



Ground Precision Components

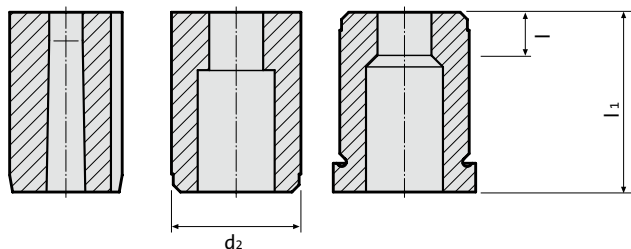




Precision Matrixes



Ordering example Matrixes



NB: See table for standard dimensions
Special dimensions to order

2 6 4 6 . 1 0 F 6 . 1 3 5 0 . 0 6 5 0 A 2

Matrices: 26 = matrices

Version:

blank (pilot hole bore)	= 0
round	= 1
square	= 2
rectangular	= 3
slot	= 4
rectangle with radiused corners	= 5
special shapes	= 9

Type:

automotive standard	= 5
without shoulder ISO 8977	= 6
with shoulder ISO 8977	= 7

Shape cutting length: l

2	= 1
3	= 2
4	= 3
5	= 4
6	= 5
8	= 6
10	= 7
12	= 8
special	= X

Format: Slot length P = 13,5 mm

Format: Slot width W = 6,5 mm

Length: l₁

13	= A
16	= B
20	= C
22	= D
25	= E
28	= F
30	= G
32	= H
35	= J
40	= K
special	= X

Diameter: d₂

5	= 1
6	= 2
8	= 3
10	= 4
13	= 5
16	= 6
20	= 7
22	= 8
25	= 9
32	= 10
38	= 11
40	= 12
45	= 13
50	= 14
56	= 15
63	= 16
71	= 17
76	= 18
85	= 19
90	= 20
100	= 21

Order Code character

Angle:

0°	= A
90°	= B
180°	= C
270°	= D
special	= X

Order Code character

Anti-rotation element:

pin Ø3	= 1
pin Ø4	= 2
pin Ø6	= 3
polished surface (continuous)	= 4
polished surface top, 14 mm	= 5
polished surface bottom, 14 mm	= 6
special	= X

Ordering Code (Example):

2 6 4 6 . 1 0 F 6 . 1 3 5 0 . 0 6 5 0 A 2

Anti-rotation element:
Pin Ø = 4 mm (2)

Angle = 0° (A)

Format: Slot
width W = 6,5 mm (0650)

Format: Slot
length P = 13,5 mm (1350)

Shape cutting length: l = 8 mm (6)

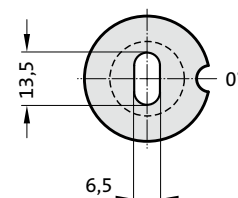
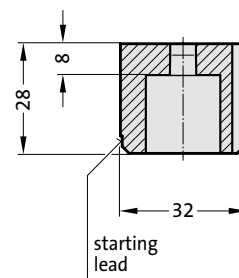
Length: l₁ = 28 mm (F)

Diameter:
d₂ = 32 mm (10)

Type = without shoulder ISO 8977 (6)

Version: Slot (4)

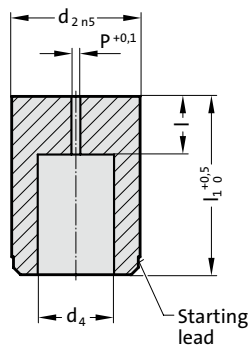
Matrices:
Matrices (26)





Matrix without shoulder, blank, ISO 8977

2606.

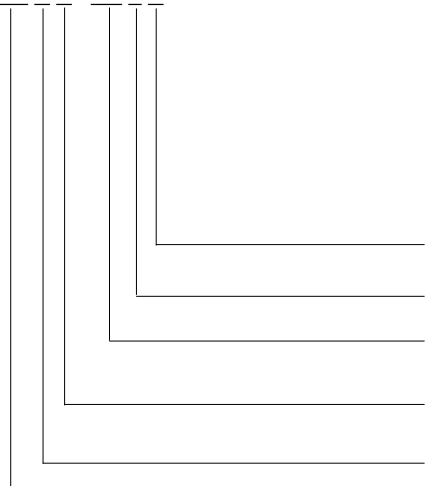


2606. Matrix without shoulder, blank, ISO 8977

d ₂ / (Order No)	d ₄	P	l / (Order No)	l ₁ / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
5 / (1)	2.8	0.8	2 / (1)		●	●	●	●	●	●	●	●	●
6 / (2)	3.5	1	3 / (2)		●	●	●	●	●	●	●	●	●
8 / (3)	4	1	4 / (3)		●	●	●	●	●	●	●	●	●
10 / (4)	5.8	1	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●	●
13 / (5)	8	1.2	5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●
16 / (6)	9.5	1.2	5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●
20 / (7)	12	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●
22 / (8)	15	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●
25 / (9)	17.3	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●
32 / (10)	20.7	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●
40 / (12)	27.7	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●
50 / (14)	37	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●

Ordering-code (example):

2 6 0 6 . 10 F 8



Shape cutting length: l

12 mm

Length: l₁

28 mm

Diameter: d₂

32 mm

Type:

without sholder

ISO 8977

Version:

Blank (pilot hole bore)

Matrix

Order No

= (8)

Order code character

= (F)

Order No

= (10)

Order No

= (6)

Order No

= (0)

Order No

= 26

Material:

HSS

Hardness 62 ± 2 HRC

Execution:

Diameter d₂, starting lead and face surfaces ground.

Diameter P is a bored pilot hole for wire EDM.

Special dimensions on request.



Technical drawing of a shaft-hub assembly. The shaft has a diameter of $d_{2\text{ n5}}$ and a tolerance of $+0.01$. The hub has a diameter of d_4 and a tolerance of $+0.5$. The drawing also shows a "Starting lead" dimension.

d_2 / (Order No)	d_4	P	I / (Order No)	I_1 / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
5 / (1)	2.8	1,0-2,4	2 / (1)		●	●	●	●	●	●	●	●	
6 / (2)	3.5	1,6-3,0	3 / (2)		●	●	●	●	●	●	●	●	
8 / (3)	4	2,0-3,5	4 / (3)		●	●	●	●	●	●	●	●	
10 / (4)	5.8	2,5-5,0	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●	
13 / (5)	8	4,0-7,0	5 / (4) 8 / (6)			●	●	●	●	●	●	●	
16 / (6)	9.5	6,0-9,0	5 / (4) 8 / (6)			●	●	●	●	●	●	●	
20 / (7)	12	8,0-11,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
22 / (8)	15	9,0-14,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
25 / (9)	17.3	10,7-16,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
32 / (10)	20.7	15,0-20,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
40 / (12)	27.7	19,0-27,0	8 / (6) 12 / (8)					●	●	●	●	●	
50 / (14)	37	26,0-36,0	8 / (6) 12 / (8)					●	●	●	●	●	●

[illegible]

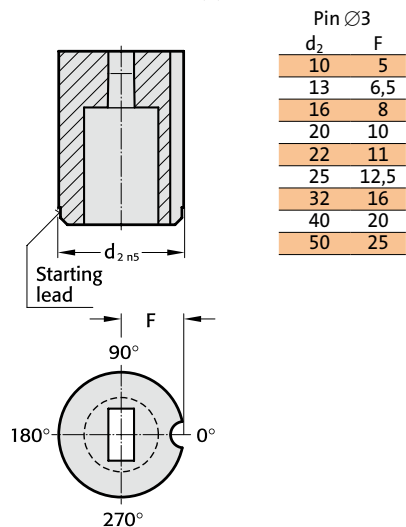
= 1510
Order No
 = (8)
Order code character
 = (F)
Order No
 = (10)
Order No

 = (6)
Order No
 = (1)
 = 26

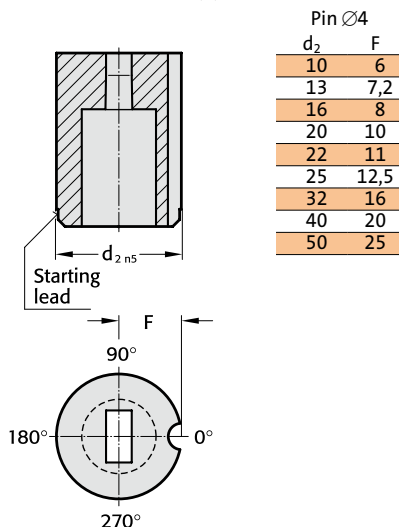
Precision Matrixes without shoulder, cylindrical , ISO 8977

Anti-rotation elements

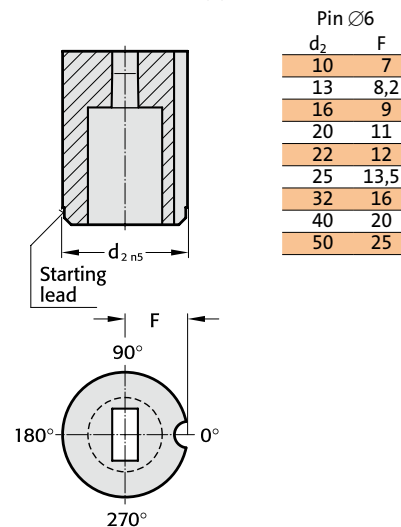
anti-rotation element 1 (1)



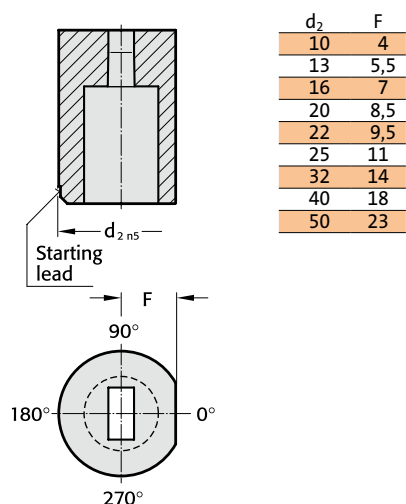
anti-rotation element 2 (2)



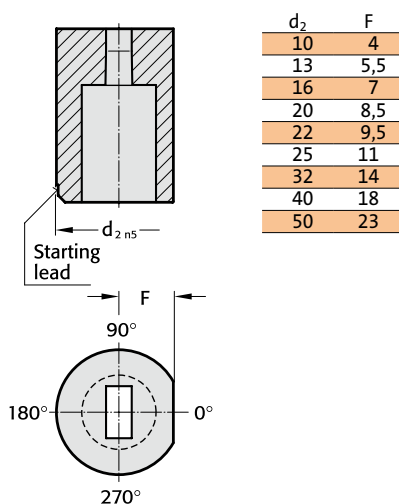
anti-rotation element 3 (3)



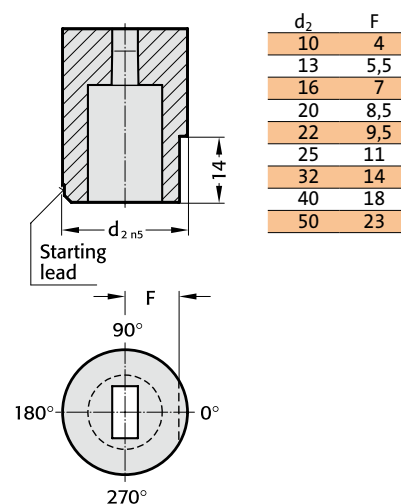
anti-rotation element 4 (4)



anti-rotation element 5 (5)



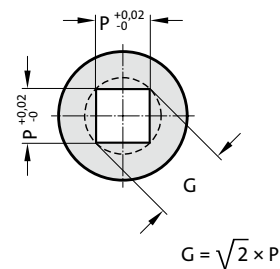
anti-rotation element 6 (6)



Ordering example: with anti-rotation element from d₂ ≥ 10 mm

2616.10F8.1510A4

2	6	1	6	.	10	F	8	.	15	10	A	4
Matrixes	Version	Type	Diameter: d ₂	Length: l ₁	Punch cutting length: l	Format: Round	Angle: 0°	Polished surface (continuous)	Anti-rotation element:	Order No	Order Code character	Order No
26	Round	without shoulder ISO 8977	32 mm	28 mm	12 mm	P = ø15,1 mm	0°			= (4)	= (A)	= (1510)
												Order No
												= (8)
												Order Code character
												= (F)
												Order No
												= (10)
												Order No
												= (6)
												Order No
												= (1)



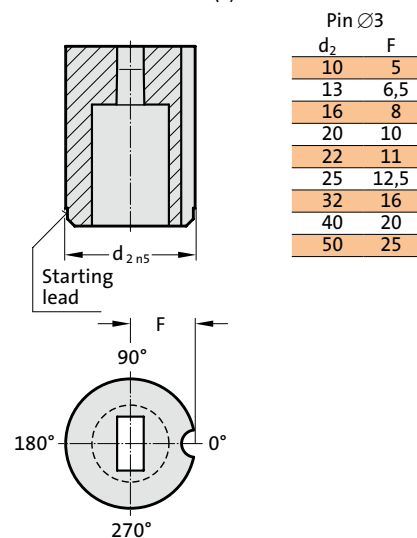
d_2 / (Order No)	d_4	P_{\min}	G_{\max}	l / (Order No)	l_1 / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
10 / (4)	5.8	1.2	5	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●	
13 / (5)	8	2	7	5 / (4) 8 / (6)			●	●	●	●	●	●	●	
16 / (6)	9.5	2.4	9	5 / (4) 8 / (6)			●	●	●	●	●	●	●	
20 / (7)	12	3.2	11	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
22 / (8)	15	4	14	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
25 / (9)	17.3	4.8	16	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
32 / (10)	20.7	5.5	20	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
40 / (12)	27.7	6.4	27	8 / (6) 12 / (8)					●	●	●	●	●	
50 / (14)	37	9	36	8 / (6) 12 / (8)					●	●	●	●	●	●

subject to alterations

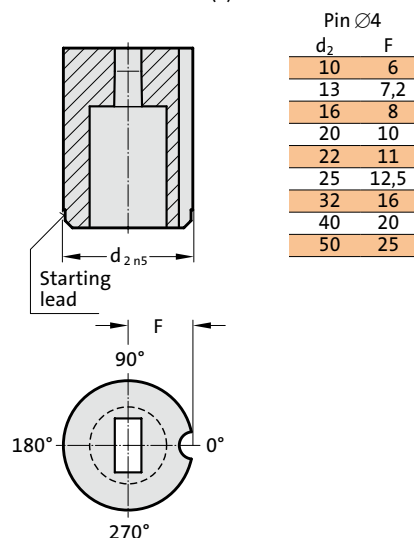
Precision Matrixes without shoulder, cylindrical , ISO 8977

Anti-rotation elements

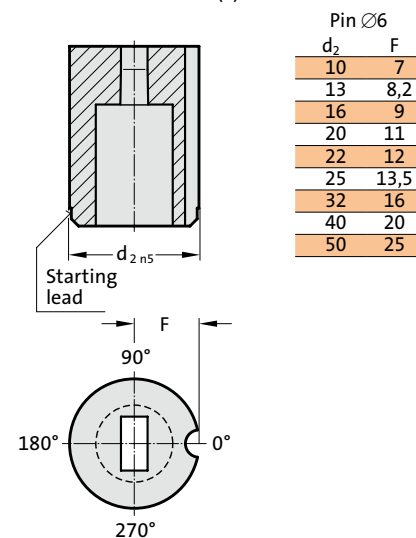
anti-rotation element 1 (1)



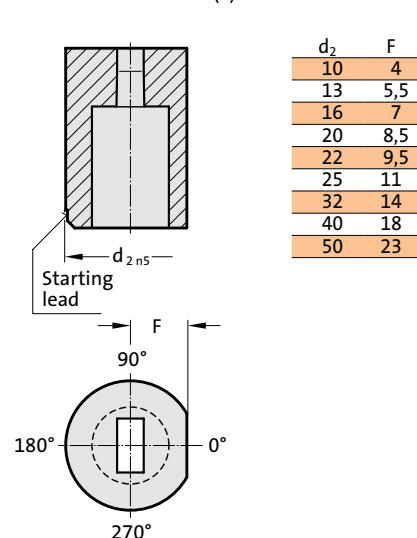
anti-rotation element 2 (2)



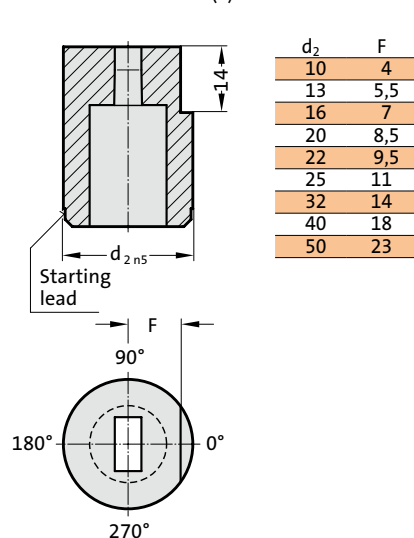
anti-rotation element 3 (3)



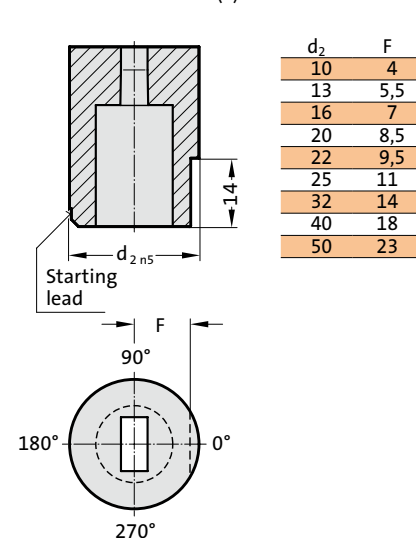
anti-rotation element 4 (4)

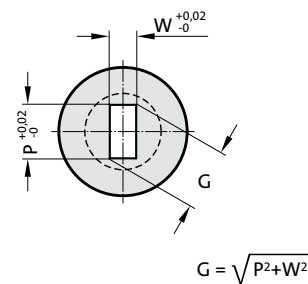
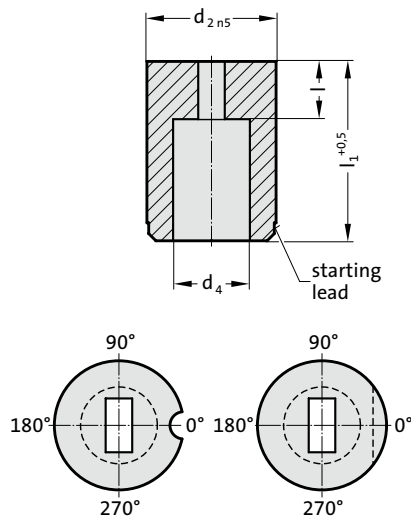


anti-rotation element 5 (5)

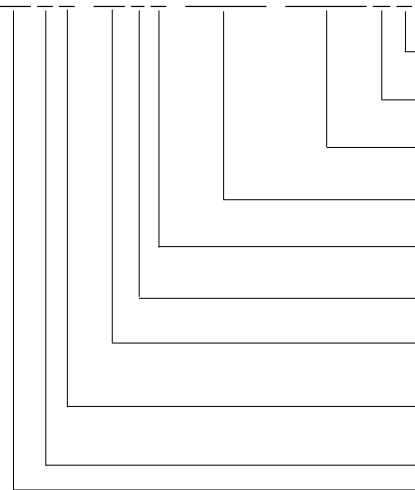


anti-rotation element 6 (6)





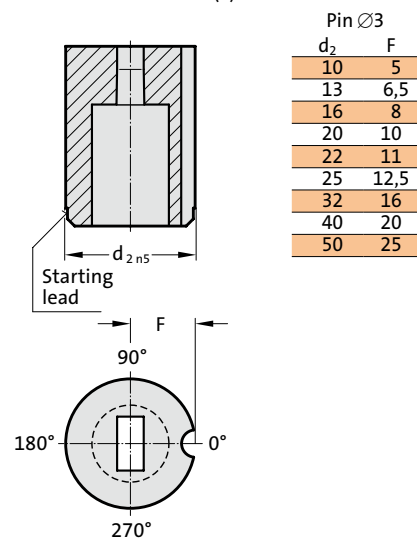
d_2 / (Order No)	d_4	W_{\min}	G_{\max}	l / (Order No)	l_1 / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
10 / (4)	5.8	1.2	5	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●	
13 / (5)	8	2	7	5 / (4) 8 / (6)			●	●	●	●	●	●	●	
16 / (6)	9.5	2.4	9	5 / (4) 8 / (6)			●	●	●	●	●	●	●	
20 / (7)	12	3.2	11	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
22 / (8)	15	4	14	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
25 / (9)	17.3	4.8	16	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
32 / (10)	20.7	5.5	20	8 / (6) 12 / (8)			●	●	●	●	●	●	●	
40 / (12)	27.7	6.4	27	8 / (6) 12 / (8)				●	●	●	●	●	●	
50 / (14)	37	9	36	8 / (6) 12 / (8)					●	●	●	●	●	●



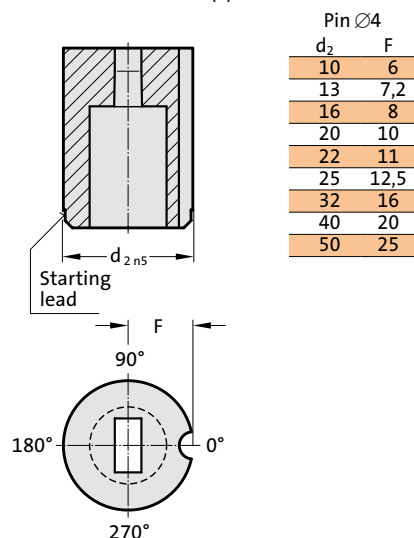
Precision Matrixes without shoulder, cylindrical , ISO 8977

Anti-rotation elements

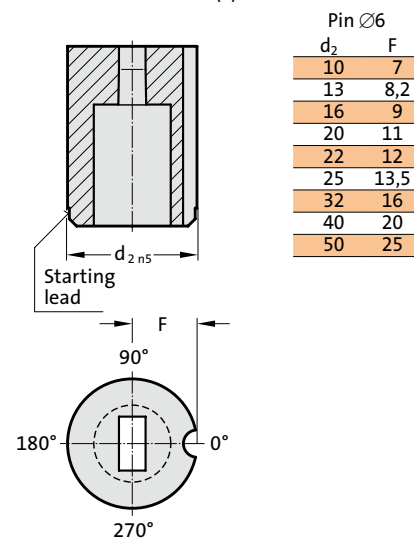
anti-rotation element 1 (1)



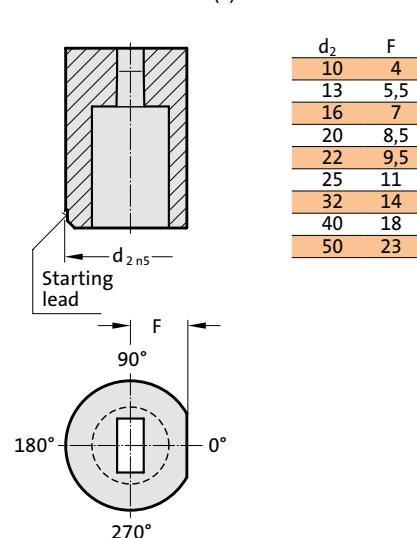
anti-rotation element 2 (2)



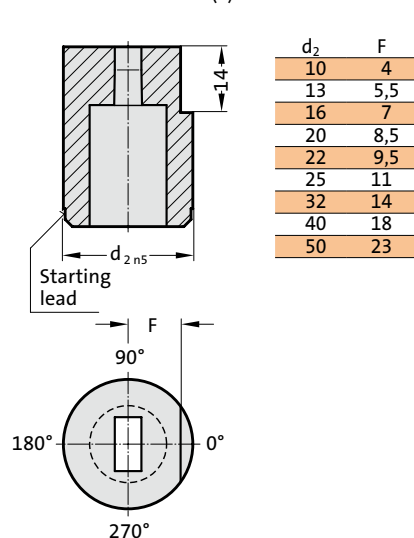
anti-rotation element 3 (3)



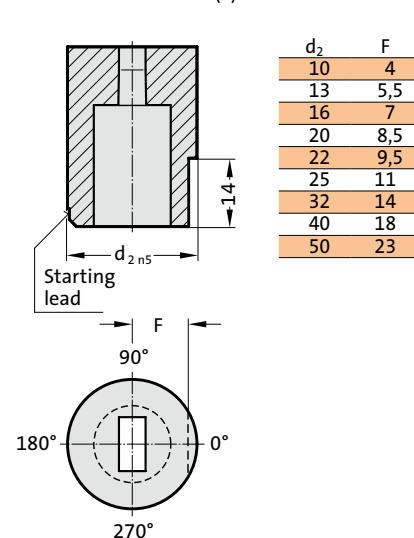
anti-rotation element 4 (4)



anti-rotation element 5 (5)



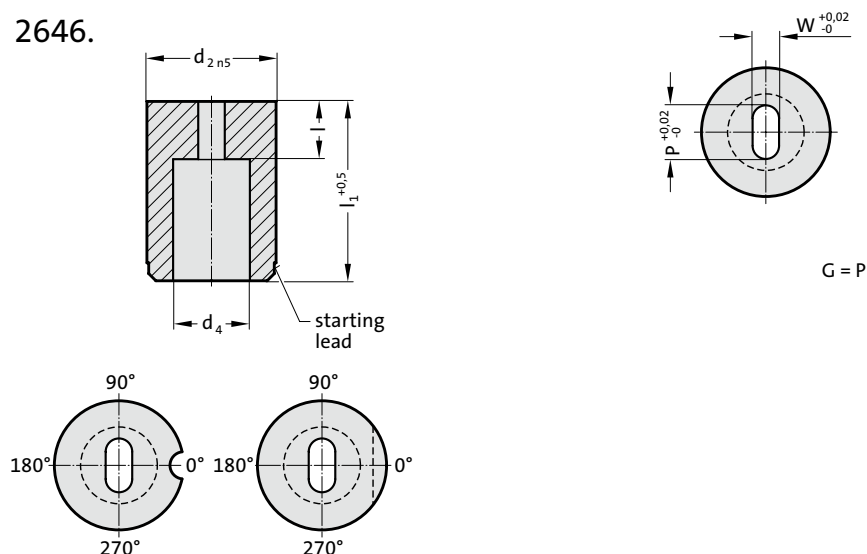
anti-rotation element 6 (6)



Matrix without shoulder, slot, ISO 8977



2646.



