INTERNATIONAL STANDARD

ISO 12164-1

First edition
2001-12-01

Hollow taper interface with flange contact surface —

Part 1: Shanks — Dimensions

Interfaces à cône creux-face —

Partie 1: Queues — Dimensions

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 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 12164 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 12164-1 was prepared by Technical Committee ISO/TC 29, *Small tools*.

ISO 12164 consists of the following parts, under the general title *Hollow taper interface with flange contact surface*:

— *Part 1: Shanks — Dimensions*

— *Part 2: Receivers — Dimensions*

Annex A forms a normative part of this part of ISO 12164. Annex B is for information only.

Hollow taper interface with flange contact surface —

Part 1:
Shanks — Dimensions

1 Scope

This part of ISO 12164 specifies dimensions for hollow taper shanks with flange contact surface (HSK) to be applied to machine tools (e. g. turning machines, drilling machines, milling machines and grinding machines). A range of shank sizes is specified.

This part of ISO 12164 specifies two styles of shanks. Style A incorporates a grooved flange to enable automatic tool exchange. The tools may also be exchanged manually. Style C has no groove in its flange and can only be manually exchanged. Provision is made for manual clamping of both styles via a hole in the shank taper.

The torque is transmitted at the tail end of the shank through keys as well as friction.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 12164. 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 12164 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 1101:—[1)], *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

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

ISO 3040:1990, *Technical drawings — Dimensioning and tolerancing — Cones*

3 Dimensions

3.1 General

Dimensions of hollow taper shanks with flange contact surface are specified in Figure 1, Table 1 and annex A for style A; and Figure 2, Table 1 and annex A for style C. Dimensions of the balancing hole, the balancing flat and information about the preferred balancing zone are specified in annex B. Details not specified in Figures 1 and 2 shall be chosen expediently. Tolerancing of form, orientation, location and run-out is in accordance with ISO 1101. Dimensioning and tolerancing of cones is in accordance with ISO 3040. Tolerances not specified shall be of tolerance class “m” in accordance with ISO 2768-1.

1) To be published. (Revision of ISO 1101:1983)

3.2 Hollow taper shank, style A

See Figure 1, Table 1 and annex A.

