
Tools for pressing — Ball-lock punches —

Part 1:

Ball-lock punches for light duty

Outillage de presse — Poinçons à bille —

Partie 1: Poinçons à bille pour tôles minces

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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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 part of ISO 10071 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10071-1 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 8, *Tools for pressing and moulding*.

This first edition, together with ISO 10071-2, cancels and replaces ISO 10071:1991 which has been technically revised and augmented.

ISO 10071 consists of the following parts, under the general title *Tools for pressing — Ball-lock punches*:

— *Part 1: Ball-lock punches for light duty*

The following additional part is in preparation:

— *Part 2: Ball-lock punches for heavy duty*

Tools for pressing — Ball-lock punches —

Part 1: Ball-lock punches for light duty

1 Scope

This part of ISO 10071 lays down interchangeability dimensions and tolerances, in millimetres, for ball-lock punches.

It covers ball-lock punches with shank diameter sizes from 6 mm up to and including 32 mm, in round, square, rectangular and oblong shapes, for punching holes in steel sheets or other materials, the thickness of which is less than 3 mm.

This part of ISO 10071 also gives examples on materials and hardness, and specifies the designation of ball-lock punches for light duty.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10071. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10071 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 2768-1:1989, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

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

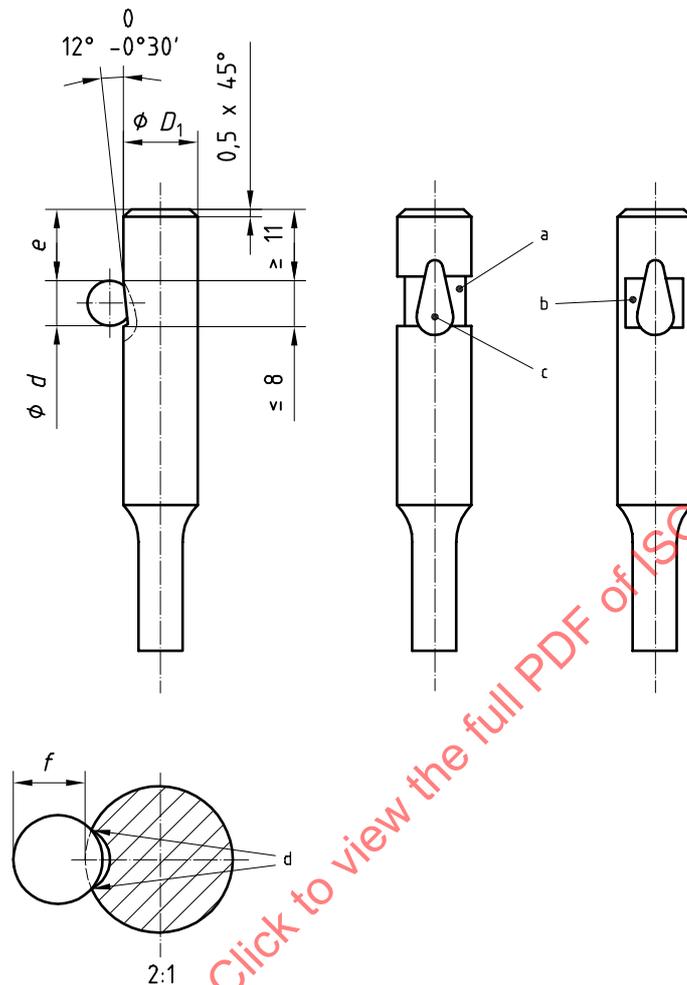
3 Terms and definitions

For the purposes of this part of ISO 10071, the terms and definitions given in ISO 8695 apply.

4 Dimensions

4.1 Basic dimensions — Ball in locking position

See Figure 1 and Table 1.



- a Ball seat relief: type and dimensions at manufacturer's direction
- b Alternative ball seat relief types (band type, swipe type)
- c Ball seat
- d 2-point contact

Figure 1

Table 1

D_1	Ball diameter d	e $+0,2$ 0	f 0 $-0,1$
g5			
6	6	14	5,2
10	8	12,4	6,7
13	8	12,4	6,7
16	8	12,4	6,7
20	8	12,4	6,7
25	8	12,4	6,7
32	8	12,4	6,7

4.2 Perforating punches

4.2.1 Punches with straight shank — Type A

See Figure 2 and Table 2.

