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Hollow taper interface with flange contact surface —

Part 3: Shanks of types T, TA and U

Interfaces à cône creux-face —

Partie 3: Queues de type T, TA et U

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Contents

Page

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 29, *Small tools,* Subcommittee SC 9*, Tools with defined cutting edges, holding tools, cutting items, adaptive items and interfaces*.

This third edition cancels and replaces the second edition (ISO 12164-3:2014), which has been technically revised.

The main changes are as follows:

— new hollow taper shank of type TA with peripherally grooved flange collar for automatic tool change added, with similar geometry as type A;

— some editorial changes.

A list of all parts of the ISO 12164 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Hollow taper interface with flange contact surface —

Part 3:
Shanks of types T, TA and U

1 Scope

This document specifies the dimensions for hollow taper shanks with flange contact surface (HSK). These shanks are the male part of the interface to the machine tools (e.g. milling/drilling, turning and grinding machines).

This document specifies three types of shanks:

— type T has a peripherally grooved flange for automatic tool change in turning machines with a gripper for HSK type T;

— type TA has a peripherally grooved flange for automatic tool change in milling machines, enabled (designed) for turning, with a gripper for HSK type A or AB;

— type U has no peripheral groove flange and is designed for manual tool change in turning machines.

HSK types T and TA can also be changed manually via radial access bore holes in the hollow shank taper.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Hollow taper shanks, types and dimensions

4.1 General

All dimensions of the different hollow taper shank sizes with flange contact surface (also called “HSK” or “HSK shank” in this document) are specified in Figure 1 for type T, Figure 2 for type TA and Figure 3 for type U. Table 1 provides the parameters of all types and sizes.

Preferred zones for balancing measures are specified in Clause 5.

Clamping forces for HSK shanks of types T, TA and U are provided in Annex A.

Hollow taper shanks of types U with medium - transfer unit are provided in Annex B.

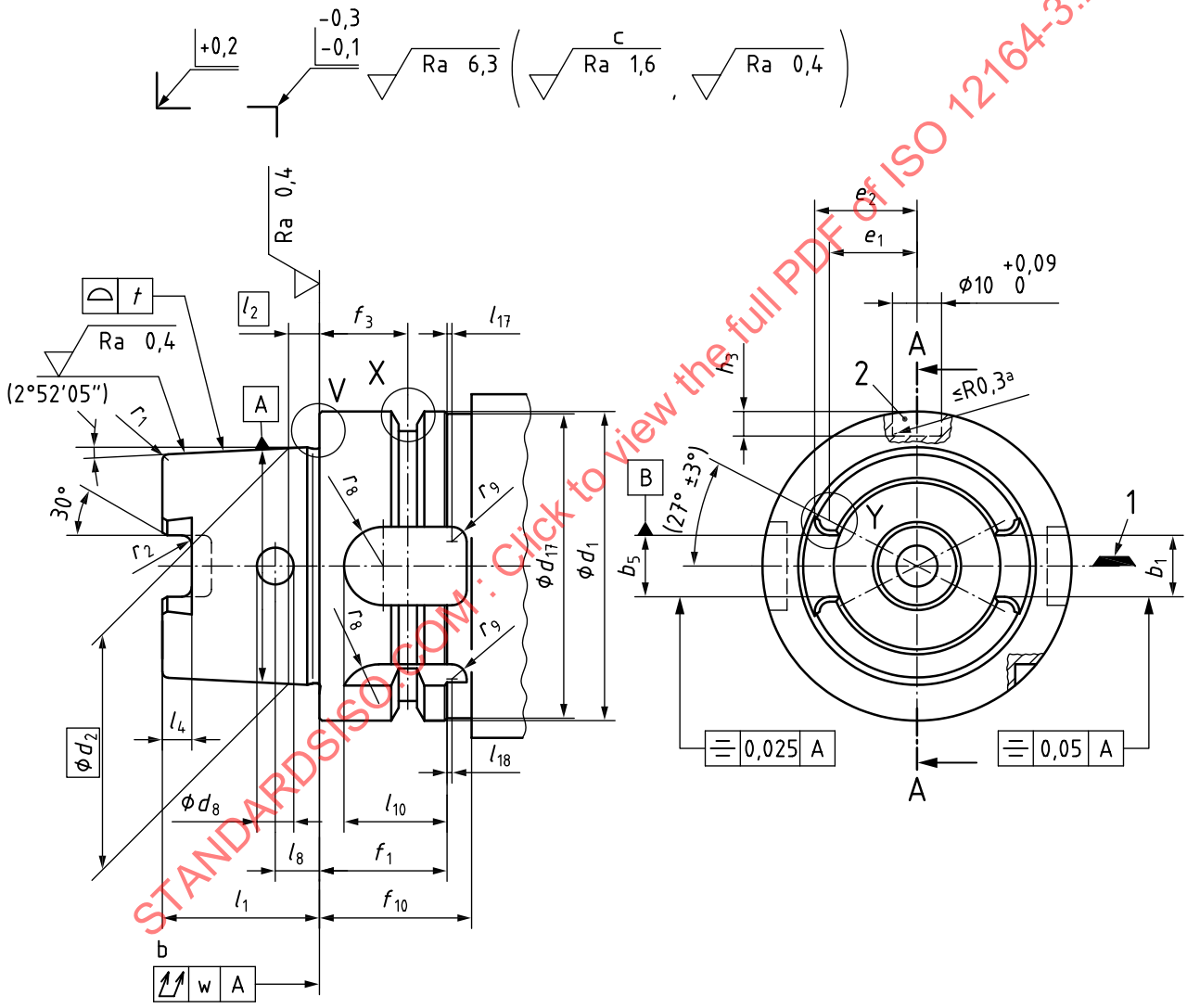
An overview of all different types of shanks are provided in Annex C.

