Ball Lock
Punches
Die Buttons
Pilots
Retainers

Visit us at www.daytonprogress.com
**Ball Lock Products**

**Quick Change Punches and Retainers**

**Jektole® Punches and Clearances**

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

**Ball Lock Retainers for Single Punches**

True Position retainer allow easy replacement of worn punches, drastically reducing downtime. It has been adopted as the world-standard by many automobile manufacturers. They are CNC compatible and require no re-doweling when replacing. The precision ground ball hole assures repetitive alignment of shaped punches.

Change retainers allow multiple hole patterns to be punched without the need to change dies. Different parts such as right and left hand can be run in one die. An air cylinder retracts the punch when a hole is not needed.

Ultra-Compact retainers for round punches and pilots use less space and a single dowel for location.

**Multiple Punch Retainers**

When a cluster of holes is in an extremely tight area where single retainers will not fit, standard retainers with multiple holes are the answer. Dayton’s Multi-Position retainers provide a simple low cost solution to multiple holes in a small area. They eliminate the need for special details, cutting both design and build time.

**Other Products That Complement Retainers**

**Urethane strippers** that fit tightly over punches might be the answer to some of the low production jobs. Urethane can eliminate the costly stripper plate and provides a benefit over the bridge stripper normally used in low budget jobs. They hold the stock flat, unlike a bridge stripper, assuring the least amount of stripping pressure and resulting wear on punches.

**Punch Pullers**

Ball lock punches can sometimes be very difficult to remove from retainers. Many tools have been used by maintenance people but none are as simple or as effective as Dayton Punch Pullers. The task of removal is simple. Slide the Punch Puller over the punch shank, rotate the built-in wrench until it is tight, release the ball in the retainer and pull down. No more struggling with homemade tools and best of all no more busted knuckles.

**Wear Resistant Coatings and Surface Treatments**

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. These coatings and treatments are available for M2 and PS4 material. See page 33 for a complete list.

**Shear Angles**

Shear Angles can be applied to all punch points. These angles are used primarily to reduce slug pulling. Single and Double Shears can be used to reduce the punching force as well as minimize slug pulling. These alterations are prepriced and do not add to the standard delivery of the product. See page 33.

**Retainer Accessories**

All Dayton retainers come with all the necessary hardware for precise mounting. If replacement parts are needed they can be found in the Retainer Accessories section of this catalog. It is always a good idea to keep spares of anything that is vital to maintaining production. You don't want an inexpensive item holding up production.

® Jektole, DayTride, DAYTiN, True Position, True Position Shape and the True Position Backing Plug Design are registered trademarks of Dayton Progress Corporation.

**EZ Fit, DayTAN, DayKool, ZertonPlus, Multi-Position and all Triliteral Designators are trademarks of Dayton Progress Corporation.**

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Several products in this catalog conform to standards established by the North American Automotive Metric Standards (NAAMS™) for Forming and Stamping. Those products are appropriately identified on the page that they appear as well as in the table of contents on the next page.

**NAAMS™ is a trademark of AutoSteel Partnership**
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### Punches Heavy Duty

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<thead>
<tr>
<th>Standard Shapes</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
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<td>K</td>
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<td>Z</td>
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- *BJ_ Jektole Punch*
- *BP_ Regular Punch*
- *BPT Regular Pilot*
- *BPA Positive Pick-up Pilot*
- BJB & BPB Punch Blanks
- *BK_ & *BZ_ Point Larger Than Shank

### Punches Light Duty

<table>
<thead>
<tr>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
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<tbody>
<tr>
<td>CJ_ Jektole Punch</td>
<td>CP_ Regular Punch</td>
<td>CPT Regular Pilot</td>
<td>CPA Positive Pick-up Pilot</td>
<td>CJB &amp; CPB Punch Blanks</td>
<td>CK &amp; CZ Point Larger Than Shank</td>
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### Die Buttons

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<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
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<tbody>
<tr>
<td>*AD_ Counter-bored Relief</td>
<td>*AN_ Tapered Relief</td>
<td>*BK_ &amp; *BZ_ Inserts</td>
<td>ADE/ADU EDM Button Blanks</td>
<td>ADE/ADU EDM Button Blanks</td>
<td>ADE/ADU EDM Button Blanks</td>
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### Retainers

<table>
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<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>*BRAR Reversible Change Retainers</td>
<td>*BRA Change Retainers</td>
<td>*BRT &amp; CRT True Position Retainers</td>
<td>BRTB Backing Plate Retainers</td>
<td>NRT &amp; TRT Ultra-Compact Retainers</td>
<td>BRP &amp; CRP Multi Position Retainers</td>
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### Miscellaneous

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<th>Qty. Type</th>
<th>Qty. Type</th>
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</thead>
<tbody>
<tr>
<td>Locking Devices</td>
<td>Classified Shapes</td>
<td>Retainer Accessories</td>
<td>Jektole Data</td>
<td>Punch Pullers</td>
<td>Shim Plates</td>
</tr>
</tbody>
</table>

### Catalog Ordering System

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

**Example:**

- **BPR** for Heavy Duty
- **P** for Punch (Regular)
- **R** for Rectangle

<table>
<thead>
<tr>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
<th>Qty. Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 BPR 13 13 80 P8.9 W4.8</td>
<td>B for Heavy Duty</td>
<td>P for Punch (Regular)</td>
<td>R for Rectangle</td>
<td>Overall Length L</td>
<td>Point or Hole Size</td>
</tr>
</tbody>
</table>

**NAAMS™ Standard**

- Catalog Number
- Dimensions as Specified
**Heavy Duty Jektole® Punches**

**Type BJ**

### Standard Alterations for BJ and BP Punches

Standard Alterations are beyond those sizes listed above and can be manufactured for a slight additional charge.

