



THE INNOVATOR OF OUR INDUSTRY®

# Precision Punches

Metric



## Heat Treatment for Tool Steel

Punches must be heat treated correctly and with great care if they are to perform at their best.

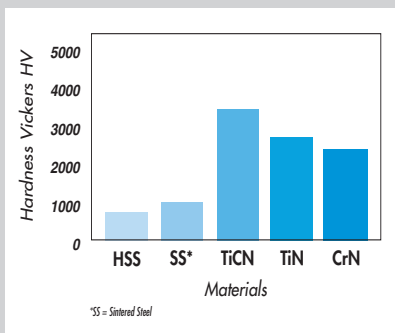
Tool steel heated to 650° C in an atmosphere furnace is prone to decarburization, even in the purest atmosphere.

Decarburization results in poor wear resistance, cracks, dimensional inconsistencies, and low fatigue resistance.



All Danly punches, matrixes, and guide bushings are vacuum heat treated in computerized vacuum furnaces. The components are then quenched in nitrogen within the furnace. The result is a very fine grain structure which provides high wear resistance, high shock resistance, and dimensional consistency, day after day, year after year.

## Hardness Comparison



HSS + TiCN (3000 - 3400 HV)

HSS + TiN (2300 - 2500 HV)

HSS + CrN (2000 - 2400 HV)

The technology of physical Vapor Deposition (PVD) provides a very high surface hardness, which reduces wear and significantly increases the life of punches, matrixes and guide bushings. Coatings add 0,003 mm to 0,004 mm to the working surface of the coated part. This option is available for HSS steel.

**Carbide and Other Steel Grades** - available upon request.

## Our Steels and Procedures

**HWS:** (58 – 60 HRC)

- Good wear resistance, high toughness.
- Effective under normal conditions of shock and wear.

**HSS:** (62 – 64 HRC)

- High wear resistance, good toughness.
- Very good performance at high stamping speeds.
- Well suited for punching high tensile strength steel.

**HSS + Nitriding:** (68 HRC)












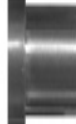


- This process introduces nitrogen atoms into the steel surface, increasing the surface hardness of the punch.
- This low cost process increases punch life for most applications.
- Particularly well-suited for punching abrasive materials.
- This option is available for HSS steel.

**Sintered Steel:** (64 – 66 HRC)

- Very high wear resistance, good toughness.
- Ideal for very large production runs requiring high wear and shock resistance.

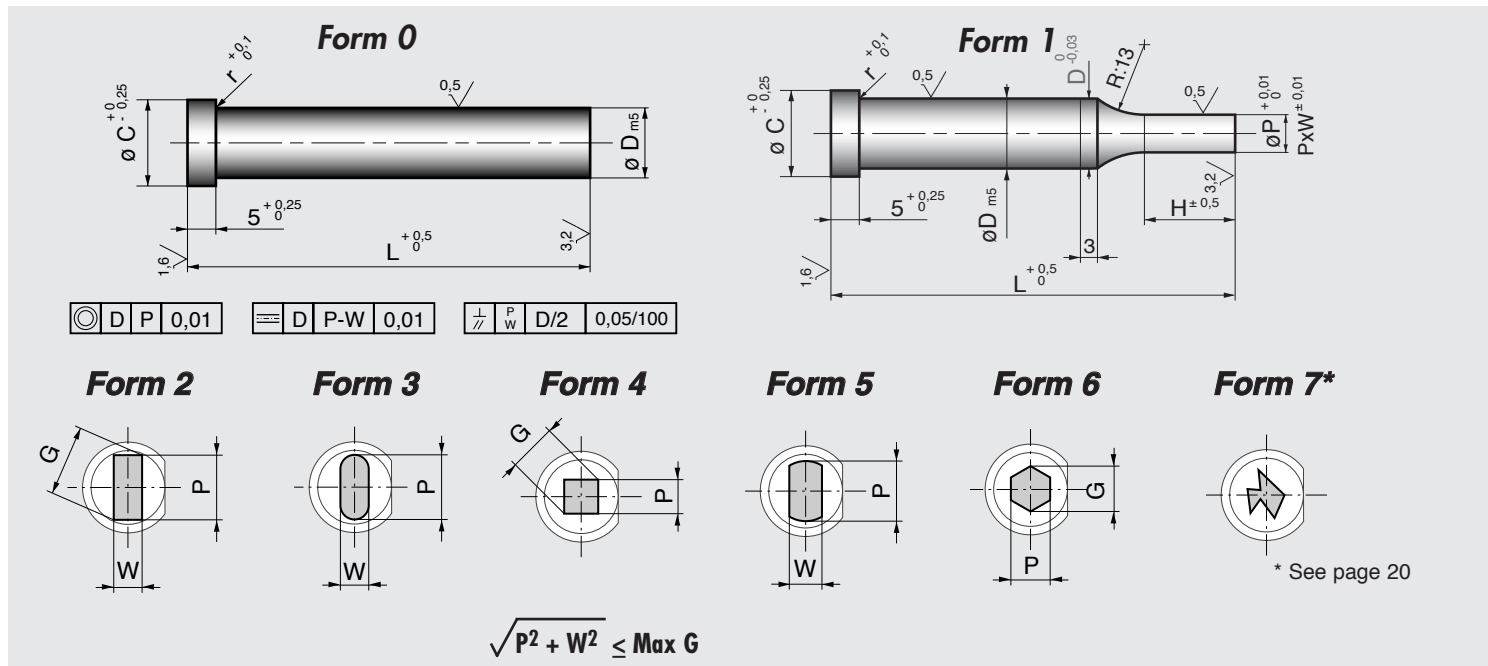


**Punch Type**

	<b>P</b>	<b>Cylindrical Head Punches</b> ISO 8020 . . . . .	<b>4</b>
	<b>P</b>	<b>Cylindrical Head Punches</b> ISO 8021 . . . . . intermediate shank diameters	<b>5</b>
	<b>Q</b>	<b>Cylindrical Head Punches</b> ISO 8020 . . . . . ejector style	<b>6</b>
		<b>Ejector Punches and Punch Alterations</b> . . . . .	<b>7</b>
	<b>R/S</b>	<b>Cylindrical Head Punches</b> Tol: m <sup>5</sup> /h <sup>6</sup> . . . . .	<b>8-9</b>
	<b>T</b>	<b>Cylindrical Head Punches</b> DIN 9837 . . . . .	<b>10</b>
	<b>U</b>	<b>Cylindrical Head Punches</b> reinforced head . . . . .	<b>11</b>
	<b>V</b>	<b>60° Conical Head Punches</b> . . . . .	<b>12-13</b>
	<b>H</b>	<b>30° Conical Head Punches</b> . . . . .	<b>14</b>
	<b>AO/AC</b>	<b>Pointed Pilot Punches</b> . . . . .	<b>15</b>
	<b>J</b>	<b>Headless Matrixes</b> ISO 8977 . . . . .	<b>16</b>
	<b>K</b>	<b>Headed Matrixes</b> ISO 8977, and <b>Matrixes Alterations</b> . . . . .	<b>17-18</b>
	<b>L/M/N</b>	<b>Guide Bushings</b> . . . . .	<b>19</b>
		<b>Classified Shapes</b> . . . . .	<b>20-21</b>
		<b>Technical Information</b> . . . . .	<b>22</b>

# P Cylindrical Head Punches

ISO 8020



D	L					Form 1 Std. Range P	Min. P	Max. P/G	Min. W	Std. H (•) / Alt.H(x)					C	r
	71	80	90	100	120					10	13	16	20	25		
5	•	•	•	•	•	3 - 4,95	1,6	4,95	2	•	x				8	0,25
6	•	•	•	•	•	3,5 - 5,95	1,6	5,95	2	•	x				9	0,25
8	•	•	•	•	•	5 - 7,95	2,5	7,95	3	•	•	x			11	0,25
10	•	•	•	•	•	5,5 - 9,95	3,2	9,95	4	•	•	x			13	0,25
13	•	•	•	•	•	6 - 12,95	5	12,95	5	•	•	•	x		16	0,4
16	•	•	•	•	•	8 - 15,95	6	15,95	6	•	•	•	•	x	19	0,4
20	•	•	•	•	•	10 - 19,95	8	19,95	8	•	•	•	•	x	24	0,4
25	•	•	•	•	•	12 - 24,95	11	24,95	11	•	•	•	•	x	29	0,4
32	•	•	•	•	•	16 - 31,95	16	31,95	16	•	•	•	•	x	36	0,4

HWS is not available in the length of 120 mm. Sintered steel is available only in the length 100 mm.