Tolerancing of form, orientation, location and run-out correspond to ISO 1101. Dimensions and tolerances of cones are according to ISO 3040. Tolerances not specified shall be of tolerance class “m” in accordance with ISO 2768-1.

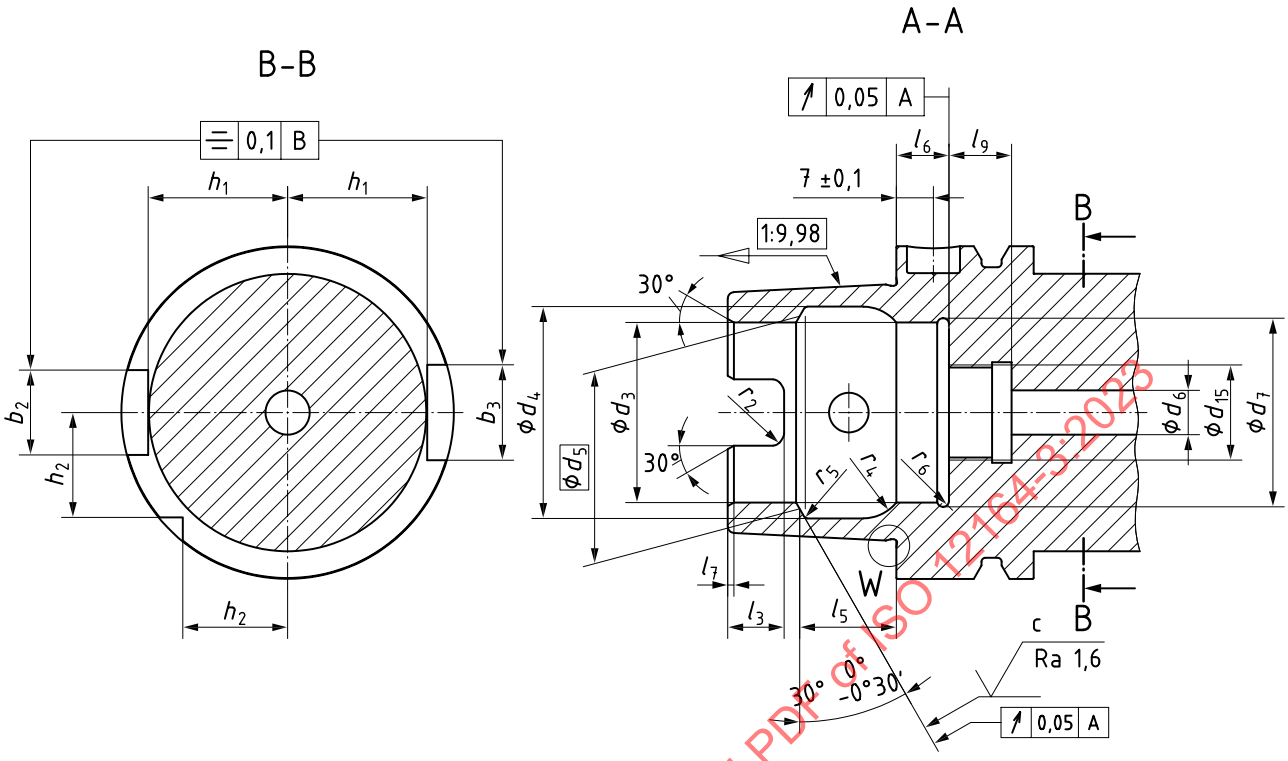
4.2 Hollow taper shank of type T

