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.
Contents

**Punches**
- Standard Shapes
- VJ_Jektole®
- VP_ Regular
- VPT Pilots
- VPA Pilots
- VUAC/VPAC Pilots
- VJB/VPB Blanks
- VYX/VUX Straight
- Clospace
- VJ_/VP_E Extended Range

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- VN_/VR_ Die Buttons
- KD_/KH_EDM Button Blanks

**Retainers**
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- VRT/VRTS Retainers

**Bushings/Guides**
- VJ_/VP_ Extended Range

**Bushings/Guides (cont’d)**
- MEX/MFX/MGX Micro Guides
- MDX/MHX Micro Buttons
- VQX/VFQ Quill Bushings/Guides

**Miscellaneous/Other**
- Classified Shapes
- Shear Angles
- Locking Devices
- Form Shapes
- Jektole® Data

**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:

- **Line**: VPR
- **Product**: 37
- **Type**: V for Versatile
- **Catalog Number**: P37
- **Shape**: P for Punch (Regular)
- **Press-Fit Dia.** (shank diameter) 0.35
- **Overall Length L**: 2.25
- **Shank Length**: 0.88
- **Paint or Hole Size**: W.1325

### Classification 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® Punctures

Features/Benefits
Jektole® punctures permit double punching to die button clearance: produce up to three times the number of hits between sharpenings, and reduce burr heights.

Surface Coatings & Treatments
Some catalog products can be coated to increase hardness, reduce galling, and improve wear and erosion resistance.

DayTriX® (XN) — a low-cost surface application that treats all exposed surfaces. Ideal for punches and die sets. Provides high dimensional stability. Apex hardness: R200-73.

DayTriB® (XP)—applied by PVD (physical vapor deposition). Provides extreme hardness (harder than carbide) and excellent lubricity even under load with a lubricant. Not recommended for stainless steel, copper, or nickel. Apex hardness: XN450-525.


— ZertonPlus ™ M2, PS4 & PS
— XNAProgress M2, PS4 & PS
— XAN—applied via PVD (physical vapor deposition).

Reflected D™ (harder than carbide) and superior abrasive wear resistance.

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

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

Note: Specifications may vary. See p. 34 for additional information.

<table>
<thead>
<tr>
<th>Type</th>
<th>D Code</th>
<th>L</th>
<th>P (or W)</th>
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<tr>
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<td>100</td>
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Spec: D: Type D Code L P (or W) X

Example: 2 VJX 501303 F3755 PS

L:

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<th>5.00</th>
<th>5.31</th>
<th>5.59</th>
<th>5.78</th>
<th>6.08</th>
<th>6.35</th>
<th>6.63</th>
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</table>

Material:

Steel: A2, M2, P8H (RC 60-63), P8 (RC 63-65)

All hardnesses are shown in RC 45-55

P&W Tolerance: ±.0002 P to D

— Interchangeably with 

— Exact size. 

— Range

P&W Tolerance ±.0002 P to D

Examples:

1.155 when D = .7500

— Range

— See p. 34 for additional information.

Jektole® Punctures

Standard Alterations

| XP, XW: Fast & Dimensions
<table>
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<tbody>
<tr>
<td>L</td>
<td>AN X</td>
</tr>
</tbody>
</table>
| X | X | X
| AN L | X | X | X
| AN P | X | X | X

Note: Specifications may vary. See p. 34 for additional information.

Standard Alterations

| XP, XW: Fast & Dimensions
<table>
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</thead>
<tbody>
<tr>
<td>L</td>
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</tbody>
</table>
| X | X | X
| AN L | X | X | X
| AN P | X | X | X

Note: Specifications may vary. See p. 34 for additional information.

Jektole® Punctures

Standard Alterations

| XP, XW: Fast & Dimensions
<table>
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</tbody>
</table>
| X | X | X
| AN L | X | X | X
| AN P | X | X | X

Note: Specifications may vary. See p. 34 for additional information.

Jektole® Punctures

Standard Alterations

| XP, XW: Fast & Dimensions
<table>
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<tbody>
<tr>
<td>L</td>
<td>AN X</td>
</tr>
</tbody>
</table>
| X | X | X
| AN L | X | X | X
| AN P | X | X | X

Note: Specifications may vary. See p. 34 for additional information.
Features/Benefits
Regular Punches provide three times better alignment than major brands; offer longer tool life; and can significantly improve finished part quality.

Surface Coatings & Treatments
Some catalog products can be coated to increase hardness, reduce galling, and improve wear and corrosion resistance.

DayTAM® (IAI)—low cost surface application that treats all tool steel punches and die buttons. Provides excellent high dimensional stability. Approx. hardness: R620-73.

DayTAM®-CrN—applied via PVD (physical vapor deposition).
  Promotes excellent hardness (hard as cemented) and excellent lubricity when used with a lubricant. Not recommended for exposed surfaces. Ideal for punches and die buttons. Provides excellent formability. Approx. hardness: “Vickers 3000.”


ANN-PVD—adding PVD coating reduces the oxidation of metal surfaces. Reduced friction when used with a lubricant. Approx. hardness: “Vickers 3000.”

DayN®—coercive steel coating process, used primarily with hard, thick materials. Improves strength, tough- ness, and dimensional stability.

CON®—excellent adhesion, high toughness, and good corrosion resistance. Primarily applicable to hot forming (copper, brass, bronze, metal casting, and plastic injection molding). Approx. hardness: “Vickers 3000.”

Zertex®+ (YNA)—excellent wear resistance, thermal shock stability and high hardness. Approx. hardness: “Vickers 3000.”