Dimensions in millimetres,
surface roughness values in micrometres

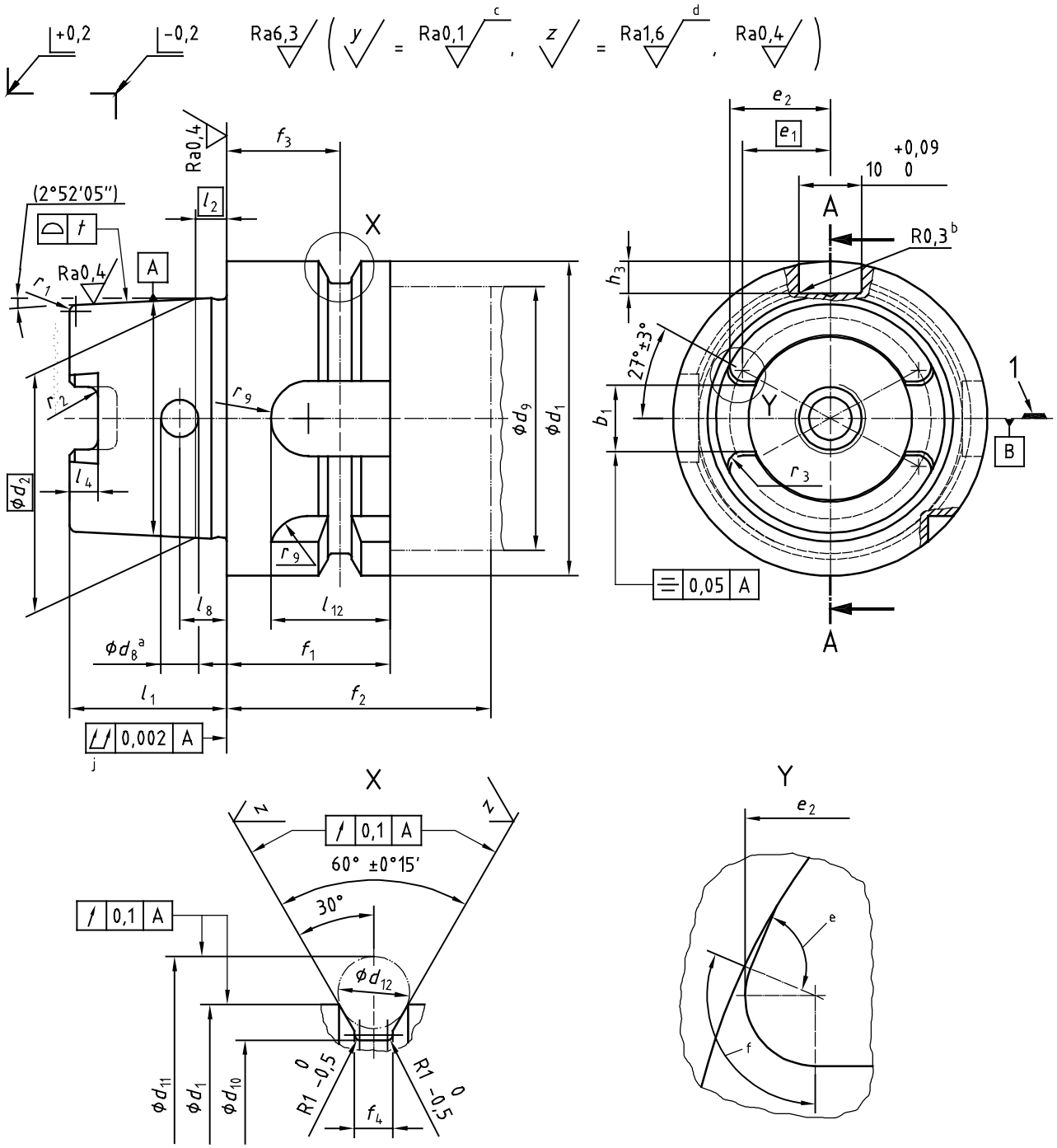
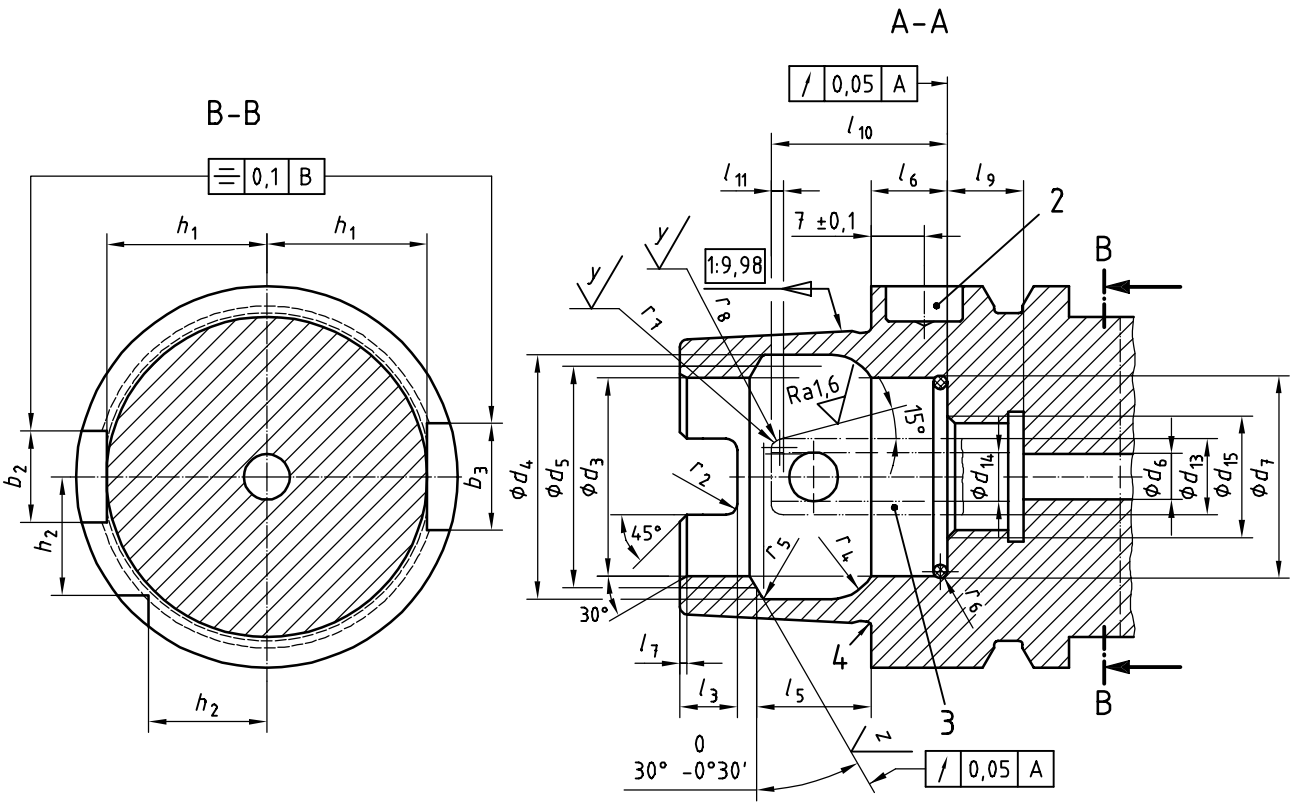


