

**Quality  
Punches,  
Pilots,  
Matrixes, &  
Retainers**

# BALL LOCK



Global leader in  
providing fabrication  
and stamping solutions

Subsidiary Federal Signal Corporation 

[www.daytonprogress.com](http://www.daytonprogress.com)

**Improved  
performance,  
less downtime,  
longer tool life**



# Ball Lock Quality Products

## Product Applications

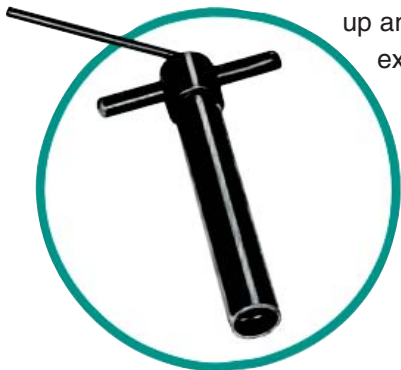
**Dayton Ball Lock Punches, Retainers, Matrixes, and Accessories** are mainstays in industries with high-demand applications, including automotive and major appliance manufacturing. Because there is no need to pull a die from the press, removal and replacement of worn punches can reduce downtime and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

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

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

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

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

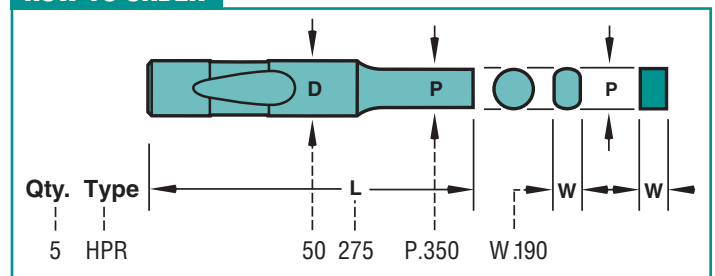


## Ordering Information

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

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

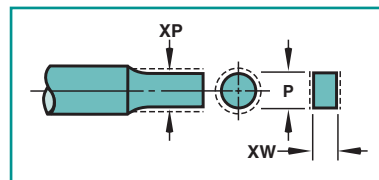
### HOW TO ORDER



## Standard Alterations

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

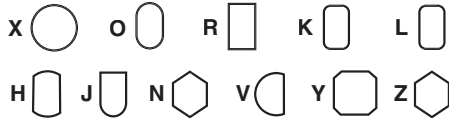
When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an “X” is placed in front of the P or W dimension, e.g., “XP” and/or “XW.” If the point length is longer or shorter than standard,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



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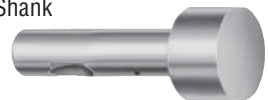
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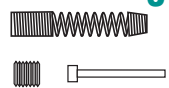


### Accessories 34, 35

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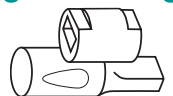


### Jektol® Data 37

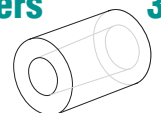


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# Contents



## Jektole® Punches

HEAVY  
DUTY  
LIGHT  
DUTY



## Regular Punches

HEAVY  
DUTY  
LIGHT  
DUTY



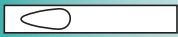
## Regular Pilots

HEAVY  
DUTY  
LIGHT  
DUTY



## Positive Pick-Up Pilots

HEAVY  
DUTY  
LIGHT  
DUTY



## Punch Blanks

HEAVY  
DUTY  
LIGHT  
DUTY

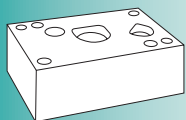


## Point Larger than Shank Punches

HEAVY  
DUTY  
LIGHT  
DUTY



## Matrixes



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## Classified Shapes/ Miscellaneous



## Product Designation

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

**Example:**

<p><b>HPR</b></p> <p>Line Product Shape</p>	<p><b>50</b></p> <p>Shank Dia. <b>D</b> (shank diameter) Coded by the first 2 digits of dec. equiv. (.500).</p>	<p><b>275</b></p> <p>Overall Length <b>L</b> Coded by whole number and first two digits of dec. equiv. (2.750).</p>	<p><b>P.350, W.190</b></p> <p>Point or Hole Size Dimensions, As Specified</p>
<p>Product <b>HPR</b> Type</p>	<p>Series <b>50</b> Catalog Number</p>	<p>Length <b>275</b></p>	<p>Point or Hole Size <b>P.350, W.190</b> Dimensions, As Specified</p>

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

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

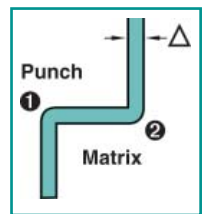
## Classified Shapes

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

## Clearance

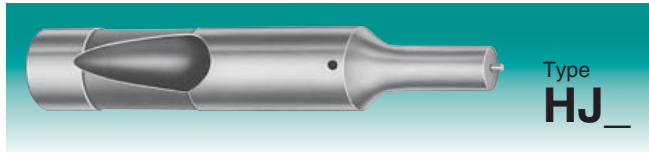
Normal grinding methods produce:

- ① .007 max. fillet on the punch—matching corner shape on the matrix.
- ② .007 max. fillet on the matrix—matching corner shape on the punch.