ANNPro® (HAP)—hard PVD coating that absorbs shock stress. Provides excellent high-temperature resistance ideal for stamping where tools are subjected to extreme stresses. A good alternative to TiCN coatings without the dimensional changes associated with that process. Approx. hardness: “Vickers 3000.”

Diamond Like Carbon Coating (XCD)—combines high hardness and an extremely hard coating to resist wear under the most severe conditions while maintaining desired tool life. Approx. hardness: “Vickers 3000.”

Standard Alterations
Regular/Variable 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 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 and W dimension, e.g. “X90” and “X80.”

When the point length is longer than standard, designate “KL” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designations.
Material: 16 52. 525 (RC 62-65)
All heads are drawn to TC 40-65.
P = .400 when L = 3.0. P = .235 when L = 1.5.

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 applications.

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

Day/Trial (D): a low-cost surface application that treats all exposed surfaces. Ideal for punchings and die blocks. Provides high dimensional stability. Approx. hardness: Rockwell 62-73.

Day/Trial (D) Plus (PT) —applied to PVG (physical vapor deposition). Provides added hardness (than carbide) and excellent lubricity and is easy to work with a lathe. Not recommended for stainless steel, copper, or nickel. Approx. hardness: Rockwell C 50.

Day/Trial (C) —hard, high-aluminum PVG coating. Usually done in dies and provides high-temperature resistance.


Press-In Lead

Standard Alterations

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 "S" is placed in front of the P
dimension, e.g., "P = 0.188". If the point length is
longer than standard, designate "K" as the point length.
Also see "Standard Alterations" on the front of
this chart for details for other special order
designations.

Regular Pilots

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 applications.

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

Day/Trial (D): a low-cost surface application that treats all exposed surfaces. Ideal for punchings and die blocks. Provides high dimensional stability. Approx. hardness: Rockwell 62-73.

Day/Trial (D) Plus (PT) —applied to PVG (physical vapor deposition). Provides added hardness (than carbide) and excellent lubricity and is easy to work with a lathe. Not recommended for stainless steel, copper, or nickel. Approx. hardness: Rockwell C 50.

Day/Trial (C) —hard, high-aluminum PVG coating. Usually done in dies and provides high-temperature resistance.


Press-In Lead

Standard Alterations

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 "S" is placed in front of the P
dimension, e.g., "P = 0.188". If the point length is
longer than standard, designate "K" as the point length.
Also see "Standard Alterations" on the front of
this chart for details for other special order
designations.

Regular Pilots

- **.125 when D = .125 or .175**
- XT = 5R
- SBR Straight Before Radius
- Standard Notations

Standard Alterations

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 "S" is placed in front of the P
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Also see "Standard Alterations" on the front of
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designations.

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- Standard Notations

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When ordering, you are asked to specify different
designations for various non-standard dimensions.
For example, if the P dimension is outside the
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this chart for details for other special order
designations.

Regular Pilots

- **.125 when D = .125 or .175**
- XT = 5R
- SBR Straight Before Radius
- Standard Notations

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For example, if the P dimension is outside the
standard range, an "S" is placed in front of the P
dimension, e.g., "P = 0.188". If the point length is
longer than standard, designate "K" as the point length.
Also see "Standard Alterations" on the front of
this chart for details for other special order
designations.

Regular Pilots

- **.125 when D = .125 or .175**
- XT = 5R
- SBR Straight Before Radius
- Standard Notations

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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 "S" is placed in front of the P
dimension, e.g., "P = 0.188". If the point length is
longer than standard, designate "K" as the point length.
Also see "Standard Alterations" on the front of
this chart for details for other special order
designations.

Regular Pilots

- **.125 when D = .125 or .175**
- XT = 5R
- SBR Straight Before Radius
- Standard Notations

Standard Alterations

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 "S" is placed in front of the P
dimension, e.g., "P = 0.188". If the point length is
longer than standard, designate "K" as the point length.
Also see "Standard Alterations" on the front of
this chart for details for other special order
designations.

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- XT = 5R
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- Standard Notations

Standard Alterations

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 "S" is placed in front of the P
dimension, e.g., "P = 0.188". If the point length is
longer than standard, designate "K" as the point length.
Also see "Standard Alterations" on the front of
this chart for details for other special order
designations.

Regular Pilots

- **.125 when D = .125 or .175**
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Standard Alterations

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 "S" is placed in front of the P
dimension, e.g., "P = 0.188". If the point length is
longer than standard, designate "K" as the point length.
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Regular Pilots

- **.125 when D = .125 or .175**
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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 "S" is placed in front of the P
dimension, e.g., "P = 0.188". If the point length is
longer than standard, designate "K" as the point length.
Also see "Standard Alterations" on the front of
this chart for details for other special order
designations.
Positive Pick-Up Pilots

Features/Benefits

Dayton Versatile positive pick-up pilots provide a smooth pick-up without the risk of distorting the hole; in addition, the unique design moves the stock farther than conventional pilots.

Surface Coatings & Treatments

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


DayKool™—cryogenic steel conditioning process, used in combination with conventional pilots for improved performance. Also works well in shaving operations. Tolerance is ±0.0002. Approx. hardness: *Vickers 3200.


XCN—cryogenic steel conditioning process, used in combination with conventional pilots for improved performance. Also works well in shaving operations. Tolerance is ±0.0002. Approx. hardness: *Vickers 2000.

XH—ultra-hard, high-alumium PVD coating. Provides extreme hardness (hard as carbide) and excellent wear resistance. Approx. hardness: *Vickers 3200.

XHNP—ultra-hard PVD coating that absorbs stress better, provides excellent high-temperature resistance. Ideal for forging where tools are exposed to extreme stress profiles. Approx. alteration in TS coating without the dimensional changes associated with that process. Approx. hardness: *Vickers 1800-2300.