Figure 1 and Table 1 show all general parameters and values of the different HSK-T sizes.

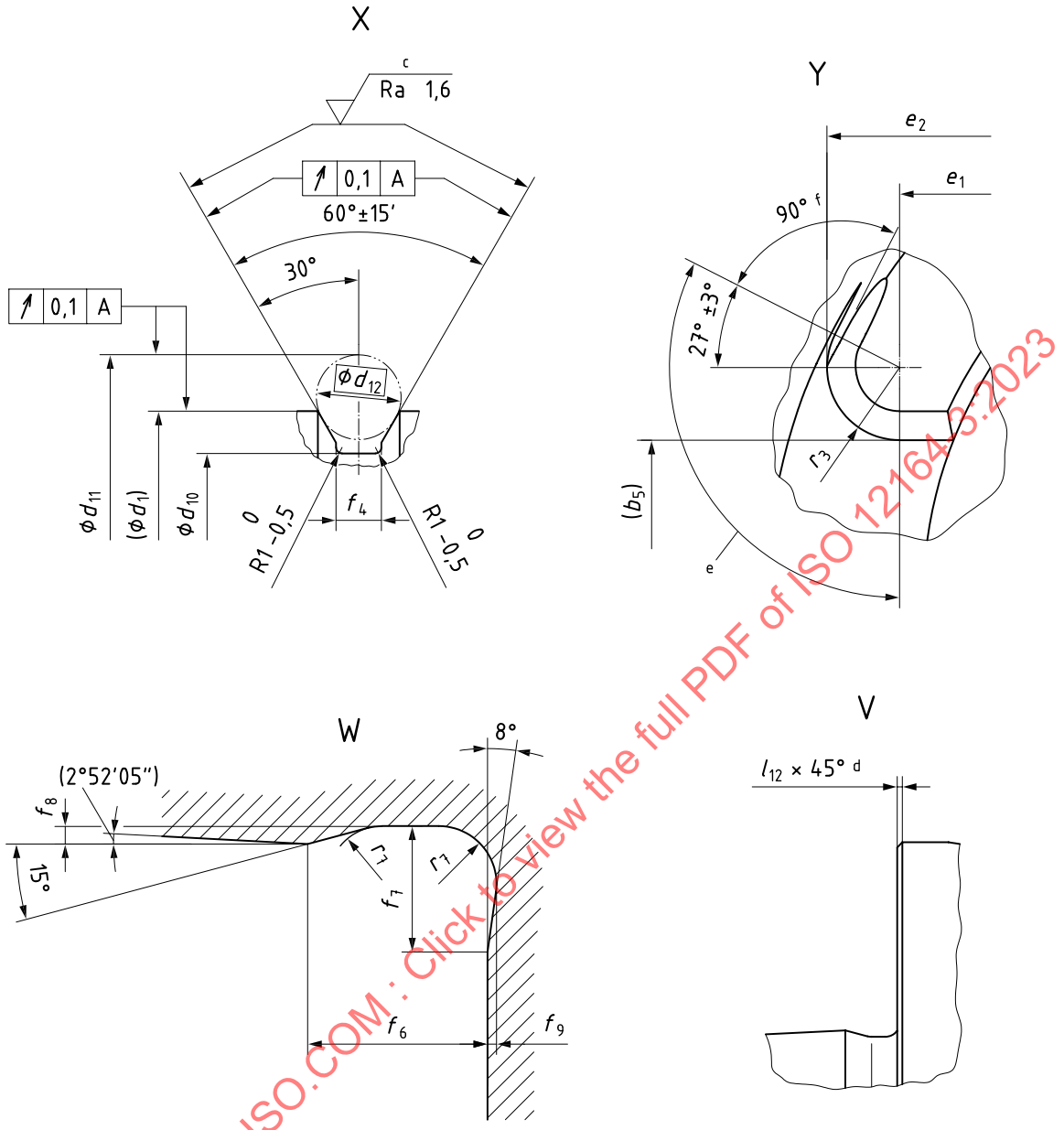
In case of balancing bore holes at the HSK shank flange, mechanical restrictions of known automatic tool changing systems shall be taken into account.



