	.158	J6
62 LJ__	—	.158	.158	.158	.158	.158	.158	.158	.158	J6
75 LJ__	—	.235	.235	.235	.235	.235	.235	.235	.235	J9
87 LJ__	—	.235	.235	.235	.235	.235	.235	.235	.235	J9
100 LJ__	—	.235	.235	.235	.235	.235	.235	.235	.235	J9

\*J2 (P = .050-.0799) J3 (P ≥ .080)

### SBR Straight Before Radius

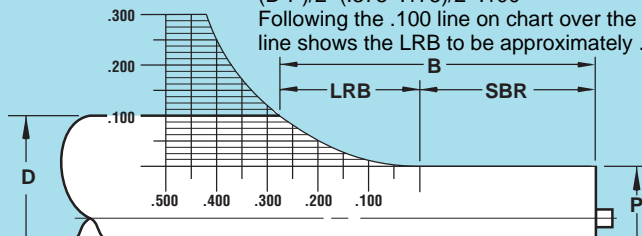
To determine Length of Radius Blend (LRB)

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

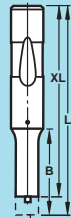
$$(D-P)/2 = (.375 - .175)/2 = .100$$

Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300



### XL Overall Length Shortened (1.75 min.)

Stock removal from point end which shortens B length.



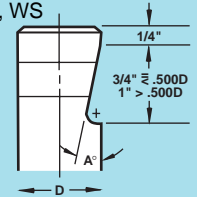
### WS Whistle Stop (See table for standard angles)

The Whistle Stop alteration is ground through the ball seat. Subject to same limitations as Standard and Custom Ball Seat Locations.

**Example:** LJX50 400, P.327, M2, WS

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**.)



### XN DayTride® A unique wear-resistant surface treatment for M2 only.

### XNT DAYTiN® Titanium Nitride coating for extra wear. Available on M2 only.

### XK No Side Hole For air ejection. No cost.

### XJ Smaller Jektole Components See page 22.

### XCN

\*J2 (P = .050-.0799) J4 (P ≥ .080)

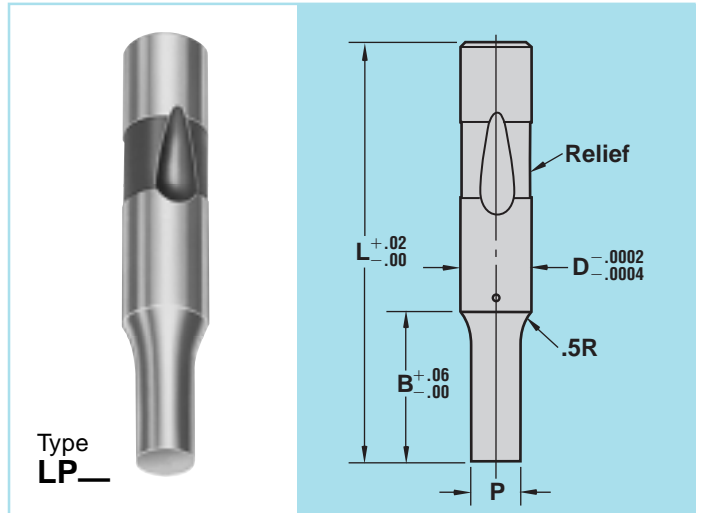
# Light Duty Regular Punches

ANSI/ASME B94.18-1987

**NEW** Particle Steel  
PS4 with 4% vanadium  
provides higher wear  
resistance and toughness  
than M2.

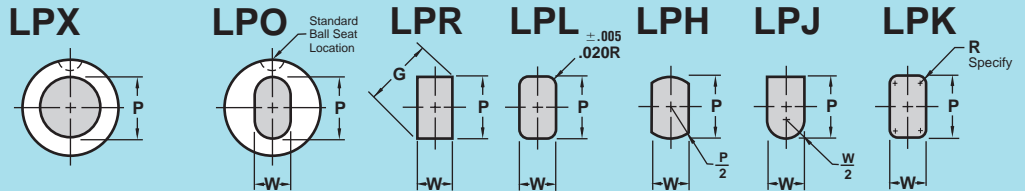
**FDS**  
FIRM DELIVERY SCHEDULE  
Round 1 Day, Shape 2 Days,  
PS4 +2 Days

Steel: A2, M2, PS4 Rc 60-63



Type  
LP\_

Round P  $\pm .0005$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$  P to D  
Shape P,W  $\pm .0005$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$   $\begin{matrix} \text{---} \\ \text{---} \end{matrix}$  P to D



Type	Shank		Point Length B	Round		Shape			Overall Length L						
	D	Code		Min. XP	Range P	Min. XW	Min. W	Max. P/G	2.00	2.25	2.50	2.75	3.00	3.25	3.50
LP_	.250	25	.500	.040	.062-.249	.040	.062-.249		200	225	250	275	300	325	350
	.375	37	.625	.050	.125-.374	.050	.125-.374		200	225	250	275	300	325	350
	.500	50	.750	.093	.187-.499	.093	.187-.499		200	225	250	275	300	325	350
	.625	62	.875	.125	.312-.624	.125	.250-.624			225	250	275	300	325	350
	.750	75	.937	.235	.437-.749	.235	.312-.749			225	250	275	300	325	350
	.875	87	.937	.300	.625-.874	.235	.375-.874			225	250	275	300	325	350
	1.000	100	.937	.350	.750-.999	.235	.437-.999			225	250	275	300	325	350
LP_	.250	25	.75	.040	.093-.249	.040	.093-.249			B225	B250	B275	B300	B325	B350
	.375	37		.050	.125-.374	.050	.125-.374			B225	B250	B275	B300	B325	B350
	.500	50		.093	.187-.499	.093	.187-.499			B225	B250	B275	B300	B325	B350
	.625	62		.125	.312-.624	.125	.250-.624			B225	B250	B275	B300	B325	B350
	.750	75		.235	.437-.749	.235	.312-.749			B225	B250	B275	B300	B325	B350
	.875	87		.300	.625-.874	.235	.375-.874			B225	B250	B275	B300	B325	B350
LP_	.375	37	1.00	.081	.125-.374	.081	.125-.374			C225	C250	C275	C300	C325	C350
	.500	50		.093	.187-.499	.093	.187-.499			C225	C250	C275	C300	C325	C350
	.625	62		.125	.312-.624	.125	.250-.624			C225	C250	C275	C300	C325	C350
	.750	75		.235	.437-.749	.235	.312-.749			C225	C250	C275	C300	C325	C350
	.875	87		.300	.625-.874	.235	.375-.874			C225	C250	C275	C300	C325	C350
LP_	.500	50	1.25	.125	.187-.499	.125	.187-.499				D250	D275	D300	D325	D350
	.625	62		.158	.312-.624	.158	.250-.624				D250	D275	D300	D325	D350
	.750	75		.235	.437-.749	.235	.312-.749				D250	D275	D300	D325	D350
	.875	87		.300	.625-.874	.235	.375-.874				D250	D275	D300	D325	D350
LP_	.500	50	1.25	.350	.750-.999	.235	.437-.999				D250	D275	D300	D325	D350
	1.000	100													



## How to Order:

Specify: Quantity

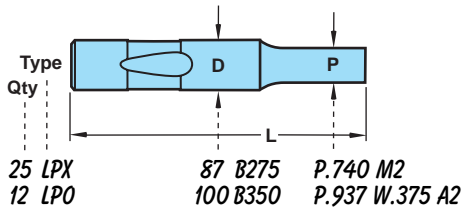
Type

Shank & Length Codes

P or P & W dimensions

Steel

Standard Alterations

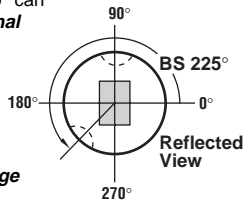


### Standard Ball Seat Locations

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

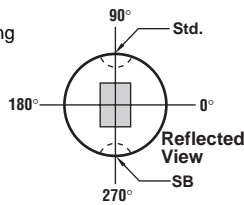
Custom Ball Seat Locations can be specified as BS and degrees counter-clockwise from 0°. **See page 31 for more information.**



**Double Ball Seat** A second ball seat can 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. Can also be located 90° from primary ball seat.

**Not recommended for diameters under .375.**



### Example:

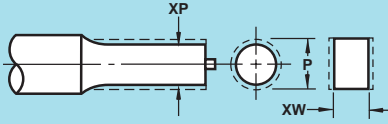
LPR 87, B 325, P .675, W .380, SB 270°

	Code	3.75	4.00
	25		
	37	375	400
	50	375	400
	62	375	400
	75	375	400
	87	375	400
	100	375	400
	25		
	37	B375	B400
	50	B375	B400
	62	B375	B400
	75	B375	B400
	87	B375	B400
	100	B375	B400
	37	C375	C400
	50	C375	C400
	62	C375	C400
	75	C375	C400
	87	C375	C400
	100	C375	C400
	50	D375	D400
	62	D375	D400
	75	D375	D400
	87	D375	D400
	100	D375	D400

# Standard Alterations

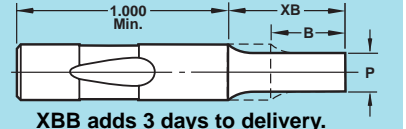
Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge. Does not add to delivery unless noted.

## XP, XW P & W Dimensions Smaller than Standard



## XB Point Length Longer than Standard

For point lengths over 1.625 thru 2.000, specify **XBB** and dimensions. Limitations are the same as 1.625 as shown in the chart below.



**XBB adds 3 days to delivery.**

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
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Code	Type	Min. P (Rounds)								
25	LPX	.040	.040	.080	.080	.106	.115	—	—	—
37	LPX	.050	.050	.080	.080	.106	.115	.115	.115	.115
50	LPX	—	.093	.093	.093	.125	.125	.125	.125	.125
62	LPX	—	.125	.125	.125	.158	.158	.158	.158	.158
75	LPX	—	.235	.235	.235	.235	.235	.235	.235	.235
87	LPX	—	.300	.300	.300	.300	.300	.300	.300	.300
100	LPX	—	.350	.350	.350	.350	.350	.350	.350	.350

		Min. W (Shapes)								
25	LP__	.040	.040	.080	.080	.106	.115	—	—	—
37	LP__	.052	.050	.080	.080	.106	.115	.115	.115	.115
50	LP__	—	.093	.093	.093	.125	.125	.125	.125	.125
62	LP__	—	.125	.125	.125	.158	.158	.158	.158	.158
75	LP__	—	.235	.235	.235	.235	.235	.235	.235	.235
87	LP__	—	.235	.235	.235	.235	.235	.235	.235	.235
100	LP__	—	.235	.235	.235	.235	.235	.235	.235	.235

## SBR Straight Before Radius

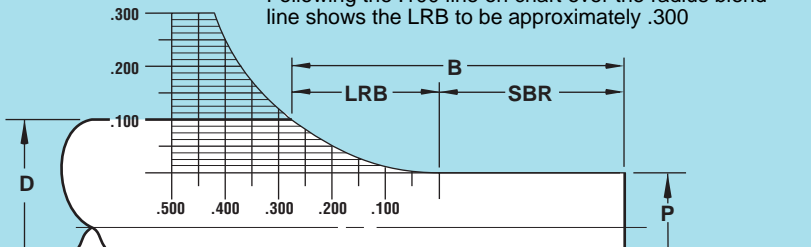
To determine Length of Radius Blend (LRB)

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

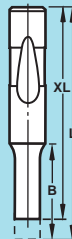
$$(D-P)/2 = (.375 - .175)/2 = .100$$

Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300



## XL Overall Length Shortened (1.75 min.)

Stock removal from point end which shortens B length.



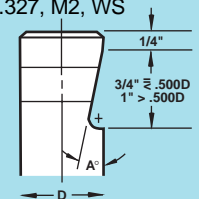
## WS Whistle Stop (See table for standard angles)

The Whistle Stop alteration is ground through the ball seat. Subject to same limitations as Standard and Custom Ball Seat Locations.

**Example:** LPX50 400, P.327, M2, WS

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**.)



## XN DayTride®

A unique wear-resistant surface treatment for M2 only.

## XNT DAYTiN®

Titanium Nitride coating for extra wear. Available on M2 only.