2646. Matrix without shoulder, slot, ISO 8977

d ₂ / (Order No)	d ₄	W _{min}	G _{max}	l / (Order No)	l ₁ / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
10 / (4)	5.8	1.2	5	4 / (3) 8 / (6)		●		●	●	●	●	●	●	
13 / (5)	8	2	7	5 / (4) 8 / (6)			●	●	●	●	●	●	●	●
16 / (6)	9.5	2.4	9	5 / (4) 8 / (6)			●	●	●	●	●	●	●	●
20 / (7)	12	3.2	11	8 / (6) 12 / (8)			●	●	●	●	●	●	●	●
22 / (8)	15	4	14	8 / (6) 12 / (8)			●	●	●	●	●	●	●	●
25 / (9)	17.3	4.8	16	8 / (6) 12 / (8)			●	●	●	●	●	●	●	●
32 / (10)	20.7	5.5	20	8 / (6) 12 / (8)			●	●	●	●	●	●	●	●
40 / (12)	27.7	6.4	27	8 / (6) 12 / (8)					●	●	●	●	●	●
50 / (14)	37	9	36	8 / (6) 12 / (8)					●	●	●	●	●	●

Material:

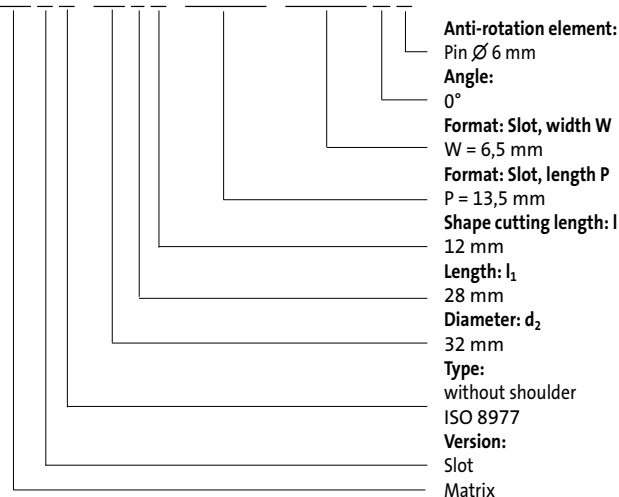
HSS
Hardness 62 ± 2 HRC

Execution:

Diameter d₂, starting lead and face surfaces ground.
Special dimensions on request.

Ordering-code (example): with anti-rotation element

2 6 4 6 . 10 F 8 . 1 3 5 0 . 0 6 5 0 A 3

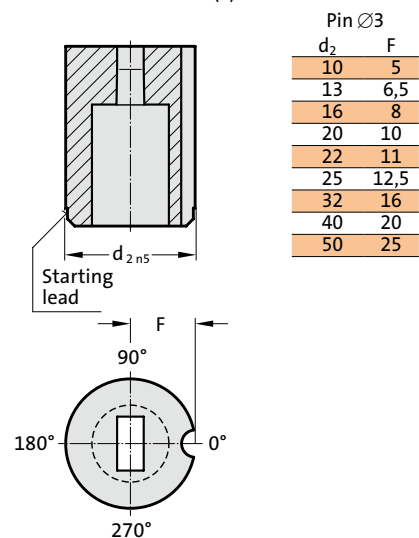


Order No
= (3)
Order code character
= (A)
= 0650
= 1350
Order No
= (8)
Order code character
= (F)
Order No
= (10)
Order No
= (6)
Order No
= (4)
= 26

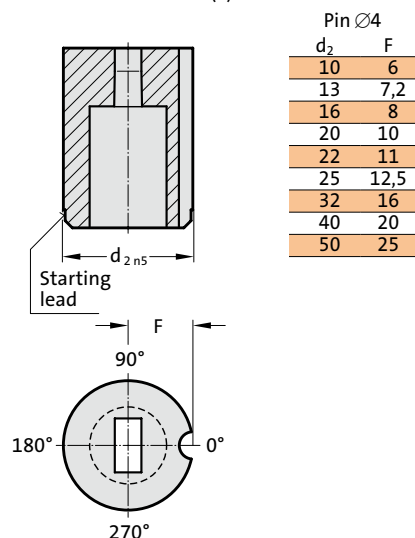
Precision Matrixes without shoulder, cylindrical , ISO 8977

Anti-rotation elements

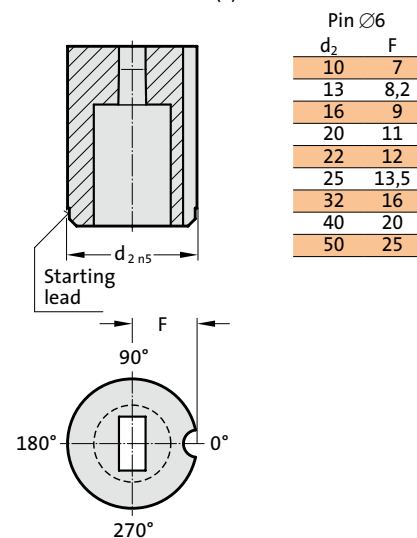
anti-rotation element 1 (1)



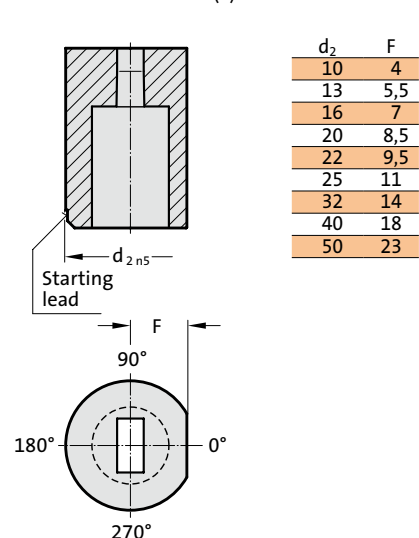
anti-rotation element 2 (2)



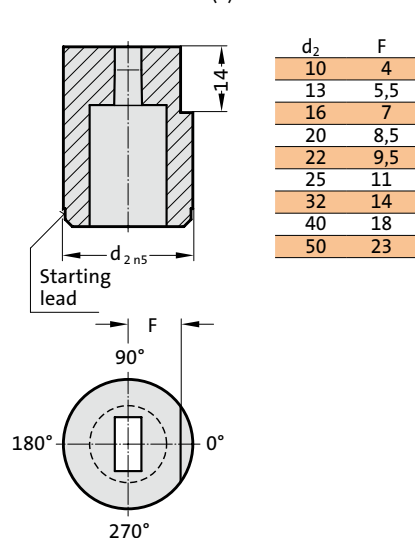
anti-rotation element 3 (3)



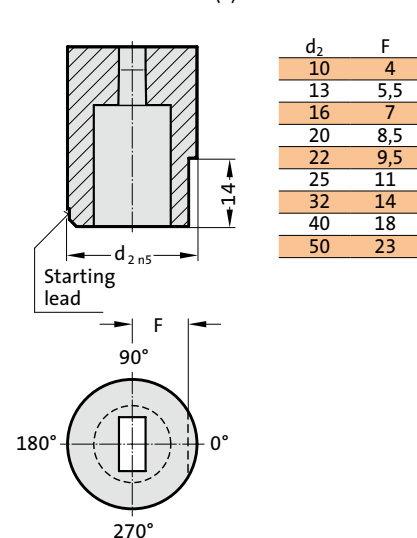
anti-rotation element 4 (4)



anti-rotation element 5 (5)



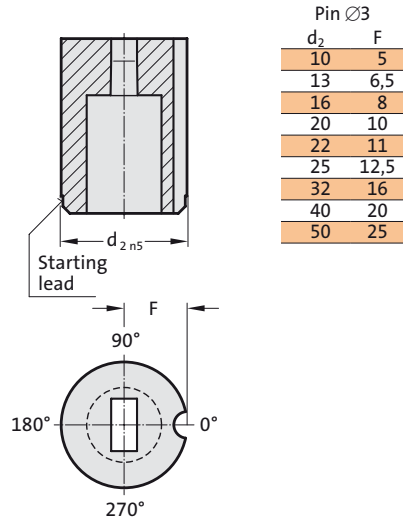
anti-rotation element 6 (6)



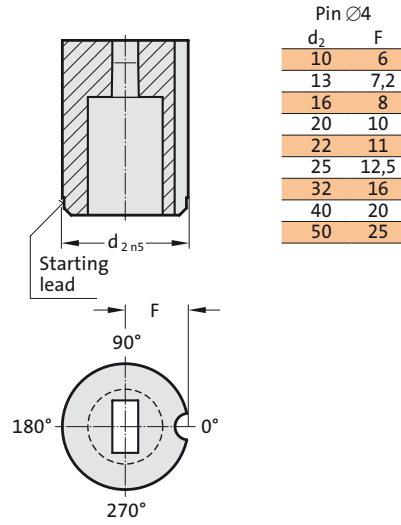
Precision Matrixes without shoulder, cylindrical , ISO 8977

Anti-rotation elements

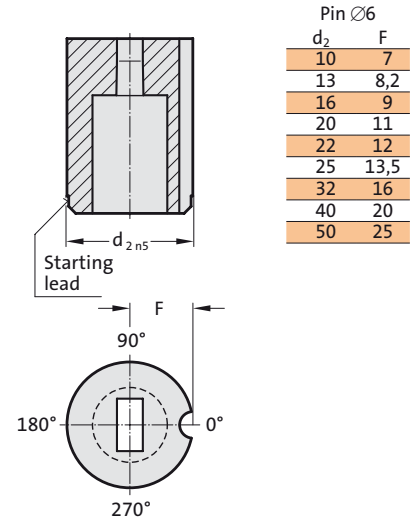
anti-rotation element 1 (1)



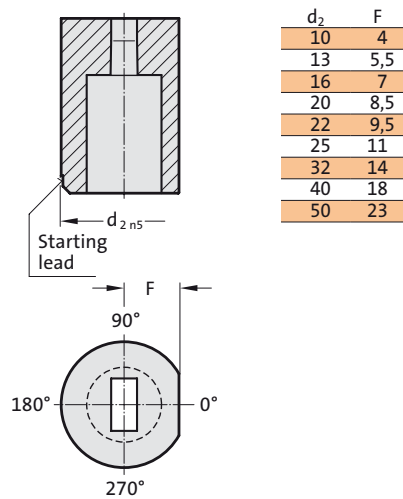
anti-rotation element 2 (2)



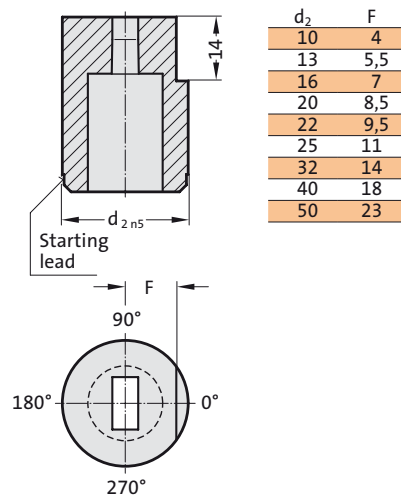
anti-rotation element 3 (3)



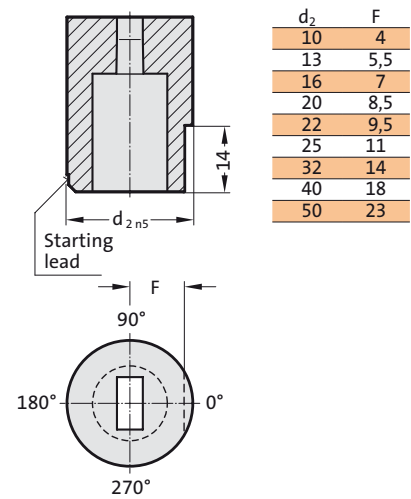
anti-rotation element 4 (4)



anti-rotation element 5 (5)



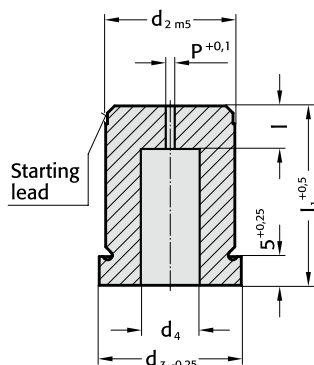
anti-rotation element 6 (6)





Matrix with shoulder, blank, ISO 8977

2607.

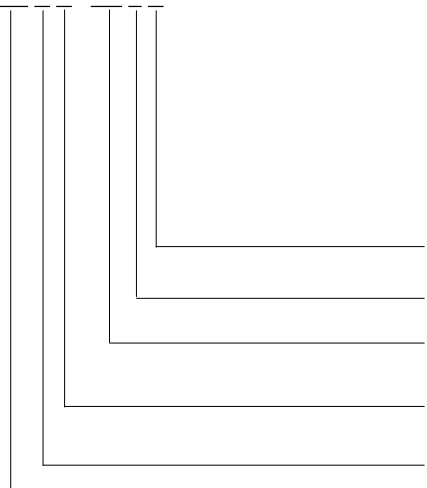


2607. Matrix with shoulder, blank, ISO 8977

d ₂ / (Order No)	d ₃	d ₄	P	l / (Order No)	l ₁ / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)
5 / (1)	8	2.8	0.8	2 / (1)		●	●	●	●	●	●	●	●
6 / (2)	9	3.5	1	3 / (2)		●	●	●	●	●	●	●	●
8 / (3)	11	4	1	4 / (3)		●	●	●	●	●	●	●	●
10 / (4)	13	5.8	1	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●
13 / (5)	16	8	1.2	5 / (4) 8 / (6)		●	●	●	●	●	●	●	●
16 / (6)	19	9.5	1.2	5 / (4) 8 / (6)		●	●	●	●	●	●	●	●
20 / (7)	23	12	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
22 / (8)	25	15	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
25 / (9)	28	17.3	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
32 / (10)	35	20.7	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
40 / (12)	43	27.7	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
50 / (14)	53	37	1.5	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●

Ordering-code (example):

2 6 0 7 . 10 F 8



Shape cutting length: l

12 mm

Length: l₁

28 mm

Diameter: d₂

32 mm

Type:

with shoulder

ISO 8977

Version:

Blank (pilot hole bore)

Matrix

Order No

= (8)

Order code character

= (F)

Order No

= (10)

Order No

= (7)

Order No

= (0)

Order No

= 26

Material:

HSS

Hardness 62 ± 2 HRC

Execution:

Diameter d₂, starting lead and face surfaces ground.

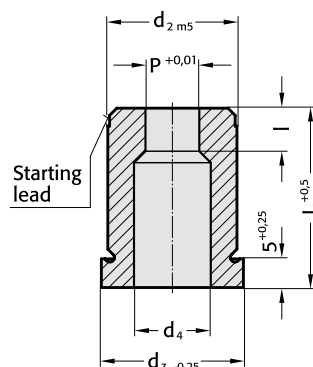
Diameter P is a bored pilot hole for wire EDM.

Special dimensions on request.

Matrix with shoulder, round, ISO 8977



2617.



2617. Matrix with shoulder, round, ISO 8977

d ₂ / (Order No)	d ₃	d ₄	P	l / (Order No)	l ₁ / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)
5 / (1)	8	2.8	1,0-2,4	2 / (1)		●	●	●	●	●	●	●	●
6 / (2)	9	3.5	1,6-3,0	3 / (2)		●	●	●	●	●	●	●	●
8 / (3)	11	4	2,0-3,5	4 / (3)		●	●	●	●	●	●	●	●
10 / (4)	13	5.8	2,5-5,0	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●
13 / (5)	16	8	4,0-7,0	5 / (4) 8 / (6)			●	●	●	●	●	●	●
16 / (6)	19	9.5	6,0-9,0	5 / (4) 8 / (6)			●	●	●	●	●	●	●
20 / (7)	23	12	8,0-11,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●
22 / (8)	25	15	9,0-14,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●
25 / (9)	28	17.3	10,7-16,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●
32 / (10)	35	20.7	15,0-20,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●
40 / (12)	43	27.7	19,0-27,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●
50 / (14)	53	37	26,0-36,0	8 / (6) 12 / (8)			●	●	●	●	●	●	●

Material:

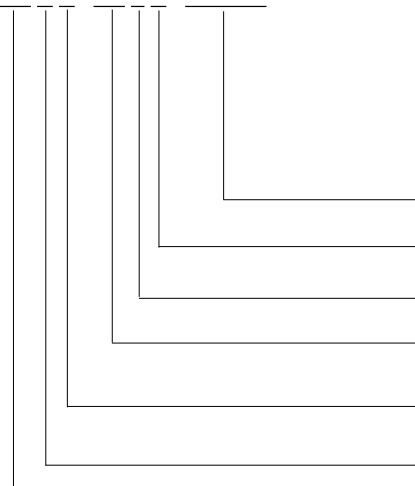
HSS
Hardness 62 ± 2 HRC

Execution:

Diameter d₂, starting lead and face surfaces ground.
Special dimensions on request.

Ordering-code (example): without anti-rotation element

2 6 1 7 . 1 0 F 8 . 1 5 1 0



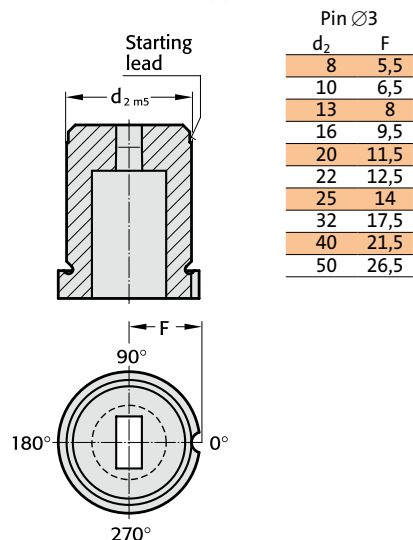
Format: Round
P = Ø 15,1 mm
Shape cutting length: l
12 mm
Length: l₁
28 mm
Diameter: d₂
32 mm
Type:
with shoulder
ISO 8977
Version:
Round
Matrix

= 1510
Order No
= (8)
Order code character
= (F)
Order No
= (10)
Order No
= (7)
Order No
= (1)
= 26

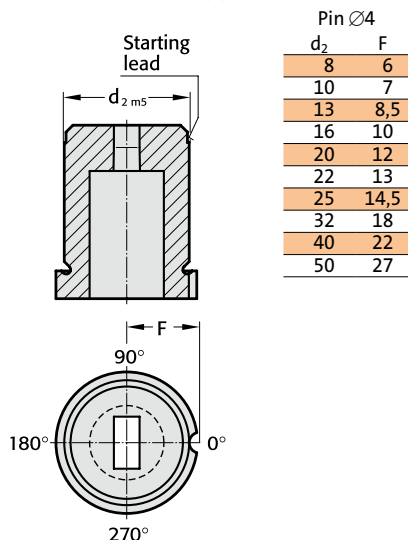
Precision Matrixes with shoulder, cylindrical , ISO 8977

Anti-rotation elements

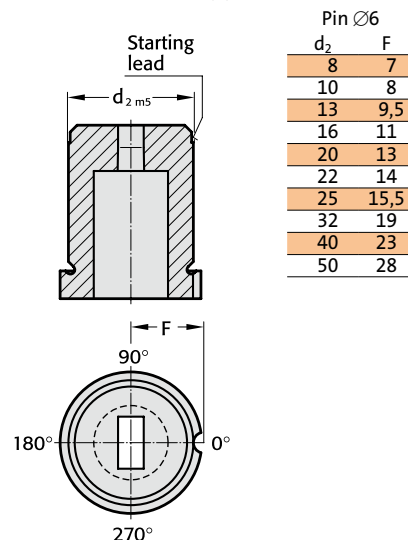
anti-rotation element 1 (1)



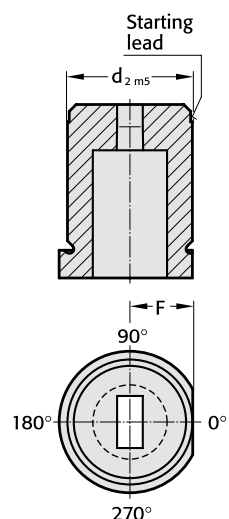
anti-rotation element 2 (2)



anti-rotation element 3 (3)



anti-rotation element 4 (4)



Ordering example: with anti-rotation element from d₂ ≥ 8 mm

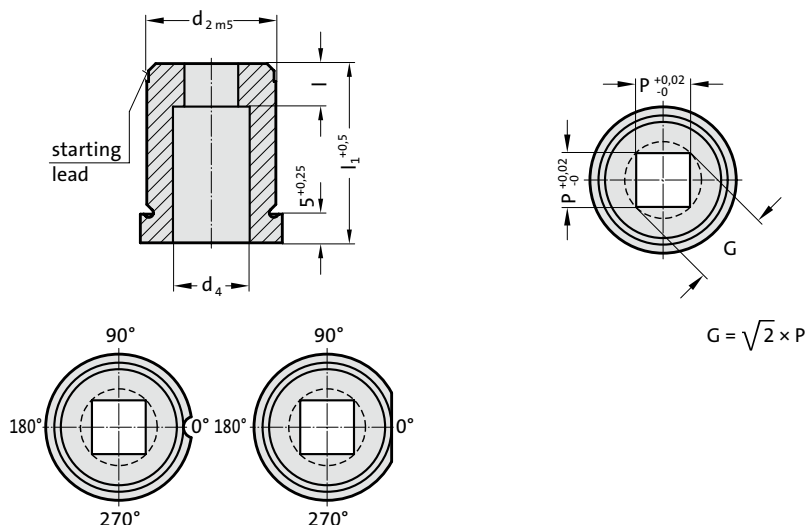
2 6 1 7 . 10 F 8 . 15 10 A 4

2	Anti-rotation element:	Order No
6	Polished surface (continuous)	= (4)
1	Angle:	Order Code character
7	0°	= (A)
.	Format: Round	
1	P = ø15,1 mm	= (1510)
0	Punch cutting length: l	Order No
1	12 mm	= (8)
5	Length: l ₁	Order Code character
1	28 mm	= (F)
0	Diameter: d ₂	Order No
8	32 mm	= (10)
.	Type:	Order No
1	with shoulder ISO 8977	= (7)
5	Version:	Order No
1	Round	= (1)
0	Matrixes:	
4	26 Matrixes	

Matrix with shoulder, square, ISO 8977



2627.



2627. Matrix with shoulder, square, ISO 8977

d_2 / (Order No)	d_3	d_4	P_{\min}	G_{\max}	l / (Order No)	l_1 / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)
8 / (3)	11	4	1.2	3.5	4 / (3)		●	●	●	●	●	●	●	●
10 / (4)	13	5.8	1.2	5	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●
13 / (5)	16	8	2	7	5 / (4) 8 / (6)			●	●	●	●	●	●	●
16 / (6)	19	9.5	2.4	9	5 / (4) 8 / (6)			●	●	●	●	●	●	●
20 / (7)	23	12	3.2	11	8 / (6) 12 / (8)			●	●	●	●	●	●	●
22 / (8)	25	15	4	14	8 / (6) 12 / (8)			●	●	●	●	●	●	●
25 / (9)	28	17.3	4.8	16	8 / (6) 12 / (8)			●	●	●	●	●	●	●
32 / (10)	35	20.7	5.5	20	8 / (6) 12 / (8)			●	●	●	●	●	●	●
40 / (12)	43	27.7	6.4	27	8 / (6) 12 / (8)			●	●	●	●	●	●	●
50 / (14)	53	37	6.4	36	8 / (6) 12 / (8)			●	●	●	●	●	●	●

Material:

HSS

Hardness 62 ± 2 HRC

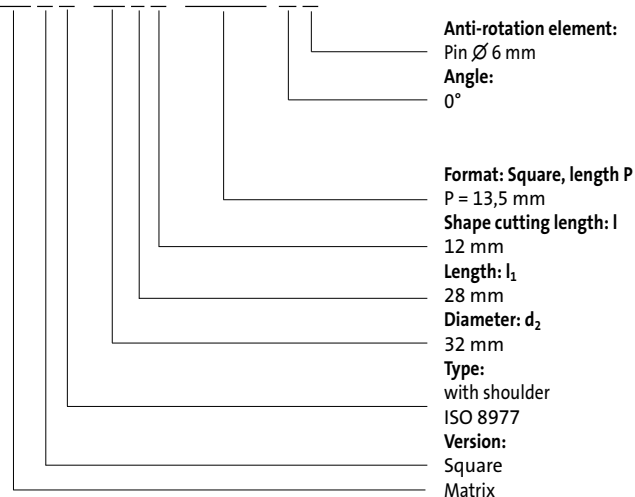
Execution:

EXECUTION:
Diameter d_2 , starting lead and face surfaces ground.