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

**Other:** 1 = HWS (body 58-60 HRC, head 45 HRC ±5)

3 = HSS + nitride

4 = Sintered steel (body 64-66 HRC, head 50 HRC ±5)

6 = HSS + TiN

Available surface treatments on request:

CrN, TiCN

## Here's How To Order:

**P22 13 120 W5.2 P10.5 H16**

Type P D=13,00 L=120 W=5,20 P=10,50 H=16  
HSS  
Form 2

**P20 20 100**

Type P D=20,00 L=100  
HSS  
Form 0

**P64 13 80 W0 P6.2 H13**

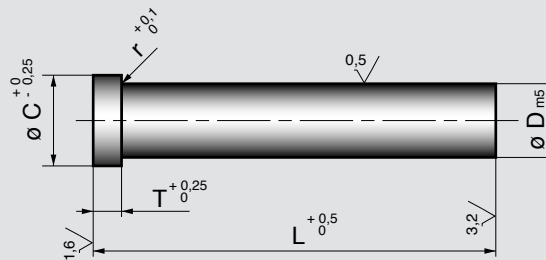
Type P D=13,00 L=80 W=0 P=6,20 H=13  
HSS+TiN  
Form 4

**P11 8 71 W0 P5 H10**

Type P D=8,00 L=71 W=0 P=5,00 H=10  
HWS  
Form 1

**P Cylindrical Head Punches, intermediate shank diameters** ISO 8021

Form 0



⊙ D P 0,01
▨ D P-W 0,01
⊕<sub>z</sub> P W D/2 0,05/100

D <sub>m5</sub>	L			C	T	r
	71	80	100			
2	•	•	•	3,5	3	0,25
2,5			•	4	3	0,25
3	•	•	•	5	3	0,25
3,2			•	5	3	0,25
4	•	•	•	6	3	0,25
6,3			•	9	5	0,25
7			•	10	5	0,25
8,1 → 8,4			•	11	5	0,25
8,5 → 8,9			•	11,5	5	0,25
9			•	12	5	0,25
9,1 → 9,4			•	12	5	0,25
9,5 → 9,9			•	12,5	5	0,25
10,1 → 10,4			•	13	5	0,4
10,5			•	13,5	5	0,4
10,6 → 10,9			•	13,5	5	0,4
11			•	14	5	0,4
11,1 → 11,4			•	14	5	0,4
11,5			•	14,5	5	0,4

D <sub>m5</sub>	L			C	T	r
	71	80	100			
11,6 → 11,9			•	14,5	5	0,4
12			•	15	5	0,4
12,1 → 12,4			•	15,5	5	0,4
12,5			•	15,5	5	0,4
12,6 → 12,9			•	15,5	5	0,4
13,5			•	16,5	5	0,4
14			•	17	5	0,4
14,5			•	17,5	5	0,4
15			•	18	5	0,4
15,5			•	18,5	5	0,4
17			•	21	5	0,4
18			•	22	5	0,4
19			•	23	5	0,4
22			•	26	5	0,4
24				28	5	0,4
26				30	5	0,4
28				32	5	0,4
30				34	5	0,4

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

**Other:** 1 = HWS (body 58-60 HRC, head 45 HRC ±5)

3 = HSS + nitride

6 = HSS + TiN

Available surface treatments on request:

CrN, TiCN

Here's How To Order:

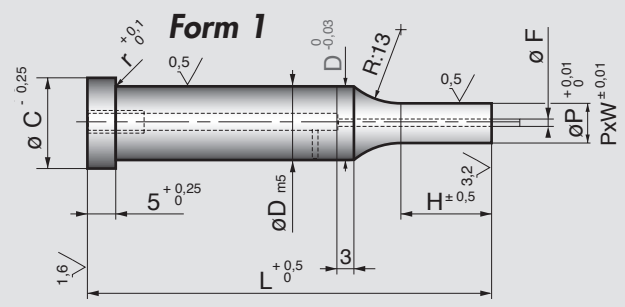
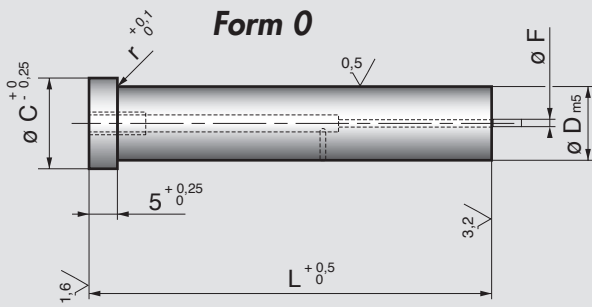
<b>P22</b>	<b>15.5</b>	<b>100</b>	<b>W8.2</b>	<b>P10.5</b>	<b>H16</b>
Type P	D=15,50	L=100	W=8,20	P=10,50	H=16
HSS					
Form 2					

<b>P20</b>	<b>10.3</b>	<b>100</b>
Type P	D=10,30	L=100
HSS		
Form 0		

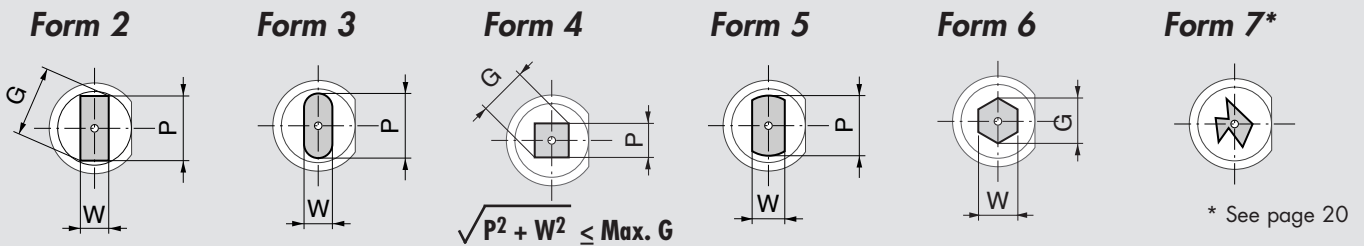
Alternative dimensions to those above can be specified.  
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

**Q Cylindrical Head Punches** ejector style

ISO 8020



$\text{D}$	$\text{P}$	0,01	$\text{D}$	$\text{P-W}$	0,01	$\frac{\text{P}}{\text{W}}$	$\frac{\text{D}}{2}$	0,05/100
------------	------------	------	------------	--------------	------	-----------------------------	----------------------	----------



D	L					Form 1 Std. Range P	Min. P	Max. P/G	Min. W	Std. H (•) / Alt.H(x)					C	r
	71	80	90	100	120					10	13	16	20	25		
5	•	•	•	•		3 - 4,95	1,6	4,95	2	•	x				8	0,25
6	•	•	•	•		3,5 - 5,95	1,6	5,95	2	•	x				9	0,25
8	•	•	•	•	•	5 - 7,95	2,5	7,95	3	•	•	x			11	0,25
10	•	•	•	•	•	5,5 - 9,95	3,2	9,95	4	•	•	x			13	0,25
13	•	•	•	•	•	6 - 12,95	5	12,95	5	•	•	•	x		16	0,4
16	•	•	•	•	•	8 - 15,95	6	15,95	6	•	•	•	•	x	19	0,4
20	•	•	•	•	•	10 - 19,95	8	19,95	8	•	•	•	•	x	24	0,4
25	•	•	•	•	•	12 - 24,95	11	24,95	11	•	•	•	•	x	29	0,4
32	•	•	•	•		16 - 31,95	16	31,95	16	•	•	•	•	x	36	0,4

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

**Other:** 1 = HWS (body 58-60 HRC, head 45 HRC ±5)

3 = HSS + nitride

6 = HSS +TiN

Available surface treatments on request: CrN, TiCN

Here's How To Order:

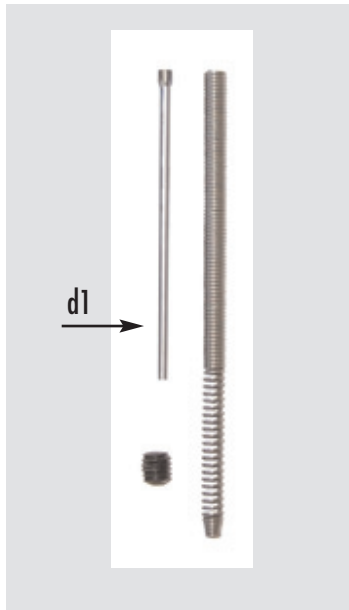
**Q22 13 100 W5.2 P10.5 H16**  
 Type Q D=13,00 L=100 W=5,20 P=10,50 H=16  
 HSS  
 Form 2

**Q20 20 80**  
 Type Q D=20,00 L=80  
 HSS  
 Form 0

**Q64 13 80 W0 P6.2 H13**  
 Type Q D=13,00 L=80 W=0 P=6,20 H=13  
 HSS+TiN  
 Form 4

**Q11 8 71 W0 P5 H10**  
 Type Q D=8.00 L=71 W=0 P=5,00 H=10  
 HWS  
 Form 1

## Ejector Punches



F	L	Ref. 5005 d1 x L
1	71	0,9 x 71
1	80	0,9 x 80
1	90	0,9 x 90
1	100	0,9 x 100
1,3	71	1,2 x 71
1,3	80	1,2 x 80
1,3	90	1,2 x 90
1,3	100	1,2 x 100
1,3	120	1,2 x 120
1,6	71	1,5 x 71
1,6	80	1,5 x 80
1,6	90	1,5 x 90
1,6	100	1,5 x 100
1,6	120	1,5 x 120
2,4	71	2,3 x 71
2,4	80	2,3 x 80
2,4	90	2,3 x 90
2,4	100	2,3 x 100
2,4	120	2,3 x 120

Here's How To Order:

**5005 2.3 71**

Ref. d1=2,3 L=71

## Punch Alterations

### Standard Location and Custom Location

Standard location of key flat is at 0°.

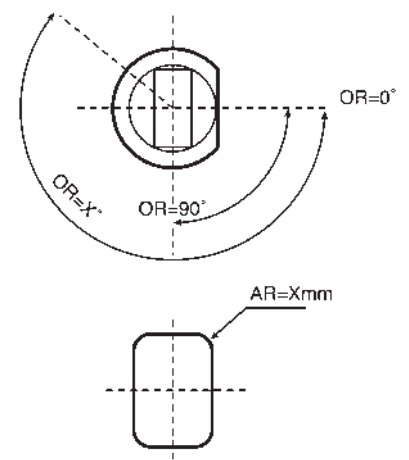
No specified on order for standard forms.

Alternate location and custom location can be specified on request.

### Custom Shape Radius

Custom radius can be specified on request.