## XCN



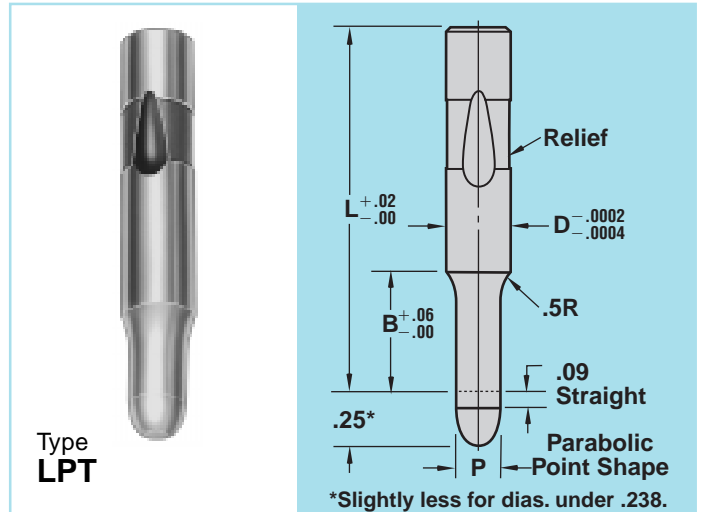
# Light Duty Regular Pilots

ANSI/ASME B94.18-1987

**NEW** Particle Steel  
PS4 with 4% vanadium  
provides higher wear  
resistance and toughness  
than M2.

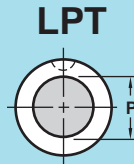
**FDS**  
FIRM DELIVERY SCHEDULE  
1 Day, PS4 +2 Days

Steel: A2, M2, PS4 Rc 60-63

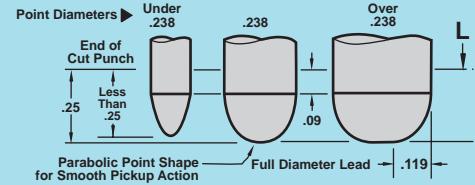


Type  
**LPT**

Round P  $\begin{matrix} +.0005 \\ -.0000 \end{matrix}$   $\text{\textcircled{C}}$  .0005 P to D



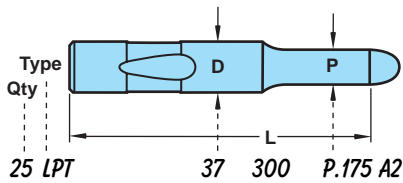
When P=D Shank Tolerance Applies



Type	Shank		Point Length B	Round		Overall Length L						
	D	Code		Min. XP	Range P	2.00	2.25	2.50	2.75	3.00	3.25	3.50
LPT	.250	25	.500	.050	.092- .250	200	225	250	275	300	325	350
	.375	37	.625	.061	.124- .375	200	225	250	275	300	325	350
	.500	50	.750	.092	.186- .599	200	225	250	275	300	325	350
	.625	62	.875	.124	.311- .625		225	250	275	300	325	350
	.750	75	.937	.234	.436- .750		225	250	275	300	325	350
	.875	87	.937	.299	.624- .875		225	250	275	300	325	350
	1.000	100	.937	.349	.749-1.000		225	250	275	300	325	350
LPT	.250	25	.75	.050	.092- .250		B225	B250	B275	B300	B325	B350
	.375	37		.061	.124- .375		B225	B250	B275	B300	B325	B350
	.500	50		.092	.186- .500		B225	B250	B275	B300	B325	B350
	.625	62		.124	.311- .625		B225	B250	B275	B300	B325	B350
	.750	75		.234	.436- .750		B225	B250	B275	B300	B325	B350
	.875	87		.299	.624- .875		B225	B250	B275	B300	B325	B350
	1.000	100		.349	.749-1.000		B225	B250	B275	B300	B325	B350
LPT	.375	37	1.00	.080	.124- .375		C225	C250	C275	C300	C325	C350
	.500	50		.092	.186- .500		C225	C250	C275	C300	C325	C350
	.625	62		.124	.311- .625		C225	C250	C275	C300	C325	C350
	.750	75		.234	.436- .750		C225	C250	C275	C300	C325	C350
	.875	87		.299	.624- .875		C225	C250	C275	C300	C325	C350
1.000	100	.349	.749-1.000		C225	C250	C275	C300	C325	C350		
LPT	.500	50	1.25	.124	.186- .500		D250	D275	D300	D325	D350	
	.625	62		.157	.311- .625		D250	D275	D300	D325	D350	
	.750	75		.234	.436- .750		D250	D275	D300	D325	D350	
	.875	87		.299	.624- .875		D250	D275	D300	D325	D350	
	1.000	100		.349	.749-1.000		D250	D275	D300	D325	D350	

## How to Order:

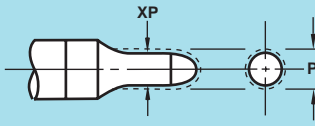
Specify: Quantity  
 Type  
 Shank & Length Codes  
 P Dimension  
 Steel  
 Standard Alterations



## Standard Alterations

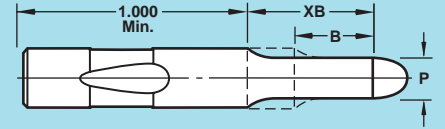
Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge. Does not add to delivery unless noted.

### XP P Dimensions Smaller than Standard



### XB Point Length Longer than Standard

For point lengths over 1.625 thru 2.000, specify **XB** and dimensions. Limitations are the same as 1.625 as shown in the chart below.



**XBB** adds 3 days to delivery.

Point Length	.5001	.6251	.7501	.8751	1.0001	1.1251	1.2501	1.3751	1.5001
	.6250	.7500	.8750	1.0000	1.1250	1.2500	1.3750	1.5000	1.6250
Code	Type	Min. P (Rounds)							
25	LPT	.050	.050	.079	.079	—	—	—	—
37	LPT	.061	.061	.079	.079	.105	.114	.114	—
50	LPT	—	.092	.092	.092	.124	.124	.124	.124
62	LPT	—	.124	.124	.124	.157	.157	.157	.157
75	LPT	—	.234	.234	.234	.234	.234	.234	.234
87	LPT	—	.299	.299	.299	.299	.299	.299	.299
100	LPT	—	.349	.349	.349	.349	.349	.349	.349

### SBR Straight Before Radius

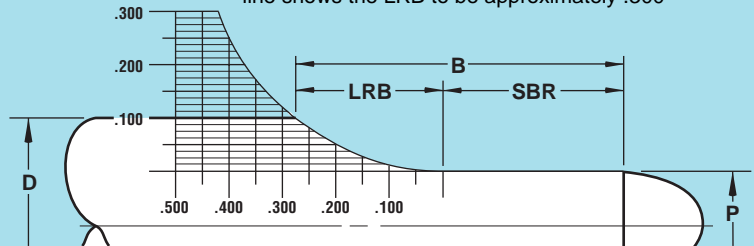
To determine Length of Radius Blend (LRB)

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

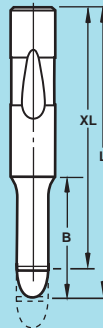
$$(D-P)/2 = (.375 - .175)/2 = .100$$

Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300



Code	3.75	4.00
25		
37	375	400
50	375	400
62	375	400
75	375	400
87	375	400
100	375	400
25		
37	B375	B400
50	B375	B400
62	B375	B400
75	B375	B400
87	B375	B400
100	B375	B400
37	C375	C400
50	C375	C400
62	C375	C400
75	C375	C400
87	C375	C400
100	C375	C400
50	D375	D400
62	D375	D400
75	D375	D400
87	D375	D400
100	D375	D400

### XL Overall Length Shortened (1.75 min.) Stock removal from point end which shortens B length.



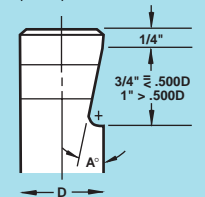
### WS Whistle Stop (See table for standard angles) The Whistle Stop alteration is ground through the ball seat. Subject to same limitations as Standard and Custom Ball Seat Locations.

**Example:**

LPT50 400, P.327, M2, WS

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**.)



### XN DayTride® A unique wear-resistant surface treatment for M2 only.

### XNT DAYTiN® Titanium Nitride coating for extra wear. Available on M2 only.

## XCN

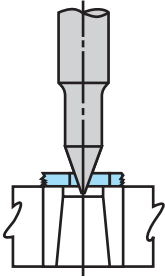
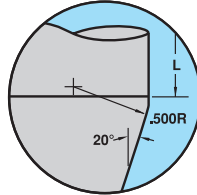
# Light Duty Positive Pick-Up Pilots

Order any length from 2.50 through 5.50

**NEW** Particle Steel  
PS4 with 4% vanadium  
provides higher wear  
resistance and toughness  
than M2.

**FDS**  
FIRM DELIVERY SCHEDULE  
1 Day, PS4 +2 Days

Geometry provides smoother  
pick-up without the risk of  
distorting the hole.

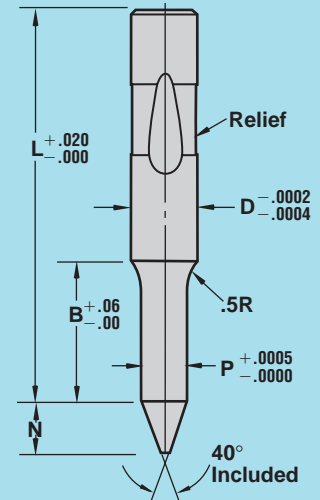


Greater Positioning — moves the  
stock further than conventional pilots.

Steel: M2, PS4 Rc 60-63

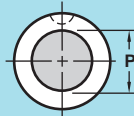


Type  
LPA



## LPA

Round P  $\begin{matrix} +.0005 \\ -.0000 \end{matrix}$   $\text{Ⓢ} .0005 \text{ P to D}$

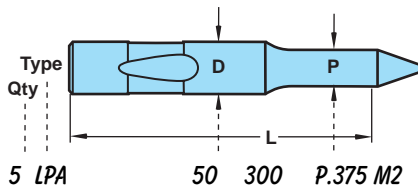


When P=D Shank Tolerance Applies

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

## How to Order:

Specify: Quantity  
 Type  
 Shank & Length Codes  
 P Dimension  
 Steel  
 Standard Alterations

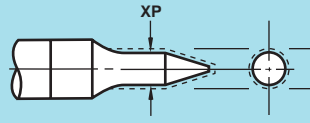


## Standard Alterations

Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge. Does not add to delivery unless noted.

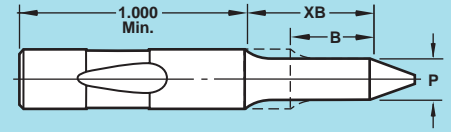
### XP P Dimensions Smaller than Standard

XP < .186 Pilot is 1.5P in length.  
 XP < .083 Pilot needs to be >1.5P in length, therefore special.



### XB Point Length Longer than Standard

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



XBB and X3B adds 3 days to delivery.

Point Length	XB									XBB	X3B	
	.5001	.6251	.7501	.8751	1.0001	1.1251	1.2501	1.3751	1.5001	1.6251	2.0001	2.5001
	.6250	.7500	.8750	1.0000	1.1250	1.2500	1.3750	1.5000	1.6250	2.0000	2.5000	3.0000
Code Type	Min. P (Rounds)											
37 LPA	.061	.061	.079	.079	.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

### SBR Straight Before Radius

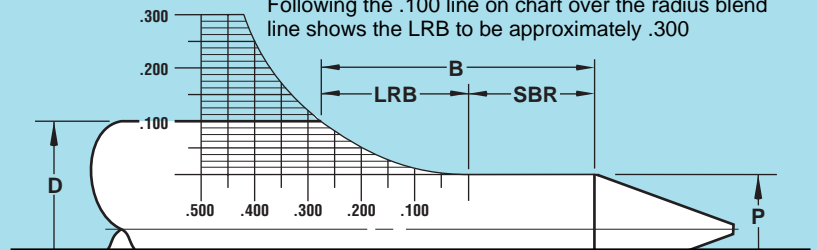
To determine Length of Radius Blend (LRB)

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

$$(D-P)/2 = (.375 - .175)/2 = .100$$

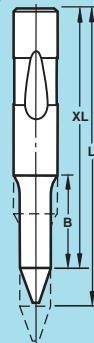
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300



### XL Overall Length Shortened

(1.75 min.) Stock removal from point end B length maintained.

Available at no charge within catalog range



### WS Whistle Stop (See table for standard angles)

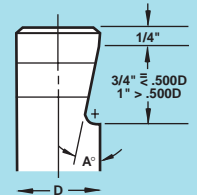
The Whistle Stop alteration is ground through the ball seat. Subject to same limitations as Standard and Custom Ball Seat Locations.

Example:

LPA50 400, P.327, M2, WS

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**.)



### XN DayTride® A unique wear-resistant surface treatment for M2 only.

### XNT DAYTIN® Titanium Nitride coating for extra wear. Available on M2 only.

### XCN

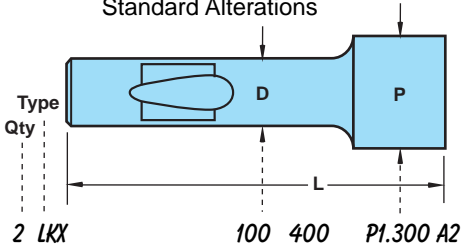
Code	5.00	5.25	5.50
37			
50	500	525	550
62	500	525	550
75	500	525	550
87	500	525	550
100	500	525	550
37	B500	B525	B550
50	B500	B525	B550
62	B500	B525	B550
75	B500	B525	B550
87	B500	B525	B550
100	B500	B525	B550
37	C500	C525	C550
50	C500	C525	C550
62	C500	C525	C550
75	C500	C525	C550
87	C500	C525	C550
100	C500	C525	C550
50	D500	D525	D550
62	D500	D525	D550
75	D500	D525	D550
87	D500	D525	D550
100	D500	D525	D550

# Light Duty Point Larger than Shank Punches

**FDS**  
FIRM DELIVERY SCHEDULE  
3 Days 1-5 pcs.  
5 Days 6-19 pcs.

## How to Order:

Specify: Quantity  
Type  
Shank & Length Codes  
P or P & W Dimensions  
Steel  
Standard Alterations

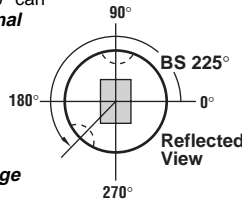


## Standard Ball Seat Locations

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°. **See page 31 for more information.**



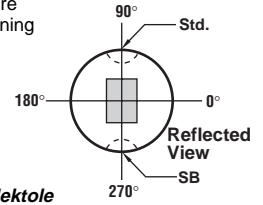
## Double Ball Seat

A second ball seat can 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.