<table>
<thead>
<tr>
<th>BJX</th>
<th>XBR</th>
<th>XBB</th>
<th>BJL</th>
<th>XJY</th>
</tr>
</thead>
</table>

### XP, XW

P or W Dimensions Smaller than Standard

**XBR**

Point Length Longer than Standard

Specify XBR or XBB and length (see chart at left)

**XL**

Overall Length Shortened

Stock removal from point end which shortens point length. To maintain point length specify XBR.

**XLB**

Overall Length Shortened

$L_1$ length maintained. (See XBR for min. shank length)

---

**Steel:**

| M2, PS4 | HRC | 60-63 |

---

No side hole D32, 40

---

*Min P or W = 1.60 when $L_1 = 10$**

*Min P or W and smaller may result in less than 25 Alt. $L_1$**

$L_1$ not available.†

†J2 (P< 3.0)
Steel: M2, PS4  HRC 60-63

Heavy Duty
Regular Punches

Type BP_ 

Relief

BPX
BPO
BPR
BPL
BPY
BPZ

1. Sharp corners are typical. To assure proper clearance, Dayton will provide standard broken corners if die button is ordered with punch to eliminate interference with die button fillet when total clearance is 0.08 or less.

2. Check your P&W dimensions to be sure the diagonal G does not exceed the max. shown.

\[ G = \sqrt{W^2 + P^2} \]

<table>
<thead>
<tr>
<th>D</th>
<th>Point Length L₁</th>
<th>Type &amp; D</th>
<th>Round Range P</th>
<th>Type &amp; D</th>
<th>Shape Min. W</th>
<th>Max. P/G</th>
<th>L</th>
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<tr>
<td>10</td>
<td>19 10* —</td>
<td>BPX10</td>
<td>2.10- 9.97</td>
<td>BP_10</td>
<td>2.10- 9.97</td>
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<td>19 13 25</td>
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<td>4.50-12.97</td>
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<td>8.00-19.97</td>
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</table>

*Min P or W = 1.60 when L₁ = 10

See page 33 for coatings/treatments and shear angles.

XK No Side Hole For air ejection. No cost. Components not supplied.

XJ Smaller Jektole Components. See page 29.

BJL & BPL Punches For Longer Life
Dayton’s BJL & BPL punches with a constant corner radius of 0.5R puts the clearance where it’s needed to prevent rapid wear and unacceptable burrs commonly generated with sharp corners. This reduces maintenance time and the risk of edge breaking during operation.

The “L” Long Life punch will reduce maintenance costs while increasing production runs by reducing corner wear.

How to Order:
Specify: Quantity
Type Shank & Length Codes P or P&W Dimensions
Standard Alterations

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Type</th>
<th>L</th>
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<tr>
<td>6</td>
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<tr>
<td>13</td>
<td>BPO</td>
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<td>19</td>
<td>80</td>
<td>71</td>
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<tr>
<td>16</td>
<td>P6.7</td>
<td>M2</td>
</tr>
<tr>
<td>12</td>
<td>W6.9</td>
<td>P54</td>
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</table>

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

Custom Ball Seat Locations
Custom Ball Seat Locations can be specified as BS and degrees counter-clockwise from 0°.

Double Ball Seat Locations
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 shank diameters under 20.

Steel: HRC
M2, PS4 60-63
## Heavy Duty

### Regular Pilots

**Type BPT**

![Type BPT](image)

### Standard Alterations for BPT and BPA Pilots

<table>
<thead>
<tr>
<th>Type &amp; D</th>
<th>Round Range P</th>
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### Point Length Longer than Standard

Specify XBR, XBB, or X3B and length (see chart at left)

### XP  P Dimensions Smaller than Standard

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<tr>
<td>40</td>
<td>40.05-40.00</td>
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</table>

### Steel: HRC

| M2, PS4 | 60-63 |

### Shaded Area for BPA Only

When P = D Shank tolerance applies to full length
Heavy Duty

Positive Pick-up Pilots

Order any length from 80 through 150mm

Type BPA

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

Greater Positioning moves the stock further than conventional pilots.

When P = D Shank tolerance applies to full length

BPA Pilots conform to NAAMS™ standard for Ball Lock Pilot Punches

How to Order:
Specify: Quantity
Type
Shank & Length Codes
P Dimensions
Standard Alterations

See page 33 for coatings/treatments.
Heavy Duty Punch Blanks

Type
BJB and BPB
Jektole® Regular

No side hole D32, 40

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<tr>
<th>D</th>
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<th>L</th>
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Standard Alterations for BZ and BK Punches

Standard Alterations are beyond those sizes listed above and can be manufactured for a slight additional charge.

See page 33 for coatings/treatments and shear angles.

XBR
Point Length Shorter Than Standard on Point Larger than Shank Punches.
(Shortens punch from the point end.)

XL
Overall Length Shortened
Stock removal from shank end on Point Larger than Shank Punches. Does not alter ball seat location.
Stock removal from point end on BJB and BPB blanks.

