Precision Punches, Pilots, Matrixes, & Retainers

Versatile

Better performance, longer runs, less downtime

DAYTON®

Global leader in providing fabrication and stamping solutions

Subsidiary Federal Signal Corporation

www.daytonprogress.com

Versatile Precision Products

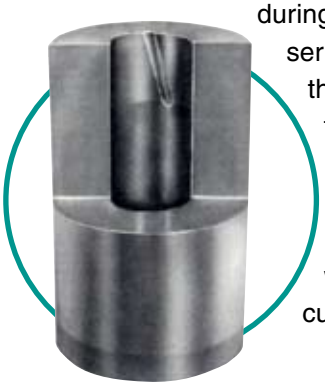
Product Applications

Versatile Punches, Pilots, Matrixes, 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 matrixes provide three times better alignment than other major brands, thus assuring longer runs and better part performance. Versatile matrixes 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; Matrixes; 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 patented, 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 matrix (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.

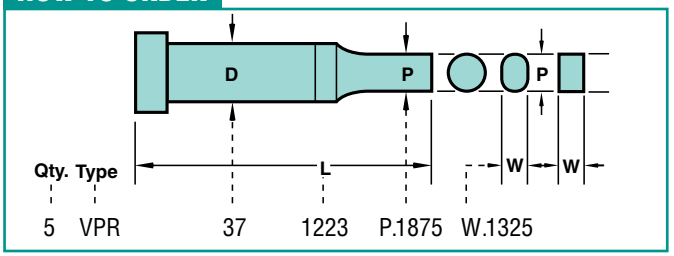


Ordering Information

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.

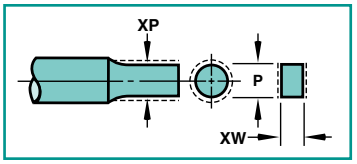
HOW TO ORDER



Standard Alterations

Punches, pilots, and matrixes 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

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:

VPR — **Line Product Shape**: **V** for Versatile; **P** for Punch (Regular); **R** for Rectangle

37 — **Press-Fit Dia. D (shank diameter)** Coded by the first 2 digits of dec. equiv. (.375).

12 — **Shank Length** Coded by inches and quarter-inches (1 inch and 2 quarters).

23 — **Overall Length L** Coded by inches and quarter-inches (2 inches and 3 quarters).

Product Type	Series Catalog Number	Length	Point or Hole Size Dimensions As Specified
VPR	37	1223	P.1875, W.1325

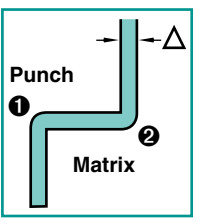
Diameter (D) is shown on the order as a two- or three-digit code. To convert the shank diameter to the appropriate code, use the following chart.

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

Classified Shapes

Classified shapes (83 common shapes, no detailing required) are available on all punches, solid matrixes, 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



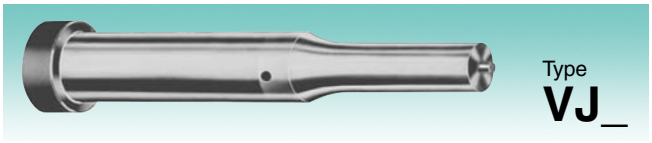
Normal grinding methods produce:

❶.007 max fillet on the punch—matching corner shape on the matrix.

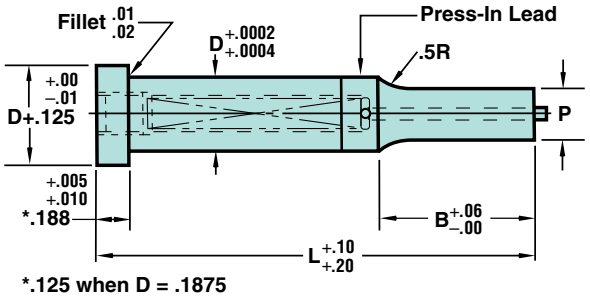
❷.007 max fillet on the matrix—matching corner shape on the punch.

Contents

Jektole® Punches



Type
VJ_



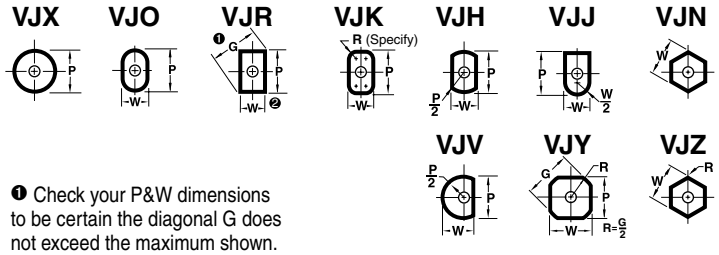
*.125 when D = .1875

Material
Steel: A2, M2, D2, RC 60-63, PS, RC 63-65
All heads are drawn to RC 40-55.
P&W Tolerance +.0002 −.0000 P to D .0003 Ⓜ

Shank D	Code	Point Lgth. B	Round Min. XP	Round Range P	Shape Min. XW	Shape Min. W	Shape Max. P/G	L 1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25
*.1875	18	.50	.050	.062-.1874	.062	.062-	.1875	0311	1012	1113	1220	1321	2022	2123	2230	2331	3032	3133	3240	3341
*.2500	25		.080	.093-.2499	.080	.093-	.2500													
.3125	31		.115	.125-.3124	.115	.125 -	.3125													
.3750	37		.158	.187-.3749	.158	.187 -	.3750													
*.1875	18	.75	.050	.062-.1874	.062	.062-	.1875		0312	1013	1120	1221	1322	2023	2130	2231	2332	3033	3140	3241
*.2500	25		.080	.093-.2499	.080	.093-	.2500													
.3125	31		.115	.125-.3124	.115	.125 -	.3125													
.3750	37		.158	.187-.3749	.158	.187 -	.3750													
.4375	43		.158	.187-.4374	.158	.187 -	.4375													
.5000	50		.158	.225-.4999	.158	.250-	.5000													
.6250	62		.235	.310-.6249	.235	.282-	.6250													
.7500	75		.300	.390-.7499	.235	.312 -	.7500													
.8750	87		.350	.440-.8749	.235	.343 -	.8750													
1.0000	100		.400	.485-.9999	.235	.375	1.0000													
*.1875	18	1.00	.058	.062-.1874	.093	.093-	.1875			0313	1020	1121	1222	1323	2030	2131	2232	2333	3040	3141
*.2500	25		.080	.093-.2499	.093	.093-	.2500													
.3125	31		.115	.125-.3124	.115	.125 -	.3125													
.3750	37		.158	.187-.3749	.158	.187 -	.3750													
.4375	43		.158	.187-.4374	.158	.187 -	.4375													
.5000	50		.158	.225-.4999	.158	.250-	.5000													
.6250	62		.235	.310-.6249	.235	.282-	.6250													
.7500	75		.300	.390-.7499	.235	.312 -	.7500													
.8750	87		.350	.440-.8749	.235	.343 -	.8750													
1.0000	100		.400	.485-.9999	.235	.375	1.0000													
*.2500	25	1.25	.080	.093-.2499	.093	.093-	.2500				0320	1021	1122	1223	1330	2031	2132	2233	2340	3041
.3125	31		.115	.125-.3124	.115	.125 -	.3125													
.3750	37		.158	.187-.3749	.158	.187 -	.3750													
.4375	43		.158	.187-.4374	.158	.187 -	.4375													
.5000	50		.158	.225-.4999	.158	.250-	.5000													
.6250	62		.235	.310-.6249	.235	.282-	.6250													
.7500	75		.300	.390-.7499	.235	.312 -	.7500													
.8750	87		.350	.440-.8749	.235	.343 -	.8750													
1.0000	100		.400	.485-.9999	.235	.375	1.0000													
.3125	31	1.50	.115	.125-.3124	.115	.125 -	.3125					0321	1022	1123	1230	1331	2032	2133	2240	2341
.3750	37		.158	.187-.3749	.158	.187 -	.3750													
.4375	43		.158	.187-.4374	.158	.187 -	.4375													
.5000	50		.158	.225-.4999	.158	.250-	.5000													
.6250	62		.235	.310-.6249	.235	.282-	.6250													
.7500	75		.300	.390-.7499	.235	.312 -	.7500													
.8750	87		.350	.440-.8749	.235	.343 -	.8750													
1.0000	100		.400	.485-.9999	.235	.375	1.0000													

*Not Available in D2
**See p.32 for additional information.

Jektole® Punches



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

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

	Code	L									** Jektole® Group
		4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	
	18										J2
	25										J3
	31	4042	4143	4250	4351	5052	5153	5260			J4
	37										J6
	18										J2
	25										J3
	31										J4
	37										J6
	43										J6
	50	3342	4043	4150	4251	4352	5053	5160	5261	5362	J6
	62										J9
	75										J9
	87										J9
	100										J9
	18										J2
	25										J3
	31										J4
	37										J6
	43										J6
	50	3242	3343	4050	4151	4252	4353	5060	5161	5262	J6
	62										J9
	75										J9
	87										J9
	100										J9
	25										J3
	31										J4
	37										J6
	43										J6
	50										J6
	62	3142	3243	3350	4051	4152	4253	4360	5061	5162	J9
	75										J9
	87										J9
	100										J9
	31										J4
	37										J6
	43										J6
	50										J6
	62	3042	3143	3250	3351	4052	4153	4260	4361	5062	J9
	75										J9
	87										J9
	100										J9

Features/Benefits

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

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	2	VJX	50	1020	P.375	PS
	1	VJR	37	0312	P.321, W.189	A2, X2

Note: The standard location of a key flat is at 0°. See p. 31 for more information on flats and dowel slots.

FDS® FIRM DELIVERY SCHEDULE

1 Day

Standard Alterations

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

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

Surface Coatings

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

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

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

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

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

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

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

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

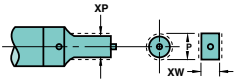
DayKool™ ***(XCR)***—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS
XNT —DayTiN®	+ 3 days	M2 & PS
XAN —DayTAN™	+ 4 days	M2 & PS
XND —DayKote™	+ 8 days	M2 & PS
XCN —TiCN	+ 3 days	M2 & PS
XNM —MoST™	+ 7 days	M2 & PS
XNP	+ 8 days	M2 & PS
XCR —DayKool™	+ 1 day	M2 & PS

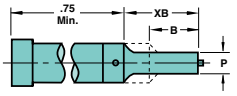
*Vickers used when RC exceeds 80.

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

Standard Alterations
Jektole® Punches



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

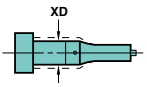


XB **Point Length Other than Standard**

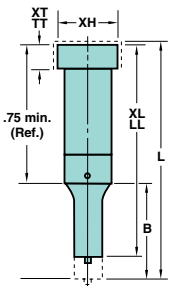
For XBB, add three days to delivery.

	XB					XBB	XB					XBB
Point Length	.500-.750	.751-1.000	1.001-1.250	1.251-1.500	1.501-1.625	1.626-2.000	.500-.750	.751-1.000	1.001-1.250	1.251-1.500	1.501-1.625	1.626-2.000
Code Type	Min. P (Rounds)						Min. W (Shapes)					
18 VJ_	.050	.058					.062	.093				
25 VJ_	.080	.080	.080				.080	.093	.093			
31 VJ_	.115	.115	.115	.115	.115	.187	.115	.115	.115	.115	.115	.187
37 VJ_	.158	.158	.158	.158	.158	.187	.158	.158	.158	.158	.158	.187
43 VJ_	.158	.158	.158	.158	.158	.187	.158	.158	.158	.158	.158	.187
50 VJ_	.158	.158	.158	.158	.158	.187	.158	.158	.158	.158	.158	.187
62 VJ_	.235	.235	.235	.235	.235	.235	.235	.235	.235	.235	.235	.235
75 VJ_	.300	.300	.300	.300	.300	.250	.235	.235	.235	.235	.235	.250
87 VJ_	.350	.350	.350	.350	.350	.250	.235	.235	.235	.235	.235	.250
100 VJ_	.400	.400	.400	.400	.400	.250	.235	.235	.235	.235	.235	.250

XD **Reduced Shank Diameter**
Head diameter does not change with body diameter.



Shank Dia.	18	25	31	37	43	50	62	75	87	100
Min. XD	.172	.218	.282	.344	.376	.438	.562	.688	.813	.938



XL **Overall Length Shortened**
Stock removal from point end which shortens B length. To maintain "B," specify "XB."

LL **Precision Overall Length**
Same as XL except overall length is held to ±.001.

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.

XH **Reduced Head Diameter**
Minimum head diameter equals D +.000 – .001.

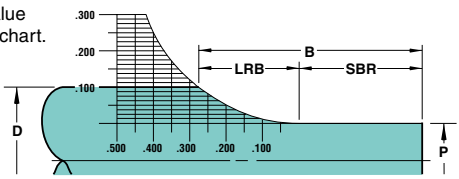
XK **No Side Hole**
For air ejection. No cost.

XJ **Smaller Jektole Components**
+3 days
See p. 32.

SBR Straight Before Radius

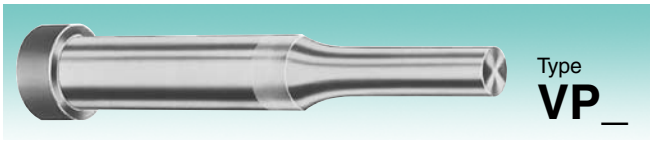
To determine Length of Radius Blend (LRB)

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

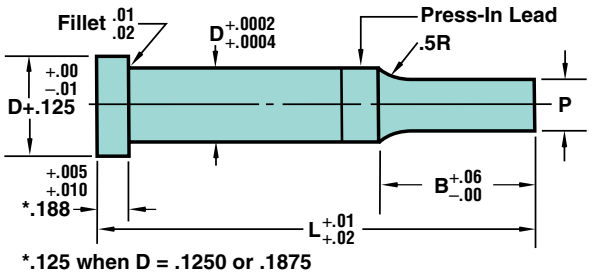


Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Regular Punches



Type
VP_



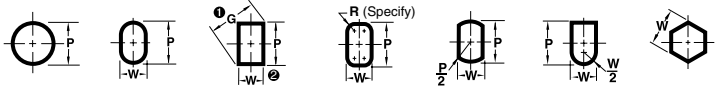
*.125 when D = .1250 or .1875

Material
Steel: A2, M2, D2, RC 60-63, PS, RC 63-65
All heads are drawn to RC 40-55.
P&W Tolerance +.0002 −.0000 P to D .0003 Ⓜ

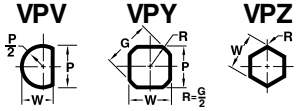
Shank	Code	Point Lgth. B	Round		Shape			L											
D			Min. XP	Range P	Min. XW	Min. W	Max. P/G	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25
.1250	12	.50	.031	.031-.1249	.062	.062	- .1250	0311	1012	1113	1220	1321	2022	2123	2230	2331	3032	3133	3240	3341
.1875	18		.042	.046-.1874	.062	.062	- .1875													
.2500	25		.062	.062-.2499	.062	.062	- .2500													
.3125	31		.062	.093-.3124	.062	.093	- .3125													
.3750	37		.062	.125-.3749	.080	.125	- .3750													
.1250	12	.75	.042	.062-.1249	.062	.062	- .1250		0312	1013	1120	1221	1322	2023	2130	2231	2332	3033	3140	3241
.1875	18		.042	.062-.1874	.062	.062	- .1875													
.2500	25		.062	.062-.2499	.062	.062	- .2500													
.3115	31		.062	.093-.3124	.062	.093	- .3125													
.3750	37		.062	.125-.3749	.080	.125	- .3750													
.4375	43		.093	.187-.4374	.109	.187	- .4375													
.5000	50		.125	.225-.4999	.125	.187	- .5000													
.6250	62		.235	.310-.6249	.235	.250	- .6250													
.7500	75		.300	.390-.7499	.235	.312	- .7500													
.8750	87		.350	.440-.8749	.235	.343	- .8750													
1.0000	100		.400	.485-.9999	.235	.375	-1.0000													
.1250	12	1.00	.058	.062-.1249	.062	.062	- .1250			0313	1020	1121	1222	1323	2030	2131	2232	2333	3040	3141
.1875	18		.058	.062-.1874	.062	.062	- .1875													
.2500	25		.062	.062-.2499	.062	.062	- .2500													
.3125	31		.062	.093-.3124	.093	.093	- .3125													
.3750	37		.062	.125-.3749	.109	.125	- .3750													
.4375	43		.093	.187-.4374	.109	.187	- .4375													
.5000	50		.125	.225-.4999	.125	.187	- .5000													
.6250	62		.235	.310-.6249	.235	.250	- .6250													
.7500	75		.300	.390-.7499	.235	.312	- .7500													
.8750	87		.350	.440-.8749	.235	.343	- .8750													
1.0000	100		.400	.485-.9999	.235	.375	-1.0000													
.1250	12	1.25	.075	.093-.1249	.093	.093	- .1250				0320	1021	1122	1223	1330	2031	2132	2233	2340	3041
.1875	18		.075	.093-.1874	.093	.093	- .1875													
.2500	25		.080	.093-.2499	.093	.093	- .2500													
.3125	31		.093	.093-.3124	.093	.093	- .3125													
.3750	37		.093	.125-.3749	.125	.125	- .3750													
.4375	43		.093	.187-.4374	.141	.187	- .4375													
.5000	50		.125	.225-.4999	.141	.187	- .5000													
.6250	62		.235	.310-.6249	.235	.250	- .6250													
.7500	75		.300	.390-.7499	.235	.312	- .7500													
.8750	87		.350	.440-.8749	.235	.343	- .8750													
1.0000	100		.400	.485-.9999	.235	.375	-1.0000													
.1875	18	1.50	.093	.125-.1874	.125	.125	- .1875					0321	1022	1123	1230	1331	2032	2133	2240	2341
.2500	25		.093	.125-.2499	.125	.125	- .2500													
.3125	31		.093	.125-.3124	.125	.125	- .3125													
.3750	37		.125	.125-.3749	.125	.125	- .3750													
.4375	43		.125	.187-.4374	.172	.187	- .4375													
.5000	50		.125	.225-.4999	.172	.187	- .5000													
.6250	62		.235	.310-.6249	.235	.250	- .6250													
.7500	75		.300	.390-.7499	.235	.312	- .7500													
.8750	87		.350	.440-.8749	.235	.343	- .8750													
1.0000	100		.400	.485-.9999	.235	.375	-1.0000													

Regular Punches

VPX VPO VPR VPK VPH VPJ VPN



VPV VPY VPZ



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

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

Code	L										
	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00
12											
18											
25	4042	4143	4250	4351	5052	5153	5260				
31											
37											
12											
18											
25											
31											
37											
43											
50	3342	4043	4150	4251	4352	5053	5160				
62								5261	5362	6063	6170
75											
87											
100											
12											
18											
25											
31											
37											
43											
50	3242	3343	4050	4151	4252	4353	5060				
62								5161	5262	5363	6070
75											
87											
100											
12											
18											
25											
31											
37											
43											
50	3142	3243	3350	4051	4152	4253	4360				
62								5061	5162	5263	5370
75											
87											
100											
18											
25											
31											
37											
43											
50	3042	3143	3250	3351	4052	4153	4260				
62								4361	5062	5163	5270
75											
87											
100											

Features/Benefits

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

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	2	VPX	37	1020	P.250	A2
	1	VPJ	12	0312	P.103, W.065	M2, XN

Note: The standard location of a key flat is at 0°. See p. 31 for more information on flats and dowel slots.