Special dimensions on request.

Ordering-code (example): with anti-rotation element

2627.10 F8.1350 A3



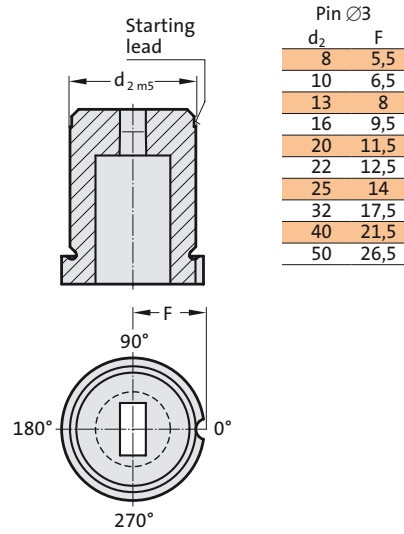
Order No
= (3)
Order code character
= (A)

= 1350
Order No
= (8)
Order code character
= (F)
Order No
= (10)
Order No
= (7)
Order No
= (2)
= 26

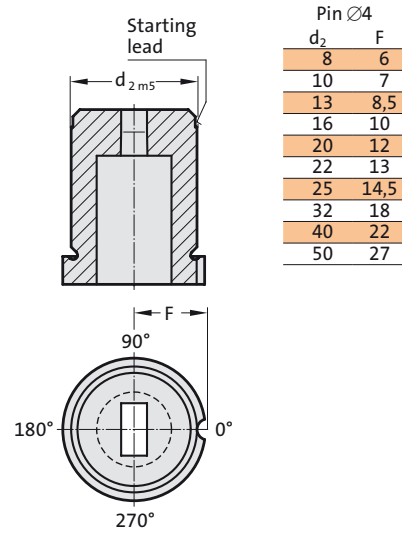
Precision Matrixes with shoulder, cylindrical , ISO 8977

Anti-rotation elements

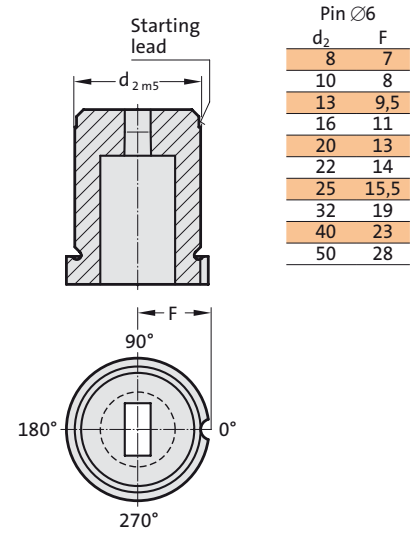
anti-rotation element 1 (1)



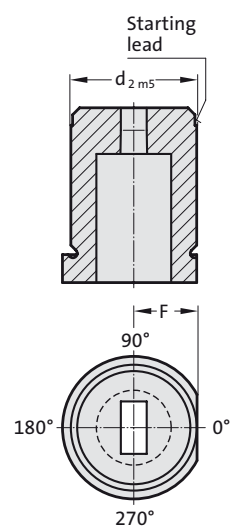
anti-rotation element 2 (2)

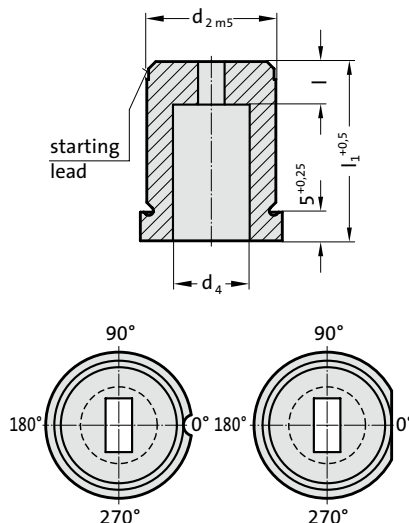


anti-rotation element 3 (3)



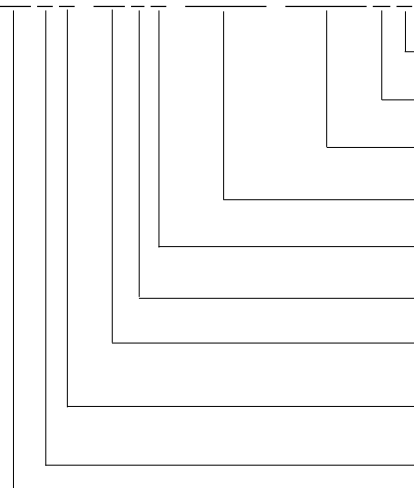
anti-rotation element 4 (4)





$$G = \sqrt{P^2 + W^2}$$

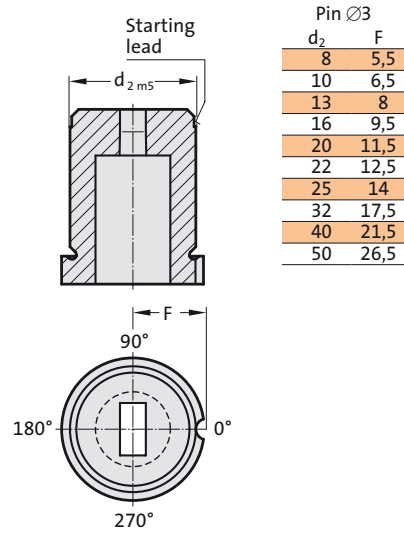
d_2 / (Order No)	d_3	d_4	W_{\min}	G_{\max}	l / (Order No)	l_1 / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (I)
8 / (3)	11	4	1.2	3.5	4 / (3)		●	●	●	●	●	●	●	●
10 / (4)	13	5.8	1.2	5	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●
13 / (5)	16	8	2	7	5 / (4) 8 / (6)			●	●	●	●	●	●	●
16 / (6)	19	9.5	2.4	9	5 / (4) 8 / (6)			●	●	●	●	●	●	●
20 / (7)	23	12	3.2	11	8 / (6) 12 / (8)			●	●	●	●	●	●	●
22 / (8)	25	15	4	14	8 / (6) 12 / (8)			●	●	●	●	●	●	●
25 / (9)	28	17.3	4.8	16	8 / (6) 12 / (8)			●	●	●	●	●	●	●
32 / (10)	35	20.7	5.5	20	8 / (6) 12 / (8)			●	●	●	●	●	●	●
40 / (12)	43	27.7	6.4	27	8 / (6) 12 / (8)			●	●	●	●	●	●	●
50 / (14)	53	37	6.4	36	8 / (6) 12 / (8)			●	●	●	●	●	●	●



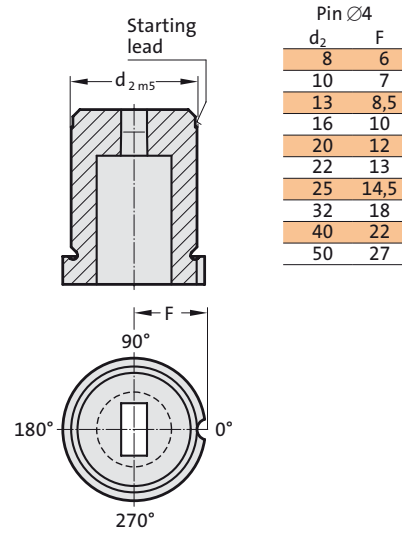
Precision Matrixes with shoulder, cylindrical , ISO 8977

Anti-rotation elements

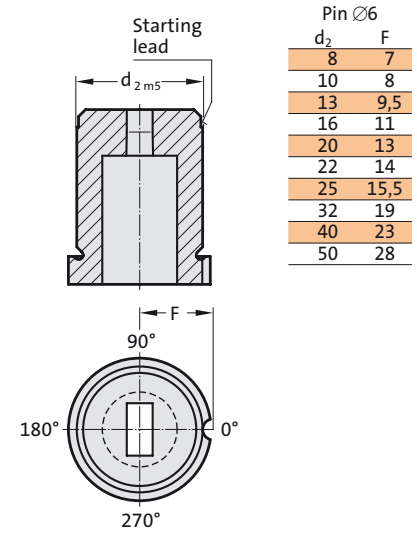
anti-rotation element 1 (1)



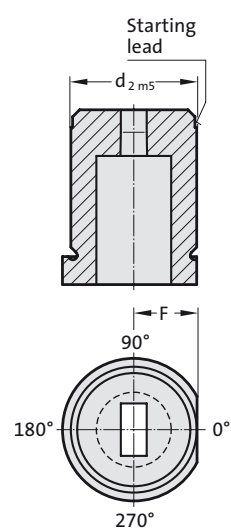
anti-rotation element 2 (2)



anti-rotation element 3 (3)



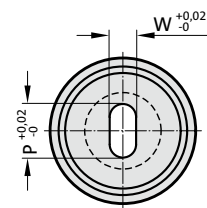
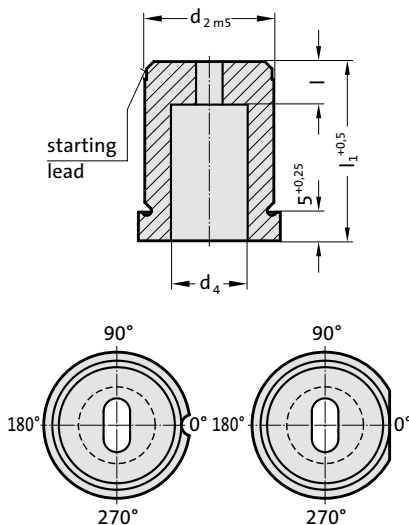
anti-rotation element 4 (4)



Matrix with shoulder, slot, ISO 8977



2647.



G = P

2647. Matrix with shoulder, slot, ISO 8977

d_2 / (Order No)	d_3	d_4	W_{min}	G_{max}	l / (Order No)	l_1 / (Order Code character)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)
8 / (3)	11	4	1.2	3.5	4 / (3)		●	●	●	●	●	●	●	●
10 / (4)	13	5.8	1.2	5	4 / (3) 8 / (6)		●	●	●	●	●	●	●	●
13 / (5)	16	8	2	7	5 / (4) 8 / (6)		●	●	●	●	●	●	●	●
16 / (6)	19	9.5	2.4	9	5 / (4) 8 / (6)		●	●	●	●	●	●	●	●
20 / (7)	23	12	3.2	11	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
22 / (8)	25	15	4	14	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
25 / (9)	28	17.3	4.8	16	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
32 / (10)	35	20.7	5.5	20	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
40 / (12)	43	27.7	6.4	27	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●
50 / (14)	53	37	6.4	36	8 / (6) 12 / (8)		●	●	●	●	●	●	●	●

Material:

HSS

Hardness 62 ± 2 HRC

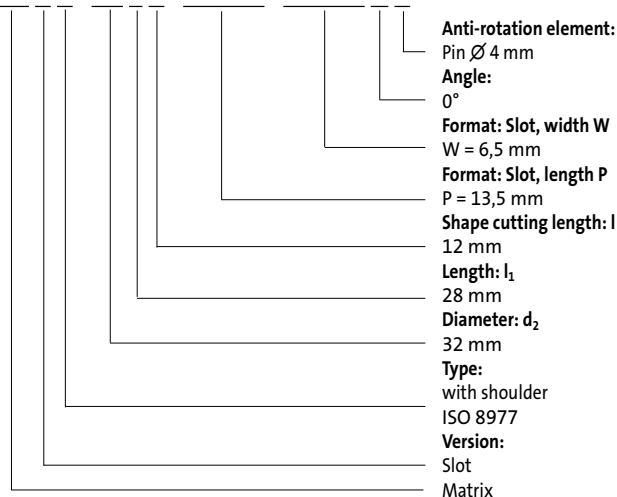
Execution:

Diameter d_2 , starting lead and face surfaces ground.

Special dimensions on request.

Ordering-code (example): with anti-rotation element

2 6 4 7 . 1 0 F 8 . 1 3 5 0 . 0 6 5 0 A 2

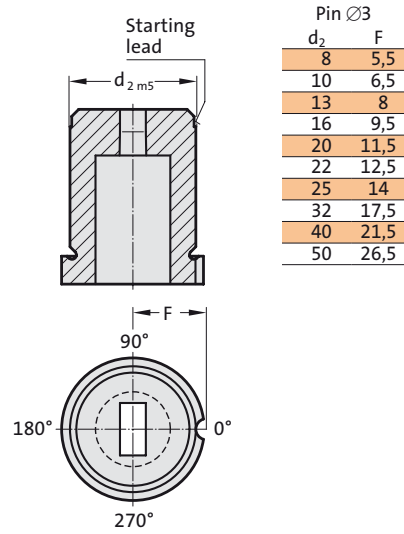


Order No = (2)
Order code character = (A)
= 0650
= 1350
Order No = (8)
Order code character = (F)
Order No = (10)
Order No = (7)
Order No = (4)
= 26

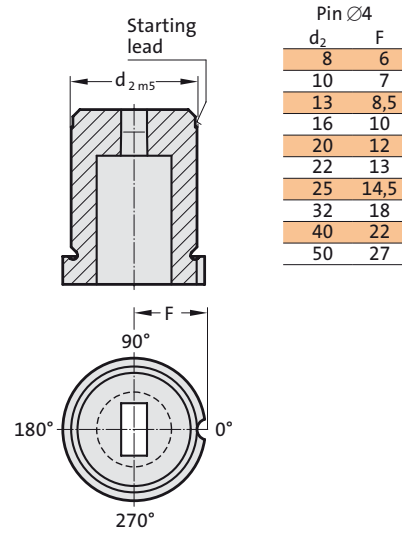
Precision Matrixes with shoulder, cylindrical , ISO 8977

Anti-rotation elements

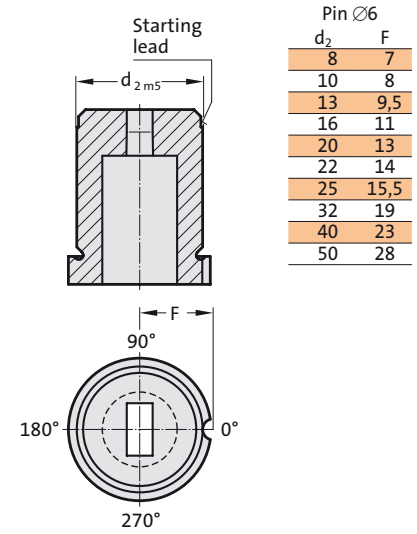
anti-rotation element 1 (1)



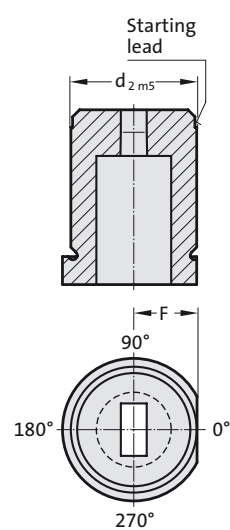
anti-rotation element 2 (2)



anti-rotation element 3 (3)



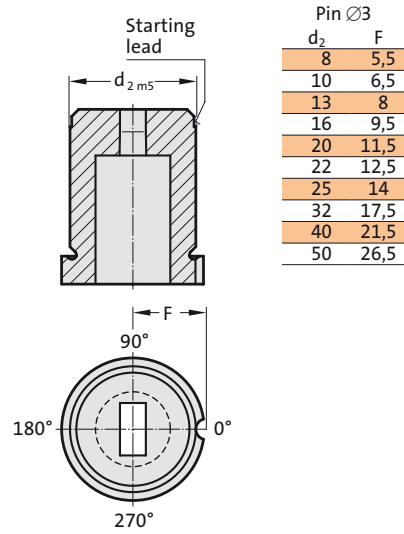
anti-rotation element 4 (4)



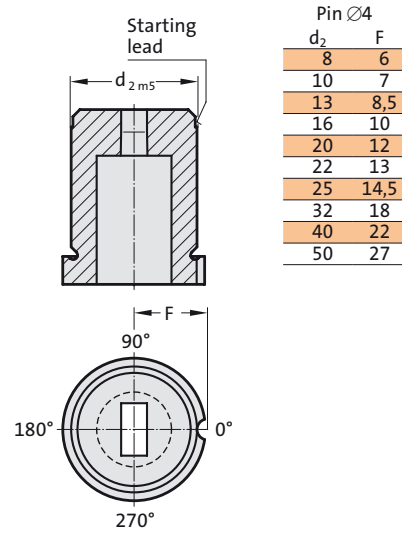
Precision Matrixes with shoulder, cylindrical , ISO 8977

Anti-rotation elements

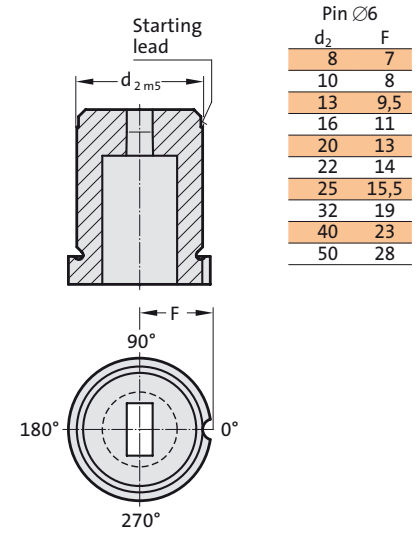
anti-rotation element 1 (1)



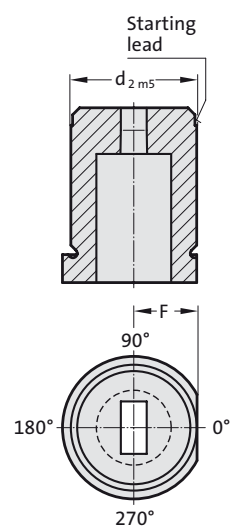
anti-rotation element 2 (2)



anti-rotation element 3 (3)



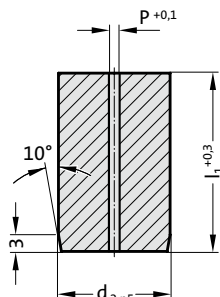
anti-rotation element 4 (4)



Matrix without shoulder, blank, Automotive Standard



2605.



2605. Matrix without shoulder, blank, Automotive Standard

d ₂ / (Order No)	P	l ₁ / (Order Code character)	13 (A)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
10 / (4)	0.8											
13 / (5)	0.8											
16 / (6)	1.5											
20 / (7)	2.4											
22 / (8)	3											
25 / (9)	3											
32 / (10)	3											
38 / (11)	3											
40 / (12)	3											
45 / (13)	3											
50 / (14)	3											
56 / (15)	3											
63 / (16)	3											
71 / (17)	3											
76 / (18)	3											
85 / (19)	3											
90 / (20)	3											
100 / (21)	3											

Material:

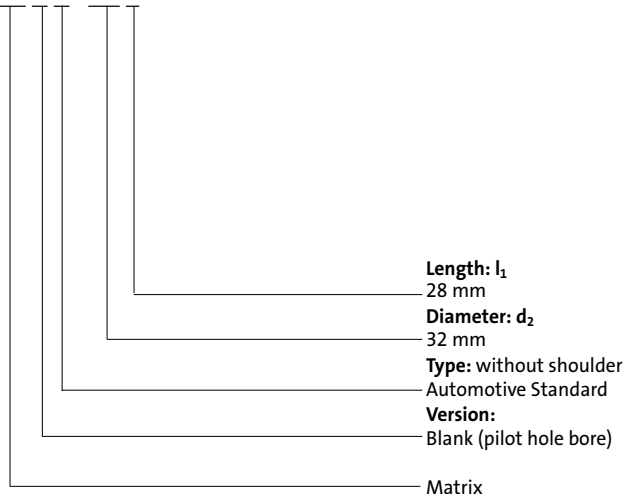
HSS
Hardness 62 ± 2 HRC

Execution:

Diameter d₂ and end faces ground.
Diameter P is a bored pilot hole for wire EDM.
Special dimensions on request.

Ordering example:

2 6 0 5 . 10 F



Order Code character
= (F)
Order No
= (10)
Order No
= (5)
Order No
= (0)
= 26

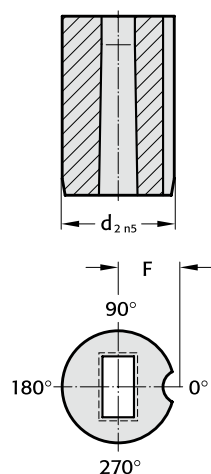


Matrix without shoulder, round, Automotive Standard

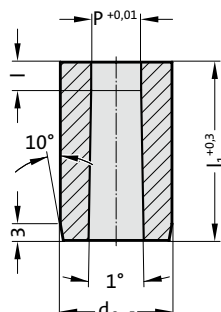
Anti-rotation element 3 (3)

Pin $\varnothing 6$

2615.



d_2	F
10	7
13	8,2
16	9
20	11
22	12
25	13,5
32	16
38	19
40	20
45	22,5
50	25
56	28
63	31,5
71	35,5
76	38
85	42,5
90	45
100	50



2615. Matrix without shoulder, round, Automotive Standard

d_2 / (Order No)	P	l / (Order No)	l_1 / (Order Code character)	13 (A)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (I)	40 (K)
10 / (4)	1,6-6,8	3 / (2) 4 / (3) 5 / (4)		●	●	●	●	●	●	●	●	●	●
13 / (5)	3,0-8,8	3 / (2) 5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●	●
16 / (6)	7,4-10,8	3 / (2) 5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●	●
20 / (7)	9,5-13,6	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
22 / (8)	10,5-15,0	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
25 / (9)	12,0-17,0	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
32 / (10)	16,0-22,0	3 / (2) 6 / (5) 12 / (8)		●	●	●	●	●	●	●	●	●	●
38 / (11)	18,0-27,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
40 / (12)	18,0-27,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
45 / (13)	18,0-35,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
50 / (14)	18,0-40,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
56 / (15)	18,0-45,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
63 / (16)	18,0-50,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
71 / (17)	18,0-56,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
76 / (18)	25,0-60,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
85 / (19)	25,0-66,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
90 / (20)	32,0-70,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
100 / (21)	32,0-78,0	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●

Ordering example: without / with anti-rotation element

2 6 1 5 . 10 F 8 . 2 1 9 0 / A 3

anti-rotation element:
Pin $\varnothing 6$
Angle:
0°

Format: Round
P = $\varnothing 21,9$ mm
Shape cutting length: l
12 mm
Length: l_1
28 mm
Diameter: d_2
32 mm
Type: without shoulder
Automotive Standard
Version:
Round
Matrix

Order No
= (3)
Order Code character
= (A)

= (2190)
Order No
= (8)
Order Code character
= (F)
Order No
= (10)
Order No
= (5)
Order No
= (1)
= 26

Material:

HSS
Hardness 62 ± 2 HRC

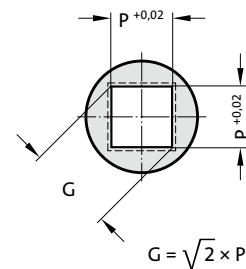
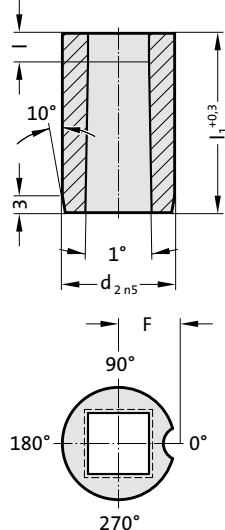
Execution:

Diameter d_2 and end faces ground.
Special dimensions on request.

Matrix without shoulder, square, Automotive Standard



2625.



2625. Matrix without shoulder, square, Automotive Standard

d ₂ / (Order No)	P _{min}	G _{max}	F	I / (Order No)	l ₁ / (Order Code character)	13 (A)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
10 / (4)	1.3	6.8	7	3 / (2) 4 / (3) 5 / (4)		●	●	●	●	●	●	●	●	●	●
13 / (5)	1.9	8.8	8.2	3 / (2) 5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●	●
16 / (6)	1.9	10.8	9	3 / (2) 5 / (4) 8 / (6)				●	●	●	●	●	●	●	●
20 / (7)	1.9	13.6	11	3 / (2) 6 / (5) 10 / (7)				●	●	●	●	●	●	●	●
22 / (8)	1.9	15	12	3 / (2) 6 / (5) 10 / (7)				●	●	●	●	●	●	●	●
25 / (9)	1.9	17	13.5	3 / (2) 6 / (5) 10 / (7)				●	●	●	●	●	●	●	●
32 / (10)	1.9	22	16	3 / (2) 6 / (5) 12 / (8)				●	●	●	●	●	●	●	●
38 / (11)	1.9	27	19	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
40 / (12)	1.9	27	20	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
45 / (13)	2.4	35	22.5	3 / (2) 8 / (6) 12 / (8)					●	●	●	●	●	●	●
50 / (14)	4	40	25	3 / (2) 8 / (6) 12 / (8)					●	●	●	●	●	●	●
56 / (15)	4	45	28	3 / (2) 8 / (6) 12 / (8)					●	●	●	●	●	●	●
63 / (16)	4	50	31.5	3 / (2) 8 / (6) 12 / (8)					●	●	●	●	●	●	●
71 / (17)	4	56	35.5	3 / (2) 8 / (6) 12 / (8)					●	●	●	●	●	●	●
76 / (18)	5.6	60	38	3 / (2) 8 / (6) 12 / (8)						●	●	●	●	●	●
85 / (19)	5.6	66	42.5	3 / (2) 8 / (6) 12 / (8)						●	●	●	●	●	●
90 / (20)	5.6	70	45	3 / (2) 8 / (6) 12 / (8)						●	●	●	●	●	●
100 / (21)	5.6	78	50	3 / (2) 8 / (6) 12 / (8)						●	●	●	●	●	●

Material:

HSS

Hardness 62 ± 2 HRC

Execution:

Diameter d₂ and end faces ground.