Can also be located 90° from primary ball seat. **Not recommended for diameters under .625 Jektole and under .375 Solid.**

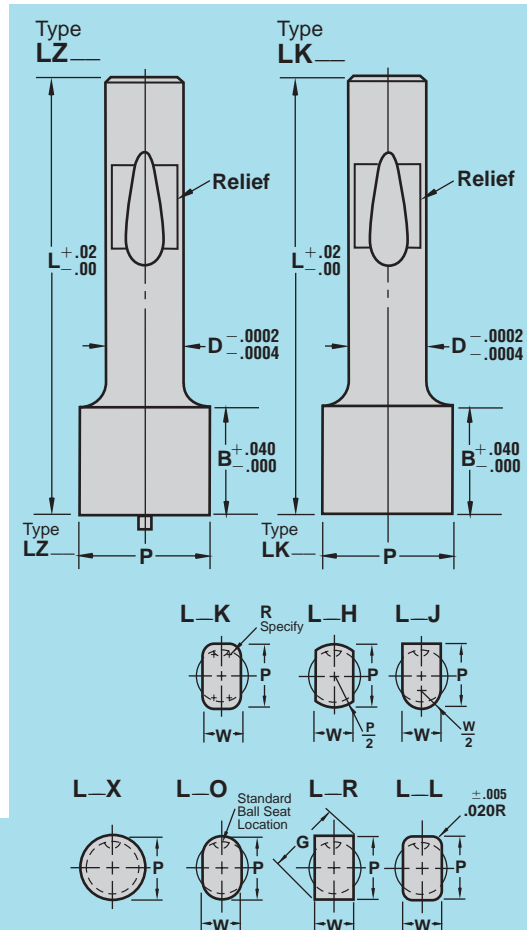
## Example:

LZR 87, B 350, P1.500, W .900, SB 270°



Steel: A2, M2 Rc 60-63

Round P  $\pm .0005$   $\pm .0000$   $\text{P to D}$   
Shape P,W  $\pm .0005$   $\text{P to D}$

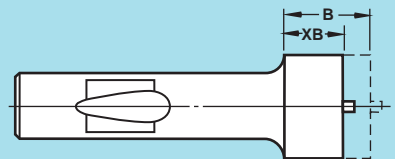


## Standard Alterations

Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge.

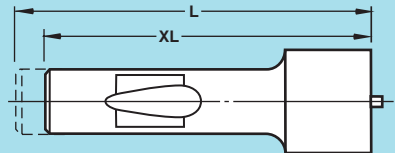
### **XB** Point Length Longer than Standard

(Shortens punch from the point end.)



### **XL** Overall Length Shortened (2.00 min.)

Stock removal from **shank end**. Minimum shank length is 1 3/16". **Does not alter ball seat location.**



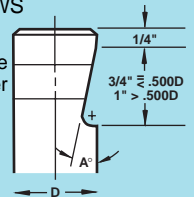
### **WS** Whistle Stop (See table for standard angles)

The Whistle Stop alteration is ground through the ball seat. Subject to same limitations as Standard and Custom Ball Seat Locations.

**Example:** LZXR75 400, P1.250, M2, WS  
LKR75 400, P1.250, W.350, M2, WS

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**.)



**XN** DayTride® A unique wear-resistant surface treatment for M2 only.

**XNT** DAYTiN® Titanium Nitride coating for extra wear. Available for M2 only.

**XJ** Smaller Jektole® Components. See page 22.

**XCN**

Type	Shank		Point Length B	Round Range P	Shape Min. Max. W P/G		Overall Length L				Jektole Pin
	D	Code			2.50	3.00	3.50	4.00			
LZ_ Jektole	.500	50	.75	.501-1.250	.188-1.250	250	300	350	400	J6	
LK_ Regular	.625	62	.88	.626-1.500	.250-1.500	250	300	350	400	J6	
	.750	75	.94	.751-1.500	.312-1.500	250	300	350	400	J9	
	.875	87	.94	.876-1.750	.375-1.750	250	300	350	400	J9	
	1.000	100	.94	1.001-1.750	.437-1.750	250	300	350	400	J9	

Light Duty

# Jektol<sup>®</sup>/Regular Punch Blanks

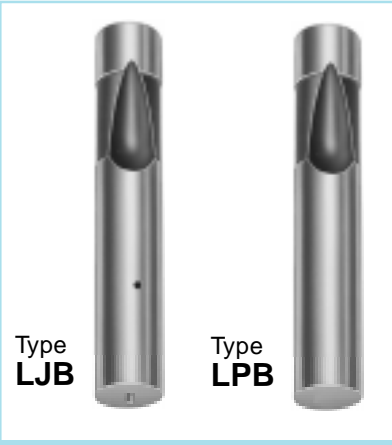
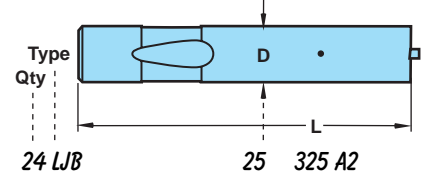


ANSI/ASME B94.18-1987

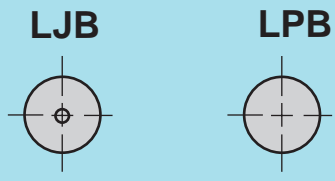
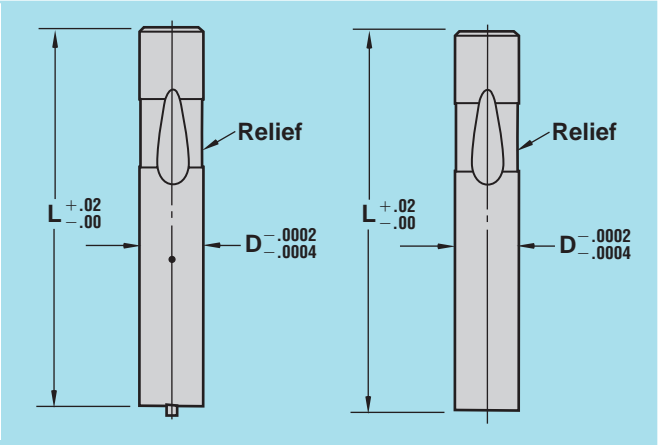
**NEW** Particle Steel PS4 with 4% vanadium provides higher wear resistance and toughness than M2.

**How to Order:**

Specify: Quantity  
Type  
Shank & Length Codes  
Steel



Steel: A2, M2, PS4 Rc 60-63



Type	Shank		Overall Length L										Jektol <sup>®</sup> Pin
	D	Code	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00		
LJB	.250	25	200	225	250	275	300	325	350			J3	
	.375	37	200	225	250	275	300	325	350	375	400	J4	
	.500	50	200	225	250	275	300	325	350	375	400	J6	
	.625	62		225	250	275	300	325	350	375	400	J6	
	.750	75		225	250	275	300	325	350	375	400	J9	
	.875	87		225	250	275	300	325	350	375	400	J9	
	1.000	100		225	250	275	300	325	350	375	400	J9	

Type	Shank		Overall Length L									
	D	Code	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25
LPB	.250	25	200	225	250	275	300	325	350	375		
	.375	37	200	225	250	275	300	325	350	375	400	425
	.500	50	200	225	250	275	300	325	350	375	400	425
	.625	62		225	250	275	300	325	350	375	400	425
	.750	75		225	250	275	300	325	350	375	400	425
	.875	87		225	250	275	300	325	350	375	400	425
	1.000	100		225	250	275	300	325	350	375	400	425

For lengths longer than 4.25 contact the factory for availability (M2 LPB only).

# Jektole® Data



## Jektole® In Production

- Requires less press tonnage
- Reduces pressure required to strip the punch, reducing punch wear
- Produces minimal blurr
- Doubles (and often triples) piece output per grind
- Reduces total punch costs

## Jektole® In Maintenance

- Keeper Key — holds pin in retracted position
- Eliminates the need for disassembly before grinding
- Maintains proper pin extension
- Reduces downtime for re-grinding

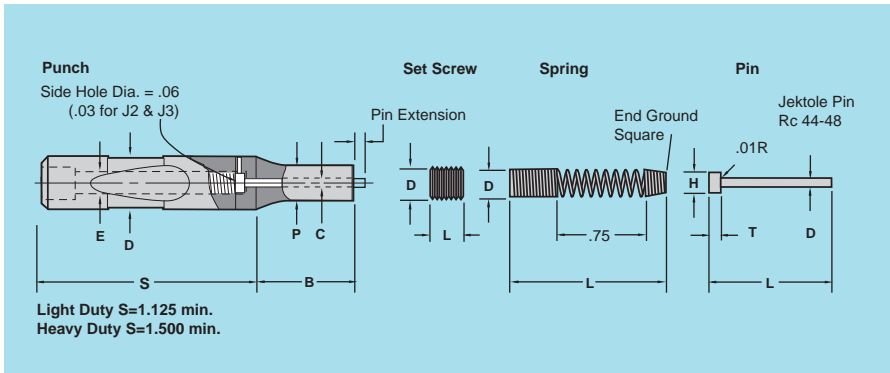
## Standard Jektole Data

DIMENSION	J2*	J3	J4	J6	J9	J12	
Std. Shank Dia.	D	.2500	.2500	.3750	.5000	.8750	1.2500
					.6250	1.0000	
Point Hole Dia.	C	.020	.032	.046	.063	.094	.125
Shank Hole Dia.	E	.086	.109	.141	.172	.221	.275
Pin Extension		.03	.03	.06	.06	.06	.06

## Jektole Design Limits

DIMENSION	J2	J3	J4	J6	J9	J12	
Min. Shank Dia.	D	.250	.250	.375	.500	.625	1.250
Min. Point Dia.	P	.050	.080	.115	.158	.235	.281
Max. Point Lgth.	B	1.25	1.50	1.62	1.62	1.62	1.62
Max. Shank Lgth.	S	3.375	3.375	3.375	4.25	4.25	2.75

## Jektole® Components



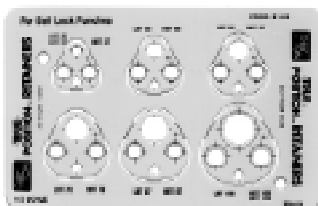
## Universal Jektole Components

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
Head 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" Pre-load)	Lbs.	.5	.75	1	1.5	2	2.5
SCREWS	J2	J3	J4	J6	J9	J12	
Screw Size	D	#3-48	#5-50	#8-32 #10-32	¼-28	5/16-24	
Screw Length	L	.19	.19	.19	.19	.25	.25

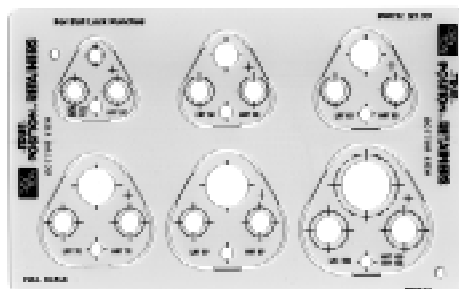
\*Point Diameters <.080"

# Templates

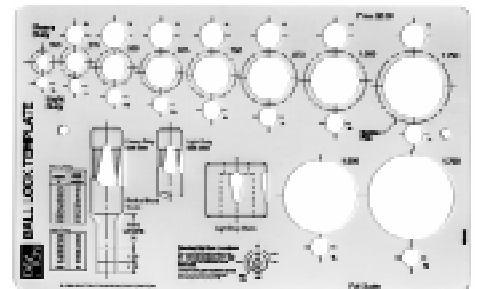
## True Position® Half Scale RD8475



## True Position® Full Scale RD8473



## Ball Location Full Scale RD9432





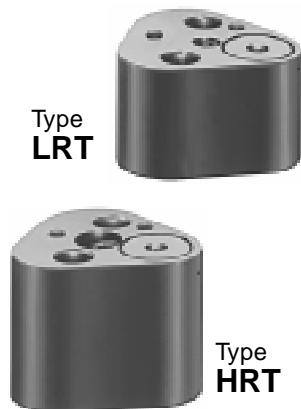
Heavy Duty/Light Duty

# TRUE<sup>®</sup> POSITION Retainers

## Single Ball Lock Punch Retainers

Dayton's interchangeable retainer that is now the industry standard

- The in-line dowel guarantees precise punch-to-matrix alignment. You gain higher quality parts, longer punch life and drastically reduced downtime.
- True-Position retainers eliminate hand fitting and cut mounting time by nearly 50%. Simply pull the retainer from its box and screw it to the die set. True Position retainers give you dimensional accuracy every time.
- Shaped punches use the secondary dowel for precise alignment; round punches need only one.
- The precision-ground ball hole assures perfect alignment of any punch shape — even if you replace the retainer.
- Tapped ball release hole.
- True Position adaptability can cut your retainer inventory in half.