a) HSK-T main and side view



b) HSK-T section A-A and section B-B



c) HSK-T details

Key

1 position of the cutting edge for right hand tools with single cutting edge

2 bore hole for data chip

All radial bore holes shall be deburred.

a Or max. chamfer 0,3 × 45°.

b Not convex.

c Fine turning.

d Or radius.

e Area of r_3.

f Leadout of r_3.

Figure 1 — Hollow taper shank of type T

4.3 Hollow taper shank of type TA

The dimensions of hollow taper shanks type TA shall be in accordance with Figure 1 and Table 1.

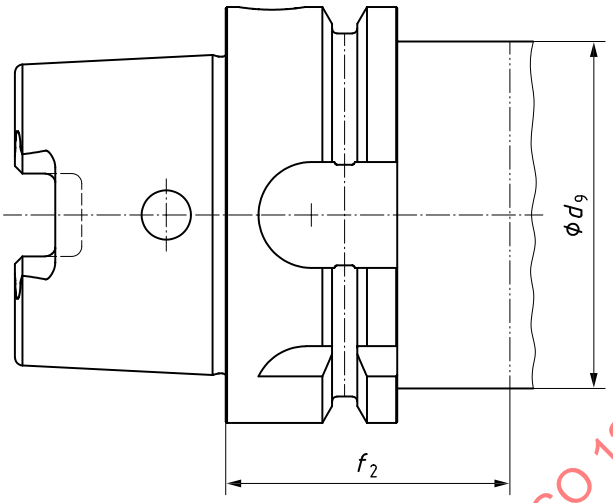
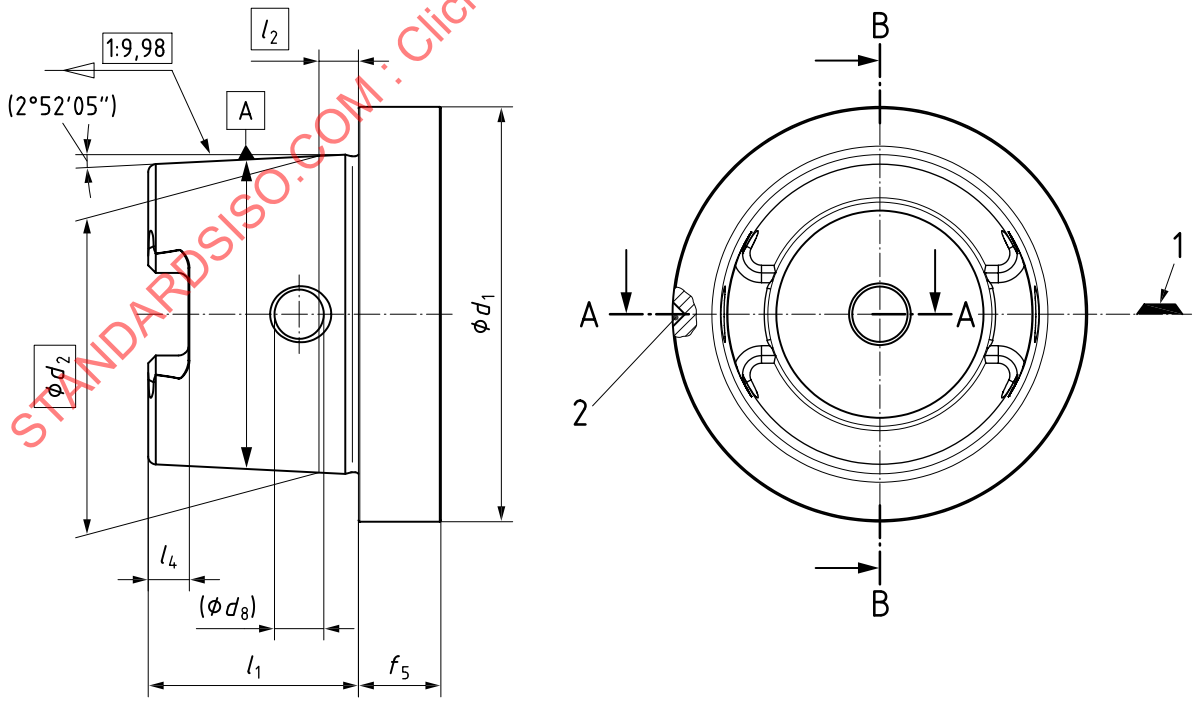


