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ISO 26623-1

Third edition
2020-11

Polygonal taper interface with flange contact surface —

Part 1: Dimensions and designation of shanks

Interfaces à cône polygonal avec face d'appui —

Partie 1: Dimensions et désignation des queues

Reference number
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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 documents 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 26623-1:2014, which has been technically revised.

The main changes compared to the previous edition are as follows:

— size 80X is removed;

— Figure 1 is divided in 6 figures to achieve better readability;

— internal design is changed to fit medium-transfer unit referenced (ISO 22402-2);

— information about medium-transfer unit is added;

— dimensions for dynamical balancing by design when used are added in Annex A;

A list of all parts in the ISO 26623 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.

Polygonal taper interface with flange contact surface —

Part 1:
Dimensions and designation of shanks

1 Scope

This document specifies dimensions for polygonal taper interfaces with flange contact surface — polygon shanks for automatic and manual tool exchange to be applied on machine tools (e. g. turning machines, drilling machines, milling machines and turn/milling centres as well as grinding machines). A range of shank sizes is specified.

These shanks incorporate a grooved flange to enable automatic tool exchange. The clamping can be realized by a circular groove using clamping segments or internal screw threads using centre-bolts.

The torque is transmitted by form lock (polygon).

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 965-2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*

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

ISO 2768-2, *General tolerances — Part 2: Geometrical tolerances for features without individual tolerance indications*

ISO 22402-2, *Medium-transfer units for tool interfaces — Part 2: Transfer units for polygonal taper interfaces in accordance with ISO 26623*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 Polygonal taper interface with flange contact surface

4.1 General

Tolerances for linear dimensions for features without individual tolerance indications shall be of tolerance class “m” in accordance with ISO 2768-1 and geometrical tolerances for features without individual tolerance indications shall be of tolerance class “K” in accordance with ISO 2768-2.

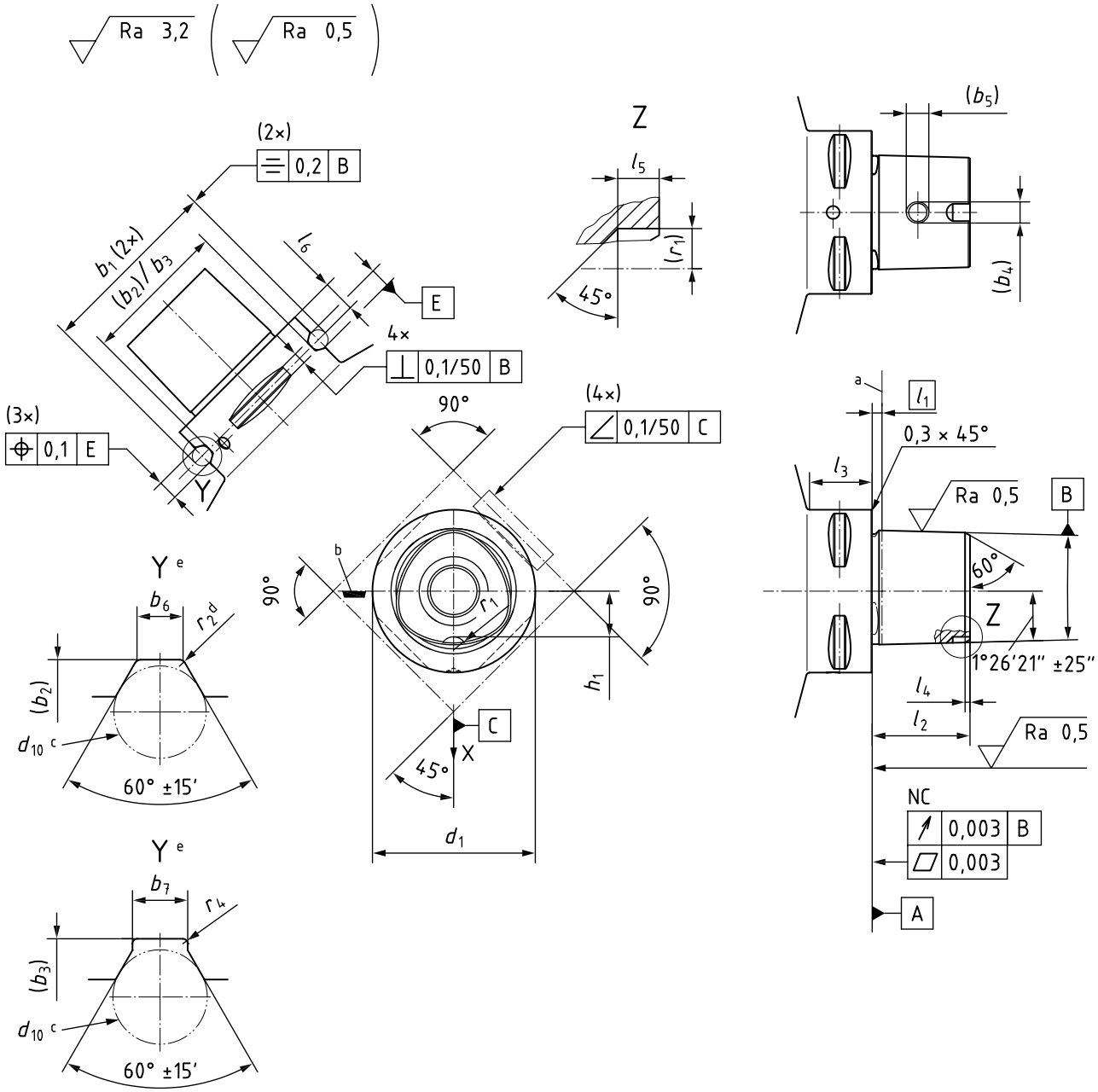
Tolerances for threads where tolerance is not stated shall be in accordance with ISO 965-2.

4.2 Polygon shanks

The dimensions of polygon shanks shall be in conformance with Figure 1 to Figure 7 and Table 1. Figure 6 only applies if chip hole bore is used.

NOTE Additional recommendations for use and application (i.e. dynamical balancing by design) are given in Annex A. Only in cases where stationary tools need extra room for clamping devices or coolant supply, dimensions specified in Annex B are valid.

Surface roughness in micrometres
Dimensions in millimetres



a Gauge line.

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

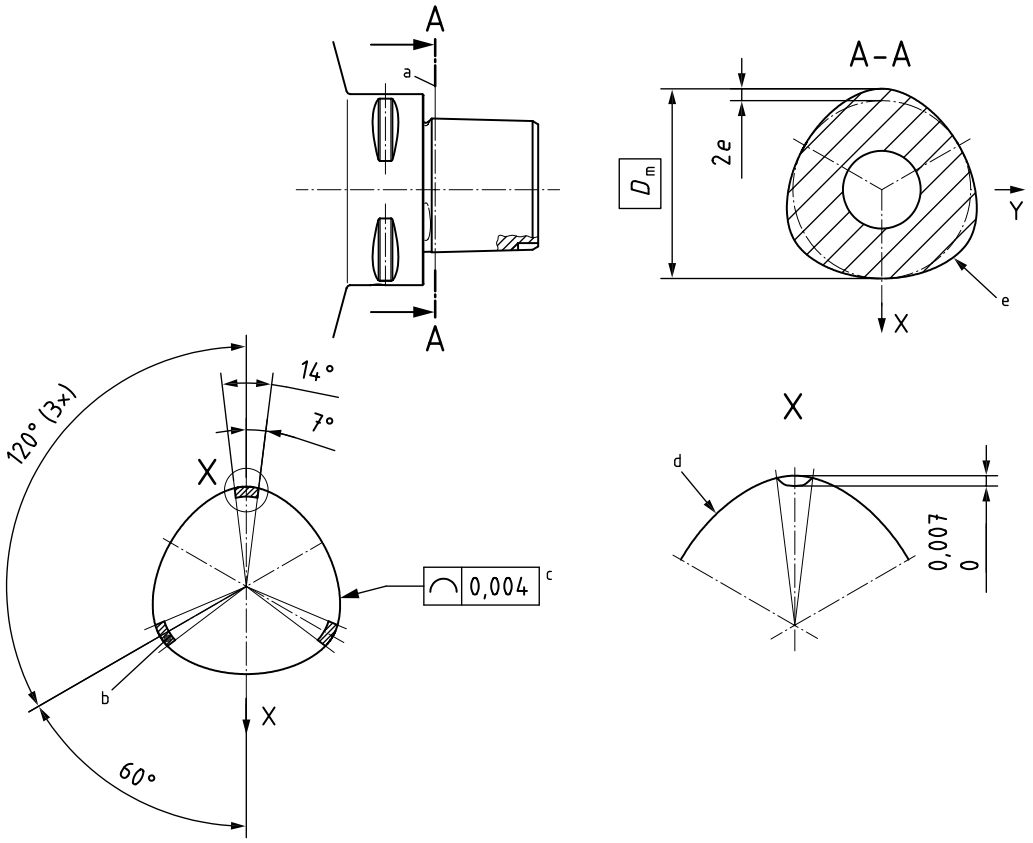
c Gauge pin.

d r_2 or f_1 as alternative.

e Detail Y shows the two alternatives.

Figure 1 — External dimensions of polygon shanks

Dimensions in millimetres

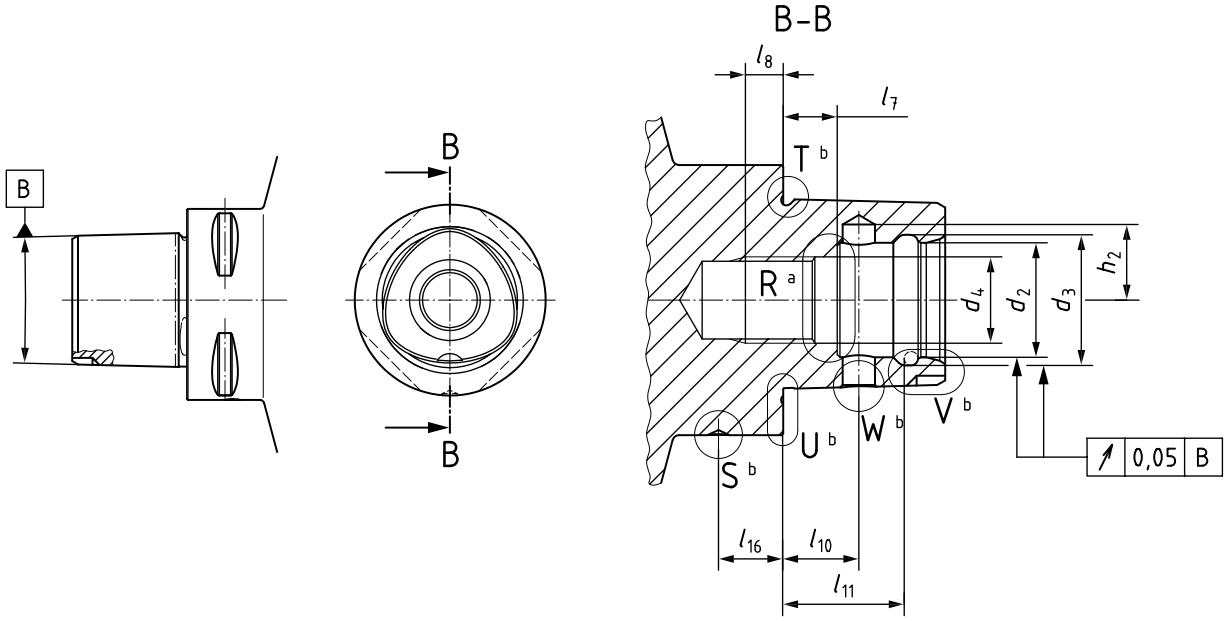


Key

a	Gauge line.	e	Polygon curve according to Figure 7.
b	Form of profile from actual ground curve = $^{+0}_{-0,007}$ (sectioned areas).	X	x-axis for theoretical polygon curve according to Figure 7
c	Theoretical polygon curve.	Y	y-axis for theoretical polygon curve according to Figure 7
d	Actual ground curve.		

