INTERNATIONAL STANDARD

ISO 8020

Third edition
2002-06-01

Tools for pressing — Punches with cylindrical head and straight or reduced shank

Outillage de presse — Poinçons à tête cylindrique et à corps droit ou épaulé

Reference number
ISO 8020:2002(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 8020 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 8, *Tools for pressing and moulding*.

This third edition cancels and replaces the second edition (ISO 8020:1992), as well as ISO 8021:1986 where the tolerances on the diameters and on the point diameter have been technically revised.

Tools for pressing — Punches with cylindrical head and straight or reduced shank

1 Scope

This International Standard specifies the basic dimensions and tolerances, in millimetres, of punches with cylindrical head and straight or reduced shank.

Cylindrical head punches with reduced shank are standardized in round, oblong, square and rectangular shapes.

This International Standard gives examples of materials and their hardness, and specifies the designation of punches.

These punches are available with shank diameters, D_1, from 3 mm to 32 mm.

The main use of the punches specified in this International Standard is for punching holes in steel sheet. They may also be used for punching in other materials.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 8695:1987, *Tools for pressing — Punches — Nomenclature and terminology*

ISO 2768-1:1989, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 8695 apply.

4 Dimensions

4.1 Perforating punches

4.1.1 Punches with straight shank — Type A

See Figure 1 and Table 1.

General tolerance: ISO 2768m
Surface roughness values in micrometers

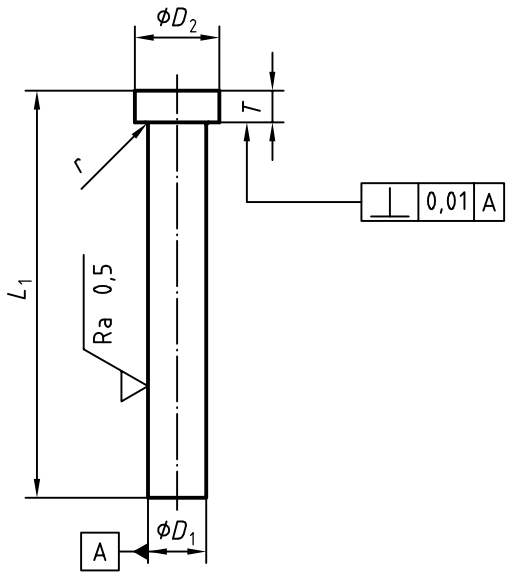


Figure 1

Table 1

D_1 m5	D_2 $^{0}_{-0,25}$	T $^{+0,25}_{0}$	r $^{+0,1}_{0}$	L_1 $^{+1}_{0}$						
				56	63	71	80	90	100	120
3	5	3	0,2	x	x	x	x	x		
4	6			x	x	x	x	x		
5	8	5	0,3	x	x	x	x	x	x	x
6	9			x	x	x	x	x	x	x
8	11			x	x	x	x	x	x	x
10	13			x	x	x	x	x	x	x
13	16		0,4			x	x	x	x	x
16	19					x	x	x	x	x
20	23					x	x	x	x	x
25	28					x	x	x	x	x
32	35					x	x	x	x	x

4.1.2 Punches with reduced shank

4.1.2.1 Punches with round shape — Type B

See Figure 2 and Table 2.