Special dimensions on request.

Ordering example: with anti-rotation element

2 6 2 5 . 10 F 8 . 1350 A 3

anti-rotation element:

Pin Ø 6

Angle:

0°

Format: Square, length P

P = 13,5 mm

Shape cutting length: I

12 mm

Length: l₁

28 mm

Diameter: d₂

32 mm

Type: without shoulder

Automotive Standard

Version:

Square

Matrix

Order No

= (3)

Order Code character

= (A)

= (1350)

Order No

= (8)

Order Code character

= (F)

Order No

= (10)

Order No

= (5)

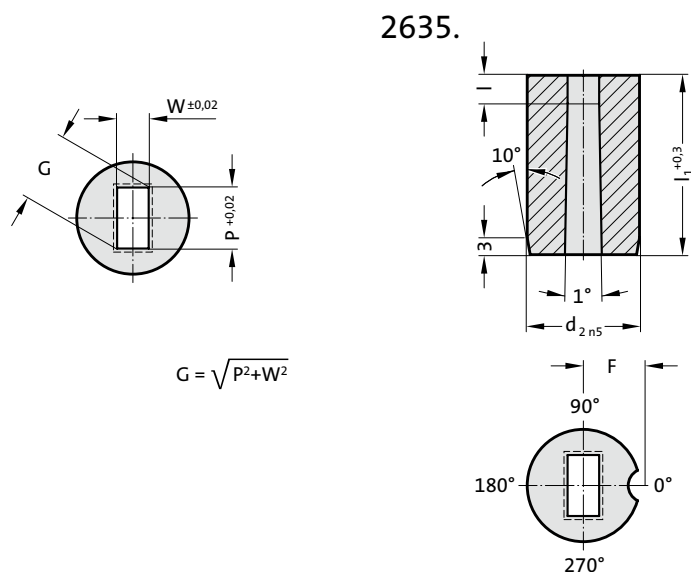
Order No

= (2)

= 26



Matrix without shoulder, rectangular, Automotive Standard



$$G = \sqrt{P^2 + W^2}$$



2635. Matrix without shoulder, rectangular, Automotive Standard

d ₂ / (Order No)	W _{min}	G _{max}	F	I / (Order No)	l ₁ / (Order Code character)	13 (A)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
10 / (4)	1.3	6.8	7	3 / (2) 4 / (3) 5 / (4)		●	●	●	●	●	●	●	●	●	●
13 / (5)	1.9	8.8	8.2	3 / (2) 5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●	●
16 / (6)	1.9	10.8	9	3 / (2) 5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●	●
20 / (7)	1.9	13.6	11	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
22 / (8)	1.9	15	12	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
25 / (9)	1.9	17	13.5	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
32 / (10)	1.9	22	16	3 / (2) 6 / (5) 12 / (8)		●	●	●	●	●	●	●	●	●	●
38 / (11)	1.9	27	19	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
40 / (12)	1.9	27	20	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
45 / (13)	2.4	35	22.5	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
50 / (14)	4	40	25	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
56 / (15)	4	45	28	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
63 / (16)	4	50	31.5	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
71 / (17)	4	56	35.5	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
76 / (18)	5.6	60	38	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
85 / (19)	5.6	66	42.5	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
90 / (20)	5.6	70	45	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
100 / (21)	5.6	78	50	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●

Ordering example: with anti-rotation element

2 6 3 5 . 1 0 F 8 . 1 3 5 0 . 0 6 5 0 A 3

Anti-rotation element: Pin ø6
Angle: 0°
Format: Rectangular, width W
W = 6,5 mm
Format: Rectangular, length P
P = 13,5 mm
Shape cutting length: I
12 mm
Length: l₁
28 mm
Diameter: d₂
32 mm
Type: without shoulder
Automotive Standard
Version:
Rectangular
Matrix

Order No
= (3)
Order Code character
= (A)
Order No
= (0650)
Order No
= (1350)
Order No
= (8)
Order Code character
= (F)
Order No
= (10)
Order No
= (5)
Order No
= (3)
Order No
= 26

Material:

HSS
Hardness 62 ± 2 HRC

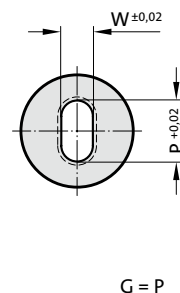
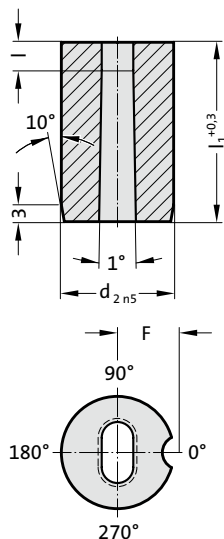
Execution:

Diameter d₂ and end faces ground.
Special dimensions on request.

Matrix without shoulder, slot, Automotive Standard



2645.



G = P

2645. Matrix without shoulder, slot, Automotive Standard

d ₂ / (Order No)	W _{min}	G _{max}	F	I / (Order No)	I ₁ / (Order Code character)	13 (A)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (J)	40 (K)
10 / (4)	1.3	6.8	7	3 / (2) 4 / (3) 5 / (4)		●	●	●	●	●	●	●	●	●	●
13 / (5)	1.9	8.8	8.2	3 / (2) 5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●	●
16 / (6)	1.9	10.8	9	3 / (2) 5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●	●
20 / (7)	1.9	13.6	11	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
22 / (8)	1.9	15	12	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
25 / (9)	1.9	17	13.5	3 / (2) 6 / (5) 10 / (7)		●	●	●	●	●	●	●	●	●	●
32 / (10)	1.9	22	16	3 / (2) 6 / (5) 12 / (8)		●	●	●	●	●	●	●	●	●	●
38 / (11)	1.9	27	19	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
40 / (12)	1.9	27	20	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
45 / (13)	2.4	35	22.5	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
50 / (14)	4	40	25	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
56 / (15)	4	45	28	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
63 / (16)	4	50	31.5	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
71 / (17)	4	56	35.5	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
76 / (18)	5.6	60	38	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
85 / (19)	5.6	66	42.5	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
90 / (20)	5.6	70	45	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●
100 / (21)	5.6	78	50	3 / (2) 8 / (6) 12 / (8)		●	●	●	●	●	●	●	●	●	●

Material:

HSS

Hardness 62 ± 2 HRC

Execution:

Diameter d₂ and end faces ground.

Special dimensions on request.

Ordering example: with anti-rotation element

2 6 4 5 . 10 F 8 . 1 3 5 0 . 0 6 5 0 A 3

Anti-rotation element:

Pin ø6

Angle:

0°

Format: Slot, width W

W = 6,5 mm

Format: Slot, length P

P = 13,5 mm

Shape cutting length: I

12 mm

Length: I₁

28 mm

Diameter: d₂

32 mm

Type: without shoulder

Automotive Standard

Version:

Slot

Matrix

Order No

= (3)

Order Code character

= (A)

= (0650)

= (1350)

Order No

= (8)

Order Code character

= (F)

Order No

= (10)

Order No

= (5)

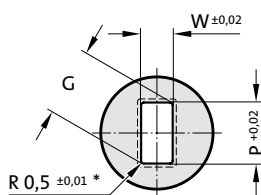
Order No

= (4)

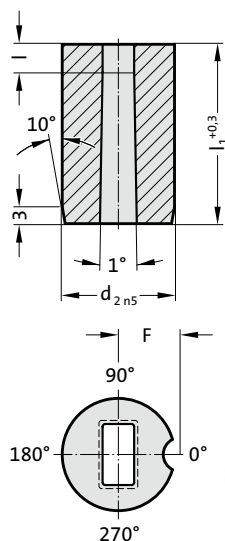
= 26

Matrix without shoulder, rectangle with radiused corners, Automotive Standard

2655.



$$G = \sqrt{(P-1.0)^2 + (W-1.0)^2} + 1$$



2655. Matrix without shoulder, rectangle with radiused corners, Automotive Standard

d ₂ / (Order No)	W _{min}	G _{max}	F	I / (Order No)	I ₁ / (Order Code character)	13 (A)	16 (B)	20 (C)	22 (D)	25 (E)	28 (F)	30 (G)	32 (H)	35 (I)	40 (K)
10 / (4)	1.3	6.8	7	3 / (2) 4 / (3) 5 / (4)		●	●	●	●	●	●	●	●	●	●
13 / (5)	1.9	8.8	8.2	3 / (2) 5 / (4) 8 / (6)		●	●	●	●	●	●	●	●	●	●
16 / (6)	1.9	10.8	9	3 / (2) 5 / (4) 8 / (6)				●	●	●	●	●	●	●	●
20 / (7)	1.9	13.6	11	3 / (2) 6 / (5) 10 / (7)				●	●	●	●	●	●	●	●
22 / (8)	1.9	15	12	3 / (2) 6 / (5) 10 / (7)				●	●	●	●	●	●	●	●
25 / (9)	1.9	17	13.5	3 / (2) 6 / (5) 10 / (7)				●	●	●	●	●	●	●	●
32 / (10)	1.9	22	16	3 / (2) 6 / (5) 12 / (8)				●	●	●	●	●	●	●	●
38 / (11)	1.9	27	19	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
40 / (12)	1.9	27	20	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
45 / (13)	2.4	35	22.5	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
50 / (14)	4	40	25	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
56 / (15)	4	45	28	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
63 / (16)	4	50	31.5	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
71 / (17)	4	56	35.5	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
76 / (18)	5.6	60	38	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
85 / (19)	5.6	66	42.5	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
90 / (20)	5.6	70	45	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●
100 / (21)	5.6	78	50	3 / (2) 8 / (6) 12 / (8)				●	●	●	●	●	●	●	●

Ordering example: with anti-rotation element

2 6 5 5 . 10 F 8 . 1 3 5 0 . 0 6 5 0 A 3

Anti-rotation element: Order No = (3)
Pin $\phi 6$ Order Code character = (A)
Angle: 0°
Format: Rectangle with radiused corners, width W = 6,5 mm Order No = (0650)
Format: Rectangle with radiused corners, length P = 13,5 mm Order No = (1350)
Shape cutting length: I = 12 mm Order No = (8)
Length: I₁ = 28 mm Order Code character = (F)
Diameter: d₂ = 32 mm Order No = (10)
Type: without shoulder Order No = (5)
Automotive Standard Order No = (5)
Version: Rectangle with radiused corners
Matrixes: 26 Matrixes

Material:

HSS
 Hardness 62 ± 2 HRC

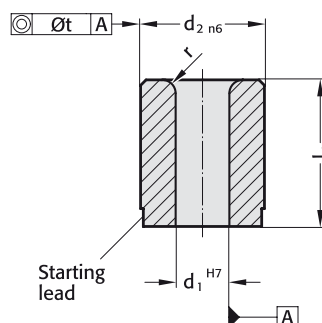
Execution:

Diameter d₂ and end faces ground.
 Special dimensions on request.
 * For other radius options, see standardised special shapes.

Guide bush for punch DIN 9845, Shape C



262.



262. Guide bush for punch DIN 9845, Shape C

Material:
Case hardened steel
Hardness 740 ± 40 HV 10

Execution:
Diameters d_1 , d_2 and starting lead ground.

Diameter steps					
d_1	d_1	d_2	t	l_1	r
0.5 - 1	0.1	5	0.01	9	1
1.1 - 2	0.1	6	0.01	12	1
2.1 - 3	0.1	7	0.01	12	1
3.1 - 4	0.1	8	0.01	12	1
4.1 - 5	0.1	10	0.01	16	1
5.1 - 6	0.1	12	0.02	16	1.5
6.1 - 8	0.1	15	0.02	20	1.5
8.1 - 10	0.1	18	0.02	20	2
10.1 - 12	0.1	22	0.02	28	2
12.1 - 15	0.1	26	0.02	28	2
15.1 - 18	0.5	30	0.02	36	2

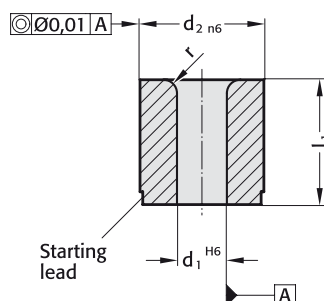
Ordering Code (example):

Guide bush for punch DIN 9845, Shape C	=262.1.
Guide diameter d_1	5.1 mm = 0510.
Length l_1	16 mm = 016
Order No	=262.1.0510.016



Guide bush for punch ISO 8978

2621.



Material:

WS
Hardness 60 ± 2 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

Execution:

Diameters d_1 , d_2 and starting lead ground.

2621. Guide bush for punch ISO 8978

Diameter steps				
d_1	d_1	d_2	l_1	r
1 - 2.4	0.1	5	8	1
1.6 - 3	0.1	6	12.5	1
2 - 3.5	0.1	8	12.5	1.5
3 - 5	0.1	10	16	2
4 - 7.2	0.1	13	16	2
6 - 8.8	0.1	16	20	2
7.5 - 11.3	0.1	20	20	2.5
11 - 16.6	0.1	25	25	2.5
15 - 20	0.5	32	25	4
18 - 27	0.5	40	32	4
26 - 36	0.5	50	40	4

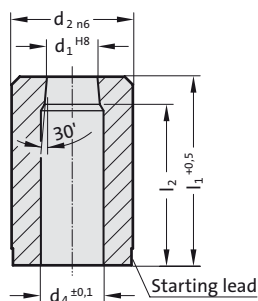
Ordering Code (example):

Guide bush for punch ISO 8978	=2621.1.
Guide diameter d_1 6 mm	= 0600.
External diameter d_2 16 mm	= 1600
Order No	=2621.1. 0600. 1600

Matrix without collar, DIN 9845 Shape A



260.



260. Matrix without collar, DIN 9845 Shape A

Diameter steps				
d_1	d_1	d_2	l_2	l_2
0.5 - 1	0.1	5	$l_1=20$	$l_1=28$
1.1 - 2	0.1	6	17	25
2.1 - 3	0.1	7	17	25
3.1 - 4	0.1	8	17	25
4.1 - 5	0.1	10	16	24
5.1 - 6	0.1	12	16	24
6.1 - 8	0.1	15	16	24
8.1 - 10	0.1	18	16	24
10.1 - 12	0.1	22	15	23
12.1 - 15	0.1	26	15	23
15.1 - 18	0.1	30		23

Material:

HSS

Order No 260.

Hardness 62 ± 2 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

Execution:

Diameters d_1 , d_2 and face surfaces ground.

d_4 : For $d_1 \leq 2$ mm, $d_4 = d_1 + 0,3$

For $d_1 = 2,1$ mm to 4,0 mm, $d_4 = d_1 + 0,5$

For $d_1 = 4,1$ mm to 8,0 mm, $d_4 = d_1 + 0,7$

For $d_1 \geq 8,1$ mm, $d_4 = d_1 + 1$

Other diameters on request.

Ordering Code (example):

Matrix without collar, DIN 9845 Shape A =260.3.

Cutting diameter d_1 5.1 mm = 0510.

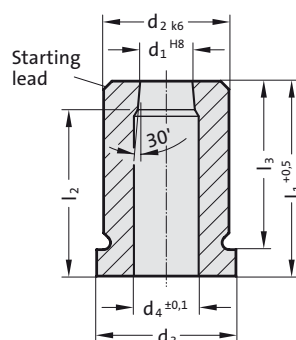
Length l_1 20 mm = 020

Order No =260.3.0510.020



Matrix with collar, DIN 9845 Shape B

261.



Material:

HSS

Order No 261.3.

Hardness 62 ± 2 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

Execution:

Diameters d_1 , d_2 and face surfaces ground.

d_4 : For $d_1 \leq 2$ mm, $d_4 = d_1 + 0,3$

For $d_1 = 2,1$ mm to 4,0 mm, $d_4 = d_1 + 0,5$

For $d_1 = 4,1$ mm to 8,0 mm, $d_4 = d_1 + 0,7$

For $d_1 \geq 8,1$ mm, $d_4 = d_1 + 1$

Other diameters on request.

261. Matrix with collar, DIN 9845 Shape B

Diameter steps							
d_1	d_1	d_2	d_3	l_2	l_3	l_2	l_3
				$l_1=20$	$l_1=20$	$l_1=28$	$l_1=28$
0.5 - 1	0.1	5	7	18	16		
1.1 - 2	0.1	6	8	17	16	25	24
2.1 - 3	0.1	7	9	17	16	25	24
3.1 - 4	0.1	8	10	17	16	25	24
4.1 - 5	0.1	10	12	16	16	24	24
5.1 - 6	0.1	12	14	16	16	24	24
6.1 - 8	0.1	15	17	16	16	24	24
8.1 - 10	0.1	18	20	16	16	24	24
10.1 - 12	0.1	22	24	15	16	23	24
12.1 - 15	0.1	26	28	15	16	23	24
15.1 - 18	0.1	30	32			23	24

Ordering Code (example):

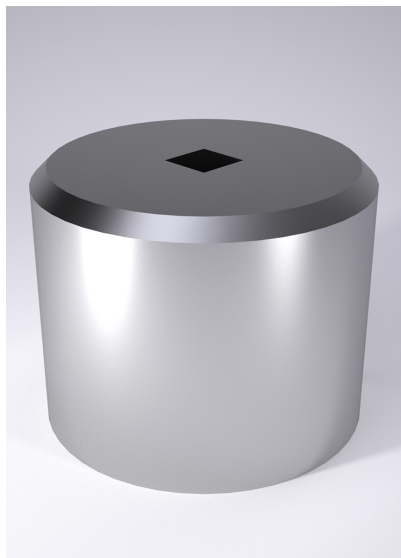
Matrix with collar, DIN 9845 Shape B =261.3.

Cutting diameter d_1 5.1 mm = 0510.

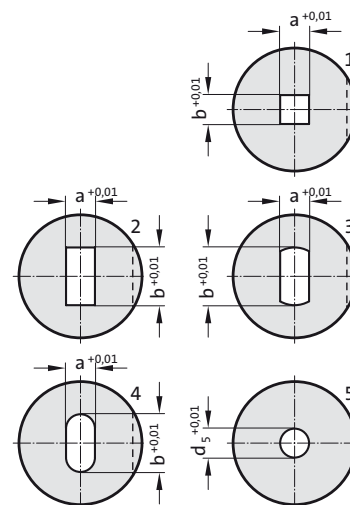
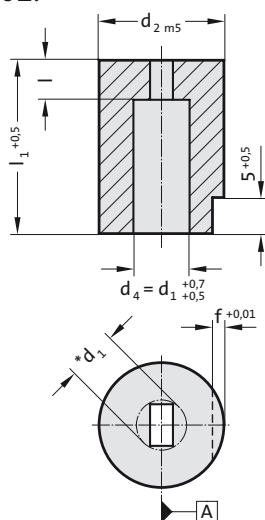
Length l_1 20 mm = 020

Order No =261.3. 0510.020

Matrix without collar, cylindrical



2602.



2602. Matrix without collar, cylindrical

d_1, d_5	d_2	l	f	l_1	l_1	l_1	l_1	l_1	l_1
				16	19	22	25	28	32
1.8 - 3.2	8	3	1	●	●	●	●	●	●
2 - 5	10	3	1	●	●	●	●	●	●
3 - 7	13	3	1.5	●	●	●	●	●	●
5 - 8	16	5	1.5	●	●	●	●	●	●
7 - 11	20	5	1.5	●	●	●	●	●	●
11 - 16	25	5	2.5	●	●	●	●	●	●
16 - 19	32	7	2.5	●	●	●	●	●	●
19 - 28	40	7	2.5	●	●	●	●	●	●

Material:

HSS
Order No. 2602.3.
Hardness 64 ± 2 HRC

Execution:

Diameter d_2 and end faces ground.
Key flats parallel with reference axis "A" unless otherwise specified.
* d_1 = size over corners

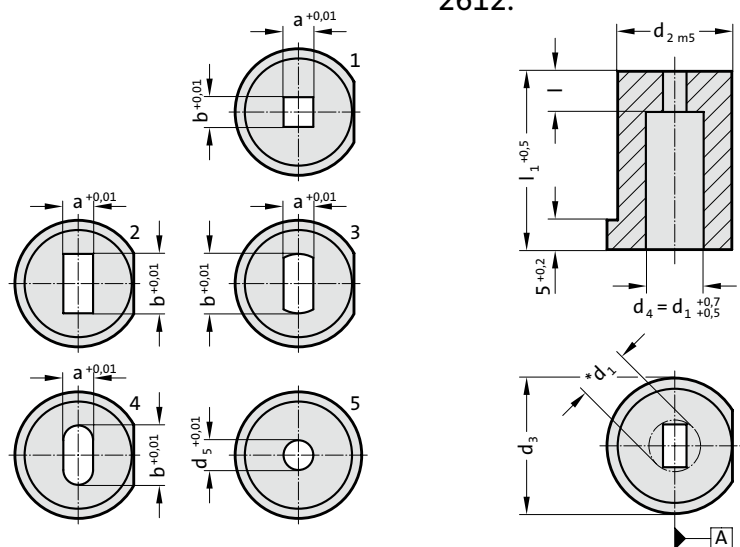
With starting holes for wire-EDM as per 2601.

Ordering Code (example):

Matrix without collar, cylindrical	=2602.3.
Locating diameter d_2	20 mm = 020.
Length l_1	16 mm = 016.
Die shape SHAPE	Square = 1.
Width of die shape a	320 mm= 0320.
Die shape length b	320 mm= 0320
Order No	=2602.3. 020.016.1.0320.0320



Matrix with collar, cylindrical

2612.**Material:**

HSS

Order No. 2612.3.

Hardness 64 ± 2 HRC

Execution:Diameter d_2 and end faces ground.

Key flats parallel with reference axis "A" unless otherwise specified.

* d_1 = size over corners

With starting holes for wire-EDM as per 2611.

2612. Matrix with collar, cylindrical

d_1, d_5	d_2	d_3	l	F	l_1	l_1	l_1	l_1	l_1	l_1
1.8 - 3.2	8	11	3	1	16	19	22	25	28	32
2 - 5	10	13	3	1	●	●	●	●	●	●
3 - 7	13	16	3	1.5	●	●	●	●	●	●
5 - 8	16	19	5	1.5	●	●	●	●	●	●
7 - 11	20	23	5	1.5	●	●	●	●	●	●
11 - 16	25	28	5	2.5	●	●	●	●	●	●
16 - 19	32	35	7	2.5	●	●	●	●	●	●
19 - 28	40	43	7	2.5	●	●	●	●	●	●

Matrix with collar, cylindrical =2612.3.

Locating diameter d_2 20 mm = 020.Length l_1 16 mm = 016.

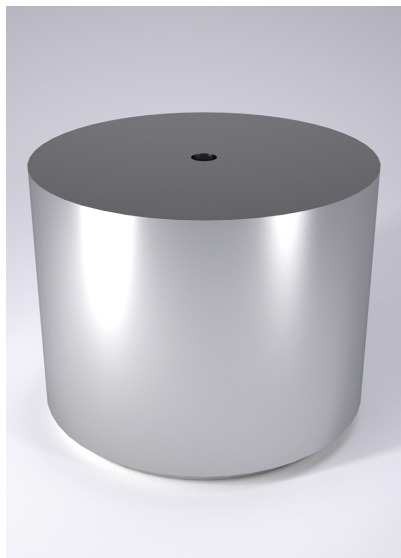
Die shape Shape Square = 1.

Width of die shape a 3.2 mm = 0320.

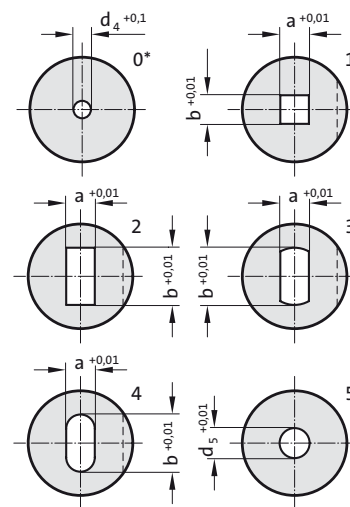
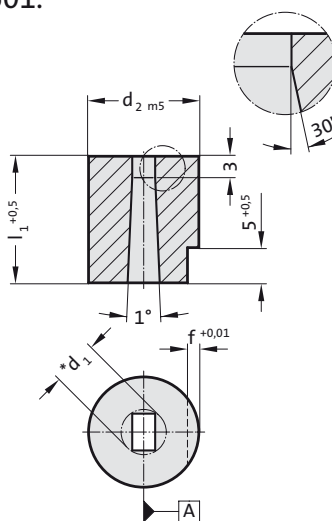
Die shape Shape Square = 0320

Order No =2612.3.020.016.1.0320.0320

Matrix without collar, conical



2601.



2601. Matrix without collar, conical

d ₁ , d ₅	d ₂	d ₄	f	l ₁	l ₁	l ₁	l ₁	l ₁	l ₁
1.6 - 3.2	8	1	1	16	19	22	25	28	32
2 - 5	10	1	1	●	●	●	●	●	●
3 - 7	13	1.5	1.5	●	●	●	●	●	●
5 - 8	16	1.5	1.5	●	●	●	●	●	●
7 - 11	20	1.5	1.5	●	●	●	●	●	●
11 - 16	25	2.5	2.5	●	●	●	●	●	●
16 - 19	32	2.5	2.5	●	●	●	●	●	●
19 - 28	40	2.5	2.5	●	●	●	●	●	●

Material:

HSS

Order No. 2601.3.