Steel:
M2, PS4 60-63
HRC

<table>
<thead>
<tr>
<th>Steel</th>
<th>HRC</th>
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<td>M2, PS4</td>
<td>60-63</td>
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Coatings/Treatments and Shear Angles
See page 33 for coatings/treatments and shear angles.
**Heavy Duty**

**Point Larger than Shank Punches**

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<tr>
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<td>60-63</td>
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### BZ & BK Punches

**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 counterclockwise from 0°.

**Double Ball Seat Locations**

- 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 shank diameters under 20.

---

**Jektole® BZ_**

- Regular BK

### How to Order:

1. Specify: Quantity
2. Type
3. Shank & Length Codes
4. P or P&W Dimensions
5. Standard Alterations

---

**BZL & BKL Punches For Longer Life**

Dayton’s BZL & BKL punches with a constant corner radius of 0.5R puts the clearance where it’s needed to prevent rapid wear and unacceptable burrs commonly generated with sharp corners. This reduces maintenance time and the risk of edge breaking during operation.

The “L” Long Life punch will reduce maintenance costs while increasing production runs by reducing corner wear.

---

**Reflected View**

- Standard Ball Seat Locations
- Custom Ball Seat Locations
- Double Ball Seat Locations

---

**BZ & BK Punches conform to NAAMS™ standard for Ball Lock Punches**

---

**Standard Ball Seat Location**

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

---

**How to Order:**

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

- Qty. Type
- L
- L1
- 3 BZX 19 30
- 5 BJB 20 100

---

**BZL & BKL Punches For Longer Life**

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**How to Order:**

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

- Qty. Type
- L
- L1
- 3 BZX 19 30
- 5 BJB 20 100

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

- Qty. Type
- L
- L1
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- 5 BJB 20 100

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**How to Order:**

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

- Qty. Type
- L
- L1
- 3 BZX 19 30
- 5 BJB 20 100

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**How to Order:**

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

- Qty. Type
- L
- L1
- 3 BZX 19 30
- 5 BJB 20 100

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**BZL & BKL Punches For Longer Life**

Dayton’s BZL & BKL punches with a constant corner radius of 0.5R puts the clearance where it’s needed to prevent rapid wear and unacceptable burrs commonly generated with sharp corners. This reduces maintenance time and the risk of edge breaking during operation.

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**How to Order:**

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

- Qty. Type
- L
- L1
- 3 BZX 19 30
- 5 BJB 20 100

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**BZL & BKL Punches For Longer Life**

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The “L” Long Life punch will reduce maintenance costs while increasing production runs by reducing corner wear.

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**How to Order:**

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

- Qty. Type
- L
- L1
- 3 BZX 19 30
- 5 BJB 20 100

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**BZL & BKL Punches For Longer Life**

Dayton’s BZL & BKL punches with a constant corner radius of 0.5R puts the clearance where it’s needed to prevent rapid wear and unacceptable burrs commonly generated with sharp corners. This reduces maintenance time and the risk of edge breaking during operation.

The “L” Long Life punch will reduce maintenance costs while increasing production runs by reducing corner wear.

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**How to Order:**

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

- Qty. Type
- L
- L1
- 3 BZX 19 30
- 5 BJB 20 100
**Light Duty**

**Jektole® Punches**

ISO 10071 — Ejector Punches

<table>
<thead>
<tr>
<th>Steel:</th>
<th>HRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2, M2, PS4</td>
<td>60-63</td>
</tr>
</tbody>
</table>

### Standard Alterations for CJ and CP Punches

Standard Alterations are beyond those sizes listed above and can be manufactured for a slight additional charge.

#### XP, XW

P or W Dimensions Smaller than Standard

#### XBR

Point Length Longer than Standard

Specify XBR or XBB and length (see chart at left)

#### XL

Overall Length Shortened

Stock removal from point end which shortens point length. To maintain point length specify XBR.

#### XLB

Overall Length Shortened

L1 length maintained. (See XBR for min. shank length)

#### WS

Whistle Stop

The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations. See page 10 for details.

---

<table>
<thead>
<tr>
<th>D</th>
<th>Point Length L1</th>
<th>Round Range P</th>
<th>Shape Min. W</th>
<th>Max. P/G</th>
<th>CJH</th>
<th>CJK</th>
<th>CJJ</th>
<th>CJN</th>
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</tr>
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</table>

*Min P or W = 1.60 when L1 = 10

** J2 (P < 2.0) †J2 (P < 3.0)
**Steel:** HRC
A2, M2, PS4 60-63

---

### Light Duty

**Regular Punches**

ISO 10071 — Non-ejector Punches

---

**Type CP**

![Diagram of CP type punch]

Relief

- **CPX**
- **CPO**
- **CPR**
- **CPL**
- **CPY**
- **CPZ**

---

<table>
<thead>
<tr>
<th>D</th>
<th>Point Length L₁</th>
<th>Type &amp; D</th>
<th>Round Range P</th>
<th>Type &amp; D</th>
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<th>Max. P/G</th>
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<td>CP38</td>
<td>14.00-37.97</td>
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<td></td>
</tr>
</tbody>
</table>

*Min P or W = 1.60 when L₁ = 10

---

See page 33 for coatings/treatments and shear angles.