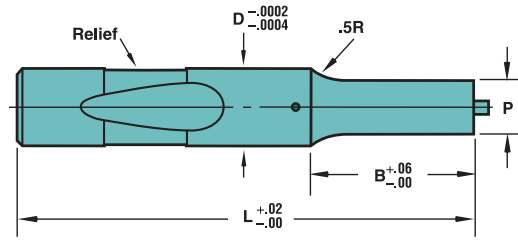


# Jektol® Punches

## Heavy Duty



Type  
**HJ**



**Material**

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

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

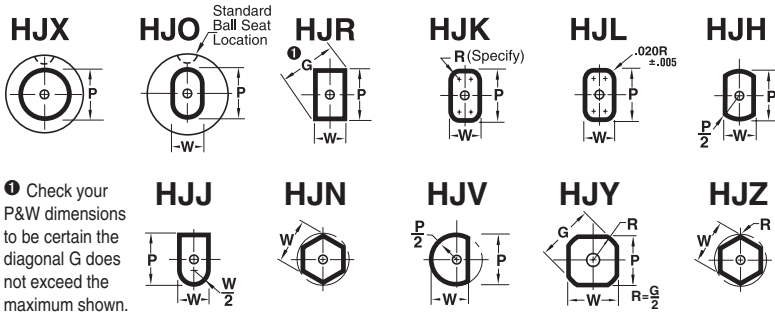
Shape P, W  $\pm .0005$   $\begin{matrix} \text{P to D} \\ \text{P to D} \end{matrix}$

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

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

# Jektole® Punches

## Heavy Duty



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

## Features/Benefits

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

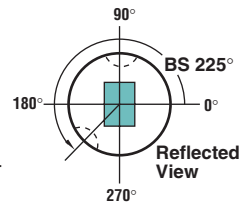
### HOW TO ORDER

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

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

### Standard Ball Seat Locations

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

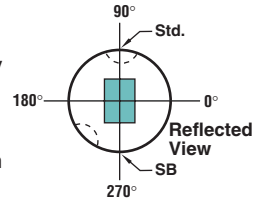


### Custom Ball Seat Locations

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

### Double Ball Seat

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



Not recommended for diameters under .750.

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

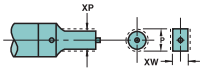
## Standard Alterations

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

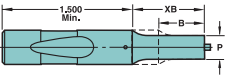
When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the P and W dimensions are outside the standard range, an "X" is placed in front of the P or W dimension, e.g., "XP" and/or "XW." If the point length is other than standard, designate "XB"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

# Standard Alterations

## Jektol® Punches—Heavy Duty



**XP, XW** P and W Dimensions  
Smaller than Standard

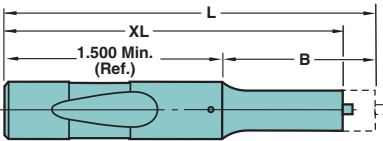


**XB** Point Length  
Other than Standard

For XBB, add three days to delivery.

	XB										XBB
Point Length	.5001-.6250	.6251-.7500	.7501-.8750	.8751-1.0000	1.0001-1.1250	1.1251-1.2500	1.2501-1.3750	1.3751-1.5000	1.5001-1.6250	1.6251-2.0001	
Code Type	Min. P (Rounds)										
37 HJX	.062	.062	.080	.080	.115	.115	.115	.115	.115		
50 HJX	.158	.158	.158	.158	.158	.158	.158	.158	.158	.187	
62 HJX	.158	.158	.158	.158	.158	.158	.158	.158	.158	.187	
75 HJX	.235	.235	.235	.235	.235	.235	.235	.235	.235	.281	
87 HJX	.300	.300	.300	.300	.300	.300	.300	.300	.300	.350	
100 HJX	.350	.350	.350	.350	.350	.350	.350	.350	.350	.350	
125 HJX	.450	.450	.450	.450	.450	.450	.450	.450	.450	.450	
	Min. W (Shapes)										
37 HJ_	.062	.062	.080	.080	.115	.115	.115	.115	.115		
50 HJ_	.158	.158	.158	.158	.158	.158	.158	.158	.158	.187	
62 HJ_	.158	.158	.158	.158	.158	.158	.158	.158	.158	.187	
75 HJ_	.235	.235	.235	.235	.235	.235	.235	.235	.235	.281	
87 HJ_	.235	.235	.235	.235	.235	.235	.235	.235	.235	.281	
100 HJ_	.235	.235	.235	.235	.235	.235	.235	.235	.235	.281	
125 HJ_		.281	.281	.281	.281	.281	.281	.281	.281	.281	

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



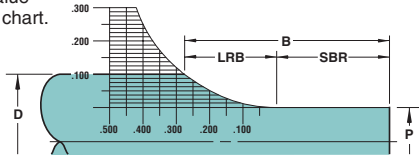
**XJ Smaller Jektol® Components**  
See p. 37

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

### SBR Straight Before Radius

To determine Length of Radius Blend (LRB)

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



**Example:**

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

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

## Surface Coatings

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

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

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

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

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

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

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

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

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

Code / Delivery	Material
XN —DayTride® + 3 days	M2 & PS4
XNT —DayTiN® + 2 days	M2 & PS4
XAN —DayTAN™ + 4 days	M2 & PS4
XND —DayKote™ + 10 days	M2 & PS4
XCN —TiCN + 3 days	M2 & PS4
XNM —MoST™ + 7 days	M2 & PS4
XNP + 10 days	M2 & PS4
XCR —DayKool™ + 1 day	M2 & PS4

\*Vickers used when RC exceeds 80.

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