Type P and Type Q Punches	Standard	Alternate
Location of key flat	// P 0°	on request
Overall length shortened	71 - 80 - 90 - 100 - 120*	on request
Precision overall length	0/+0,5 mm	0/+0,25
Straight before radius	10 - 13 - 16 - 20 - 25	on request
Head thickness	5 mm	on request
Head diameter	D + 3 mm	on request
Head tolerance	0/+0,25 mm	0/-0,05
Shape radius	0 mm	on request



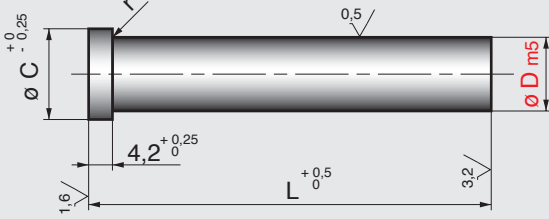
\* Length 120 mm is available for Type Q, Ø8 to Ø25.

# R/S Cylindrical Head Punches

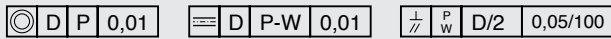
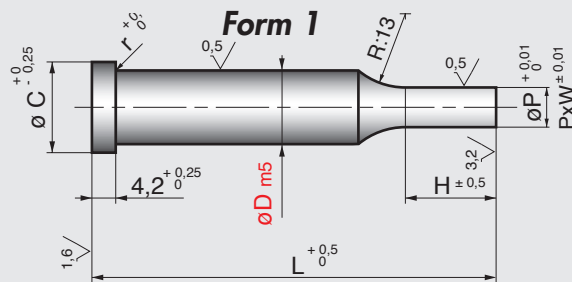
tol: m<sup>5</sup> / h<sup>6</sup>

**TYPE R** Tolerance D = m5

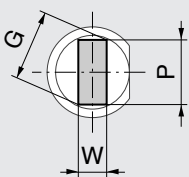
**Form 0**



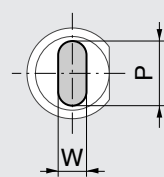
**Form 1**



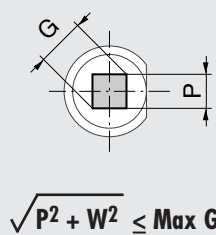
**Form 2**



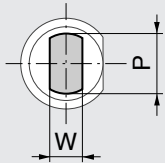
**Form 3**



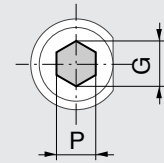
**Form 4**



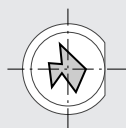
**Form 5**



**Form 6**



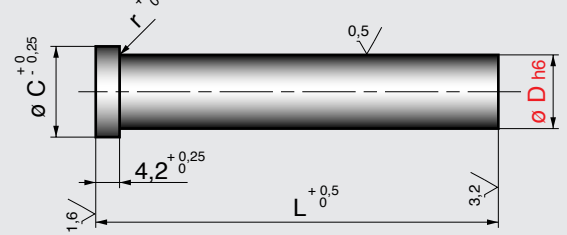
**Form 7\***



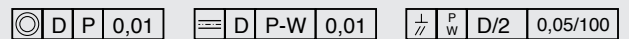
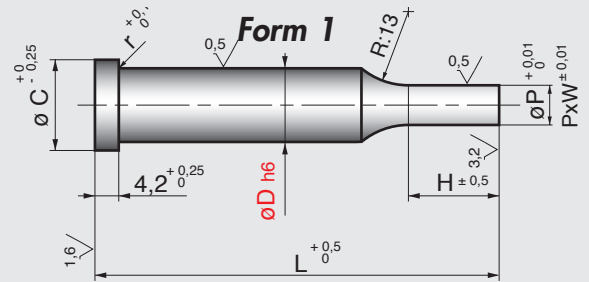
\*See page 20

**TYPE S** Tolerance D = h6

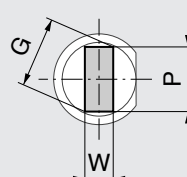
**Form 0**



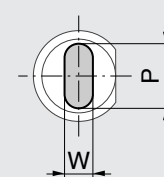
**Form 1**



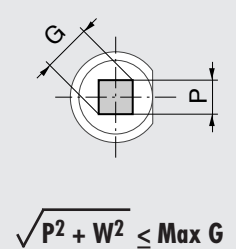
**Form 2**



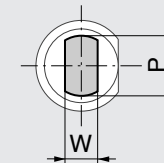
**Form 3**



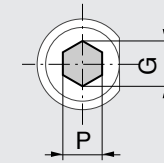
**Form 4**



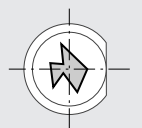
**Form 5**



**Form 6**



**Form 7\***



\*See page 20

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

**Other:** 1 = HWS (body 58-60 HRC, head 45 HRC ±5)

3 = HSS + nitride

6 = HSS + TiN

Available surface treatments on request: CrN, TiCN

D	L				Form 1 Range P	Max.P/G	Mini. W	H	C	r
	71	80	100	120						
0,5									1	
0,6 / 0,7									1,3	
0,8 / 0,9									1,5	
1	•	•	•						2	
1,01 → 1,20			•						2,2	
1,21 → 1,40			•						2,5	
1,41 → 1,49			•						3	
1,5	•	•	•						3	
1,51 → 1,70			•						3	
1,71 → 1,90			•						3,2	
1,91 → 1,99			•						3,5	
2	•	•	•	•	0,5 - 1,99	1,99	0,8	7	3,5	
2,1 / 2,2			•						3,7	
2,3 / 2,4			•						4	
2,5			•						4	
2,6 → 2,9			•						4,5	
3	•	•	•	•	1,6 - 2,99	2,99	1,3	7	5	0,25
3,1 → 3,4			•						5	
3,5	•	•	•						5,5	
3,6 → 3,9			•						5,5	
4	•	•	•	•	1,6 - 3,99	3,99	1,5	10	6,5	
4,1 → 4,4			•						6,5	
4,5	•	•	•						7	
4,6 → 4,9			•						7	
5	•	•	•	•	1,6 - 4,99	4,99	2	10	8	
5,1 → 5,4			•						8	
5,5 → 5,9			•						8,5	
6	•	•	•	•	1,6 - 5,99	5,99	2	10	9	
6,1 → 6,4			•						9	
6,5 → 6,9			•						9,5	
7			•						10	
7,1 → 7,4			•						10	
7,5 → 7,9			•						10,5	

HWS is not available in the length of 120 mm.

### Here's How To Order:

<b>R20</b>	<b>5</b>	<b>71</b>
Type R	D=5,00	L=71
HSS		
Form 0		

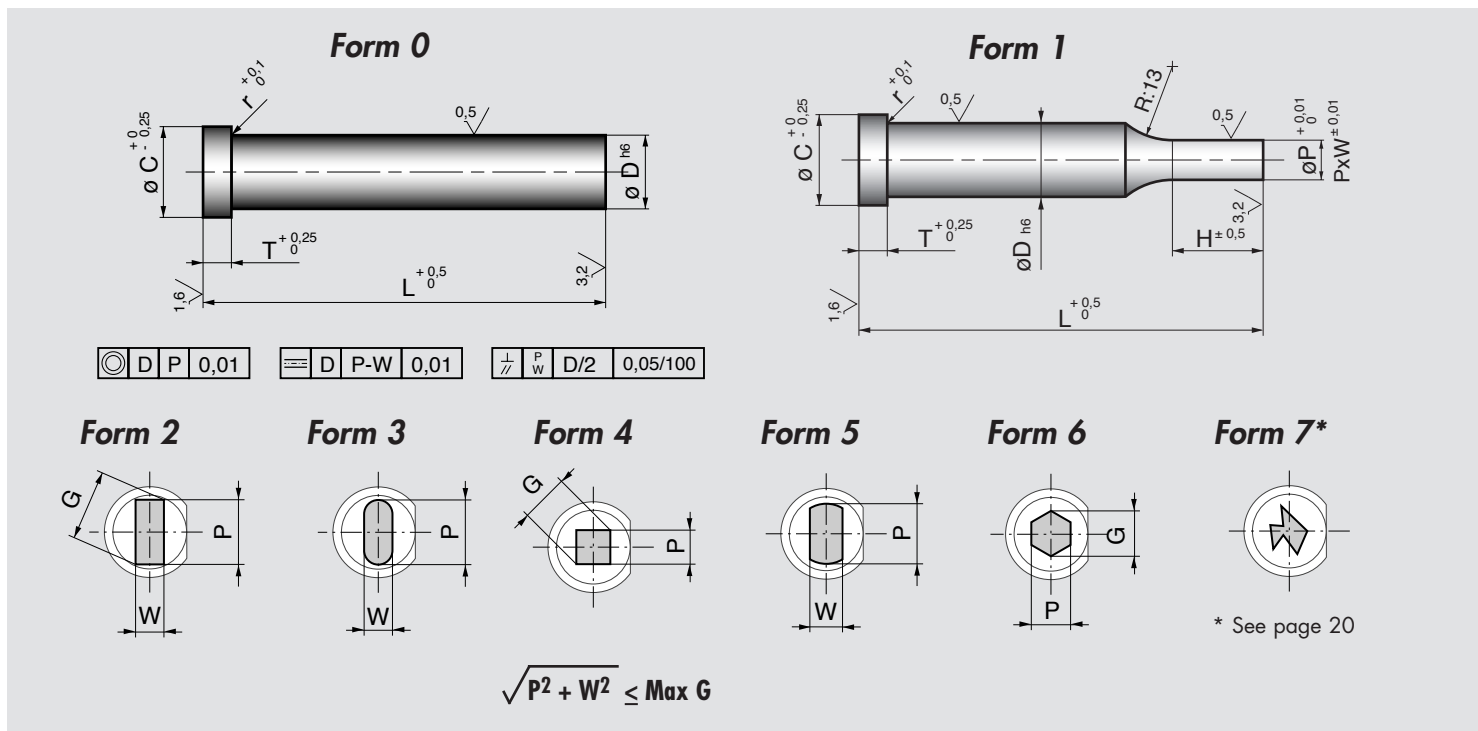
<b>S20</b>	<b>3</b>	<b>80</b>
Type S	D=3,00	L=80
HSS		
Form 0		