Figure 1



Key

1 Cutting edge [g]
2 Data chip hole [h]
3 Lubrication pipe [i]
4 Groove (see annex A)

[a] Outer edge 0,5 × 45° min. chamfer

[b] or 0,3 × 45°

[c] Polished

[d] Fine turning

[e] 90°= run out

[f] Area of r_3

[g] Position of the cutting edge for right hand tools with single cutting edge

[h] Optional

[i] Lubrication pipe shall be sealed, self centred and shall allow an angular movement of ± 1° with a low displacement force

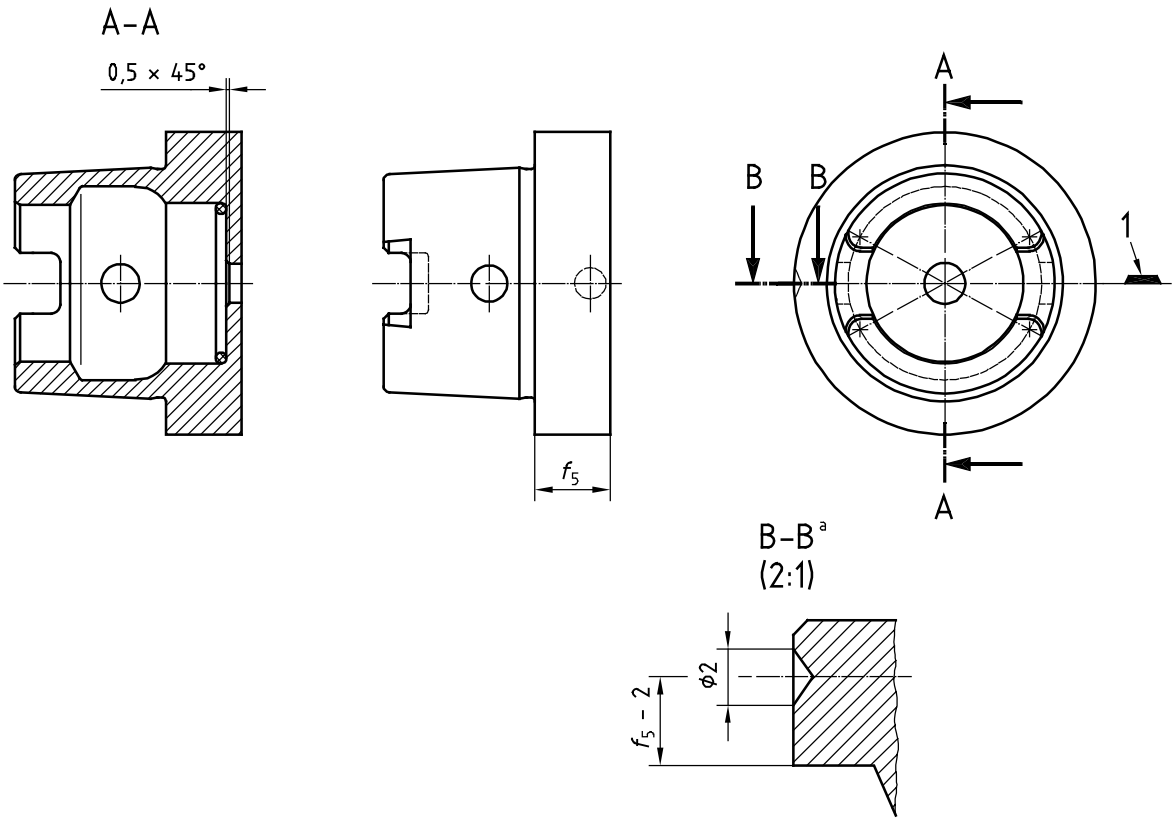
[j] Not convex

Figure 1 (*continued*)

3.3 Hollow taper shank, style C

See Figure 2, Table 1 and annex A.

Dimensions in millimetres



See Figure 1 for unspecified dimensions.

Key

1 Cutting edge[b]

[a] Marking of the clamping hole position (enlarged)