General tolerance: ISO 2768m
Surface roughness values in micrometers

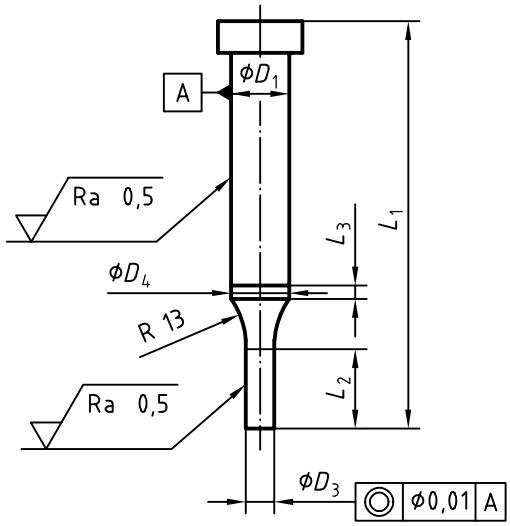


Figure 2

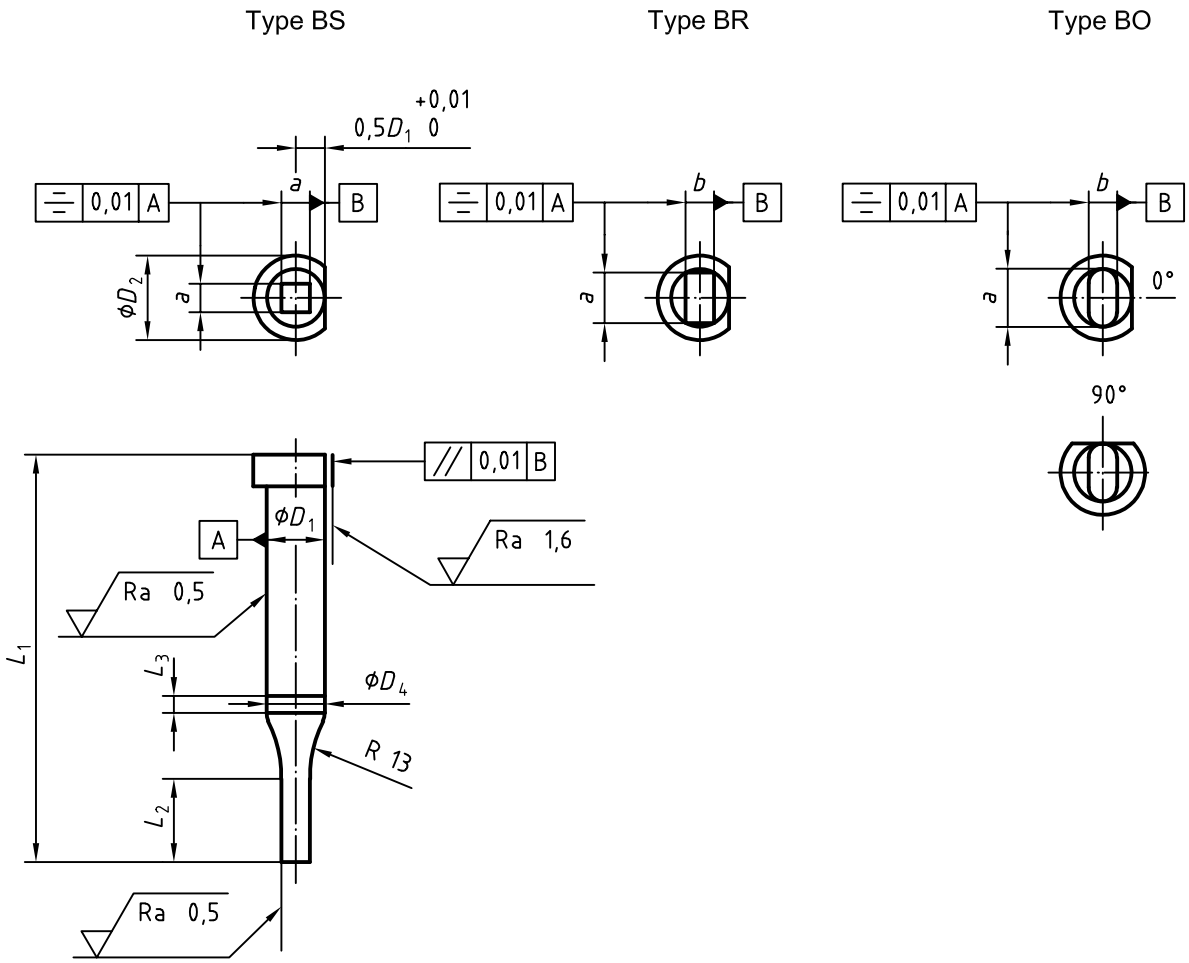
Table 2

D_1 m5	D_3 $\pm$ 0,01	L_1 $^{+1}_{0}$						
		56	63	71	80	90	100	120
3	$0{,}8 \leqslant D_3 \leqslant 2{,}9$	x	x	x	x			
4	$1 \leqslant D_3 \leqslant 3{,}9$	x	x	x	x			
5	$1{,}5 \leqslant D_3 \leqslant 4{,}9$	x	x	x	x	x		
6	$1{,}6 \leqslant D_3 \leqslant 5{,}9$	x	x	x	x	x		
8	$2{,}5 \leqslant D_3 \leqslant 7{,}9$	x	x	x	x	x	x	x
10	$4 \leqslant D_3 \leqslant 9{,}9$	x	x	x	x	x	x	x
13	$5 \leqslant D_3 \leqslant 12{,}9$			x	x	x	x	x
16	$8 \leqslant D_3 \leqslant 15{,}9$			x	x	x	x	x
20	$12 \leqslant D_3 \leqslant 19{,}9$			x	x	x	x	x
25	$16{,}5 \leqslant D_3 \leqslant 24{,}9$			x	x	x	x	x
32	$20 \leqslant D_3 \leqslant 31{,}9$			x	x	x	x	x
NOTE The point length L_2, diameter D_4 and length L_3 are left to the manufacturer's discretion. See 4.1.1 for all other dimensions (D_2, r and T).								

4.1.2.2 Punches with square (S), rectangular (R) and oblong (O) shapes — Types BS, BR and BO

See Figure 3 and Table 3.

General tolerance: ISO 2768m
