Precision Punches, Pilots, Die Buttons, & Retainers

Better performance, longer runs, less downtime

Versatile

Global leader in providing fabrication and stamping solutions

a MISUMI Group Company

www.daytonlamina.com
Versatile Precision Products

**Product Applications**

*Versatile Punches, Pilots, Die Buttons, and Retainers* are built to exact tolerances and concentricity to provide superior alignment, better performance, longer runs, and less downtime. Dayton Versatile products are considered “top-of-the-line” by regular users, and are mainstays in heavy industries with high-demand applications, such as automotive and major appliance manufacturing.

Versatile punches and die buttons provide three times better alignment than other major brands, thus assuring longer runs and better part performance. Versatile die buttons with tapered relief have no overhand and no step (unlike conventional counter-bored relief); provide positive slug control; and never fail due to lack of support of the cutting edge.

Dayton’s Versatile precision product line includes: *Jektole® Punches (slug ejection punches); Regular Punches; Regular Pilots; Positive Pick-Up Pilots; Compact Positive Pick-Up Pilots; Straight and Blank Punches; Clospace Punches; Die Buttons; Retainers; Guide Bushings; and others, including Quill Bushings, Micro Guides, Misfeed Detectors, and Locking Devices.* Standard sizes and standard alterations are shown in this catalog within individual product sections.

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

**Ordering Information**

Each page contains detailed instructions on how to order specific Dayton Versatile products. Individual drawings show product shape, dimensions, tolerances, and concentricity. When ordering, you are asked to specify quantity, type, shank and length codes (for example), and other applicable data.

In the example below, the type specified is “VPR.” “V” stands for Versatile, “P” stands for punch, and “R” stands for rectangle. 37 is the press-fit diameter, which is coded by the first two digits of the decimal equivalent (.375”). 12 is the shank length, which is coded by inches and quarter-inches (one inch and two quarters). 23 is the overall length, coded by inches and quarter-inches. Finally, P.1875 and W.1325 represent the point or hole size dimensions.

**Standard Alterations**

Punches, pilots, and die buttons 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 other 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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Product Designation

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

Example:

<table>
<thead>
<tr>
<th>Code</th>
<th>Code</th>
<th>Code</th>
</tr>
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<tbody>
<tr>
<td>D</td>
<td>D</td>
<td>D</td>
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<tr>
<td>12</td>
<td>.1250</td>
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<td>25</td>
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<tr>
<td>37</td>
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<td>100</td>
</tr>
<tr>
<td>43</td>
<td>.4375</td>
<td>125</td>
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</tbody>
</table>

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.

Classified Shapes

Classified shapes (83 common shapes, no detailing required) are available on all punches, solid die buttons, and guide bushings as indicated in this catalog. See pp. 22, 23 for more information and special instructions. Also, see individual product pages and pp. 30, 31 for additional information on orientation and views.

Clearance

Normal grinding methods produce:

1. .007 max fillet on the punch — matching corner shape on the die button.

2. .007 max fillet on the die button — matching corner shape on the punch.
### Jektole® Punches

**Material:**
- Steel: A2, M2, PS4 (RC 60-63), PS (RC 63-65)
- All heads are drawn to RC 45-55

**P&W Tolerance (Max):**
P to D +.0002

**Features/Benefits:**
- Jektole® punches permit double-punch to die button clearance: produce up to three times the number of hits between sharpenings, and reduce burr height.

### Steel: A2, M2, PS4 (RC 60-63), PS (RC 63-65)

<table>
<thead>
<tr>
<th>Steel</th>
<th>A2</th>
<th>M2</th>
<th>PS4</th>
<th>PS</th>
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<tbody>
<tr>
<td>Quality</td>
<td>60-63</td>
<td>63-65</td>
<td>60-63</td>
<td>66-68</td>
</tr>
<tr>
<td>Hardness</td>
<td>1.25</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
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</table>

### Punches

- **Round Shape**
  - Includes Jektole punches available in sizes other than or W dimension, e.g., "XP" and/or "XW." If the point is 75\(^\circ\) or less, it is held to ±.0005.

### Surface Treatments & Coatings

- **Some coating products can be coated to increase hardness, reduce build-up, and improve wear resistance.**

**DayTriade™ (XN):**
- ultra-hard, high-alloy PVD coating. Available for all standard and custom die button sizes. Provides high temperature stability. Jektole® is a trademark of Dayton Progress Corporation

**DayKool™**
- high-vacuum PVD coating. Provides excellent lubricity and heat resistance. Good for lower hardness.

**KMM®**
- PVD, solid film. Provides lower coefficient of friction than other coatings. Provides excellent lubricity.鑫硬度

### Standard Altimeters

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 is 75\(^\circ\) or less, it is held to ±.0005.

### Standard Altimeters

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 is 75\(^\circ\) or less, it is held to ±.0005.

### Standard Altimeters

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 is 75\(^\circ\) or less, it is held to ±.0005.
### Features/Benefits

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

### Standard Alterations

Regular Vennell 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., “0.090” and “0.125”.

If the point length is longer than standard, designate “XP” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designations.

### Surface Coatings & Treatments

Some catalog products can be coated to increase hardness, reduce galling, and improve wear and/or corrosion resistance.