Hardness 64 ± 2 HRC

Execution:

Diameter d₂ and end faces ground.

Key flats parallel with reference axis "A" unless otherwise specified.

*d₁ = size over corners

*0 = Execution only with starting hole for wire cut

Ordering Code (example):

Matrix without collar, conical =2601.3.

Locating diameter d₂ 20 mm = 020.

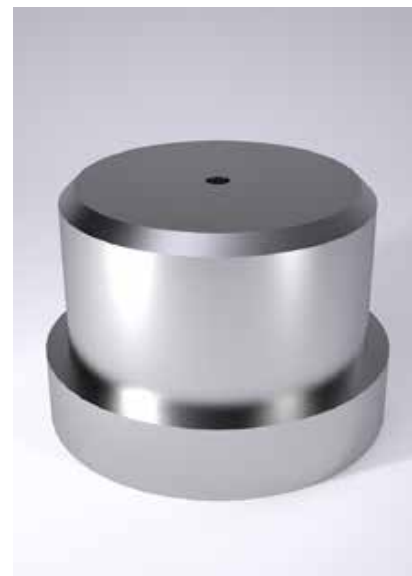
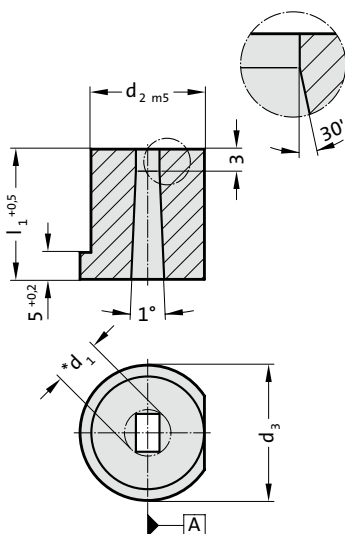
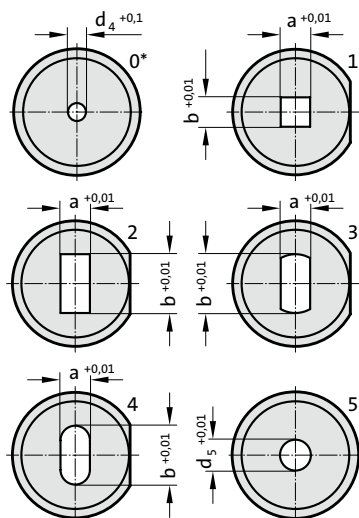
Length l₁ 16 mm = 016.

Die shape SHAPE Starting hole= 0

Order No =2601.3. 020.016.0



Matrix with collar, conical

2611.**Material:**

HSS

Order No. 2611.3.

Hardness 64 ± 2 HRC

Execution:Diameter d_2 and end faces ground.

Key flats parallel with reference axis "A" unless otherwise specified.

* d_1 = size over corners

*0 = Execution only with starting hole for wire cut

2611. Matrix with collar, conical

d_1, d_5	d_2	d_3	d_4	l_1	l_1	l_1	l_1	l_1	l_1
1.6 - 3.2	8	11	1	●	●	●	●	●	●
2 - 5	10	13	1	●	●	●	●	●	●
3 - 7	13	16	1.5	●	●	●	●	●	●
5 - 8	16	19	1.5	●	●	●	●	●	●
7 - 11	20	23	1.5	●	●	●	●	●	●
11 - 16	25	28	2.5	●	●	●	●	●	●
16 - 19	32	35	2.5	●	●	●	●	●	●
19 - 28	40	43	2.5	●	●	●	●	●	●

Matrix with collar, conical =2611.3.

Locating diameter d_2 20 mm = 020.Length l_1 16 mm = 016.

Die shape Shape Square = 1.

Width of die shape a 3.2 mm = 0320.

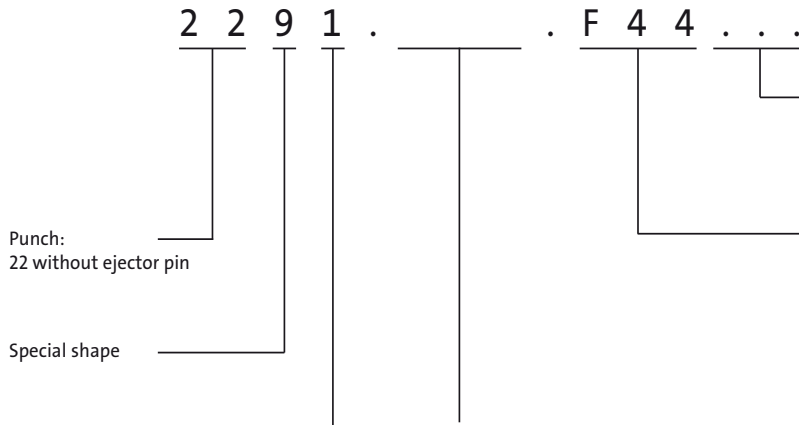
Die shape Shape Square = 0320

Order No =2611.3.020.016.1.0320.0320

Standardised Special Shapes

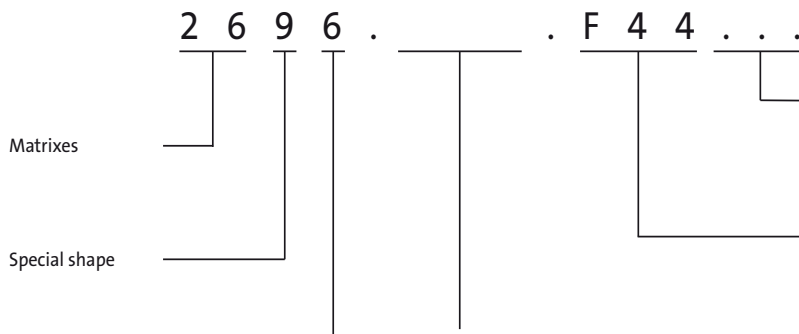


Ordering examples Special shapes Punches/Matrixes (standardised)



Type:	Order No
ISO 8020	= 1
ball-lock, light duty	= 2
ball-lock, heavy duty	= 3
ball-lock, larger cutting edge, light duty	= 4
ball-lock, larger cutting edge, heavy duty	= 5

You will find diameters and lengths on the pages of punches you have selected.



Type:	Order No
automotive	= 5
without shoulder	= 6
ISO 8977	
with shoulder ISO 8977	= 7

You will find diameters and lengths on the pages of cutting bushes you have selected.

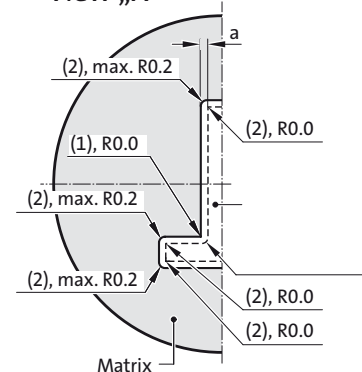
Cutting gap (a)

Roundings with the corresponding sharp corners reduce the cutting gap per side (a). If the cutting gap is 0.04 mm (a) or less, FIBRO will round the sharp edges if the cutting punch and the matrixes are ordered together. This reduces the installation time and the risk of an edge breaking during operation.

Note:

- (1) and (2) - roundings and sharp edges
- (1) rounding on the cutting punch of max. R0.2, corresponds to a sharp edge on the matrix
- (2) rounding on the cutting matrix of max. R0.2, corresponds to a sharp edge on the punch

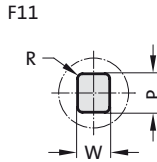
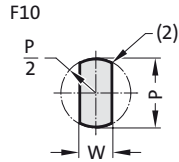
View „X“



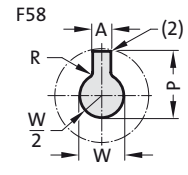
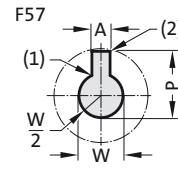
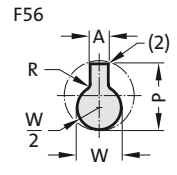
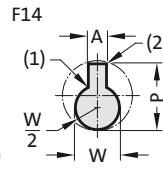
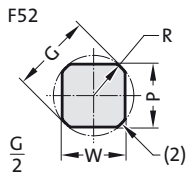
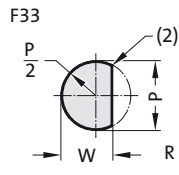
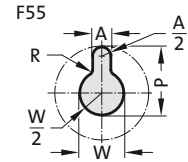
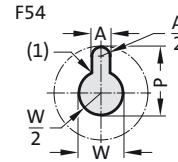
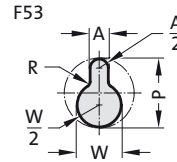
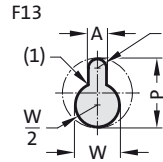
Standardised special shapes

90°

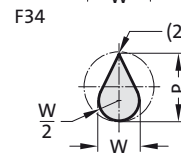
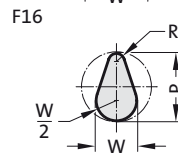
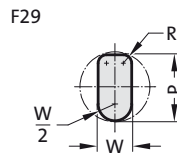
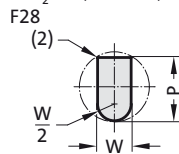
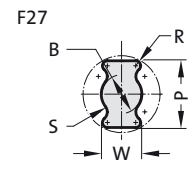
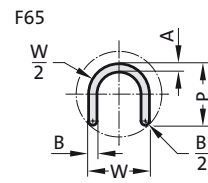
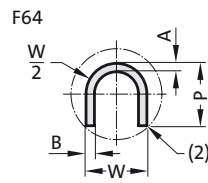
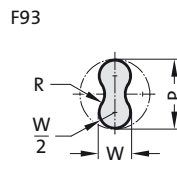
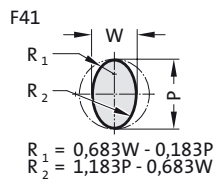
Round, flattened



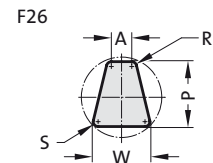
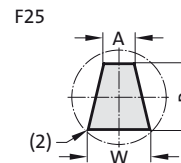
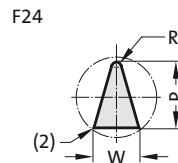
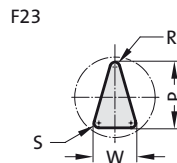
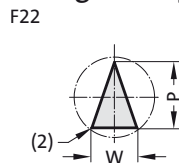
Key-hole shapes



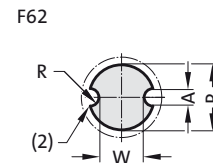
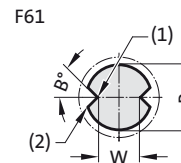
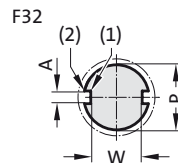
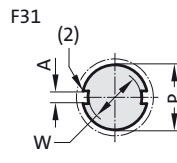
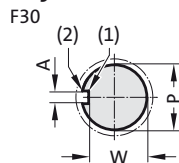
Various



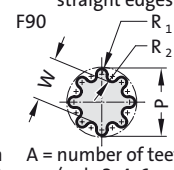
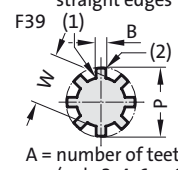
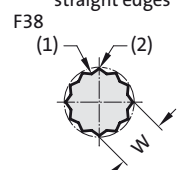
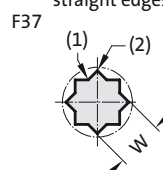
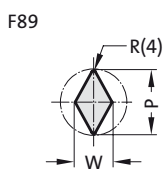
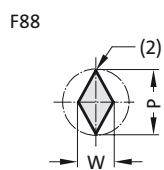
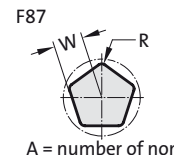
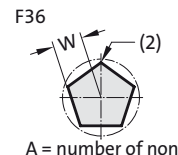
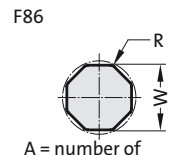
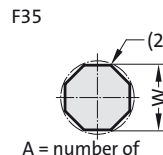
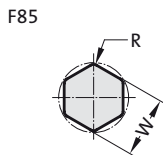
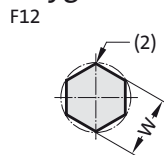
180° Triangles, trapezes



Key-hole

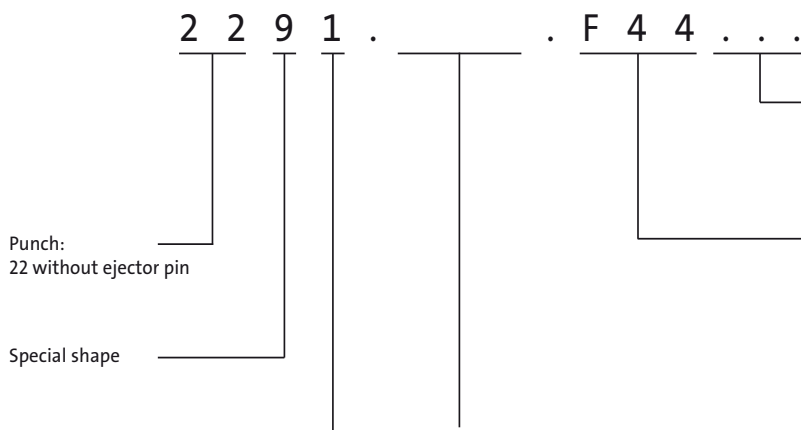


Polygons

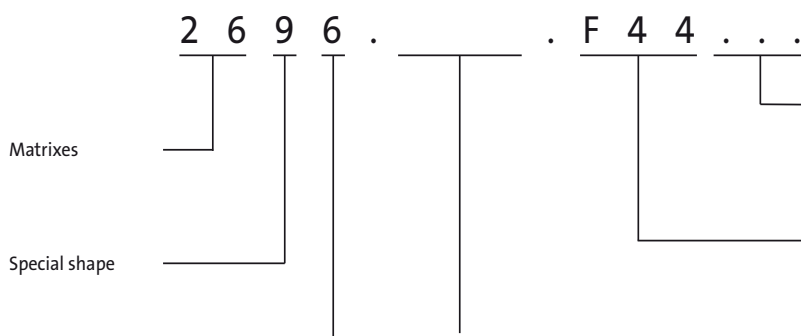
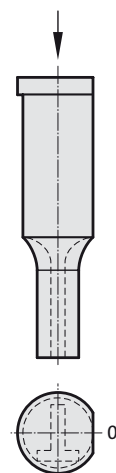


270°

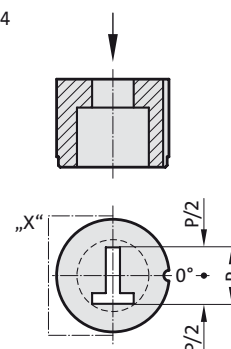
Ordering examples Special shapes Punches/Matrixes (standardised)



Type:	Order No
ISO 8020	= 1
ball-lock, light duty	= 2
ball-lock, heavy duty	= 3
ball-lock, larger cutting edge, light duty	= 4
ball-lock, larger cutting edge, heavy duty	= 5



Type:	Order No
automotive	= 5
without shoulder	= 6
ISO 8977	
with shoulder ISO 8977	= 7



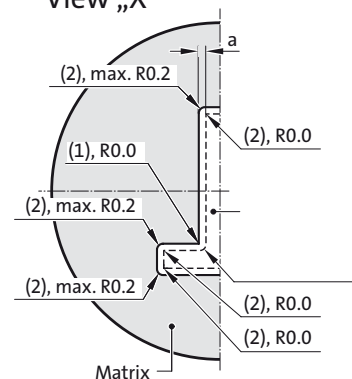
Cutting gap (a)

Roundings with the corresponding sharp corners reduce the cutting gap per side (a). If the cutting gap is 0.04 mm (a) or less, FIBRO will round the sharp edges if the cutting punch and the matrixes are ordered together. This reduces the installation time and the risk of an edge breaking during operation.

Note:

- (1) and (2) - roundings and sharp edges
- (1) rounding on the cutting punch of max. R0.2, corresponds to a sharp edge on the matrix
- (2) rounding on the cutting matrix of max. R0.2, corresponds to a sharp edge on the punch

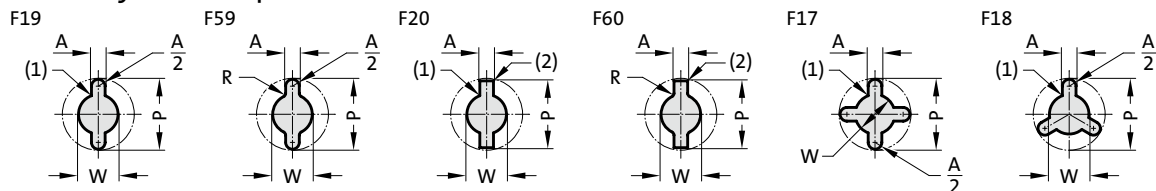
View „X“



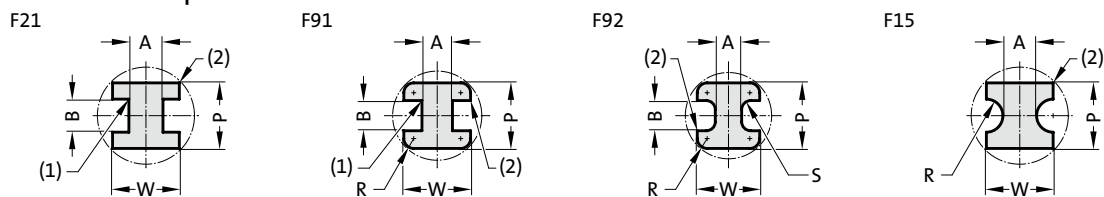
Standardised special shapes

90°

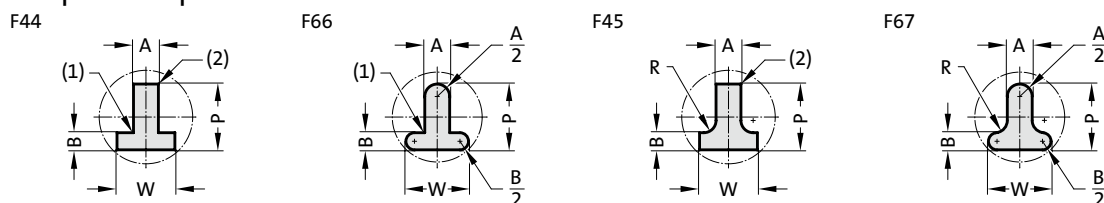
Multi key-hole shapes



Double T-shapes

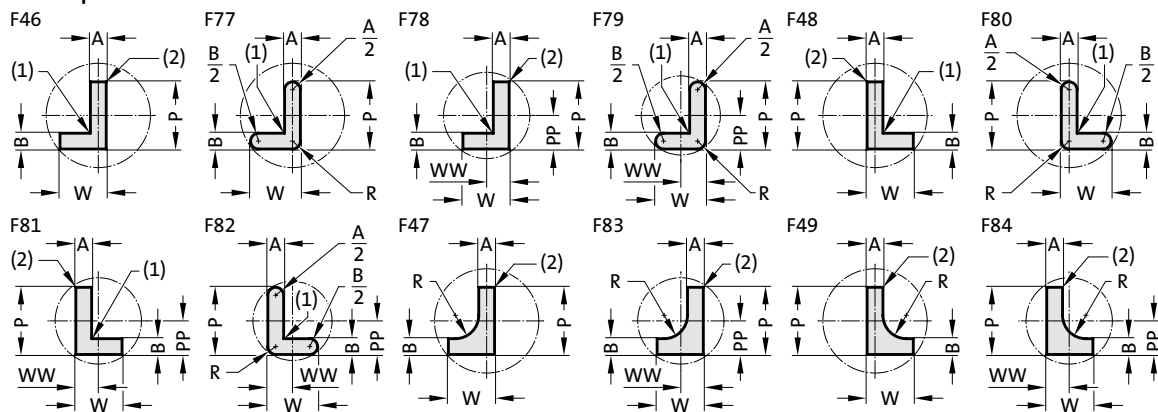


Simple T-shapes



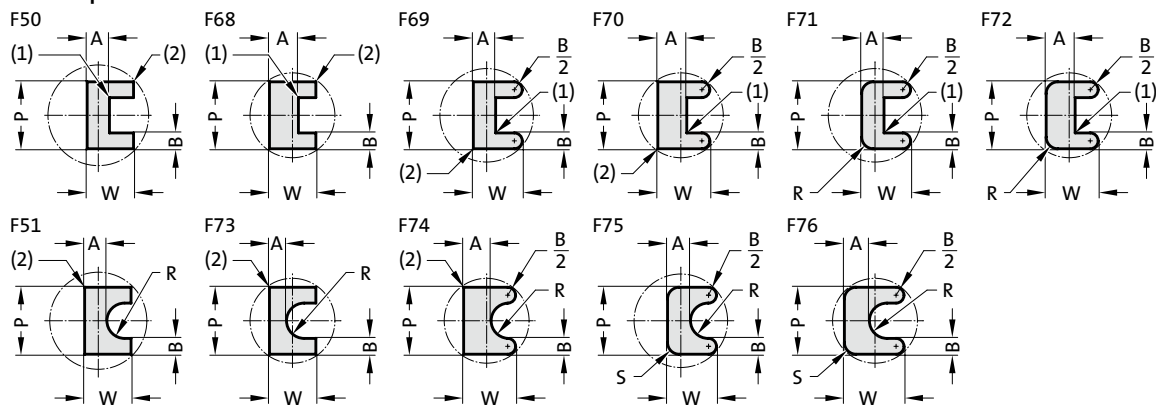
L-shapes

180°



0°

U-shapes

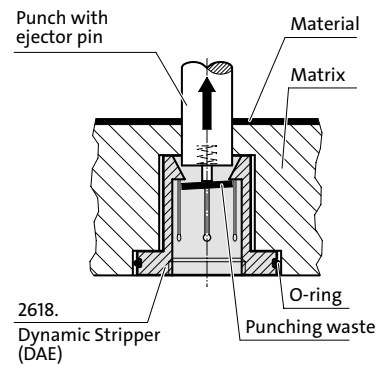
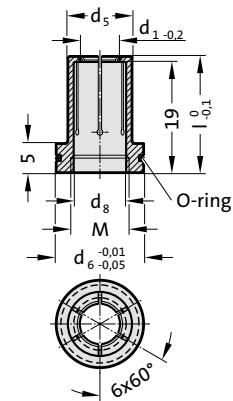


270°

Dynamic stripping element (DAE)



2618.



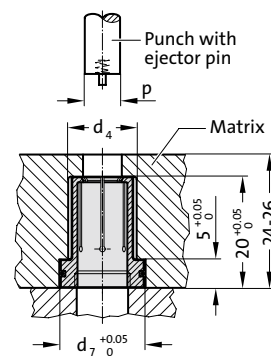
Description:

The dynamic stripper is used in blanking tools for punching operations using material up to 2 mm thick. The stripper is below the die. It is similar in shape to a segmented chuck. After the punching operation the punch enters the stripper with the punch waste still attached. The dynamic stripper opens up to receive the punch. On the return stroke the dynamic stripper strips the punch waste from the punch. The stripping element diameter d_1 is manufactured 0.2 mm smaller than the diameter p of the punch. To ensure reliable stripping the minimum entry depth into the dynamic stripper must be no less than 1 mm. The dynamic stripper can help to protect both the tool and the product from damage and also accelerate the production rate.