FDS® FIRM DELIVERY SCHEDULE

1 Day

Standard Alterations

Regular Versatile 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 longer than standard, designate “XB” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.

Surface Coatings

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

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

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

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

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

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

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

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

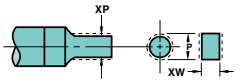
DayKool™ ***(XCR)***—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS
XNT —DayTiN®	+ 3 days	M2 & PS
XAN —DayTAN™	+ 4 days	M2 & PS
XND —DayKote™	+ 8 days	M2 & PS
XCN —TiCN	+ 3 days	M2 & PS
XNM —MoST™	+ 7 days	M2 & PS
XNP	+ 8 days	M2 & PS
XCR —DayKool™	+ 1 day	M2 & PS

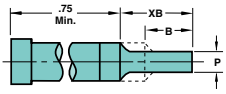
*Vickers used when RC exceeds 80.

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

Standard Alterations
Regular Punches



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



XB **Point Length Other than Standard**

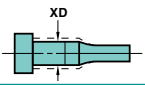
For XBB and X3B, add three days to delivery.

	XB					XBB	X3B		XB					XBB
Point Length	.500-.750	.751-1.000	1.001-1.250	1.251-1.500	1.501-1.625	1.626-2.000	2.001-2.500	2.501-3.000	.500-.750	.751-1.000	1.001-1.250	1.251-1.500	1.501-1.625	1.626-2.000
Code Type	Min. P (Rounds)								Min.W (Shapes)					
12 VP_	.042*	.058	.075	.062	.062				.093					
18 VP_	.042	.058	.075	.093	.062				.062	.093	.125			
25 VP_	.062	.062	.080	.093	.062				.062	.093	.125			
31 VP_	.062	.062	.093	.093	.125	.187			.062	.093	.093	.125	.195	.187
37 VP_	.062	.062	.093	.125	.125	.187	.250	.312	.080	.109	.125	.125	.195	.187
43 VP_	.093	.093	.093	.125	.125	.187	.250	.312	.109	.109	.141	.172	.195	.187
50 VP_	.125	.125	.125	.125	.125	.187	.250	.312	.125	.125	.141	.172	.195	.187
62 VP_	.235	.235	.235	.235	.235	.235	.312	.375	.235	.235	.235	.235	.235	.235
75 VP_	.300	.300	.300	.300	.300	.300	.343	.406	.235	.235	.235	.235	.235	.250
87 VP_	.350	.350	.350	.350	.350	.350	.375	.437	.235	.235	.235	.235	.235	.350
100 VP_	.400	.400	.400	.400	.400	.400	.400	.437	.235	.235	.235	.235	.235	.400

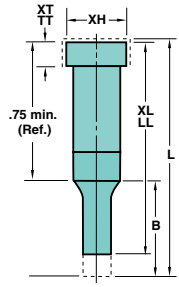
*.031 for .500 B

XD **Reduced Shank Diameter**

Head diameter does not change with body diameter.



Shank Dia.	12	18	25	31	37	43	50	62	75	87	100
Min. XD	.063	.126	.188	.251	.313	.376	.438	.562	.688	.813	.938



XL **Overall Length Shortened**
Stock removal from point end which shortens B length. To maintain "B," specify "XB."

LL **Precision Overall Length**
Same as XL except overall length is held to ±.001.

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

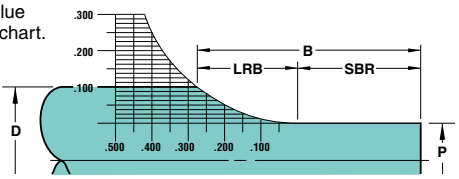
TT **Precision Head Thickness**
Same as XT except head thickness tolerance is held to ±.0005.

XH **Reduced Head Diameter**
Minimum head diameter equals D +.000 – .001.

SBR **Straight Before Radius**

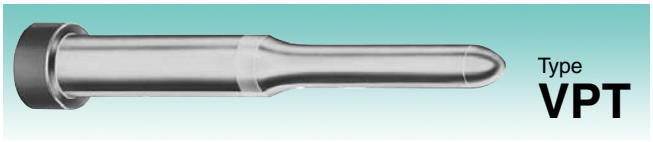
To determine Length of Radius Blend (LRB)

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



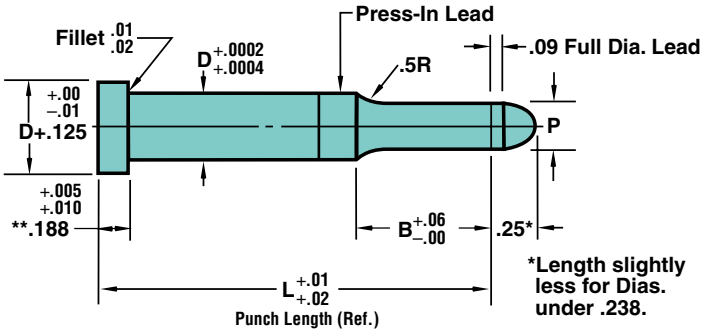
Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Regular Pilots



Type
VPT

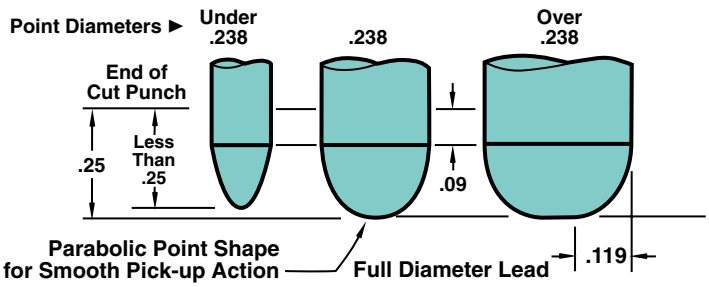
Material
Steel: A2, M2
All heads are drawn to RC 40-55.
P Tolerance $^{+.0002}_{-.0000}$ P to D .0003 Ⓜ
When P=D, shank tolerance applies.



**.125 when D = .1250 or .1875

Shank		Point Lgth. B	Round		L												
D	Code		Min. XP	Range P	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
.1250	12	.50	.050	.061 - .1250	0311	1012	1113	1220	1321	2022	2123	2230	2331	3032	3133	3240	3341	4042
.1875	18		.050	.061 - .1875														
.2500	25		.061	.061 - .2500														
.3125	31		.061	.092 - .3125														
.3750	37		.061	.124 - .3750														
.1250	12	.75	.050	.061 - .1250		0312	1013	1120	1221	1322	2023	2130	2231	2332	3033	3140	3241	3342
.1875	18		.050	.061 - .1875														
.2500	25		.061	.061 - .2500														
.3125	31		.061	.092 - .3125														
.3750	37		.061	.124 - .3750														
.4375	43		.092	.186 - .4375														
.5000	50		.124	.224 - .5000														
.6250	62		.234	.309 - .6250														
.7500	75		.299	.389 - .7500														
.8750	87		.349	.439 - .8750														
1.0000	100		.399	.484 -1.0000														
.1250	12	1.00	.057	.061 - .1250			0313	1020	1121	1222	1323	2030	2131	2232	2333	3040	3141	3242
.1875	18		.057	.061 - .1875														
.2500	25		.061	.061 - .2500														
.3125	31		.061	.092 - .3125														
.3750	37		.061	.124 - .3750														
.4375	43		.092	.186 - .4375														
.5000	50		.124	.224 - .5000														
.6250	62		.234	.309 - .6250														
.7500	75		.299	.389 - .7500														
.8750	87		.349	.439 - .8750														
1.0000	100		.399	.484 -1.0000														
.1250	12	1.25	.074	.092 - .1250				0320	1021	1122	1223	1330	2031	2132	2233	2340	3041	3142
.1875	18		.074	.092 - .1875														
.2500	25		.079	.092 - .2500														
.3125	31		.092	.092 - .3125														
.3750	37		.092	.124 - .3750														
.4375	43		.092	.186 - .4375														
.5000	50		.124	.224 - .5000														
.6250	62		.234	.309 - .6250														
.7500	75		.299	.389 - .7500														
.8750	87		.349	.439 - .8750														
1.0000	100		.399	.484 -1.0000														
.1875	18	1.50	.092	.124 - .1875					0321	1022	1123	1230	1331	2032	2133	2240	2341	3042
.2500	25		.092	.124 - .2500														
.3125	31		.092	.124 - .3125														
.3750	37		.124	.124 - .3750														
.4375	43		.124	.186 - .4375														
.5000	50		.124	.224 - .5000														
.6250	62		.234	.309 - .6250														
.7500	75		.299	.389 - .7500														
.8750	87		.349	.439 - .8750														
1.0000	100		.399	.484 -1.0000														

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.

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P	Steel
Example:	3	VPT	37	1020	P.251	M2
	2	VPT	43	1322	P.300	M2, XNT

	Code	L									
		4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00
	12										
	18	4143	4250								
	25			4351	5052	5153	5260				
	31										
	37										
	12										
	18										
	25										
	31										
	37										
	43										
	50	4043	4150	4251	4352	5053	5160	5261	5362	6063	6170
	62										
	75										
	87										
	100										
	12										
	18										
	25										
	31										
	37										
	43										
	50	3343	4050	4151	4252	4353	5060	5161	5262	5363	6070
	62										
	75										
	87										
	100										
	12										
	18										
	25										
	31										
	37										
	43										
	50	3243	3350	4051	4152	4253	4360	5061	5162	5263	5370
	62										
	75										
	87										
	100										
	18										
	25										
	31										
	37										
	43										
	50	3143	3250	3351	4052	4153	4260	4361	5062	5163	5270
	62										
	75										
	87										
	100										

FDS® FIRM DELIVERY SCHEDULE
1 Day

Standard Alterations

Regular Versatile pilots 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 dimension is outside the standard range, an “X” is placed in front of the P dimension, e.g., “XP.” If the point length is longer than standard, designate “XB” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.

Surface Coatings

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

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

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

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

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

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

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

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

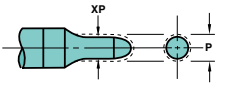
DayKool™ ***(XCR)***—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2
XNT —DayTiN®	+ 3 days	M2
XAN —DayTAN™	+ 4 days	M2
XND —DayKote™	+ 8 days	M2
XCN —TiCN	+ 3 days	M2
XNM —MoST™	+ 7 days	M2
XNP	+ 8 days	M2
XCR —DayKool™	+ 1 day	M2

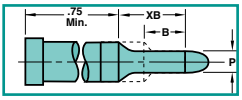
*Vickers used when RC exceeds 80.

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

Standard Alterations
Regular Pilots



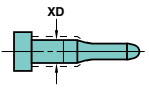
XP **P Dimension Smaller than Standard**



XB **Point Length Other than Standard**

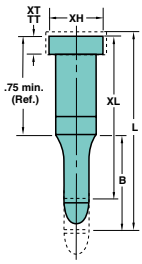
For XBB and X3B, add three days to delivery.

		XB					XBB	X3B	
Point Length		.500-.750	.751-1.000	1.001-1.250	1.251-1.500	1.501-1.625	1.6261-2.0000	2.0001-2.5000	2.5001-3.0000
Code	Type	Min. P (Rounds)							
12	VPT	.050	.057	.074					
18	VPT	.050	.057	.074	.092				
25	VPT	.061	.061	.079	.092				
31	VPT	.061	.061	.092	.092	.124	.186		
37	VPT	.061	.061	.092	.124	.124	.186	.249	.311
43	VPT	.092	.092	.092	.124	.124	.186	.249	.311
50	VPT	.124	.124	.124	.124	.124	.186	.249	.311
62	VPT	.234	.234	.234	.234	.234	.234	.311	.374
75	VPT	.299	.299	.299	.299	.299	.299	.342	.405
87	VPT	.349	.349	.349	.349	.349	.349	.374	.436
100	VPT	.399	.399	.399	.399	.399	.399	.399	.499



XD **Reduced Shank Diameter**
Head diameter does not change with body diameter.

Shank Dia.	12	18	25	31	37	43	50	62	75	87	100
Min. XD	.063	.126	.188	.251	.313	.376	.438	.562	.688	.813	.938



XL **Overall Length Shortened**
Stock removal from point end which shortens B length. To maintain "B," specify "XB."

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

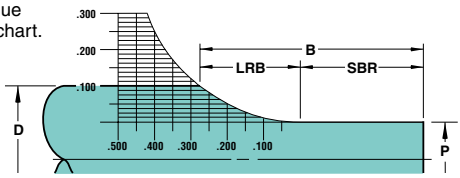
TT **Precision Head Thickness**
Same as XT except head thickness tolerance is held to ±.0005.

XH **Reduced Head Diameter**
Minimum head diameter equals D +.000 – .001.

SBR Straight Before Radius

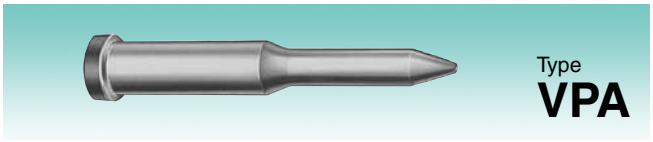
To determine Length of Radius Blend (LRB)

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



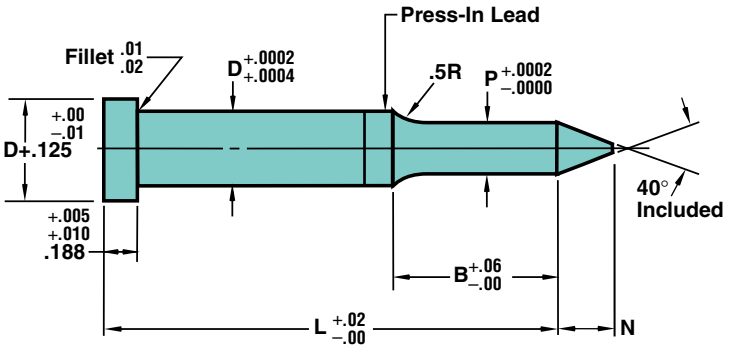
Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Positive Pick-Up Pilots



Type
VPA

Material
Steel: A2, M2, RC 60-63
All heads are drawn to RC 40-55.
P Tolerance $^{+.0002}_{-.0000}$ P to D .0003 Ⓜ
When P=D, Tolerance is $^{+.0002}_{+.0004}$
When P=D, shank tolerance applies.

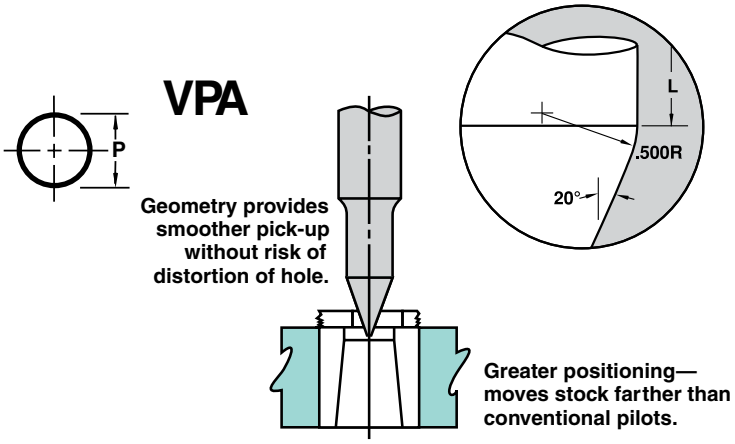


Order any length shown. If you require a length between those shown, designate "XL."
Example: You require a length of 3.600. Order 375, then show XL 3.600. See "How to Order" example on the next page. XL is available down to 1.375. Note shank length limitation of .75.
(B length may be shorter than shown when XL is under the shortest length shown.)
There is no additional charge for XL.