<b>R62</b>	<b>6</b>	<b>80</b>	<b>W2.2</b>	<b>P4.2</b>	<b>H10</b>
Type R	D=6,00	L=80	W=2,20	P=4,20	H=10
HSS+TiN					
Form 2					

<b>S11</b>	<b>4</b>	<b>100</b>	<b>W0</b>	<b>P2.5</b>	<b>H10</b>
Type S	D=4,00	L=100	W=0	P=2,50	H=10
HWS					
Form 1					

# T Cylindrical Head Punches

DIN 9837



D	L			Form 1 Std. Range P	Min. P	Max. P/G	Min. W	H	T	C	r
	71	80	100								
2	•		•	0,5 - 1,95	0,5	1,95	0,8	7	3,15	3,5	0,25
3	•		•	1,6 - 2,95	1,6	2,95	1	7	3,15	5	0,25
4	•		•	1,6 - 3,95	1,6	3,95	1,5	10	3,15	6,5	0,25
5	•		•	1,6 - 4,95	1,6	4,95	2	10	3,15	8	0,25
6	•		•	1,6 - 5,95	1,6	5,95	2	10	3,15	9	0,25
8	•		•	2,5 - 7,95	2,5	7,95	3	13	4,2	11	0,25
10	•		•	3,2 - 9,95	3,2	9,95	4	13	4,2	13	0,25
13			•	5 - 12,95	5	12,95	5	16	4,2	16	0,4
16			•	8 - 15,95	8	15,95	6	18	4,2	19	0,4
20			•	10 - 19,95	10	19,95	8	20	4,2	24	0,4
25			•	12 - 24,95	12	24,95	11	20	4,2	29	0,4

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

**Other:** 3 = HSS + nitride

6 = HSS + TiN

Available surface treatments on request: CrN, TiCN

## Here's How To Order:

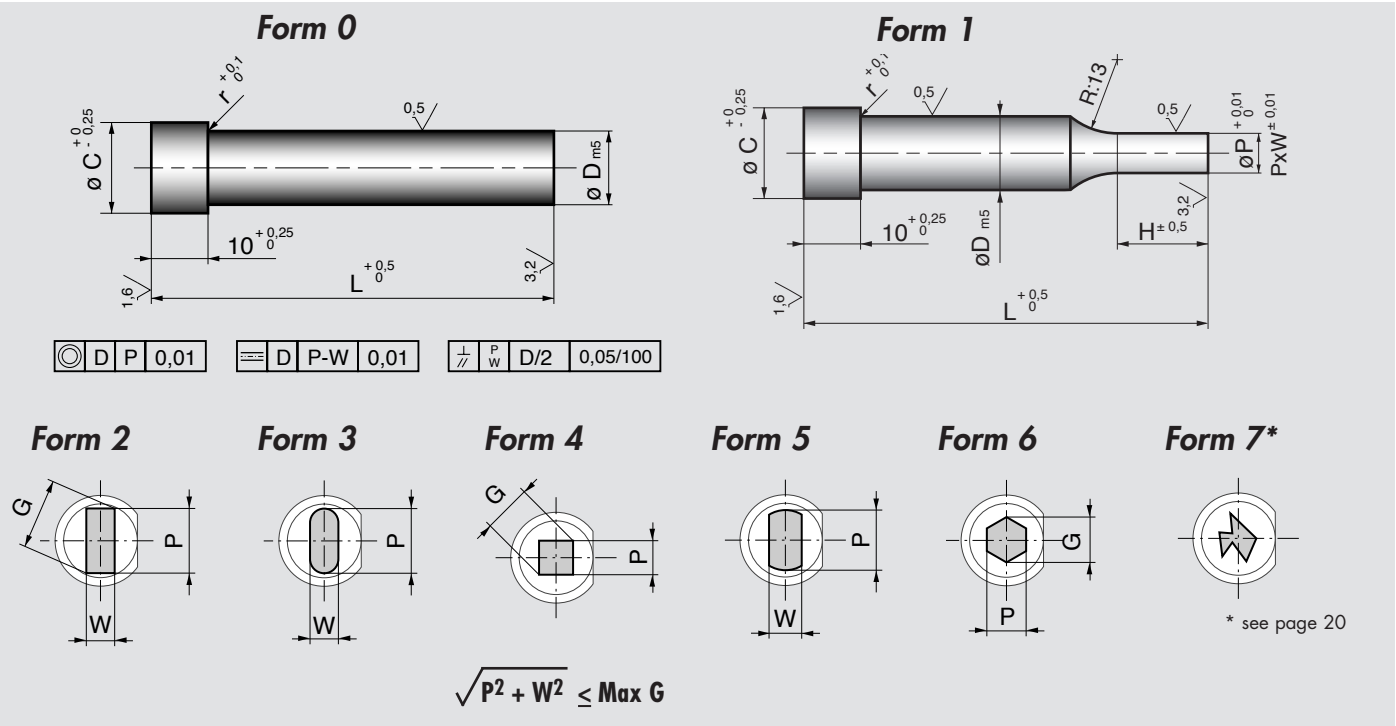
**T22 16 100 W8.5 P13.5 H18**

Type T   D=16,00   L=100   W=8,5   P=13,5   H=18  
HSS  
Form 2

**T20 13 100**

Type T   D=13,00   L=100  
HSS  
Form 0

# U Cylindrical Head Punches, reinforced head



D	L				Form 1 Std. Range P	Min. P	Max. P/G	Min. W	Std. H	C	r
	71	80	100	120							
5					3 - 4,95	1,6	4,95	1,6	10	8	0,25
6					3,5 - 5,95	1,6	5,95	1,6	10	9	0,25
8			●		5 - 7,95	2,5	7,95	2,5	13	11	0,25
10			●		5,5 - 9,95	3,2	9,95	3,2	13	13	0,25
13			●		6 - 12,95	5	12,95	5	16	16	0,4
16			●		8 - 15,95	8	15,95	6	18	19	0,4
20			●		10 - 19,95	10	19,95	8	20	24	0,4
22			●		12 - 21,95	12	21,95	10	20	26	0,4
25			●		12 - 24,95	12	24,95	11	20	29	0,4

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

**Other:** 3 = HSS + nitride  
6 = HSS + TiN

Available surface treatments on request: CrN, TiCN

## Here's How To Order:

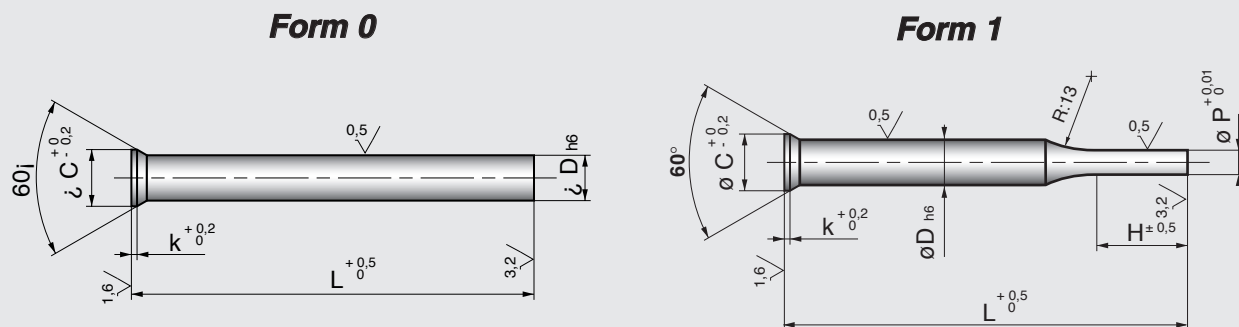
<b>U22</b>	<b>16</b>	<b>100</b>	<b>W8.2</b>	<b>P13.5</b>	<b>H18</b>
Type U	D=16,00	L=100	W8,20	P=13,50	H18
HSS					
Form 2					

<b>U20</b>	<b>13</b>	<b>120</b>
Type U	D=13,00	L=120
HSS		
Form 0		

Alternative dimensions to those above can be specified.  
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

# V 60° Conical Head Punches

DIN 9861



© D P 0,01

D <sub>h6</sub>	L				P	H	C	K
	71	80	100	120				
0,5	•						0,9	0,2
0,55	•						1	0,2
0,60	•						1,1	0,2
0,65	•						1,2	0,2
0,70 - 0,75	•						1,3	0,2
0,80 - 0,85	•						1,4	0,4
0,90 - 0,95	•						1,6	0,4
1	•	•	•				1,8	0,5
1,10	•		•				1,8	0,5
1,20 - 1,30	•		•				2	0,5
1,40	•		•				2,2	0,5
1,50	•		•				2,2	0,5
1,60 - 1,70	•		•				2,5	0,5
1,80 - 1,90	•		•				2,8	0,5
2	•	•	•	•	0,5 / 1,99	7	3	0,5
2,1 - 2,2	•		•		D-1,5 / D-0,01	7	3,2	0,5
2,3 - 2,4	•		•		D-1,5 / D-0,01	7	3,5	0,5
2,5	•	•	•		1,0 / 2,49	7	3,5	0,5
2,6 → 2,9	•		•		D-1,5 / D-0,01	7	4	0,5
3	•	•	•	•	1,5 / 2,99	7	4,5	0,5
3,1 → 3,4	•		•		D-1,5 / D-0,01	7	4,5	0,5
3,5 → 3,9	•		•		D-1,5 / D-0,01	7	5	0,5
4	•	•	•	•	2,0 / 3,99	10	5,5	0,5
4,1 → 4,4	•		•		D-1,5 / D-0,01	10	5,5	0,5
4,5 → 4,9	•		•		D-1,5 / D-0,01	10	6	0,5
5	•	•	•	•	3,0 / 4,99	10	6,5	0,5
5,1 → 5,4	•		•		D-1,5 / D-0,01	10	6,5	0,5
5,5 → 5,9	•		•		D-1,5 / D-0,01	10	7	0,5
6	•	•	•	•	3,5 / 5,99	10	8	0,5
6,1 → 6,4	•		•		D-1,5 / D-0,01	10	8	0,5
6,5 → 7,4	•		•		D-1,5 / D-0,01	10	9	1
7,5 → 7,9	•		•		D-1,5 / D-0,01	10	10	1