Surface roughness values in micrometers



NOTE Standard position of location device is 0°.

Figure 3

Table 3

D_1 m5	**Type BS** a $\pm$ 0,01	**Types BR and BO** a and b $\pm$ 0,01	L_1 $^{+1}_{0}$						
			56	63	71	80	90	100	120
5	$1 \leqslant a \leqslant 3{,}5$	$1 < (a,\ b) \leqslant 4{,}9$	x	x	x	x	x		
6	$1{,}6 \leqslant a \leqslant 4{,}2$	$1{,}6 < (a,\ b) \leqslant 5{,}9$	x	x	x	x	x		
8	$2 \leqslant a \leqslant 5{,}6$	$2 < (a,\ b) \leqslant 7{,}9$	x	x	x	x	x	x	x
10	$3{,}5 \leqslant a \leqslant 7$	$3{,}5 < (a,\ b) \leqslant 9{,}9$	x	x	x	x	x	x	x
13	$4{,}5 \leqslant a \leqslant 9{,}1$	$4{,}5 < (a,\ b) \leqslant 12{,}9$			x	x	x	x	x
16	$6 \leqslant a \leqslant 11{,}2$	$6 < (a,\ b) \leqslant 15{,}9$			x	x	x	x	x
20	$8 \leqslant a \leqslant 14{,}1$	$8 < (a,\ b) \leqslant 19{,}9$			x	x	x	x	x
25	$10 \leqslant a \leqslant 17{,}6$	$10 < (a,\ b) \leqslant 24{,}9$			x	x	x	x	x
32	$10 \leqslant a \leqslant 22{,}5$	$10 < (a,\ b) \leqslant 31{,}9$			x	x	x	x	x

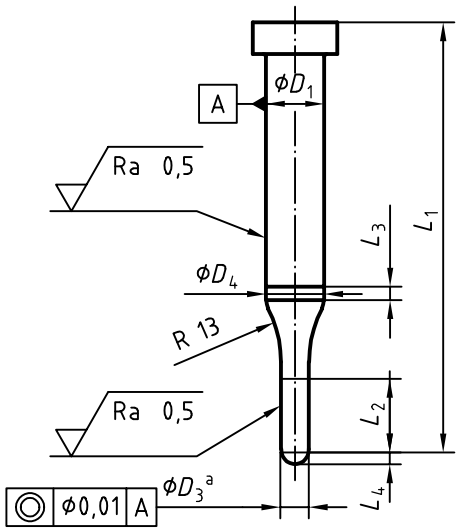
NOTE The point length L_2 diameter D_4 and length L_3 are left to the manufacturer's discretion. See 4.1.1 for all other dimensions (D_2, r and T).