General tolerance: ISO 2768-m
Surface roughness value in micrometres

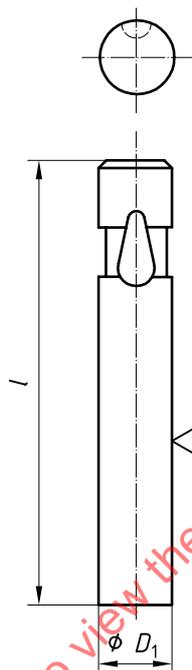


Figure 2

Table 2

D_1 g5	l $+0,5$ 0				
	63	71	80	90	100
6	x	x	x	x	x
10	x	x	x	x	x
13	x	x	x	x	x
16		x	x	x	x
20		x	x	x	x
25		x	x	x	x
32		x	x	x	x

NOTE See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.2.2 Punches with reduced shank

4.2.2.1 Punches with round shape — Type B

See Figure 3 and Table 3.

General tolerance: ISO 2768-m
Surface roughness value in micrometres

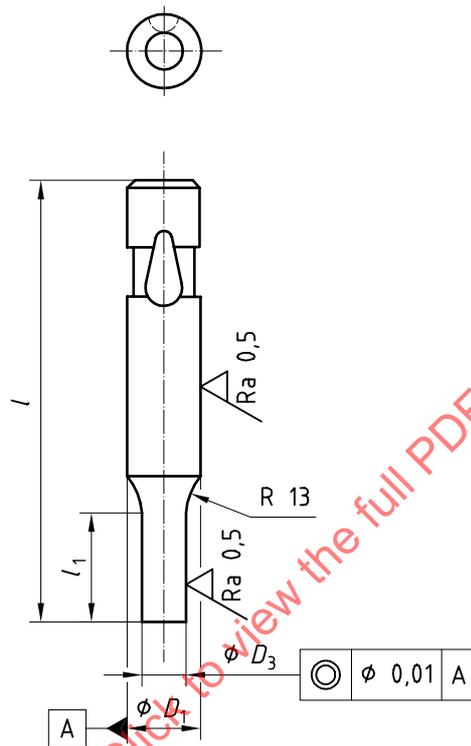


Figure 3

Table 3

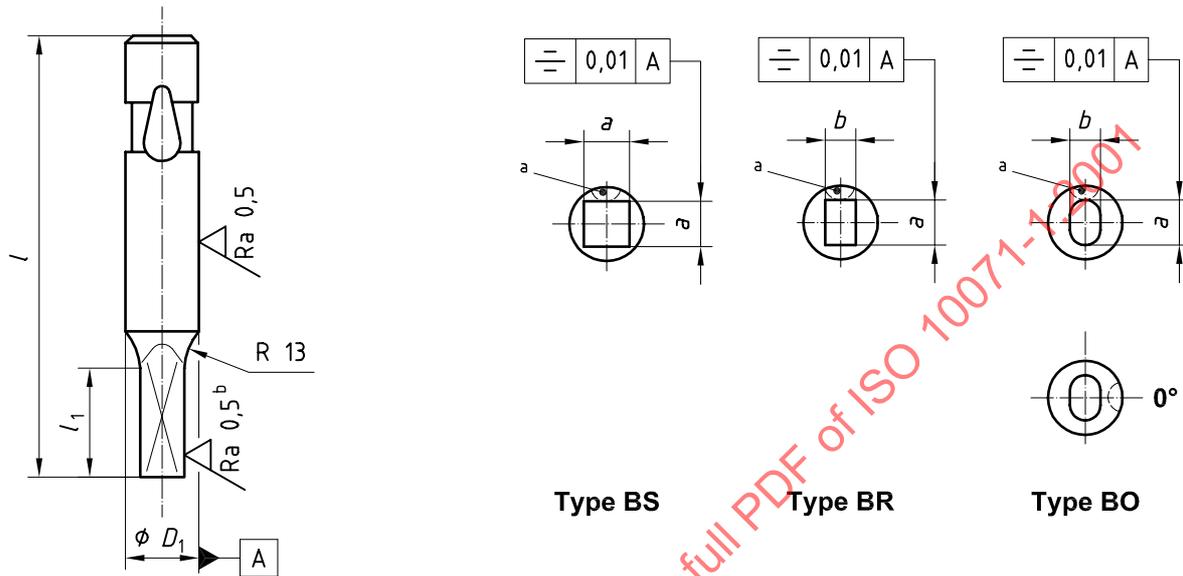
D_1 g5	D_3 $\pm 0,01$	l				
		63	71	$\begin{matrix} +0,5 \\ 0 \end{matrix}$ 80	90	100
6	$1,6 \leq D_3 \leq 5,9$	x	x	x	x	x
10	$3,5 \leq D_3 \leq 9,9$	x	x	x	x	x
13	$6 \leq D_3 \leq 12,9$	x	x	x	x	x
16	$8,5 \leq D_3 \leq 15,9$		x	x	x	x
20	$12,5 \leq D_3 \leq 19,9$		x	x	x	x
25	$18 \leq D_3 \leq 24,9$		x	x	x	x
32	$20 \leq D_3 \leq 31,9$		x	x	x	x