**XK** No Side Hole
For air ejection.
No cost. Components not supplied.

**XJ** Smaller Jektole Components.
See page 29.

---

**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 counterclockwise from 0°.

**Double Ball Seat Locations**
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 shank diameters under 20.

---

**CJL & CPL Punches For Longer Life**

Dayton’s CJL & CPL punches with a constant corner radius of 0.5R puts the clearance where it’s needed to prevent rapid wear and unacceptable burrs commonly generated with sharp corners. This reduces maintenance time and the risk of edge breaking during operation.

The "L" Long Life punch will reduce maintenance costs while increasing production runs by reducing corner wear.

---

**How to Order:**

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

---

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</table>

---

For air ejection.
No cost. Components not supplied.

---

Standard Ball Seat Locations
See page 29.

---

Sharp corners are typical. To assure proper clearance, Dayton will provide standard broken corners if die button is ordered with punch to eliminate interference with die button fillet when total clearance is 0.08 or less.

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

---

See page 33 for coatings/treatments and shear angles.

---

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.

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

Double Ball Seat Locations
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 shank diameters under 20.
## Light Duty
### Regular Pilots

**ISO 10071**

### CPT

**Relief**

![Relief Diagram]

**CPT**

- **Porpholic Point Shape** for Smooth Pickup Action

- When $P = D$, Shank tolerance applies to full length

<table>
<thead>
<tr>
<th>D</th>
<th>Point Length $L_1$ Std.</th>
<th>Type &amp; D</th>
<th>Round Range P</th>
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<td>CPT10</td>
<td>2.05-10.00</td>
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<tr>
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<td>21 15 27</td>
<td>CPT13</td>
<td>4.95-13.00</td>
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<td>21 15 27</td>
<td>CPT16</td>
<td>7.95-16.00</td>
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<tr>
<td>20</td>
<td>21 15 27</td>
<td>CPT20</td>
<td>11.95-20.00</td>
</tr>
<tr>
<td>25</td>
<td>21 15 27</td>
<td>CPT25</td>
<td>15.95-25.00</td>
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<td>CPT32</td>
<td>23.95-32.00</td>
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<td>27 21 32</td>
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<td>29.95-38.00</td>
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### Standard Alterations for CPT and CPA Pilots

**Standard Alterations** are beyond those sizes listed above and can be manufactured for a slight additional charge.

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<th>CPA</th>
<th>CPT</th>
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<td>70</td>
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**XBR XBB X3B**

- Round Point Length $L_1$ Type Range $D$ Std. Alt. Alt. $P$

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</tr>
<tr>
<td>10</td>
<td>21</td>
<td>12°</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>21</td>
<td>15</td>
<td>27</td>
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<td>21</td>
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<td>38</td>
<td>27</td>
<td>21</td>
<td>32</td>
<td>—</td>
<td>—</td>
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</tr>
</tbody>
</table>

**Shaded Area** for CPA Only

- *Min. $P = 1.55$ when $L_1 = 12$

### Point Length Longer than Standard

- Specify XBR, XBB, or X3B and length (see chart at left)

**WS Whistle Stop**

- See table for standard angles. The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations. Angles of 5° and 7.5° also available on 16 and larger diameters. (Specify $XA$ and angle after WS.)

Example: CPA20 110, P17.00, M2, WS, XA 7.5°

**XP Dimensions** Smaller than Standard

<table>
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<tr>
<td>6-10</td>
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<tr>
<td>13</td>
<td>7.5°</td>
</tr>
<tr>
<td>16-38</td>
<td>10°</td>
</tr>
</tbody>
</table>
## Light Duty Positive Pick-up Pilots

**Steel:** M2  
**HRC:** 60-63

Order any length from 71 through 150mm

---

### Type CPA

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

**Greater Positioning moves the stock further than conventional pilots.**

---

### How to Order:

Specify:  
- **Quantity**
- **Type**
- Shank & Length Codes
- **P Dimensions**
- **Steel**
- **Standard Alterations**

---

### Table: CPA

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<th>Round Range P</th>
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---

### XL

**Overall Length Shortened**  
Stock removal from point end. Standard or Alternate L₁ length is maintained on CPA only.

---

### XLB

**Overall Length Shortened**  
L₁ length maintained. (CPT only)  
(Min. shank length 25)

---

See page 33 for coatings/treatments.
**Light Duty Punch Blanks**

**Type**

**CJB and CPB**

Jektole® Regular

---

**Steel:**

A2, M2, PS4 60-63

---

**Standard Alterations for CZ and CK Punches**

Standard Alterations are beyond those sizes listed above and can be manufactured for a slight additional charge.

See page 33 for coatings/treatments and shear angles.

**WS Whistle Stop**

See table for standard angles. The Whistle Stop alteration is ground through the ball seat, subject to the same limitations as other standard and custom ball seat locations. Angles of 5° and 7.5° also available on 16 and larger diameters. (Specify XA and angle after WS.)

Example: CPB20 100, M2, WS, XA 7.5°

**XBR**

Point Length Shorter Than Standard on Point Larger than Shank Punches.

(Shortens punch from the point end.)

**XL**

Overall Length Shortened

Stock removal from shank end on Point Larger than Shank Punches. Does not alter ball seat location.

Stock removal from point end on CJB and CPB Blanks.

