INTERNATIONAL STANDARD

ISO 10071-2

First edition
2005-08-01

Tools for pressing — Ball-lock punches —

Part 2: Ball-lock punches for heavy duty

Outillage de presse — Poinçons à bille —

Partie 2: Poinçons à bille pour tôles épaisses

Reference number
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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10071-2 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 8, *Tools for pressing and moulding*.

This first edition of ISO 10071-2, together with ISO 10071-1:2001, cancels and replaces ISO 10071:1991, of which it constitutes a technical revision.

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*

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

Tools for pressing — Ball-lock punches —

Part 2: Ball-lock punches for heavy duty

1 Scope

This part of ISO 10071 specifies interchangeability dimensions and tolerances, in millimetres, for ball-lock punches for heavy duty.

It is applicable to ball-lock punches with shank diameter sizes from 10 mm up to including 40 mm, in round, square, rectangular and oblong shapes, for punching holes in steel sheets or other materials the thickness of which is less than 8 mm.

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

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

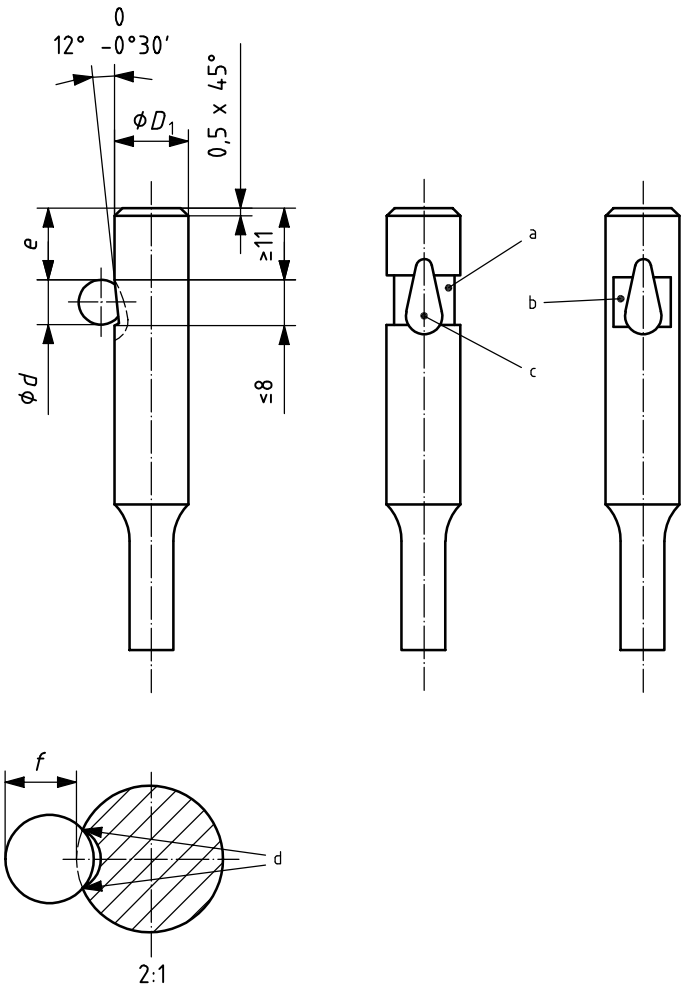
For the purposes of this document, the terms and definitions given in ISO 8695 apply.

4 Dimensions

4.1 Basic dimensions — Ball in locking position

See Figure 1 and Table 1.

General tolerance: ISO 2768-m



a Ball seat relief: type and dimensions at manufacturer's discretion.

b Alternative ball seat relief types (band type, swipe type).

c Ball seat.

d Two-point contact.

Figure 1

Table 1

D_1 g5	**Ball diameter** d	e $^{+0,2}_{0}$	f $^{0}_{-0,1}$
10	10	11,4	8,6
13	12	12,3	10,2
16	12	12,3	10,2
20	12	12,3	10,2
25	12	12,3	10,2
32	12	12,3	10,2
40	12	12,3	10,2