True Position<sup>®</sup>  
Retainer Includes:

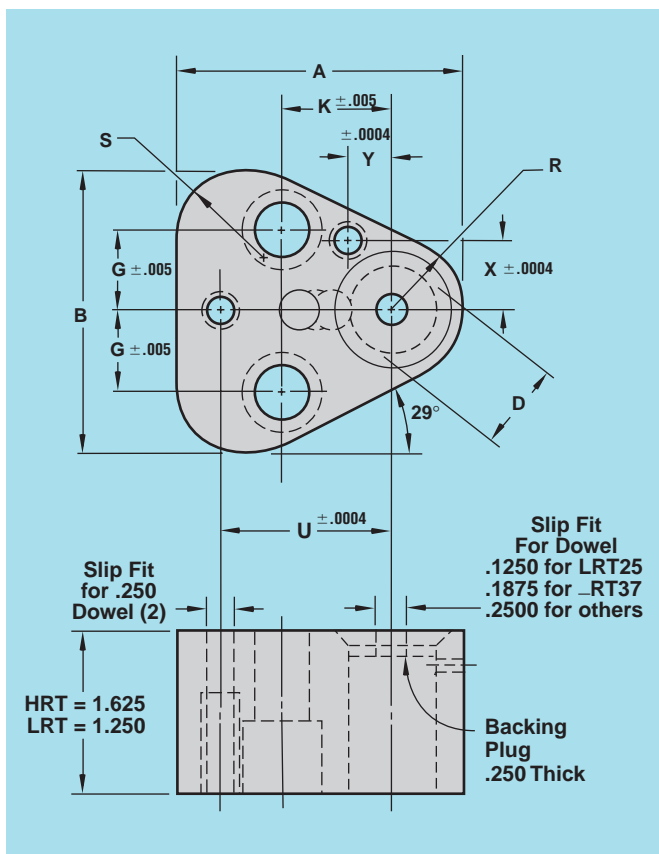
- 1 Ball
- 1 Spring
- 2 Screws
- 2 Dowels
- 1 Ball Release Screw

## How to Order:

Quantity 20  
10

Catalog No. HRT37  
LRT62

**FDS<sup>®</sup>**  
FIRM DELIVERY SCHEDULE 1 Day

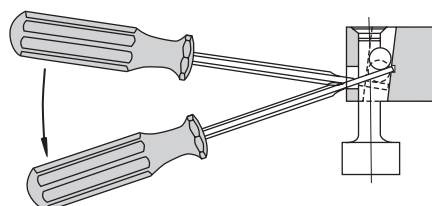


## Catalog Number

Heavy Duty	Light Duty	Code	D	A	B	G	K	R	S	U	X	Y	Screw Size
—	LRT	25	.2500	1.75	1.72	.438	.750	.38	.47	1.060	.354	.294	5/16-18
HRT	LRT	37	.3750	1.75	1.72	.438	.750	.38	.47	1.060	.354	.295	5/16-18
HRT	LRT	50	.5000	2.00	1.97	.562	.750	.50	.60	1.180	.472	.256	3/8-16
HRT	LRT	62	.6250	2.12	2.09	.625	.750	.56	.55	1.250	.532	.236	3/8-16
HRT	LRT	75	.7500	2.38	2.34	.688	.750	.69	.79	1.320	.650	.197	3/8-16
HRT	LRT	87	.8750	2.50	2.47	.688	.750	.75	.85	1.400	.728	.197	3/8-16
HRT	LRT	100	1.0000	2.75	2.72	.781	.938	.88	.97	1.600	.866	.276	1/2-13
HRT	—	125	1.2500	2.75	2.72	.781	.938	.88	.97	1.600	.866	.276	1/2-13

## Retainer Side Release Option

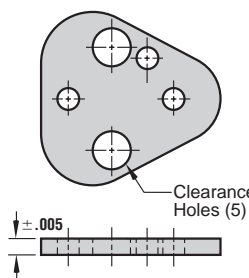
**SR Side Release Option** There are circumstances where the standard ball release hole on the bottom of the retainer cannot be used without alteration to the die or the punch. This is common when using Point Larger than Shank punches. To eliminate this problem an alteration is available that allows a standard ball release tool to be inserted from the side of the retainer to release the ball for punch removal. Specify "SR" at the end of the retainer catalog number.



Example: HRT-50-SR

U.S. Pat. 5,197,368

## Backing/Shim Plates



D	Thickness T	
	.189 (Rc58)	.071 (Soft)
25-37	37048HT	37018AN
50	50048HT	50018AN
62	62048HT	62018AN
75	75048HT	75018AN
100	11148HT	11118AN
125	12548HT	12518AN

# Multi-Position™ Retainers



**FIRM DELIVERY SCHEDULE**

1-6 Punch holes: 5 days.

7+ Punch holes: 8 days.



Using two Type A Backing Plugs eliminates the need for dowels in the retainer.

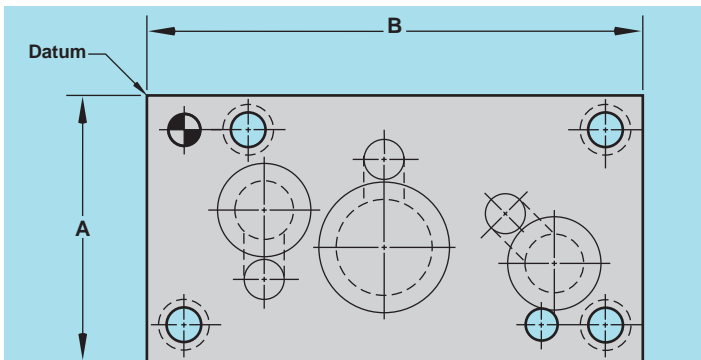


Dayton's innovative Multi-Position retainers provide a simple, low-cost solution to building new dies. These retainers reduce the need for special detailing, saving both design and build time.

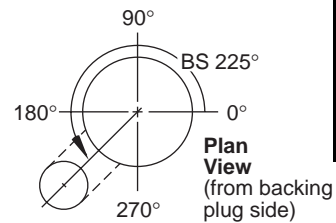
Multi-Position retainers are easy to order. Simply specify HRP for Heavy Duty or LRP for Light Duty Ball Lock retainers followed by the catalog number, hole locations and hole sizes. (For more information, see How to Order example on the next page.) Order forms are available on request.

The Side Release Option for retainers is available on Multi-Position™ retainers. (See page 23)

## Ball Hole Locations:



Note: Looking at retainer from backing plug side.

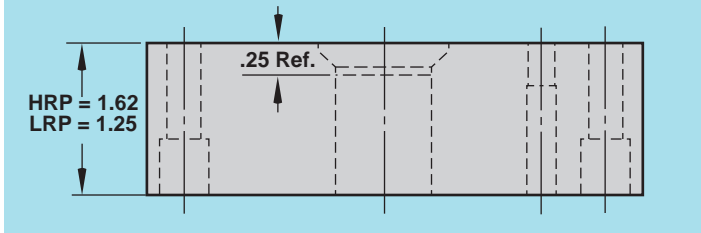


Specify radial location in degrees counter-clockwise from 0°.

Hole Tolerance Re Datum Point	
Dowel Holes	±.0003
Screw Holes	±.005
Component Holes	±.0003

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

Class B provided unless otherwise specified.



Specify screw size and location

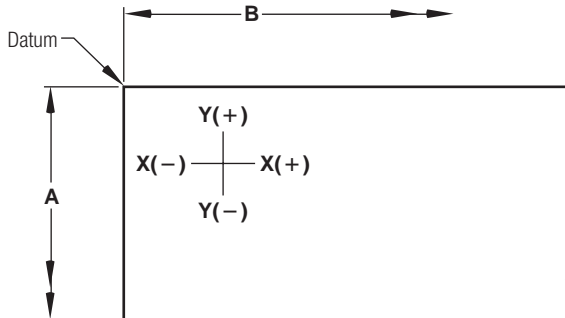
Type	W	L													
		2.50	2.75	3.00	3.25	3.50	3.75	4.00	5.00	6.00	7.00	8.00	9.00	10.00	12.00
HRP	2.00	2025	2027	2030	2032	2035	2037	2040	2050	2060	2070	2080	2090	2010	2012
LRP	2.75		2727	2730	2732	2735	2737	2740	2750	2760	2770	2780	2790	2710	2712
	3.00		3027	3030	3032	3035	3037	3040	3050	3060	3070	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

## How to Order: Specify datum location first

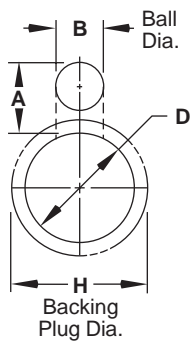
Retainer		Catalog No.		Special Size			
<input checked="" type="checkbox"/> HRP <input type="checkbox"/> LRP		3070		A _____		B _____	
<b>Multi-Position™ Retainers</b>							
Hole No.	Component		Location		Ball Hole		Backing Plug Type
	Type	Size	X Axis	Y Axis	Location	Class	
1	DOWEL	5/16 S.F.	.375	-.375	—	—	—
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	—	—	—

S.F. = Slip Fit

You must specify all dimensions from Datum.



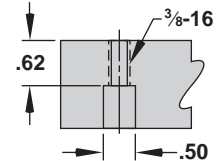
## Space Requirements:



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
LRP	1.000	.69	.500	1.250
	1.250	.69	.500	1.500
	.250	.44	.250	.500
	.375	.44	.250	.625
	.500	.50	.312	.750
LRP	.625	.50	.312	.875
	.750	.57	.375	1.000
	.875	.57	.375	1.125
	1.000	.57	.375	1.250

## Alterations: No change in delivery

**Standard Jackscrew Hole**  
Jackscrews provide for easy removal of retainer off dowels.

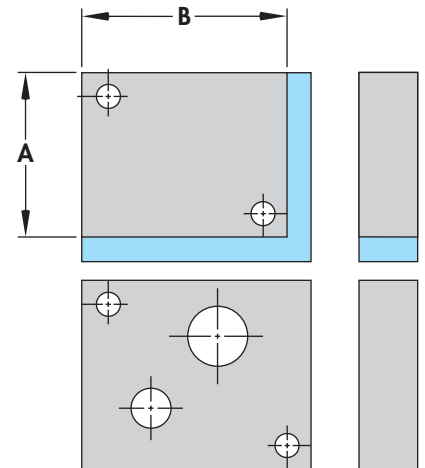


**Special Size**  
Any amount of material can be removed from the sides of the retainer for a custom size. Edges are sawcut  $\pm .03$ .

**Clearance Holes**  
Clearance holes or tapped holes can be detailed or shown in the chart like the order example above.

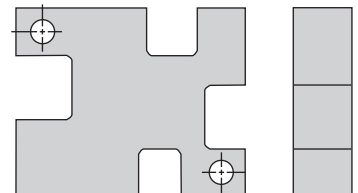
Holes are drilled through the retainer unless otherwise specified. **Location**  $\pm .010$

**Diameter**  $+.030$   
 $+.040$

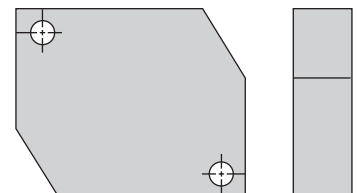


**These alterations add 1 day to FDS.**  
(requires a detailed drawing)

**Notches**  
Notches to clear other tooling can be added to any side of the retainer. Notches are sawcut  $\pm .03$ .



**Angles**  
Angles, like notches can be added to clear other tooling in the die. Angles are sawcut  $\pm .03$ .



## Backing Plugs:

Backing Plugs		
Type A	Type B	Type C
In-Line Dowel	Matrixes	Solid

The **Type C** Backing Plug is standard. However, as shown in the photograph on the previous page, two **Type A** plugs can be used with  $1/4$ " diameter dowels for location. This eliminates the cost of two dowel holes in the retainer.

Matrix Retainers require detailed drawing.