[b] Position of the cutting edge for right hand tools with single cutting edge

Figure 2

Table 1

Dimensions in millimetres

Nominal size		32	40	50	63	80	100	125	160
b_1	$^{+0,04}_{-0,04}$	7,05	8,05	10,54	12,54	16,04	20,02	25,02	30,02
b_2	H10	7	9	12	16	18	20	25	32
b_3	H10	9	11	14	18	20	22	28	36
d_1	h10	32	40	50	63	80	100	125	160
d_2		24,007	30,007	38,009	48,010	60,012	75,013	95,016	120,016
d_3	H10	17	21	26	34	42	53	67	85
d_4	H11	20,5	25,5	32	40	50	63	80	100
d_5		19	23	29	37	46	58	73	92
d_6	max.	4,2	5	6,8	8,4	10,2	12	14	16
d_7	$^{0}_{-0,1}$	17,4	21,8	26,6	34,5	42,5	53,8	—	—
d_8		4	4,6	6	7,5	8,5	12	—	—
d_9	max.	26	34	42	53	68	88	111	144
d_{10}	$^{0}_{-0,1}$	26,5	34,8	43	55	70	92	117	152
d_{11}	$^{0}_{-0,1}$	37	45	59,3	72,3	88,8	109,75	134,75	169,75
d_{12}		4	4	7	7	7	7	7	7
d_{13}	f8	6	8	10	12	14	16	18	20
d_{14}		3,5	5	6,4	8	10	12	14	16
d_{15}		M10 × 1	M12 × 1	M16 × 1	M18 × 1	M20 × 1,5	M24 × 1,5	M30 × 1,5	M35 × 1,5
e_1		8,82	11	13,88	17,99	21,94	27,37	35,37	44,32
e_2	$^{0}_{-0,05}$	10,2	12,88	16,26	20,87	25,82	32,25	41,25	52,2
f_1	$^{0}_{-0,1}$	20	20	26	26	26	29	29	31
f_2	min.	35	35	42	42	42	45	45	47
f_3	± 0,1	16	16	18	18	18	20	20	22
f_4	$^{+0,15}_{0}$	2	2	3,75	3,75	3,75	3,75	3,75	3,75
f_5		10	10	12,5	12,5	16	16	—	—
h_1	$^{0}_{-0,2}$	13	17	21	26,5	34	44	55,5	72
h_2	$^{0}_{-0,3}$	9,5	12	15,5	20	25	31,5	39,5	50
h_3	$^{+0,2}_{0}$	5,4	5,2	5,1	5,0	4,9	4,9	4,8	4,8
l_1	$^{0}_{-0,2}$	16	20	25	32	40	50	63	80
l_2		3,2	4	5	6,3	8	10	12,5	16
l_3	$^{+0,2}_{0}$	5	6	7,5	10	12	15	19	23
l_4	$^{+0,2}_{0}$	3	3,5	4,5	6	8	10	12	16
l_5	JS10	8,92	11,42	14,13	18,13	22,85	28,56	36,27	45,98
l_6	$^{0}_{-0,1}$	8	8	10	10	12,5	12,5	16	16
l_7	$^{+0,3}_{0}$	0,8	0,8	1	1	1,5	1,5	2	2
l_8	± 0,1	5	6	7,5	9	12	15	—	—
l_9	$^{0}_{-0,3}$	6	8	10	12	14	16	18	20
l_{10}		20	21,5	23	24,5	26	28	30	32
l_{11}		2,5	2,5	3	3	3	3	3,5	3,5
l_{12}		12	12	19	21	22	24	24	24
r_1		0,6	0,8	1	1,2	1,6	2	2,5	3,2
r_2	$^{0}_{-0,2}$	1	1	1,5	1,5	2	2	2,5	2,5

Table 1 (*continued*)

Dimensions in millimetres

Nominal size	32	40	50	63	80	100	125	160
r_3[a] ± 0,05	1,38	1,88	2,38	2,88	3,88	4,88	5,88	7,88
r_4	4	5	6	8	10	12	16	20
r_5	0,4	0,4	0,5	0,6	0,8	1	1,2	1,6
r_6	0,5	1	1,5	1,5	2	2	—	—
r_7	1	1	1	1,5	1,5	1,5	1,5	1,5
r_8	2	2	2	3	3	3	3	3
r_9[b]	3,5	4,5	6	8	9	10	5	5
t	0,002	0,002	0,002 5	0,003	0,004	0,004	0,005	0,005
Groove[c]	0,2 × 0,1	0,4 × 0,2	0,6 × 0,2	0,6 × 0,2	1 × 0,2	1 × 0,2	1,6 × 0,3	1,6 × 0,3
O-ring[d]	16 × 1	18,77 × 1,78	21,89 × 2,62	29,82 × 2,62	36,09 × 3,53	47,6 × 3,53	—	—

[a] r_3 tangent to b_1.

[b] r_9 applies equally to b_2 and b_3.

[c] See annex A.

[d] The need of the O-ring depends on the used clamping system (is not part of delivery).

4 Design

4.1 Data chip hole

Design without data chip hole is standard.

Design with data chip hole is optional.

4.2 Orientation notch

Design with notch is standard.

Design without notch is optional.

4.3 Clamping forces

The clamping system shall provide sufficient clamping force to ensure contact of the shank flange with the face of the receiver, as well as seating the taper by elastic deformation. The torque transmitting capacity of the interface is substantially determined by the size of the clamping force.

A guide to clamping forces for hollow taper shank styles A and C is given in annex B.

4.4 Hole for manual clamping

Design with hole for manual clamping is standard.

Design without hole for manual clamping is optional.

5 Designation

A hollow taper shank (HSK) in accordance with this part of ISO 12164 shall be designated by:

a) “Hollow shank”

b) Reference to this part of ISO 12164, i.e. ISO 12164-1;

c) “HSK”;

d) Type: A or C;

e) Nominal size, in millimetres.