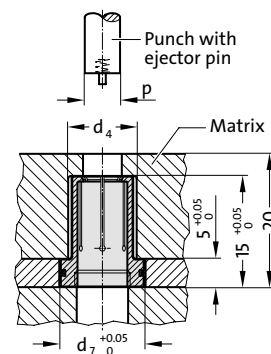
Material:

Steel, hardened

Mounting example



Mounting example





Dynamic stripping element (DAE)

2618. Dynamic stripping element (DAE)

Cutting punch p	DAE d ₁ Order-Ø	d ₅	d ₆	l	M	Matrix d ₄	d ₇
3-3.09	3	7	11	19.95	M6	8	11
3.1-3.19	3.1	7	11	19.95	M6	8	11
3.2-3.29	3.2	7	11	19.95	M6	8	11
3.3-3.39	3.3	7	11	19.95	M6	8	11
3.4-3.49	3.4	7	11	19.95	M6	8	11
3.5-3.59	3.5	7	11	19.95	M6	8	11
3.6-3.69	3.6	7	11	19.95	M6	8	11
3.7-3.79	3.7	7	11	19.95	M6	8	11
3.8-3.89	3.8	7	11	19.95	M6	8	11
3.9-3.99	3.9	7	11	19.95	M6	8	11
4-4.09	4	7	11	19.95	M6	8	11
4.1-4.19	4.1	8	12	19.95	M8	9	12
4.2-4.29	4.2	8	12	19.95	M8	9	12
4.3-4.39	4.3	8	12	19.95	M8	9	12
4.4-4.49	4.4	8	12	19.95	M8	9	12
4.5-4.59	4.5	8	12	19.95	M8	9	12
4.6-4.69	4.6	8	12	19.95	M8	9	12
4.7-4.79	4.7	8	12	19.95	M8	9	12
4.8-4.89	4.8	8	12	19.95	M8	9	12
4.9-4.99	4.9	8	12	19.95	M8	9	12
5-5.09	5	8	12	19.95	M8	9	12
5.1-5.19	5.1	9	13	19.95	M8	10	13
5.2-5.29	5.2	9	13	19.95	M8	10	13
5.3-5.39	5.3	9	13	19.95	M8	10	13
5.4-5.49	5.4	9	13	19.95	M8	10	13
5.5-5.59	5.5	9	13	19.95	M8	10	13
5.6-5.69	5.6	9	13	19.95	M8	10	13
5.7-5.79	5.7	9	13	19.95	M8	10	13
5.8-5.89	5.8	9	13	19.95	M8	10	13
5.9-5.99	5.9	9	13	19.95	M8	10	13
6-6.09	6	9	13	19.95	M8	10	13
6.1-6.19	6.1	10	14	19.95	M10	11	14
6.2-6.29	6.2	10	14	19.95	M10	11	14
6.3-6.39	6.3	10	14	19.95	M10	11	14
6.4-6.49	6.4	10	14	19.95	M10	11	14
6.5-6.59	6.5	10	14	19.95	M10	11	14
6.6-6.69	6.6	10	14	19.95	M10	11	14
6.7-6.79	6.7	10	14	19.95	M10	11	14
6.8-6.89	6.8	10	14	19.95	M10	11	14
6.9-6.99	6.9	10	14	19.95	M10	11	14
7-7.09	7	10	14	19.95	M10	11	14
7.1-7.19	7.1	11	15	19.95	M10	12	15
7.2-7.29	7.2	11	15	19.95	M10	12	15
7.3-7.39	7.3	11	15	19.95	M10	12	15
7.4-7.49	7.4	11	15	19.95	M10	12	15
7.5-7.59	7.5	11	15	19.95	M10	12	15
7.6-7.69	7.6	11	15	19.95	M10	12	15
7.7-7.79	7.7	11	15	19.95	M10	12	15
7.8-7.89	7.8	11	15	19.95	M10	12	15
7.9-7.99	7.9	11	15	19.95	M10	12	15
8-8.09	8	11	15	19.95	M10	12	15

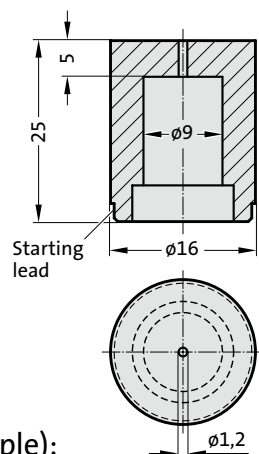
Ordering Code (example):

Dynamic stripping element (DAE)	=2618.
External diameter d ₅	9 mm = 09.
Order length BL	20 mm = 020.
Order diameter d ₁	5.5 mm = 0550
Order No	=2618.09.020.0550

Ordering Code (example) Matrixes for Dynamic Stripper (DAE)

Note:

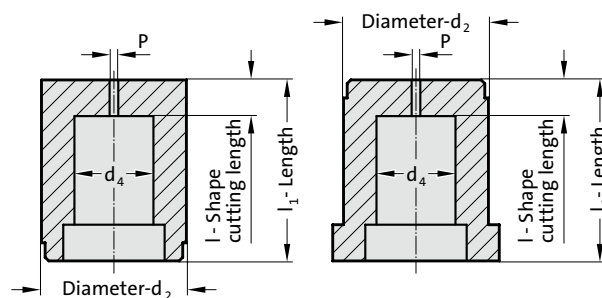
See table
for standard dimensions



Ordering Code (example):

2618.06.6E4.09

- (09) $d_4 = 9$ mm
- (4) Shape cutting length:
 $l = 5$ mm
- (E) Length:
 $l_1 = 25$ mm
- (6) Diameter:
 $d_2 = 16$ mm
- (6) Type: without collar for
Dynamic Stripper DAE
- (0) Version:
Blank
(pilot hole bore)
- (2618) Matrix
for Dynamic Stripper
(DAE)



$d_4 = 9$ mm

Shape cutting length I Order No

5

= 4

Length l_1 Order Code character

25

= E

Diameter d_2 Order No

13

= 5

16

= 6

20

= 7

Type Order No

without collar for DAE

= 6

with collar for DAE

= 7

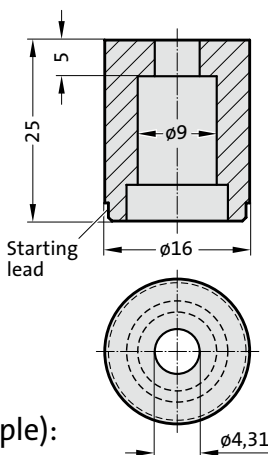
Version Order No

blank

= 0

(pilot hole bore)

Matrixes
for Dynamic Stripper (DAE)



Ordering Code (example):

2618.16.6E4.0431

- (0431) Shape:
Round, $P = 4,31$ mm
- (4) Shape cutting length:
 $l = 5$ mm
- (E) Shape cutting length:
 $l_1 = 25$ mm
- (6) Diameter:
 $d_2 = 16$ mm
- (6) Type: without collar for
Dynamic Stripper DAE
- (1) Version:
Round
- (2618) Matrix
for Dynamic Stripper
(DAE)

Shape: Round, $P = 4,31$ mm

Shape cutting length I Order No

5

= 4

Length l_1 Order Code character

25

= E

Diameter d_2 Order No

13

= 5

16

= 6

20

= 7

Type Order No

without collar for DAE

= 6

with collar for DAE

= 7

Version Order No

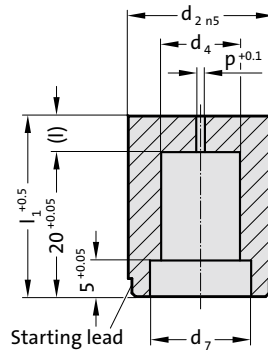
Round

= 1

Matrixes
for Dynamic Stripper (DAE)

Matrix without collar for dynamic stripper (DAE), blank

2618.06.

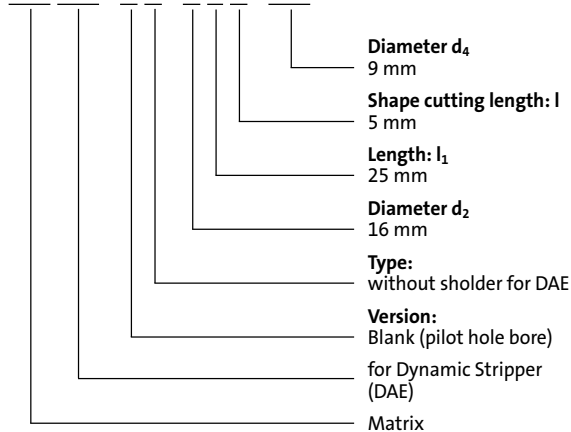


2618.06. Matrix without collar for dynamic stripper (DAE), blank

d_2	d_4	d_7	p	l	l_1
13	8	11	1.2	5	25
16	9	12	1.2	5	25
16	10	13	1.5	5	25
20	11	14	1.5	5	25
20	12	15	1.5	5	25

Ordering-code (example):

2618.06.6E4.09



Material:

HSS
Hardness 62 ± 2 HRC

Execution:

Diameter d_2 , starting lead and face surfaces ground.
Diameter P is a bored pilot hole for wire EDM.

Note:

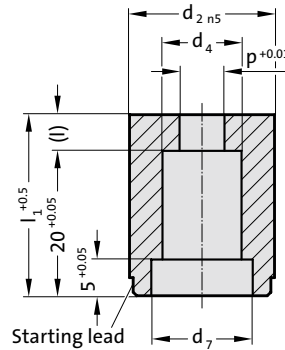
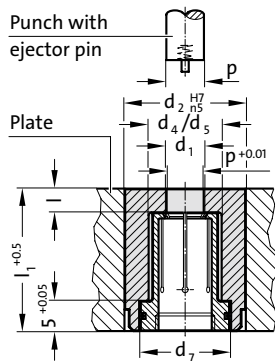
Order dynamic stripper (DAE) separately.



Matrix without collar for dynamic stripper (DAE), round

Mounting example

2618.16.

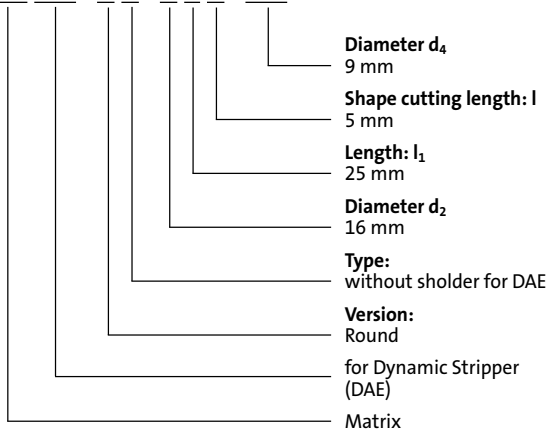


2618.16. Matrix without collar for dynamic stripper (DAE), round

d_2	d_4	d_7	l	l_1	Matrix	DAE d_5	d_1 Diameter steps 0.1
					Diameter steps 0.01 P		
13	8	11	5	25	3 - 4.29	7	3 - 4
16	9	12	5	25	4.3 - 5.29	8	4.1 - 5
16	10	13	5	25	5.3 - 6.29	9	5.1 - 6
20	11	14	5	25	6.3 - 7.29	10	6.1 - 7
20	12	15	5	25	7.3 - 8.29	11	7.1 - 8

Ordering-code (example):

2 6 1 8 . 1 6 . 6 E 4 . 0 9



= 09
Order number = (4)
Order code character = (E)
Order number = (6)
Order number = (6)
Order number = (1)
= 18
= 26

Material:

HSS
Hardness 62 ± 2 HRC

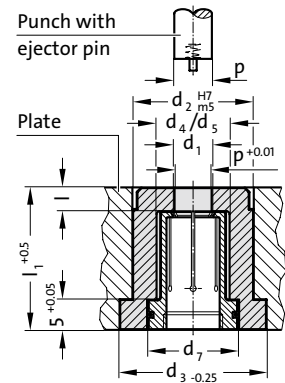
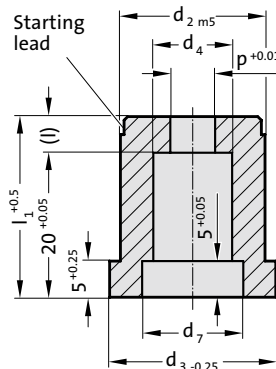
Execution:

Diameter d_2 , starting lead and end faces ground.

Note:

Order dynamic stripper (DAE) separately.

Mounting example



d ₂	d ₃	d ₄	d ₇	l	l ₁	Matrix	DAE	d ₁
						Diameter steps 0.01		Diameter steps 0.1
						P	d ₅	
13	16	8	11	5	25	3 - 4.29	7	3 - 4
16	19	9	12	5	25	4.3 - 5.29	8	4.1 - 5
16	19	10	13	5	25	5.3 - 6.29	9	5.1 - 6
20	23	11	14	5	25	6.3 - 7.29	10	6.1 - 7
20	23	12	15	5	25	7.3 - 8.29	11	7.1 - 8

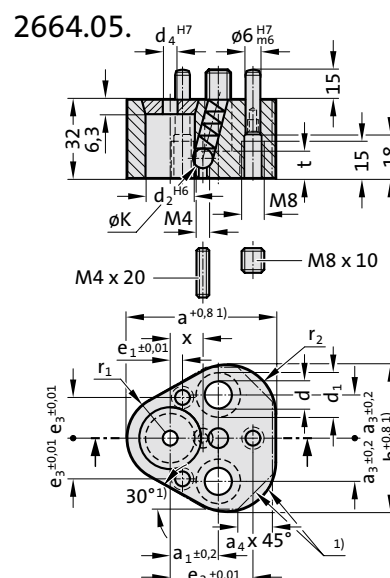
$$= 26$$



Retainers for ball-lock punches



Triangle retainer for ball-lock punches, light duty



Execution:

Version for metal thicknesses up to 3 mm. The punch locating hole d_2 is manufactured to a tolerance of ± 0.01 mm relative to the 6 stud holes H7. This ensures the interchangeability of the locating plate with other polygon versions.

Note:

Special punch retainers available to order.

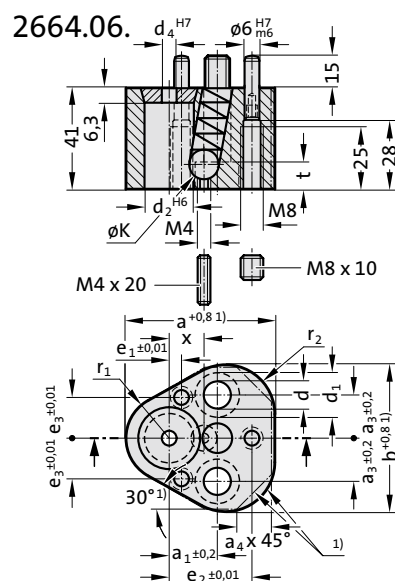
1) Contours may vary. Maximum dimensions are specified in the table.

2664.05. Triangle retainer for ball-lock punches, light duty

Order No	d	d ₁	d ₂	d ₄	a	a ₁	a ₃	a ₄	b	e ₁	e ₂	e ₃	ØK	t	r ₁	r ₂	x
2664.05.10	9	15	10	6	44.5	19	11.1	10	43.7	7.5	26.925	9	8	9	9.5	12	8.2
2664.05.13	9	15	13	6	50.8	19	14.3	12	50	6.5	29.97	12	8	9	12.7	15.2	9.5
2664.05.16	9	15	16	6	54	19	15.9	13	53.2	6	31.75	13.5	8	9	14.3	16.8	11.2
2664.05.20	11	18	20	6	60.3	19	17.5	14	59.5	5	33.53	16.5	8	11	17.5	20	13.2
2664.05.25	13.5	20	25	6	69.9	23.8	19.8	16	69.1	7	40.64	22	8	13.5	22.2	24.7	15.7
2664.05.32	13.5	20	32	6	69.9	23.8	19.8	16	69.1	7	40.64	22	8	13.5	22.2	24.7	19.25
2664.05.38	13.5	20	38	6	77.4	27	24	18	76.6	10	43.993	26	8	13.5	26	28.5	22.25



Triangle retainer for ball-lock punches, heavy duty



Execution:

Version for metal thicknesses > 3 mm/max. 6 mm. The punch locating hole d_2 is manufactured to a tolerance of ± 0.01 mm relative to the 6 stud holes H7. This ensures the interchangeability of the locating plate with other polygon versions.

Note:

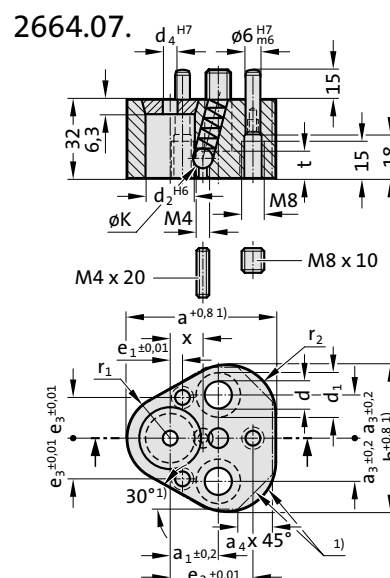
Special punch retainers available to order.

1) Contours may vary. Maximum dimensions are specified in the table.

2664.06. Triangle retainer for ball-lock punches, heavy duty

Order No	d	d ₁	d ₂	d ₄	a	a ₁	a ₃	a ₄	b	e ₁	e ₂	e ₃	ØK	t	r ₁	r ₂	x
2664.06.10	9	15	10	6	44.5	19	11.1	10	43.7	7.5	26.925	9	10	9	9.5	12	9.8
2664.06.13	9	15	13	6	50.8	19	14.3	12	50	6.5	29.97	12	12	9	12.7	15.2	11.3
2664.06.16	9	15	16	6	54	19	15.9	13	53.2	6	31.75	13.5	12	9	14.3	16.8	12.8
2664.06.20	11	18	20	6	60.3	19	17.5	14	59.5	5	33.53	16.5	12	11	17.5	20	14.8
2664.06.25	13.5	20	25	6	69.9	23.8	19.8	16	69.1	7	40.64	22	12	13.5	22.2	24.7	17.3
2664.06.32	13.5	20	32	6	69.9	23.8	19.8	16	69.1	7	40.64	22	12	13.5	22.2	24.7	20.8
2664.06.40	13.5	20	40	6	77.4	27	24	18	76.6	10	43.993	26	12	13.5	26	28.5	24.8

Triangle retainer for ball-lock punches, light duty



Execution:

Version for metal thicknesses up to 3 mm. The punch locating hole d_2 is manufactured to a tolerance of ± 0.01 mm relative to the 6 stud holes H7. This ensures the interchangeability of the locating plate with other polygon versions.

Note:

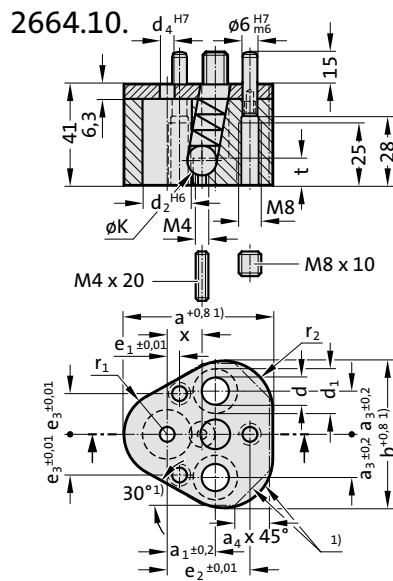
Special punch retainers available to order.

1) Contours may vary. Maximum dimensions are specified in the table.

2664.07. Triangle retainer for ball-lock punches, light duty

Order No	d	d ₁	d ₂	d ₄	a	a ₁	a ₃	a ₄	b	e ₁	e ₂	e ₃	ØK	t	r ₁	r ₂	x
2664.07.06	6.6	11	6	3	35	19	11.1	6	37.5	9	23	8	6	7	8	8	5.7

Triangle retainer for ball-lock punches, heavy duty



Execution:

Version for metal thicknesses >3 mm/max. 6 mm. The punch locating hole d_2 is manufactured to a tolerance of ± 0.01 mm relative to the 6 stud holes H7. This ensures the interchangeability of the locating plate with other polygon versions.

Note:

Special punch retainers available to order.
Pressure plate welded.

1) Contours may vary. Maximum dimensions are specified in the table.

2664.10. Triangle retainer for ball-lock punches, heavy duty

Order No	d	d ₁	d ₂	d ₄	a	a ₁	a ₃	a ₄	b	e ₁	e ₂	e ₃	ØK	t	r ₁	r ₂	x
2664.10.10	9	15	10	6	44.5	19	11.1	10	43.7	7.5	26.925	9	10	9	9.5	12	9.8
2664.10.13	9	15	13	6	50.8	19	14.3	12	50	6.5	29.97	12	12	9	12.7	15.2	11.3
2664.10.16	9	15	16	6	54	19	15.9	13	53.2	6	31.75	13.5	12	9	14.3	16.8	12.8
2664.10.20	11	18	20	6	60.3	19	17.5	14	59.5	5	33.53	16.5	12	11	17.5	20	14.8
2664.10.25	13.5	20	25	6	69.9	23.8	19.8	16	69.1	7	40.64	22	12	13.5	22.2	24.7	17.3
2664.10.32	13.5	20	32	6	69.9	23.8	19.8	16	69.1	7	40.64	22	12	13.5	22.2	24.7	20.8
2664.10.40	13.5	20	40	6	77.4	27	24	18	76.6	10	43.993	26	12	13.5	26	28.5	24.8

Accessories for Retainers, triangular, for Ball-Lock Punches



		2192.10.	236.1.	2666.04.	2192.72.	2666.06.	2666.01. .1	2192.72.
Retainer	Ø d ₂	Socket head cap screw	Dowel pin	Ball	Ball release pin	Spring	Pressure disk for centring pin	Pin screw
2664.05.	10	2192.10.08.035	236.1.0600.020	2666.04.008	2192.72.04.020	2666.06.008	2666.01.10.1	2192.72.08.008
	13	2192.10.08.035	236.1.0600.020	2666.04.008	2192.72.04.020	2666.06.008	2666.01.13.1	2192.72.08.008
	16	2192.10.08.035	236.1.0600.020	2666.04.008	2192.72.04.020	2666.06.008	2666.01.16.1	2192.72.08.008
	20	2192.10.10.035	236.1.0600.020	2666.04.008	2192.72.04.020	2666.06.008	2666.01.20.1	2192.72.08.008
	25	2192.10.12.035	236.1.0600.020	2666.04.008	2192.72.04.020	2666.06.008	2666.01.25.1	2192.72.08.008
	32	2192.10.12.035	236.1.0600.020	2666.04.008	2192.72.04.020	2666.06.008	2666.01.32.1	2192.72.08.008
	38	2192.10.12.035	236.1.0600.020	2666.04.008	2192.72.04.020	2666.06.008	2666.01.38.1	2192.72.08.008
2664.06./10.	10	2192.10.08.040	236.1.0600.020	2666.04.010	2192.72.04.020	2666.06.010	2666.01.10.1	2192.72.08.008
	13	2192.10.08.040	236.1.0600.020	2666.04.012	2192.72.04.020	2666.06.012	2666.01.13.1	2192.72.08.008
	16	2192.10.08.040	236.1.0600.020	2666.04.012	2192.72.04.020	2666.06.012	2666.01.16.1	2192.72.08.008
	20	2192.10.10.050	236.1.0600.020	2666.04.012	2192.72.04.020	2666.06.012	2666.01.20.1	2192.72.08.008
	25	2192.10.12.050	236.1.0600.020	2666.04.012	2192.72.04.020	2666.06.012	2666.01.25.1	2192.72.08.008
	32	2192.10.12.050	236.1.0600.020	2666.04.012	2192.72.04.020	2666.06.012	2666.01.32.1	2192.72.08.008
	40	2192.10.12.050	236.1.0600.020	2666.04.012	2192.72.04.020	2666.06.012	2666.01.40.1	2192.72.08.008
2664.07.	6	2192.10.06.035	236.1.0600.020	2666.04.006	2192.72.04.020	2666.06.006	2666.01.06.1	2192.72.08.008

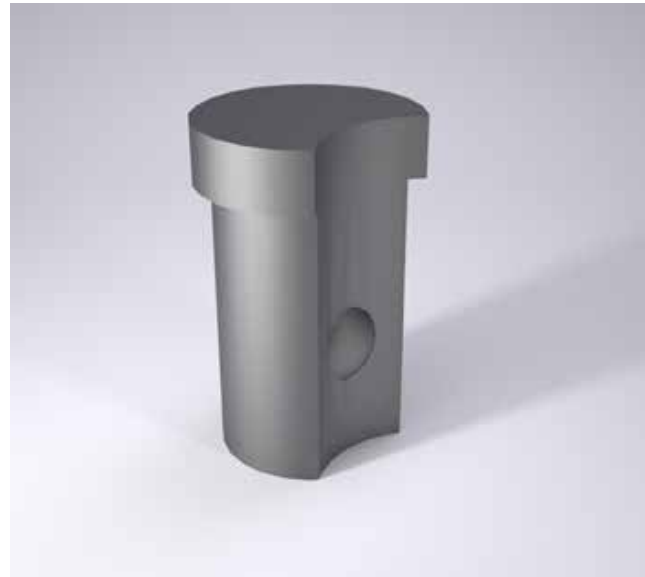
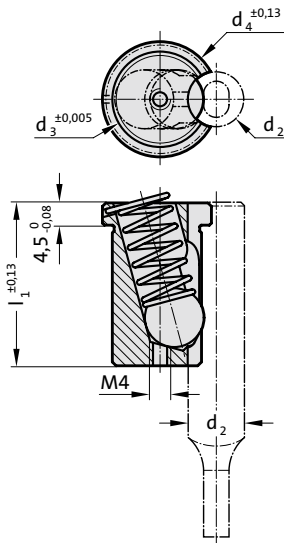
Ball release tool

Hook shape	straight	straight with threaded tip
2666.05.01	2666.05.02	2666.05.03

ACCU-LOCK Fixture device for ball-lock punches, light duty



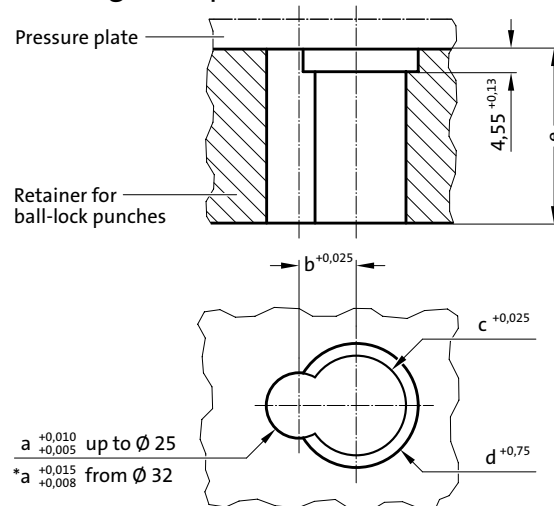
2668.2.



Note:

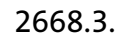
Use ball release tool 2666.05.02, straight.