Figure 2 — Hollow taper shank of type TA

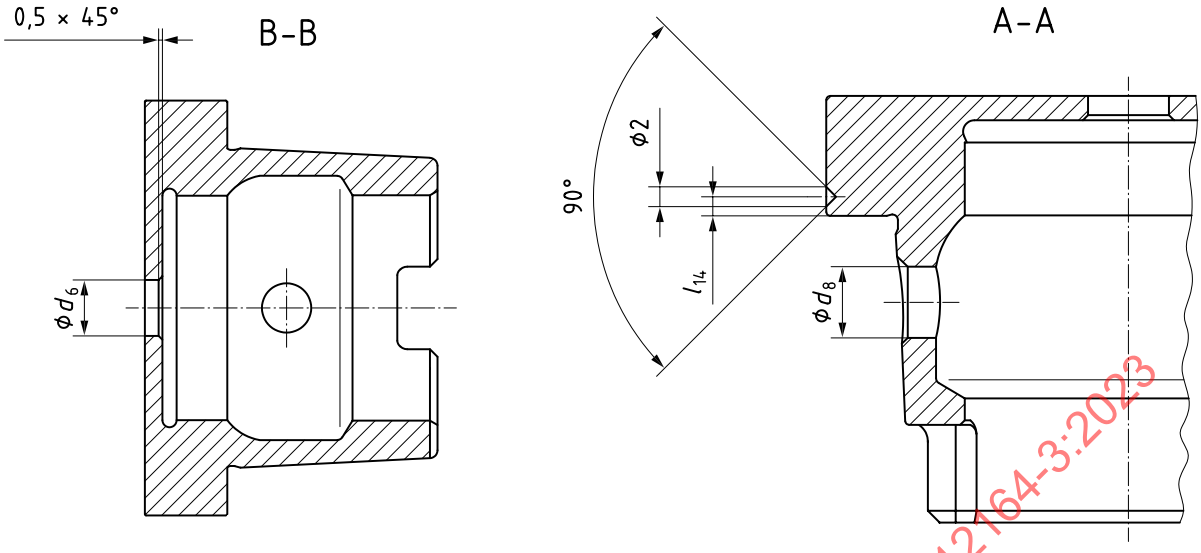
The HSK of type TA has the same diameter d_9 (see Figure 2) such as the shanks of type AB and type EB and can therefore be handled by automatic tool changers of standard machining centres, preferably equipped with turning option.

4.4 Hollow taper shank of type U

The dimensions of hollow taper shanks of type U shall be in accordance with Figure 1 and Table 1 (see Figure 1 for unspecified dimensions).



a) HSK-U main and side view



b) HSK-U section A-A **c) HSK-U section section B-B**

Key

1 position of the cutting edge for right hand tools with single cutting edge

2 marking bore of the clamping hole position

Figure 3 — Hollow taper shank of type U

4.5 Dimensions

The dimensions of hollow taper shanks defined in this document shall be in accordance with Table 1.