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

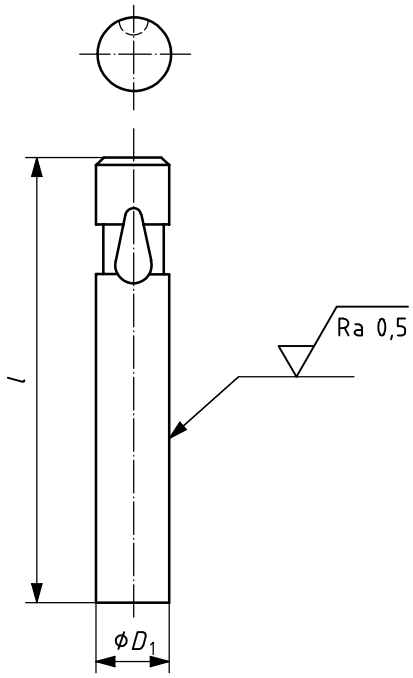


Figure 2

Table 2

D_1 g5	l $^{+0,5}_{0}$				
	80	90	100	110	125
10	×	×	×	×	×
13	×	×	×	×	×
16	×	×	×	×	×
20	×	×	×	×	×
25	×	×	×	×	×
32	×	×	×	×	×
40	×	×	×	×	×
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

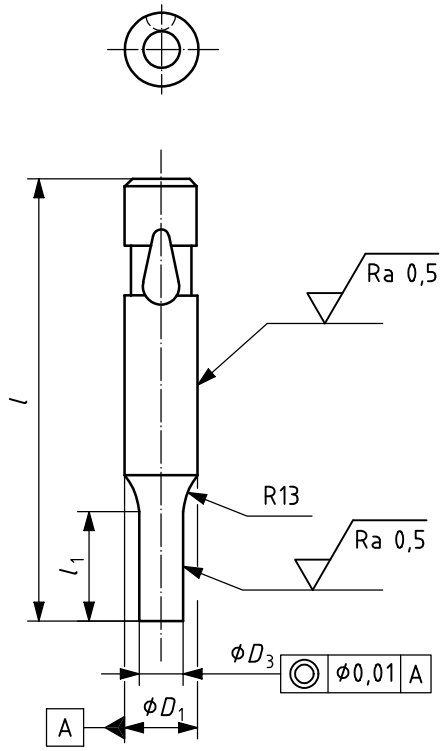


Figure 3

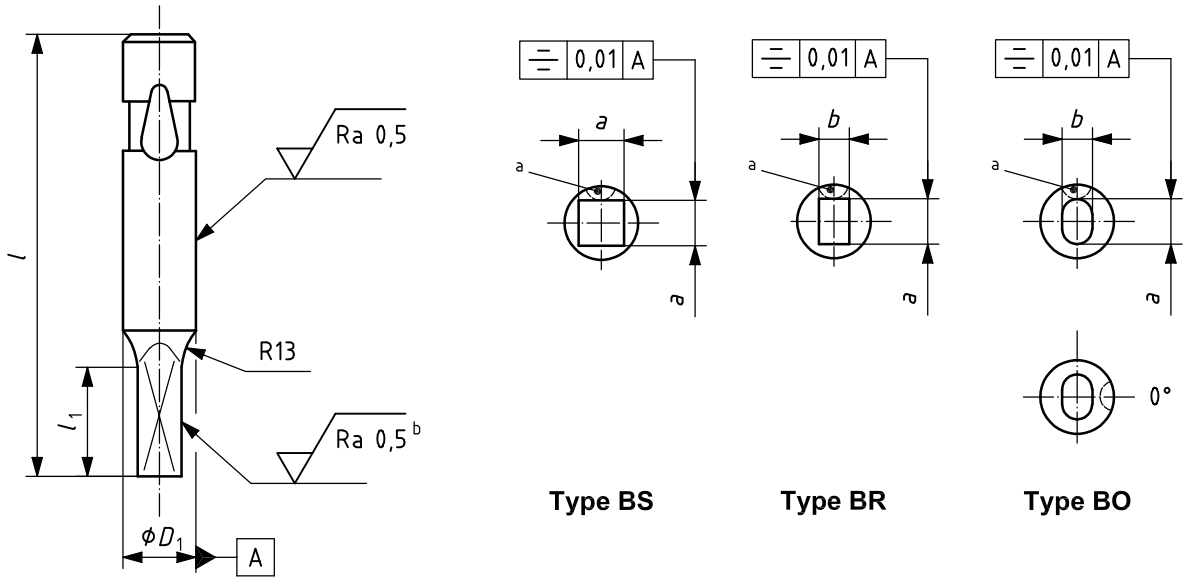
Table 3

D_1 g5	D_3 ± 0,01	l +0,5 0			
		80	90	100	110
10	$2{,}1 \leqslant D_3 \leqslant 9{,}9$	×	×	×	×
13	$5 \leqslant D_3 \leqslant 12{,}9$	×	×	×	×
16	$8 \leqslant D_3 \leqslant 15{,}9$	×	×	×	×
20	$12 \leqslant D_3 \leqslant 19{,}9$	×	×	×	×
25	$16 \leqslant D_3 \leqslant 24{,}9$	×	×	×	×
32	$24 \leqslant D_3 \leqslant 31{,}9$	×	×	×	×
40	$30 \leqslant D_3 \leqslant 39{,}9$	×	×	×	×
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

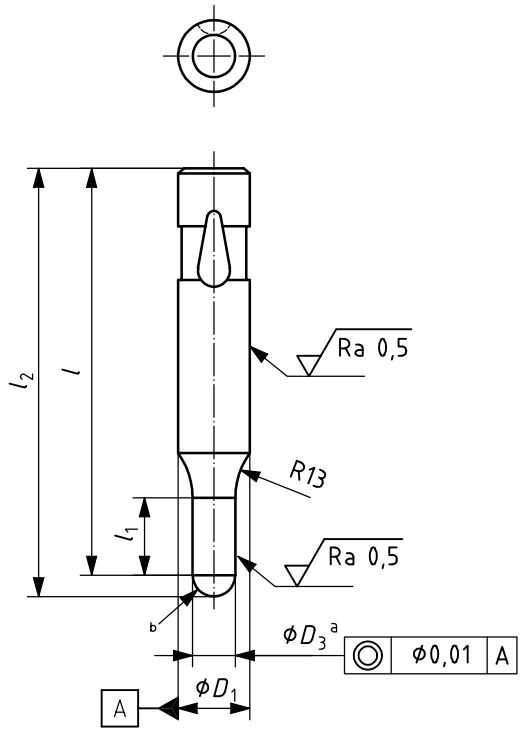
D_1 g5	**Type BS** a ± 0,01	**Types BR and BO** a and b ± 0,01	l $^{+0,5}_{0}$			
			80	90	100	110
10	$2,1 \leqslant a \leqslant 7$	$2,1 \leqslant (a, b) \leqslant 9,9$	×	×	×	×
13	$4,5 \leqslant a \leqslant 9,1$	$4,5 \leqslant (a, b) \leqslant 12,9$	×	×	×	×
16	$6 \leqslant a \leqslant 11,2$	$6 \leqslant (a, b) \leqslant 15,9$	×	×	×	×
20	$8 \leqslant a \leqslant 14,1$	$8 \leqslant (a, b) \leqslant 19,9$	×	×	×	×
25	$10 \leqslant a \leqslant 17,6$	$10 \leqslant (a, b) \leqslant 24,9$	×	×	×	×
32	$12,5 \leqslant a \leqslant 22,5$	$12,5 \leqslant (a, b) \leqslant 31,9$	×	×	×	×
40	$14 \leqslant a \leqslant 28,2$	$14 \leqslant (a, b) \leqslant 39,9$	×	×	×	×

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.

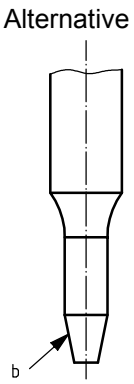
4.3 Pilots — Types C and D

See Figure 5 and Table 5.

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



Type C



Type D

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

b The shape is left to the manufacturer's discretion.

Figure 5

Table 5

D_1 g5	D_3 ± 0,01	l_2 max.			
		90	100	110	125
		l $^{+0,5}_{0}$			
		80	90	100	110
10	$2,1 \leqslant D_3 \leqslant 9,9$	×	×	×	×
13	$5 \leqslant D_3 \leqslant 12,9$	×	×	×	×
16	$8 \leqslant D_3 \leqslant 15,9$	×	×	×	×
20	$12 \leqslant D_3 \leqslant 19,9$	×	×	×	×
25	$16 \leqslant D_3 \leqslant 24,9$	×	×	×	×
32	$24 \leqslant D_3 \leqslant 31,9$	×	×	×	×
40	$30 \leqslant D_3 \leqslant 39,9$	×	×	×	×
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.					

4.4 Punches with ejector

4.4.1 Punches with ejector with straight shank — Type E

See Figure 6 and Table 6.

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

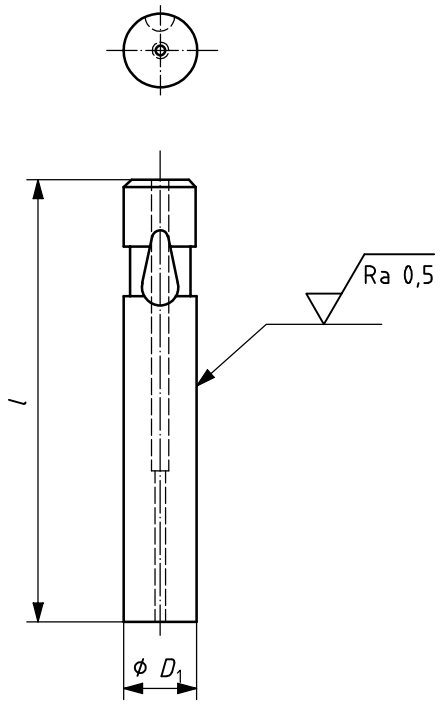


Figure 6

Table 6

D_1 g5	l $^{+0,5}_{0}$			
	80	90	100	110
10	×	×	×	×
13	×	×	×	×
16	×	×	×	×
20	×	×	×	×
25	×	×	×	×
32	×	×	×	×
40	×	×	×	×

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 7 and Table 7.

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

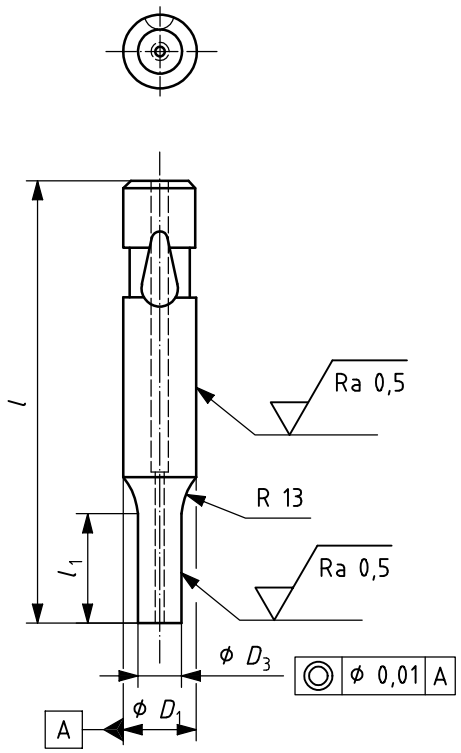


Figure 7

Table 7

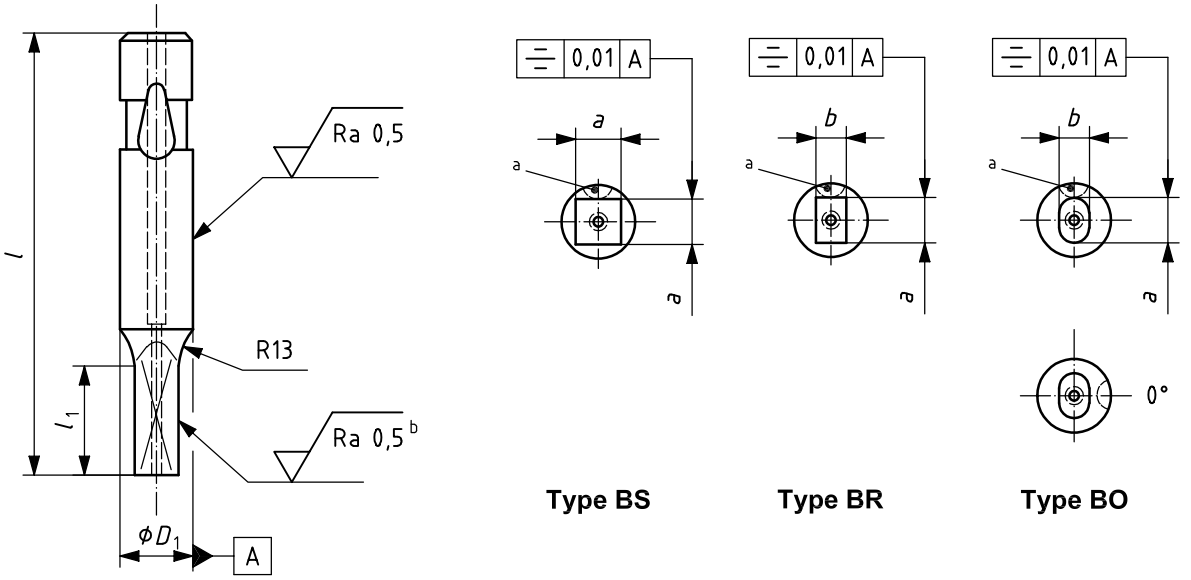
D_1 g5	D_3 ± 0,01	l +0,5 0			
		80	90	100	110
10	$2{,}1 \leqslant D_3 \leqslant 9{,}9$	×	×	×	×
13	$5 \leqslant D_3 \leqslant 12{,}9$	×	×	×	×
16	$8 \leqslant D_3 \leqslant 15{,}9$	×	×	×	×
20	$12 \leqslant D_3 \leqslant 19{,}9$	×	×	×	×
25	$16 \leqslant D_3 \leqslant 24{,}9$	×	×	×	×
32	$24 \leqslant D_3 \leqslant 31{,}9$	×	×	×	×
40	$30 \leqslant D_3 \leqslant 39{,}9$	×	×	×	×

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 8 and Table 8.

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



a Standard at 90°.

b On all work faces of the point.

Figure 8

Table 8

D_1 g5	**Type FS** a ± 0,01	**Types FR and FO** a and b ± 0,01	l $^{+0,5}_{0}$			
			80	90	100	110
10	$2,1 \leqslant a \leqslant 7$	$2,1 \leqslant (a, b) \leqslant 9,9$	×	×	×	×
13	$4,5 \leqslant a \leqslant 9,1$	$4,5 \leqslant (a, b) \leqslant 12,9$	×	×	×	×
16	$6 \leqslant a \leqslant 11,2$	$6 \leqslant (a, b) \leqslant 15,9$	×	×	×	×
20	$8 \leqslant a \leqslant 14,1$	$8 \leqslant (a, b) \leqslant 19,9$	×	×	×	×
25	$10 \leqslant a \leqslant 17,6$	$10 \leqslant (a, b) \leqslant 24,9$	×	×	×	×
32	$12,5 \leqslant a \leqslant 22,5$	$12,5 \leqslant (a, b) \leqslant 31,9$	×	×	×	×
40	$14 \leqslant a \leqslant 28,2$	$14 \leqslant (a, b) \leqslant 39,9$	×	×	×	×

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.

5 Material and hardness

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

a) alloyed cold work steel with 5 % to 12 % Cr: (62 ± 2) HRC;

b) high speed steel: (62 ± 2) HRC;

c) powdered steel: (62 ± 2) HRC.

6 Designation

A ball-lock punch in accordance with this part of ISO 10071 shall be designated by:

a) “Ball-lock punch”,

b) reference to this part of ISO 10071, i.e. ISO 10071-2,

c) 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 B, BS, BR, BO, FS, FR and FO, the relative position of the shape to the ball seat position if not at standard 90° position, e.g. 135°,

g) its length, l, in millimetres,

h) its material (alloyed cold work steel with 5 % to 12 % Cr or high speed steel or powdered steel).

EXAMPLE 1 Ball-lock punch, round (type B), diameter D_1 = 10 mm, range of point diameter D_3 = 3 mm and length l = 80 mm in alloyed cold work steel is designated as follows:

Ball-lock punch ISO 10071-2 - B - 10 × 3 × 80 - alloyed cold work steel

EXAMPLE 2 Ball-lock punch, rectangular (type BR), diameter D_1 = 10 mm, range of point size $a \times b$ = 3 mm × 5 mm, with a ball seat position at 90° and length l = 80 mm in high speed steel is designated as follows:

Ball-lock punch ISO 10071-2 - BR - 10 × 3 × 5 × 80 - high speed steel

Bibliography

[1] ISO 4957:1999, *Tool steels*

[2] ISO 6508-1:1999, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

[3] ISO 6508-2:1999, *Metallic materials — Rockwell hardness test — Part 2: Verification and calibration of testing machines (scales A, B, C, D, E, F, G, H, K, N, T)*

[4] ISO 6508-3:1999, *Metallic materials — Rockwell hardness test — Part 3: Calibration of reference blocks (scales A, B, C, D, E, F, G, H, K, N, T)*

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