XHNP—ultra-hard PVD coating. Provides extreme hardness (hard as carbide) and excellent wear resistance. Approx. hardness: *Vickers 3200.


Range

Lgth.      5 5.25 5.50 5.75 6.00 6.25 6.50 6.75 7.00

There is no additional charge for XL.

Standard Alterations

Positive pick-up pilots are available in steels 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 D dimension is outside the standard range, an “X” is placed in front of the D dimension, e.g., “XP.” If the point length is other than standard, designate “XR” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designations.

Standard Alte

Material

Steel: A2, M2 (RC 60-62)
All heads are shown in RC 45-55.

When P.D. Tolerance is ±0.0002

When P.D. should be tolerated applies.

If you require a length other than shown, designate “XL” (original D length will be maintained).

Example: You require a length of 3.000. Order 375, then show XL 3.000. See “Versa Order” on page 108.

Positive Pick-Up Pilots

Geometry provides stock movement without risk of distortion of hole. 


When D-P, show tolerance applies. 

Example: 25   VUAC      —           75      .4380      XL.695     A2

Specify:   Qty.     Type       D Code       L            P              Alt.        Steel

Example: 25   VUAC      —           75      .4380      XL.695     A2

Specify:   Qty.     Type       D Code       L            P              Alt.        Steel

Example: 25   VUAC      —           75      .4380      XL.695     A2

Specify:   Qty.     Type       D Code       L            P              Alt.        Steel

Example: 25   VUAC      —           75      .4380      XL.695     A2

Specify:   Qty.     Type       D Code       L            P              Alt.        Steel

Example: 25   VUAC      —           75      .4380      XL.695     A2

Specify:   Qty.     Type       D Code       L            P              Alt.        Steel
Compact Positive Pick-Up Pilots

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Head H</th>
<th>Range P</th>
<th>N</th>
<th>&quot;+L&quot;</th>
</tr>
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<tbody>
<tr>
<td>VUAC Straight</td>
<td>.375</td>
<td>.1865 - .2500</td>
<td>.25</td>
<td>62</td>
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<tr>
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<td>.438</td>
<td>.2501 - .3130</td>
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<td>.500</td>
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<td>.562</td>
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<td>.750</td>
<td>.5001 - .6250</td>
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<td>1.125</td>
<td>.8751 - 1.0000</td>
<td>1.00</td>
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</tbody>
</table>

*Any length is available within catalog range. Specify "XL" and length.

**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" as the variable length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.

**HOW TO ORDER**
Specify: Qty. | Type | D Code | L | P | Alt. | Steel
---|-----|-------|---|---|-----|-----
Example: 25 | VUAC | — | 75 | .4380 | XL.695 | A2
11 | VPAC | 62 | 100 | .6200 | — | A2

XP | P Dimension Smaller than Standard

XBR | L₁ Longer than Standard

**XP**
P Dimension Smaller than Standard

**XBR**
L₁ Longer than Standard

**XL** "L" Shortened
Stock removal from point end. L₁ length is maintained.

**XT** Thinner Head than Standard
Stock removal from head end which shortens overall length.

**TT** Precision Head Thickness
Same as XT except head thickness tolerance is held to ±.005.

**XH** Reduced Head Diameter
Minimum head diameter equals H +.000 – .001.
Compact Positive Pick-Up Pilots

Type VPAC

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Shank D</th>
<th>Code</th>
<th>Head H</th>
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<td>.3125</td>
<td>31</td>
<td>.438</td>
<td>.092</td>
<td>.1870 - .3124</td>
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<td>.3750 - .6249</td>
<td>.62</td>
<td>.4162</td>
</tr>
<tr>
<td></td>
<td>.7500</td>
<td>75</td>
<td>.875</td>
<td>.299</td>
<td>.4500 - .7499</td>
<td>.75</td>
<td>.5072</td>
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<tr>
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<td>.8750</td>
<td>87</td>
<td>1.000</td>
<td>.349</td>
<td>.5250 - .8749</td>
<td>.87</td>
<td>.5982</td>
</tr>
<tr>
<td></td>
<td>1.0000</td>
<td>100</td>
<td>1.125</td>
<td>.399</td>
<td>.6000 - .9999</td>
<td>1.00</td>
<td>.6892</td>
</tr>
</tbody>
</table>

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

Features/Benefits
Dayton Versatile 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 regrinding.

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

www.daytonlamina.com
Punch Blanks
Jektole & Regular

Features/Benefits
Dayton Punch Blanks are an ideal cost-effective alternative in applications where Dayton standard shank 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.

Punch Blanks
Jektole & Regular

Standard Altersations
Punch Blanks

Surface Coatings & Treatments
Some coating products can be ordered to increase hardness, reduce galling, and improve wear and corrosion resistance.

DayTreated® (XT)—a low-cost surface application that takes all exposed surfaces Ideal for punch and die blank Provides high dimensional accuracy Approx. hardness: R50-T3

DayTiN® (XTN)—applied via PVD (physical vapor deposition). Provides extreme hardness (hard as carbides) and excellent stability when exposed to a vacuum. Not recommended for stainless steel, copper or nickel. Approx. hardness: "Vickers: 2100.

DayTAN® (XAP)—ultra-high-temperature PVD coating. Achieves shorter times and provides high temperature resistance Ideal for high temperatures, dust, and TMAK steels. Approx. hardness: "Vickers: 2450.

TiCN (XCN)—very hard PVD thin film. Provides a ultra-high hardness (harder than carbide) and superior abrasive wear resistance. Approx. hardness: "Vickers: 4000.