Shank		Point	Round		*N	Pn	L						A2/M2			M2 only		
D	Code	Lgth. B	Min. XP	Range P			2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00
.1875	18	.75	.050	.061 - .1875	.18	.0977	1221	1322	2023	2130	2231	2332	3033	3140	3241	3342	4043	4150
.2500	25		.061	.061 - .2500	.25	.1432												
.3125	31		.061	.092 - .3125	.31	.1883												
.3750	37		.061	.124 - .3750	.37	.2342												
.4375	43		.092	.186 - .4375	.43	.2793												
.5000	50		.124	.224 - .5000	.50	.3252												
.6250	62		.234	.309 - .6250	.62	.4162												
.7500	75		.299	.389 - .7500	.75	.5072												
.8750	87		.349	.439 - .8750	.87	.5982												
1.0000	100		.399	.484 -1.0000	1.00	.6892												
.1875	18	1.00	.057	.061 - .1875	.18	.0977	1121	1222	1323	2030	2131	2232	2333	3040	3141	3242	3343	4050
.2500	25		.061	.061 - .2500	.25	.1432												
.3125	31		.061	.092 - .3125	.31	.1883												
.3750	37		.061	.124 - .3750	.37	.2342												
.4375	43		.092	.186 - .4375	.43	.2793												
.5000	50		.124	.224 - .5000	.50	.3252												
.6250	62		.234	.309 - .6250	.62	.4162												
.7500	75		.299	.389 - .7500	.75	.5072												
.8750	87		.349	.439 - .8750	.87	.5982												
1.0000	100		.399	.484 -1.0000	1.00	.6892												
.1875	18	1.25	.074	.092 - .1875	.18	.0977		1122	1223	1330	2031	2132	2233	2340	3041	3142	3243	3350
.2500	25		.079	.092 - .2500	.25	.1432												
.3125	31		.092	.092 - .3125	.31	.1883												
.3750	37		.092	.124 - .3750	.37	.2342												
.4375	43		.092	.186 - .4375	.43	.2793												
.5000	50		.124	.224 - .5000	.50	.3252												
.6250	62		.234	.309 - .6250	.62	.4162												
.7500	75		.299	.389 - .7500	.75	.5072												
.8750	87		.349	.439 - .8750	.87	.5982												
1.0000	100		.399	.484 -1.0000	1.00	.6892												

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

Positive Pick-Up Pilots



Features/Benefits

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

HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P	XL	Steel
Example:	6	VPA	100	2333	P.749	3.600	M2

	Code	L				M2 only			
		5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00
	18								
	25								
	31								
	37								
	43								
	50	4251	4352	5053	5160				
	62					5261	5362	6063	6170
	75								
	87								
	100								
	18								
	25								
	31								
	37								
	43								
	50	4151	4252	4353	5060				
	62					5161	5262	5363	6070
	75								
	87								
	100								
	18								
	25								
	31								
	37								
	43								
	50	4051	4152	4253	4360				
	62					5061	5162	5263	5370
	75								
	87								
	100								

FDS® FIRM DELIVERY SCHEDULE

1 Day

Standard Alterations

Versatile positive pick-up pilots 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 dimension is outside the standard range, an “X” is placed in front of the P dimension, e.g., “XP.” If the point length is other than standard, designate “XB” as the point length. Also see “Standard Alterations” on the front of the pullout tab in this section for other special order designators.

Surface Coatings

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

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

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

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

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

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

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

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

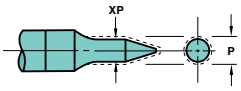
***DayKool*™ (XCR)**—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2
XNT —DayTiN®	+ 3 days	M2
XAN —DayTAN™	+ 4 days	M2
XND —DayKote™	+ 8 days	M2
XCN —TiCN	+ 3 days	M2
XNM —MoST™	+ 7 days	M2
XNP	+ 8 days	M2
XCR —DayKool™	+ 1 day	M2

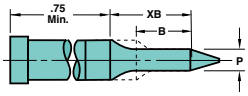
*Vickers used when RC exceeds 80.

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

Standard Alterations
Positive Pick-up Pilots



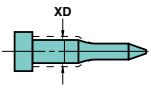
XP **P Dimension Smaller than Standard**



XB **Point Length Other than Standard**
Specify XB, XBB, or X3B and length (see chart below).

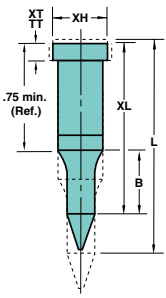
For XBB and X3B, add three days to delivery.

	XB									XBB	X3B	
Point Length	**.500-.625**	**.626-.750**	**.751-.875**	**.876-1.000**	**1.001-1.125**	**1.126-1.250**	**1.251-1.375**	**1.376-1.500**	**1.501-1.625**	**1.626-2.000**	**2.001-2.500**	**2.501-3.000**
Code Type	**Min. P (Rounds)**											
18 VPA	.050	.050	.057	.057	.074	.074	.092	.092				
25 VPA	.061	.061	.061	.061	.079	.079	.092	.092				
31 VPA	.061	.061	.061	.061	.092	.092	.092	.092	.124	.186		
37 VPA	.061	.061	.061	.061	.092	.092	.124	.124	.124	.186	.249	.311
43 VPA	.092	.092	.092	.092	.092	.092	.124	.124	.124	.186	.249	.311
50 VPA	.124	.124	.124	.124	.124	.124	.124	.124	.124	.186	.249	.311
62 VPA	.234	.234	.234	.234	.234	.234	.234	.234	.234	.234	.311	.374
75 VPA	.299	.299	.299	.299	.299	.299	.299	.299	.299	.299	.342	.405
87 VPA	.349	.349	.349	.349	.349	.349	.349	.349	.349	.349	.374	.436
100 VPA	.399	.399	.399	.399	.399	.399	.399	.399	.399	.399	.399	.436



XD **Reduced Shank Diameter**
Head Diameter does not change with body diameter.

Shank Dia.	**18**	**25**	**31**	**37**	**43**	**50**	**62**	**75**	**87**	**100**
Min. XD	.126	.188	.251	.313	.376	.438	.562	.688	.813	.938



XL **Overall Length Shortened**
See note p.10.

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

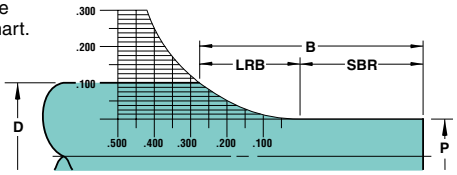
TT **Precision Head Thickness**
Same as XT except head thickness tolerance is held to ±.0005.

XH **Reduced Head Diameter**
Minimum head diameter equals D +.000 – .001.

SBR Straight Before Radius

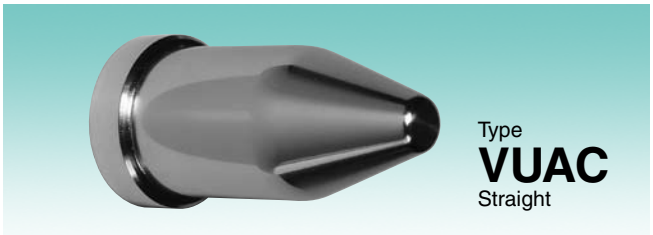
To determine Length of Radius Blend (LRB)

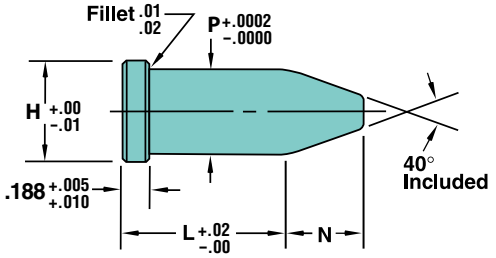
1. Calculate (D-P)/2.
2. Find (D-P)/2 value on left side of chart.
3. Follow line over to intersection point on radius blend line.
4. Read LRB value on bottom of chart.



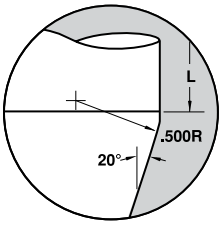
Example:
D=.375
P=.175
(D-P)/2=(.375–.175)/2=.100
Following the .100 line on chart over the radius blend line shows the LRB to be approximately .300.

Compact Positive Pick-Up Pilots





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



Type	Head H	Range P	N	*Overall Length L						
				.625	.750	.875	1.00	1.125	1.250	1.375
VUAC Straight	.375	.1865 - .2500	.25	62	75	87	100	112	125	137
	.438	.2501 - .3130	.31							
	.500	.3131 - .3750	.37							
	.562	.3751 - .4380	.43							
	.625	.4381 - .5000	.50							
	.750	.5001 - .6250	.62							
	.875	.6251 - .7500	.75							
	1.000	.7501 - .8750	.87							
	1.125	.8751 -1.0000	1.00							

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

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

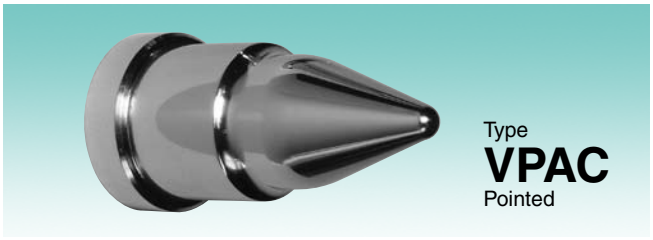
FDS® FIRM DELIVERY SCHEDULE
2 Days

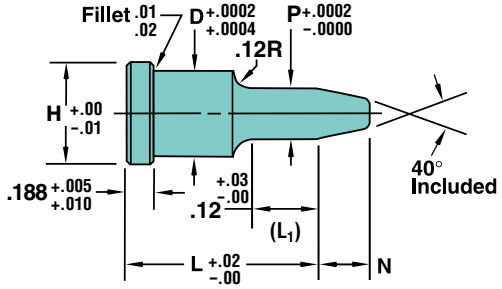
Standard Alterations

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 L_1 (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.

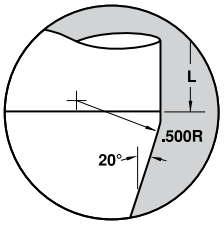
Compact Positive Pick-Up Pilots





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

P to D .0003 Ⓜ



Type	Shank D	Code	Head H	Min. XP	Range P	*N	Pn	**Overall Length L						
								.625	.750	.875	1.00	1.125	1.250	1.375
	.2500	25	.375	.092	.1500 - .2499	.25	.1432							
	.3125	31	.438	.092	.1870 - .3124	.31	.1883							
	.3750	37	.500	.092	.2250 - .3749	.37	.2342	62						
VPAC Pointed	.4375	43	.562	.092	.2650 - .4374	.43	.2793							
	.5000	50	.625	.124	.3000 - .4999	.50	.3252		75	87	100	112	125	137
	.6250	62	.750	.234	.3750 - .6249	.62	.4162							
	.7500	75	.875	.299	.4500 - .7499	.75	.5072							
	.8750	87	1.000	.349	.5250 - .8749	.87	.5982							
	1.0000	100	1.125	.399	.6000 - .9999	1.00	.6892							

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

**Any overall length is available within catalog range. Specify "XL" and length. The L_1 .12 is maintained. Because L_1 .12 is standard, use alteration code "XBR" for different length (0.060 min.).

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.

Surface Coatings

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

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

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

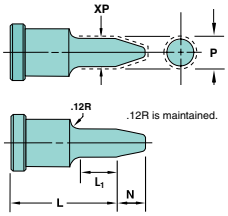
DayTAN™ (XAN)—ultra-hard, high-aluminum PVD coating. Absorbs shear stress and provides high temperature resistance. Ideal for HSLA, dual phase, and TRIP steels. Approx. hardness: * Vickers 3400.

Code / Delivery		Material
XNT —DayTiN®	+ 3 days	M2
XCN —TiCN	+ 3 days	M2
XAN —DayTAN™	+ 4 days	M2

*Vickers used when RC exceeds 80.

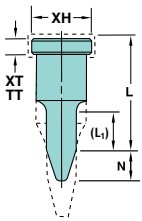
® DayTiN is a registered trademark of Dayton Progress.
™DayTAN is a trademark of Dayton Progress.

Standard Alterations
Compact Pilots



XP **P Dimension Smaller than Standard**

XBR **L_1 Longer than Standard**



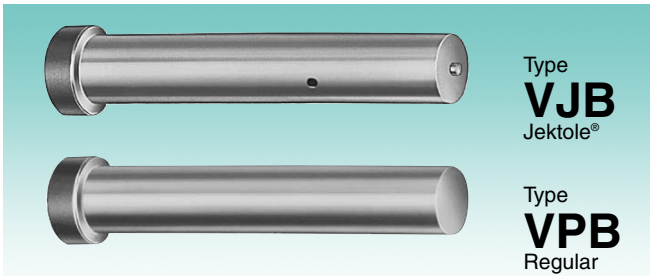
XL **Overall Length Shortened**
Stock removal from point end. L_1 length is maintained.

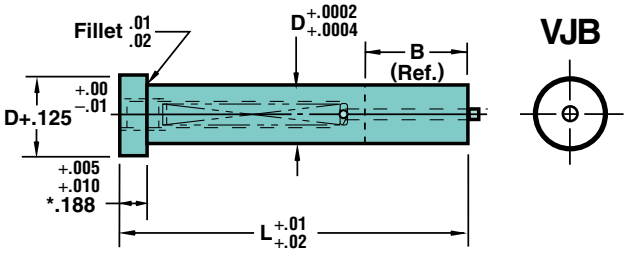
XT **Thinner Head than Standard**
Stock removal from head end which shortens overall length.

TT **Precision Head Thickness**
Same as XT except head thickness tolerance is held to ±.0005.

XH **Reduced Head Diameter**
Minimum head diameter equals H +.000 – .001.

Punch Blanks
Jektole® & Regular



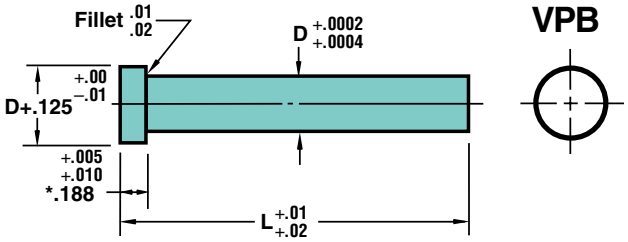


*.125 when D = .125 or .1875

Type	Shank D	Code	Point Lgth. B	L 1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25
VJB	*.1875	18	.50	0311	1012	1113	1220	1321	2022	2123	2230	2331	3032	3133	3240	3341	4042	4143	4250	4351
	*.2500	25																		
	.3125	31																		
	.3750	37																		
	*.1875	18	.75		0312	1013	1120	1221	1322	2023	2130	2231	2332	3033	3140	3241	3342	4043	4150	4251
	*.2500	25																		
	.3125	31																		
	.3750	37																		
	.4375	43																		
	.5000	50																		
	.6250	62																		
	.7500	75																		
	.8750	87																		
	1.0000	100																		
	*.1875	18	1.00			0313	1020	1121	1222	1323	2030	2131	2232	2333	3040	3141	3242	3343	4050	4151
	*.2500	25																		
	.3125	31																		
	.3750	37																		
	.4375	43																		
	.5000	50																		
	.6250	62																		
	.7500	75																		
	.8750	87																		
	1.0000	100																		
	*.2500	25	1.25				0320	1021	1122	1223	1330	2031	2132	2233	2340	3041	3142	3243	3350	4051
	.3125	31																		
	.3750	37																		
	.4375	43																		
	.5000	50																		
	.6250	62																		
	.7500	75																		
	.8750	87																		
	1.0000	100																		
	.3125	31	1.50					0321	1022	1123	1230	1331	2032	2133	2240	2341	3042	3143	3250	3351
	.3750	37																		
	.4375	43																		
	.5000	50																		
	.6250	62																		
	.7500	75																		
	.8750	87																		
	1.0000	100																		
VPB	.1250	12	N/A	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525
	.1875	18																		
	.2500	25																		
	.3125	31																		
	.3750	37																		
	.4375	43																		
	.5000	50																		
	.6250	62																		
	.7500	75																		
	.8750	87																		
	1.0000	100																		

*Not available in D2 **See p.32 for additional information.

Punch Blanks
Jektole® & Regular



*.125 when D = .125 or .1875

	Code	L							** Jektole® Group
		5.50	5.75	6.00	6.25	6.50	6.75	7.00	
	18								J2
	25								J3
	31	5052	5153	5260	5361	6062			J4
	37								J6
	18								J2
	25								J3
	31								J4
	37								J6
	43								J6
	50	4352	5053	5160	5261	5362			J6
	62								J9
	75								J9
	87								J9
	100								J9
	18								J2
	25								J3
	31								J4
	37								J6
	43								J6
	50	4252	4353	5060	5162	5262			J6
	62								J9
	75								J9
	87								J9
	100								J9
	25								J3
	31								J4
	37								J6
	43								J6
	50	4152	4253	4360	5061	5162			J6
	62								J9
	75								J9
	87								J9
	100								J9
	31								J4
	37								J6
	43								J6
	50	4052	4153	4260	4361	5062			J6
	62								J9
	75								J9
	87								J9
	100								J9
	12								
	18								
	25								
	31								
	37								
	43								N/A
	50	550	575	600					
	62				625	650	675	700	
	75								
	87								
	100								

Material
Steel: A2, M2, D2, RC 60-63, PS, RC 63-65
All heads are drawn to RC 40-55.