Table 1 — HSK hollow taper shanks, dimensions

Dimensions in millimetres

Nominal size		See Figure[b]	25	32	40	50	63	80	100	125	160	HSK-type
b_1	±0,04	1a, r	6,05	7,05	8,05	10,54	12,54	16,04	20,02	25,02	30,02	T, TA, U
b_2	H10 Ⓔ	1b, B-B	6	7	9	12	16	18	20	25	32	T, TA
b_3	H10 Ⓔ	1b, B-B	7	9	11	14	18	20	22	28	36	T, TA
b_5		1a, r	5,932	6,932	7,932	10,425	12,425	15,93	19,91	24,915	29,915	T, TA, U
	tol.		+0,03 0	+0,03 0	+0,03 0	+0,035 0	+0,035 0	+0,035 0	+0,035 0	+0,04 0	+0,04 0	
d_1	H10 Ⓔ	1a, l	25	32	40	50	63	80	100	125	160	T, TA, U
d_2		1a, l	19,006	24,007	30,007	38,009	48,01	60,012	75,013	95,016	120,016	T, TA, U
d_3	H10 Ⓔ	1b, A-A	14	17	21	26	34	42	53	67	85	T, TA, U
d_4	H11 Ⓔ	1b, A-A	16,4	20,5	25,5	32	40	50	63	80	100	T, TA, U
d_5		1b, A-A	15	19	23	29	37	46	58	73	92	T, TA, U
d_6	max.	1b, A-A	3	4,2	5	6,8	8,4	10,2	12	14	16	T, TA, U
d_7	0 -0,1	1b, A-A	14,4	17,4	21,8	26,6	34,5	42,5	53,8	68,1	86,1	T, TA, U
d_8		1a, l	3,7	4	4,6	6	7,5	8,5	12	14,5	17	T, TA, U
d_9	max	2	20	26	34	42	53	68	88	111	144	TA
d_{10}	0 -0,1	1c, X	22	26,5	34,8	43	55	70	92	117	152	T, TA
d_{11}	0 -0,1	1c, X	28,5	37	45	59,3	72,3	88,8	109,75	134,75	169,75	T, TA
d_{12}		1c, X	3	4	4	7	7	7	7	7	7	T, TA
d_{15}[a]		1b, A-A	M8 x 1	M10 × 1	M12 × 1	M16 × 1	M18 × 1	M20 × 1,5	M24 × 1,5	M30 × 1,5	M35 × 1,5	T, TA
d_{17}	max.	1a, l	24	31	39	49	62	79	99	124	159	T
e_1		1a, r	6,84	8,82	11	13,88	17,99	21,94	27,37	35,37	44,32	T TA

[a] Thread for mounting of a medium-transfer unit (see Annex B).

[b] Indicates the drawing of the first appearance of a parameter; e.g. '1a, l' → Figure 1 a), left drawing; → Figure 1 b), cross section B-B.

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

Table 1 *(continued)*

Nominal size		See Figure[b]	25	32	40	50	63	80	100	125	160	HSK-type
e_2	0 -0,05	1a, r	7,97	10,2	12,88	16,26	20,87	25,82	32,25	41,25	52,2	T TA
f_1	0 -0,1	1a, l	10	20	20	26	26	26	29	29	31	T, TA
f_2	min.	2	20	35	35	42	42	42	45	45	47	TA
f_3	±0,1	1a, l	4,5	16	16	18	18	18	20	20	22	T, TA
f_4	+0,15 0	1c, X	2	2	2	3,75	3,75	3,75	3,75	3,75	3,75	T, TA
f_5		3a, l	8	10	10	12,5	12,5	16	16	20	20	U
f_6		1c, W	1	1	1	2	2	2	2,5	2,5	4	T, TA, U
f_7	≈	1c, W	0,9	0,9	1,1	1,4	1,4	1,8	1,8	3,1	3,1	T, TA, U
f_8	+0,1 0	1c, W	0,1	0,1	0,2	0,2	0,2	0,2	0,2	0,3	0,3	T, TA, U
f_9	+0,05 0	1c, W	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,2	T, TA, U
f_{10}	min.	1a, l	13	23	23	30	30	30	34	34	36	T
h_1	0 -0,2	1b, B-B	10	13	17	21	26,5	34	44	55,5	72	T, TA
h_2	0 -0,3	1b, B-B	7,5	9,5	12	15,5	20	25	31,5	39,5	50	T, TA
h_3	+0,2 0	1a, r	—	5,4	5,2	5,1	5	4,9	4,9	4,8	4,8	T, TA
l_1	0 -0,2	1a, l	13	16	20	25	32	40	50	63	80	T, TA, U
l_2		1a, l	2,5	3,2	4	5	6,3	8	10	12,5	16	T, TA, U

[a] Thread for mounting of a medium-transfer unit (see Annex B).