4.2 Pilot punches

4.2.1 Pilot punches — Type C

See Figure 4 and Table 4.

General tolerance: ISO 2768m
Surface roughness values in micrometers



[a] The diameter D_3 of the pilot shall be smaller than the diameter of the equivalent punch.

Figure 4

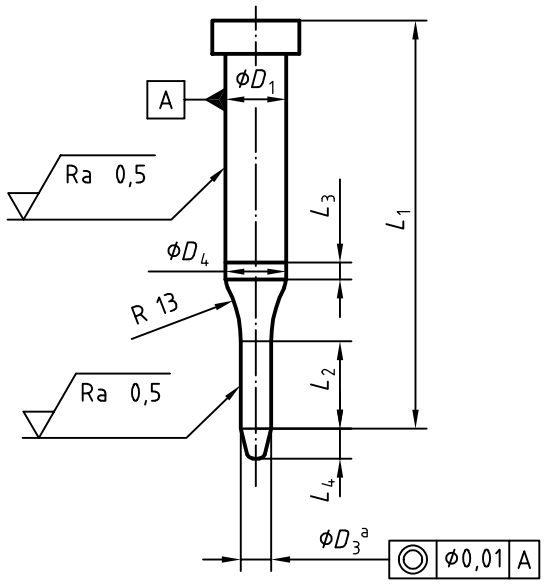
Table 4

D_1 m5	D_3 $\pm$ 0,01	L_1 $^{+1}_{0}$						
		56	63	71	80	90	100	120
5	$1 \leqslant D_3 \leqslant 4{,}9$	x	x	x	x	x		
6	$1{,}6 \leqslant D_3 \leqslant 5{,}9$	x	x	x	x	x		
8	$2{,}5 \leqslant D_3 \leqslant 7{,}9$	x	x	x	x	x	x	x
10	$4 \leqslant D_3 \leqslant 9{,}9$	x	x	x	x	x	x	x
13	$5 \leqslant D_3 \leqslant 12{,}9$			x	x	x	x	x
16	$8 \leqslant D_3 \leqslant 15{,}9$			x	x	x	x	x
20	$12 \leqslant D_3 \leqslant 19{,}9$			x	x	x	x	x
25	$16{,}5 \leqslant D_3 \leqslant 24{,}9$			x	x	x	x	x
32	$20 \leqslant D_3 \leqslant 31{,}9$			x	x	x	x	x
NOTE The point length L_2 and L_4, diameter D_4, length L_3 and point shape are left to the manufacturer's discretion. See 4.1.1 for all other dimensions (D_2, r and T).								

4.2.2 Positive pilot punches — Type D

See Figure 5 and Table 5.

General tolerance: ISO 2768m
Surface roughness values in micrometers



[a] The diameter D_3 of the pilot shall be smaller than the diameter of the equivalent punch.

Figure 5

Table 5

D_1 m5	D_3 $\pm$ 0,01	L_1 $^{+1}_{0}$						
		56	63	71	80	90	100	120
5	$1 \leqslant D_3 \leqslant 4{,}9$	x	x	x	x	x		
6	$1{,}6 \leqslant D_3 \leqslant 5{,}9$	x	x	x	x	x		
8	$2{,}5 \leqslant D_3 \leqslant 7{,}9$	x	x	x	x	x	x	x
10	$4 \leqslant D_3 \leqslant 9{,}9$	x	x	x	x	x	x	x
13	$5 \leqslant D_3 \leqslant 12{,}9$			x	x	x	x	x
16	$8 \leqslant D_3 \leqslant 15{,}9$			x	x	x	x	x
20	$12 \leqslant D_3 \leqslant 19{,}9$			x	x	x	x	x
25	$16{,}5 \leqslant D_3 \leqslant 24{,}9$			x	x	x	x	x
32	$20 \leqslant D_3 \leqslant 31{,}9$			x	x	x	x	x
NOTE The point length L_2 and L_4, diameter D_4, length L_3 and point shape are left to the manufacturer's discretion. See 4.1.1 for all other dimensions (D_2, r and T).								