DayPVD® (XNT)—applied via PVD (physical vapor deposition). Excellent adhesion, high toughness, and good dimensional stability. Approx. hardness: "Vickers: 2200.


XNAProgress (XNAP)—ultra-high PVD coating that absorbs stress energy, provides excellent high temperature resistance Ideal for bending where tools are exposed to extreme stresses. A good alternative to TiCN coating without the dimensional changes associated with that process. Approx. hardness: "Vickers: 3000.


Material
Steel: A2, M5, P5 (PS: 03-03), PS (PS: 03-04) All heads are drawn to RC 40-04.

*See p.32 for additional information.
**Straight Punches**  
**Jektolé and Regular**

**Material**
- Steel: A2, M2 (RC 60-63)
- All heads are drawn to RC 40-55.
- P Tolerance: ±.0002

**How To Order**

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Type</th>
<th>P</th>
<th>L</th>
<th>Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>VYX</td>
<td>P.324</td>
<td>250</td>
<td>A2</td>
</tr>
<tr>
<td>2</td>
<td>VUX</td>
<td>P.492</td>
<td>325</td>
<td>M2</td>
</tr>
</tbody>
</table>

**Standard Alterations**

**Straight and Clospace Punches**

- **XT** Thinner Head than Standard
  - Stock removal from head end which shortens overall length.
- **TT** Precision Head Thickness
  - Same as XT except head thickness tolerance is held to ±.0005.
- **XL** Overall Length Shortened
  - Stock removal from point end.
- **LL** Precision Overall Length
  - Same as XL except overall length is held to ±.001.

**V尼克**

<table>
<thead>
<tr>
<th>Type</th>
<th>Range P</th>
<th>Head Dia. H</th>
<th>Head Thk. T</th>
<th>C Vent Hole</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>VYX</td>
<td>1.875-2.500</td>
<td>.375</td>
<td>.55</td>
<td>125</td>
<td>400</td>
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<tr>
<td></td>
<td>2.250-3.125</td>
<td>.438</td>
<td>.55</td>
<td>125</td>
<td>400</td>
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<td></td>
<td>3.125-3.750</td>
<td>.500</td>
<td>.60</td>
<td>125</td>
<td>400</td>
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<tr>
<td></td>
<td>3.750-4.375</td>
<td>.562</td>
<td>.85</td>
<td>150</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>4.375-5.000</td>
<td>.625</td>
<td>.85</td>
<td>150</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>5.00-6.250</td>
<td>.750</td>
<td>1.10</td>
<td>150</td>
<td>400</td>
</tr>
</tbody>
</table>

| VUX  | 0.020-1.250 | .250        | .125        | 125         | 250 |
|      | 1.250-1.875 | .312        | .125        | 125         | 250 |
|      | 1.875-2.500 | .375        | .188        | 125         | 250 |
|      | 2.500-3.125 | .438        | .188        | 125         | 250 |
|      | 3.125-3.750 | .500        | .188        | 150         | 250 |
|      | 3.750-4.375 | .562        | .188        | 150         | 250 |
|      | 4.375-5.000 | .625        | .188        | 150         | 250 |
|      | 5.00-6.250 | .750        | .188        | 150         | 250 |

**Standard Alterations**

Versatile straight and clospace punches are available in sizes other than those shown in the chart above and on p.17. 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.” Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.
**Clospace Punches**

### HOW TO ORDER

Specify: Qty. Type D Code L P Steel

Example: 5 VCX 12 200 P.098 M2

<table>
<thead>
<tr>
<th>Type</th>
<th>Shank</th>
<th>Head Dia.</th>
<th>Point Lgth.</th>
<th>Range P</th>
<th>L</th>
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<tr>
<td></td>
<td>D Code</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dia. H.</td>
<td>B.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>.125</td>
<td></td>
<td>.0000-.0500</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.0625</td>
<td></td>
<td>.0626-.0937</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.0938</td>
<td></td>
<td>.0938-.1249</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.1250</td>
<td></td>
<td>.1251-.1561</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.1562</td>
<td>.190</td>
<td>.1571-.1680</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.1875</td>
<td>.220</td>
<td>.1681-.2100</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.2188</td>
<td>.282</td>
<td>.1876-.2187</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.2500</td>
<td>.313</td>
<td>.2189-.2499</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
<td></td>
<td>.0000-.0500</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.0625</td>
<td></td>
<td>.0626-.0937</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.0938</td>
<td></td>
<td>.0938-.1249</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.1250</td>
<td></td>
<td>.1251-.1561</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.1562</td>
<td>.190</td>
<td>.1571-.1680</td>
<td>1.50</td>
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<td>.220</td>
<td>.1681-.2100</td>
<td>1.50</td>
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<tr>
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<td></td>
<td>.2188</td>
<td>.282</td>
<td>.1876-.2187</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.2500</td>
<td>.313</td>
<td>.2189-.2499</td>
<td>1.50</td>
</tr>
</tbody>
</table>

- **VCB** A2, M2
- **VVB** M2
- **VXX**, **VCX**, and **VCB** heads are drawn to RC 40-55.