EXAMPLE 1 A hollow taper shank (HSK) for automatic and manual tool exchange, of type A and with nominal size 50 mm is designated as follows:

Hollow shank ISO 12164-1-HSK-A 50

EXAMPLE 2 A hollow taper shank (HSK) for manual tool exchange, of type C and with nominal size 50 mm is designated as follows:

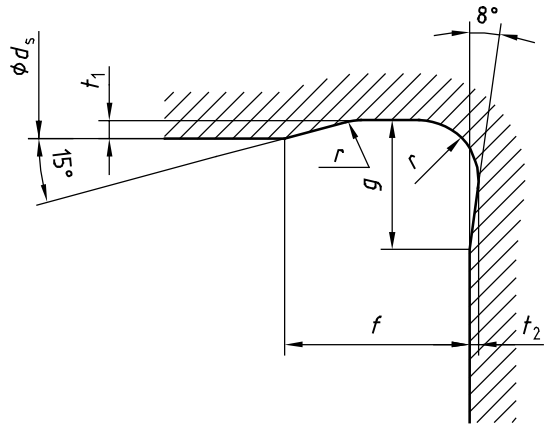
Hollow shank ISO 12164-1-HSK-C 50

Annex A
(normative)

Details of groove

Figure A.1 gives the details of groove (see Figure 1, key 4).

Dimensions are given in Table A.1.



d_s = diameter of the shank

Figure A.1

Table A.1

Dimensions in millimetres

r	t_1 $^{+0,1}_{0}$	f	g $\approx$	t_2 $^{+0,05}_{0}$
0,2	0,1	1	0,9	0,1
0,4	0,2	2	1,1	0,1
0,6	0,2	2	1,4	0,1
1	0,2	2,5	1,8	0,1
1,6	0,3	4	3,1	0,2

A groove in accordance with this international standard shall be designated by:

a) “Groove”

b) radius, r, in millimetres;

c) depth, t_1, in millimetres.

EXAMPLE A groove with radius $r = 0,6$ mm and depth $t_1 = 0,2$ mm is designated as follows:

Groove 0,6 × 0,2

Annex B
(informative)

Recommendations for use and application

B.1 Clamping forces

Variations of taper shank and receiver size within the specified limits of tolerance will cause the portion of the clamping force acting on the flange surface to vary. However, the clamping forces given in Table B.1 will ensure that the portion acting on the flange surface is never less than 75 % of the total. The flange contact surface is decisive for the torque transmitting capacity and stiffness of the hollow taper interface.

The clamping forces listed in Table B.1 only apply to hollow taper shanks style A and style C.

Table B.1

Nominal size, mm	**32**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Clamping force, kN	5	6,8	11	18	28	45	70	115

Lower clamping forces can be sufficient when operational loads are low (e.g. cutting forces in finish machining). Conversely, higher clamping forces can be required when high operational loads are encountered (e.g. cutting and feed forces in heavy machining).

B.2 Information about speeds, torques, bending loads and stiffness

The manufacturer should provide information regarding permissible speeds, torque transmitting capacities, bending loads and stiffness.

B.3 Information about material and heat treatment

Hollow taper shanks should be heat treated with considerations for strength, hardness, case depth (if not through hardened) toughness and wear requirements are to be taken into account.

B.4 Balancing

If the hollow taper shank requires balancing before tools or equipment are assembled on to the shank, it may be balanced with a flat according to Figure B.1 and Table B.2 and a hole according to Figure B.2 and Table B.3.

NOTE The balancing flat is exclusively used for compensation of the orientation notch. The data chip hole has not been taken into account.

If post assembly balancing is needed it should be confined to the preferred balancing zone as shown in Figure B.3.