Alternative dimensions to those above can be specified.  
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

**V 60° Conical Head Punches** (cont.)

DIN 9861

Dh6	L				Form 1 Range P	H ±0,5	C <sup>0</sup> ±0,25	K ±0,1
	71	80	100	120				
8	•	•	•	•	5,0 / 7,99	13	10	1
8,1 → 8,4	•		•		D-1,5 / D-0,01	13	10	1
8,5 → 9,4	•		•		D-1,5 / D-0,01	13	11	1
9,5 → 9,9	•		•		D-1,5 / D-0,01	13	12	1
10	•	•	•	•	7,5 / 9,99	13	12	1
10,1 → 10,4			•		D-1,5 / D-0,01	13	12	1
10,5	•		•		7,5 / 10,49	13	13	1
10,6 → 10,9			•		D-1,5 / D-0,01	13	13	1
11			•		8,0 / 10,99	13	13	1
11,1 → 11,4			•		D-1,5 / D-0,01	13	13	1
11,5			•		8,5 / 11,49	13	14	1
11,6 → 11,9			•		D-1,5 / D-0,01	13	14	1
12			•		9,0 / 11,9	13	14	1
12,1 → 12,4			•		D-1,5 / D-0,01	13	14	1
12,5			•		9,5 / 12,49	13	15	1
12,6 → 12,9			•		D-1,5 / D-0,01	13	15	1
13	•	•	•	•	9,0 / 12,99	13	15	1
13,5 → 14			•		D-1,5 / D-0,01	13	16	1,5
14,5 → 15			•		D-1,5 / D-0,01	13	17	1,5
15,5			•		12,5 / 15,49	13	18	1,5
16	•	•	•	•	11,0 / 15,99	13	18	1,5
17			•		12,0 / 16,99	13	19	1,5
18			•		13,0 / 17,99	13	20	1,5
19			•		14,0 / 17,99	13	21	1,5
20	•	•	•		15,0 / 19,99	13	22	1,5

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

**Other:** 1 = HWS (body 58-60 HRC, head 45 HRC ±5)

3 = HSS + nitride

6 = HSS + TiN

Available surface treatments on request: CrN, TiCN

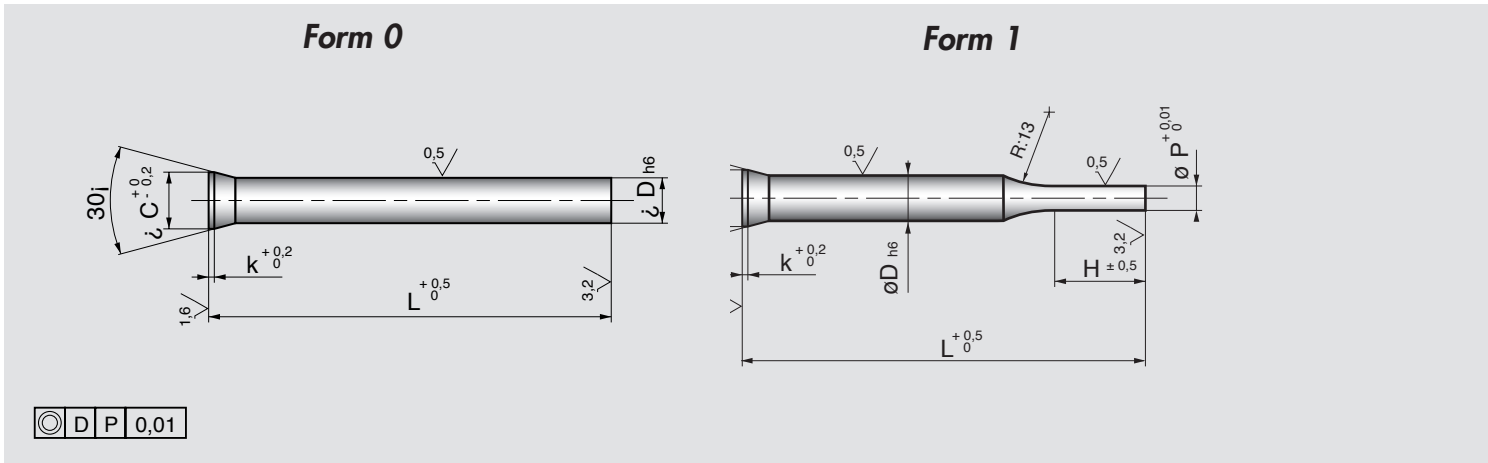
HWS is not available in the length of 120 mm.

**Here's How To Order:**

<b>V21</b>	<b>10</b>	<b>100</b>	<b>W0</b>	<b>P8</b>	<b>H13</b>
Type V HSS Form 1	D=10,00	L=100	W=0	P=8,00	H=13

<b>V20</b>	<b>13</b>	<b>100</b>
Type V HSS Form 0	D=13,00	L=100

# H 30° Conical Head Punches



Dh6	L			Form 1 Range P	H	C	K
	71	80	100				
2	•		•	0,5 - 1,99	7	3	0,5
2,5	•		•	0,5 - 2,49	7	3,5	0,5
3	•		•	1,6 - 2,99	7	4,5	0,5
3,5	•		•	1,6 - 3,49	7	5	0,5
4	•		•	1,6 - 3,99	10	5,5	0,5
5	•		•	1,6 - 4,99	10	6,5	0,5
6	•		•	1,6 - 5,99	10	8	0,5
8	•		•	2,5 - 7,99	13	10	1
10	•		•	3,2 - 9,99	13	12	1
13	•		•	5 - 12,99	16	15	1

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

**Other:** 1 = HWS (body 58-60 HRC, head 45 HRC ±5)

3 = HSS + nitride

6 = HSS + TiN

Available surface treatments on request: CrN, TiCN

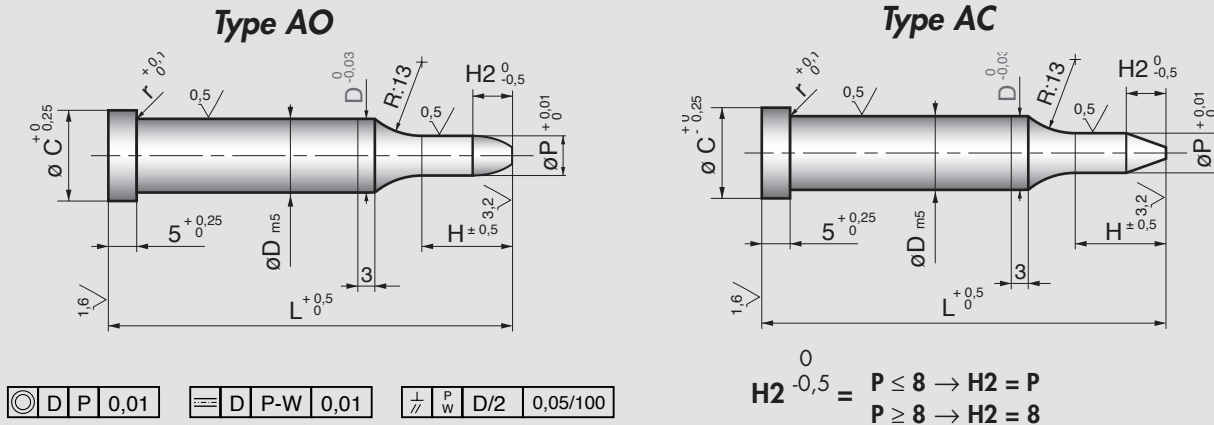
## Here's How To Order:

<b>H21</b>	<b>6</b>	<b>71</b>	<b>W0</b>	<b>P4</b>	<b>H10</b>
Type H HSS Form 1	D=6,00	L=71	W=0	P=4,00	H=10

<b>H20</b>	<b>5</b>	<b>100</b>
Type H HSS Form 0	D=5,00	L=100

# AO / AC Pointed Pilot Punches

ISO 8020



D	L					Form 1 Std. Range P	Min. P	Std. H	C	r
	71	80	90	100	120					
5	•	•	•	•	•	3 - 4,95	1,6	10	8	0,25
6	•	•	•	•	•	3,5 - 5,95	1,6	10	9	0,25
8	•	•	•	•	•	5 - 7,95	2,5	13	11	0,25
10	•	•	•	•	•	5,5 - 9,95	3,2	13	13	0,25
13	•	•	•	•	•	6 - 12,95	5	16	16	0,4
16	•	•	•	•	•	8 - 15,95	8	18	19	0,4
20	•	•	•	•	•	10 - 19,95	10	20	24	0,4
25	•	•	•	•	•	12 - 24,95	12	20	29	0,4
32	•	•	•	•	•	16 - 31,95	16	20	36	0,4

HWS is not available in the length of 120 mm.  
Sintered steel is available only in the length of 100 mm.