### Material

- **Steel:** A2, M2 (RC 60-63)
- **P** Tolerance = 0.0002
- **P** to **D** = 0.005

- **Steel:** A2, M2
- **Specify:** Qty. Type D Code L P Steel
- **Example:** 5 VCX 12 200 P.098 M2

- **Regular Punches**
  - **VCX**
  - **VXX**
- **Punch Blanks**
  - **VCB**
  - **VVB**

- **L**
  - **VCX**
  - **VXX**
  - **VCB**
  - **VVB**

- **Punch Blanks**
  - **VCB**
  - **VVB**

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

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

### Material

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

P&W Tolerance *+.0004 .0002

P to D .0005

<table>
<thead>
<tr>
<th>Alteration Code</th>
<th>G G</th>
<th>XB</th>
<th>G G G</th>
<th>XH</th>
<th>G</th>
<th>G G</th>
<th>XP</th>
<th>G G G</th>
<th>G G G G G G</th>
</tr>
</thead>
<tbody>
<tr>
<td>XL</td>
<td>D</td>
<td>XH</td>
<td>TT</td>
<td>LL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VXX</td>
<td>VWX</td>
<td>VCX</td>
<td>VVX</td>
<td>VCB</td>
<td>VVB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*125 when D = .1875

### HOW TO ORDER

Specify: Qty. Type D Code L P (or P&W) Steel

<table>
<thead>
<tr>
<th>Example:</th>
<th>4</th>
<th>VNR</th>
<th>37</th>
<th>112</th>
<th>P207, W.126</th>
<th>A2, X8</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>VRO</td>
<td>50</td>
<td>137</td>
<td>P3125, W.1562</td>
<td>M2, X2</td>
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</tbody>
</table>

### Type Code Range

<table>
<thead>
<tr>
<th>P</th>
<th>Min.</th>
<th>Max.</th>
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</thead>
<tbody>
<tr>
<td>.500</td>
<td>.625</td>
<td>.750</td>
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<tr>
<td>.750</td>
<td>.875</td>
<td>1.000</td>
</tr>
<tr>
<td>1.000</td>
<td>1.125</td>
<td>1.250</td>
</tr>
<tr>
<td>1.250</td>
<td>1.375</td>
<td>1.500</td>
</tr>
<tr>
<td>1.500</td>
<td>1.625</td>
<td>1.750</td>
</tr>
<tr>
<td>1.750</td>
<td>1.875</td>
<td>2.000</td>
</tr>
</tbody>
</table>

### Material

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

P&W Tolerance *+.0004 .0002

P to D .0005

### Dimensions

- **Type Code Range:**
  - P to D: .0005

### Die Button Construction

See page 25 (MDX and MHX) for die button construction where "P" is .062 and less.

### Standard Alterations

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, e.g., "XL." Also see "Standard Alterations" on the front of the pullout tab in this section for other special order designators.
## EDM Die Button Blanks

### Features/Benefits

Select either round **KD** Headless or **KH** Headed EDM Die Button Blanks. Relief hole (R) provides sufficient clearance for slug removal during the stamping process in both versions of both types.

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

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

### Material

Steel: M2 (RC 60-63)

Round P: .005 .005 P to D

D ≥ 1.75

### HOW TO ORDER

<table>
<thead>
<tr>
<th>Qty</th>
<th>Type</th>
<th>D Code</th>
<th>L</th>
<th>P</th>
<th>Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>KDE</td>
<td>37</td>
<td>100</td>
<td>XP .020</td>
<td>M2</td>
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<tr>
<td>5</td>
<td>KDU</td>
<td>50</td>
<td>112</td>
<td>.031</td>
<td>M2</td>
</tr>
</tbody>
</table>

**Maximum L for KDE & KHE is 150.**

| Standard "P" will be provided, unless otherwise specified. | **Headless Only** |

### Table

<table>
<thead>
<tr>
<th>Body</th>
<th>K U</th>
<th>K E</th>
<th><strong>L</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type D Code Std. P Optional P Std. P Optional P B R</td>
<td>.75 .87 .93* 1.00 1.125 1.25 1.375 1.50 1.625 1.75 1.875 2.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KD</td>
<td>2.500</td>
<td>.031</td>
<td>.020</td>
</tr>
<tr>
<td></td>
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<td>3.750</td>
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<td>4.375</td>
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<td>.031</td>
<td>.020</td>
</tr>
<tr>
<td></td>
<td>.7500</td>
<td>.031</td>
<td>.020</td>
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<tr>
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<td>8.750</td>
<td>.031</td>
<td>.020</td>
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<td>.020</td>
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<td>1.2500</td>
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<td>.020</td>
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<td>.031</td>
<td>.020</td>
</tr>
<tr>
<td></td>
<td>2.7500</td>
<td>.031</td>
<td>.020</td>
</tr>
</tbody>
</table>

**Standard "P" will be provided, unless otherwise specified.**
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). There, the slugs are trapped until they fall freely through the relief. The use of Dayton Slug Control has no effect on hole size, and will not require any changes in current regrind practices.

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

Ordering

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

HOW TO ORDER

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Inch</th>
<th>VNX</th>
<th>62</th>
<th>100</th>
<th>P</th>
<th>250</th>
<th>Your Specs</th>
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</thead>
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<tr>
<td>Type</td>
<td>D</td>
<td>L</td>
<td>P</td>
<td>Alt. Code</td>
<td>Mat'l Thickness</td>
<td>Clear Per Side (%)</td>
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</tr>
</tbody>
</table>

For additional information, contact your Dayton distributor.
Multi-Location™ Retainers

Multiple Head Type Punch Retainer

**Type**

<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>L</th>
</tr>
</thead>
<tbody>
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<tr>
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<td>3.00</td>
<td>6080</td>
</tr>
<tr>
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<td>3.25</td>
<td>6080</td>
</tr>
<tr>
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<td>3.50</td>
<td>6080</td>
</tr>
<tr>
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**HOW TO ORDER**

Example:

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<tbody>
<tr>
<td>VRP100</td>
<td>3070</td>
<td>A B</td>
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</table>