- **DayTak® (XT)**—a low-cost surface application that treats all surfaces. Ideal for roughing and die-casting. Provides a high-dimensional stability. Approx. hardness: **RCS7**
- **Capitron® (XP)**—applied via PVD (physical vapor deposition). Provides extremely hard (hard as carbide) and excellent lubricity when used with a lubricant. Not recommended for stainless steel, copper, or nickel. Approx. hardness: **Vickers 2000**

### How to Order

See page 35 for Shear Angles.

**SFC**—specify if standard finish coating process, used primarily with hard, thick materials. Improves strength, tough- ness, and dimensional stability.

**CON**—excellent adhesion, high toughness, and good corrosion resistance. Primary applications are metal-forming (copper, brass, bronze), metal coining, and plastic injection molding. Approx. hardness: Vickers 1200-1500.


**316L**—inherent stainless steel, high corrosion resistance.
### Material

Shank: 3241 3342
Punch: 3141 3242
Head: 3451 3552

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### Stock removal from head end which shortens Overall Length Shortened length. To maintain “B,” specify “XLB.”

- **P and W Dimensions**
  - 1.0000
  - 1.0000
  - 0.8750
  - 0.5000
  - 0.6250
  - 0.5000
  - 0.3750
  - 0.1250
  - 0.3750
  - 0.3125
  - 0.2500
  - 0.3125
  - 0.1875

---

### Shank Point

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<th>15</th>
<th>16</th>
<th>17</th>
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</tr>
</tbody>
</table>

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### Press-In Lead

- **Press-In Lead**
  - 0.061
  - 0.061
  - 0.061
  - 0.061

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### Surface Coatings & Treatments

**Some coating products can be coated to increase hardness, reduce grinding, and improve wear and frictional surface resistance.**

- **DayTal (D):** A low-cost surface application that treats all exposed surfaces. Ideal for punches and die blocks. Provides high dimensional stability. Approx. hardness: 9500.

**Note:** For 18 and 325, add term “d” in coating to order.

- **DayTal** (DT): An applied PVD coating that provides excellent wear hardness and excellent hardness. Not recommended for stainless steel, brass, and TRIP steels. Approx. hardness: 9500.

- **DayTal** (DN): A PVD coating that provides excellent wear hardness and excellent hardness. Not recommended for stainless steel, brass, and TRIP steels. Approx. hardness: 9500.

**Note:** When P=D, shank tolerance applies.

- **DayTal** (X): An ultra-hard high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: 9500.

**Note:** The ultimate coating for durability and forming applications. Also works well in high-speed forming, Tolerance e+. Approx. hardness: 9500.

- **DayTal** (XNA): An ultra-hard, high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: 9500.

**Note:** Ultra-hard, high-alumina PVD coating. Provides excellent hardness and excellent wear resistance. Not recommended for stainless steel, brass, and TRIP steels. Approx. hardness: 9500.

- **DayTal** (XNB): An ultra-hard high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: 9500.

**Note:** Diamond-like carbon coating (DLC) contains high hardness with extremely low coefficients of friction. Good protection against abrasion & adhesive wear. Approx. hardness: *Vickers 3200.

**Note:** *Vickers 3200.

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### Diagram

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

- **Surface Coatings & Treatments**
  - Some coating products can be coated to increase hardness, reduce grinding, and improve wear and frictional surface resistance.

**DayTal (D):** A low-cost surface application that treats all exposed surfaces. Ideal for punches and die blocks. Provides high dimensional stability. Approx. hardness: RCT75.

**DayTal** (DN): An applied PVD coating that provides excellent wear hardness and excellent hardness. Not recommended for stainless steel, brass, and TRIP steels. Approx. hardness: RCT50.

**DayTal** (X): An ultra-hard high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: RCT50.

**Note:** When P=D, shank tolerance applies.

**DayTal** (XNA): An ultra-hard, high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: RCT50.

**Note:** The ultimate coating for durability and forming applications. Also works well in high-speed forming, Tolerance e+. Approx. hardness: RCT50.

- **DayTal** (XNB): An ultra-hard high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: RCT50.

**Note:** Diamond-like carbon coating (DLC) contains high hardness with extremely low coefficients of friction. Good protection against abrasion & adhesive wear. Approx. hardness: *Vickers 3200.

**Note:** *Vickers 3200.

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**DayTal (D):** A low-cost surface application that treats all exposed surfaces. Ideal for punches and die blocks. Provides high dimensional stability. Approx. hardness: RCT75.

**DayTal** (DN): An applied PVD coating that provides excellent wear hardness and excellent hardness. Not recommended for stainless steel, brass, and TRIP steels. Approx. hardness: RCT50.

**DayTal** (X): An ultra-hard high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: RCT50.

**Note:** When P=D, shank tolerance applies.

**DayTal** (XNA): An ultra-hard, high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: RCT50.

**Note:** The ultimate coating for durability and forming applications. Also works well in high-speed forming, Tolerance e+. Approx. hardness: RCT50.

- **DayTal** (XNB): An ultra-hard high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: RCT50.