---

**Table**: Jektole and Regular Blanks

<table>
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<th>Type &amp; D</th>
<th>Jektole L</th>
<th>Jektole Pin</th>
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<table>
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<td>CPB10</td>
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</tr>
<tr>
<td>38</td>
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</tr>
</tbody>
</table>
Light Duty

Point Larger than Shank Punches

**Type**

- Jektole® CZ_
- Regular CK_

---

**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 counterclockwise from 0°.

**Double Ball Seat Locations**

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 shank diameters under 20.

---

**CZL & CKL Punches For Longer Life**

Dayton’s CZL & CKL punches with a constant corner radius of 0.5R puts the clearance where it’s needed to prevent rapid wear and unacceptable burrs commonly generated with sharp corners. This reduces maintenance time and the risk of edge breaking during operation.

The “L” Long Life punch will reduce maintenance costs while increasing production runs by reducing corner wear.

**How to Order:**

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

---

**Table:**

<table>
<thead>
<tr>
<th>Point Length L1</th>
<th>Type &amp; D</th>
<th>Round Range P</th>
<th>Type &amp; D</th>
<th>Min. Shape</th>
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</tbody>
</table>

---

1. Sharp corners are typical. To assure proper clearance, Dayton will provide standard broken corners if die button is ordered with punch to eliminate interference with die button fillet when total clearance is 0.08 or less.
2. Check your P&W dimensions to be sure the diagonal G does not exceed the max. shown.

\[ G = \sqrt{P^2 + W^2} \]
# Die Buttons

## Headless — ISO 8977 (Round Only)

### Type AD

#### Headless

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### Standard Alterations for AD and CD (page 17) Die Buttons

Standard Alterations are beyond those sizes listed above and can be manufactured for a slight additional charge.

### XP, XW

P or W Dimensions Larger or Smaller than Standard

### XL

Overall-Length Shortened
Stock removal does not alter B length.
Minimum overall length = 6.35
Not available on Ball Lock Buttons.

### LL

Precision Overall-Length
Same as XL except overall length is held to ±0.02.
Not available on Ball Lock Buttons.

*3.00 min. P at 8mm Land Length

**AD Die Buttons conform to NAAMS™ standard for Straight Relief Die Buttons. For diameters 32-100 add XDT-j6 to the end of the catalog number to receive NAAMS™ standard j6 tolerance for large diameters.
**Standard Key Flat Location**

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

**Custom Key Flat Location**

Custom Key Flat Locations can be specified as degree required counterclockwise from 0°. See page 20 for more details.

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**XSC** Slug Control eliminates slug pulling

Dayton Slug Control is as easy as specifying a catalog number. Add the information that is unique to your application to the die button catalog number. See ordering information.

**Dayton Slug Control is Easy to Order**

Dayton Slug Control is as easy as specifying a catalog number. Add the information that is unique to your application to the die button catalog number. See the example below.

You must specify **XSC** for alteration, material thickness and clearance per side as a percent.

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This information will be entered into our computer to generate a program to alter the land of the die button and end your slug pulling problems forever! Call us or contact your Dayton distributor for more information.

**XBL** Straight Through Land

The land length (B) equals the overall length of the die button. Can be used for bushings, guides and a variety of other applications.

*Round dies only.

**XAL** 10°Angled Lead on AD

The angle provides clearance for steps left by CNC machining. Standard on AN_.Die Buttons

**XN** DayTride®

A unique wear-resistant surface treatment for M2 only.

---

### How to Order:

Specify: Quantity

Type

Body Dia. & B and Overall Length Codes

P or P & W Dimensions

Standard Alterations

---

[Diagram of die button with dimensions and tolerances]
Tapered Relief Die Buttons

For automotive CNC build applications

Ordering Example: ANO 25 A32 P8.7 W5.0 X43

Standard Alterations for AN Die Buttons

### XP, XW
- **P or W Dimensions**
  - Larger or Smaller than Standard

### XL
- **Overall-Length Shortened**
  - Minimum overall length = 6.35

### LL
- **Precision Overall-Length**
  - Same as XL except overall length is held to ±0.02.
  - No lead when L < 12.7

### XBL
- **Straight Through Land**
  - The land length (B) equals the overall length of the die button. Can be used for bushings, guides and a variety of other applications.
  - *Round dies only.

### XAR
- **Increased Taper Relief**
  - (10° per side max) Standard. B length unless XB is specified. Default angle is 1° when an angle is not specified.

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

### XSC
- **Slug Control eliminates slug pulling**
  - Dayton Slug Control is as easy as specifying a catalog number. Add the information that is unique to your application to the die button catalog number. See ordering information on page 15.

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**Light Duty Ball Lock**

**Die Buttons**

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### 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 counterclockwise from 0°.

### Double Ball Seat Locations
- A second ball seat can be specified. Normally located 180° from the primary ball seat these are used to minimize sharpening of die buttons in notching operations by rotating 180°. Specify SB and degree desired. Can also be located 90° from primary ball seat.

---

### EDM Button Blanks

**How to Order:**
- Specify: Quantity
- Type
- Body Dia. & Length Codes
- B&P Dimensions if Required

**Ordering Example:** CDO 25 32 P8.7 W5.0

### Button Blanks

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</table>

**All dimensions and tolerances are the same unless specified.**

---

*For diameters 32-100 add XDK/j6 to the end of the catalog number to receive NAAMS™ standard j6 tolerance for large diameters.*
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 die button.

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 die button under conditions where clearance is 0.04 or less per side.

Fillets matched with sharp corners reduces the clearance per side (Δ1). If the clearance is 0.04° or less, DAYTON will break sharp corners when the punches and die buttons are ordered together. This reduces assembly time and the risk of the edge breaking during operation. All back-holes are counterbored.