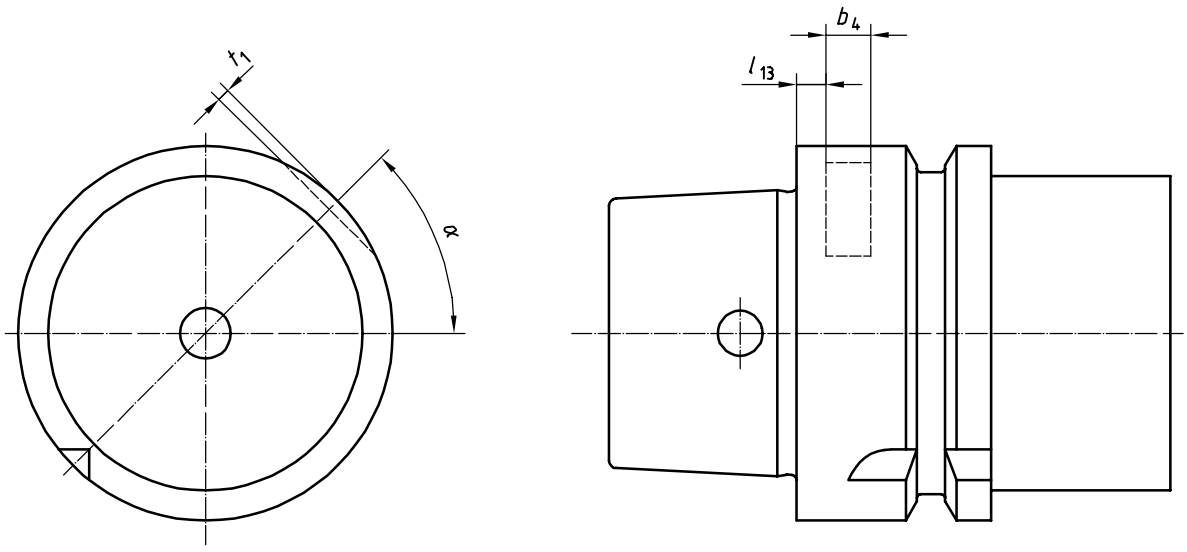


Figure B.1

Table B.2

Dimensions in millimetres

Nominal size	32	40	50	63	80	100	125	160
b_4	6	6	6	6	6	8	8	8
l_{13}	4	4	4	4	4	4	4	4
t_1	1,2	1,3	1,6	1,7	2,6	2,8	3,8	5,6
α	45°	45°	45°	45°	45°	45°	45°	45°