**Note:** Diamond-like carbon coating (DLC) contains high hardness with extremely low coefficients of friction. Good protection against abrasion & adhesive wear. Approx. hardness: *Vickers 3200.

**Note:** *Vickers 3200.

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### Diagram

- **Features/Benefits**
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- **Surface Coatings & Treatments**
  - Some coating products can be coated to increase hardness, reduce grinding, and improve wear and frictional surface resistance.

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**DayTal** (X): An ultra-hard high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: RCT50.

**Note:** When P=D, shank tolerance applies.

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**Note:** The ultimate coating for durability and forming applications. Also works well in high-speed forming, Tolerance e+. Approx. hardness: RCT50.

- **DayTal** (XNB): An ultra-hard high-alumina PVD coating. Available in sizes other than those shown in the chart to the left. Approx. hardness: RCT50.

**Note:** Diamond-like carbon coating (DLC) contains high hardness with extremely low coefficients of friction. Good protection against abrasion & adhesive wear. Approx. hardness: *Vickers 3200.

**Note:** *Vickers 3200.
1. Calculate \((D-P)/2\).

2. Follow line over to intersection point on radius blend line.

3. Read LRB value

4. The LRB value is the difference between the effective radius of the hole and the diameter of the head.

For more detailed information, please refer to the original document.
Compact Positive Pick-Up Pilots

**Features/Benefits**

Dayton Vespas Compact Positive Pick-Up Pilots—mounted in a guided stripper—provide exceptional resistance to lateral deflection. A typical longer pilot may have several inches of exposed, unsupported surface. As bending or forming takes place, this lateral deflection can create excessive force on the pilot. Sometimes, the strength of the pilot—as well as the function of the other die set components—can be compromised. Dayton Compact Pilots provide virtually no unsupported surface that is susceptible to sideways movement, stress, or wear. Pilots always maintain the proper extension, and there is no need to move or adjust the pilot during grinding.

Dayton Compact Pilots are tight during use; last longer; and are ideally suited for high-demand applications.

**Material**

- **Steel**: A2, M2 (RC 60-63), PS (RC 63-65)
- **Material**: Steel, A2, M2 (RC 60-63), PS (RC 63-65)

**Standard Alterations**

Versatile compact positive pick-up pilots are available in sizes other than those shown in the charts on pp. 12, 13. When ordering, you are asked to specify different designations for various non-standard dimensions.

For example, if the P dimension is outside the standard range, an "X" is placed in front of the P dimension, e.g. XP. If the L1 (VPAC only) is other than standard, designate "XBR" for different length (3.000 min).

2 Days

**Surface Coatings & Treatments**

Some surface products can be used to increase hardness, reduce galling, and improve wear and/or corrosion resistance.

**DayTriide** (XH) — low cost surface treatment that heats at equivalent surface. Ideal for punch and the like. Provides high dimensional stability. Approx. hardness: RC 72.

**DayTriide** (MD) — optimized PVD (physical vapor deposition). Provides external hardness (hard as carbide) and excellent reliability when used with a coolant. Not recommended for forming tool steel, copper, or brass. Approx. hardness: "Kickers" 2006.

**DayTAN** (XO) — hard, high-alumina PVD coating. Achieves above wears and provides high temperature resistance. Ideal for die cast and T700 steels. Approx. hardness: "Kickers" 348B.

**TECMET** (posting) — very hard PVD, thin film. Provides ultra hardness (Forder than carbide) and a superior abrasive wear resistance. Approx. hardness: "Kickers" 390B.

**XM2D** — very hard PVD, thin film. Produces lower coefficient of friction than other coatings. Provides excellent lubricity. Approx. hardness: "Kickers" 2500.

**XNT** — the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0004. Approx. hardness: "Kickers" 2500.

**DayKnip** (XK) — unique die coating process, used primarily with hard tool steels. Improves strength, toughness, and dimensional stability.

**XM3C** — excellent adhesion, high toughness, and good corrosion resistance. Primary applications are metal forming (punch, brass, bronze), die casting, and plastic injection molding. Approx. hardness: "Kickers" 1800-2100.

**ZenoPlat** (XZM) — excellent wear resistance, thermal shock stability and toughness. Approx. hardness: "Kickers" 5000.

**XHAProgress** (XMP) — ultra-hard PVD coating that achieves above uses, provides excellent high temperature resistance. Ideal for stamping where tools are exposed to extreme stress profiles. A good alternative to TC coating without the dimensional changes associated with that process. Approx. hardness: "Kickers" 2005.

**Diamond Like Carbon Coating** (XSCC) — combines high hardness, excellent wear resistance, and good protection against abrasion & adhesive wear. Approx. hardness: "Kickers" 5000.