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 1.25" to 7.00"— can be custom-ground to meet virtually any customer requirement.

HOW TO ORDER

Specify:	Qty.	Type	L	Steel
Example:	4	VJB	50-1020	A2
	3	VPB	37-200	M2

FDS® FIRM DELIVERY SCHEDULE
1 Day

Dayton Slug Control

Dayton Slug Control is a patented, 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 matrix (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 matrix catalog number. Please specify XSC for alteration and show material thickness (inches) and clearance per side (percentage).

HOW TO ORDER

	Catalog Number				Your Specs		
Inch	VNX	62	100	P.250	XSC	MT.0125	CS 5
	Type	**D**	**L**	**P**	**Alt. Code**	**Mat'l Thickness (inches)**	**Clear Per Side (%)**

For additional information, contact your Dayton distributor.

Surface Coatings

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

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

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

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

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

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

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

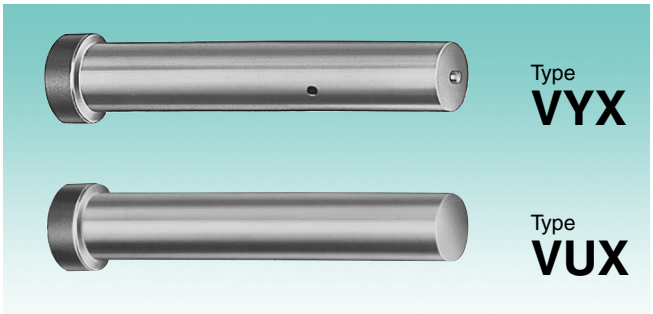
XNP—the ultimate coating for extrusion and forming applications. Also works well in shaving operations. Tolerance is ± .0002". Approx. hardness: *Vickers 3100.

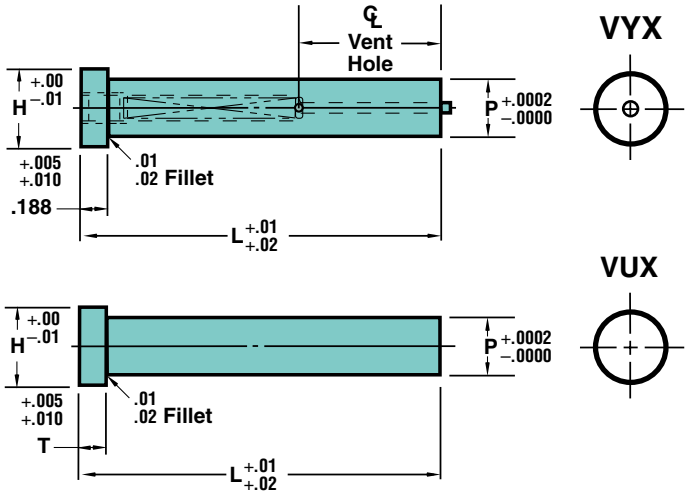
DayKool™* *(XCR)—cryogenic steel conditioning process, used primarily with hard, thick materials. Improves strength, toughness, and dimensional stability.

Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS
XNT —DayTiN®	+ 3 days	M2 & PS
XAN —DayTAN™	+ 4 days	M2 & PS
XND —DayKote™	+ 8 days	M2 & PS
XCN —TiCN	+ 3 days	M2 & PS
XNM —MoST™	+ 7 days	M2 & PS
XNP	+ 8 days	M2 & PS
XCR —DayKool™	+ 1 day	M2 & PS

*Vickers used when RC exceeds 80.

Straight Punches
Jektole® and Regular





Material
Steel: A2, M2, RC 60-63
All heads are drawn to RC 40-55.
P Tolerance $^{+.0002}_{-.0000}$

Type	Range P	Head Dia. H	Head Thk. T	℄ Vent Hole	L																						* Jektole® Group
					1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	
VYX	.1870-.2500	.375	See DWG.	.55	125	150	175	200	225	250	275	300															J2
	.2501-.3130	.438		.55 .80	125	150	175	200	225	250	275	300	325	350	375	400											J3
	.3131-.3750	.500		.60 .85	125	150	175	200	225	250	275	300	325	350	375	400											J4
	.3751-.4380	.562		.85 1.10		150	175	200	225	250	275	300	325	350	375	400											J6
	.4381-.5000	.625		.85 1.10		150	175	200	225	250	275	300	325	350	375	400											J6
	.5001-.6250	.750		.85 1.10		150	175	200	225	250	275	300	325	350	375	400											J9
VUX	.0620-.1250 .1251-.1880 .1881-.2500 .2501-.3130 .3131-.3750 .3751-.4380 .4381-.5000 .5001-.6250	.250 .312 .375 .438 .500 .562 .625 .750	.125 .125 .188 .188 .188 .188 .188 .188	N/A	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	N/A

*See p.32 for additional information.

HOW TO ORDER

Specify:	Qty.	Type	P	L	Steel
Example:	5	VYX	P.324	250	A2
	2	VUX	P.492	325	M2

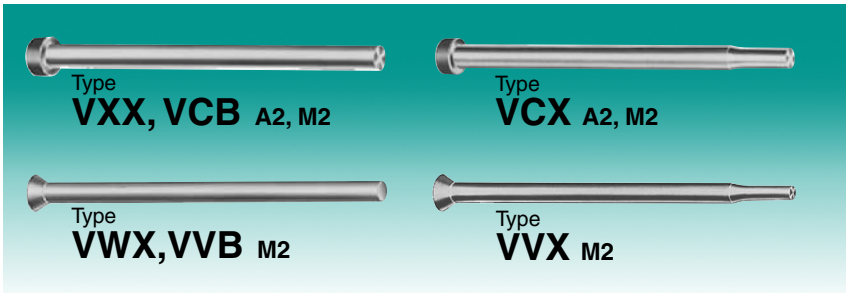
FDS® FIRM DELIVERY SCHEDULE
1 Day

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

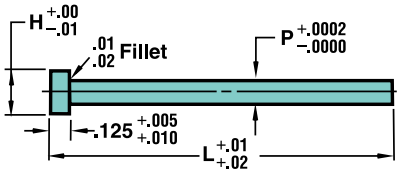


Material
Steel: A2, M2, RC 60-63
VXX, VCX, and VCB heads are drawn to RC 40-55.
P Tolerance $^{+.0002}_{-.0000}$
P to D .0003 Ⓜ

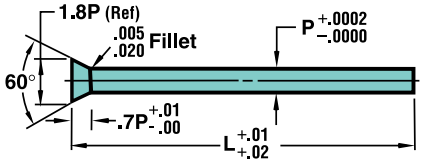
FDS FIRM DELIVERY SCHEDULE
Punches, Blanks 1 Day

Straight Punches

VXX

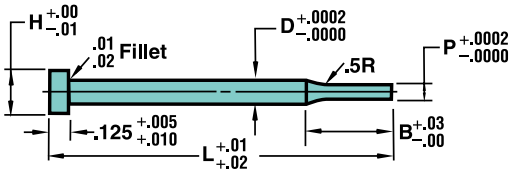


VWX

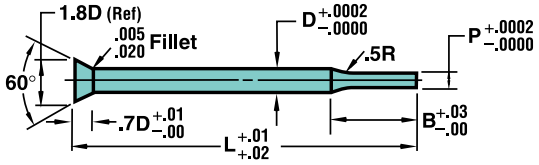


Regular Punches

VCX

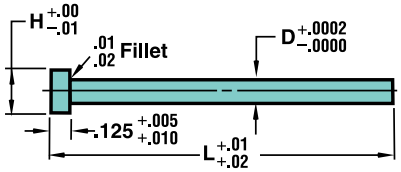


VVX

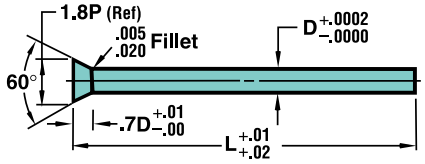


Punch Blanks

VCB



VVB



HOW TO ORDER

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

Type	Shank D	Code	Head Dia. H	Point Lgth. B	Range P	L 1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
Straight Punches VXX VWX		N/A	.125 .160 .190 .220 .250 .282 .313	N/A	.0300-.0630 .0631-.0940 .0941-.1250 .1251-.1570 .1571-.1800 .1881-.2190 .2191-.2500	150	175	200	225	250	275	300	325	350	375	400
Regular Punches VCX VVX	.0625 .0938 .1250 .1562 .1875 .2188 .2500	06 09 12 15 18 21 25	.125 .160 .190 .220 .250 .282 .313	.19 .25 .31 .31 .31 .31 .31	.0310-.0624 .0626-.0937 .0939-.1249 .1251-.1561 .1563-.1874 .1876-.2187 .2189-.2499	150	175	200	225	250	275	300	325	350	375	400
Punch Blanks VCB VVB	.0625 .0938 .1250 .1562 .1875 .2188 .2500	06 09 12 15 18 21 25	.125 .160 .190 .220 .250 .282 .313	N/A		150	175	200	225	250	275	300	325	350	375	400

Surface Coatings (VYX, VWX)

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

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

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

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

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

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

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

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

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

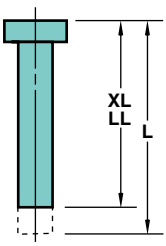
Code / Delivery		Material
XN —DayTride®	+ 3 days	M2 & PS
XNT —DayTiN®	+ 3 days	M2 & PS
XAN —DayTAN™	+ 4 days	M2 & PS
XND —DayKote™	+ 8 days	M2 & PS
XCN —TiCN	+ 3 days	M2 & PS
XNM —MoST™	+ 7 days	M2 & PS
XNP	+ 8 days	M2 & PS
XCR —DayKool™	+ 1 day	M2 & PS

*Vickers used when RC exceeds 80.

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

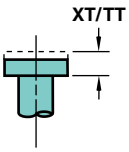
Standard Alterations
Straight and Clospace Punches

Straight Punches



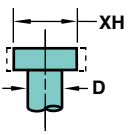
XL **Overall Length Shortened**
Stock removal from point end.

LL **Precision Overall Length**
Same as XL except overall length is held to ±.001.



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.



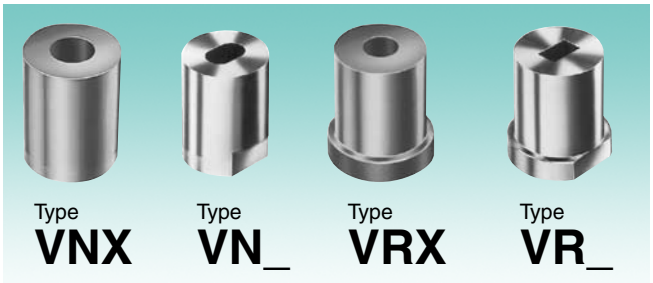
XH **Reduced Head Diameter**
Minimum head diameter equals D+.000 - .001.

Clospace Punches

Alteration Code	Product					
	VXX	VWX	VCX	VVX	VCB	VVB
XB			●	●		
XD			●			
XH	●		●		●	
XL	●	●	●	●	●	●
LL	●	●	●	●	●	●
XP			●	●		
XT	●		●		●	
TT	●		●		●	

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

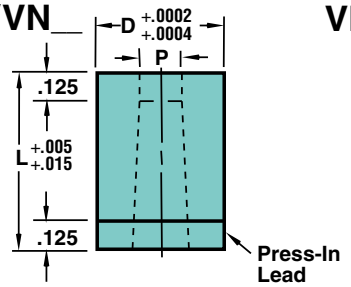
Matrixes



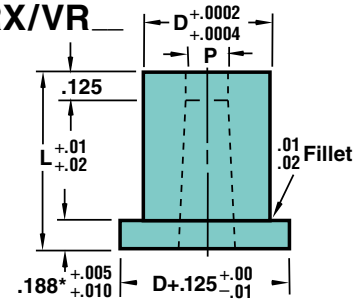
Shown here with optional key flat. See p. 31.

Material
Steel: A2, M2, RC 60-63, PS, RC 63-65
P&W Tolerance $^{+.0002}_{-.0000}$
P to D .0003 Ⓜ

VNX/VN__



VRX/VR__



*.125 when D = .1875

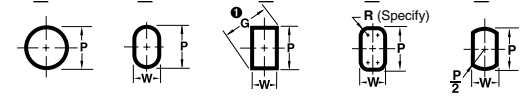
HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P (or P&W)	Steel
Example:	4	VNR	37	112	P.207, W.126	A2, X8
	3	VRO	50	137	P.3125, W.1562	M2, X2

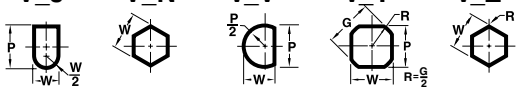
Type	Body D	Code	Round Range P	Shape Min. W	Shape Max. P/G	L .500	.625	.750	.875	1.000	1.125	1.250	1.375	1.500
VN__/VR__	.1875	18	.038 - .130	.050	.130	50	62	75	87	100	112	125	137	150
	.2500	25	.050 - .170	.050	.170									
	.3125	31	.062 - .212	.050	.212									
	.3750	37	.075 - .255	.050	.255									
	.4375	43	.130 - .297	.075	.297	50	62	75	87	100	112	125	137	150
	.5000	50	.150 - .344	.075	.344									
	.6250	62	.188 - .425	.075	.425									
	.7500	75	.225 - .510	.075	.510									
	.8750	87	.300 - .595	.075	.595			75	87	100	112	125	137	150
	1.0000	100	.400 - .680	.075	.680									
	1.2500	125	.500 - .850	.075	.850									
	1.5000	150	.600 - 1.050	.075	1.050									
A2, M2 only P&W Tolerance $^{+.0004}_{-.0000}$ D Tolerance $^{+.0002}_{+.0006}$ P to D .0005 Ⓜ	1.7500	175	.750 - 1.400	.130	1.400			75	87	100	112	125	137	150
	2.0000	200	.875 - 1.600	.130	1.600									
	2.2500	225	1.000 - 1.800	.130	1.800									
	2.5000	250	1.125 - 2.000	.130	2.000									
	2.7500	275	1.250 - 2.200	.130	2.000									

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

V_X V_O V_R V_K V_H

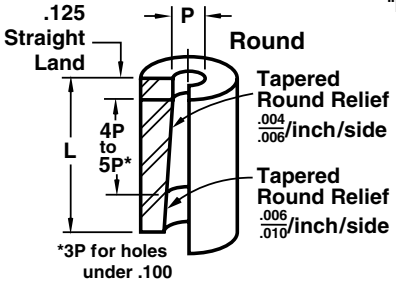


V_J V_N V_V V_Y V_Z

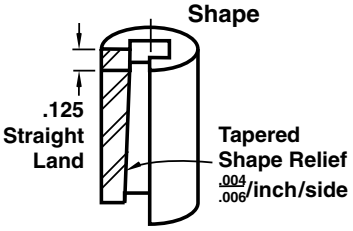


FDS FIRM DELIVERY SCHEDULE
18-100 Dia. 1 Day
125-150 Dia. 2 Days
175 and larger 4 Days

Matrix Construction



See page 25 (MDX and MRX) for matrix construction where "P" is .062 and less.



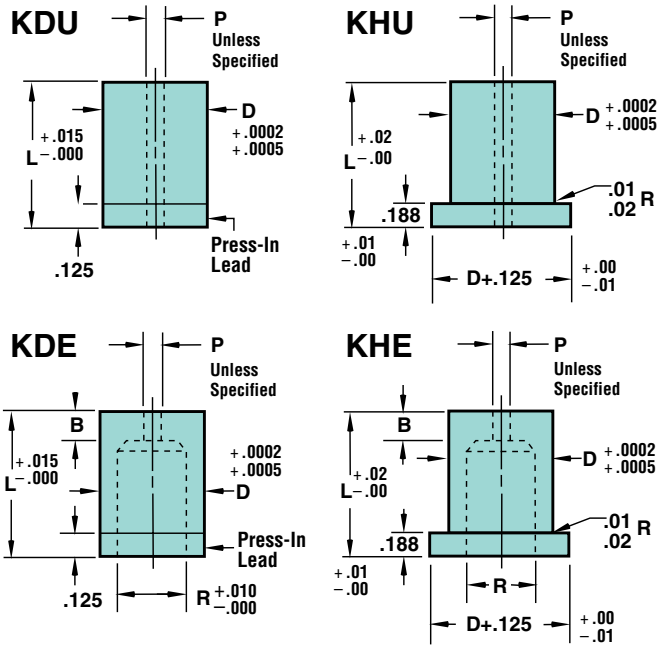
Standard Alterations

Versatile matrixes 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 Matrix Blanks

Material
Steel: M2, RC 60-63
Round P +.005 ◎ .0005 P to D
D ≧ 1.75 +.0002 +.0006



HOW TO ORDER

Specify:	Qty.	Type	D Code	L	P	Steel
Example:	6	KDE	37	100	XP.020	M2
	5	KDU	50	112	.031	M2

FIRM DELIVERY SCHEDULE
Standard P 1 Day
Larger P 3 Days
1.7500 and larger (any P) 4 Days

	Body		K_U			K_E					L							
Type	D	Code	Std. P	Optional P		Std. P	Optional P		B	R	.75	.87	.93*	1.00	1.12	1.25	1.37	1.50
KD_ KH_	.2500	25	.031	.020	—	.031	.020	—	.15	.156								
	.3125	31	.031	.020	—	.031	.020	—	.25	.191								
	.3750	37	.031	.020	—	.031	.020	—	.25	.228								
	.4375	43	.031	.020	—	.031	.020	—	.25	.281								
	.5000	50	.062	.020	—	.031	.020	—	.25	.312								
	.6250	62	.062	.020	.031	.093	.020	.031	.25	.391	75	87	93	100	112	125	137	
	.7500	75	.062	.020	.031	.093	.020	.031	.31	.468								150
	.8750	87	.062	.020	.031	.093	.020	.031	.31	.578								
	1.0000	100	.062	.020	.031	.093	.020	.031	.31	.703								
	1.2500	125	.062	.020	.031	.125	.020	.031	.37	.828								
	1.5000	150	.062	.020	.031	.125	.020	.031	.37	1.094								
KD_	1.7500	175	.125	.020	.031	.125	.020	.031	.37	1.430								
	2.0000	200	.125	.020	.031	.125	.020	.031	.37	1.630								
	2.2500	225	.125	.020	.031	.125	.020	.031	.37	1.830	75	87	93	100	112	125	137	150
	2.5000	250	.125	.020	.031	.125	.020	.031	.37	2.030								
	2.7500	275	.125	.020	.031	.125	.020	.031	.37	2.230								

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

Features/Benefits

Select either round ***KD__ Headless*** or ***KH__ Headed EDM Matrix Blanks***. Relief hole (P) 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.