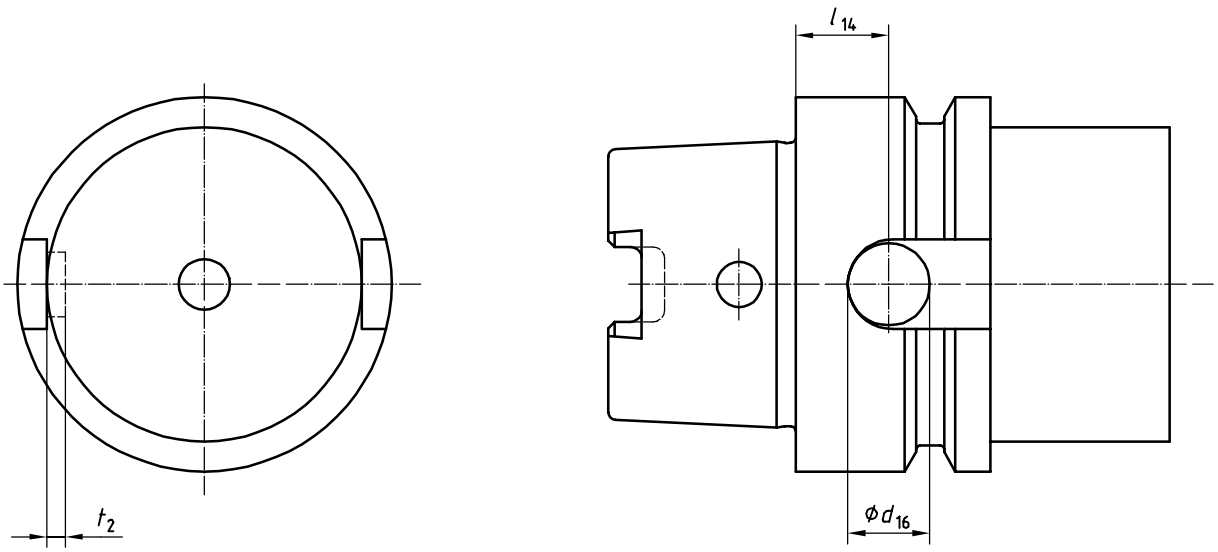
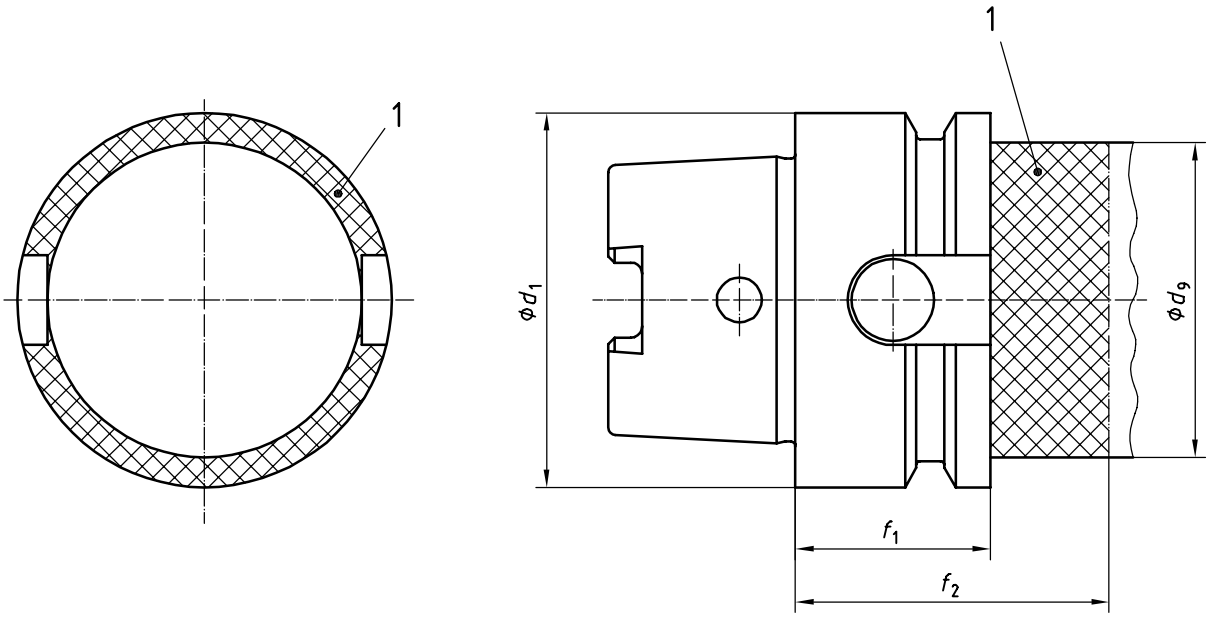


Figure B.2

Table B.3

Dimensions in millimetres

Nominal size	32	40	50	63	80	100	125	160
d_{16}	6,8	8	11	14	16	16	18	20
l_{14}	—	—	—	—	—	—	15	19
t_2	2,8	2,5	2,7	2,7	3	5,2	8,8	10,5



Key

1 Preferred balancing zone

Figure B.3

Bibliography

[1] ISO 12164-2:2001, *Hollow taper interface with flange contact surface — Part 2: Receivers — Dimensions*

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