Shape Centers
Shapes are centered on punch shanks as shown. Shaped in die buttons are also centered as shown with the exception of shapes C22 and C24. Due to the clearance, the P dimension on these shapes will not be centered.

Simplified Specifications...83 Common Shapes—No Detailing Required

How to Order:
Specify: Quantity
Catalog Number
Classified Shape
Code
Point or Hole Dimensions

Clearance
To assure proper relationship with punches, it is necessary to specify punch dimensions and clearance per side (Δ) when ordering die buttons.
DAYTON will assure the proper clearance of die buttons to the punch when ordered in this manner.

Notes 1 and 2 — Fillets and Sharp Corners
Normal grinding methods produce:
1. 0.2 max fillet on the punch, matching corner sharp on the die button.
2. 0.2 max fillet on the die button, matching corner sharp on the punch.
*Avoid excessive overhang by specifying shaped back-hole on AD_ and CD_ or use AN_ Die Buttons.
Custom Locations

Definition:
Custom Location is any angle other than: 0°, 90°, 180° or 270°.

Single Flats: X5, X50, X90

Order Example:
X50 - 135°

Additional Flats

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Dowel Slots: X0°, X4, X41 & X43

Order Example:
X0 - 180°

Dowel Slot F Dimension for Headless Die Buttons Only

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Key Flats vs. Dowel Slots

Maximum hole dimensions in die buttons were designed with key flats in mind. There are instances where, if using a dowel slot, the dowel hole could break into the relief. For this reason there are two ways to specify the location of the dowel. X0 (standard/alternate location) and X1 (custom location) are located .5D from centerline. However, when hole dimensions are approaching the high limit of “F” X4 (standard/alternate location) or X7 (custom location) may be specified. This relocates the dowel outward to assure no interference between the dowel and relief.

*Available on headless die buttons only
The BRAR Reversible Change Retainer is a unique air cylinder type change retainer that gives you the ability to change hole-punching patterns quickly and easily.

The BRAR holds the punch in two different locations: one, the NAAMS™ standard location; two, 12mm closer to the front of the retainer. (See drawings for holder configurations.)

This design allows a variety of punch configurations (e.g., right- and left-hand parts); the punch holder can be quickly and easily reversed, then changed back; and lead wires (attached to the control panel) show the on/off status of the cylinder.

BRAR
For Heavy Duty Punches

US Patent# 7,204,181 B2
EU Patent# 1763423
JP Patent# 2007-519396

BRAR Reversible Change Retainers conform to NAAMS™ standard for Ball Lock Punch Change Retainers.

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How To Order:
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Catalog No.: BRAR 25

The BRAR Reversible Change Retainer includes all necessary screws, dowels, the air cylinder, the autoswitch, and the fittings. The fittings supplied are for 6mm tubing and ¼" tubing. The metric fittings are blue, and the inch fittings are orange. Tubing is not included.
Change Retainers
Air Cylinder Type
— For Ball Lock Punches

Engage or disengage punches in seconds
Change Retainers are used where different hole patterns are required. Various hole patterns can be accomplished without the need for multiple dies. Different parts, such as right and left hand, can be run in one die.

Changing hole patterns takes only minutes, sometimes only seconds. A bar holding the punch in position is released to allow the punch to retract up far enough to avoid contact with the material.

BRA
For Heavy Duty Punches

How To Order:

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BRA Change Retainers conform to NAAMS™ standard for Ball Lock Punch Change Retainers
• The in-line dowel guarantees precise punch-to-button 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 Retainer includes:
• 1 Ball   • 1 Spring
• 2 Screws
• 2 Threaded Dowels
• 1 Ball Release Screw

How to Order:
Quantity Catalog No.
10  BRT10
13  CRT25

BRT conforms to NAAMS™ standard for Ball Lock Punch Retainer
**Retainers with Backing Plate**

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

**BRTB**
Heavy Duty

**Retainer sets include:**
- Ball
- Spring
- Screws
- Dowels
- Ball Release Set Screw

**How to Order:**

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**Retainers with Backing Plate**

BRTB conforms to NAAMS™ standard for Ball Lock Punch Retainer

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<tr>
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</tr>
</tbody>
</table>

**M8 tapped hole in two places for mounting metric urethane stripping unit to retainer.**
Space-Saving, time-saving retainers for round punches and pilots

- The industry’s smallest interchangeable retainer, so you can fit more holes into tight spaces.
- Ultra-Compact 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.
- A single dowel in the hardened backing plug is all you need for perfect alignment.
- Tapped ball release hole.
- Also interchangeable with the True Position Retainer.

Ultimate Compact Retainer includes:
- 1 Ball
- 1 Spring
- 2 Screws
- 1 Threaded Dowel
- 1 Ball Release Screw

How to Order:

<table>
<thead>
<tr>
<th>Quantity</th>
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<tr>
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Catalog Number

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<th>D</th>
<th>A</th>
<th>B</th>
<th>G</th>
<th>K</th>
<th>R</th>
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</table>
Dayton’s innovative Multi-Position retainers provide a simple, low-cost solution to building new dies. These retainers reduce the need for special detailing, save both design and build time.

Multi-Position retainers are easy to order. Simply specify BRP for Heavy Duty or CRP 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.