Dayton Slug Control

Dayton Slug Control is a patented, 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 matrix (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 matrix catalog number. Please specify XSC for alteration and show material thickness (inches) and clearance per side (percentage).

HOW TO ORDER

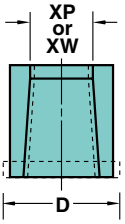
	Catalog Number				Your Specs		
Inch	VNX	62	100	P.250	XSC	MT.0125	CS 5
	Type	**D**	**L**	**P**	**Alt. Code**	**Mat'l Thickness (inches)**	**Clear Per Side (%)**

For additional information, contact your Dayton distributor.

Standard Alterations
Matrixes

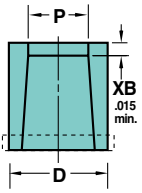
XP, XW
P and W Dimensions Larger than Standard

Body Code	Max P/G
18	.130
25	.190
31	.240
37	.290
43	.340
50	.390
62	.500
75	.600
87	.700
100	.800
125	1.000
150	1.200



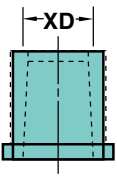
XB
Land Length Shorter (no charge) or Longer than Standard

Rounds Hole Range	Max B
.0310-.0620	2P
.0621-.0930	.187
.0931-.1580	.250
.1581-.2350	.312
.2351-.3000	.375
.3001-.4000	.437
.4001- Over	.500



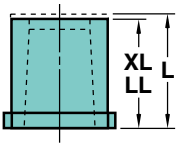
XD
Reduced Body Diameter
Head diameter does not change with body reduction.

Body Code	Min XD	Max P/G
18	.126	.076
25	.188	.130
31	.251	.190
37	.313	.240
43	.376	.290
50	.438	.340
62	.562	.437
75	.688	.550
87	.813	.650
100	.938	.750
125	1.188	.950
150	1.438	1.150



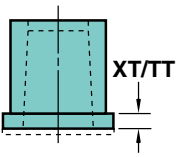
XL
Overall Length Shortened
Min. overall length: .50

LL
Precision Overall Length
Same as XL except overall length is held to ± .001.

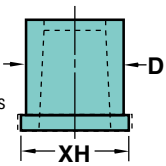


XT
Thinner Head than Standard
Stock removal from head end which shortens overall length.

TT
Precision Head Thickness
Same as XT except head thickness tolerance is held to ±.0005.



XH
Reduced Head Diameter
Minimum head diameter equals D +.000 -.001.

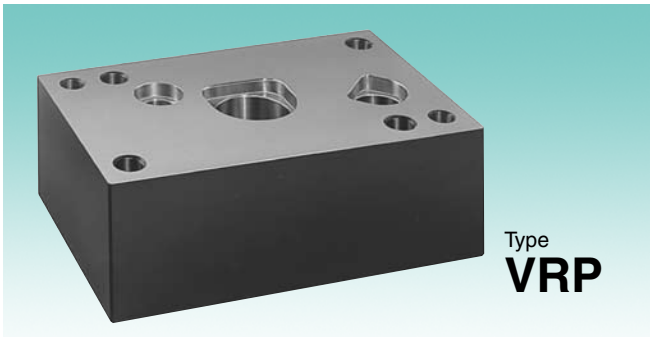


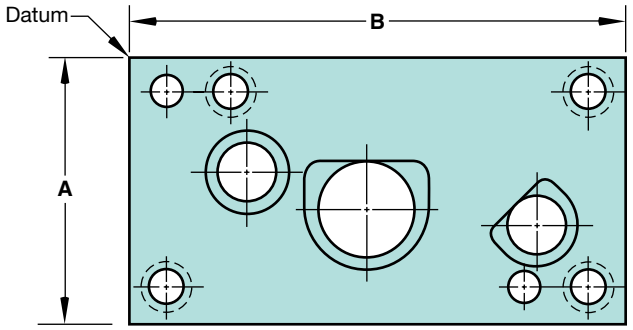
XSC
Slug Control eliminates slug pulling
(When ordering Dayton Slug Control, please specify XSC in place of the standard matrix code, as well as your specifications. See the "How to Order" example on the front of this tab.)

XN
+3 days
DayTride® A unique wear-resistant surface treatment for M2 & PS only.

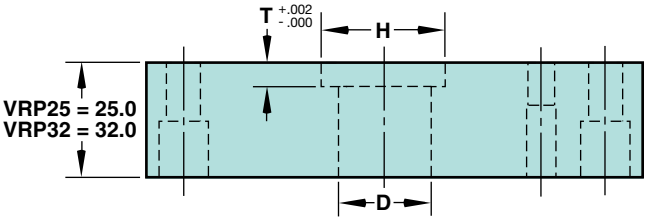
Multi-Location™ Retainers

Multiple Head Type Punch Retainer





View from the punch head side.



Specify screw and dowel size and location.

FIRM DELIVERY SCHEDULE

1-6 Holes, 5 Days
7+ Holes, 8 Days

Type	A	L													
		2.50	2.75	3.00	3.25	3.50	3.75	4.00	5.00	6.00	7.00	8.00	9.00	10.00	12.00
VRP	2.00	2025	2027	2030	2032	2035	2037	2040	2050	2060	2070	2080	2090	2010	2012
	2.75		2727	2730	2732	2735	2737	2740	2750	2760	2770	2780	2790	2710	2712
	3.00			3030	3032	3035	3037	3040	3050	3060	3070	3080	3090	3010	3012
	4.00							4040	4050	4060	4070	4080	4090	4010	4012
	6.00									6060	6070	6080	6090	6010	6012
	8.00											8080	8090	8010	8012

HOW TO ORDER

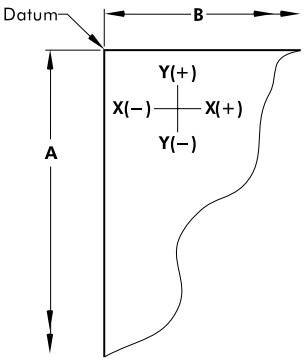
Example:

Retainer Type	Catalog No.	Special Size	
VRP	3070	A _____	B _____

Multi-Location™ Retainers

Hole No.	Component		Location		Locking Device	
	Type	Size	X Axis	Y Axis	Location	Type
1	Dowel	5/16 S.F.*	.375	– .375	—	—
2	S.H.C.S	5/16	1.000	– .375	—	—
3	VJR	62	2.090	–1.375	90°	X2
4	Clear	1.281	4.250	–1.062	—	—
5	Jackscr.	STD.	0.687	– .937	—	—

*Slip Fit



Space Requirements

D	T	H
.1250	.125	.281
.1875	.125	.344
.2500	.188	.406
.3125	.188	.469
.3750	.188	.531
.5000	.188	.656
.6250	.188	.781
.7500	.188	.906
1.0000	.188	1.156

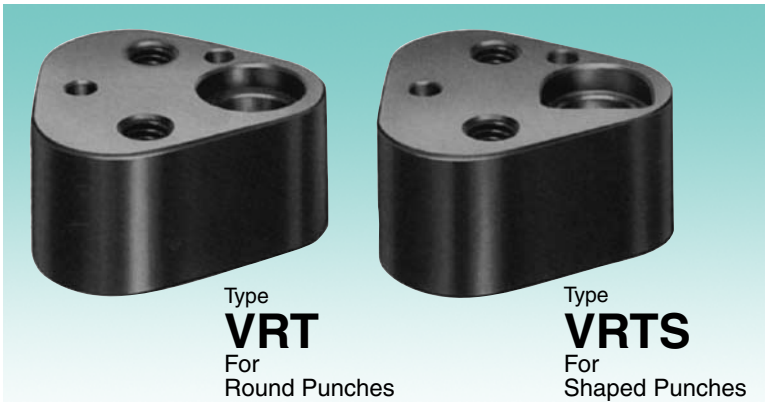
Hole Reference Re: Datum Point

Dowel Holes	±.0003
Screw Holes	±.005
Component Holes	±.0003

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.

True Location™ Retainers
Single Head

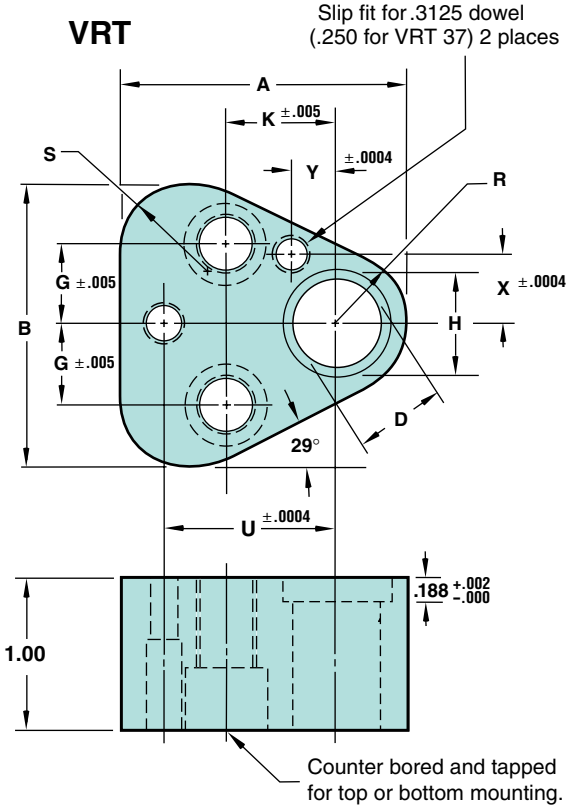


Type **VRT** For Round Punches

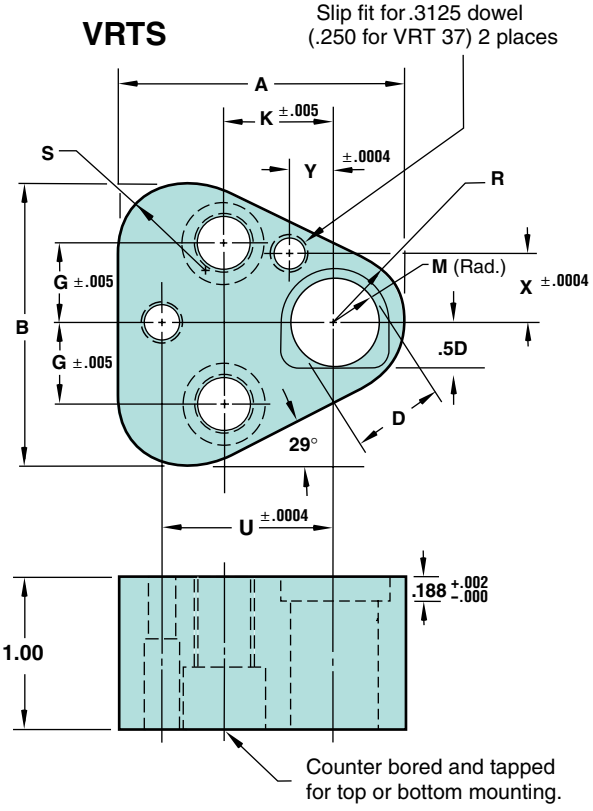
Type **VRTS** For Shaped Punches

FDS® FIRM DELIVERY SCHEDULE
1 Day

VRT



VRTS



Type	Code	D	A	B	G	K	R	S	U	X	Y	Screw Size	Tapped Hole
VRT/VRTS	37	.3750	1.75	1.72	.438	.750	.38	.47	1.060	.354	.295	5/16-18	3/8-16
	50	.5000	2.00	1.97	.562	.750	.50	.60	1.180	.472	.256	5/16-18	3/8-16
	62	.6250	2.12	2.09	.625	.750	.56	.55	1.250	.532	.236	5/16-18	3/8-16
	75	.7500	2.38	2.34	.688	.750	.69	.79	1.320	.650	.197	5/16-18	3/8-16
	100	1.0000	2.75	2.72	.781	.938	.88	.97	1.600	.866	.276	1/2 -13	5/8-11
	125	1.2500	2.75	2.72	.781	.938	.88	.97	1.600	.866	.276	1/2 -13	5/8-11

Retainer sets include:
- 2 Dowels
- 2 Screws

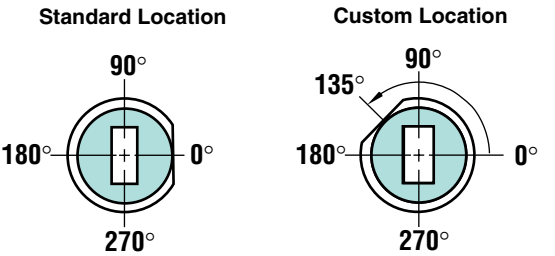
HOW TO ORDER

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

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°.



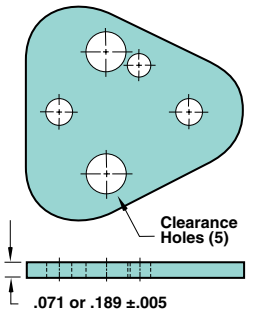
Specify radial location on VRP Retainers for shaped punches.

Flat Tolerances

FLAT

F	RADIAL
+.001 –.000	.001/inch

Shim/Backing Plate



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

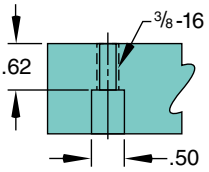
Shim Plates can also be used on any Dayton Progress triangular-shaped retainers.

	Thickness T	
D	.189 (Rc54-56)	.071 (Soft)
25	URBP 0648	URSP 0618
37	URBP 1048	URSP 1018
50	URBP 1348	URSP 1318
62	URBP 1648	URSP 1618
75	URBP 2048	URSP 2018
85	URBP 2248	URSP 2218
100	URBP 2548	URSP 2548
125	URBP 3248	URSP 3248

Standard Alterations
Multi-Location™ Retainers

Standard Jackscrew Hole

Jackscrews make it easier to pull retainers off the dowels.

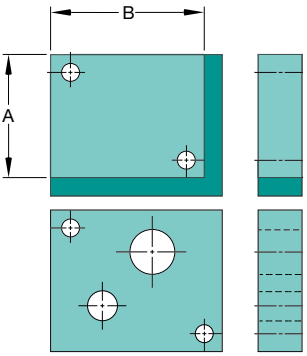


Special Size

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.

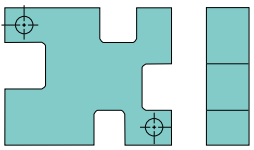
Location ±.010

Diameter +.015 −.000

The following alterations require detailed drawings:

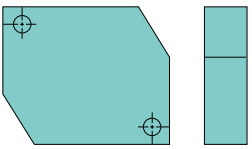
Notches

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.



Classified Shapes

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

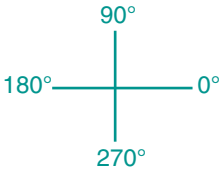
Ordering Information

*Corner Dimensions

Dimensions should be the theoretical sharp corners for shapes C22, C24, C34, C61, and C88. However, some reduction of these dimensions will result from fitting the punch and matrix under conditions where the clearance is .0025 or less per side.

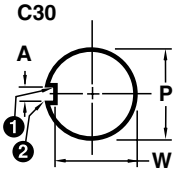
†Shape Center

Shapes are centered on the punch shanks as shown. Shapes in guide bushings and matrixes 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.