4.3 Punches with ejector

4.3.1 Punches with ejector with straight shank — Type E

See Figure 6 and Table 6.

General tolerance: ISO 2768m
Surface roughness values in micrometers

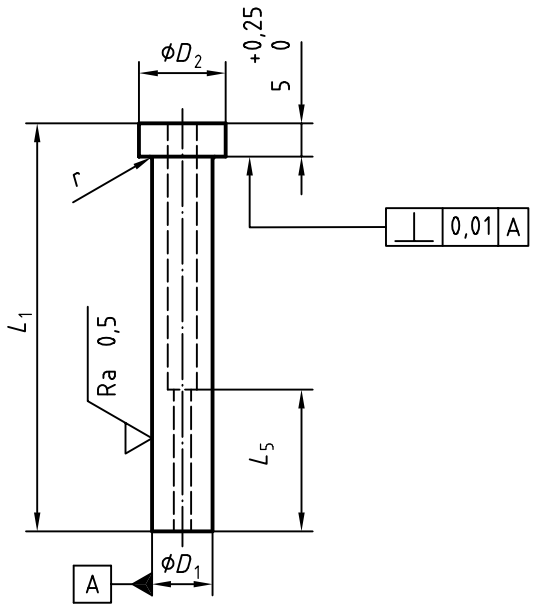


Figure 6

Table 6

D_1 m5	D_2 $^{0}_{-0,25}$	r $^{+0,1}_{0}$	L_1 $^{+1}_{0}$						
			56	63	71	80	90	100	120
5	8	0,3	x	x	x	x	x		
6	9		x	x	x	x	x		
8	11		x	x	x	x	x	x	x
10	13		x	x	x	x	x	x	x
13	16	0,4			x	x	x	x	x
16	19				x	x	x	x	x
20	23				x	x	x	x	x
25	28				x	x	x	x	x
32	35				x	x	x	x	x
NOTE The length L_5, the ejector components and the locking hole are left to the manufacturer's discretion.									

4.3.2 Punches with ejector with reduced shank

4.3.2.1 Punches with ejector with round shape — Type F

See Figure 7 and Table 7.