Multi-Position™ Retainers
For Ball Lock Punches

Using two Type A backing plugs eliminates the need for dowels in the retainer.

Datum

Note:
Looking at retainer from backing plug side.

BRP = 41.0
CRP = 32.0

Specify screw and dowel size and location.

Tapped Hole
Under Dowel

Using two Type A backing plugs eliminates the need for dowels in the retainer.

Backings Plugs

<table>
<thead>
<tr>
<th>TYPE A</th>
<th>TYPE B</th>
<th>TYPE C</th>
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</thead>
<tbody>
<tr>
<td>In-Line Dowel</td>
<td>For Die Buttons</td>
<td>Solid</td>
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</table>

The Type C solid backing plug is standard. However, as shown in the photo above left, you can use two Type A plugs with 6.0 diameter dowels for location. This eliminates the cost of dowel holes in the retainer.

See page 29 to order Backing Plugs.

Die Button Retainers require detailed drawings.

<table>
<thead>
<tr>
<th>Dowel</th>
<th>Tapped Hole</th>
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<td>4</td>
<td>M8 M8</td>
</tr>
<tr>
<td>5</td>
<td>M10 M14</td>
</tr>
<tr>
<td>6</td>
<td>M14 M16</td>
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<tr>
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<th>200</th>
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<td>50175</td>
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## Hole Locations

### From Datum

<table>
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<tr>
<th>Hole Type</th>
<th>Diameter</th>
<th>Location</th>
<th>Ball Hole</th>
<th>Radial Tolerance</th>
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<tbody>
<tr>
<td>Dowel Holes</td>
<td>±0.01</td>
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<td></td>
<td></td>
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<tr>
<td>Screw Holes</td>
<td>±0.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Component Holes</td>
<td>±0.01</td>
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### Punch Shapes

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<th>Radial Tolerance</th>
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<tr>
<td>Round</td>
<td>B</td>
<td>±5°</td>
</tr>
<tr>
<td>Shape</td>
<td>BB</td>
<td>±0°5°</td>
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</tbody>
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**Note:** Class B provided unless otherwise specified.

## Ball Hole Locations

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

<table>
<thead>
<tr>
<th>BS</th>
<th>225°</th>
<th>0°</th>
<th>180°</th>
<th>270°</th>
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<tbody>
<tr>
<td>Plan View</td>
<td>(from backing plug side)</td>
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## Space Requirements

### Ball Dia.

<table>
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<tr>
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<tbody>
<tr>
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<td>12</td>
<td>19</td>
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<td>17</td>
<td>12</td>
<td>22</td>
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<td>12</td>
<td>26</td>
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<td>17</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
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<td>32</td>
<td>17</td>
<td>12</td>
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<tr>
<td></td>
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<td>12</td>
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</table>

### Backing Plug Dia.

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<tr>
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<th>A</th>
<th>B</th>
<th>H</th>
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</thead>
<tbody>
<tr>
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<td>06</td>
<td>11.5</td>
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<td>12</td>
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<td>38</td>
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<tr>
<td></td>
<td>38</td>
<td>13</td>
<td>8</td>
<td>44</td>
</tr>
</tbody>
</table>

Tighter spacing can be achieved. When two or more plugs interfere, flats will be ground on the Backing Plugs.

## Alterations

### Standard Jackscrew Hole

Jackscrews make it easier to pull retainers off the dowels.

### Special Size

Any amount of material can be removed from the sides of the retainer for a customer size.

### Clearance Holes

Clearance holes or tapped holes can be detailed or shown in the chart like the order example below.

Holes are drilled through the retainer unless otherwise specified.

Location ±0.3  Diameter +0.4 –0

### The following alterations require detail drawings.

#### Notches

Notches to clear other tooling can be added to any side of the retainer. Notches are sawcut ±0.8

#### Angles

Angles, like notches can be added to clear other tooling in the die. Angles are sawcut ±0.8

### How to Order

Furnish the necessary information as indicated.

Order forms for Multi-Position Retainers are available upon request.

---

### Retainer Catalog No. Special Size

<table>
<thead>
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### Multi-Position™ Retainers

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<th>Component</th>
<th>Location</th>
<th>Ball Hole</th>
<th>Backing Plug Type</th>
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<td>–13.0</td>
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<tr>
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<td>–35.0</td>
<td>–35.0</td>
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<tr>
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<td>–53.0</td>
<td>90°</td>
<td>BB</td>
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<tr>
<td>4</td>
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</tr>
<tr>
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<td>JACKSCR. STD.</td>
<td>25.0</td>
<td>–25.0</td>
<td>–25.0</td>
</tr>
</tbody>
</table>

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

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

How to Order:

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Catalog No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>BRI 13</td>
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</tbody>
</table>
The Key to Increased Productivity is Jektole Engineered Clearance

### Jektole Components

- **Punch**
- **Side Hole**
- **Set Screw**
- **Spring**
- **Pin**

### Jektole® Data

#### Universal Jektole Components

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#### SPRINGS

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*Clearance hole is 0.3 larger than the Max. R for Ball Lock CD-. See chart bottom of page 14, Standard Alterations.
# Punch Puller

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.

Remove and replace ball 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 06 to 32. Dayton Punch Pullers will save you time and money.