[b] Indicates the drawing of the first appearance of a parameter; e.g. '1a, l' → Figure 1 a), left drawing; → Figure 1 b), cross section B-B.

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

Table 1 *(continued)*

Nominal size		See Figure[b]	25	32	40	50	63	80	100	125	160	HSK-type
l_3	+0,2 0	1b, A-A	4	5	6	7,5	10	12	15	19	23	T, TA, U
l_4	+0,2 0	1a, l	2	3	3,5	4,5	6	8	10	12	16	T, TA, U
l_5	JS10 Ⓔ	1b, A-A	7,21	8,92	11,42	14,13	18,13	22,85	28,56	36,27	45,98	T, TA, U
l_6	0 -0,1	1b, A-A	6	8	8	10	10	12,5	12,5	16	16	T, TA, U
l_7	+0,3 0	1b, A-A	0,6	0,8	0,8	1	1	1,5	1,5	2	2	T, TA, U
l_8	±0,1	1a, l	4	5	6	7,5	9	12	15	18,5	25	T, TA, U
l_9	0 -0,3	1b, A-A	5	6	8	10	12	14	16	18	20	T, TA
l_{10}		1a, l	8	12	12	19	21	22	24	24	24	T, TA
l_{12}		1c, V	0,3	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	T, TA, U
	tol.		±0,1	±0,2	±0,2	±0,2	±0,2	±0,2	±0,2	±0,2	±0,2	
l_{14}		3, A-A	2	2	2	2	2	2	2	2	2	U
l_{17}		1a, l	—	1	1	1	1	1	1	1	1	T
l_{18}	min.	1a, l	1	1	1	1	1	1	1	1	1	T
O-ring [c]		-	-	16 × 1	18,77 × 1,78	21,89 × 2,62	29,82 × 2,62	36,09 × 3,53	47,6 × 3,53	61,91 × 3,53	80 × 3,5	T, TA, U
r_1		1a, l	0,5	0,6	0,8	1	1,2	1,6	2	2,5	3,2	T, TA, U
r_2	0 -0,2	1a, l	0,5	1	1	1,5	1,5	2	2	2,5	2,5	T, TA, U
r_3		1c, Y	1,13	1,38	1,88	2,38	2,88	3,88	4,88	5,88	7,88	T, TA, U
	tol.		±0,03	±0,05	±0,05	±0,05	±0,05	±0,05	±0,05	±0,05	±0,05	
r_4		1b, A-A	3	4	5	6	8	10	12	16	20	T, TA, U

[a] Thread for mounting of a medium-transfer unit (see Annex B).

[b] Indicates the drawing of the first appearance of a parameter; e.g. '1a, l' → Figure 1 a), left drawing; → Figure 1 b), cross section B-B.

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

Table 1 *(continued)*

Nominal size	See Figure[b]	25	32	40	50	63	80	100	125	160	HSK-type
r_5	1b, A-A	0,3	0,4	0,4	0,5	0,6	0,8	1	1,2	1,6	T, TA, U
r_6	1b, A-A	0,5	0,5	1	1,5	1,5	2	2	2	2	T, TA, U
r_7	1c, W	0,2	0,2	0,4	0,6	0,6	1	1	1,6	1,6	T, TA, U
r_8	1a, l	3	3,5	4,5	6	8	9	10	5	5	T, TA
r_9	1a, l	3	3	3	4	4	4	5	5	5	T
t	1a, l	0,002	0,002	0,002	0,002 5	0,003	0,004	0,004	0,005	0,005	T, TA, U
w	1a, l	0,002	0,002	0,002	0,002	0,002	0,003	0,003	0,004	0,004	T, TA, U