General tolerance: ISO 2768m
Surface roughness values in micrometers

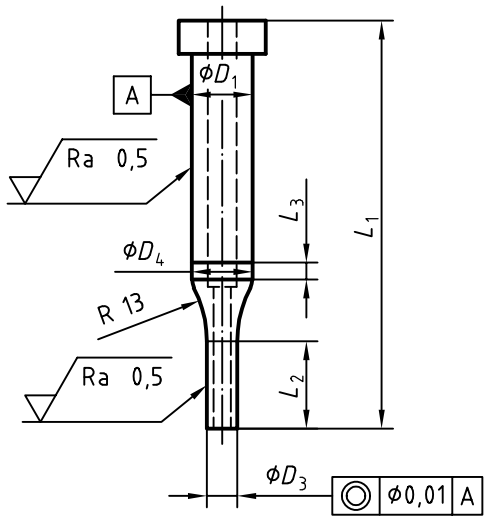


Figure 7

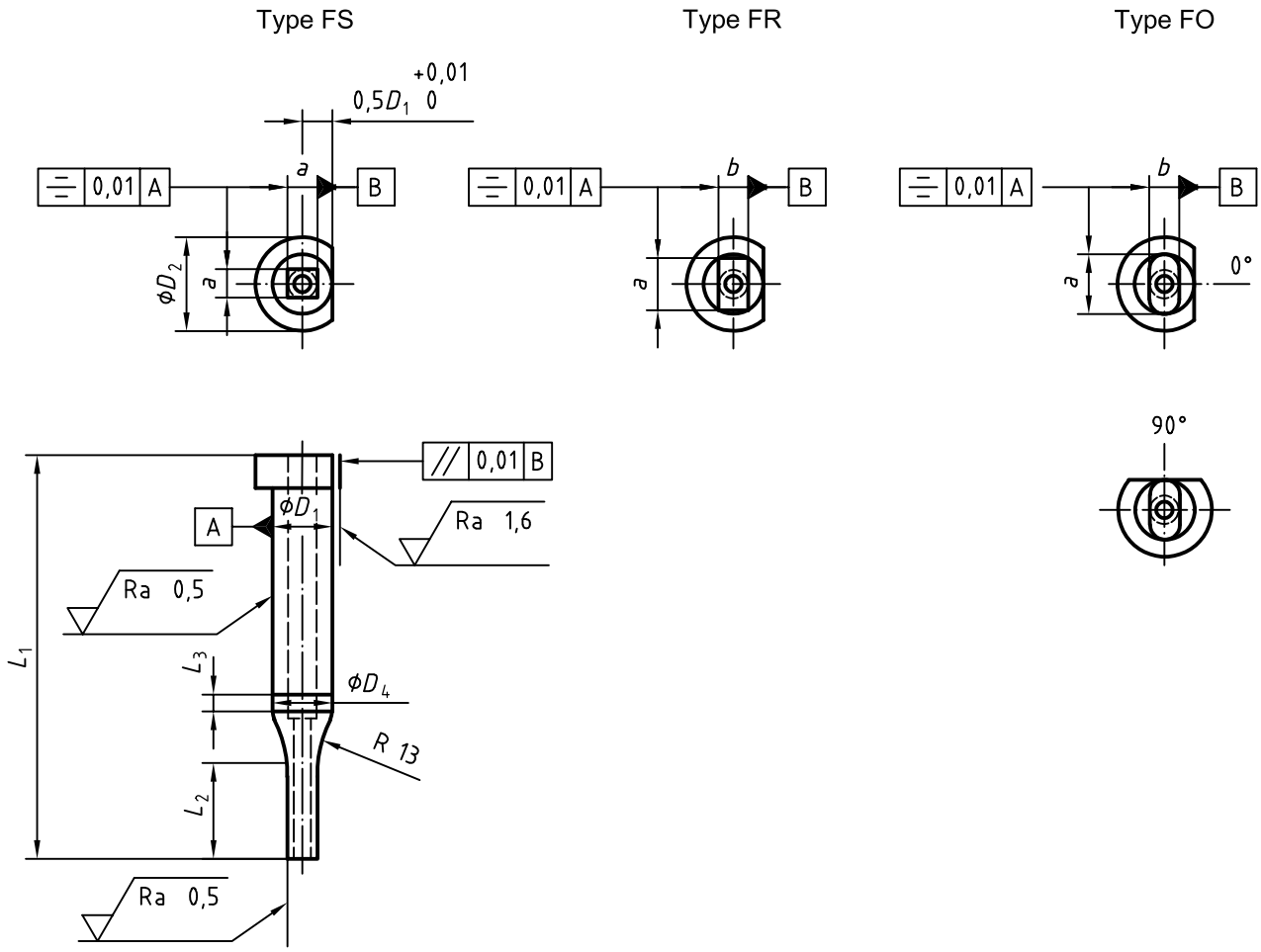
Table 7

D_1 m5	D_3 $\pm$ 0,01	L_1 $^{+1}_{0}$						
		56	63	71	80	90	100	120
5	$1 \leqslant D_3 \leqslant 4{,}9$	x	x	x	x	x		
6	$1{,}6 \leqslant D_3 \leqslant 5{,}9$	x	x	x	x	x		
8	$2{,}5 \leqslant D_3 \leqslant 7{,}9$	x	x	x	x	x	x	x
10	$4 \leqslant D_3 \leqslant 9{,}9$	x	x	x	x	x	x	x
13	$5 \leqslant D_3 \leqslant 12{,}9$			x	x	x	x	x
16	$8 \leqslant D_3 \leqslant 15{,}9$			x	x	x	x	x
20	$12 \leqslant D_3 \leqslant 19{,}9$			x	x	x	x	x
25	$16{,}5 \leqslant D_3 \leqslant 24{,}9$			x	x	x	x	x
32	$20 \leqslant D_3 \leqslant 31{,}9$			x	x	x	x	x
NOTE The point length L_2, diameter D_4, length L_3, the ejector components and the locking hole are left to the manufacturer's discretion. See 4.3.1 for all other dimensions (D_2, r and the head thickness).								