# End & Square Retainers

Reference ANSI/ASME B94.16-1987



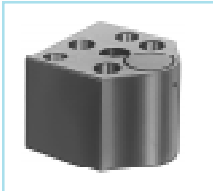
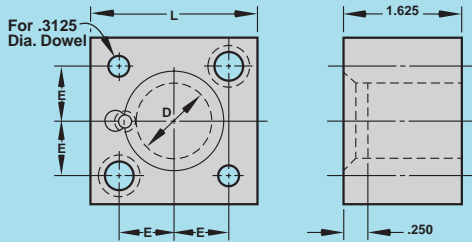
## Heavy Duty

### Retainer Sets include:

- Backing Plug    Screws
- Ball            Dowels
- Spring



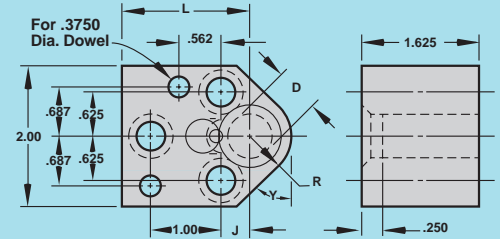
### HRS



### How to Order:

Qty	Type	D
15	HRE	100
12	HRS	62

### HRE



Catalog Number		D	L	E	Screw Size
Type	Code				
HRS	50	.5000	1.88	.562	3/8-16
HRS	62	.6250	2.00	.625	3/8-16
HRS	75	.7500	2.12	.688	3/8-16
HRS	87	.8750	2.38	.750	1/2-13
HRS	100	1.0000	2.38	.750	1/2-13
HRS	125	1.2500	2.62	.812	1/2-13

Catalog Number		D	L	J	R	Y	Screw Size
Type	Code						
HRE	50	.5000	1.75	.375	.50	40°	3/8-16
HRE	62	.6250	1.81	.438	.56	45°	3/8-16
HRE	75	.7500	1.88	.500	.69	60°	3/8-16
HRE	87	.8750	1.94	.562	.75	60°	3/8-16
HRE	100	1.0000	2.00	.625	.81	60°	3/8-16
HRE	125	1.2500	2.12	.750	1.00	—	3/8-16

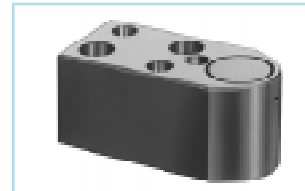
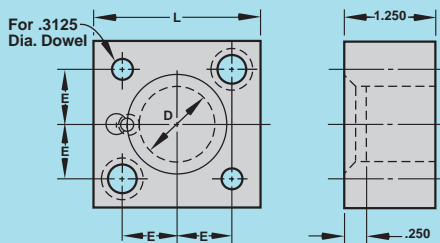
## Light Duty

### Retainer Sets include:

- Backing Plug    Screws
- Ball            Dowels
- Spring



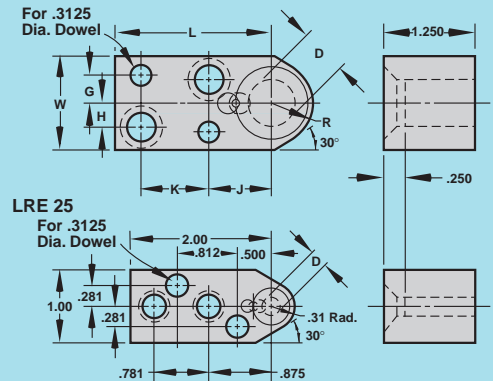
### LRS



### How to Order:

Qty	Type	D
12	LRE	87
8	LRS	37

### LRE



Catalog Number		D	L	E	Screw Size
Type	Code				
LRS	25	.2500	1.25	.312	1/4-20
LRS	37	.3750	1.38	.375	5/16-18
LRS	50	.5000	1.50	.438	5/16-18
LRS	62	.6250	1.62	.500	5/16-16
LRS	75	.7500	1.88	.562	3/8-16
LRS	87	.8750	2.00	.625	3/8-16
LRS	100	1.0000	2.25	.750	3/8-16
*LRS	125	1.2500	2.25	.750	3/8-16
*LRS	150	1.5000	2.75	1.000	3/8-16
*LRS	175	1.7500	2.75	1.000	3/8-16

Catalog Number		D	G	H	J	K	L	R	W	Screw Size
Type	Code									
LRE	25	.2500	See Drawing						1/4-20	
LRE	37	.3750	.375	.281	.906	.969	2.25	.38	1.25	3/8-16
LRE	50	.5000	.375	.281	.906	.969	2.25	.50	1.25	3/8-16
LRE	62	.6250	.375	.281	.906	.969	2.25	.56	1.25	3/8-16
LRE	75	.7500	.438	.344	1.125	1.000	2.50	.69	1.38	3/8-16
LRE	87	.8750	.438	.344	1.125	1.000	2.50	.75	1.50	3/8-16
LRE	100	1.0000	.438	.344	1.125	1.000	2.50	.81	1.62	3/8-16




\*Furnished with Backing Plate instead of Backing Plug

# Retainer Accessories




Backing Plugs			Soc. Hd. Cap Scr.	Retainer Nut	Dowel	Ball Release Screw	Ball	Standard Spring	Extra Heavy Spring	Booster Spring	Retainer Drill Bushing
Type A	Type B	Type C									

## Heavy Duty

Reg. U.S. Pat. & TM Office

Part	Qty	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	
<b>HRT</b> 	37	57334			57411 5/16-18x1 1/4	57495 5/16-18	57401 3/16x3/4		81310 1/8 Dia.	57392	57398	26902	57268
	50	57342											57275
	62	57394			57419 3/8-16x2	83009 3/8-16		57527 10-24x1	81316 1/2 Dia.	57394	57400	26904	57283
	75	57356					57403 1/4x3/4						57291
	87	57364											57298
	100	57372			57427 1/2-13x2	83012 1/2-13							57305
125	57379											57312	
<b>HRS</b> 	50			57343									
	62			57350	57419 3/8-16x2	83009 3/8-16			81316 1/2 Dia.	57394	57400	26904	
	75			57357			81700 3/16x1 1/2						
	87			57365									
	100			57373	57427 1/2-13x2	83012 1/2-13							
	125			57380									
<b>HRE</b> 	50			57343									
	62			57350									
	75			57357	57419 3/8-16x2	83009 3/8-16	81701 3/8x1 1/2		81316 1/2 Dia.	57394	57400	26904	
	87			57365									
	100			57373									
	125			57380									

## Light Duty

Part	Qty	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	
<b>LRT</b> 	25	57326			50543 5/16-18x1 1/2	57495 5/16-18	57397 1/8x3/4		81302 1/4 Dia.	57387			57261
	37	57334					57401 3/16x3/4						57268
	50	57342	57344					57525 8-32x1	81305 3/16 Dia.	57389			57275
	62	57349	57351		57416 3/8-16x1 1/2	83009 3/8-16							57283
	75	57356	57358				57403 1/4x3/4		81310 3/8 Dia.	57391			57291
	87	57364	57366		57425 1/2-13x1 1/4	83012 1/2-13							57298
100	57372	57374										57305	
<b>LRS</b> 	25			57327	50522 1/4-20x1 1/2	83003 1/4-20			81302 1/4 Dia.	57387			
	37			57335									
	50		57344	57343	50543 5/16-18x1 1/2	83006 5/16-18			81305 3/16 Dia.	57389			
	62		57351	57350									
	75		57358	57357			81700 3/16x1 1/2						
	87		57366	57365									
	100		57374	57373	57416 3/8-16x1 1/2	83009 3/8-16			81310 3/8 Dia.		57391		
	125									81410			
	175												
<b>LRE</b> 	25			57327	50522 1/4-20x1 1/2	83003 1/4-20			81302 1/4 Dia.	57387			
	37			57335									
	50		57344	57343					81305 3/16 Dia.	57389			
	62		57351	57350	57416 3/8-16x1 1/2	83009 3/8-16							
	75		57358	57357			81700 3/16x1 1/2						
	100		57366	57365	57374	57373			81310 3/8 Dia.	57391			

# Ball Release Tools

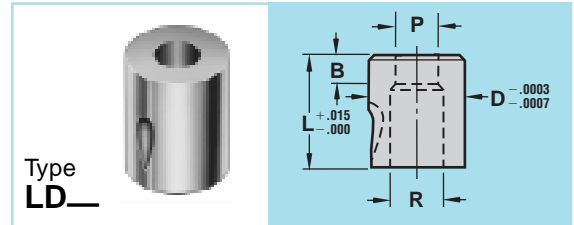
See page 36 for complete information on DAYTON Punch Pullers





Ball Lock ANSI B94-29-1988  
Press Fit ANSI B94.28-1987

## Ball Lock

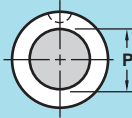
Steel: A2, M2 Rc 60-63



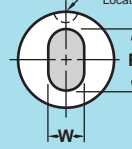
Round P  $\begin{matrix} +.0005 \\ -.0000 \end{matrix}$   .0005 P to D

Shape P,W  $\pm .0005$   .001 P to D

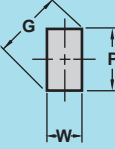
**LDX**



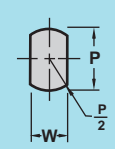
**LDO**



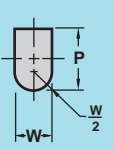
**LDR**



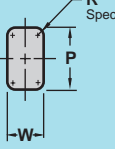
**LDH**



**LDJ**



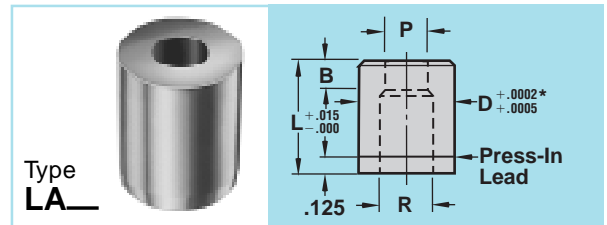
**LDK**





Body			Min. B	Max. R	Round		Shape		L
Type	D	Code			Range P	Min. W	Max. P/G	1.187	
LD_	.5000	<b>50</b>	.156	.228	.064- .195	.048- .195	118		
	.6250	<b>62</b>	.187	.312	.126- .285	.064- .285	118		
	.7500	<b>75</b>	.187	.375	.196- .345	.095- .345	118		
	.8750	<b>87</b>	.187	.468	.286- .435	.127- .435	118		
	1.0000	<b>100</b>	.250	.578	.346- .545	.158- .545	118		
	1.2500	<b>125</b>	.250	.687	.436- .655	.189- .655	118		
	1.5000	<b>150</b>	.250	.812	.546- .780	.220- .780	118		
	1.7500	<b>175</b>	.312	1.062	.656-1.035	.252-1.035	118		

## Press Fit

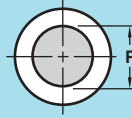
Steel: A2, M2 Rc 60-63



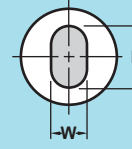
Round P  $\begin{matrix} +.0005 \\ -.0000 \end{matrix}$   .0005 P to D

Shape P,W  $\pm .0005$   .001 P to D

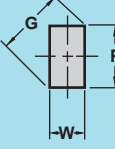
**LAX**



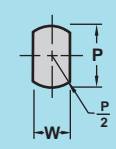
**LAO**



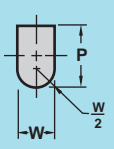
**LAR**



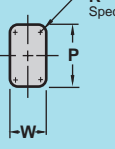
**LAH**



**LAJ**



**LAK**



Body			Min. B	Max. R	Round		Shape		Overall Length L							
Type	D	Code			Range P	Min. W	Max. P/G	.750	.875	.937	1.000	1.125	1.187	1.250	1.375	1.500
LA_	.2500	<b>25</b>	.156	.156	.064- .135	—	—	75	87	93	100	112		125	137	
	.3750	<b>37</b>	.156	.228	.064- .195	.048- .195	75	87	93	100	112		125	137	150	
	.5000	<b>50</b>	.156	.312	.064- .285	.064- .285	75	87	93	100	112		125	137	150	
	.6250	<b>62</b>	.187	.390	.136- .365	.095- .365	75	87	93	100	112		125	137	150	
	.7500	<b>75</b>	.187	.468	.136- .435	.118- .435	75	87	93	100	112		125	137	150	
	.8750	<b>87</b>	.187	.578	.276- .545	.127- .545	75	87	93	100	112		125	137	150	
	1.0000	<b>100</b>	.250	.703	.356- .675	.158- .675	75	87	93	100	112		125	137	150	
	1.2500	<b>125</b>	.250	.828	.500- .800	.189- .800	75	87	93	100	112		125	137	150	
	1.5000	<b>150</b>	.250	1.093	.616- 1.050	.252- 1.050	75	87	93	100	112		125	137	150	
LA_	1.7500	<b>175</b>	.312	1.430	.750- 1.400	.190- 1.400				100	112	118	125	137	150	
	2.0000	<b>200</b>	.312	1.630	.875- 1.600	.252- 1.600				100	112	118	125	137	150	
	2.2500	<b>225</b>	.312	1.830	1.000- 1.800	.314- 1.800				100	112	118	125	137	150	
	2.5000	<b>250</b>	.312	2.030	1.125- 2.000	.377- 2.000				100	112	118	125	137	150	
	2.7500	<b>275</b>	.312	2.230	1.250- 2.200	.439- 2.200				100	112	118	125	137	150	

\*+.0002  
-.0006 1.75 and larger

28

## How to Order:

Specify: Quantity

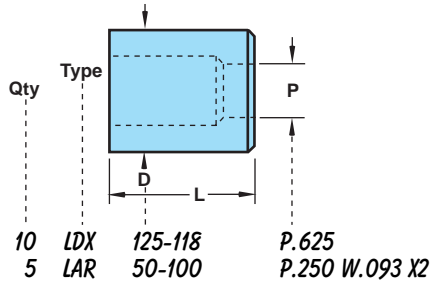
Type

Body & Length Codes

P or P & W dimensions

Steel

Standard Alterations

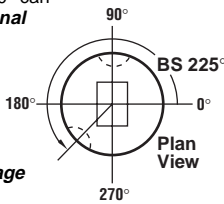


### Standard Ball Seat Locations

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°. **See page 31 for more information.**



#### Double Ball Seat

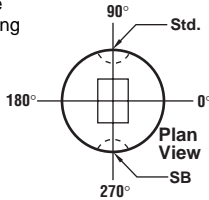
A second ball seat can be specified. Normally located 180° from the primary ball seat these are used to minimize sharpening of notching punches by rotating the punch 180°. Specify SB and degree desired.