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**Shim Plates**

**Ball Release Tools**

- **Angle Tip** (for all retainers)
  - Cat. No. 818038
- **Straight Tip** (for all retainers)
  - Cat. No. 818046
- **Threaded Tip** (for True Position® Retainers)
  - Cat. No. 269999
Strip-Shape Urethane Strippers assure positive stripping and they guard against punch failure by dampening punch vibration by gripping the punch point. The closed end design holds thin stock flat during the stripping cycle, reducing the potential of rejected parts.

Made from specially formulated urethane resins, these rugged strippers are guaranteed to meet your need for clean, fast, precise stripping action—with all types of punches. Because of Dayton’s unique curing agent, Strip-Shape urethane provides greater load bearing capacity than ordinary urethanes. Lot-to-lot pressure ratings are also much more consistent.

<table>
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Urethane Hardness: 95 ± 5 Shore A
Max. Recommended Deflection: 15% of Overall Length.
(Pressure Ratings shown in Newtons)

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Urethane Stripping Units

Fits retainers with tapped dowel holes only, such as DAYTON retainers: ART, ARTS, BRT, CRT.

When using DAYTON Ball Lock retainers these strippers fit Light Duty punch lengths 71, 80, 90, 100 and Heavy Duty punch lengths 80, 90, 100, 110. On DAYTON Head Type retainers they fit punch lengths 71, 80, 90, 100.

Urethane Strippers UHM

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Urethane Hardness: 95 ± 5 Shore A
Max. Recommended Deflection: 15% of Overall Length.
(Pressure Ratings shown in Newtons)

How to Order:
Qty.  Catalog No.
12   UHM-16-63
12   748595

UBP, URP and UHM conform to NAAMS® standard for Urethane Strippers and Backing/Retaining Plate Set.

Set consists of: Backing Plate, Retaining Plate and M8 x 20 Socket Head Cap Screw.
Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance. These coatings and treatments are available for M2 and PS4 material.

Surface Treatments

DayKool™ (XCR)—A cryogenic steel conditioning process used in addition to heat treating. An effective way to achieve optimum toughness, improved strength, and dimensional stability. Used primarily with hard, thick materials.

DayTride® (XN)—A low temperature, cost-effective surface application that treats all exposed surfaces. Provides increased dimensional stability. Ideal for punches and die buttons. Approx. hardness: RC65-73.

XVP—A thin film coating provides superior hardness (harder than carbide). Super-smooth finish on the point helps reduce galling and maintenance. Ideal for higher-than-normal punching frequency.

XPS—Super-smooth polish on the point to reduce galling and improve punch life. Use with the appropriate coating for your application to maximize punch life and reduce maintenance costs. Excellent for extruding applications.

Abraive Wear


TiCN (XCN)—Ultra-hard (harder than carbide), thin coating. Provides superior abrasive wear resistance and lubricity. A very good general-purpose coating for all materials. Upgrade over XNT. Approx. hardness: "Vickers 3000.

DayTAN™ (XAN)—Ultra-hard (harder than carbide), high-aluminum coating. Provides high temperature resistance. Well-suited for applications where surface heat is generated. Ideal for HSLA, dual phase, and TRIP steels. Upgrade over XCN. Approx. hardness: "Vickers 3400.

ZeronPlus™ (XNA)—Superior hardness (harder than carbide); provides superior abrasive wear resistance and excellent lubricity. Provides highest temperature resistance, thermal shock stability, & hot hardness. Approx. hardness: "Vickers 3200.

Adhesive Wear


XCDH—Super-smooth finish combined with advanced DLC coating for a very low coefficient of friction with extremely high wear resistance. Approx. hardness: "Vickers 5000.


Extrusion Coatings

XNP—The ultimate coating for improved resistance to galling: excellent wear resistance, superior surface finish, and high lubricity. Ideal for extruding and forming applications. Tolerance is ±.005 mm. Approx. hardness: "Vickers 3100.

XNAProgress (XNAP)—Ultra-hard coating that absorbs shear stress; provides excellent high-temperature resistance. Ideal for stamping where tools are exposed to extreme stress profiles. A good alternative to TD coating without the dimensional changes associated with that process. Approx hardness: "Vickers 3200.

Miscellaneous Coating

CRN—Excellent adhesion, high toughness, and good corrosion resistance. Primary applications are metal forming (copper, brass, & bronze), metal die casting, and plastic injection molding. Approx. hardness: "Vickers 1800-2100.

* Vickers used when RC exceeds 80.

Shear Angles

Shear Angles can be applied to all punch points. These angles are used primarily to reduce slug pulling. Single and Double Shears can be used to reduce the punching force as well as minimize slug pulling. These alterations are prepriced and do not add to the standard delivery of the product.

Shear Angles are also available on Classified Shapes, but are available as special order only.

For your reference standard head flat and dowel locations are at 0°. For ball lock punches the standard ball seat location is at 90°.

Simply add the alteration code shown next to the drawings, and the angle desired, to your punch catalog number. Tolerance on all angles is ±15 minutes.

How to Order:

Specify: Quantity
Product Alteration

5 BJB 20 100 PS4 XS23 A3°
Commitment to Quality & Customer Satisfaction

Dayton Lamina is a leading manufacturer of tool, die and mold components for the metal-working and plastics industries. As a customer-focused, world-class supplier of choice, we provide the brands, product breadth, distribution network and technical support for all your metal forming needs.

Our goal is to give our customers the most innovative and value-added products and services.

*Dayton Lamina’s line of Danly products is available only to North America.

www.daytonlamina.com