Mounting example



2668.2. ACCU-LOCK Fixture device for ball-lock punches, light duty

Order No	d ₂	d ₃	d ₄	l ₁	a	b	c	d	e
2668.2.06	6	12	14.6	25.7	6	6.5	12.013	15	25.7
2668.2.10	10	14	16.6	25.7	10	9	14.013	17	25.7
2668.2.13	13	14	16.6	25.7	13	10.5	14.013	17	25.7
2668.2.16	16	14	16.6	25.7	16	12	14.013	17	25.7
2668.2.20	20	16	18.6	25.7	20	14	16.013	19	25.7
2668.2.25	25	16	18.6	25.7	25	16.5	16.013	19	25.7
2668.2.32	32	16	18.6	25.7	32	20	16.013	19	25.7
2668.2.38	38	16	18.6	25.7	38	23	16.013	19	25.7

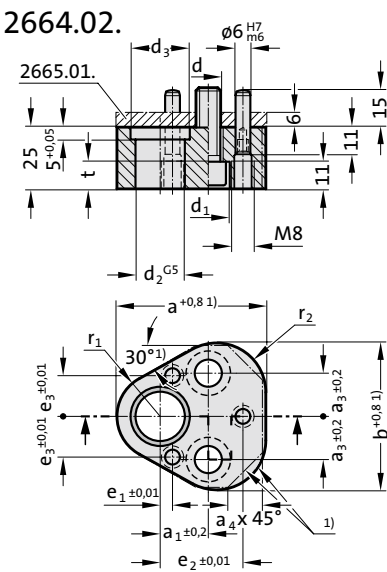




Retainers for punches ISO 8020



Triangle retainer, for punches ISO 8020 without anti-rotation element



Execution:

The centres of the pinholes are the reference points for the position of the punch bore.

The dimensions e_1 , e_2 and e_3 have a tolerance of ± 0.01 mm.

The triangle ball-lock retainers are interchangeable.

Note:

Pressure plate 2665.01. to be ordered separately for the receiving punch plate.

1) Contours may vary. Maximum dimensions are specified in the table.

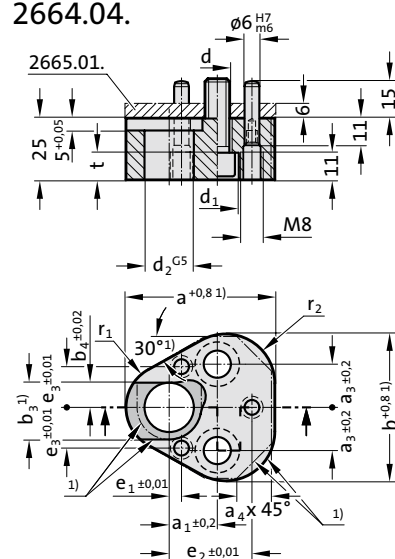


2664.02. Triangle retainer, for punches ISO 8020 without anti-rotation element

Order No	d	d ₁	d ₂	d ₃	a	a ₁	a ₃	a ₄	b	e ₁	e ₂	e ₃	t	r ₁	r ₂
2664.02.10	9	15	10	14	44.5	19	11.1	10	43.7	7.5	26.925	9	9	9.5	12
2664.02.13	9	15	13	17	50.8	19	14.3	12	50	6.5	29.97	12	9	12.7	15.2
2664.02.16	9	15	16	20	54	19	15.9	13	53.2	6	31.75	13.5	9	14.3	16.8
2664.02.20	11	18	20	24	60.3	19	17.5	14	59.5	5	33.53	16.5	11	17.5	20
2664.02.25	13.5	20	25	29	69.9	23.8	19.8	16	69.1	7	40.64	22	13.5	22.2	24.7
2664.02.32	13.5	20	32	36	69.9	23.8	19.8	16	69.1	7	40.64	22	13.5	22.2	24.7

Triangle retainer, for punches ISO 8020 with anti-rotation element

2664.04.



Execution:

Execution:
The centres of the pinholes are the reference points for the position of the punch bore.

The dimensions e_1 , e_2 and e_3 have a tolerance of ± 0.01 mm.

The triangle ball-lock retainers are interchangeable.

Note:

Pressure plate 2665.01. to be ordered separately for the receiving punch plate.

1) Contours may vary. Maximum dimensions are specified in the table.

2664.04. Triangle retainer, for punches ISO 8020 with anti-rotation element

Order No	d	d ₁	d ₂	a	a ₁	a ₃	a ₄	b	b ₃	b ₄	e ₁	e ₂	e ₃	t	r ₁	r ₂
2664.04.10	9	15	10	44.5	19	11.1	10	43.7	12	5	7.5	26.925	9	9	9.5	12
2664.04.13	9	15	13	50.8	19	14.3	12	50	15	6.5	6.5	29.97	12	9	12.7	15.2
2664.04.16	9	15	16	64	19	15.9	13	53.2	18	8	6	31.75	13.5	9	14.3	16.8
2664.04.20	11	18	20	60.3	19	17.5	14	59.5	23	10	5	33.53	16.5	11	17.5	20
2664.04.25	13.5	20	25	69.9	23.8	19.8	16	69.1	28	12.5	7	40.64	22	13.5	22.2	24.7
2664.04.32	13.5	20	32	69.9	23.8	19.8	16	69.1	35	16	7	40.64	22	13.5	22.2	24.7



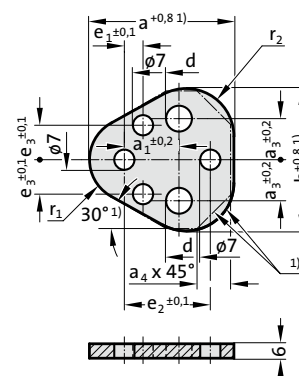
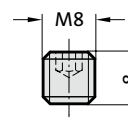
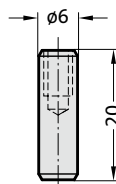
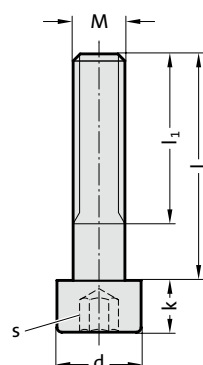
Accessories for Retainers, triangular, for Punches, to ISO 8020

2192.10.

236.1.

2192.72.

2665.01.



Retainer	Ø d ₂	Socket head cap screw	Dowel pin	Pin screw	Pressure plate
2664.02./04.	10	2192.10.08.035	236.1.0600.020	2192.72.08.008	2665.01.10
	13	2192.10.08.035	236.1.0600.020	2192.72.08.008	2665.01.13
	16	2192.10.08.035	236.1.0600.020	2192.72.08.008	2665.01.16
	20	2192.10.10.035	236.1.0600.020	2192.72.08.008	2665.01.20
	25	2192.10.12.035	236.1.0600.020	2192.72.08.008	2665.01.25
	32	2192.10.12.035	236.1.0600.020	2192.72.08.008	2665.01.32

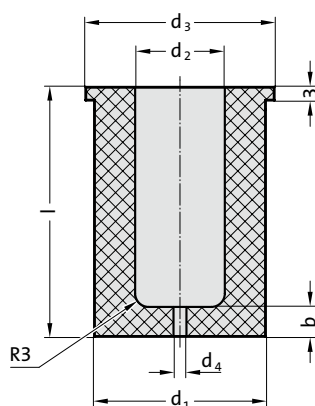
Accessories



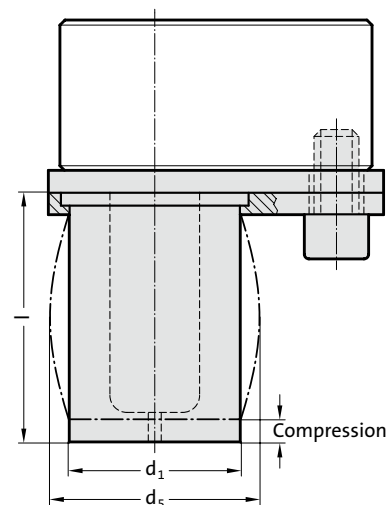
Stripping unit



2431.7.



Installation example:



Material:

FIBROFLEX® 95 Shore A

Note:

Stripping units can be used for retainers 2664.02./04./05./06.

* values for the stripping force are dependent on a number of parameters (e.g. lubricant, temperature etc.) and may vary from those given here.

** max spring travel should not exceed 15% of the length

2431.7. Stripping unit

						Stripping unit length l				
d ₂	d ₁	d ₃	d ₄	d _{5 max.}	b	35	43	53	63	73
10	18	21	1,6	22	6	○	●	●	●	●
13	23	26	3	26,5	6	○	●	●	●	●
16	28	31	3	34	6	○	●	●	●	●
20	33	36	3	38	7	○	●	●	●	●
25	40	43	3	47,6	7	○	●	●	●	●
32	50	55	3	57,9	7	○	●	●	●	●
38	60	65	3	69,6	8	○	○	○	○	○
40	60	65	3	69,6	8		●	●	●	○
						Punch lengths in use				
Ball-lock punch, light duty						63	71	80	90	100
Ball-lock punch, heavy duty						71	80	90	100	110
Precision punch ISO 8020						-	71	80	90	100
○ = Special measures upon request										

Spring travel**	3 mm	6 mm	9 mm	3 mm	6 mm	9 mm	3 mm	6 mm	9 mm	3 mm	6 mm	9 mm	3 mm	6 mm	9 mm
Length	35	35	35	43	43	43	53	53	53	63	63	63	73	73	73
Stripping forces (N)*															
d ₂															
10	1300	-	-	1060	1820	-	900	1650	-	720	1450	1860	-	-	-
13	2100	-	-	1700	2850	-	1460	2610	-	1170	2320	2910	930	2080	2500
16	3000	-	-	2310	3900	-	1990	3560	-	1590	3150	3980	1270	2810	3440
20	3500	-	-	2900	4900	-	2500	4470	-	2000	3950	5000	1590	3420	4330
25	5400	-	-	4440	7520	-	3810	6860	-	3050	6050	7680	2420	5390	6780
32	8400	-	-	6840	11390	-	5880	10450	-	4700	9310	11640	3740	8370	10280
38	-	-	-	9280	19740	-	8140	15890	-	6440	11570	18030	5460	8850	11680
40	-	-	-	10100	20190	-	8650	17300	-	6890	13780	20670	6000	9800	12700

Ordering example:

Stripping unit = 2431.7.

d₂ = 10 mm = 10.

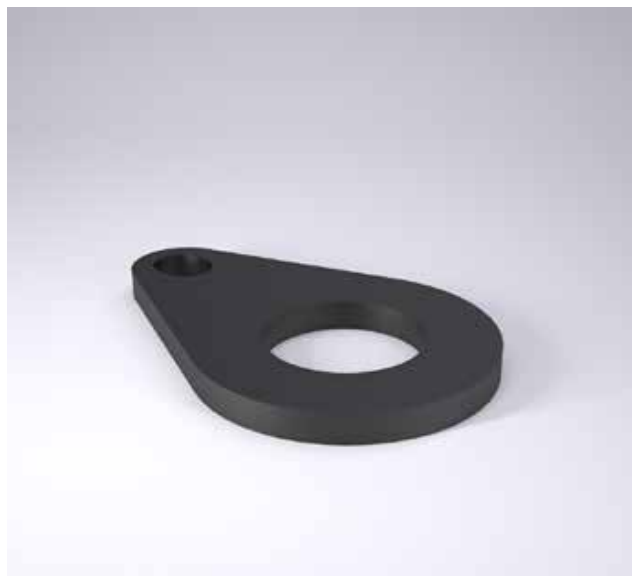
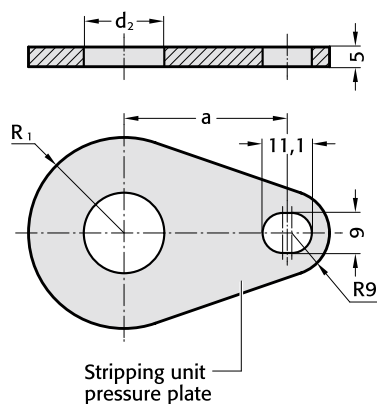
l = 53 mm = 53

Order number = 2431.7.10.53



Stripping unit - Pressure plate

2667.1.



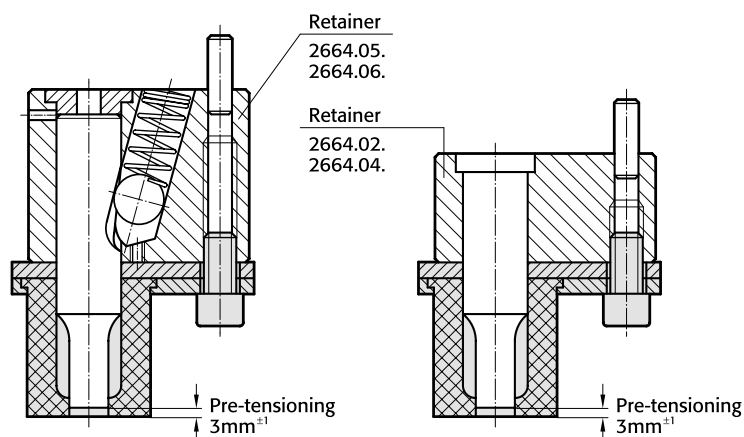
2667.1. Stripping unit - Pressure plate

Order No	d ₂	R ₁	a
2667.1.10	10	13	28
2667.1.13	13	15.5	31
2667.1.16	16	18	32.9
2667.1.20	20	20.5	34.8
2667.1.25	25	24	39.8
2667.1.32	32	31	41.3
2667.1.38	38	36	45
2667.1.40	40	36	45

Note:

Pressure plate, mounting plate and screw must all be ordered individually.

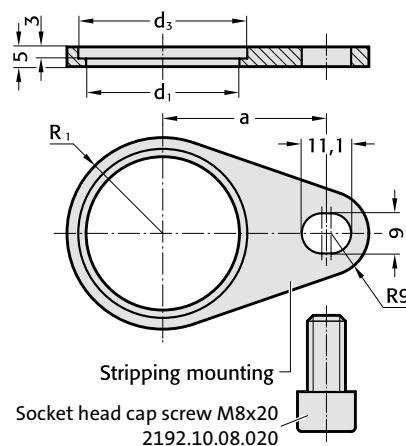
Mounting example



Stripping unit - Mounting plate



2667.2.



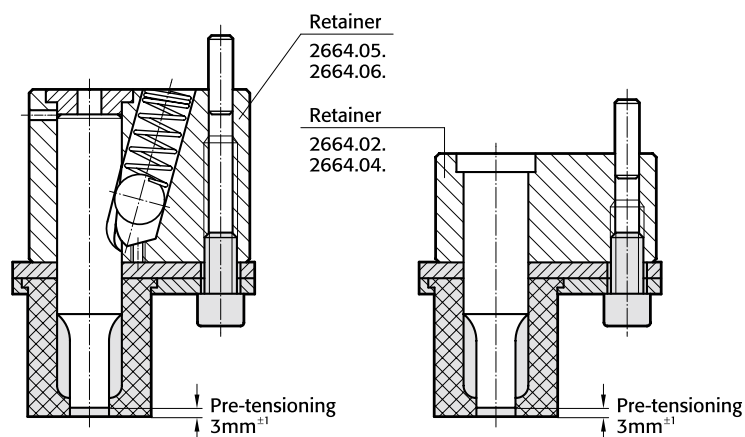
Note:

Pressure plate, mounting plate and screw must all be ordered individually.

2667.2. Stripping unit - Mounting plate

Order No	d ₂	d ₁	d ₃	R ₁	a
2667.2.10	10	19	22	13	28
2667.2.13	13	24	27	15.5	31
2667.2.16	16	29	32	18	32.9
2667.2.20	20	34	37	20.5	34.8
2667.2.25	25	41	44	24	39.8
2667.2.32	32	51	56	31	41.3
2667.2.38	38	61	66	36	45
2667.2.40	40	61	66	36	45

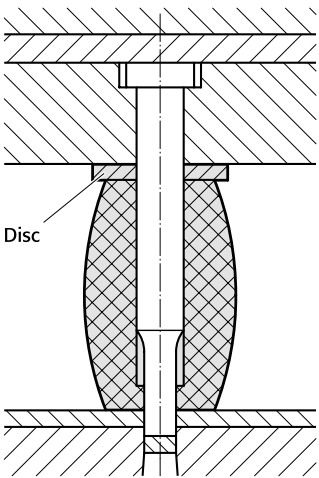
Mounting example



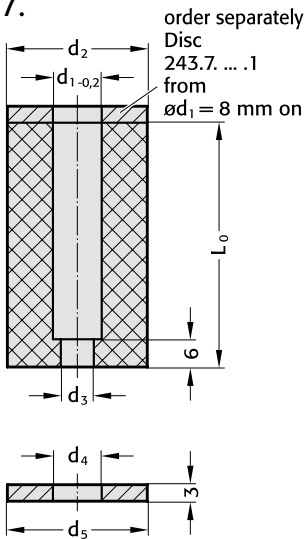
Elastomer Stripper



Mounting example



243.7.



Description:

Repairs, sharpening and modifications on dies equipped with elastomer strippers do not necessitate the dismantling of a stripper plate, thus becoming very expedient. Any marring of delicate part surfaces is precluded. This makes elastomer strippers ideal for all painted, anodized, plastic-coated and polished parts. FIBROFLEX® Elastomer Strippers are resistant against oils and greases.

Material:

FIBROFLEX®
Hardness: 95 Shore A

Application:

Especially in large dies, where the use of elastomer strippers does away with the need of huge stripper plates.

Mounting:

Push stripper over punch, where it will stay put on account of its elasticity. No other form of retention will be required. A single press stroke will then pierce a hole through the bottom portion of the stripper that matches the punch shape exactly.

243.7. Elastomer Stripper

d_1	d_2	d_3	L_0 Stock lengths*	39	47	56
4	17	1.6		●	●	●
5	17	1.6		●	●	●
6	19	1.6		●	●	●
6.3	19	1.6		●	●	●
8	21	3		●	●	●
10	23	3		●	●	●
12.5	26	3		●	●	●
13	26	3		●	●	●
16	30	3		●	●	●
20	38	3		●	●	●
25	50	3		●	●	●
32	55	3		●	●	●
38	60	3		●	●	●
40	63	3		●	●	●

*other lengths are available on request (max. 56 mm)

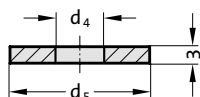
Ordering Code (example):

Elastomer Stripper	=243.7.
Inside diameter d_1 13 mm=	130.
Length L_0	
Stock lengths 39 mm=	039
Order No	=243.7. 130.039



Stop washer

243.7..1



Material:
Steel

243.7..1 Stop washer

Order No	d ₄	d ₅
243.7.085.1	8.5	21
243.7.105.1	10.5	23
243.7.130.1	13	26
243.7.135.1	13.5	26
243.7.165.1	16.5	30
243.7.205.1	20.5	38
243.7.255.1	25.5	50
243.7.325.1	32.5	55
243.7.385.1	38.5	60
243.7.405.1	40.5	63

Special Punches, Custom made
High-Precision Special Parts to Customer's Drawings

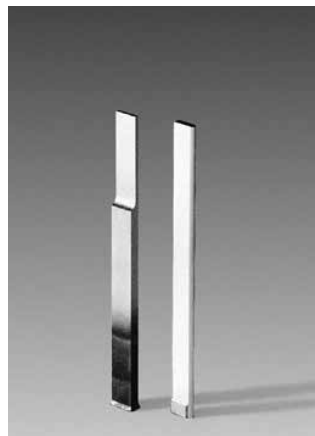
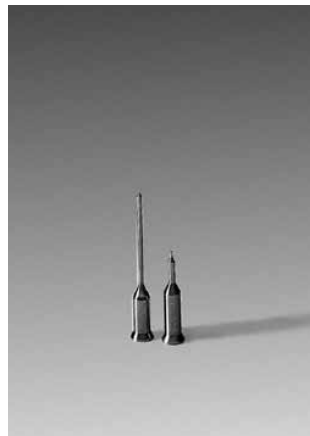
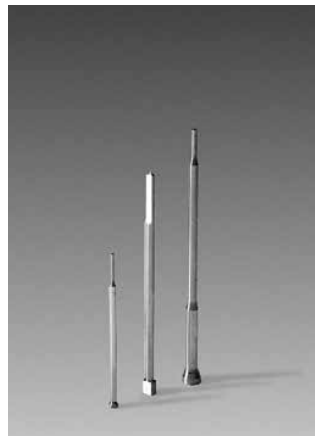
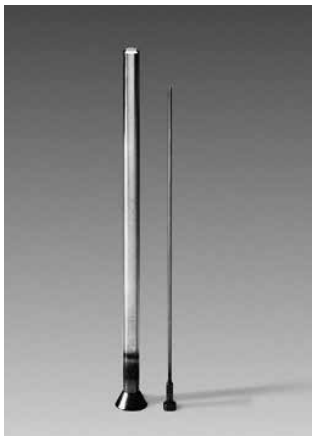


FIBRO manufactures Special Form Punches and -Matrices on most modern equipment. Projection Form Grinding, Creep Feed Grinding, EDM and Wire-EDM are used acc. to design details.

Many years of experience enable FIBRO to chose best suitable materials and methods. We manufacture to customer's drawings:

- Piercing Punches
- Draw Punched
- Form Punches

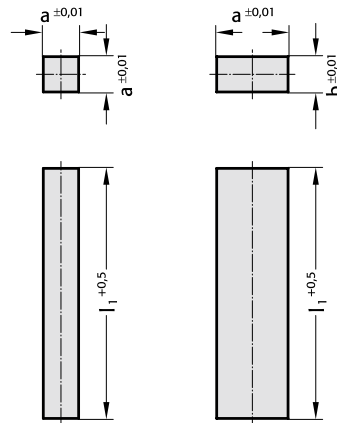
- Pre-Extrusion Punches and Ejectors for Bolt Manufacturing
- Flow-Forming Punches
- Punches with 30°-Conical Heads or other head shapes



Punch without head, square / rectangular, Shape A



230.



230. Punch without head, square / rectangular, Shape A

a	b	l_1	l
1 - 8	1	73.5	71
2 - 10	2	73.5	71
3 - 12	3	73.5	71
4 - 12	4	73.5	71
5 - 15	5	73.5	71
6 - 20	6	73.5	71
7 - 24	7	73.5	71
8 - 24	8	73.5	71
9 - 28	9	73.5	71
10 - 34	10	73.5	71
12 - 34	12	73.5	71

Material:

HSS

Order No 230.3.

Hardness:

Shaft 64 ± 2 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

Execution:

Punch shaft precision ground.

l_1 : Stock length of square punches: 73,5 mm. Other materials and dimensions on request.

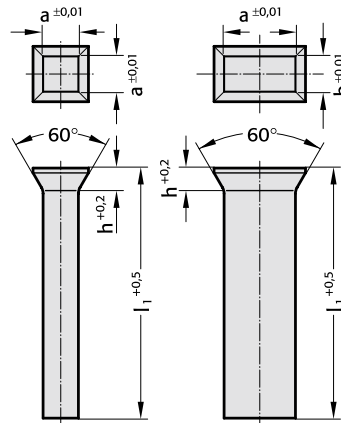
Ordering Code (example):

Punch without head, square / rectangular, Shape A	=230.
Material MAT	HSS = 3.
Punch cutting length a	6 mm = 0600.
Punch cutting width b	6 mm = 0600.
Nominal ordering length l	71 = 071
Order No	=230.3. 0600. 0600. 071



Punch with head, square / rectangular, Shape A

231.



Material:

HSS

Order No 231.3.

Hardness:

Shaft 64 ± 2 HRC

Head $52 \pm$ HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

Execution:

Punch shanks precision ground.

Heads hot upset forged - ground on special request.

l_1 : Stock length of square punches: 71 mm. Other materials and dimensions on request.

231. Punch with head, square / rectangular, Shape A

a	b	h	l_1
1 - 8	1	1.2	71
2 - 10	2	1.4	71
3 - 12	3	1.8	71
4 - 12	4	1.8	71
5 - 15	5	1.8	71
6 - 20	6	2	71
7 - 24	7	2.8	71
8 - 24	8	2.8	71
9 - 28	9	2.8	71
10 - 34	10	2.8	71
12 - 34	12	2.8	71

Ordering Code (example):

Punch with head, square / rectangular, Shape A

=231.

Material MAT

HSS = 3.

Punch cutting length a

6 mm = 0600.

Punch cutting width b

6 mm = 0600.

Length l_1

71 mm = 71

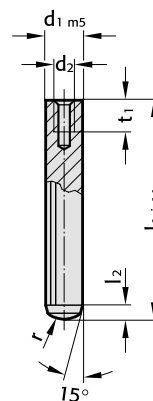
Order No

=231.3.0600.0600.71

Dowel pin with internal extracting thread, similar to DIN EN ISO 8735



236.1.



Material:

Steel

Hardness 60 ± 2 HRC



Execution:

Hardened and ground to finest finish.

FIBRO Dowel Pins are manufactured with the exacting requirements of high class diemaking in mind. Whereas DIN EN ISO 8735 stipulates ISO Class 6 for dowels, we produce our pins to m5.

FIBRO Dowels with internal extracting thread deviate from DIN in that they are case-hardened and that a smaller thread is used. This increases the cross-section around the threaded hole and thus prevents breaking.

236.1. Dowel pin with internal extracting thread, similar to DIN EN ISO 8735

d ₁	d ₂	t ₁	l ₂	r	l ₁	16	18	20	24	28	32	36	40	45	50	55	60	70	80	90	100	120
6	4	6	2.1	6		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8	5	8	2.6	8				•	•	•		•	•	•	•	•	•	•	•	•	•	•
10	6	10	3	10					•	•	•	•	•	•	•	•	•	•	•	•	•	•
12	6	12	3.8	12						•	•	•	•	•	•	•	•	•	•	•	•	•
14	8	12	4	16							•	•	•	•	•	•	•	•	•	•	•	•
16	8	16	4.7	16							•	•	•	•	•	•	•	•	•	•	•	•
20	10	20	6	20								•	•	•	•	•	•	•	•	•	•	•
25	16	24	6	25										•	•	•	•	•	•	•	•	•

Ordering Code (example):

Dowel pin with internal extracting thread, similar to
DIN EN ISO 8735

=236.1.