**Multi-Location™ Retainers**

<table>
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<th>Location</th>
<th>Locking Device</th>
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<tbody>
<tr>
<td>1</td>
<td>Dowel</td>
<td>S.P.</td>
<td>3/4 X .375</td>
</tr>
<tr>
<td>2</td>
<td>S.H.C.S</td>
<td>5/16</td>
<td>1.00 X .375</td>
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<tr>
<td>3</td>
<td>VJR</td>
<td>62</td>
<td>2.090 X 1.375</td>
</tr>
<tr>
<td>4</td>
<td>Clear</td>
<td>1.281</td>
<td>4.250 X 1.062</td>
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<tr>
<td>5</td>
<td>Jackscrew</td>
<td>STD.</td>
<td>0.687 X .937</td>
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**Space Requirements**

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<tr>
<td>.3750</td>
<td>.1880</td>
<td>.531</td>
</tr>
<tr>
<td>.5000</td>
<td>.1880</td>
<td>.656</td>
</tr>
<tr>
<td>.6250</td>
<td>.1880</td>
<td>.781</td>
</tr>
<tr>
<td>.7500</td>
<td>.1880</td>
<td>.906</td>
</tr>
<tr>
<td>1.0000</td>
<td>.1880</td>
<td>1.156</td>
</tr>
</tbody>
</table>

**Hole Reference**

Re: Datum Point

- Dowel Holes: ±.0003
- Screw Holes: ±.005
- Component Holes: ±.003

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.

---

**Standard Alterations**

**Multi-Location™ Retainers**

- **Standard Jackscrew Hole**
  
  Jackscrews make it easier to pull retainers off the dowels.
  
- **Special Size**
  
  Any amount of material can be removed from the sides of the retainer for a custom size. Edges are saw cut ±.03.
  
- **Clearance Holes**
  
  Clearance holes or tapped holes can be detailed, as shown in the order example. Holes are drilled through the retainer unless otherwise specified.
  
  **Location:** ±.010
  
  **Diameter:** ±.015

  The following alterations require detailed drawings:

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

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

Flat Tolerances

<table>
<thead>
<tr>
<th>FLAT</th>
<th>RADIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>+.001</td>
<td>.001/inch</td>
</tr>
</tbody>
</table>

Shim/Backing Plate

Shim Plates can be used as an effective way to accurately time pilot entry, or used as a backing plate.

Shim Plates can also be used on any Dayton Progress triangular-shaped retainers.

Retainer sets include:
- 2 Dowels
- 2 Screws

How to Order

Specify: Qty. Type D Code
Example: 3 VRT 37
4 VRTS 62

True Location™ is a trademark of Dayton Progress Corporation.
Guide Bushings

Material
Steel: A2 (RC 60-63)
P&W Tolerance ±.0005

<table>
<thead>
<tr>
<th>Body</th>
<th>Round</th>
<th>Shape</th>
<th>C’Bore Dia.</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Code</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Range P</td>
<td>Min. W</td>
<td>Max. P/G</td>
<td>.3125</td>
</tr>
</tbody>
</table>

Headless VG
- .1875
- .2500
- .3125
- .3750
- .4375
- .5000
- .6250

Head Down VF
- .1875
- .2500
- .3125
- .3750
- .4375
- .5000
- .6250

Head Up VE
- .1875
- .2500
- .3125
- .3750
- .4375
- .5000
- .6250

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

Product | Rounds | Shapes
---|---|---
XH | • | •
XT | • | •
TT | • | •

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

Guide Chart

<table>
<thead>
<tr>
<th>Hole Range P or G</th>
<th>Land Length V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to .0650</td>
<td>2P</td>
</tr>
<tr>
<td>.0651-.0950</td>
<td>P + .065</td>
</tr>
<tr>
<td>.0951-.4250</td>
<td>.82P + .082</td>
</tr>
</tbody>
</table>

HOW TO ORDER

Specify: Qty. Type Code L P (or P&W)

Example: 4 VEX 37 62 P.146
2 VFO 50 50 P.250, W.075
Micro Guides/Die Buttons

Guide Chart

<table>
<thead>
<tr>
<th>Hole Range P</th>
<th>Land Length V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to .0650</td>
<td>2P</td>
</tr>
<tr>
<td>.0651-.0950</td>
<td>P + .065</td>
</tr>
<tr>
<td>.0951-.250</td>
<td>.82P + .082</td>
</tr>
</tbody>
</table>

How to Order

Specify: Qty. Type Code L P (or P&W)
Example: 3 MEX 18 31 P.062
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>Max. P</th>
<th>XD Min. XD</th>
<th>Max. P</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>.0625</td>
<td>.094</td>
<td>.126</td>
<td>.0625</td>
</tr>
<tr>
<td>25</td>
<td>.0625</td>
<td>.125</td>
<td>.188</td>
<td>.0938</td>
</tr>
<tr>
<td>31</td>
<td>.0625</td>
<td>.156</td>
<td>.251</td>
<td>.1250</td>
</tr>
<tr>
<td>37</td>
<td>.0625</td>
<td>.188</td>
<td>.313</td>
<td>.1562</td>
</tr>
<tr>
<td>43</td>
<td>.0625</td>
<td>.219</td>
<td>.376</td>
<td>.1875</td>
</tr>
</tbody>
</table>

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

**How to Order**

<table>
<thead>
<tr>
<th>Specify: Qty.</th>
<th>Type</th>
<th>Code</th>
<th>L</th>
<th>Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>VQX</td>
<td>31</td>
<td>75</td>
<td>A2</td>
</tr>
<tr>
<td>4</td>
<td>VFQ</td>
<td>31</td>
<td>75</td>
<td>Bearing Bronze</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.