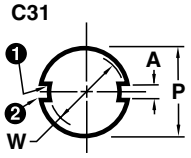


Keys

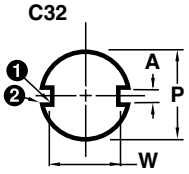
C30



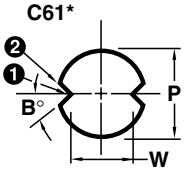
C31



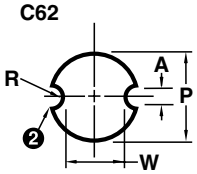
C32



C61*

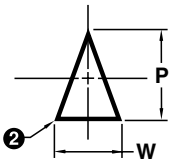


C62

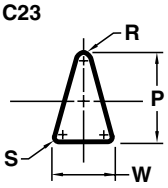


Triangles/ Trapezoids

C22*†



C23



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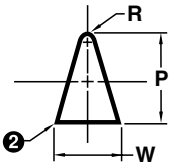

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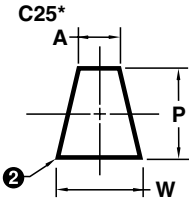

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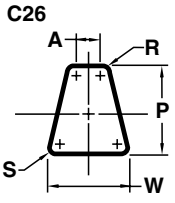
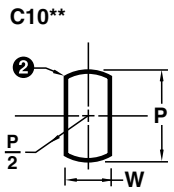


Flatted Rounds

C10**



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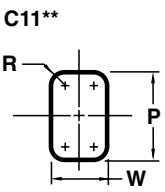

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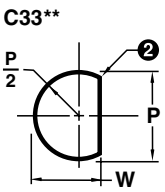

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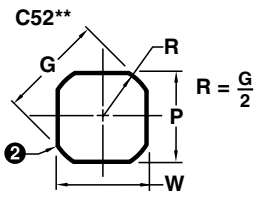
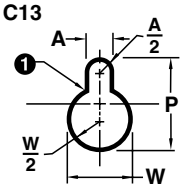


** Now standard. See product pages.

Mono Lobes

C13



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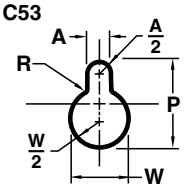
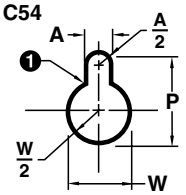


C54



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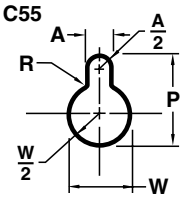
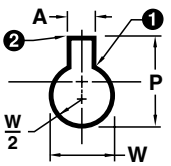


C14



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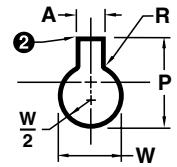

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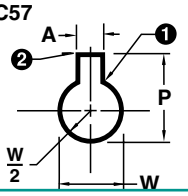

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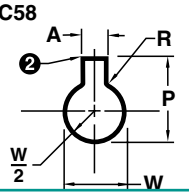
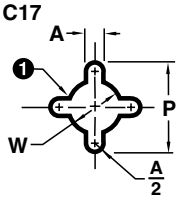
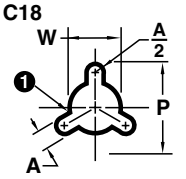


Multi Lobes

C17



C18



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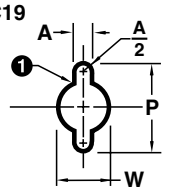

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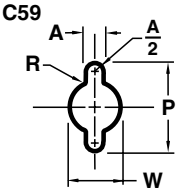

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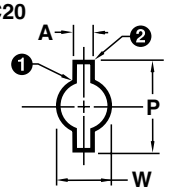

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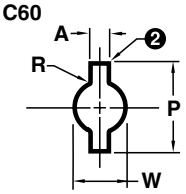
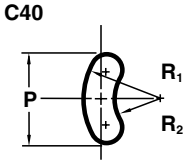


Classified Shapes

Miscellaneous

C40



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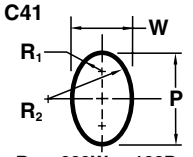

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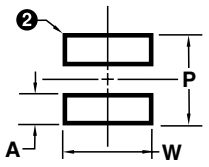
$R_2 = 1.183P - .683W$

C42*



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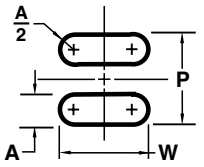

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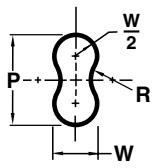

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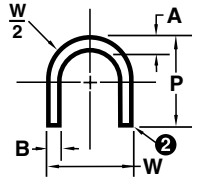

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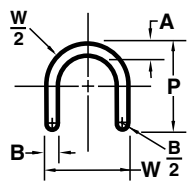

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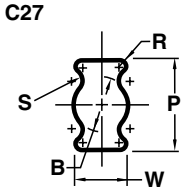

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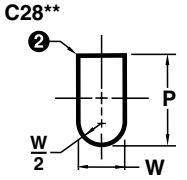

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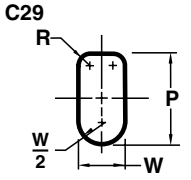

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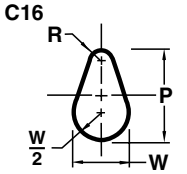

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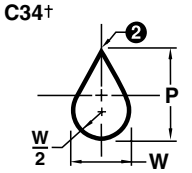
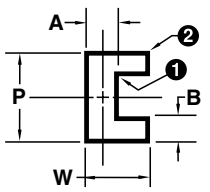


Us

C50



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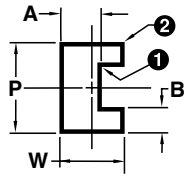

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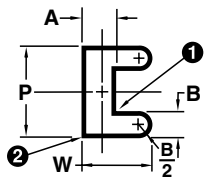

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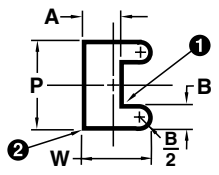

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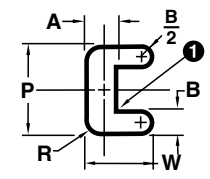

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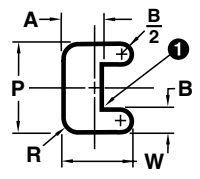

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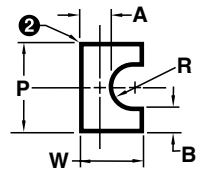

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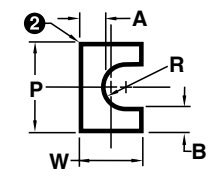

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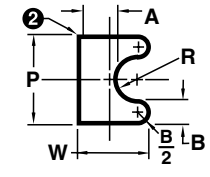

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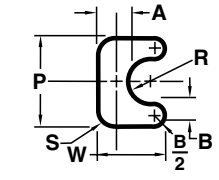

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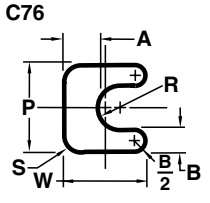

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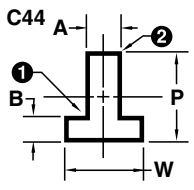
C44



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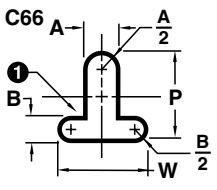

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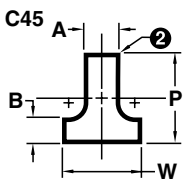

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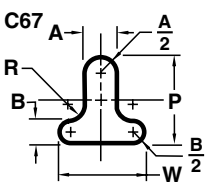

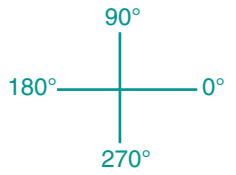

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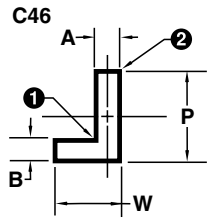

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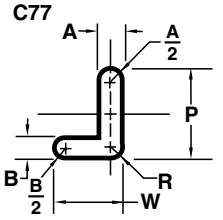

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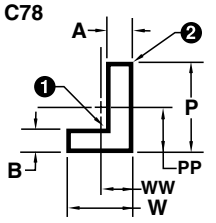

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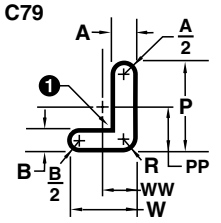

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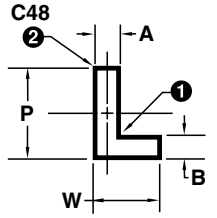
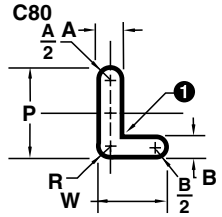
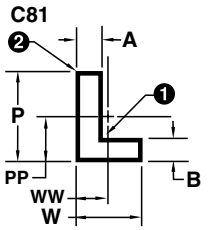


C80



C81



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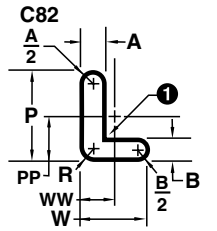
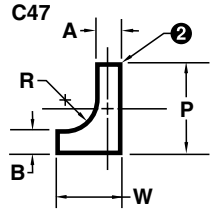
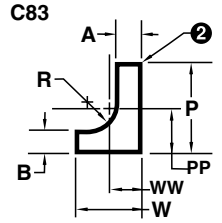


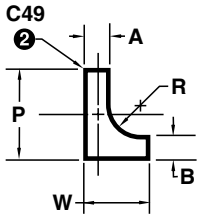
C47



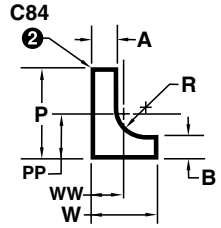
C83



C49

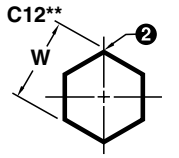


C84

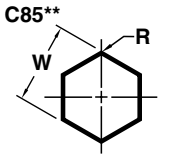


Polygons

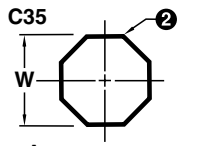
C12**



C85**

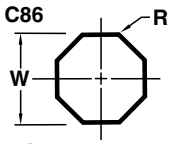


C35



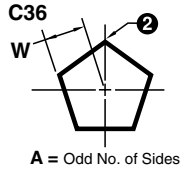
A = Even No. of Sides

C86



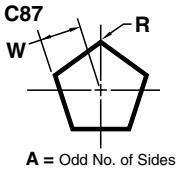
A = Even No. of Sides

C36



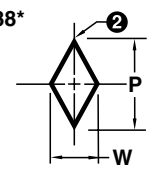
A = Odd No. of Sides

C87

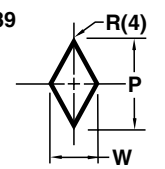


A = Odd No. of Sides

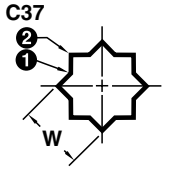
C88*



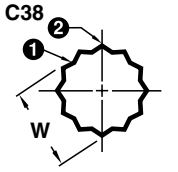
C89



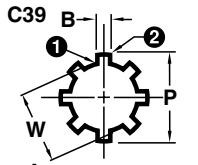
C37



C38

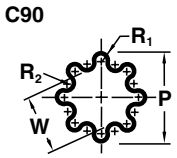


C39



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

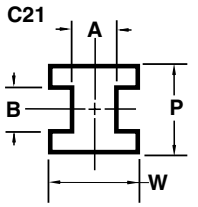
C90



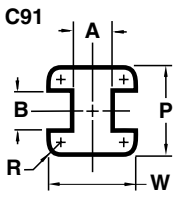
A = No. of teeth (3, 4, 6 or 8 only)

Duo Tees

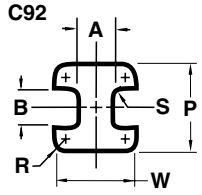
C21



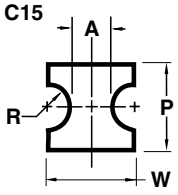
C91



C92



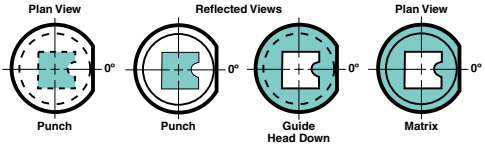
C15



*See “Corner Dimensions” note on p. 22.

Classified Shapes
Ordering Information

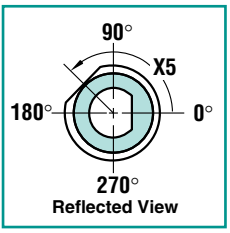
Reflected View—Punches and Guides



The reflected view is used for punches and guides. It is the view as 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.

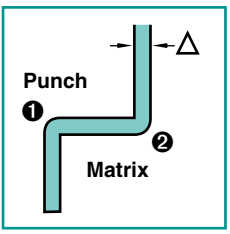
Orientation and Locking

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

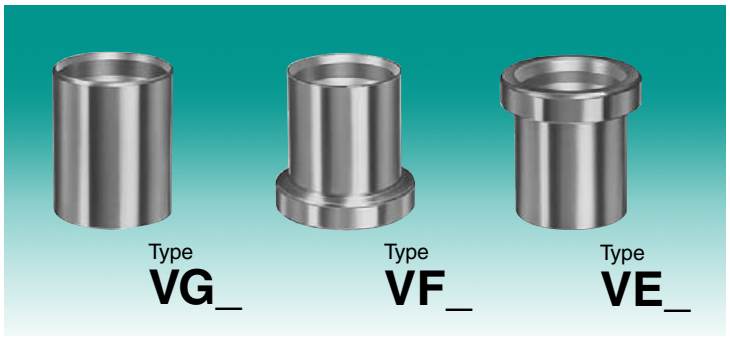


Clearance

Normal grinding methods produce ❶ .007 max fillet on the punch and ❷ .007 max fillet on the matrix with matching corner shape on the matrix and punch, respectively. When ordering matrixes, please specify punch dimensions and clearance per side (Δ). (If the clearance is .0025 Δ, Dayton will break sharp corners when the punches and matrixes are ordered together.)



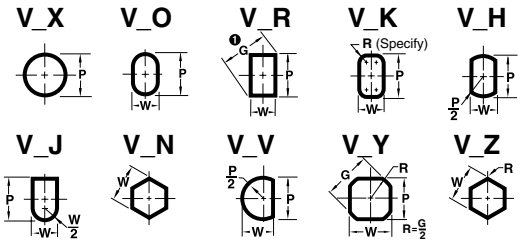
Guide Bushings

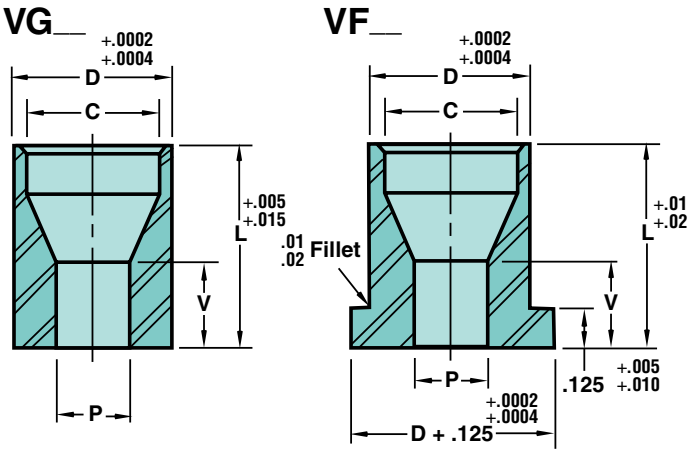


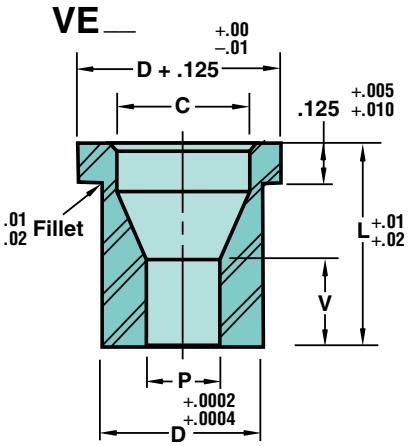
Material
Steel: A2, RC 60-63
P&W Tolerance $^{+.0002}_{-.0000}$
P to D .0003 Ⓜ

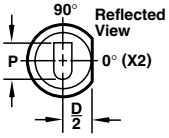
FDS FIRM DELIVERY SCHEDULE
1 Day

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









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

Body D		Code	Round Range P	Shape Min. W	Shape Max. P/G	C'Bore Dia. C	L .3125	L .3750	L .5000	L .6250
Headless VG_	.1875	18	.062-.130	.050	.130	.141	31			
	.2500	25	.062-.170	.050	.170	.201				
	.3125	31	.093-.212	.050	.212	.261		37	50	
	.3750	37	.125-.255	.050	.255	.323				
	.4375	43	.187-.297	.075	.297	.386				62
	.5000	50	.212-.344	.075	.344	.448				
	.6250	62	.293-.425	.075	.425	–				
Head Down VF_	.1875	18	.062-.130	.050	.130	.141	31			
	.2500	25	.062-.170	.050	.170	.201				
	.3125	31	.093-.212	.050	.212	.261		37	50	
	.3750	37	.125-.255	.050	.255	.323				
	.4375	43	.187-.297	.075	.297	.386				62
	.5000	50	.212-.344	.075	.344	.448				
	.6250	62	.293-.425	.075	.425	–				
Head Up VE_	.1875	18	.062-.130	.050	.130	.141	31			
	.2500	25	.062-.170	.050	.170	.201				
	.3125	31	.093-.212	.050	.212	.261		37	50	
	.3750	37	.125-.255	.050	.255	.323				
	.4375	43	.187-.297	.075	.297	.386				62
	.5000	50	.212-.344	.075	.344	.448				
	.6250	62	.293-.425	.075	.425	–				

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.