Diameter d₁

14 mm = 1400.

Length l₁

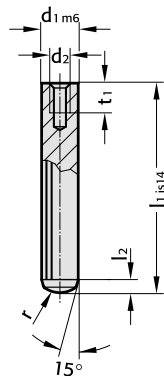
32 mm = 032

Order No

=236.1. 1400.032

Dowel pin with internal extracting thread, similar to DIN EN ISO 8735

2361.1.



Material:

Steel
Hardness 60 ± 2 HRC



Execution:

Hardened and ground to finest finish.

FIBRO Dowel Pins are manufactured with the exacting requirements of high class diemaking in mind.

FIBRO Dowels with internal extracting thread deviate from DIN in that they are case-hardened and that a smaller thread is used. This increases the cross-section around the threaded hole and thus prevents breaking.

2361.1. Dowel pin with internal extracting thread, similar to DIN EN ISO 8735

d ₁	d ₂	t ₁	l ₂	r	l ₁	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	45	50	55	60	70	80	90	100	120
4	3	4.5	1.3	4			●	●	●	●	●	●		●		●	●	●	●	●		●							
5	3	6	1.7	5		●	●	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●					
6	4	6	2.1	6				●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●			
8	5	8	2.6	8						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
10	6	10	3	10						●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●
12	6	10	3.8	12								●		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●
14	8	12	4	14												●		●	●	●	●	●	●	●	●	●	●	●	●
16	8	12	4.7	16														●	●	●	●	●	●	●	●	●	●	●	●
20	10	16	6	20															●	●	●	●	●	●	●	●	●	●	●

Ordering Code (example):

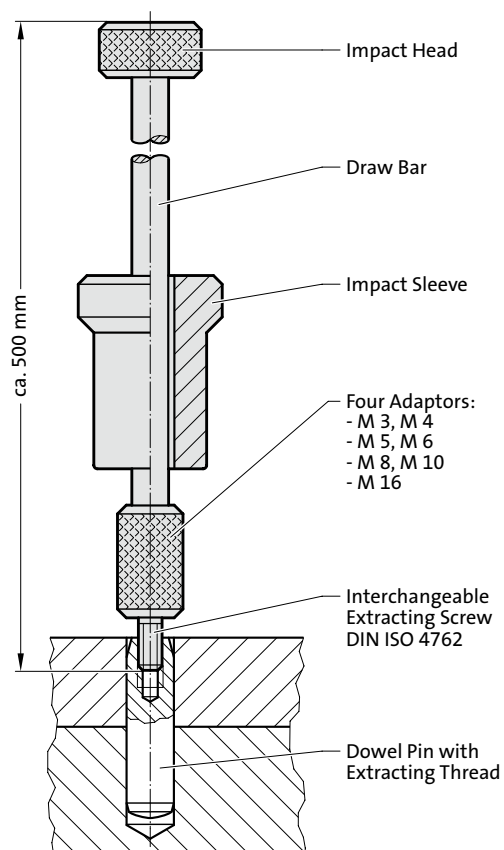
Dowel pin with internal extracting thread, similar to DIN EN ISO 8735	=2361.1.
Diameter d ₁	10 mm = 1000.
Length l ₁	16 mm = 016
Order No	=2361.1.1000.016



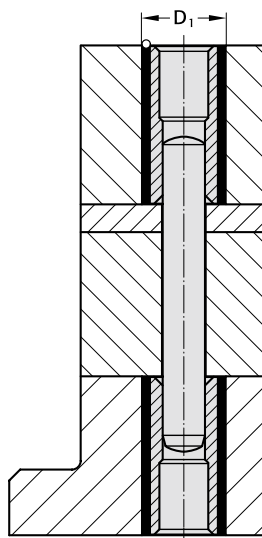
236.001 Dowel Pin Extractor FIBROZIPP

Extraction tool for the fast and convenient removal of dowels with internal extracting thread – also for shafts, plugs and other machine components.

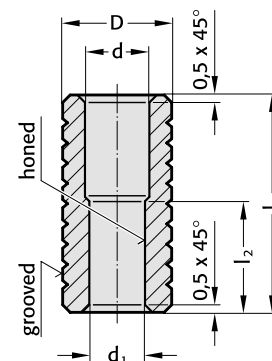
The tool comes with interchangeable adaptors and screws, to fit all threads from M3 to M16.



Liner bush for dowel pin, for bonding



265.1.



Description:

Dowel liner bushes are used where precisely positioned, unhardened parts are often changed or must be replaced, e.g. in precision tool construction.

Material:

WS

Hardness 54 ± 2 HRC

Epoxy-Bonding

The jig-ground pin holes of the hardened matrix are joined with the dowel liner bush by means of a dowel pin 235.1. Retainer holes for dowel liner bushes should be approximately 2 mm larger in diameter than the bush O.D. – a coarse finish is desirable. Following exact positioning/aligning, FIBROLIT® ZWO or FIBROFIX® SECHS is used for bonding.

265.1. Liner bush for dowel pin, for bonding

d_1	d	D	D_1	l_1	l_2
6	7	10	12	25	12
8	9	12	14	30	16
10	11	16	18	36	20

Ordering Code (example):

One Dowel Liner Bush – only –

Dowel Liner Bush	=	265.
Material: Tool Steel	=	1.
$d_1 = \varnothing 8,0$ mm	=	0800.
Quantity: one	=	1
Order No	=	265.1.0800.1

Ordering Code (example):

One Dowel Liner Bush + Matching Dowel

Dowel Liner Bush	=	265.
Material: Tool Steel	=	1.
$d_1 = \varnothing 8,0$ mm	=	0800.
Quantity: one	=	1.
Dowel: length = 40 mm	=	040
Order No	=	265.1.0800.1.040

Ordering Code (example):

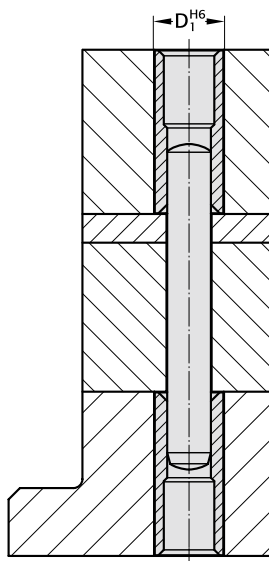
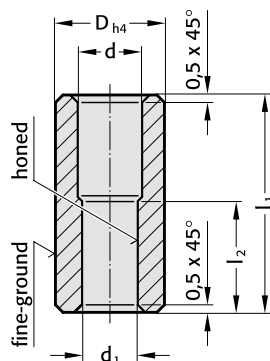
Two Dowel Liner Bushes + one Dowel

Dowel Liner Bush	=	265.
Material: Tool Steel	=	1.
$d_1 = \varnothing 8,0$ mm	=	0800.
Quantity: two	=	2.
Dowel: length = 50 mm	=	050
Order No	=	265.1.0800.2.050



Liner bush for dowel pin, for push fit

2650.1.



Description:

Dowel liner bushes are used where precisely positioned, unhardened parts are often changed or must be replaced, e.g. in precision tool construction.

Material:

WS
Hardness 54 ± 2 HRC

Slip-Fit Bonding:

The position of the bush is given by push fit hole tolerance H 6. The adhesive order no. 281.648 provides optimum bush retention whilst offering the following

advantages:

- high accuracy and stiffness
- no problems to find position when changing bushings

We do not recommend to press fit bushings.

2650.1. Liner bush for dowel pin, for push fit

d_1	d	D	l_1	l_2
6	7	10	25	12
8	9	12	30	16
10	11	16	36	20

Ordering Code (example):

One Dowel Liner Bush – only –	
Dowel Liner Bush	= 2650.
Material: Tool Steel	= 1.
$d_1 = \varnothing 8,0$ mm	= 0800.
Quantity: one	= 1
Order No	= 2650.1.0800.1

Ordering Code (example):

One Dowel Liner Bush + Matching Dowel	
Dowel Liner Bush	= 2650.
Material: Tool Steel	= 1.
$d_1 = \varnothing 8,0$ mm	= 0800.
Quantity: one	= 1.
Dowel: length = 40 mm	= 040
Order No	= 2650.1.0800.1.040

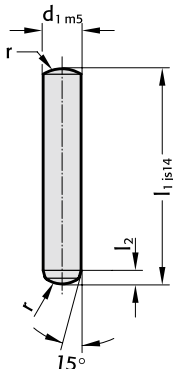
Ordering Code (example):

Two Dowel Liner Bushes + one Dowel	
Dowel Liner Bush	= 2650.
Material: Tool Steel	= 1.
$d_1 = \varnothing 8,0$ mm	= 0800.
Quantity: two	= 2.
Dowel: length = 50 mm	= 050
Order No	= 2650.1.0800.2.050

Dowel pin similar to DIN EN ISO 8734



235.1.



Material:

Steel
Hardness 60 ± 2 HRC

Execution:

Hardened and ground to finest finish.
FIBRO Dowel Pins are manufactured with the exacting requirements of high class diemaking in mind. Whereas DIN EN ISO 8734 stipulates ISO Class 6 for dowels, we produce our pins to m5.

235.1. Dowel pin similar to DIN EN ISO 8734

d ₁	l ₂	r	l ₁	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50	55	60	70	80	90	100	120	130	140
1	0.48	1			•	•	•																				
1.5	0.62	1.6		•	•	•	•	•	•																		
2	0.78	2		•	•	•	•	•	•	•	•	•	•	•	•												
2.5	0.95	2.5		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•							
3	1.1	3		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4	1.4	4		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5	1.7	5			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6	2.1	6				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8	2.6	8				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
10	3	10					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
12	3.8	12						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
14	3.8	16							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
16	4.7	16								•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
20	6	20									•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

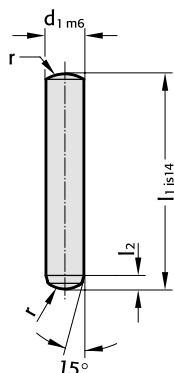
Ordering Code (example):

Dowel pin similar to DIN EN ISO 8734	=235.1.
Diameter d ₁	6 mm = 0600.
Length l ₁	10 mm = 010
Order No	=235.1.0600.010



Dowel pin similar to DIN EN ISO 8734

2351.1.



Material:

Steel
Hardness 60 ± 2 HRC

Execution:

Hardened and ground to finest finish.

2351.1. Dowel pin similar to DIN EN ISO 8734

d_1	l_2	r	l_1	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	45	50	55	60	70	80	90	100	120
1	0.4	1		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1.5	0.5	1.6		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2	0.6	2		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2.5	0.7	2.5		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3	0.8	3		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4	1	4		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5	1.2	5		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6	1.5	6		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8	1.8	8		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
10	2	10		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
12	2.5	12		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
14	2.5	16		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
16	3	16		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
20	4	20		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

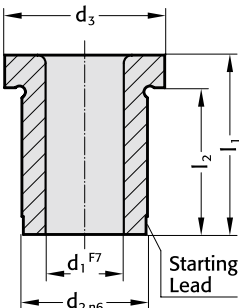
Ordering Code (example):

Dowel pin similar to DIN EN ISO 8734	=2351.1.
Diameter d_1	6 mm= 0600.
Length l_1	8 mm= 008
Order No	=2351.1. 0600.008

Drill bush with collar, DIN 172, Shape A



276.



Material:
Case hardened steel
Hardness 740 ± 40 HV 10

Execution:
Diameters d_1 , d_2 and shoulder precision ground.

276. Drill bush with collar, DIN 172, Shape A

d_1	d_2	d_3	l_1	6	8	9	10	12	16	20	25	28	30	35	36	45	56	67	78
0.4 - 1	3	6	l_2	4		7													
1.1 - 1.8	4	7		4		7													
1.9 - 2.6	5	8		4		7													
2.7 - 3.3	6	9			5.5			9.5	13.5										
3.4 - 4	7	10			5.5			9.5	13.5										
4.1 - 5	8	11			5.5			9.5	13.5										
5.1 - 6	10	13				7		13	17										
6.1 - 8	12	15				7		13	17										
8.1 - 10	15	18					9	17	22										
10.1 - 12	18	22					8	16	21										
12.1 - 15	22	26						12		24					32				
15.1 - 18	26	30						12		24					32				
18.1 - 22	30	34							15						31	40			
22.1 - 26	35	39							15						31	40			
26.1 - 30	42	46								20						40	51		
30.1 - 35	48	52								20						40	51		
35.1 - 42	55	59									25						51	62	
42.1 - 48	62	66									24						50	61	
48.1 - 55	70	74									24						50	61	
55.1 - 63	78	82												29				61	72

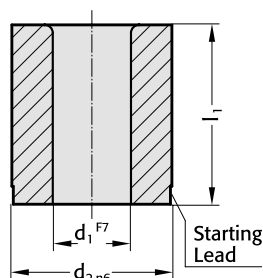
Ordering Code (example):

Drill bush with collar, DIN 172, Shape A	=276.1.
Guide diameter d_1	12.1 mm = 1210.
Length l_1	16 mm = 016
Order No	=276.1. 1210. 016



Drill bush without collar, DIN 179, Shape A

277.



Material:

Case hardened steel

Hardness 740 ± 40 HV 10

Execution:

Diameters d_1 and d_2 precision ground.

277. Drill bush without collar, DIN 179, Shape A

d_1	d_2	l_1	6	8	9	10	12	16	20	25	28	30	35	36	45	56	67	78
0.4 - 1	3		•		•													
1.1 - 1.8	4		•		•													
1.9 - 2.6	5		•		•													
2.7 - 3.3	6			•			•	•										
3.4 - 4	7			•			•	•										
4.1 - 5	8			•			•	•										
5.1 - 6	10					•		•	•									
6.1 - 8	12					•		•	•									
8.1 - 10	15						•	•	•	•								
10.1 - 12	18						•	•	•	•								
12.1 - 15	22							•			•			•				
15.1 - 18	26							•			•			•				
18.1 - 22	30								•					•	•			
22.1 - 26	35								•					•	•			
26.1 - 30	42									•				•	•	•		
30.1 - 35	48									•				•	•	•	•	
35.1 - 42	55											•		•	•	•	•	•
42.1 - 48	62											•		•	•	•	•	•
48.1 - 55	70											•		•	•	•	•	•
55.1 - 63	78												•				•	•

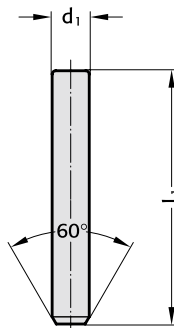
Ordering Code (example):

Drill bush without collar, DIN 179, Shape A = 277.1.
 Guide diameter d_1 12.1 mm = 1210.
 Length l_1 16 mm = 016
 Order No = 277.1. 1210.016

Gauge pin DIN 2269



240.1./2.



Material:

Alloy tool steel, hardened and tempered. Age-treated repeatedly.
Hardness 60 ± 2 HRC

Execution:

precision ground
Quality class I: diameter tolerance $\pm 0,001$
Quality class II: diameter tolerance $\pm 0,002$

Single pins:

Quality class I 240.1.
Quality class I 240.2.

Small set:

91 gauge pins from $\varnothing 1-10$ mm in steps of 0,1 mm, complete in wooden box.
Quality class I 240.51.
Quality class II 240.52.

Large set:

273 gauge pins from $\varnothing 1-10$ mm in steps of 0,1 mm, plus one each. 0,01 mm-oversize/undersize pin – complete in wooden box
Quality class I 240.41.
Quality class II 240.42.

Special sets:

Supplied to customer's requirements in respect of assortment and quality class. All gauge pins from 3 mm upward are marked with their actual size.

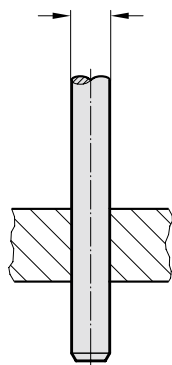
Ordering Code (example):

Gauge pin DIN 2269	=240.
Quality class KL	1 = 1.
Diameter d_1	0.29 mm = 0029
Order No	=240. 1. 0029

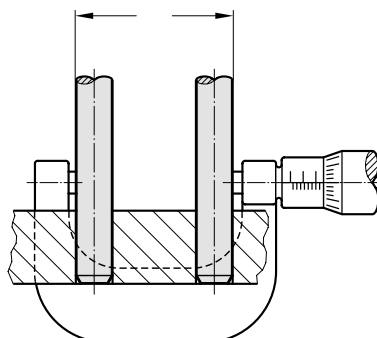
240.1./2. Gauge pin DIN 2269

d_1	l_1
0.29 - 6	50
6.01 - 20	70

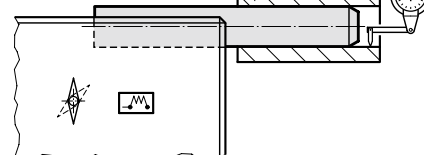
Direct gauging of bore diameters



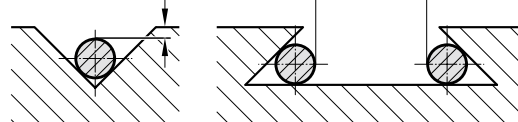
Measurement of centre-distance between two bores



Concentricity check on a bush



Measurements on prismatic faces



Gauge Pin Holders Wooden Boxes

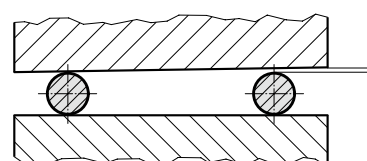
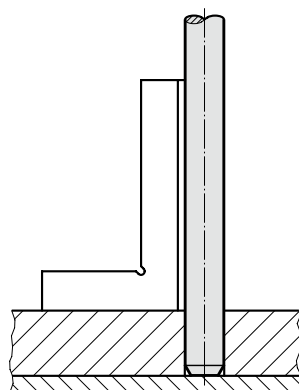
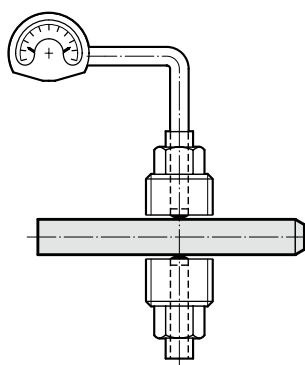


Calibration of a
comparator

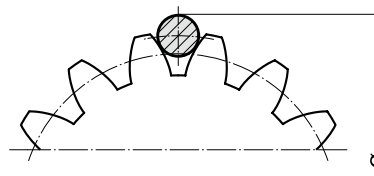


Inspection for squareness
of a bore

Check on parallelism



Measuring of gear teeth,
threads etc.



240.45. Gauge Pin Holders

(without pins)	for diameters	Order No
	von 1–2	240.45.1
	von 2–4	240.45.2
	von 4–6	240.45.3
	von 6–8	240.45.4
	von 8–10	240.45.5

Gauge Pin Holders are double-ended, to carry two pins e.g. for go – no go measurements etc.

Wooden boxes: (without pins)	with drilled holes, for the safe and orderly storage of gauge pins – each hole marked with the requisite pin size.	Order No
	Large Set of approx. 270 Pins size: 250×90×390	240.91
	Small Set of approx. 90 Pins size: 155×90×285	240.92
	Boxes complete with carrier board inset	
	Class I-Accuracy	240.9x.1
	Class II-Accuracy	240.9x.2

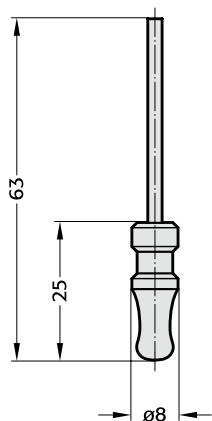
Ordering code (example):

Gauge pin box – approx. 270 pins	= 240.91.	
Class I-Accuracy	= 1	
Order No	= 240.91.1	



High Precision Gauge Pins with Handle High Precision Gauge Pins – Boxed Sets

240.11./22.



240.11./22. High-Precision Gauge Pins with Handle

The Gauge Pins are firmly fixed to the handle. Each Pin is marked with its true diameter.

Single Gauge Pins: $\varnothing 0,3 - 3,0$ mm, In dia. steps of 0.01 mm Order No

	Class I-Accuracy	240.11.			
	Class II-Accuracy	240.22.			
Assortment:	84 Gauge Pins from 0.3 – 3.0 mm, in dia. steps of 0.1 mm plus one each pin with undersize 0.01 and oversize 0.01 mm (for example 0.29 – 0.30 – 0.31 etc.)				
	Class I-Accuracy	240.31			
	Class II-Accuracy	240.32			
Special Assortments:	to customer's specifications in respect of class of accuracy				

Material:

Alloy tool steel, hardened and tempered.
Repeatedly age-treated.
Hardness 60 ± 2 HRC.
fine-ground
Class II-Accuracy ± 0.001
Class II-Accuracy ± 0.002
to DIN 2269

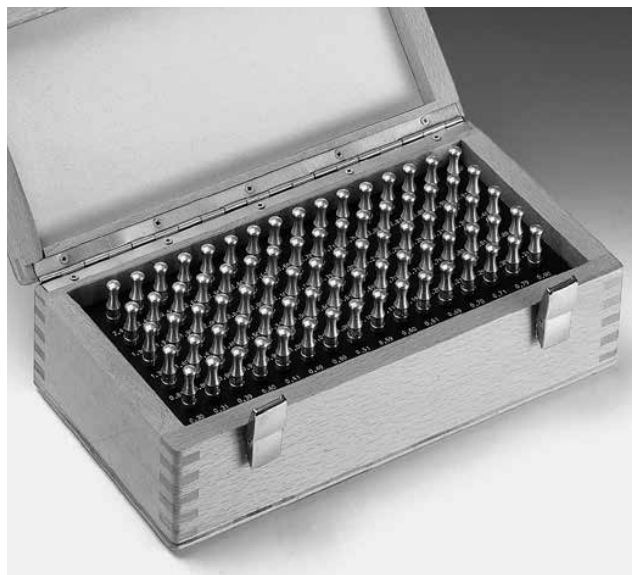
Ordering Code (example):

Gauge Pin	=	240.
Class I-Accuracy, with handle	=	11.
$d_1 = 1,5$ mm	=	0150
Order No	=	240.11.0150

Execution:

Wooden boxes for Gauge Pins – with drilled holes in wooden tray insert. Each hole marked with true size of pin.

External dimensions: 155x90x285 mm



Punching and embossing unit with matrix for punched holes and self tapping screws



Material:
HSS

Execution:
The punching and embossing unit with matrix consists of:
1 x embossing die
1 x punch die
1 x matrix

Sheet metal thickness:
max. 0,6 mm = 2282.01.035/039
max. 0,8 mm = 2282.01.042
max. 0,9 mm = 2282.01.048
max. 1,0 mm = 2282.01.055/063



2282.01. Punching and embossing unit with matrix for punched holes and self tapping screws

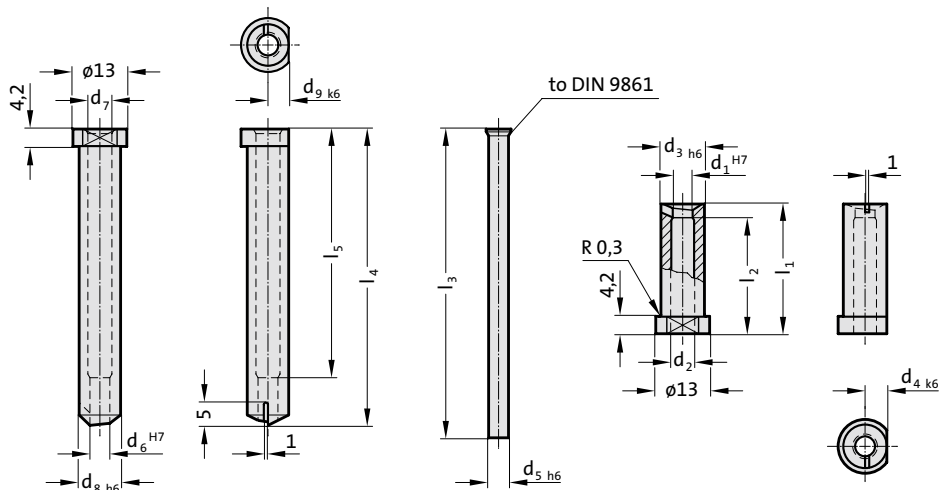
Order No	Nominal - Ø = thread size	d ₁	d ₂	d _{3h6}	d _{4k6}	d _{5h6}	d ₆	d ₇	d _{8h6}	d _{9k6}	l ₁	l ₂	l ₃	l ₄	l ₅
2282.01.035	B 3,5	2.75	3.2	7.5	3.75	2.7	2.7	3.1	7.5	3.75	31.3	28	74.5	71.5	60
2282.01.039	B 3,9	3.05	3.4	7.5	3.75	3	3	3.6	7.5	3.75	31.3	28	74.5	71.5	60
2282.01.042	B 4,2	3.15	3.5	8.5	4.25	3.1	3.1	3.7	8	4	31.3	28	74.5	71.5	60
2282.01.048	B 4,8	3.85	4.2	9	4.5	3.8	3.8	4.5	8	4	31.3	28	74.5	71.5	60
2282.01.055	B 5,5	4.35	4.8	9	4.5	4.3	4.3	5	8	4	31.3	28	74.5	71.5	60
2282.01.063	B 6,3	4.85	5.3	10.5	5.25	4.8	4.8	5.5	10	5	31.3	28	74.5	71.5	60

2282.01.xxx

2282.01.xxx.1 Embossing die

2282.01.xxx.2 Punch die

2282.01.xxx.3 Bottom die



Example of application:

