



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.

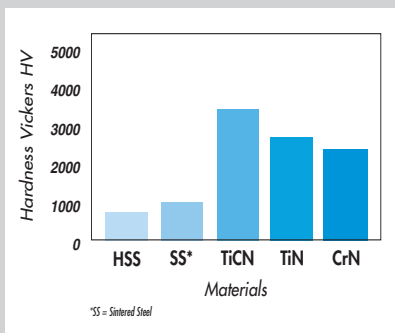
Tool steel heated to 650° C in an atmosphere furnace is prone to decarburization, even in the purest atmosphere.

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)












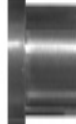


- This process introduces nitrogen atoms into the steel surface, increasing the surface hardness of the punch.
- This low cost process increases punch life for most applications.
- Particularly well-suited for punching abrasive materials.
- This option is available for HSS steel.

Sintered Steel: (64 – 66 HRC)

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

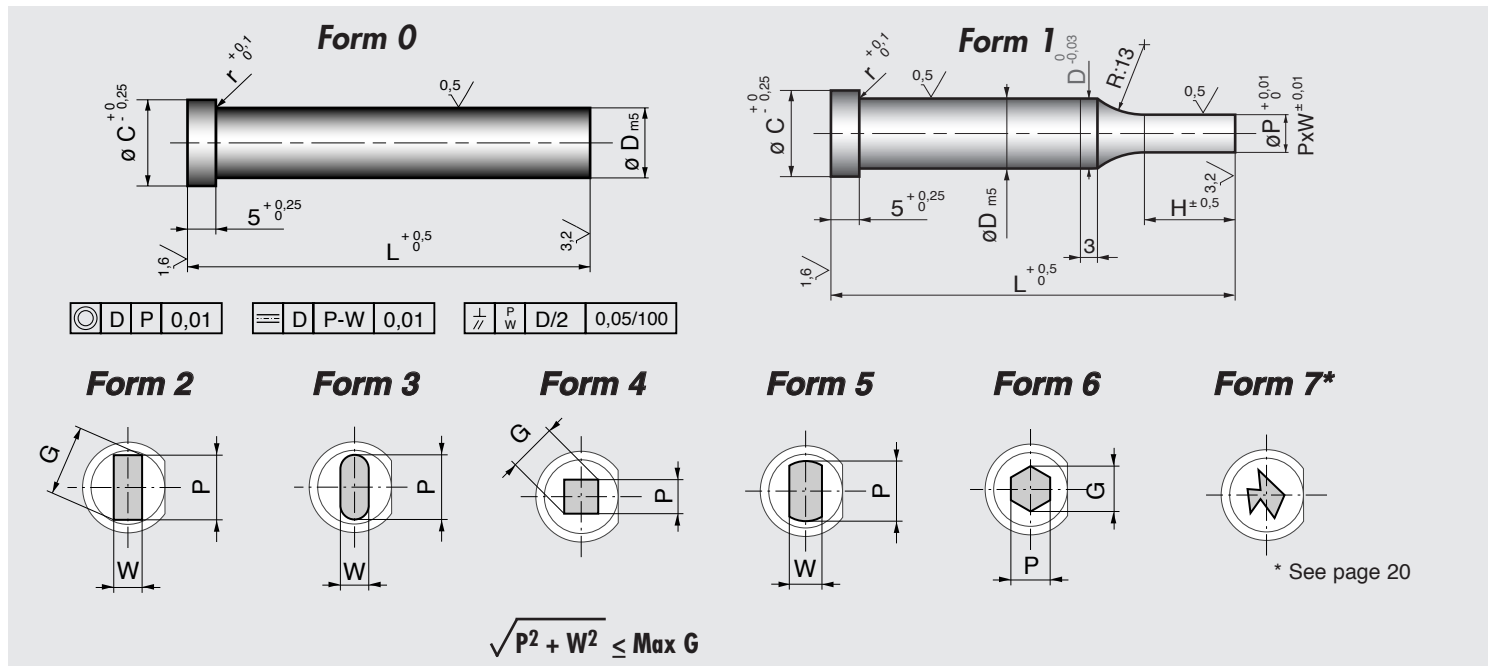


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P Cylindrical Head Punches

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

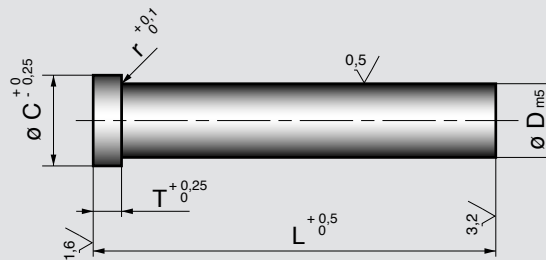
Type P D=13,00 L=80 W=0 P=6,20 H=13
HSS+TiN
Form 4

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
⊥_w P D/2 0,05/100

D _{m5}	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 _{m5}	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:

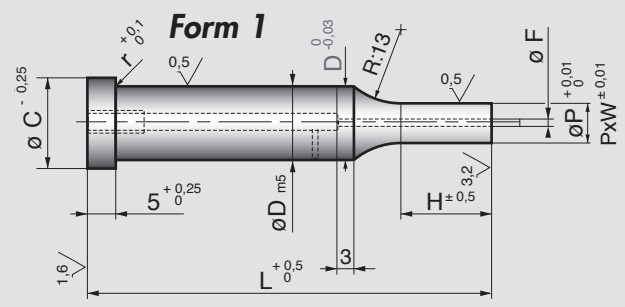
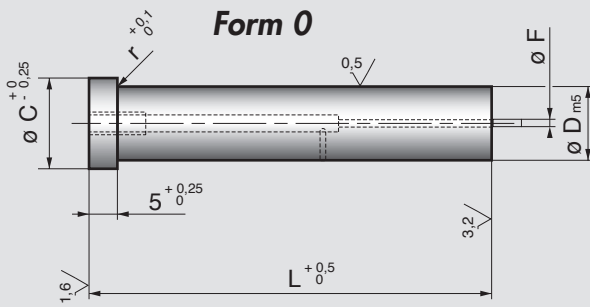
P22	15.5	100	W8.2	P10.5	H16
Type P	D=15,50	L=100	W=8,20	P=10,50	H=16
HSS					
Form 2					

P20	10.3	100
Type P	D=10,30	L=100
HSS		
Form 0		

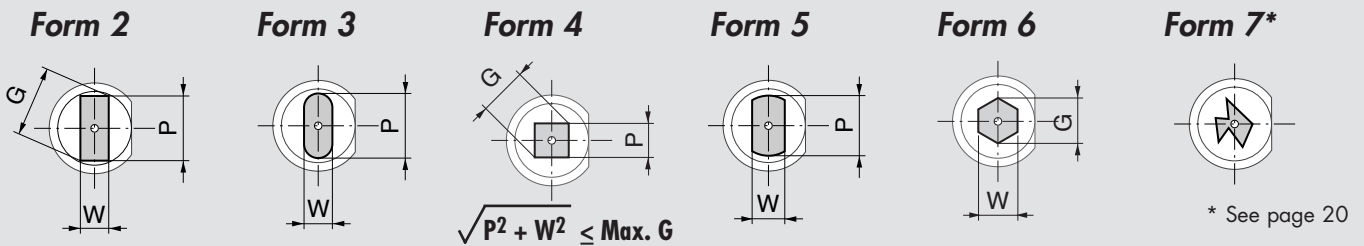
Alternative dimensions to those above can be specified.
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

Q Cylindrical Head Punches ejector style

ISO 8020



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



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:

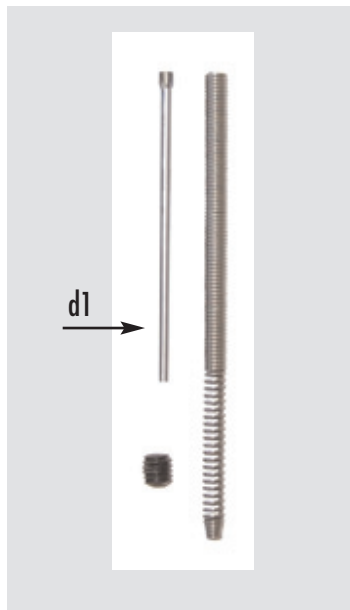
Q22 13 100 W5.2 P10.5 H16
 Type Q D=13,00 L=100 W=5,20 P=10,50 H=16
 HSS
 Form 2

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°.

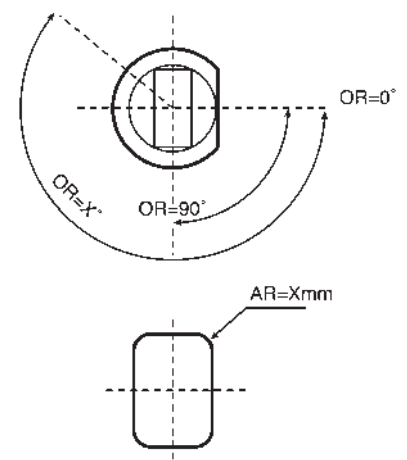
No specified on order for standard forms.

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



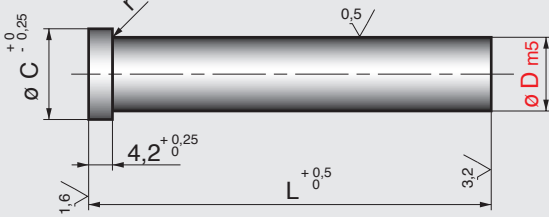
* Length 120 mm is available for Type Q, Ø8 to Ø25.

R/S Cylindrical Head Punches

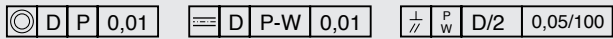
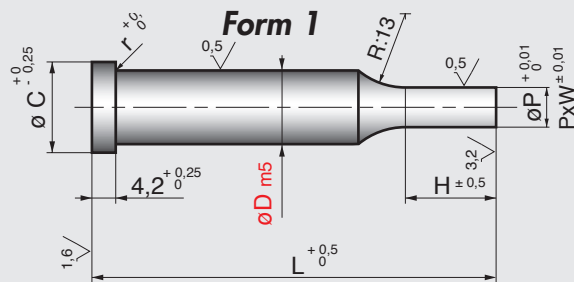
tol: m⁵ / h⁶

TYPE R Tolerance D = m5

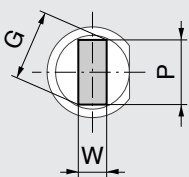
Form 0



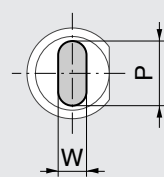
Form 1



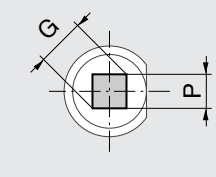
Form 2



Form 3

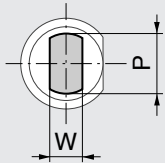


Form 4

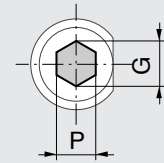


$$\sqrt{P^2 + W^2} \leq \text{Max } G$$

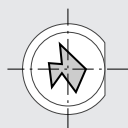
Form 5



Form 6



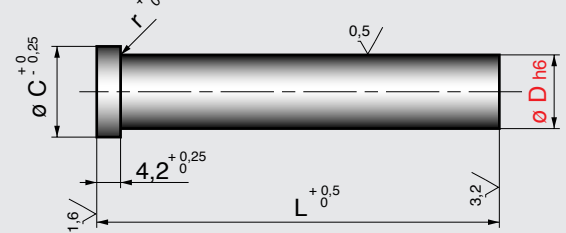
Form 7*



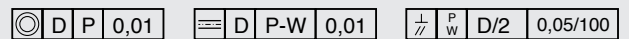
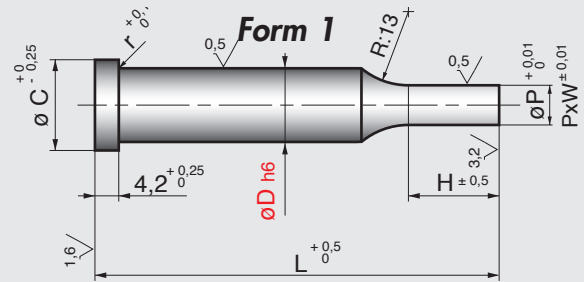
*See page 20

TYPE S Tolerance D = h6

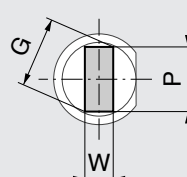
Form 0



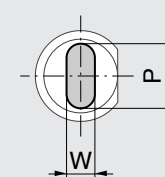
Form 1



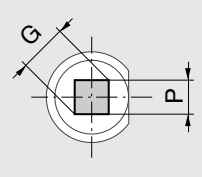
Form 2



Form 3

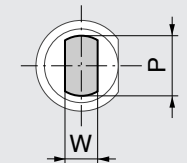


Form 4

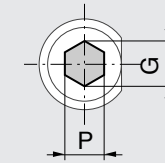


$$\sqrt{P^2 + W^2} \leq \text{Max } G$$

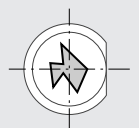
Form 5



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:

R20	5	71
Type R	D=5,00	L=71
HSS		
Form 0		

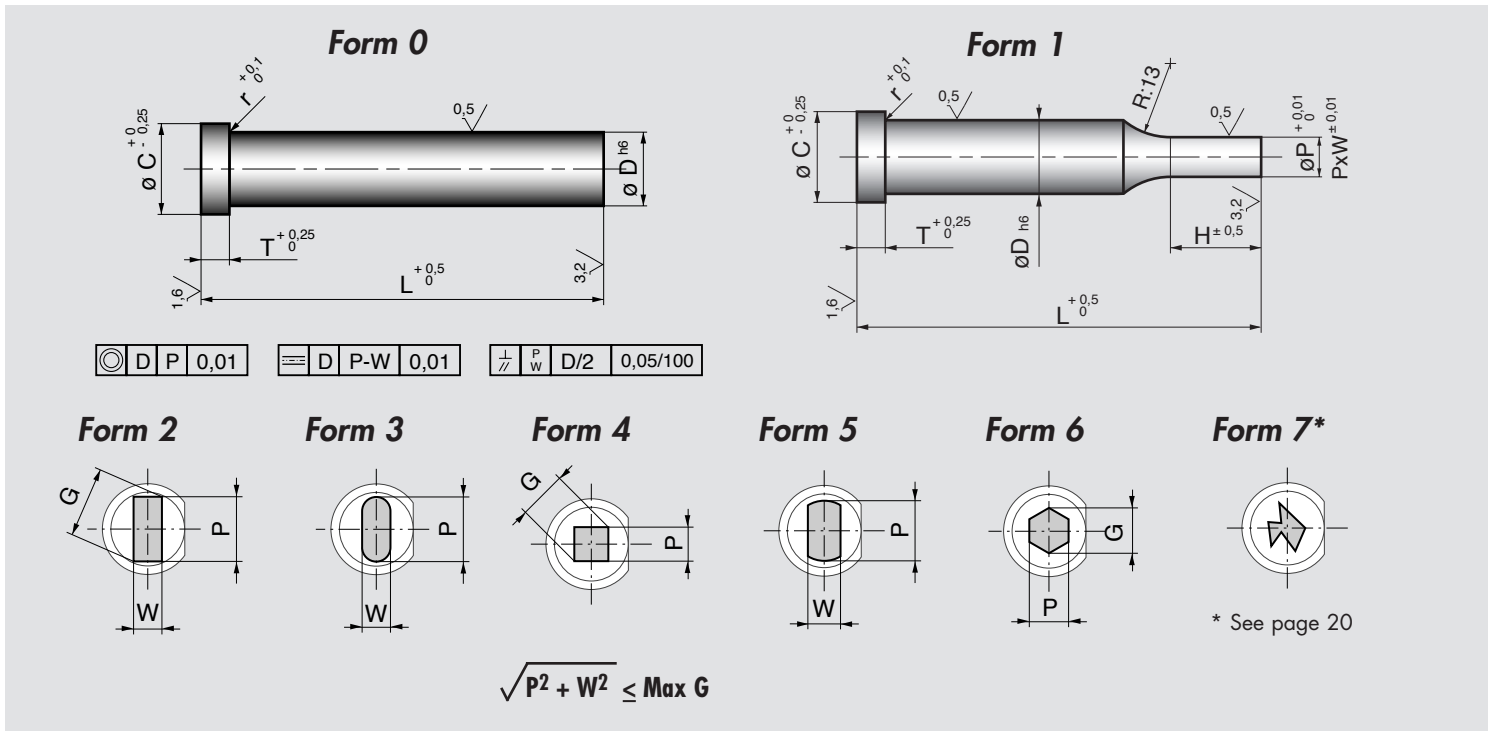
S20	3	80
Type S	D=3,00	L=80
HSS		
Form 0		

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

S11	4	100	W0	P2.5	H10
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:

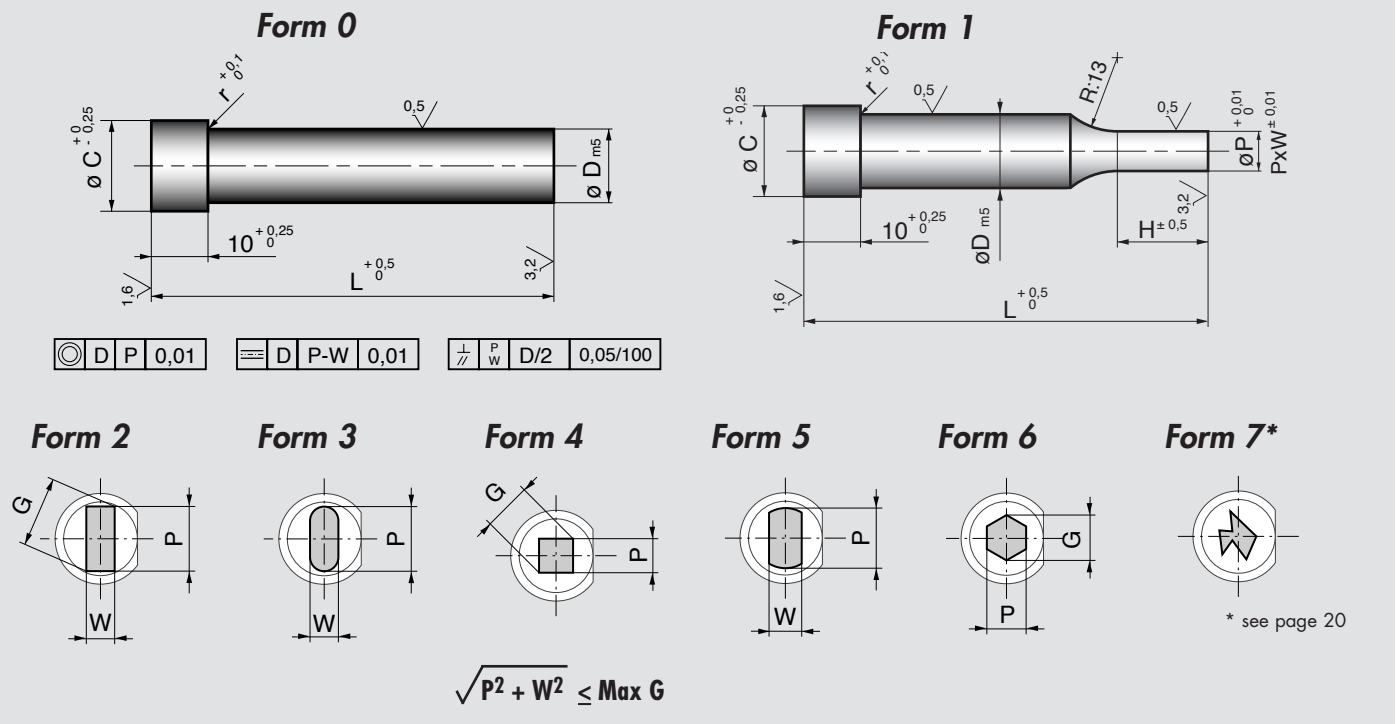
T22 16 100 W8.5 P13.5 H18

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:

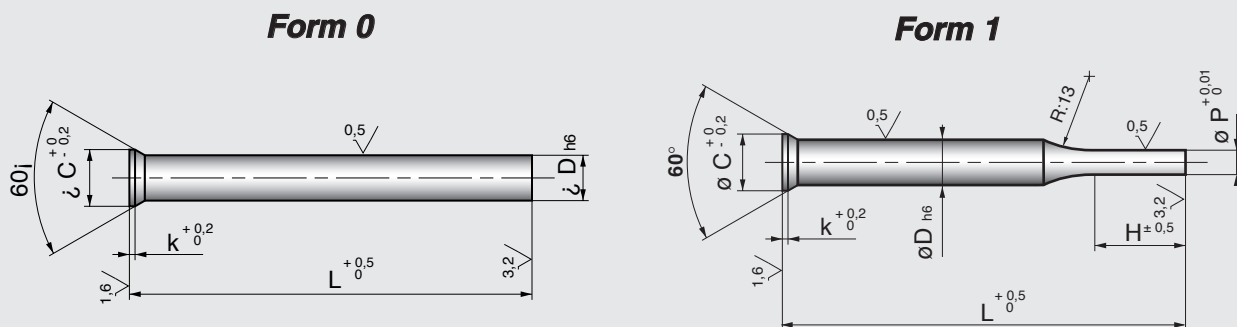
U22	16	100	W8.2	P13.5	H18
Type U	D=16,00	L=100	W8,20	P=13,50	H18
HSS					
Form 2					

U20	13	120
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 _{h6}	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 ⁰ ±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

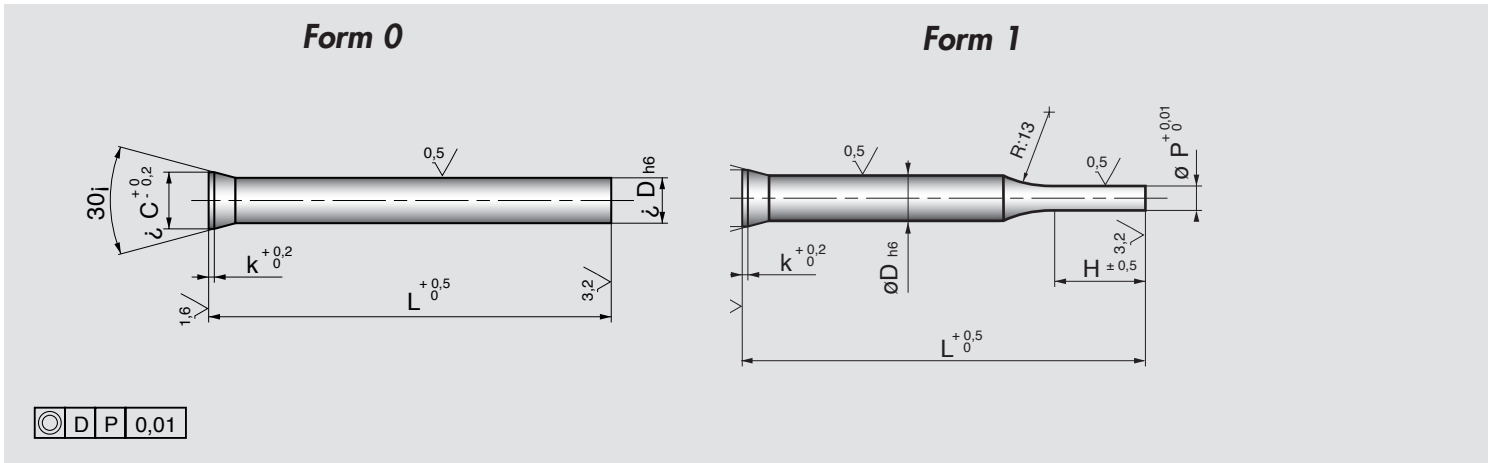
HWS is not available in the length of 120 mm.

Here's How To Order:

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

V20	13	100
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

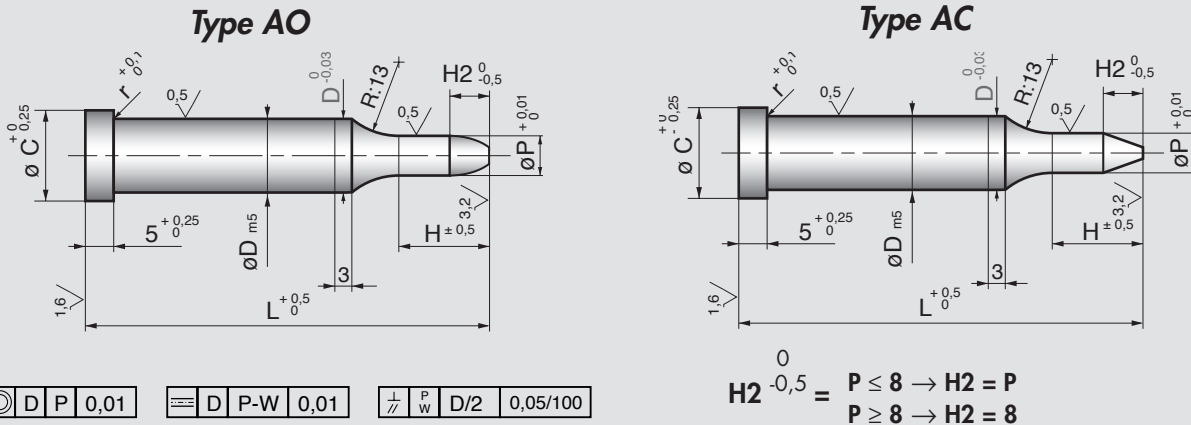
Here's How To Order:

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

H20	5	100
Type H HSS Form 0	D=5,00	L=100

AO / AC Pointed Pilot Punches

ISO 8020



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

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:

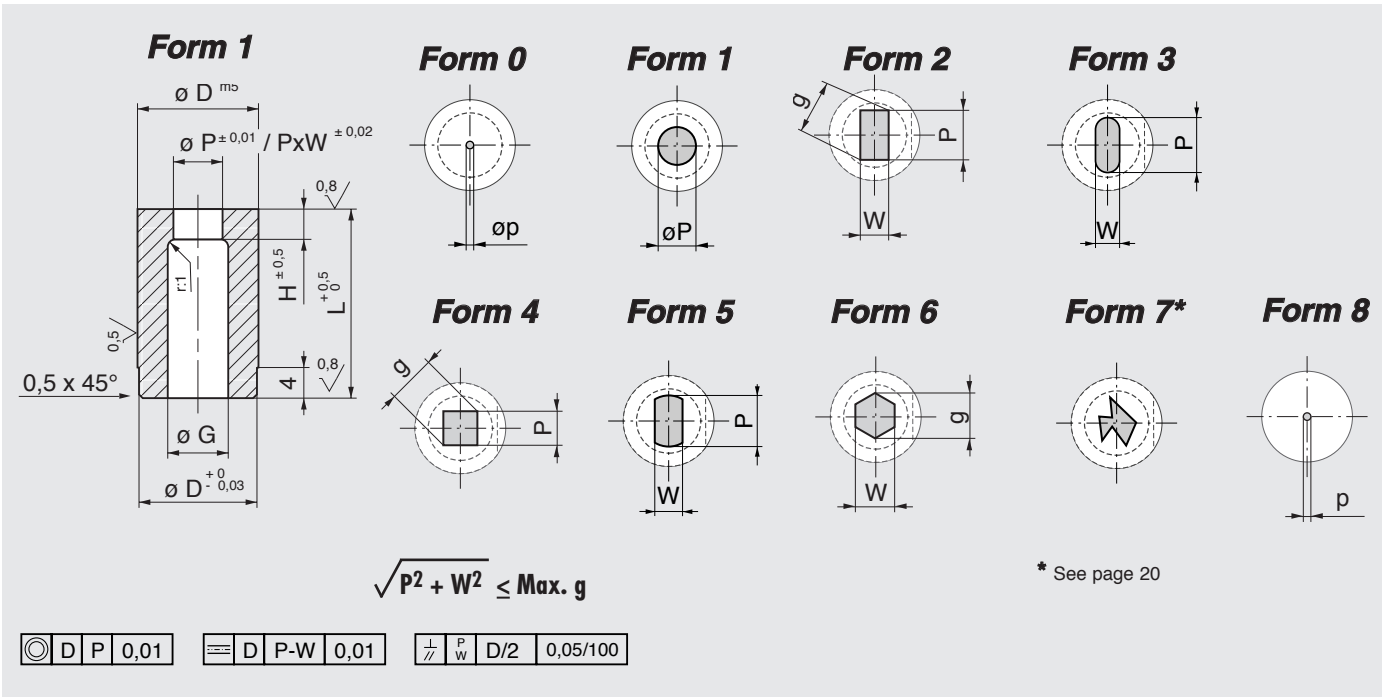
A021	13	100	W0	P12.2	H16
Type AO	D=13,00	L=100	W=0	P=12,20	H=16
HSS					
Form 1					

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

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

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

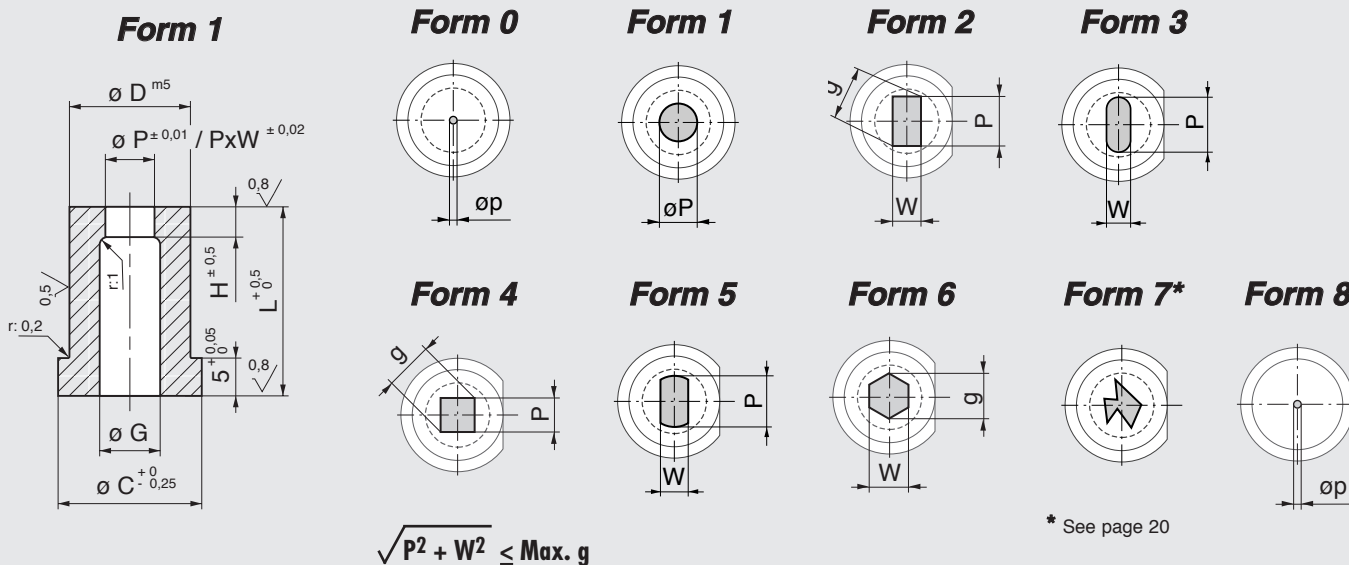
Here's How To Order:

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

J23	20	32	W8.2	P10	H8
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	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:

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

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

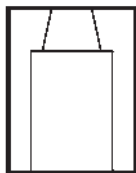
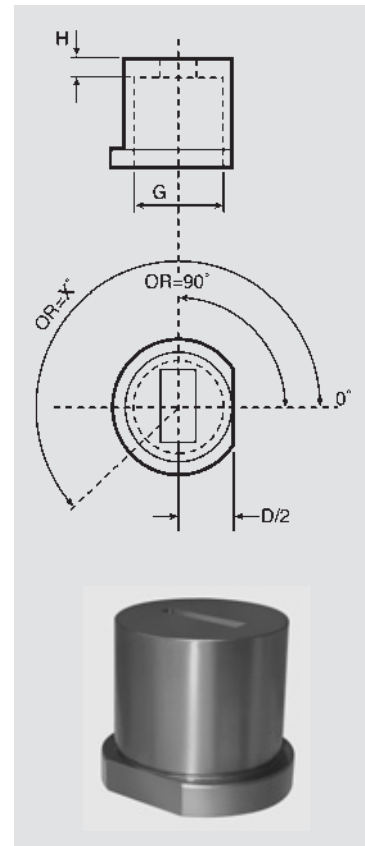
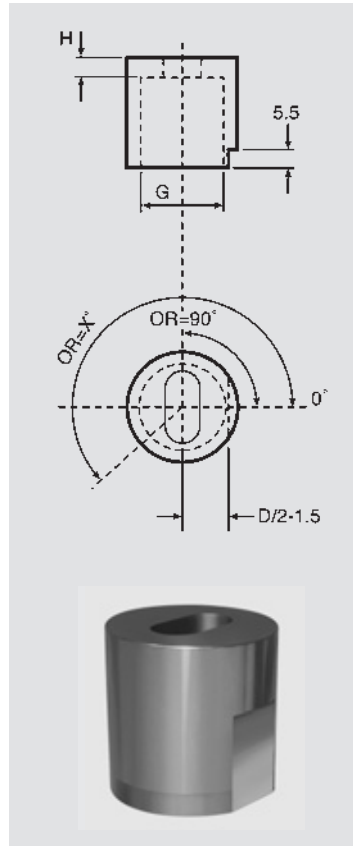
Alternative dimensions to those above can be specified.
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

Matrix Alterations

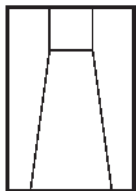
Standard Location and Custom Location

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

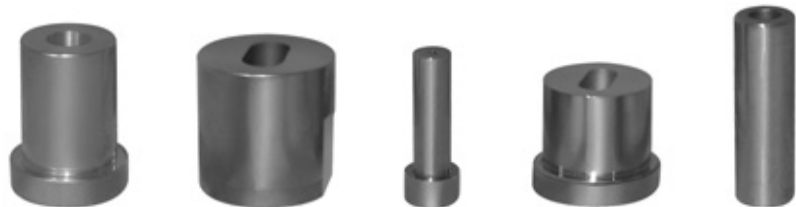
Alternate location and custom location can be specified on request.



Conical Land



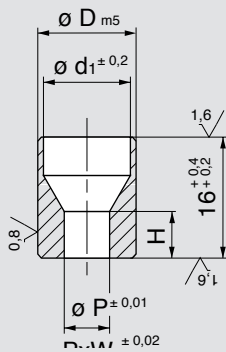
Conical Bore



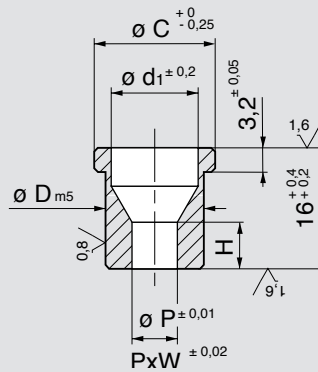
Type J and Type K Matrixes	Standard	Alternate	Custom
Location of key flat	0°	90° 180° 270°	on request
Overall length shortened	20 - 25 - 32	on request	on request
Conical land (H)		10' (per side)	on request
Conical bore (G)		1° (per side)	on request
G Dimension larger	see pages 16 & 17	on request	on request
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	

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

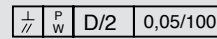
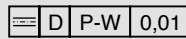
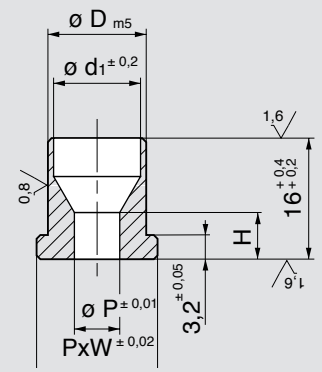
TYPE L



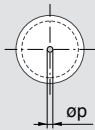
TYPE M



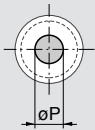
TYPE N



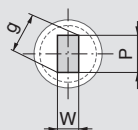
Form 0



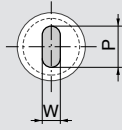
Form 1



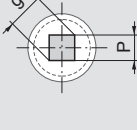
Form 2



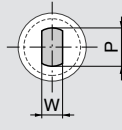
Form 3



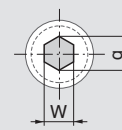
Form 4



Form 5



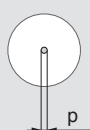
Form 6



Form 7*



Form 8



* See page 20

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

Material: 1 HWS

1 HWS

1 HWS

D _{m5}	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:

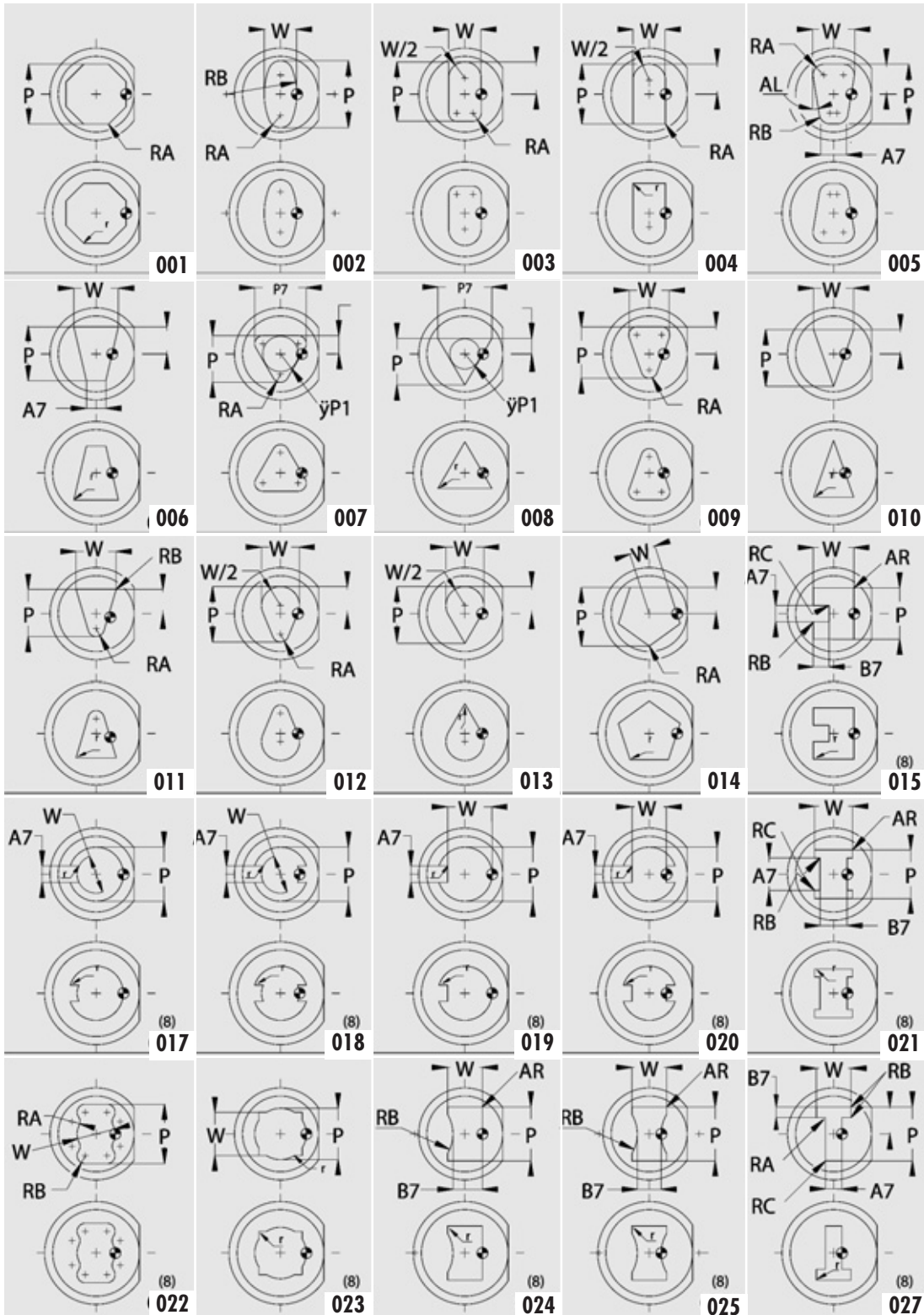
L11	16	16	W0	P7.5
Type L	D=16,00	L=16	W=0	P=7,50
HWS				
Form 1				

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

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




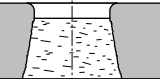

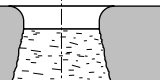

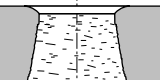







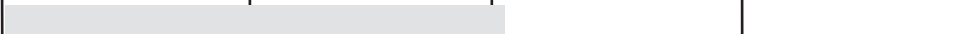
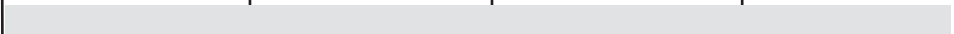


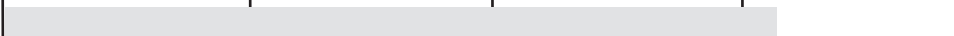
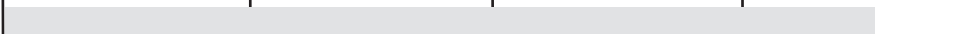
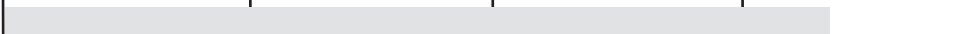
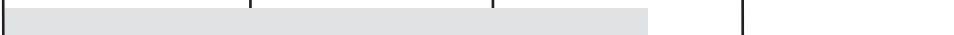
Alternative dimensions to those above can be specified.
Dimensions in mm. Drawings, pictures and dimensions are protected by copyright.

Form 7 Classified Shapes

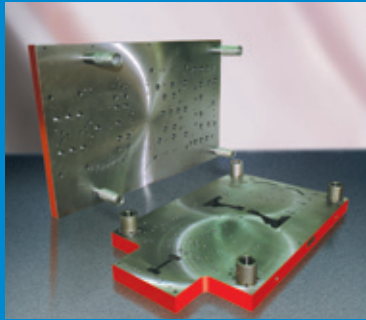


For classified shapes and special forms, send drawing for quotation.

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 ²	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				
	Average burr								
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				
	Minimum burr								
Material:									
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									
Tensile PSI (x1000)	10	20	30	50	70	90	110	145	180

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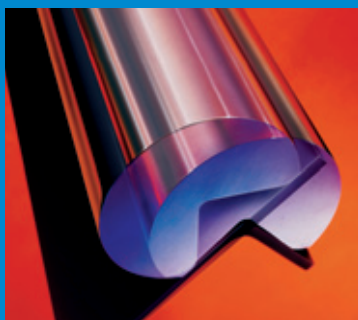
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