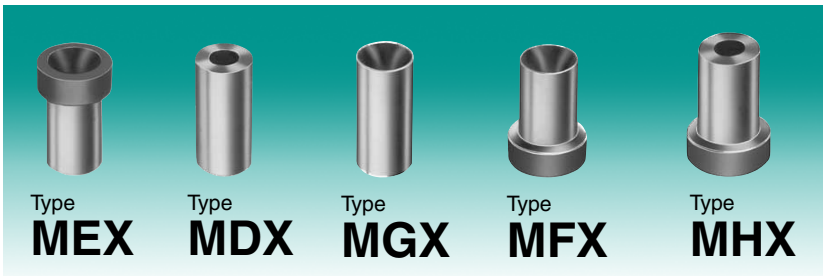
Guide Chart

Hole Range P or G	Land Length V
Up to .0650	2P
.0651-.0950	P + .065
.0951-.4250	.82P + .082

HOW TO ORDER

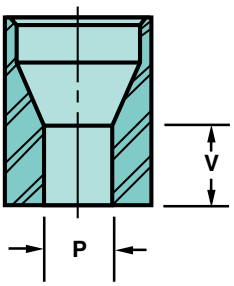
Specify:	Qty.	Type	Code	L	P (or P&W)	Steel
Example:	4	VEX	37	62	P.146	A2
	2	VFO	50	50	P.250, W.075	A2

Micro Guides/Matrixes



Material
Steel: A2, RC 60-63
P&W Tolerance $^{+.0002}_{-.0000}$
P to D .0003 Ⓜ

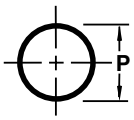
FDS® FIRM DELIVERY SCHEDULE
Guides, Matrixes 3 Days



Guide Chart

Hole Range P	Land Length V
Up to .0650	2P
.0651-.0950	P + .065
.0951-.4250	.82P + .082

M_X



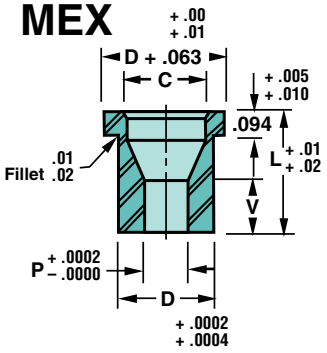
	Body D	Code	Range P	C'Bore Dia. C	L .3125	L .375	L .500
MGX Headless Guide	.1250	12	.031 - .062	.076	31	37	
	.1875	18	.046 - .130	.141	31	37	
MFX Head-Down Guide	.1250	12	.031 - .062	.076	31	37	
	.1875	18	.046 - .130	.141	31	37	
MEX Head-Up Guide	.1250	12	.031 - .062	.076	31	37	
	.1875	18	.046 - .130	.141	31	37	
MDX Headless Matrix	.1250	12	.031 - .062	N/A	31	37	50
	.1875	18	.046 - .130		31	37	50
MHX Headed Matrix	.1250	12	.031 - .062	N/A	31	37	50
	.1875	18	.046 - .130		31	37	50

HOW TO ORDER

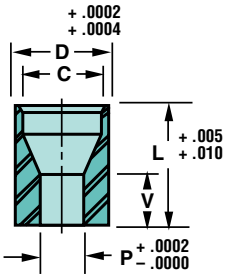
Specify:	Qty.	Type	Code	L	P (or P&W)	Steel
Example:	3	MEX	18	31	P.062	A2
	3	MGX	12	31	P.044	A2
	2	MFX	12	31	P.057	A2
	3	MHX	18	37	P.060	A2
	2	MDX	12	31	P.045	A2

Guides

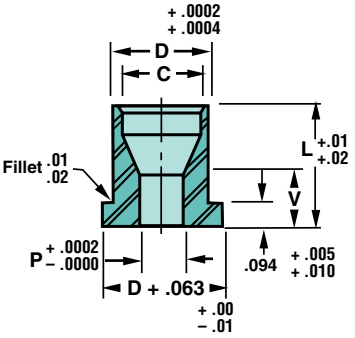
MEX



MGX



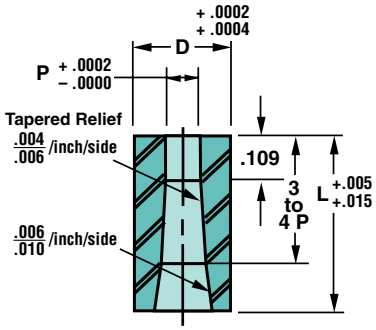
MFX



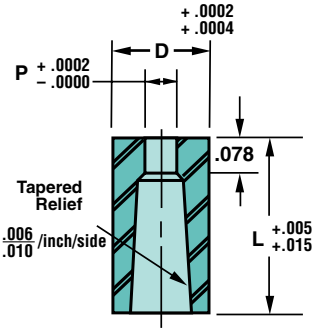
Matrixes

MDX

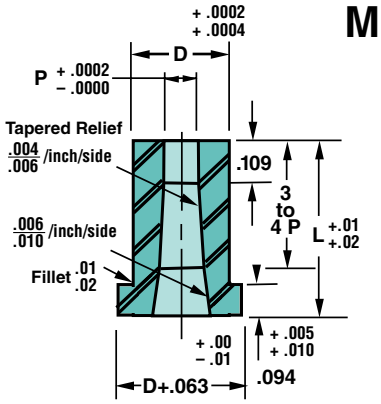
P is > .062

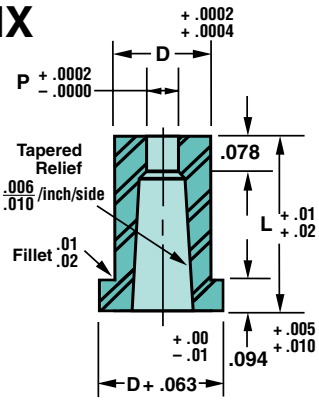


P is ≦ .062

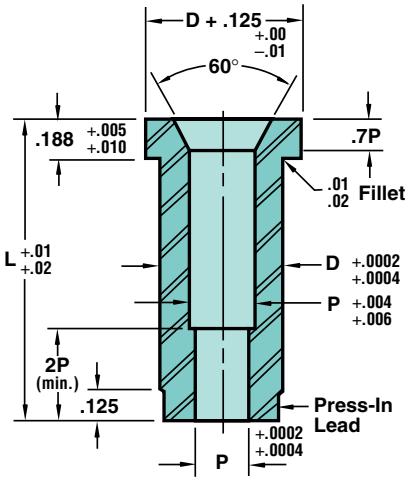


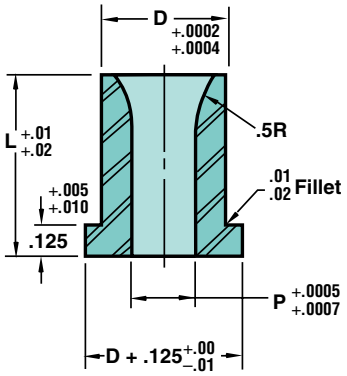
MHX

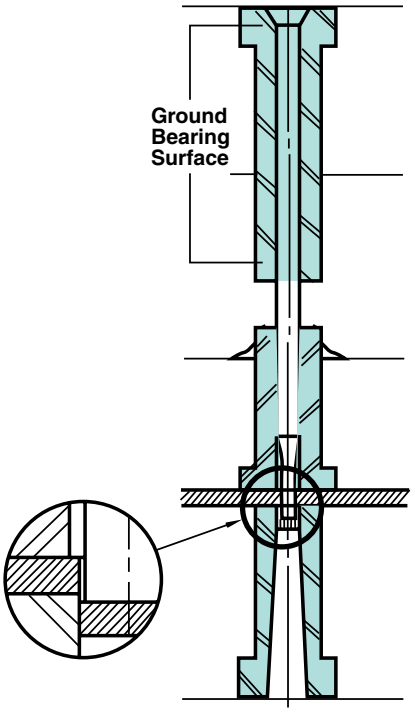




Quill Bushings/Guides







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

Limitations

Body Code	XP		XD	
	Min. P	Max. P	Min. XD	Max. P
18	.0625	.094	.126	.0625
25	.0625	.125	.188	.0938
31	.0625	.156	.251	.1250
37	.0625	.188	.313	.1562
43	.0625	.219	.376	.1875

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

	Body D	Code	Punch Hole P	L .500	L .625	L .750	L 1.000	L 1.250
VQX Press Fit Quill Bushings	.1875	18	.0625					
	.2500	25	.0938					
	.3125	31	.1250			75	100	125
	.3750	37	.1562					
	.4375	43	.1875					
VFQ Quill Guide Bushings	.1875	18	.0625	50				
	.2500	25	.0938		62			
	.3125	31	.1250					
	.3750	37	.1562			75		
	.4375	43	.1875					

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

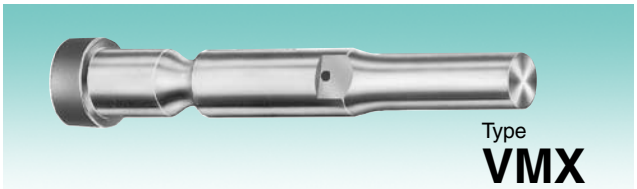
During stripping, the punch tends to pull the stock into the stripper void, which may cause part distortion. Dayton eliminates the distortion potential by manufacturing the product with a controlled limit, i.e., .015 per side maximum. Distortion cannot occur when the space between the guides and the punch (.5 D-P) is less than the stock thickness.

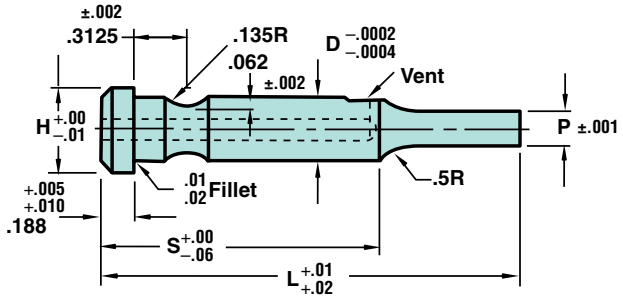
HOW TO ORDER

Specify:	Qty.	Type	Code	L	Steel
Example:	3	VQX	31	75	A2
	4	VFQ	31	75	Bearing Bronze

FDS® FIRM DELIVERY SCHEDULE
1 Day

Misfeed Detectors





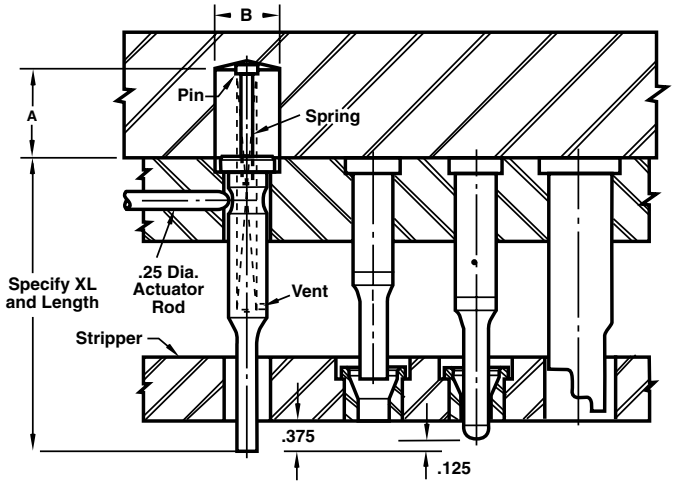
Material
Steel: A2, RC 60-63

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.



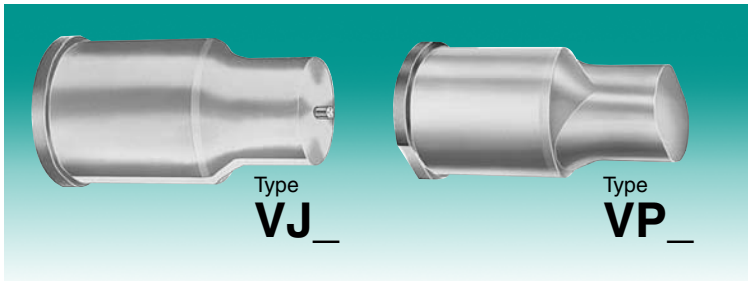
Shank			Range	Head	L							Spring Pocket	
Length S	Dia. D	Code	P	Dia. H	2.375	2.625	2.875	3.125	3.375	3.625	3.875	A	B
1.50 Code X	.375 .500	37 50	.090-.375 .375-.500	.500 .625	37-X237 50-X237	37-X262 50-X262	37-X287 50-X287	37-X312 50-X312	37-X337 50-X337			1.15	.53 .65
1.75 Code Y	.375 .500	37 50	.090-.375 .375-.500	.500 .625		37-Y262 50-Y262	37-Y287 50-Y287	37-Y312 50-Y312	37-Y337 50-Y337	37-Y362 50-Y362		.90	.53 .65
2.00 Code Z	.375 .500	37 50	.090-.375 .375-.500	.500 .625			37-Z287 50-Z287	37-Z312 50-Z312	37-Z337 50-Z337	37-Z362 50-Z362	37-Z387 50-Z387	.65	.53 .65

HOW TO ORDER

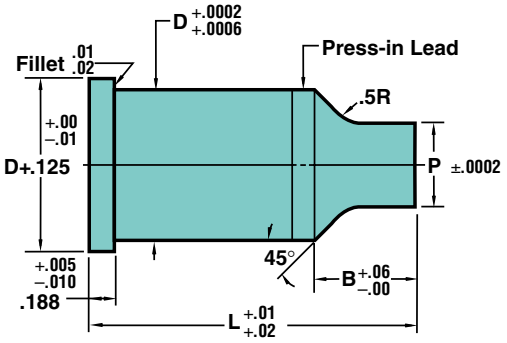
Specify:	Qty.	Type	Code	L	P	Steel
Example:	3	VMX	50	Z362	P.400, XL 3.43	A2

FDS® FIRM DELIVERY SCHEDULE
1 Day

Extended Range Punches



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



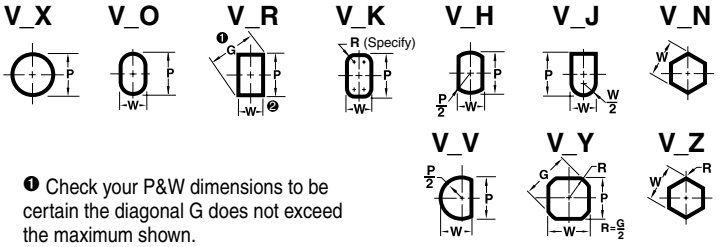
When D-P exceeds .406 a step will exist.

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

FDS® FIRM DELIVERY SCHEDULE
Round 2, Shape 4 Days

HOW TO ORDER

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



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

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

Shank	Point Lgth.	Round	Shape		L																			Jektole® Group
D	B	Range P	Min. W	Max. P/G	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	
1.250	1.25	.625-1.2499	.282	1.2500	1021	1122	1223	1330	2031	2132	2233	2340	3041	3142	3243	3350	4051	4152	4253	4360	5061	5162	5263	5370	J12
1.500		.750-1.4999	.300	1.5000																				J12
1.750		1.000-1.7499	.350	1.7500																				J12
2.000		1.187-1.9999	.400	2.0000																				J12
2.250		1.375-2.2499	.450	2.2500																				J12
2.500		1.625-2.4999	.500	2.5000																				J12
1.250	1.50	.625-1.2499	.282	1.2500																				J12
1.500		.750-1.4999	.300	1.5000																				J12
1.750		1.000-1.7499	.350	1.7500																				J12
2.000		1.187-1.9999	.400	2.0000		1022	1123	1230	1331	2032	2133	2240	2341	3042	3143	3250	3351	4052	4153	4260	4361	5062	5163	5270	J12
2.250		1.375-2.2499	.450	2.2500																				J12
2.500		1.625-2.4999	.500	2.5000																				J12

*See p.30 for more details.

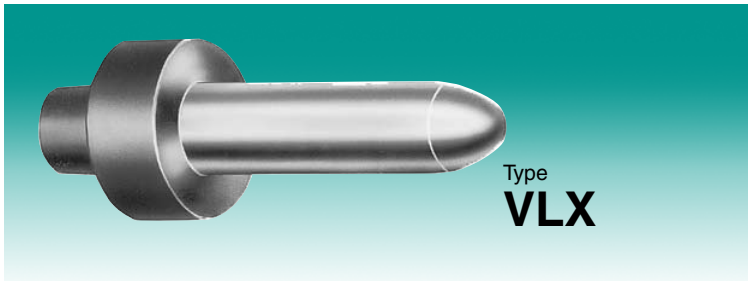
Surface Coatings

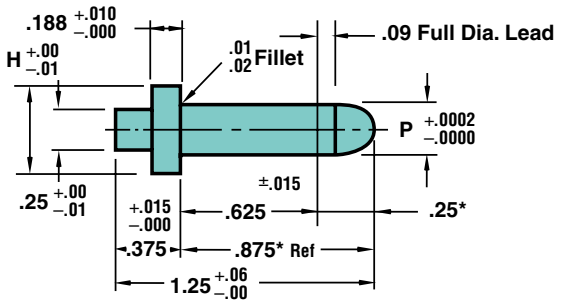
Code / Delivery		Material
XN —DayTride®	+ 3 days	M2
XNT —DayTiN®	+ 3 days	M2
XAN —DayTAN™	+ 4 days	M2
XND —DayKote™	+ 8 days	M2
XCN —TiCN	+ 3 days	M2
XNM —MoST™	+ 7 days	M2
XNP	+ 8 days	M2
XCR —DayKool™	+ 1 day	M2

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

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

Spring Pilots

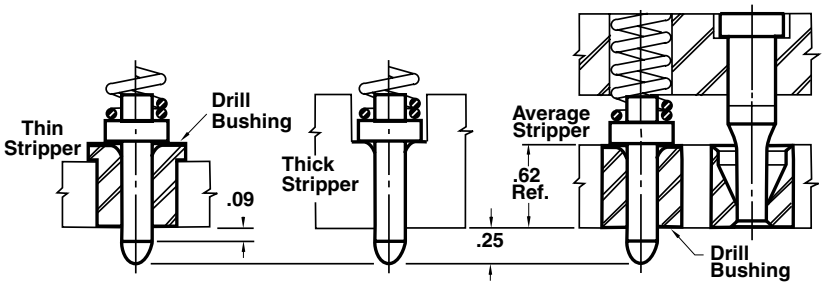




*Length slightly less for diameters under .238.