Can also be located 90° from primary ball seat.

**Not recommended for diameters under .500.**

#### Example:

LDR 150-118, P .675, W .380, SB 270°

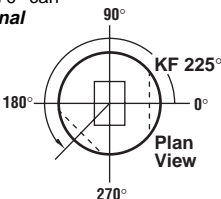


### Standard Key Flat Locations

Standard Key Flat Location is at 0°. Alternate locations of 90°, 180° or 270° can be specified **at no additional cost**.

#### Custom Key Flat Locations

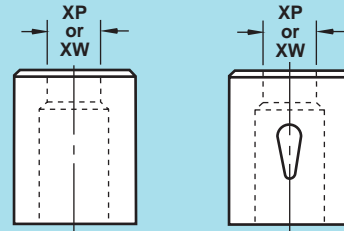
Custom Key Flat Locations can be specified as degree required counterclockwise from 0°. **See page 31 for more information.**



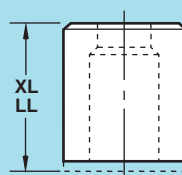
## Standard Alterations

Standard alterations are the ranges beyond those sizes listed in the catalog which can be manufactured for a slight additional charge.

### XP, XW P & 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	—	.167	.191	—	—	—	—
37	.064	.048	.250	.281	—	—	—	—
50	.064	.064	.344	.375	.064	.048	.250	.281
62	.136	.095	.453	.500	.125	.064	.344	.375
75	.136	.118	.562	.594	.150	.095	.453	.500
87	.276	.127	.656	.703	.175	.127	.562	.594
100	.356	.158	.750	.781	.200	.158	.656	.703
125	.500	.189	.935	.969	.250	.189	.750	.781
150	.616	.252	1.200	1.230	.300	.200	.935	.969
175	.750	.190	1.400	1.430	.350	.252	1.200	1.230
200	.875	.252	1.600	1.630	—	—	—	—
225	1.000	.314	1.800	1.830	—	—	—	—
250	1.125	.377	2.000	2.030	—	—	—	—
275	1.250	.439	2.200	2.230	—	—	—	—



### XL

#### Overall Length Shortened

Stock removal does not alter land length on LA\_. Minimum overall length = .25. Not available on Ball Lock matrixes.

### LL

#### Precision Overall Length

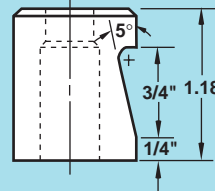
Same as XL except overall length is held to ±.001. Not available on Ball Lock matrixes.

### WS

#### Whistle Stop (5° standard angle)

The Whistle Stop alteration is ground through the ball seat. XP alteration is not available with the WS alteration.

**Example:** LDX75 118, P.329, M2, WS



### XN

**DayTride®** A unique wear-resistant surface treatment for M2 only.

### XNT

**DAYTIN®** Titanium Nitride coating for extra wear. Availability on M2 only.



# EDM Matrix Blanks

## How to Order:

Qty	Type	D	L	P
6	KDE	37-100	XP.187	
5	KDU	50-112	P.020	



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

## Round

There are two types of Round EDM Matrix Blanks to choose from:

- Type KDU Blanks** are provided with a small straight through hole. They are commonly used for wire and vertical EDM operations. There are basically two advantages to this type of blank:
  - In wirecutting, a taper relief can be cut instead of a round straight relief.
  - In conventional EDM applications you can “tailor” the size of the relief to the shape you are cutting.
- Type KDE Blanks** are for use with conventional (vertical) EDM machines. The hole (P) is to introduce dielectric to the spark gap for flushing away eroded particles of steel.

Relief hole (R) provides sufficient clearance for slug removal during the stamping process.

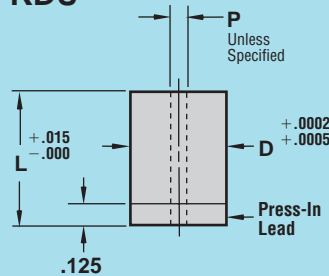
### Any Size Start or Flush Hole

For one day delivery use the standard or optional “P” dimensions shown in the chart. If no “P” dimension is specified the standard (Std.) will be provided. If a larger hole is needed simply specify “XP” and give the hole size.

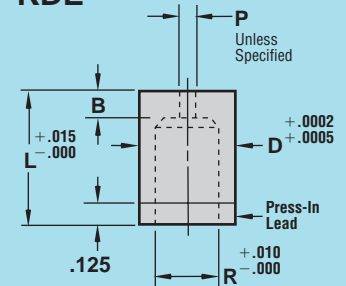


Steel: M2 Rc 60-63

**KDU**



**KDE**



Round P ±.005 .005 P to D

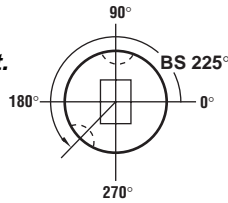
Body			K_U			K_E			Overall Length L							
Type	Dia.	Code	Std. P	Optional P		Std. P	Max. B	R	.75	.87	.93*	1.00	1.12	1.25	1.37	1.50
KD__	.2500	25	.031	.020	—	.032	.25	.156	75	87	93	100	112	125	137	
	.3125	31	.031	.020	—	.032	.25	.191	75	87	93	100	112	125	137	
	.3750	37	.031	.020	—	.032	.25	.228	75	87	93	100	112	125	137	150
	.4375	43	.062	.020	.031	.032	.25	.281	75	87	93	100	112	125	137	150
	.5000	50	.062	.020	.031	.032	.25	.312	75	87	93	100	112	125	137	150
	.6250	62	.062	.020	.031	.093	.25	.391	75	87	93	100	112	125	137	150
	.7500	75	.062	.020	.031	.093	.31	.468	75	87	93	100	112	125	137	150
	.8750	87	.062	.020	.031	.093	.31	.578	75	87	93	100	112	125	137	150
	1.0000	100	.062	.020	.031	.093	.31	.703	75	87	93	100	112	125	137	150
	1.2500	125	.062	.020	.031	.125	.37	.828	75	87	93	100	112	125	137	150
1.5000	150	.062	.020	.031	.125	.37	1.093	75	87	93	100	112	125	137	150	
KD__ D Tolerance + .0006 + .0002	1.7500	175	.125	—	—	.125	.37	1.430	75	87	93	100	112	125	137	150
	2.0000	200	.125	—	—	.125	.37	1.630	75	87	93	100	112	125	137	150
	2.2500	225	.125	—	—	.125	.37	1.830	75	87	93	100	112	125	137	150
	2.5000	250	.125	—	—	.125	.37	2.030	75	87	93	100	112	125	137	150
	2.7500	275	.125	—	—	.125	.37	2.230	75	87	93	100	112	125	137	150

Standard “P” will be provided unless otherwise specified.

# Locking Devices

## Orientation

The Standard Ball Seat location is at 90°. Alternate locations of 0°, 180° or 270° can be specified at **no extra cost**. Custom Ball Seat locations can be specified at BS and degrees counterclockwise from 0°.



## 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 Classified Shapes Section on page 32), simplifies orientation...all locking devices are in the same position.

**Note:** Identify as Reflected View on punch drawing.



## How to Specify

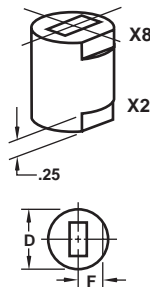
This page shows the most common locking devices available for Press-Fit matrixes, Flat, Double Flat and Dowel. Select the type then add the code to the component description.

### Single Flats X2, X5, X8, X9

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 degree required.

Example: **X2** — 90°.



### Custom Location

Specify **X5** (bottom) or **X9** (top) and degree required counterclockwise from 0°.

Example: **X5** — 135°.

### Double Flats X3, X6

Double key flat locking device is at 0°. Specify **X3** for matrixes.

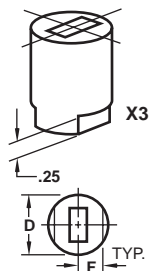
Alternate locations of 90°, 180° or 270° may be specified at no additional cost. Specify **X3** and degree required.

Example: **X3** — 90°.

### Custom Location

Specify **X6** for matrixes and degree required counterclockwise from 0°.

Example: **X6** — 135°.



## F Dimension for Flats for Press-Fit Matrixes

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

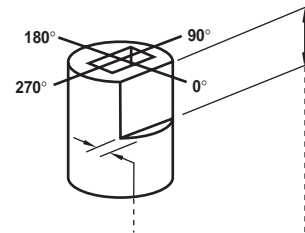
## Location Tolerance

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

## How to Order

**5 LAO 87-100 P.394, W.209, X2, A2**  
**9 LAR 50-125 P.275, W.092, X83, M2**

## Additional Flats For Headless Matrixes



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

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

Standard dowel locking device is at 0°. Specify **X4** (.125 Dowel) or **X41** (.1875 Dowel) for matrixes. **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 degree required.

Example: **X4** — 90°.

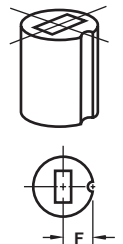
### Custom Location

Specify **X7** (.125 Dowel) or **X71** (.1875 Dowel) for matrixes.

**X1** (F=.5D) for matrixes only. Specify **X1**, **X7** or **X71**

and degree required counterclockwise from 0°.

Example: **X71** — 135°.



## F Dimension for Dowels for Press-Fit Matrixes

Body Dia.	25	37	50	62-275
<b>X0, X1</b>	.1250	.1875	.2500	D/2
<b>X4, X7</b>	.1625	.2125	.2625	D/2
<b>X41, X71</b>	.1938	.2438	.2938	D/2

X0, X1, X4 & X7 — .125 Dowel    X41 & X71 — .1875 Dowel

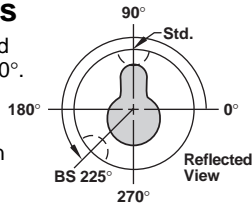
# Classified Shapes

## Standard Ball Seat Locations

The Standard Ball Seat location is at 90°. Alternative locations of 0°, 180° or 270° can be specified at no extra cost.

## Custom Ball Seat Locations

Custom Ball Seat locations can be specified as BS and degrees counterclockwise from 0°.



## Views

Views are: reflected view of punch and plan view of matrix.

## Corner Dimensions

Dimensions should be to the theoretical sharp corners for C22, C24, C25, C34, C61 and C88. Some reduction of these dimensions will result from fitting the punch and matrix under conditions where clearance is .0015 or less per side.

Fillets matched with sharp corners reduces the clearance per side ( $\Delta$ ). If the clearance is  $.0015\Delta$  or less, DAYTON will break sharp corners when the punches and matrixes are ordered together. This reduces assembly time and the risk of the edge breaking during operation. All back-holes are counterbored. **\*Avoid excessive overhang by specifying shaped back-hole**

## Shape Centers

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

## How to Order:

Specify: Quantity

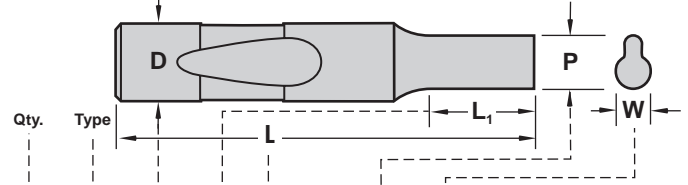
Type

Catalog Number

Classified Shape

Code

Point or Hole Dimensions



15 HPC 62 - 250 C13 P.550, W.400, A.220

Example: Matrixes

2 LDC 62-118 C13 P.125 W.150 A.090  $\Delta$ .002

## Clearance

To assure proper relationship with punches, it is necessary to specify punch dimensions and clearance per side ( $\Delta$ ) when ordering matrixes.

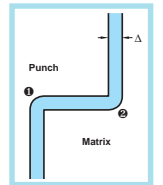
DAYTON will assure the proper clearance of matrixes to the punch when ordered in this manner.