NOTE The point length l_1 is left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

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

See Figure 4 and Table 4.

General tolerance: ISO 2768-m
Surface roughness value in micrometres



- a Standard at 90°
- b On all work faces of the point

Figure 4

Table 4

D_1 g5	Type BS a $\pm 0,01$	Types BR and BO a and b $\pm 0,01$	l				
			63	71	$\begin{matrix} +0,5 \\ 0 \end{matrix}$ 80	90	100
6	$1,6 \leq a \leq 4,2$	$1,6 \leq a$ and $b \leq 5,9$	x	x	x	x	x
10	$3,2 \leq a \leq 7$	$3,2 \leq a$ and $b \leq 9,9$	x	x	x	x	x
13	$5 \leq a \leq 9,1$	$5 \leq a$ and $b \leq 12,9$	x	x	x	x	x
16	$6,5 \leq a \leq 11,2$	$6,3 \leq a$ and $b \leq 15,9$		x	x	x	x
20	$8,5 \leq a \leq 14,1$	$8 \leq a$ and $b \leq 19,9$		x	x	x	x
25	$11 \leq a \leq 17,6$	$10 \leq a$ and $b \leq 24,9$		x	x	x	x
32	$14 \leq a \leq 22,5$	$12 \leq a$ and $b \leq 31,9$		x	x	x	x

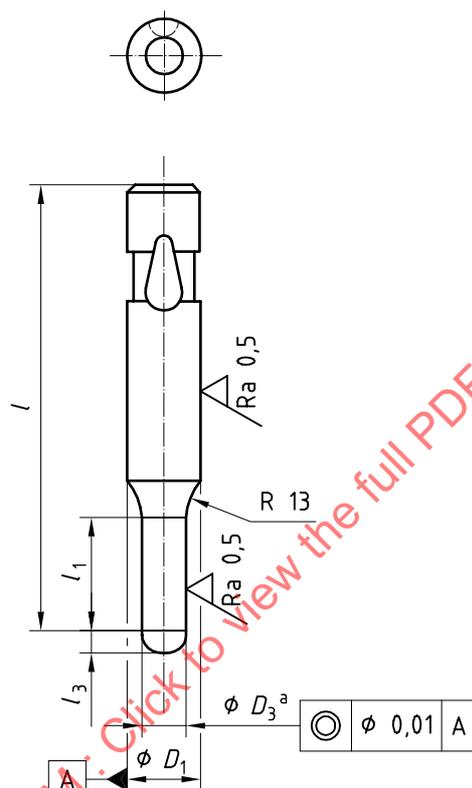
NOTE The point length l_1 is left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.3 Pilot punches

4.3.1 Pilot punches — Type C

See Figure 5 and Table 5.

General tolerance: ISO 2768-m
Surface roughness value in micrometres



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

Figure 5

Table 5

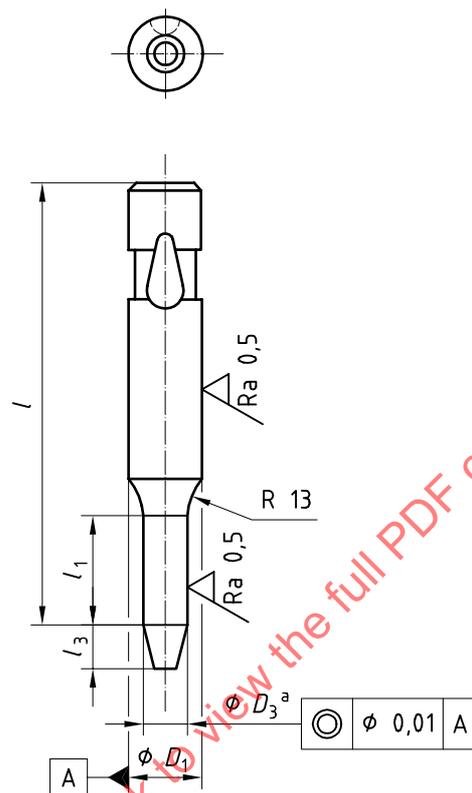
D_1 g5	D_3 $\pm 0,01$	l				
		63	71	$\begin{matrix} +0,5 \\ 0 \end{matrix}$ 80	90	100
6	$1,59 \leq D_3 \leq 5,9$	x	x	x	x	x
10	$3,49 \leq D_3 \leq 9,9$	x	x	x	x	x
13	$5,99 \leq D_3 \leq 12,9$	x	x	x	x	x
16	$8,49 \leq D_3 \leq 15,9$		x	x	x	x
20	$12,49 \leq D_3 \leq 19,9$		x	x	x	x
25	$17,99 \leq D_3 \leq 24,9$		x	x	x	x
32	$19,99 \leq D_3 \leq 31,9$		x	x	x	x