Material
Steel: A2, RC 60-63

FDS® FIRM DELIVERY SCHEDULE
1 Day



HOW TO ORDER

Specify:	Qty.	Type	H	P	Steel
Example:	2	VLX	50	P.156	A2

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.

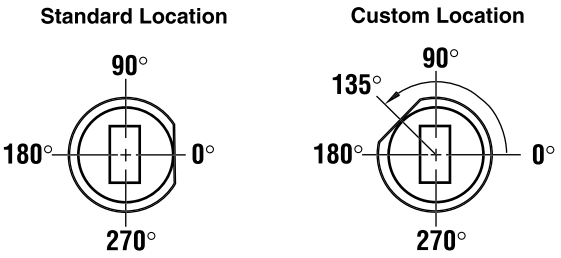
The parabolic point shape develops a smoothly curved surface, providing positive register in the hole.

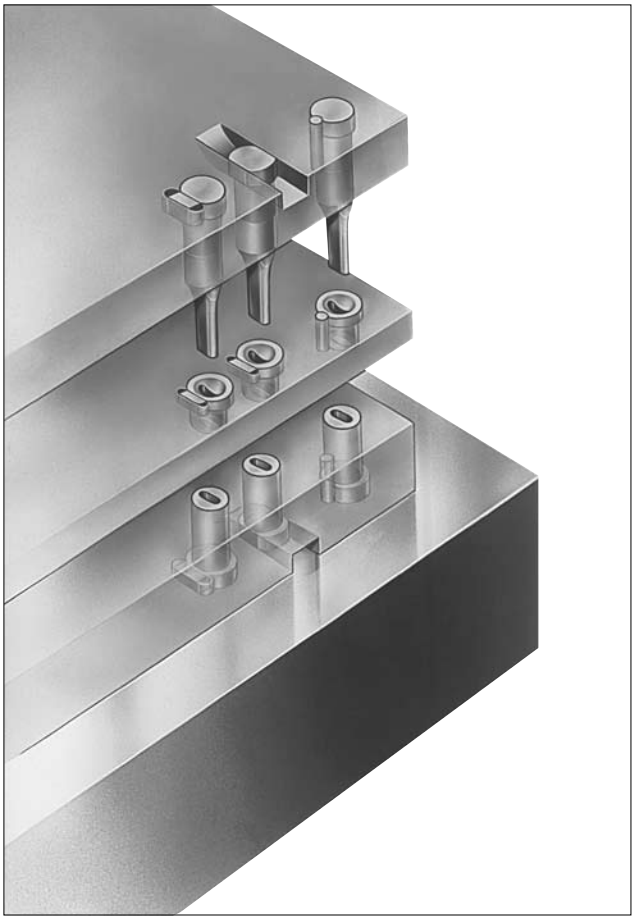
Catalog Number	Range P	Head Dia. H
VLX-50	.124-.2499	.500
VLX-62	.250-.3749	.625
VLX-75	.375-.5000	.750

Locking Devices—Ordering Information

Orientation

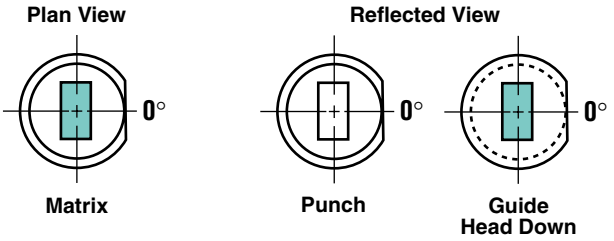
The standard location for all locking devices is at 0°, and is always on the long side (P) of the shape. Custom locations are measured counterclockwise from 0°. (See drawing below.)

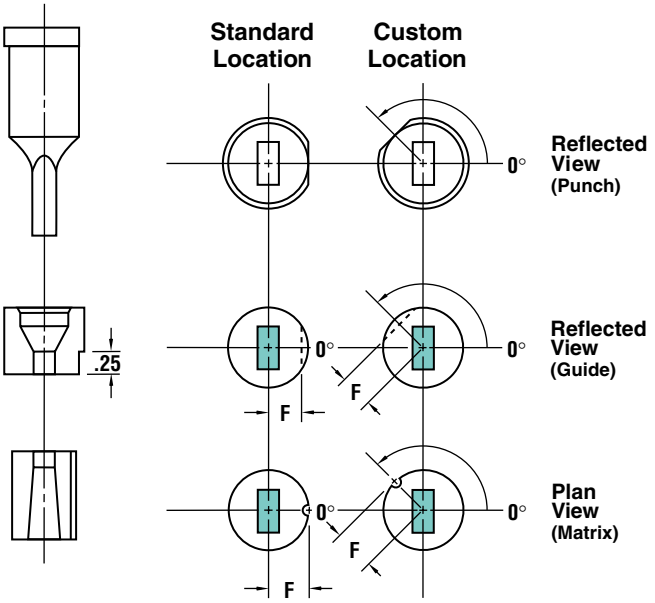




Views

A Plan View is used for the matrix, 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.

HOW TO ORDER

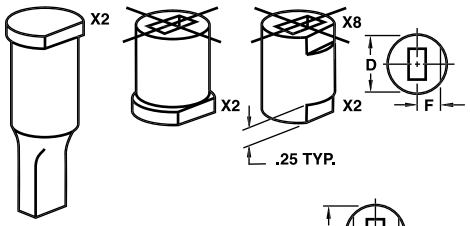
Specify:	Qty.	Type	Code	L	P (or P&W)	Steel
Example:	1	VJJ	37	312	P.321, W.189	A2, X2
	3	VRO	50	137	P.3125, W.1562	A2, X2

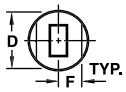
Location Tolerance

Flat		Dowel	
F	Radial	F	Radial
+ .0002 – .0000	.0005/ inch	+ .0002 – .0000	0°2'

Locking Devices—Flats vs. Dowel Slots

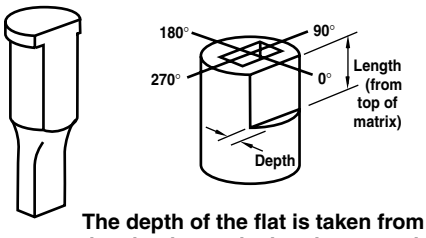
Flats





F Dimension
(.5D on Headed Products)
Headless Matrixes and Guides

Body Dia.	18	25	31	37	43	50
F	.080	.110	.135	.165	.190	.220
Body Dia.	**62**	**75**	**87**	**100**	**125**	**150**
F	.270	.325	.380	.435	.540	.650
Body Dia.	**175**	**200**	**225**	**250**	**275**	
F	.775	.900	1.025	1.150	1.275	



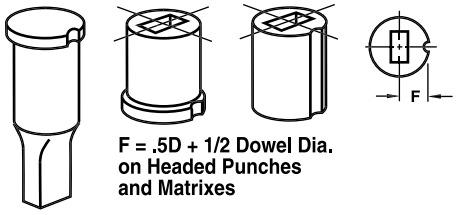
The depth of the flat is taken from the shank, not the head, on punches.

Key Flats vs. Dowel Slots

Maximum hole dimensions in matrixes were designed with key flats in mind. There are instances where, if using a dowel slot in a headless matrix, 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 matrix 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 Matrix construction.

Dowel Slots



F = .5D + 1/2 Dowel Dia. on Headed Punches and Matrixes

Standard and Alternate Locations

Definitions:
Standard Location is at 0°.
Alternate Location is 90°, 180°, or 270°.
Alternate Locations are available at no additional charge.

Custom Locations

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

Single Flats: X2 & X8

Locking Devices	Punches	Matrixes
X2	Top	Bottom
X8	N/A	Top

Order Example:
X2 — 90°

Single Flats: X5 & X9

Locking Devices	Punches	Matrixes
X5	Top	Bottom
X9	N/A	Top

Order Example:
X5 — 135°

Double Flats: X3

Locking Devices	Punches	Matrixes
X3	Top	Bottom

Order Example:
X3 — 90°

Second Flat is *always parallel* to the first flat.

Double Flats: X6

Locking Devices	Punches	Matrixes
X6	Top	Bottom

Order Example:
X6 — 135°

Additional Flats (From Top)

Code	Depth	Length
X81	.060	.500
X82	.060	.625
X83	.060	.750
X84	.060	Full Length
X85	.093	.500
X86	.093	.625
X87	.093	.750
X88	.093	Full Length
X89	Specify Dimensions	

Additional Flats (From Top)

Code	Depth	Length
X91	.060	.500
X92	.060	.625
X93	.060	.750
X94	.060	Full Length
X95	.093	.500
X96	.093	.625
X97	.093	.750
X98	.093	Full Length
X99	Specify Dimensions	

HEADLESS MATRIXES ONLY

Dowel Slots: X0, X4, & X41

Locking Devices	Dowel Diameter
X0	.1250
X4	.1250
X41	.1875

Order Example:
X0 — 180°

Dowel Slots: X1, X7, & X71

Locking Devices	Dowel Diameter
X1	.1250
X7	.1250
X71	.1875

Order Example:
X71 — 135°

F Dimension

Body Diameter		25	31	37	43	50	62-275
X0	F	.1250	.1562	.1875	.2188	.2500	.5D
X4		.1625	.1875	.2125	.2375	.2625	.5D
X41		.1938	.2188	.2438	.2688	.2938	.5D

F Dimension

Body Diameter		25	31	37	43	50	62-275
X1	F	.1250	.1562	.1875	.2188	.2500	.5D
X7		.1625	.1875	.2125	.2375	.2625	.5D
X71		.1938	.2188	.2438	.2688	.2938	.5D

Jektole® Data

The Engineered Clearance

Perforating punch-to-matrix 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 Δ 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., 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

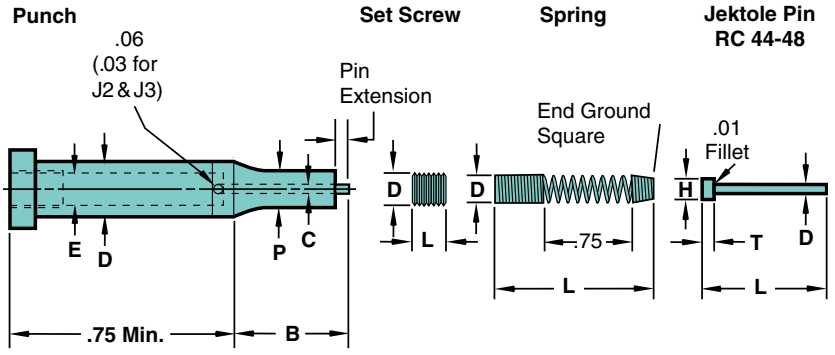
DIMENSION		J2	J3	J4	J6	J9	J12
Std. Shank Diameter	D	.1875	.2500	.3125	.3750 .4375 .5000	.6250 .7500 1.000	1.250 and larger
Point Hole Diameter	C	.020	.032	.046	.063	.094	.125
Shank Hole Diameter	E	.086	.109	.141	.172	.221	.275
Pin Extension		.03	.03	.06	.06	.06	.06
Keeper Key Number		920045			920053		*

* Keeper Key not available

Jektole® Design Limits

DIMENSION		J2	J3	J4	J6	J9	J12
Min. Shank Dia.	D	.172	.218	.282	.344	.442	.552
Min. Point Dia.	P	.040	.064	.092	.126	.188	.250
Max. Point Lgth.	B	1.25	1.50	1.62	1.62	1.62	1.62

Jektole® Components



Universal Jektole® Components

EJECTOR PINS		J2	J3	J4	J6	J9	J12
Overall Length	L	1.11	1.38	1.94	1.94	2.22	2.22
Pin Diameter	D	.017	.027	.041	.058	.089	.120
Head Diameter	H	.048	.073	.094	.120	.156	.188
Hd. Thickness	T	.031	.047	.062	.062	.094	.094
SPRINGS		**J2**	**J3**	**J4**	**J6**	**J9**	**J12**
Outside Dia.	D	.081	.104	.136	.167	.216	.270
Free Length	L	2.38	2.38	3.19	3.00	3.03	2.56
Pressure (.12" Pre-load)	lbs.	.5	.75	1	1.5	2	2.5
SCREWS		**J2**	**J3**	**J4**	**J6**	**J9**	**J12**
Screw Size	D	#3-48	#5-40	#8-32	#10-32	1/4-28	5/16-24
Screw Length	L	.19	.19	.19	.19	.25	.25

Other Dayton Products

Ball Lock Punches, Matrixes, Pilots, and Retainers

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

Dayton *True Position® Retainers* (the recognized industry standard) eliminate hand fitting, reduce mounting time, and are ideally suited for both round and complex-shaped products. True Position® allows easy replacement of broken or worn punches.

MaxLife® Die Springs

Dayton *MaxLife® Die Springs* are: made to exact specifications; manufactured to outperform and outlast other major brands; designed specifically for press and mold dies; and ensure optimum operation in heavy industry applications. Corrosion-resistant Dayton die springs are made from pre-tempered chrome silicon wire, and optimize the working life of press and mold dies.

Urethane Stripping and Forming Products

Durable, yet flexible, Dayton urethane strippers and forming products provide superior stripping over conventional strippers; develop higher load-bearing capacity; are tear- and oil-resistant; provide exceptional dampening; and are easy to install and replace.

Dayton dual durometer *SMARTStrip™ Strippers* (two elastomers molded into a single piece) are a cost-effective alternative to metal spring strippers.

Dayton provides a full range of leading-edge die component products: headed punches, guides, and matrixes; positive-locking Ball Lock products; retainers; slug-ejection punches; retaining systems; die springs; self-lubricating bearings and plates; and others. For details, contact Dayton Progress or your nearest Dayton Progress Distributor.

® True Position and Max Life are registered trademarks of Dayton Progress.
™ SMARTStrip is a trademark of Dayton Progress.

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.

Features/Benefits

Dayton VersaPlus® premium products include: ***Jektole® Punches (slug ejection punches); Regular Punches; Straight Punches; Regular Pilots;*** and ***Positive Pick-Up Pilots.***

VersaPlus® standard features include:

- Precision concentricity between the point and the shank, resulting in better punch and die alignment
- A super-smooth finish on the point, resulting in less galling and reduced maintenance effort and costs
- State-of-the-art coatings that provide superior hardness

VersaPlus® benefits include:

- Increased wear resistance
- Less sharpening time
- Lower maintenance costs
- Longer die runs
- Reduced operating costs

State-of-the-art Coatings

Dayton Progress is the industry's technology leader with the largest selection of leading-edge coatings. These coatings are designed to:

- Increase material hardness
- Reduce galling
- Increase corrosion resistance
- Eliminate loss of resistance after sharpening
- Improve wear

In addition to manufacturing, Dayton Progress maintains and operates full-service proprietary prep, metallurgy lab, and special treatment facilities. This means improved pricing and faster delivery on all coated products.

A few of the advanced PVD coatings include:

- DayTiN® (XNT)—hard as carbide; general-purpose coating for mild steels.
- TiCN (XCN)—harder than carbide; ideal for aluminum, galvanized, and stainless steels.
- TiALN—ultra hard; perfect for HSLA, dual-phase, and TRIP steels.

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

® VersaPlus is a registered trademark of Dayton Progress.

VersaPlus® Premium Products

PUNCHES

Standard features on all Dayton VersaPlus® punch products include precision concentricity between the point and the shank (resulting in better punch and die alignment); a super-smooth finish on the point (resulting in less galling and reduced maintenance costs); and state-of-the-art-coatings that provide superior hardness.

Jektole® Punches

VersaPlus® Jektole® Punches permit doubling punch to matrix clearance; produce up to three times (or more) the number of hits between sharpenings; and reduce burr heights.

Regular Punches

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

Straight Punches

VersaPlus® Straight Punches—Jektole® and Regular—are available in a wide range of sizes; can be designed and formed to accommodate your specific punching needs; and provide longer die runs, less downtime, and reduced maintenance costs.

PILOTS

Standard features on all Dayton VersaPlus® pilots include smoother pick-up action; less hole distortion; and state-of-the-art coatings to provide superior hardness.

Regular Pilots

VersaPlus® Regular 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 fabricating applications.

Positive Pick-Up Pilots

VersaPlus® Positive Pick-Up Pilots provide smoother pick-up without the risk of distorting the hole; in addition, the unique design moves the stock farther than conventional pilots.

If optimum performance is a MUST, this may be the only punch you'll ever need!

VersaPlus® sets the new industry standard for high-performance punches and pilots. VersaPlus® means less downtime, longer production runs, and better value for your stamping dollar.

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