**Our Standard Material:** 2 = HSS (body 62-64 HRC, head 45 HRC ±5)

- Other:**
- 1 = HWS (body 58-60 HRC, head 45 HRC ±5)
  - 3 = HWS + nitride
  - 4 = Sintered steel (body 64-66 HRC, head 50 HRC ±5)
  - 6 = HSS + TiN

Available surface treatments on request: CrN, TiCN



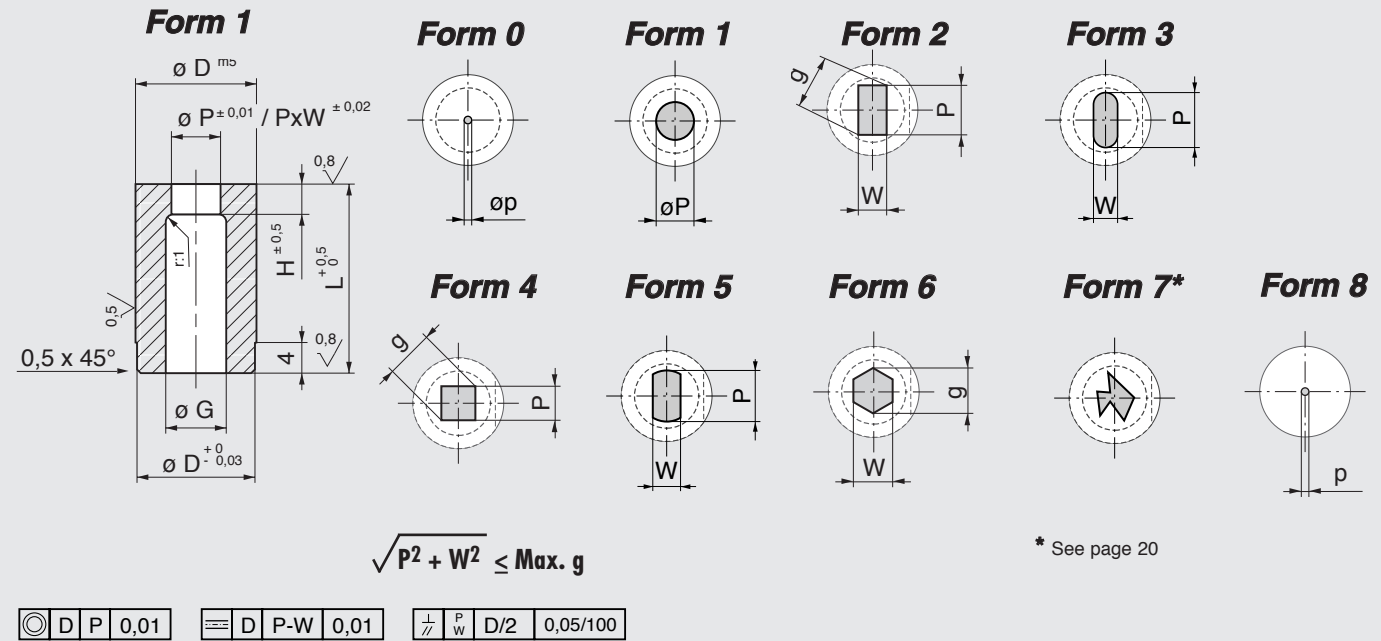
## Here's How To Order:

<b>A021</b>	<b>13</b>	<b>100</b>	<b>W0</b>	<b>P12.2</b>	<b>H16</b>
Type AO	D=13,00	L=100	W=0	P=12,20	H=16
HSS					
Form 1					

<b>AC21</b>	<b>13</b>	<b>100</b>	<b>W0</b>	<b>P12.2</b>	<b>H16</b>
Type AC	D=13,00	L=100	W=0	P=12,20	H=16
HSS					
Form 1					

# J Headless Matrixes

ISO 8977



Our Standard Material: **2** = HSS (body 62-64 HRC)

Our Standard:  $\varnothing D = m5$

On Request:  $\varnothing D = h5$

D	L			Form 1 Std. Range P	(p)	Max. P/g	Min. W	H	G
	20	25	32						
6	•	•	•	1,2 - 2,8	1	2,8	1,8	3	3
8	•	•	•	1,8 - 3,8	1	3,8	1,8	4	4
10	•	•	•	2,5 - 4,8	1	4,8	2	4 - 8	5
13	•	•	•	4,5 - 7,8	1,5	7,8	3	4 - 8	8
16	•	•	•	6,5 - 9,8	2	9,8	3	4 - 8	10
20	•	•	•	7,5 - 13,8	2	13,8	4	5 - 8	14
22	•	•	•	7,5 - 14,8	2	14,8	5	5 - 8	15
25	•	•	•	9,5 - 17,8	2,5	17,8	5	5 - 8	18
32		•	•	14 - 21,5	2,5	21,5	6	8	22
40		•	•	16 - 29,5	2,5	29,5	8	8	30
50		•	•	21 - 37,5	2,5	37,5	10	8	38

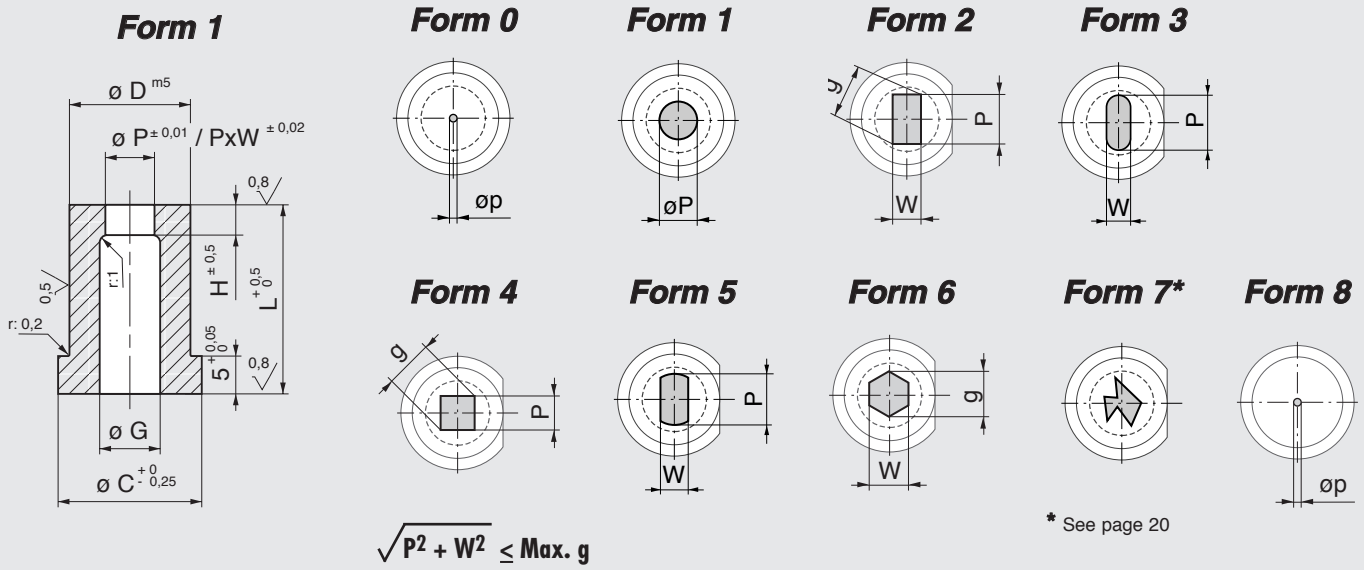
Here's How To Order:

<b>J21</b>	<b>13</b>	<b>25</b>	<b>W0</b>	<b>P7.5</b>	<b>H4</b>
Type J	D=13,00	L=25	W=0	P=7,50	H=4
HSS					
Form 1					

<b>J23</b>	<b>20</b>	<b>32</b>	<b>W8.2</b>	<b>P10</b>	<b>H8</b>
Type J	D=20,00	L=32	W=8,2	P=10	H=8
HSS					
Form 3					

# K Headed Matrixes

ISO 8977



D P 0,01	D P-W 0,01	$\frac{P}{W}$ D/2 0,05/100
----------	------------	----------------------------

Our Standard Material: **2** = HSS (body 62-64 HRC)

Our Standard: Ø D = m5

On Request: Ø D = h5

D	L			Form 1 Std. Range P	(p)	Max. P/g	Min. W	H	G	C
	20	25	32							
6	•	•	•	1,2 - 2,8	1	2,8	1,8	3	3	9
8	•	•	•	1,8 - 3,8	1	3,8	1,8	4	4	11
10	•	•	•	2,5 - 4,8	1	4,8	2	4 - 8	5	13
13	•	•	•	4,5 - 7,8	1,5	7,8	3	4 - 8	8	16
16	•	•	•	6,5 - 9,8	2	9,8	3	4 - 8	10	19
20	•	•	•	7,5 - 13,8	2	13,8	4	5 - 8	14	24
22	•	•	•	7,5 - 14,8	2	14,8	5	5 - 8	15	26
25	•	•	•	9,5 - 17,8	2,5	17,8	5	5 - 8	18	29
32		•	•	14 - 21,5	2,5	21,5	6	8	22	36
40		•	•	16 - 29,5	2,5	29,5	8	8	30	44
50		•	•	21 - 37,5	2,5	37,5	10	8	38	54

Here's How To Order:

<b>K21</b>	<b>13</b>	<b>25</b>	<b>W0</b>	<b>P7</b>	<b>H4</b>
Type K	D=13,00	L=25	W=0	P=7,00	H=4
HSS					
Form 1					