NOTE The point length l_1 and l_3 and point shape are left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.3.2 Positive pilot punches — Type D

See Figure 6 and Table 6.

General tolerance: ISO 2768-m
Surface roughness value in micrometres



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

Figure 6

Table 6

D_1 g5	D_3 $\pm 0,01$	l $\begin{matrix} +0,5 \\ 0 \end{matrix}$				
		63	71	80	90	100
10	$5 \leq D_3 \leq 9,9$	x	x	x	x	x
13	$9 \leq D_3 \leq 12,9$	x	x	x	x	x
16	$12 \leq D_3 \leq 15,9$		x	x	x	x
20	$15 \leq D_3 \leq 19,9$		x	x	x	x
25	$19 \leq D_3 \leq 24,9$		x	x	x	x
32	$24 \leq D_3 \leq 31,9$		x	x	x	x

NOTE The point length l_1 and l_3 and point shape are left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.4 Punches with ejector

4.4.1 Punches with ejector with straight shank — Type E

See Figure 7 and Table 7.

General tolerance: ISO 2768-m
Surface roughness value in micrometres

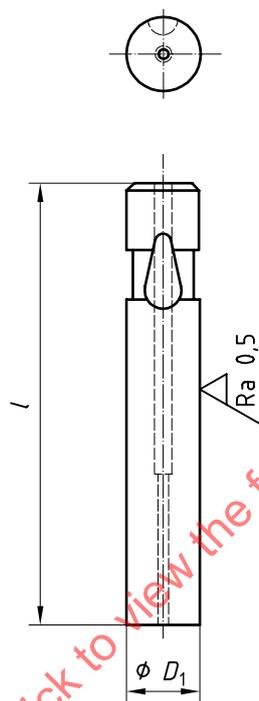


Figure 7

Table 7

D_1 g5	l				
	63	71	$80^{+0,5}_0$	90	100
6	x	x	x	x	x
10	x	x	x	x	x
13	x	x	x	x	x
16		x	x	x	x
20		x	x	x	x
25		x	x	x	x
32		x	x	x	x

NOTE The ejector components and the locking hole are left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.4.2 Punches with ejector with reduced shank

4.4.2.1 Punches with ejector with round shape — Type F

See Figure 8 and Table 8.

General tolerance: ISO 2768-m
Surface roughness value in micrometres

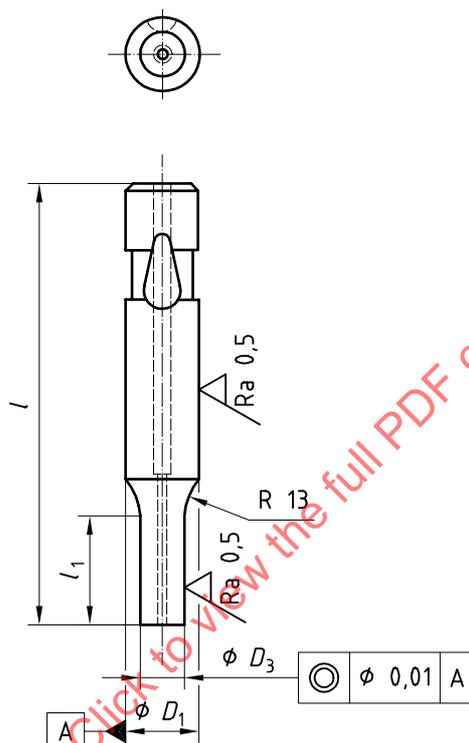


Figure 8

Table 8

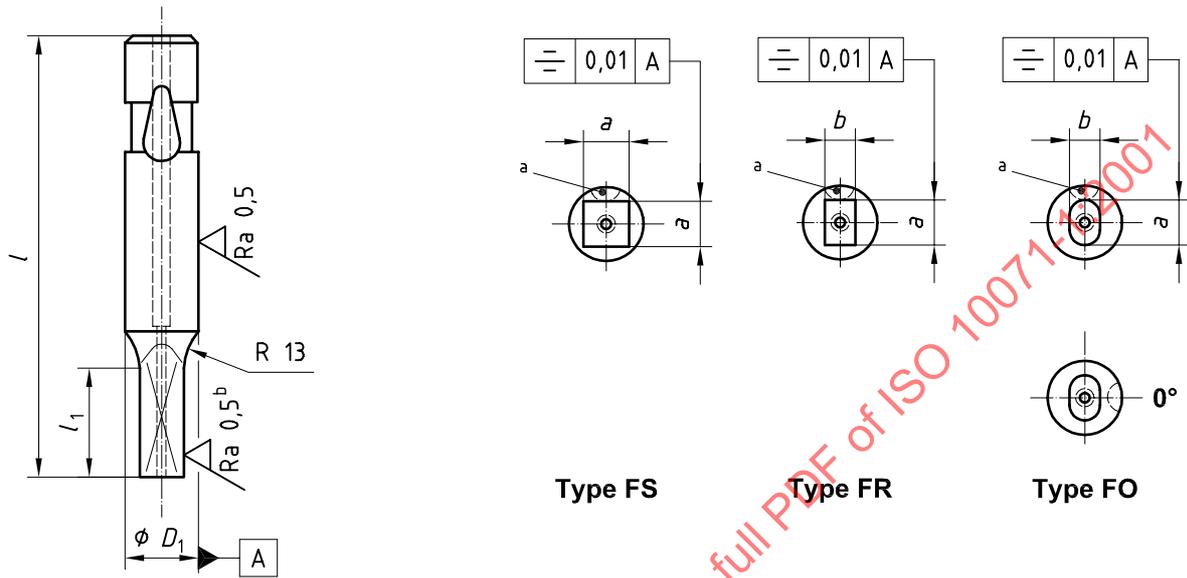
D_1 g5	D_3 $\pm 0,01$	l $\begin{matrix} +0,5 \\ 0 \end{matrix}$				
		63	71	80	90	100
6	$1,6 \leq D_3 \leq 5,9$	x	x	x	x	x
10	$3,5 \leq D_3 \leq 9,9$	x	x	x	x	x
13	$6 \leq D_3 \leq 12,9$	x	x	x	x	x
16	$8,5 \leq D_3 \leq 15,9$		x	x	x	x
20	$12,5 \leq D_3 \leq 19,9$		x	x	x	x
25	$18 \leq D_3 \leq 24,9$		x	x	x	x
32	$20 \leq D_3 \leq 31,9$		x	x	x	x

NOTE The point length l_1 , the ejector components and the locking hole are left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

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

See Figure 9 and Table 9.

General tolerance: ISO 2768-m
Surface roughness value in micrometres



- a Standard at 90°
- b On all work faces of the point

Figure 9

Table 9

D_1 g5	Type FS a $\pm 0,01$	Types FR and FO a and b $\pm 0,01$	l $\begin{matrix} +0,5 \\ 0 \end{matrix}$				
			63	71	80	90	100
6	$1,6 \leq a \leq 4,2$	$1,6 \leq a$ and $b \leq 5,9$	x	x	x	x	x
10	$3,2 \leq a \leq 7$	$3,2 \leq a$ and $b \leq 9,9$	x	x	x	x	x
13	$5 \leq a \leq 9,1$	$5 \leq a$ and $b \leq 12,9$	x	x	x	x	x
16	$6,5 \leq a \leq 11,2$	$6,3 \leq a$ and $b \leq 15,9$		x	x	x	x
20	$8,5 \leq a \leq 14,1$	$8 \leq a$ and $b \leq 19,9$		x	x	x	x
25	$11 \leq a \leq 17,6$	$10 \leq a$ and $b \leq 24,9$		x	x	x	x
32	$14 \leq a \leq 22,5$	$12 \leq a$ and $b \leq 31,9$		x	x	x	x

NOTE The point length l_1 , the ejector components and the locking hole are left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.