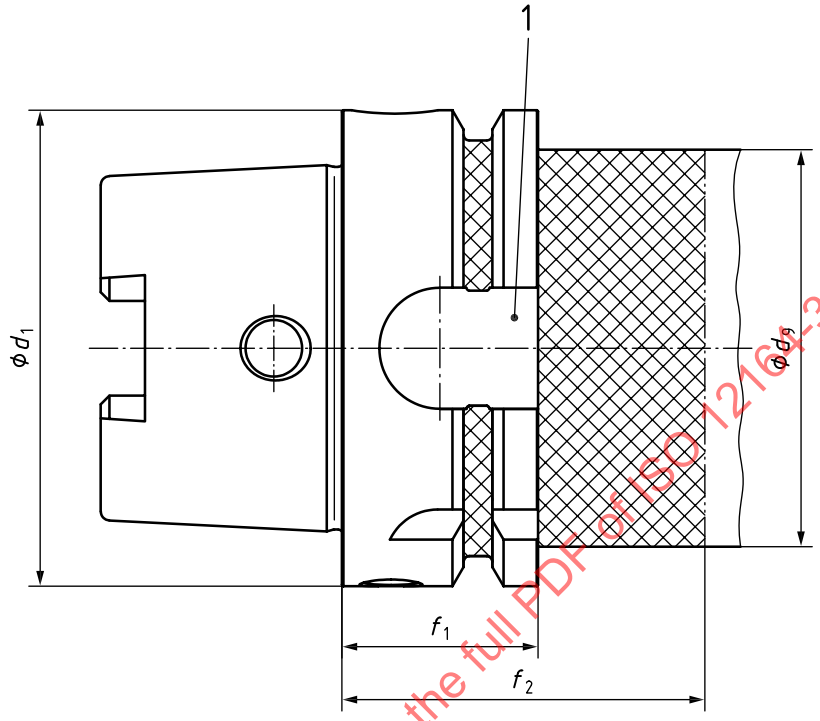
[a] Thread for mounting of a medium-transfer unit (see Annex B).

[b] Indicates the drawing of the first appearance of a parameter; e.g. '1a, l' → Figure 1 a), left drawing; → Figure 1 b), cross section B-B.

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

5 Balancing

The crosshatched area of Figure 4 provides the space for static balancing as well as for the "left" balancing plane near to the HSK shank in case of dynamic balancing.



Key

1 labelling allowed in both OD grooves (b_2 and b_3, see Figure 1 b)

Figure 4 — Area for fine balancing of products with HSK shanks

6 Design

6.1 HSK sizes and types

Table 2 shows the preferred sizes of hollow taper shanks described in this document.

Table 2 — Sizes and types

Nominal size	25	32	40	50	63	80	100	125	160
HSK-T	o	o	X	X	X	X	X	o	o
HSK-TA	o	o	X	X	X	X	X	o	o
HSK-U	o	o	X	X	X	X	X	o	o
X preferred o applicable									

6.2 Medium-transfer units

Medium-transfer units can be applied according to ISO 22402-1.

6.3 Clamping forces

The clamping system shall provide sufficient clamping force to ensure the contact of the shank flange with the face of the receiver by seating of the taper according to elastic deformation. The bending moment capacity of an HSK interface is substantially determined by the amount of the clamping force.

A recommendation for clamping forces is given in Annex A.

6.4 Material and heat treatment

HSK shanks shall be made from either tempering or case hardening steel with a minimum core strength of 800 N/mm^2 and a minimum surface hardness of 50 HRC after hardening, tempering and finish grinding.

7 Designation

A hollow taper shank (HSK) in accordance with this document shall be designated by:

a) "Hollow shank ISO 12164-3 — HSK";

a) T, TA or U;

b) nominal size, in millimetres (e.g. 63).

EXAMPLE 1 A hollow taper shank (HSK), of type T, nominal size 63, for automatic and manual tool change is designated as follows:

Hollow shank ISO 12164-3 **— HSK-T 63**

EXAMPLE 2 A hollow taper shank (HSK), of type TA, nominal size 50, for automatic and manual tool change is designated as follows:

Hollow shank ISO 12164-3 **— HSK-TA 50**

EXAMPLE 3 A hollow taper shank (HSK), of type U, nominal size 50, for manual tool change is designated as follows:

Hollow shank ISO 12164-3 **— HSK-U 50**

Annex A
(informative)

Clamping forces for shanks of types T, TA and U

The recommended clamping forces for all sizes of the shanks of types T, TA and U are shown in Table A.1.

Table A.1 — Clamping forces

Nominal size	mm	25	32	40	50	63	80	100	125	160
Clamping force	kN	2,8	5	8	14	24	37	55	86	150

Lower clamping forces can be sufficient when operational loads are also low (e.g. cutting and feed forces of finish machining). Higher clamping forces however can be required when high operational loads occur (e.g. cutting and feed forces of heavy machining).