**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.
**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.
Extended Range Punches

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

Material
Steel: A2, M2, PS4 (RC 60-63)
P&W Tolerance ±.0002
P to D .0003

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

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.
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**

<table>
<thead>
<tr>
<th>Type Code</th>
<th>Description</th>
<th>Steel</th>
<th>Alteration</th>
</tr>
</thead>
<tbody>
<tr>
<td>XS19</td>
<td>Nail Point</td>
<td>P</td>
<td>A2 XS23 A3°</td>
</tr>
<tr>
<td>XS20</td>
<td>Chamfer</td>
<td>P/W</td>
<td></td>
</tr>
<tr>
<td>XS21</td>
<td>Conical</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>XS22</td>
<td>Double Shear</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>XS23</td>
<td>Single Shear</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>XS24</td>
<td>Single Shear Angle with Flat</td>
<td>P</td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>HOW TO ORDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify: Qty.</td>
</tr>
<tr>
<td>Example: 1 VJJ</td>
</tr>
<tr>
<td>3 VRO</td>
</tr>
</tbody>
</table>

Location Tolerance

<table>
<thead>
<tr>
<th>Flat</th>
<th>Dowel</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Radial</td>
</tr>
<tr>
<td>+ .0002</td>
<td>.0005/inch</td>
</tr>
<tr>
<td>− .0000</td>
<td>− .0000</td>
</tr>
</tbody>
</table>
**Locking Devices—Flats vs. Dowel Slots**

### Flats

- **X2**: Top, Bottom
- **X8**: Top

### Dowel Slots

#### X0**, X4, X41 & X43
- **X0****: Top, Bottom
- **X4**: Top
- **X41**: Top
- **X43**: Top

### 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 in a headless die button, 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 “P,” **X4** (standard/alternate location) or **X7** (custom location) may be specified. This relocates the dowel outward to assure no interference between the dowel and the relief hole. Note: When the die button diameter is over .5000, the centerline dimension is .5D on all dowels.

*To determine if you have an interference problem, see pp. 18-19 for information on Die Button construction.*

### Dowel Slots: X0**, X4, X41 & X43

- **X0****: .1250
- **X4**: .1250
- **X41**: .1875
- **X43**: .2500

### Additional Flats (From Top)

<table>
<thead>
<tr>
<th>Code</th>
<th>Depth</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>X81*</td>
<td>.060</td>
<td>.500</td>
</tr>
<tr>
<td>X82*</td>
<td>.060</td>
<td>.625</td>
</tr>
<tr>
<td>X83*</td>
<td>.060</td>
<td>.750</td>
</tr>
<tr>
<td>X84</td>
<td>.060</td>
<td>Full Length</td>
</tr>
<tr>
<td>X85*</td>
<td>.093</td>
<td>.500</td>
</tr>
<tr>
<td>X86*</td>
<td>.093</td>
<td>.625</td>
</tr>
<tr>
<td>X87*</td>
<td>.093</td>
<td>.750</td>
</tr>
<tr>
<td>X88</td>
<td>.093</td>
<td>Full Length</td>
</tr>
<tr>
<td>X89*</td>
<td>Specify Dimensions</td>
<td></td>
</tr>
</tbody>
</table>

* not available on headed die buttons (X89 available only if flat is full length).

**available on headless die buttons only

### F Dimension for Headed Punches and Die Buttons

\[ F = .5D + .5 \text{ Dowel Dia.} \]

### F Dimension for Headless Die Buttons Only

<table>
<thead>
<tr>
<th>Body Diameter</th>
<th>25</th>
<th>31</th>
<th>37</th>
<th>43</th>
<th>50</th>
<th>62</th>
<th>75</th>
<th>87</th>
<th>100</th>
<th>125-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>X0, X1</td>
<td>.1250</td>
<td>.1562</td>
<td>.1875</td>
<td>.2188</td>
<td>.2500</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
</tr>
<tr>
<td>X4, X7</td>
<td>.1625</td>
<td>.1875</td>
<td>.2125</td>
<td>.2375</td>
<td>.2625</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
</tr>
<tr>
<td>X41, X71</td>
<td>.1938</td>
<td>.2188</td>
<td>.2438</td>
<td>.2688</td>
<td>.2938</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
<td>.5D</td>
</tr>
<tr>
<td>X43, X73</td>
<td>.2250</td>
<td>.2500</td>
<td>.2750</td>
<td>.3000</td>
<td>.3250</td>
<td>.3438</td>
<td>.4063</td>
<td>.4688</td>
<td>.5313</td>
<td>.5D</td>
</tr>
</tbody>
</table>

**Note**: For headed punches and die buttons: F = .5D + .5 dowel dia.

---

**Custom Locations**

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

### Single Flats: X5 & X9

- **X5**: Top, Bottom
- **X9**: Top

### Additional Flats (From Top)

<table>
<thead>
<tr>
<th>Code</th>
<th>Depth</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>X91*</td>
<td>.060</td>
<td>.500</td>
</tr>
<tr>
<td>X92*</td>
<td>.060</td>
<td>.625</td>
</tr>
<tr>
<td>X93*</td>
<td>.060</td>
<td>.750</td>
</tr>
<tr>
<td>X94</td>
<td>.060</td>
<td>Full Length</td>
</tr>
<tr>
<td>X95*</td>
<td>.093</td>
<td>.500</td>
</tr>
<tr>
<td>X96*</td>
<td>.093</td>
<td>.625</td>
</tr>
<tr>
<td>X97*</td>
<td>.093</td>
<td>.750</td>
</tr>
<tr>
<td>X98</td>
<td>.093</td>
<td>Full Length</td>
</tr>
<tr>
<td>X99*</td>
<td>Specify Dimensions</td>
<td></td>
</tr>
</tbody>
</table>

* not available on headed die buttons (X99 available only if flat is full length).