<b>K23</b>	<b>20</b>	<b>32</b>	<b>W8.2</b>	<b>P10.2</b>	<b>H8</b>
Type K	D=20,00	L=32	W=8,2	P=10,20	H=8
HSS					
Form 2					

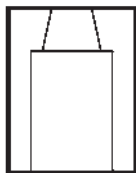
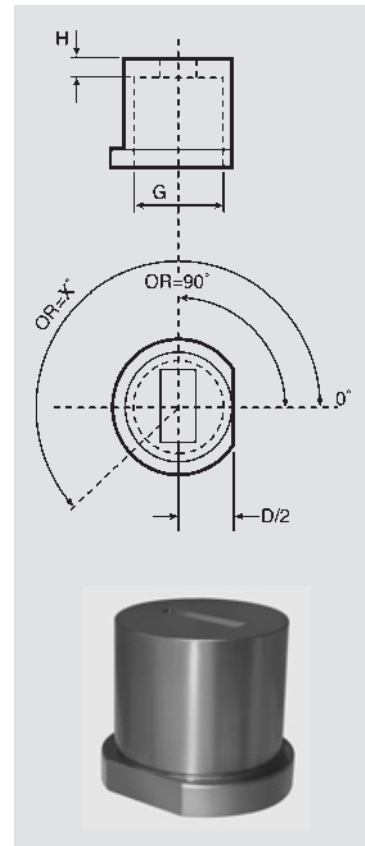
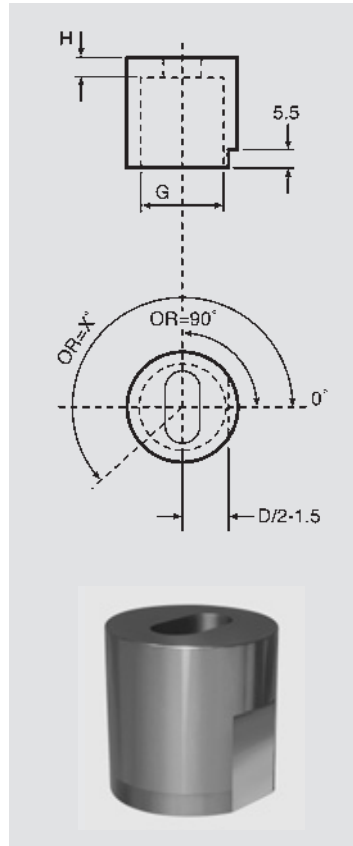
Alternative dimensions to those above can be specified.  
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

# Matrix Alterations

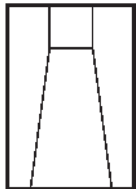
## Standard Location and Custom Location

Standard location of key flat is at 0°. No specified on order for standard forms.

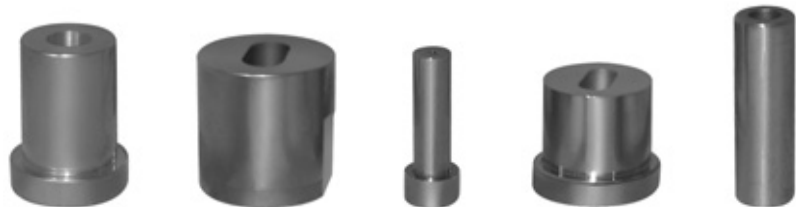
Alternate location and custom location can be specified on request.



**Conical Land**



**Conical Bore**

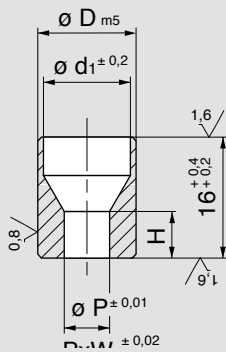


Type J and Type K Matrixes	Standard	Alternate	Custom
Location of key flat	0°	90° 180° 270°	on request
Overall length shortened	20 - 25 - 32	on request	on request
Conical land (H)		10' (per side)	on request
Conical bore (G)		1° (per side)	on request
G Dimension larger	see pages 16 & 17	on request	on request
D tolerance	m 5	h 5	
Precision G dimension larger: body D < 8		+ 0,2 G = P + 0,1	
Precision G dimension larger: body D > 10		+0,5 G = P + 0,1	

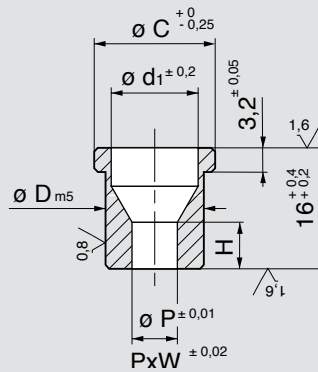
Alternative dimensions to those above can be specified.  
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

# L/M/N Guide Bushings (on special request)

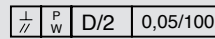
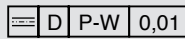
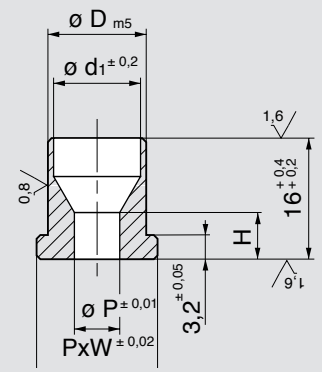
**TYPE L**



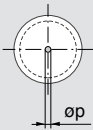
**TYPE M**



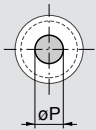
**TYPE N**



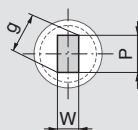
**Form 0**



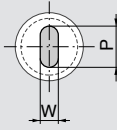
**Form 1**



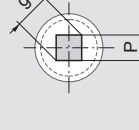
**Form 2**



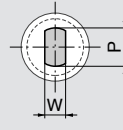
**Form 3**



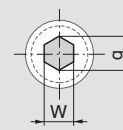
**Form 4**



**Form 5**



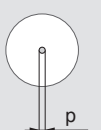
**Form 6**



**Form 7\***



**Form 8**



\* See page 20

$$\sqrt{P^2 + W^2} \leq \text{Max. } g$$

Material: 1 HWS

1 HWS

1 HWS

D <sub>m5</sub>	G	Form 1 Range P	p	Max.P/g	Min. W	H	C
6	4,8	1,2 - 4,4	1	4,4	1,2	0,86 P+1	9
8	6,8	1,8 - 6,4	1	6,4	1,8	0,86 P+1	11
10	8,5	2 - 8,1	1	8,1	2	0,86 P+1	13
13	11,5	2 - 11,1	1,5	11,1	2	0,86 P+1	16
16	13,5	2,5 - 13,1	2	13,1	2,5	0,86 P+1	19
20	17	2,5 - 16,6	2	16,6	2,5	0,86 P	24
22	19	2,5 - 18,6	2	18,6	2,5	0,86 P	26
25	21	3 - 20,6	2,5	20,6	3	0,86 P	29

## Here's How To Order:

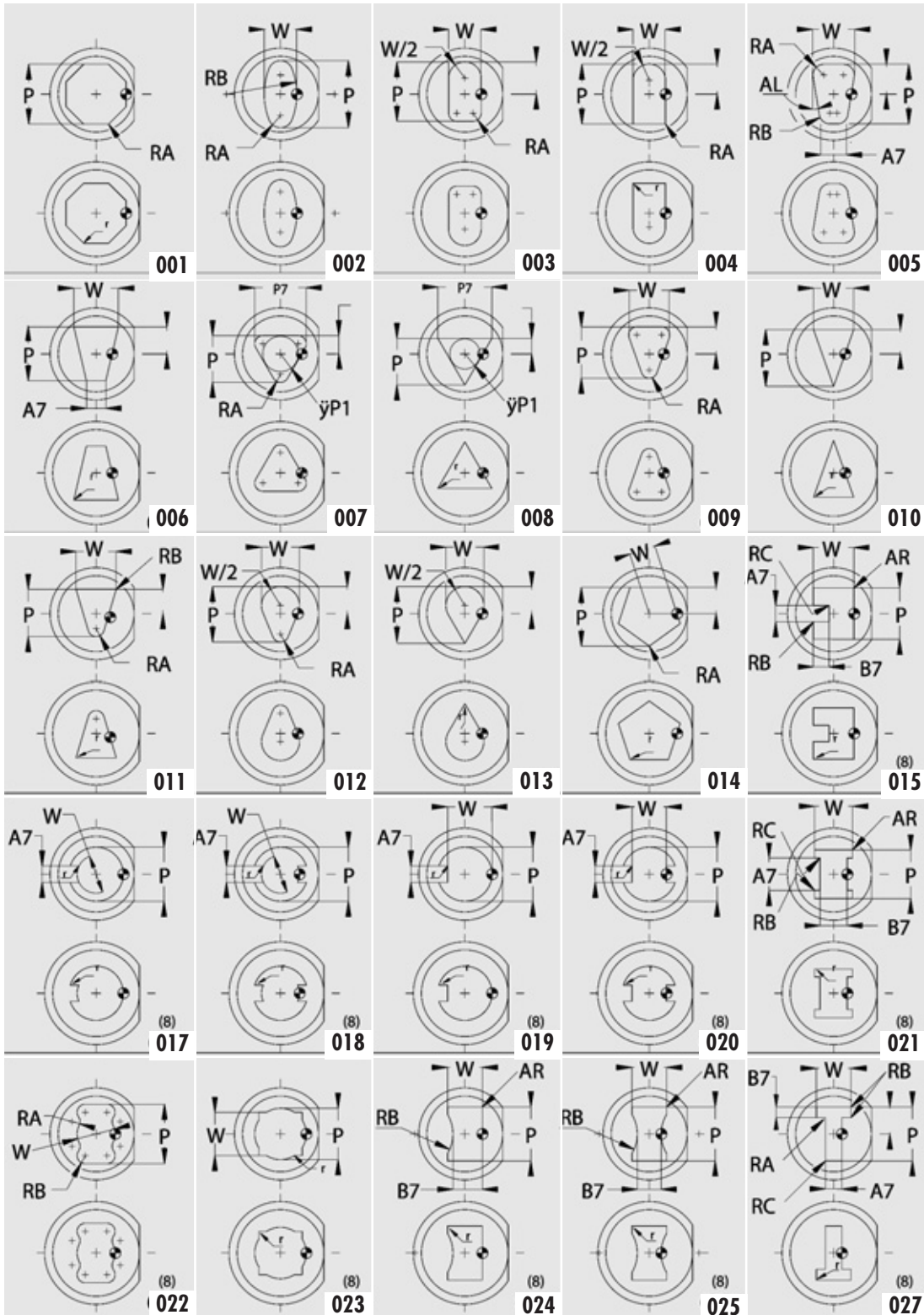
<b>L11</b>	<b>16</b>	<b>16</b>	<b>W0</b>	<b>P7.5</b>
Type L	D=16,00	L=16	W=0	P=7,50
HWS				
Form 1				