## Notes $\partial$ and $\Sigma$ — Fillets and Sharp Corners

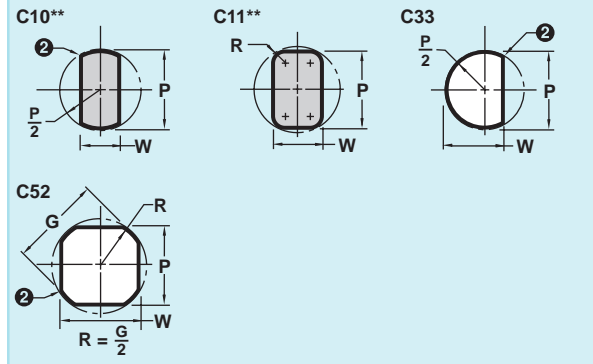
Normal grinding methods produce:

$\partial$  .007 max fillet on the punch...matching corner sharp on the matrix.

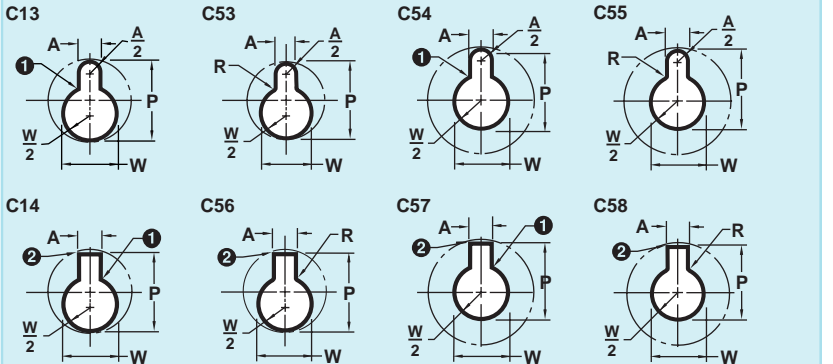
$\Sigma$  .007 max fillet on the matrix...matching corner sharp on the punch.



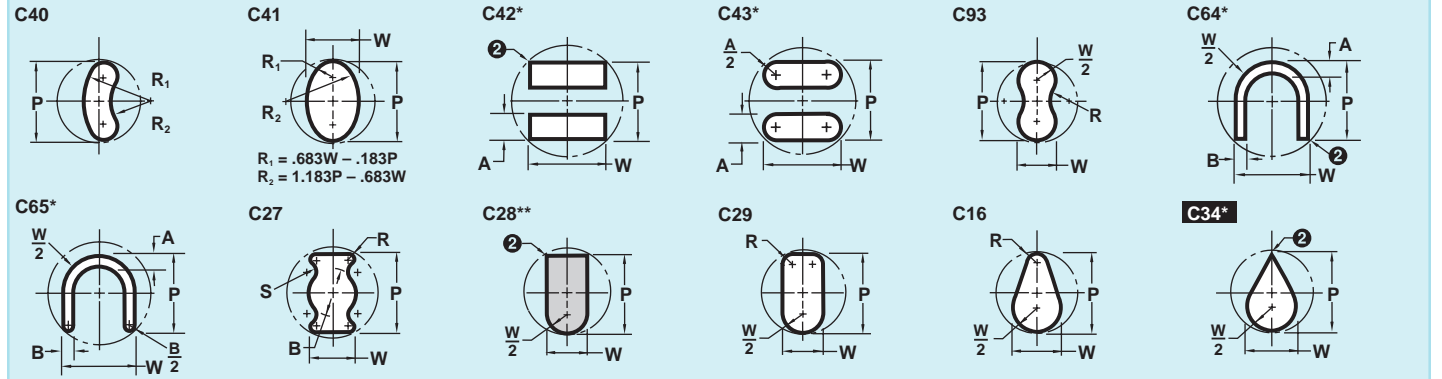
## Flatted Rounds



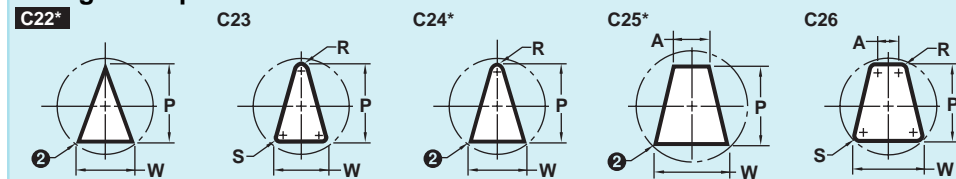
## Mono Lobes



## Miscellaneous



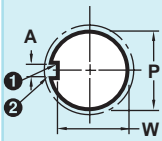
## Triangles/Trapezoids



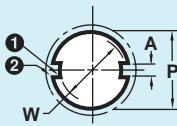
**\*\* Now a standard shape. See product pages.**

## Keys

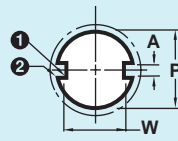
C30



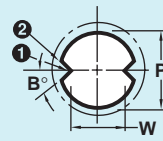
C31



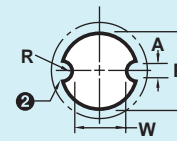
C32



C61

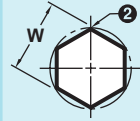


C62

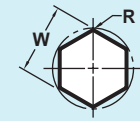


## Polygons

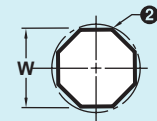
C12



C85

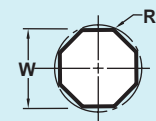


C35



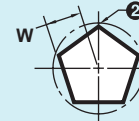
A = Even No. of Sides

C86



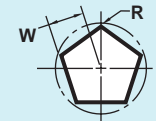
A = Even No. of Sides

C36



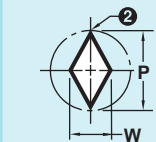
A = Odd No. of Sides

C87

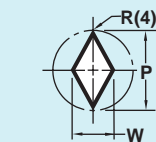


A = Odd No. of Sides

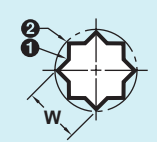
C88



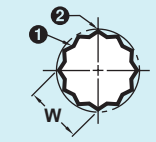
C89



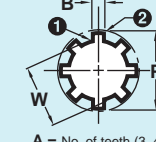
C37



C38

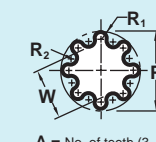


C39



A = No. of teeth (3, 4, 6 or 8 only)

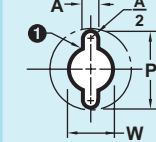
C90\*



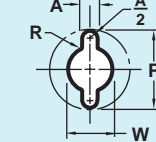
A = No. of teeth (3, 4, 6 or 8 only)

## Multi Lobes

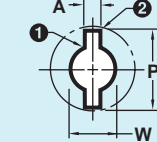
C19



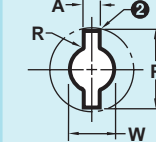
C59



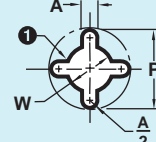
C20



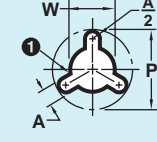
C60



C17

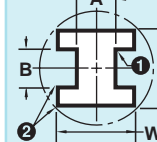


C18

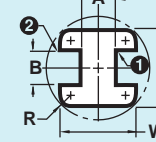


## Duo Tees

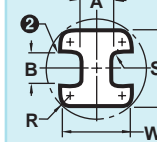
C21\*



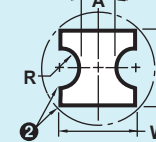
C91\*



C92

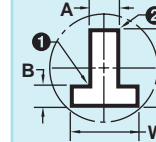


C15\*

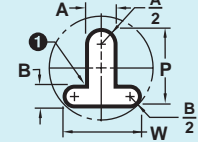


## T's

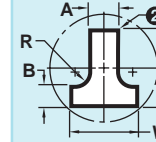
C44\*



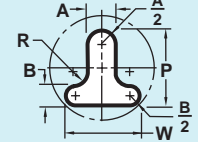
C66\*



C45\*

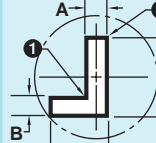


C67\*

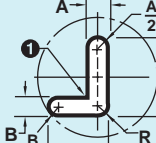


## L's

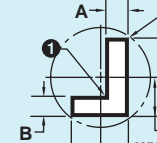
C46\*



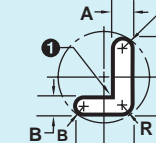
C77\*



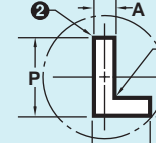
C78\*



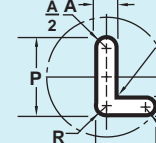
C79\*



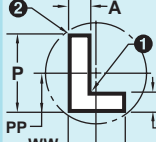
C48\*



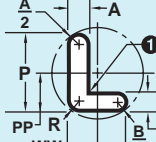
C80\*



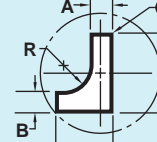
C81\*



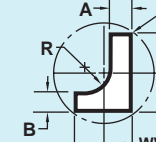
C82\*



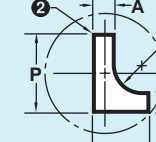
C47\*



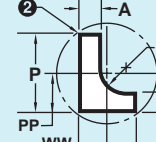
C83\*



C49\*

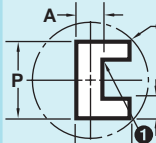


C84\*

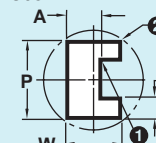


## U's

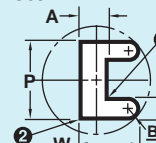
C50\*



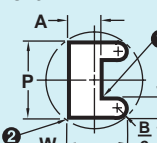
C68\*



C69\*



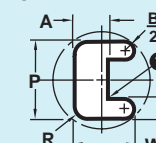
C70\*



C71\*



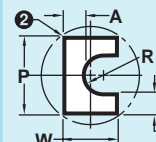
C72\*



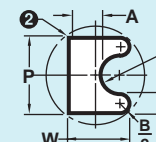
C51\*



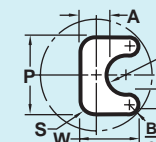
C73\*



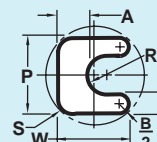
C74\*



C75\*



C76\*



\*Avoid excessive overhang by specifying shaped back-hole.

# Urethane Strippers

Strip-Shape Urethane Strippers assure positive stripping and at the same time dampen punch vibration by gripping around the punch point. Vibration can lead to premature punch failure. The closed end feature holds thin stock flat during the stripping cycle, eliminating the potential for rejected parts.

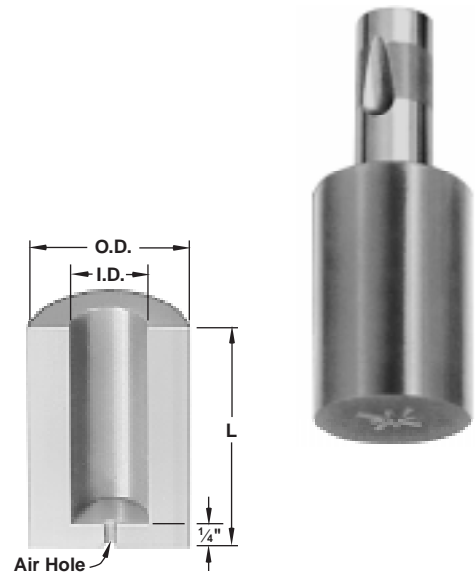
And that's not all...

Because of a unique curing agent, Strip-Shape Urethane Strippers develop more load-bearing capacity than similar urethanes. The curing agent also contributes to consistent ratings from lot to lot.