---

**Key Flats vs. Dowel Slots**

The depth of the flat is taken from the shank, not the head, on punches. To determine if you have an interference problem, see pp. 18-19 for information on Die Button construction.
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 standard punch blanks. Form Punches other than those are available as specials.

**HOW TO ORDER**

Specify: Qty. Type Code L Steel W Shape P PP LA Alterations

Example: 2 VPW 37 1322 PS W201 P.1875 PP.1250 LA2.235 XNT

*P* is the point dimension of the product. The *P* dimensions are not shown below. When *P* = “D,” shank tolerance applies.
Form Punch Shapes

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.

* B (Land Length) will be per catalog standard, unless XB is ordered. O.A.L. will be held to LL tolerance, i.e., ±.001.

Form Die Button Shapes

HOW TO ORDER

<table>
<thead>
<tr>
<th>Specify:</th>
<th>Qty.</th>
<th>Type</th>
<th>Code</th>
<th>LL</th>
<th>Steel</th>
<th>W Shape</th>
<th>P</th>
<th>PP</th>
<th>LA</th>
<th>RS</th>
<th>RF</th>
<th>AN*</th>
<th>Alterations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example:</td>
<td>4</td>
<td>VNW</td>
<td>100</td>
<td>100</td>
<td>M2</td>
<td>W935</td>
<td>.50</td>
<td>.625</td>
<td>.15</td>
<td>.05</td>
<td>.03</td>
<td>XNT</td>
<td></td>
</tr>
</tbody>
</table>
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 ($\Delta$ = clearance per side).

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

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

In addition, clearances of up to $\Delta$ 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® Data

#### 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>
</tr>
</thead>
<tbody>
<tr>
<td>Std. Shank Diameter</td>
<td>D</td>
<td>.1875</td>
<td>.2500</td>
<td>.3125</td>
<td>.3750</td>
<td>.4375</td>
</tr>
<tr>
<td>Point Hole Diameter</td>
<td>C</td>
<td>.020</td>
<td>.032</td>
<td>.046</td>
<td>.063</td>
<td>.094</td>
</tr>
<tr>
<td>Shank Hole Diameter</td>
<td>E</td>
<td>.086</td>
<td>.109</td>
<td>.141</td>
<td>.172</td>
<td>.221</td>
</tr>
<tr>
<td>Pin Extension</td>
<td>.03</td>
<td>.03</td>
<td>.06</td>
<td>.06</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>Keeper Key Number</td>
<td>920045</td>
<td>920053</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Keeper Key not available

#### Jektole® Design Limits

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>J2</th>
<th>J3</th>
<th>J4</th>
<th>J6</th>
<th>J9</th>
<th>J12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Shank Dia.</td>
<td>D</td>
<td>.172</td>
<td>.218</td>
<td>.282</td>
<td>.344</td>
<td>.442</td>
</tr>
<tr>
<td>Min. Point Dia.</td>
<td>P</td>
<td>.040</td>
<td>.064</td>
<td>.092</td>
<td>.126</td>
<td>.188</td>
</tr>
<tr>
<td>Max. Point Lgh.</td>
<td>B</td>
<td>1.25</td>
<td>1.50</td>
<td>1.62</td>
<td>1.62</td>
<td>1.62</td>
</tr>
</tbody>
</table>

#### Universal Jektole® Components

<table>
<thead>
<tr>
<th>EJECTOR PINS</th>
<th>J2</th>
<th>J3</th>
<th>J4</th>
<th>J6</th>
<th>J9</th>
<th>J12</th>
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<tbody>
<tr>
<td>Overall Length</td>
<td>L</td>
<td>1.11</td>
<td>1.38</td>
<td>1.94</td>
<td>1.94</td>
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<tr>
<td>Pin Diameter</td>
<td>D</td>
<td>.017</td>
<td>.027</td>
<td>.041</td>
<td>.058</td>
<td>.089</td>
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<tr>
<td>Head Diameter</td>
<td>H</td>
<td>.048</td>
<td>.073</td>
<td>.094</td>
<td>.120</td>
<td>.156</td>
</tr>
<tr>
<td>Hd. Thickness</td>
<td>T</td>
<td>.031</td>
<td>.047</td>
<td>.062</td>
<td>.062</td>
<td>.094</td>
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</tbody>
</table>

<table>
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<tr>
<th>SPRINGS</th>
<th>J2</th>
<th>J3</th>
<th>J4</th>
<th>J6</th>
<th>J9</th>
<th>J12</th>
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<tbody>
<tr>
<td>Outside Dia.</td>
<td>D</td>
<td>.081</td>
<td>.104</td>
<td>.136</td>
<td>.167</td>
<td>.216</td>
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<tr>
<td>Free Length</td>
<td>L</td>
<td>2.38</td>
<td>2.38</td>
<td>3.19</td>
<td>3.00</td>
<td>3.03</td>
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<tr>
<td>Pressure (.12” Pre-load)</td>
<td>lbs.</td>
<td>.5</td>
<td>.75</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
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<table>
<thead>
<tr>
<th>SCREWS</th>
<th>J2</th>
<th>J3</th>
<th>J4</th>
<th>J6</th>
<th>J9</th>
<th>J12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw Size</td>
<td>D</td>
<td>#3-48</td>
<td>#5-40</td>
<td>#8-32</td>
<td>#10-32</td>
<td>1/4-28</td>
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<tr>
<td>Screw Length</td>
<td>L</td>
<td>.19</td>
<td>.19</td>
<td>.19</td>
<td>.19</td>
<td>.25</td>
</tr>
</tbody>
</table>
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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