4.3.2.2 Punches with ejector with square (S), rectangular (R) and oblong (O) shapes — Types FS, FR and FO

See Figure 8 and Table 8.

General tolerance: ISO 2768m
Surface roughness values in micrometers



NOTE Standard position of location device is 0°.

Figure 8

Table 8

D_1	**Type FS** a $\pm$ 0,01	**Types FR and FO** a and b $\pm$ 0,01	L_1 $^{+1}_{0}$						
m5			56	63	71	80	90	100	120
5	$1 \leqslant a \leqslant 3{,}5$	$1 < (a,\ b) \leqslant 4{,}9$	x	x	x	x	x		
6	$1{,}6 \leqslant a \leqslant 4{,}2$	$1{,}6 < (a,\ b) \leqslant 5{,}9$	x	x	x	x	x		
8	$2 \leqslant a \leqslant 5{,}6$	$2 < (a,\ b) \leqslant 7{,}9$	x	x	x	x	x	x	x
10	$3{,}5 \leqslant a \leqslant 7$	$3{,}5 < (a,\ b) \leqslant 9{,}9$	x	x	x	x	x	x	x
13	$4{,}5 \leqslant a \leqslant 9{,}1$	$4{,}5 < (a,\ b) \leqslant 12{,}9$			x	x	x	x	x
16	$6 \leqslant a \leqslant 11{,}2$	$6 < (a,\ b) \leqslant 15{,}9$			x	x	x	x	x
20	$8 \leqslant a \leqslant 14{,}1$	$8 < (a,\ b) \leqslant 19{,}9$			x	x	x	x	x
25	$10 \leqslant a \leqslant 17{,}6$	$10 < (a,\ b) \leqslant 24{,}9$			x	x	x	x	x
32	$10 \leqslant a \leqslant 22{,}5$	$10 < (a,\ b) \leqslant 31{,}9$			x	x	x	x	x

NOTE The point length L_2 diameter D_4, length L_3, the ejector component and the locking hole are left to the manufacturer's discretion. See 4.3.1 for all other dimensions (D_2, r and head thickness).

5 Material and hardness

The material is left to the manufacturer's discretion. The following hardness value are given as examples:

a) alloyed cold work steel with 5 % to 12 % Cr
   — point: (60 ± 2) HRC
   — head: (45 ± 5) HRC
b) high speed steel
   — point: (62 ± 2) HRC
   — head: (52 ± 5) HRC

6 Designation

A punch in accordance with this International Standard shall be designated by:

a) “Punch”;
b) reference to this International Standard, i.e. ISO 8020;
c) the type of punch (A, B, BS, BR, BO, C, D, E, F, FS, FR or FO);
d) its shank diameter, D_1, in millimetres;
e) for types B, BS, BR, BO, C, D, F, FS, FR and FO, its point dimensions (D_3, a or $a \times b$), in millimetres;
f) for types BS, BR, BO, FS, FR and FO, the angle position of the location device (0°, 90°);
g) its overall length L_1, in millimetres;
h) its material (alloyed cold work steel with 5 % to 12 % Cr or high speed steel).

EXAMPLE 1 A round perforating punch (type B) of shank diameter $D_1 = 5$ mm, of point diameter $D_3 = 2$ mm and of overall length $L_1 = 71$ mm in alloyed cold work steel is designated as follows:

Punch ISO 8020-B-5 $\times$ 2 $\times$ 71-alloyed cold work steel

EXAMPLE 2 A rectangular perforating punch (type BR) of shank diameter $D_1 = 5$ mm, of point dimensions $a \times b = 2$ mm $\times$ 3 mm, with a location device at 90° and of overall length $L_1 = 90$ mm in high speed steel is designated as follows:

Punch ISO 8020-BR-5 $\times$ 2 $\times$ 3 $\times$ 90° $\times$ 90-high speed steel

ICS 25.120.10

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