**Material**

- **Steel**: A2, M2 (RC 60-63), PS (RC 63-65)
- **Material**: Steel, A2, M2 (RC 60-63), PS (RC 63-65)

**Pilot Delivery**

- **DayTAN** D100 1.1250 1.1200 1.1150 1.1100 1.1050 1.1075 1.1000 1.0950 1.0900 1.0850 1.0800 1.0750 1.0700 1.0650 1.0600 1.0550 1.0500 1.0450 1.0400 1.0350 1.0300 1.0250 1.0200 1.0150 1.0100 1.0050 1.0000 0.9950 0.9900 0.9850 0.9800 0.9750 0.9700 0.9650 0.9600 0.9550 0.9500 0.9450 0.9400 0.9350 0.9300 0.9250 0.9200 0.9150 0.9100 0.9050 0.9000 0.8950 0.8900 0.8850 0.8800 0.8750 0.8700 0.8650 0.8600 0.8550 0.8500 0.8450 0.8400 0.8350 0.8300 0.8250 0.8200 0.8150 0.8100 0.8050 0.8000 0.7950 0.7900 0.7850 0.7800 0.7750 0.7700 0.7650 0.7600 0.7550 0.7500 0.7450 0.7400 0.7350 0.7300 0.7250 0.7200 0.7150 0.7100 0.7050 0.7000 0.6950 0.6900 0.6850 0.6800 0.6750 0.6700 0.6650 0.6600 0.6550 0.6500 0.6450 0.6400 0.6350 0.6300 0.6250 0.6200 0.6150 0.6100 0.6050 0.6000 0.5950 0.5900 0.5850 0.5800 0.5750 0.5700 0.5650 0.5600 0.5550 0.5500 0.5450 0.5400 0.5350 0.5300 0.5250 0.5200 0.5150 0.5100 0.5050 0.5000 0.4950 0.4900 0.4850 0.4800 0.4750 0.4700 0.4650 0.4600 0.4550 0.4500 0.4450 0.4400 0.4350 0.4300 0.4250 0.4200 0.4150 0.4100 0.4050 0.4000 0.3950 0.3900 0.3850 0.3800 0.3750 0.3700 0.3650 0.3600 0.3550 0.3500 0.3450 0.3400 0.3350 0.3300 0.3250 0.3200 0.3150 0.3100 0.3050 0.3000 0.2950 0.2900 0.2850 0.2800 0.2750 0.2700 0.2650 0.2600 0.2550 0.2500 0.2450 0.2400 0.2350 0.2300 0.2250 0.2200 0.2150 0.2100 0.2050 0.2000 0.1950 0.1900 0.1850 0.1800 0.1750 0.1700 0.1650 0.1600 0.1550 0.1500 0.1450 0.1400 0.1350 0.1300 0.1250 0.1200 0.1150 0.1100 0.1050 0.1000 0.0950 0.0900 0.0850 0.0800 0.0750 0.0700 0.0650 0.0600 0.0550 0.0500 0.0450 0.0400 0.0350 0.0300 0.0250 0.0200 0.0150 0.0100 0.0050 0.0000

**Material**

- **Steel**: A2, M2 (RC 60-63), PS (RC 63-65)
- **Material**: Steel, A2, M2 (RC 60-63), PS (RC 63-65)

**Material**

- **Steel**: A2, M2 (RC 60-63), PS (RC 63-65)
- **Material**: Steel, A2, M2 (RC 60-63), PS (RC 63-65)

2 Days

Dayton Progress Corporation

Dayton Progress Corporation

Dayton Progress Corporation
### Punch Blanks - Jektole® and Regular

#### Jektole®

- **Type**: Jektole®
- **Material**: Steel: A2, M5, P5 (RC 60-63), PS (RC 38-45)

#### Regular

- **Type**: Jektole®
- **Material**: Steel: A2, M5, P5 (RC 60-63), PS (RC 38-45)

### Features/Benefits

Dayton Punch Blanks are an ideal cost-effective alternative in applications where Dayton standard shape configurations or our classified shapes do not meet customer requirements. Blanks—available in a full range of standard lengths from 1.250" to 7.000"—can be custom-ground to meet virtually any customer requirement.

### Surface Coatings & Treatments

- **DayTiN** (XNB)—ultra-hard, especially for high-temperature applications.
  - Provides extreme hardness (hard as cement) and excellent durability when subjected to abrasion.
  - Ideal for high-speed steel, stainless steel, copper, or nickel. Approx. hardness: "Vickers" 3200.

- **DayTiN™** (XNC)—very hard PVD, thin film coating. Provides excellent hardness (harder than cement) and superior abrasive wear resistance. Approx. hardness: "Vickers" 3200.


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- **Circo™**—excellent adhesion, high toughness, and good corrosion resistance. Primary applications are metal forming (stamping, bending, forming), metal die coating, and plastic injection molding. Approx. hardness: "Vickers" 1900-3100.

- **VentPac™** (XVPC)—excellent wear resistance, thermal shock resistance, and high hardness. Approx. hardness: "Vickers" 2500.

- **XNAP**—ultra-hard PVD coating that absorbs severe stress. Excellent high-temperature resistance. Ideal for standing where tools are subjected to extreme stress problems. A good alternative to T2 coating without the dimensional changes associated with that process. Approx. hardness: "Vickers" 3200.

- **Diamond Like Carbon Coating (DLC)**—combines high hardness with an extremely low coefficient of friction. Good protection against abrasive & adhesive wear. Approx. hardness: "Vickers" 2500.

### Standard Allocations

#### Punch Blanks

- **VJB**: Blank lengths do not change with body diameter.
- **VYX**: Material designations for various non-standard dimensions.
- **VUX**: Punch Blanks

---

### Punch Blanks - Jektole® and Regular

#### Punch Blanks - Jektole®

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Head Diameter</th>
<th>Shank Diameter</th>
<th>Overall Length</th>
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</thead>
<tbody>
<tr>
<td>VJB</td>
<td>NA</td>
<td>125, 187, 253</td>
<td>205, 275, 375, 450, 605</td>
<td>675, 805, 925, 1050</td>
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#### Punch Blanks - Regular

<table>
<thead>
<tr>
<th>Type</th>
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<th>Shank Diameter</th>
<th>Overall Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>VYX</td>
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<td>125, 187, 253</td>
<td>205, 275, 375, 450, 605</td>
<td>675, 805, 925, 1050</td>
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</tbody>
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---

### Standard Allocations

#### Punch Blanks

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Head Diameter</th>
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</tr>
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</table>

---

### Materials

- **Steel**: A2, M5, P5 (RC 60-63), PS (RC 38-45)

---

### Surface Coatings & Treatments

- **DayTiN** (XNB)—ultra-hard, especially for high-temperature applications.
  - Provides extreme hardness (hard as cement) and excellent durability when subjected to abrasion.
  - Ideal for high-speed steel, stainless steel, copper, or nickel. Approx. hardness: "Vickers" 3200.

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---

### Punch Blanks - Jektole® and Regular

#### Punch Blanks - Jektole®

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Head Diameter</th>
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</thead>
<tbody>
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</tr>
</tbody>
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<th>Shank Diameter</th>
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Die Buttons

**Die Buttons Construction**

See page 35 (DieX and MNX) for more information on die button construction when "P" is .000 and less.

---

**Standard Alternations**

Versatile die buttons are available in sizes other than those shown in the chart above. When ordering, you are asked to specify different designations for various non-standard dimensions. For example, if the L dimension is outside the standard range, an "X" is placed in front of the L dimension. Also see "Standard Alternations" on the front of the pullout tab in this section for other special order designations.

---

**Dayton Slug Control**

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

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

**Ordering**

Dayton Slug Control is easy to specify and order. Simply add the information that a unique application to your drawing to the die button catalog number. Please specify LSC for alteration and include material thickness (inches) and clearance per side (percentage).

---

For additional information, contact your Dayton distributor.

---

**Edm Die Button Blanks**

---

**Die Button Construction**

See page 35 (DieX and MNX) for more information on die button construction when "P" is .000 and less.

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For additional information, contact your Dayton distributor.

---

**Edm Die Button Blanks**

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Multi-Location Retainers

Multiple Head Type Punch Retainer

True Location Retainers

Single Head

Locking Mechanism

The locking mechanism for the Multi-Location™ VRP Retainer and the True Location™ VRTS Retainer (for shaped punches) is part of the retainer itself, and is used to lock the shaped punches, thus providing accurate radial location.

The flat for the VRTS Retainer is always located as shown in the drawing on the left. The flats for the VRP Retainer can be located at any angle by specifying the angle from 0°.

Clearance Holes

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

Location ±.010

Diameter ±.005

The following alterations require detailed drawings:

Nebbers

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

Angles

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

Shim/Backing Plate

Shim Plates can be used as an effective way to accurately space pilot entry, or used as a backing plate. Shim Plates can also be used on any Dayton Progress triangular-shaped retainers.

See the back of the pullout tab for additional information on VRP Locking Devices.

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

Multi-Location™ is a trademark of Dayton Progress Corporation.

True Location™ is a trademark of Dayton Progress Corporation.

Standard Alterations

Multi-Location™ Retainers

Standard Jactons V/NV

Jactons make it easier to pull retainers off the dowels.

Special Size

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

Clearance Holes

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

Location ±.010

Diameter ±.005

The following alterations require detailed drawings:

Nebbers

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

Angles

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

Shim/Backing Plate

Shim Plates can be used as an effective way to accurately space pilot entry, or used as a backing plate. Shim Plates can also be used on any Dayton Progress triangular-shaped retainers.

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True Location™ is a trademark of Dayton Progress Corporation.
Classified Shapes

Alterations—Guide Bushings

Example: 4 VEX 37 62 P .146

Keys

Classified shapes (all common shapes, no detailing required) are available on all punches, die buttons, and guide bushings, as indicated in this catalog. The 83 available common shapes are shown here and in p. 23. Also, see the outside of the pullout tab for notes and drawing references.

Ordering Information

• Corner Dimensions
  Dimensions should be the theoretical shape corners for shapes C22, C23, C34, C61, and C66. However, some reduction of these dimensions will result from filing the punch and die button under conditions where the clearance is .0025 or less per side.

• Shape Center
  Shapes are centered on the punch shank as shown. Shapes in guide bushings and die buttons are also centered as shown with the exception of shapes C22 and C34. Due to clearance, the P dimension on these shapes will not be centered.

Triangles/Trapezoids

Mono Lobes

Classified Shapes

Miscellaneous

Us

Polygons

Duo Tees

Classified Shapes

Orientation and Locking

The locking device orientation is standard at 0°. For types of locking methods and custom lock sizes, see p. 30.