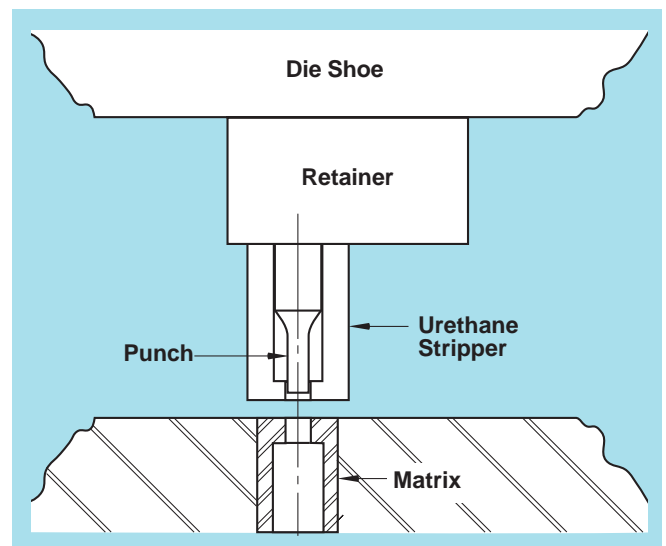
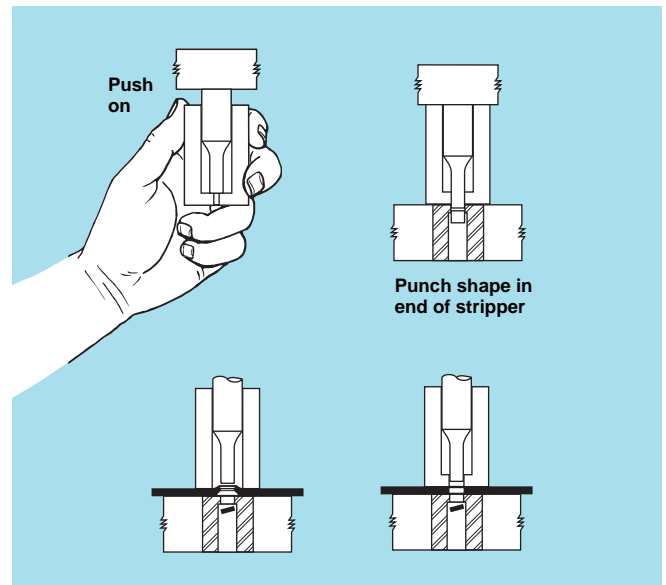
### How to Order:

Qty Type I.D. L  
12 USE 37 125

Air Hole	I.D.
1/16	3/16-1/4
3/32	5/16
1/8	3/8-1



Catalog Number	I.D.	O.D.	L	Pressure at Deflection of		
				1/8	1/4	3/8
USE18-125 USE18-150	3/16	1 1/16	1 1/4 1 1/2	250 230	400 350	— —
USE25-125 USE25-150 USE25-175	1/4	3/4	1 1/4 1 1/2 1 3/4	280 275 220	475 465 375	— — 490
USE31-125 USE31-150 USE31-175 USE31-200	5/16	13/16	1 1/4 1 1/2 1 3/4 2	320 300 270 240	500 450 400 370	— — 575 600
USE37-125 USE37-150 USE37-175 USE37-200	3/8	7/8	1 1/4 1 1/2 1 3/4 2	420 385 355 310	695 625 575 515	— — 760 670
USE50-125 USE50-150 USE50-175 USE50-200 USE50-225	1/2	1"	1 1/4 1 1/2 1 3/4 2 2 1/4	520 450 435 315 275	790 725 680 510 475	— — 875 650 600
USE62-125 USE62-150 USE62-175 USE62-200	5/8	1 1/8	1 1/4 1 1/2 1 3/4 2	600 520 480 440	925 835 775 730	— — 1000 935
USE75-175 USE75-200 USE75-225 USE75-250 USE75-275	3/4	1 1/2	1 3/4 2 2 1/4 2 1/2 2 3/4	500 400 350 325 300	800 700 650 600 550	1200 1100 1000 900 800
USE87-175 USE87-200 USE87-225 USE87-250 USE87-275	7/8	1 3/4	1 3/4 2 2 1/4 2 1/2 2 3/4	1500 1200 1150 900 850	2200 1900 1850 1450 1350	3400 2800 2400 1900 1800
USE100-175 USE100-200 USE100-225 USE100-250 USE100-275	1"	2"	1 3/4 2 2 1/4 2 1/2 2 3/4	2000 1600 1400 1200 1000	3000 2600 2300 2000 1800	3500 3400 3200 3000 2800

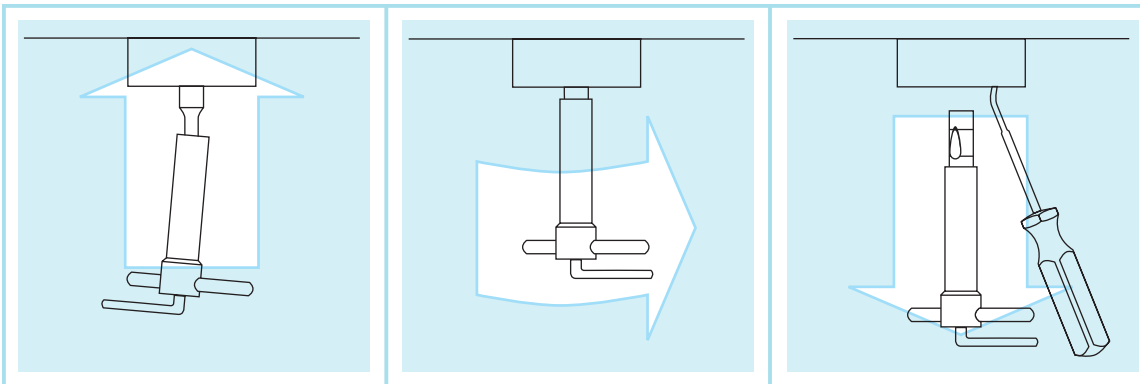


## Remove and replace ball lock punches in minutes

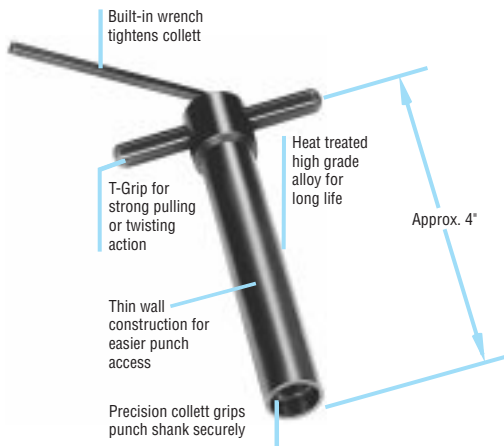
Dayton Punch Pullers speed and simplify the task of removing ball lock punches from retainers. You no longer have to improvise with vise grips or other tools that can slip from the punch, making removal difficult and sometimes hazardous.

Made of high grade alloy steel, Dayton Punch Pullers are heat treated and precision machined for long, reliable service. Available in shank sizes from .250" to 1.250". Dayton Punch Pullers will save you time and money.

## Removes ball lock punches in three quick steps...



- 1** Slide Punch Puller over the shank.
- 2** Rotate the built-in wrench until tight.
- 3** Insert release tool and pull down.



Catalog Number	Shank Diameter In Inches	Max. Point Length
81809	.250	1.12
81811	.375	1.31
81812	.500	1.56
81813	.625	1.56
81814	.750	1.56
81815	.875	1.56
81817	1.000	1.81
81818	1.250	1.81
81819	.....	Set of 8

**Dayton Ball Lock Release Tools**  
 81803 ..... Angle Tip  
 81804 ..... Straight Tip



**Angle Tip**  
(for all retainers)



**Straight Tip**  
(for all retainers)

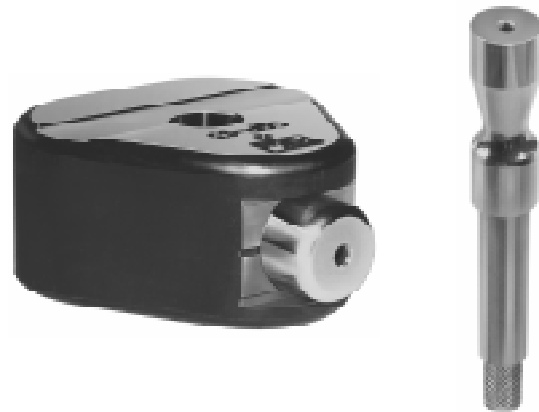


# Ball Lock Punch Gage

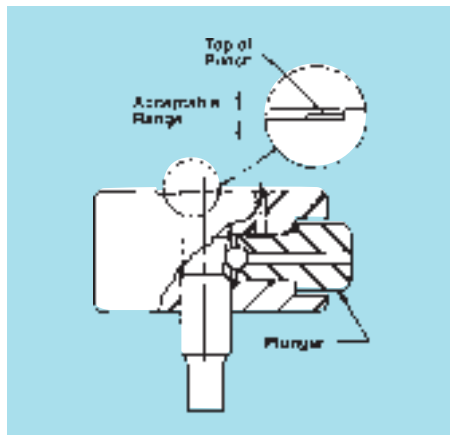
Ball Lock Punch Gages are used to check the location of the ball seat. A properly located ball seat assures you that when the punch is inserted into a retainer manufactured to ANSI Standards you will have proper engagement and will have eliminated unsafe locking conditions.

Ball engagement out of the safe locking zone can cause a punch to rotate, pump up and down or even pull out of the retainer, which can lead to costly repair work on the die.

The dimensions of the ball seat are not standardized; only the locking function is standardized. All manufacturers of ball lock punches should be using a gage made to ANSI Standard B94.17 to insure their products have a correct ball seat location. With this gage you can check a punch before putting it into the die to guarantee the locking function will not cause any costly downtime.

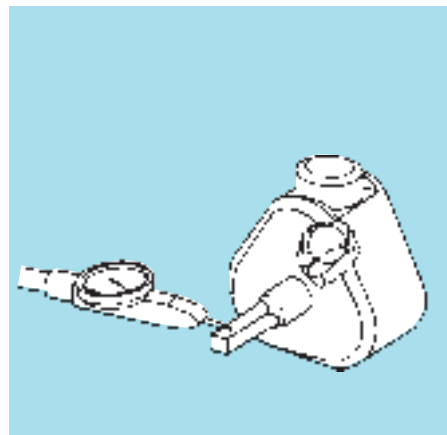


## Check Ball Seat



If you have determined the ball seat is in the proper location, but you encounter a problem when in production, the problem is with the retainer.

## Check Radial Location



This gage can be used to check the radial accuracy of the ball seat.

Catalog Number			
Heavy Duty	Light Duty	Code Dia.	Shank Size
—	LGP	25	.250
HGP	LGP	37	.375
HGP	LGP	50	.500
HGP	LGP	62	.625
HGP	LGP	75	.750
HGP	LGP	87	.875
HGP	LGP	100	1.000
HGP	—	125	1.250

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AutoCAD is a registered trademark of Autodesk, Inc.



# Ball Lock Products

Quick Change Punches and Retainers



## Just In Time

By using the exclusive Dayton Firm Delivery Schedule (FDS), you can be assured of Just-In-Time delivery of the product needed because the FDS lets you know the delivery of any catalog product before you place the order. There is no lost lead time or extensive downtime waiting for components. The Firm Delivery Schedule is fast, accurate and dependable, based on extensive inventory, modern facilities and skilled craftspeople.

## Dayton The Industry Leader

Dayton has a variety of technical slide presentations which are available to you.

- Die Clinic: The Tooling
- Birth of a Hole
- High Speed Stamping
- Stamping Basics
  - Presses
  - Die Assemblies
  - Die Operations
- Die Component Engineering
- Die Springs
- True Position® Retainers

When looking for: variety, quality, leadership, innovation and technical assistance — look to Dayton to fill all your tooling needs.

## Catalog Ordering System

The Catalog Designation completely defines the product, including shape, dimensions, tolerances and concentricity.

**Example:**

<p><b>Line</b> HPR</p> <p><b>Product</b> 50</p> <p><b>Shape</b> 275</p>	<p><b>H</b> for Heavy Duty <b>P</b> for Punch (Regular) <b>R</b> for Rectangle</p> <p><b>D</b> Shank Dia. D Coded by the first 2 digits of dec equiv (.500)</p> <p><b>L</b> Overall Length L Coded by whole number and first 2 digits of decimal equiv. (2.750)</p> <p>Point or Hole Size P.350 W.190</p>
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HPR™ 50 - 275 | P.350 W.190

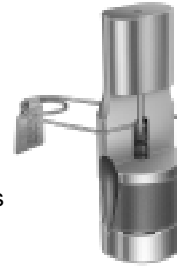
Catalog Number | Dimensions as Specified

6 HPR      50 275 P.350 W.190 M2

All Trilateral Designators are a Trademark of Dayton Progress Corporation.

## Jektole® Punches and Clearances

Jektole®, Dayton's slug ejection punch, permits doubling punch to matrix clearance; produces up to three times the number of hits between sharpenings and reduces burr height.



## Dayton On Disk

To simplify the die design process, Dayton has proved again why we are the industry leader. This Ball Lock catalog, is available on disk for those using AutoCAD®. Not only does the software help specify the products used, it also generates a stock list saving detailing time. For more information, contact your authorized Dayton distributor.

## Ball Lock Is Metric

Dayton is an international company with branches or distributors in all major markets and has complete inch or metric interchangeability anywhere in the world.

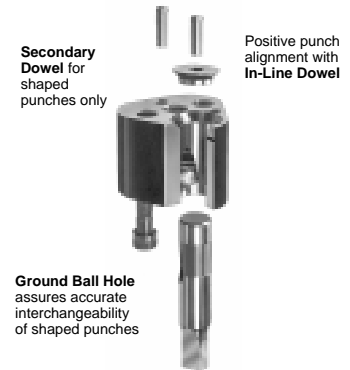
## World Class Products

For Metric  
Ball Lock Products see  
Catalog No. 920M.

## Dayton True Position® Retainers

Commonly used in high volume manufacturing such as the automotive and appliance industries, True Position allows easy replacement of broken or worn punches, drastically reducing downtime.

Dayton True Position retainers are performance proven, having been accepted by over a dozen automobile manufacturers around the world as their standard retainer. True Position retainers have their interchangeability built in. The precision ground ball hole assures repetitive alignment of shaped punches. Retainers and punches are interchangeable, with no need to redowel.



All Dayton True Position retainers share the following features:

- Accurate punch-to-die alignment
- No more time consuming hand fitting of retainers
- Only one dowel needed for round punches
- Precision ground ball hole assures repetitive alignment of shaped punches
- True Position retainers are CAD/CAM compatible
- True Position retainers cut inventory in half