<b>N13</b>	<b>20</b>	<b>16</b>	<b>W10</b>	<b>P15</b>
Type N	D=20,00	L=16	W=10,00	P=15,00
HWS				
Form 3				

<b>M12</b>	<b>13</b>	<b>16</b>	<b>W5</b>	<b>P7</b>
Type M	D=13,00	L=16	W=5,00	P=7,00
HWS				
Form 2				

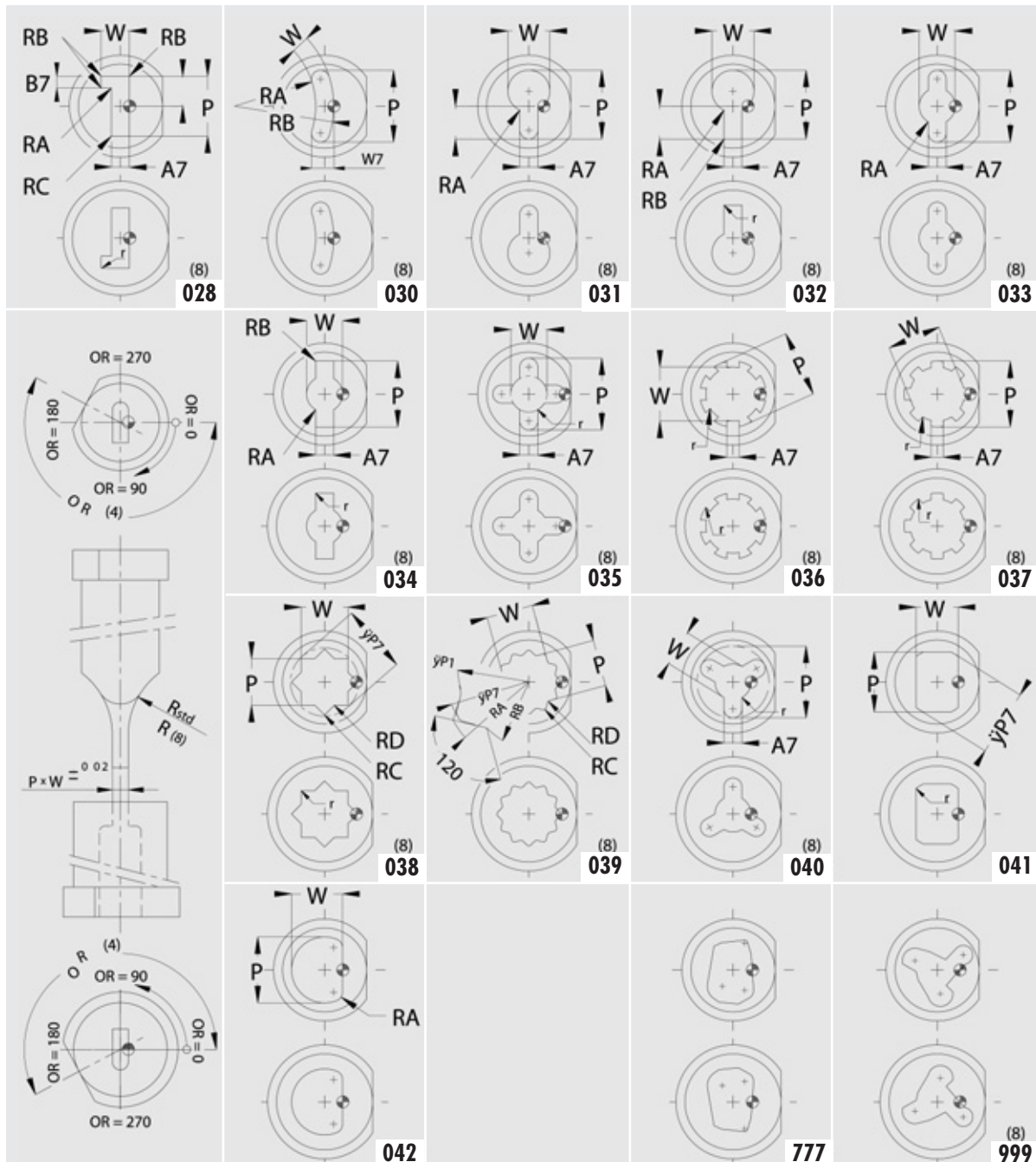
Alternative dimensions to those above can be specified.  
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

# Form 7 Classified Shapes



For classified shapes and special forms, send drawing for quotation.




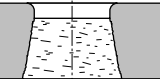

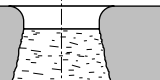

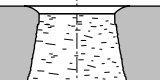







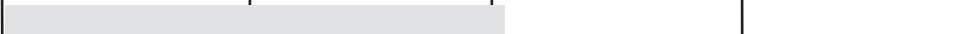
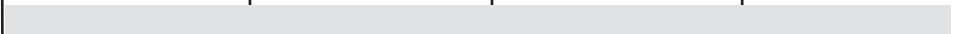


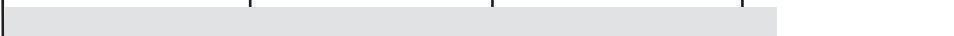
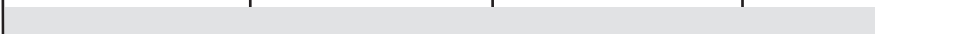
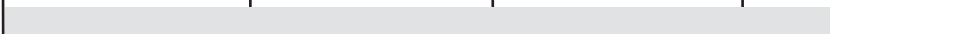
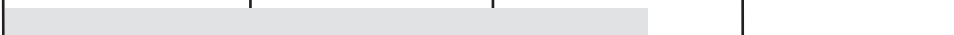
# Form 7 Classified Shapes



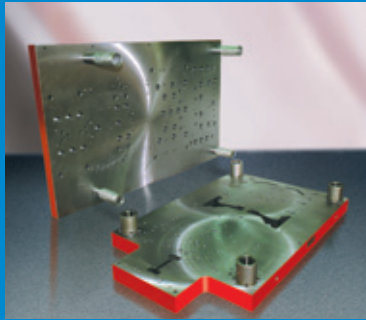
## How to Order Standard Punches and Matrixes: Example

Qty	Type	Material	Form	Diameter	Length	W dimension	P dimension	H dimension
4	Punches	Q	2	13	100	W8.5	P10	H16
6	Punches	P	4	16	90	W0	P12.5	H20
4	Matrixes	J	2	16	32	W3.25	P6.42	H8
6	Matrixes	K	2	20	25	W0	P10.4	H5
10	Punches	P	6	25	80	W15.2	P20.4	H20
60	Punches	V	2	4.1	71			

## For Better Productivity

Material		Ductile	Mild	Tough <small>(stainless steel)</small>	Hard				
Tensile Strength	PSI (x1000)	10 - 30	30 - 70	70 - 110	110 - 180				
	daN/mm <sup>2</sup>	7 - 20	20 - 50	50 - 80	80 - 130				
Regular punches	Burnish length in % of stock thickness	50 - 70	40 - 60	30 - 50	20 - 40				
	Shear clearance in % of stock thickness	5	5	5	5				
	<b>Average burr</b>								
Ejector punches	Burnish length in % of stock thickness	40 - 60	30 - 50	20 - 40	10 - 30				
	Shear clearance in % of stock thickness	7 - 9	9 - 12	12 - 15	15 - 20				
	<b>Minimum burr</b>								
<b>Material:</b>									
Aluminum alloys									
Aluminum alloys + Zn									
Brass to half hard									
Brass Hard, Spring									
Phos Bronze (Ann.)									
Phos Bronze (Hd.)									
Comm Bronze									
Beryllium Copper									
Beryllium Copper Hard									
CRS 0,15% Carbon (max.)									
CRS 0,25% Carbon (max.)									
CRS 0,50% Carbon (max.)									
CRS 1,00% Carbon (max.)									
Stainless steel +Mn									
Stainless steel									
<b>Tensile PSI (x1000)</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>50</b>	<b>70</b>	<b>90</b>	<b>110</b>	<b>145</b>	<b>180</b>

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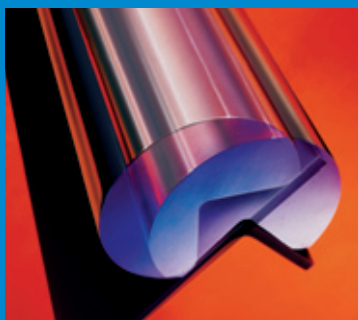
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