Clearance

Normal grinding methods produce 0.027 max. filet on the punch and 0.027 max. filet on the die button with matching corner shape on the die button and punch, respectively. When ordering die buttons, please specify punch dimensions and clearance per side. (If the clearance is .0025, Dayton will break sharp corners when the punches and die buttons are ordered together.)

Reflected View—Punches and Guides

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

Material
Steel: A2 (RC 60-63)
P&W Tolerance = 0.0005

1 Day Delivery Schedule
P to D: 0008

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

Applications
Guide bushings should be ordered a minimum of .0005 larger than the punch point diameter with which they are to be used.

Alterations—Guide Bushings

For an explanation of the alteration codes shown above, see the “Standard Alterations, Regular Punches” on the p.7 pullout tab.

Guide Chart

How to Order
Specify: Qty. Type Code L P (or P&W)
Example: 4 VE__ 37 62 P.146
2 VF__ 50 50 P.250, W.075

Reflected View
Note: The standard location of a key flat is at 0°. See p. 31 for more information.

Applications
Guide bushings should be ordered a minimum of .0005 larger than the punch point diameter with which they are to be used.

Alterations—Guide Bushings

For an explanation of the alteration codes shown above, see the “Standard Alterations, Regular Punches” on the p.7 pullout tab.

Guide Chart

How to Order
Specify: Qty. Type Code L P (or P&W)
Example: 4 VE__ 37 62 P.146
2 VF__ 50 50 P.250, W.075
micro guides/die buttons

material
steel: a2 (rc 60-63)
p&w tolerance +.0002
p to d .0003

firm delivery schedule
guides, die buttons 3 days

guide chart

<table>
<thead>
<tr>
<th>hole range</th>
<th>land length</th>
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</thead>
<tbody>
<tr>
<td>up to .0650</td>
<td>2p</td>
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<tr>
<td>.0651-.0950</td>
<td>p + .065</td>
</tr>
<tr>
<td>.0951-.4250</td>
<td>.82p + .082</td>
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</table>

body | range p | c’bore dia. c | l | d + .063 | c + .005 |
<table>
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<td>.1250 12</td>
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<td>.076</td>
<td>25</td>
<td>31</td>
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<tr>
<td></td>
<td>.1875 18</td>
<td>.046 -.130</td>
<td>.141</td>
<td>31</td>
<td>37</td>
</tr>
<tr>
<td>mfx head-down guide</td>
<td>.1250 12</td>
<td>.031 -.062</td>
<td>.076</td>
<td>25</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>.1875 18</td>
<td>.046 -.130</td>
<td>.141</td>
<td>31</td>
<td>37</td>
</tr>
<tr>
<td>mex head-up guide</td>
<td>.1250 12</td>
<td>.031 -.062</td>
<td>.076</td>
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<tr>
<td></td>
<td>.1875 18</td>
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<td>31</td>
<td>37</td>
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<tr>
<td>mdx headless die button</td>
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<td>.031 -.062</td>
<td>n/a</td>
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<td></td>
<td>.1875 18</td>
<td>.046 -.130</td>
<td>n/a</td>
<td>31</td>
<td>37</td>
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<tr>
<td>mhx headed die button</td>
<td>.1250 12</td>
<td>.031 -.062</td>
<td>n/a</td>
<td>31</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>.1875 18</td>
<td>.046 -.130</td>
<td>n/a</td>
<td>31</td>
<td>37</td>
</tr>
</tbody>
</table>

how to order
specify: qty. type code l p (or p&w)
example: 3 mgx 12 31 p.044
3 mgx 12 31 p.044
2 mfx 12 31 p.057
3 mhx 18 37 p.060
2 mdx 12 31 p.045
Quill Bushings/Guides

Material
Steel: A2 (RC 60-63)
Bearing: Bronze (VFQ)

Limitations

<table>
<thead>
<tr>
<th>Body Code</th>
<th>XP Min. P</th>
<th>XP Max. P</th>
<th>XD Min. XD</th>
<th>XD Max. P</th>
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<tbody>
<tr>
<td>18</td>
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<td>.0625</td>
<td>.125</td>
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<td>.219</td>
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<td>.1875</td>
</tr>
</tbody>
</table>

Note: No alterations available on VFQ. VFQ, as shown above, comes complete with a halo washer that provides a head at both ends.

Quill Bushing Alterations
XD Reduced Shank Diameter
XH Reduced Head Diameter
XL Overall Length Shortened
XP P Dimensions Larger than Standard

Matched Quill Sets
Matched Quill Sets are ideal for small hole applications where the risk of punch breakage is extremely high and where replacement costs must be considered.

Perfect Alignment
Ground bearings at both ends of the Quill Bushing assure precise punch-to-punch alignment. This eliminates the bending influence of unrelieved bushing holes, which are difficult to manufacture straight. Dayton manufactures products with a .002 to .003 relief per side between bearing surfaces, which eliminates this problem.

No Stock Distortion Risk
During stripping, the punch tends to pull the stock into the stripper void, which may cause part distortion. Dayton eliminates the distortion potential by manufacturing the product with a controlled limit, i.e., .015 per side maximum. Distortion cannot occur when the space between the guides and the punch (.5 D-P) is less than the stock thickness.
# Misfeed Detectors

**Material**

Steel: A2 (RC 60-63)

## Features/Benefits

Dayton’s Misfeed Detector senses an out-of-register stock position, then actuates a switch to cut off the electrical power to the press. (The detector point diameter is typically .025 to .030 smaller than the hole to be probed.) Misfeed Detectors are engineered to extend .375 beyond the stripper and .125 beyond standard VPT pilots. However, shorter lengths can be specified: Simply add “XL” and the dimension.

Detectors are furnished with a spring, spring pin, and a six-inch actuator rod, which can be altered to suit your specific electrical design.

## Shank

<table>
<thead>
<tr>
<th>Shank Length</th>
<th>Shank Dia.</th>
<th>Shank Code</th>
<th>Range Dia. P</th>
<th>Head Dia. H</th>
<th>L</th>
<th>Spring Pocket</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50</td>
<td>.375</td>
<td>37</td>
<td>.090-.375</td>
<td>.500</td>
<td>2.375</td>
<td>37-Z387</td>
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<tr>
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<td>50</td>
<td>.375-.500</td>
<td>.625</td>
<td>2.625</td>
<td>50-Z387</td>
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<tr>
<td>1.75</td>
<td>.375</td>
<td>37</td>
<td>.090-.375</td>
<td>.500</td>
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<tr>
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<td>.375-.500</td>
<td>.625</td>
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<td>2.00</td>
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<td>37</td>
<td>.090-.375</td>
<td>.500</td>
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<td>.500</td>
<td>50</td>
<td>.375-.500</td>
<td>.625</td>
<td>3.375</td>
<td>50-Z387</td>
</tr>
</tbody>
</table>

**HOW TO ORDER**

Specify: **Qty.** **Type** **Code** **L** **P** **Alt**

Example: 3 VMX Z362 P400 XL 3.43
Extended Range Punches

Material
Steel: A2, M2, PS4 (RC 60-63)
P&W Tolerance ±0.0002
P to D ±0.0003

HOW TO ORDER
Specify: Qty. Type Shank L P (or P&W) Steel
Example: 3 VPR 200 1021 P1.206, W.582 M2

When D-P exceeds .406 a step will exist.

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

Sharp corners are typical. To assure proper clearance, Dayton will provide standard broken corners to eliminate interference with die button fillet when total clearance is .005 or less.

Surface Coatings

For more information on Dayton Progress surface coatings, see the back of the pullout tab on p. 5.

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™DayTAN and DayKool are trademarks of Dayton Progress.

V_J_ Type
V_P_ Type

Shown here with optional key flat. See p. 31.

**Extended Range Punches**

**Material**
Steel: A2, M2, PS4 (RC 60-63)
P&W Tolerance ±0.0002
P to D ±0.0003

**HOW TO ORDER**
Specify: Qty. Type Shank L P (or P&W) Steel
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**Code / Delivery**

<table>
<thead>
<tr>
<th>Code / Delivery</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>XN —DayTride®</td>
<td>+ 3 days M2 &amp; PS4</td>
</tr>
<tr>
<td>XNT —DayTIN™</td>
<td>+ 3 days M2 &amp; PS4</td>
</tr>
<tr>
<td>XAN —DayTAN™</td>
<td>+ 4 days M2 &amp; PS4</td>
</tr>
<tr>
<td>XCN —TiCN</td>
<td>+ 3 days M2 &amp; PS4</td>
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<tr>
<td>XNM</td>
<td>+12 days M2 &amp; PS4</td>
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<tr>
<td>XNP</td>
<td>+ 8 days M2 &amp; PS4</td>
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<tr>
<td>XCR —DayKool™</td>
<td>+ 1 day M2 &amp; PS4</td>
</tr>
<tr>
<td>CRN</td>
<td>+ 7 days M2 &amp; PS4</td>
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<tr>
<td>XNA —ZertonPlus™</td>
<td>+ 7 days M2 &amp; PS4</td>
</tr>
<tr>
<td>XNAP —XNAProgress</td>
<td>+12 days M2 &amp; PS4</td>
</tr>
<tr>
<td>XCD</td>
<td>+12 days M2 &amp; PS4</td>
</tr>
</tbody>
</table>
Spring Pilots

Material
Steel: A2 (RC 60-63)

Features/Benefits
Precision pilots are used for spring-loaded stripper applications. Spring pilots permit full length feed when starting the stock in progressive punching, notching, and blanking dies.

The parabolic point shape develops a smoothly curved surface, providing positive register in the hole.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Range P</th>
<th>Head Dia. H</th>
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<td>.124-.2499</td>
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<tr>
<td>VLX-75</td>
<td>.375-.5000</td>
<td>.750</td>
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</table>

 HOW TO ORDER

Specify: Qty. Type H P
Example: 2 VLX 50 P.156

*Length slightly less for diameters under .238.
Locking Devices—Ordering Information

Orientation
The standard location for all locking devices is at 0°, and is always on the long side (P) of the shape. Custom locations are measured counterclockwise from 0°. (See drawing below.)

Views
A Plan View is used for the die button, and a Reflected View is used for the punch or guide. The Reflected View, a mirror image, simplifies orientation—locking devices are all in the same position.

How To Specify
The most common locking devices—flat, double flat, and dowel—are available. Simply select the type, then add the code to the component description shown on p. 31.

Location Tolerance
Flat

<table>
<thead>
<tr>
<th>F</th>
<th>Radial</th>
<th>Dowel</th>
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<tbody>
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<td>+ .0050</td>
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<td>+ .0050</td>
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</tbody>
</table>

Locking Devices—Flats vs. Dowel Slots

Flats

- **Standard Location**
  - 0°, 90°, 180°, or 270°.
  - Custom locations are available at no additional charge.

- **Alternate Location**
  - Any angle other than 0°, 90°, 180°, or 270°.

- **Standard & Alternate Locations**
  - Available only if flat is full length.

- **Custom Locations**
  - Custom Location is any angle other than: 0°, 90°, 180°, or 270°.
  - Alternate Locations are available at no additional charge.

- **Single Flats: X2 & X8**
  - Order Example: X2 — 90°

- **Double Flats: X3**
  - Order Example: X3 — 90°

- **Additional Flats (From Top)**
  - Not available on headed die buttons (X99 only if flat is full length).

- **Dowel Slots**
  - Available only if flat is full length.

- **Dowel Slots: X1**, X7, X71 & X73

- **Dowel Slots: X2**, X4, X41 & X43

- **Dowel Slots: X0**, X4, X71 & X73

- **Dowel Slots: X1**, X7, X71 & X73

- **F Dimension**
  - For headed punches and die buttons:
    - F = .5D + .5 Dowel Dia.
  - For headless die buttons only:
    - F = .5D + .5 Dowel Dia.
Form Punch Shapes

Dayton Progress Form Punches are available on round punches (i.e., those designated as standard "X" shaped punches). When ordering, change the "X" designator to a "W." In addition, specify other dimensions, as shown in the example below. Specify alterations, if applicable. The shapes shown below are standard, but are not the only shapes Dayton provides. Others are available with a detailed drawing attached to the order.

Form Punches are also available on headed punch blanks. Form Punches other than those are available as specials.

**available on headless die buttons only**

Dowel Slots: X0, X4, X41 & X43

Dayton Die Buttons are available for all the Form Punches shown here, i.e., round punches designated as standard "X" shaped punches. When ordering, please change the "X" designator to a "W." Die Buttons are available as headed or headless with a counterbore relief, or as headed or headless with a tapered relief.

Form Die Button Shapes
The Engineered Clearance
Perforating punch-to-die button clearances in metal stamping dies has been universally expressed as a percentage of stock thickness, and for clarity should be articulated as percent per side (Δ = clearance per side).

Standard practice has called for Δ5%, and is commonly known as “regular clearance.” Regular clearance has been applied almost universally to all applications involving the perforation of ferrous materials.

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

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

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

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

Standard Jektole® Data

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>J2</th>
<th>J3</th>
<th>J4</th>
<th>J6</th>
<th>J9</th>
<th>J12</th>
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<td>and larger</td>
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<tr>
<td>Point Hole Diameter</td>
<td>C</td>
<td>.020</td>
<td>.032</td>
<td>.046</td>
<td>.063</td>
<td>.094</td>
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<tr>
<td>Shank Hole Diameter</td>
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* Keeper Key not available

Jektole® Design Limits

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Universal Jektole® Components

<table>
<thead>
<tr>
<th>EJECTOR PINS</th>
<th>J2</th>
<th>J3</th>
<th>J4</th>
<th>J6</th>
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<tr>
<td>Overall Length</td>
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<td>.047</td>
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<tr>
<td>SPRINGS</td>
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<td>J3</td>
<td>J4</td>
<td>J6</td>
<td>J9</td>
<td>J12</td>
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<tr>
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Jektole® in Production
- Requires less press tonnage
- Reduces the pressure required to strip the punch, which, in turn, reduces punch wear
- Produces minimal burr
- Doubles—often triples—piece output per grind
- Reduces total punch costs

Jektole® in Maintenance
- Keeper Key holds pin in retracted position (see photo at left)
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- Reduces downtime for regrinding

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<td>.19</td>
<td>.19</td>
<td>.19</td>
<td>.25</td>
</tr>
</tbody>
</table>
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.

Standard head flat and dowel locations are at 0°.

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.

LL not available on XS19, XS21, XS22, and XS23.

HOW TO ORDER
Type Code L P (or P&W) Steel Alteration
VPO 50 2332 P:400, W:300 A2 XS23 A3°

VersaPlus® Premium Products

Precision, High-Performance Punches and Pilots
VersaPlus® Punches and Pilots are a premium line of precision, high-performance products that offer more features and benefits to users in industries where higher-than-normal production runs occur—and where optimum performance is a MUST.

VersaPlus® is “setting the new standard in high performance,” according to tool companies and manufacturers who have field-tested the products. For example, a furniture hardware manufacturer realized a production run improvement from 250,000 to 375,000—a 150% increase. In another test, a tool and die company increased run-time-to-sharpening from 100,000 pieces to 200,000.

VersaPlus® gives users the real “plus” through improved production capabilities, increased uptime, and lower costs.

For additional information or a copy of our latest VersaPlus® catalog, contact your Dayton Progress Distributor.

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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.

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