Figure 2 — Shape of polygon shanks

Dimensions in millimetres

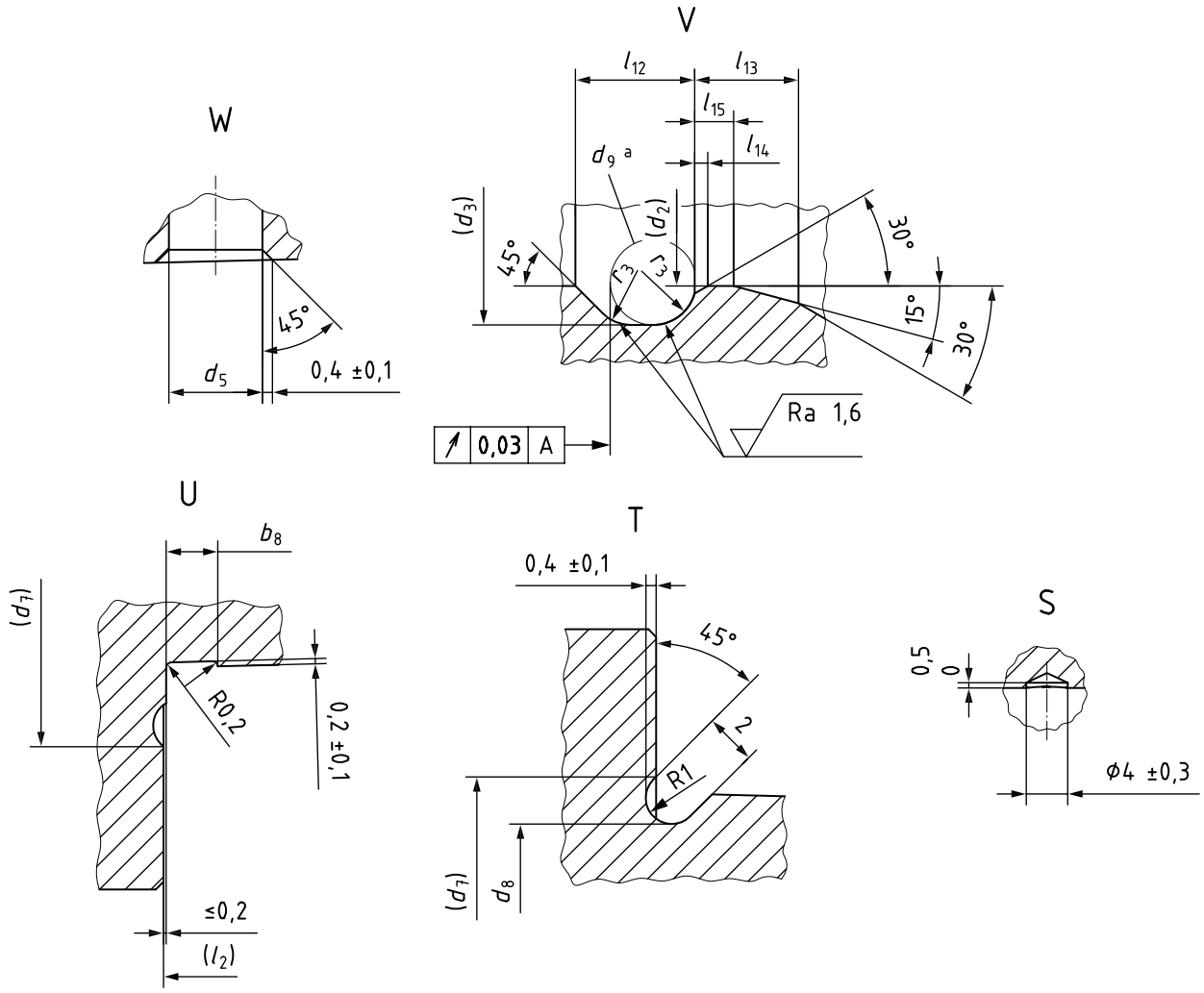


a See Figure 5.

b See Figure 4.

NOTE Details S, T, U, V and W are shown in Figure 4.

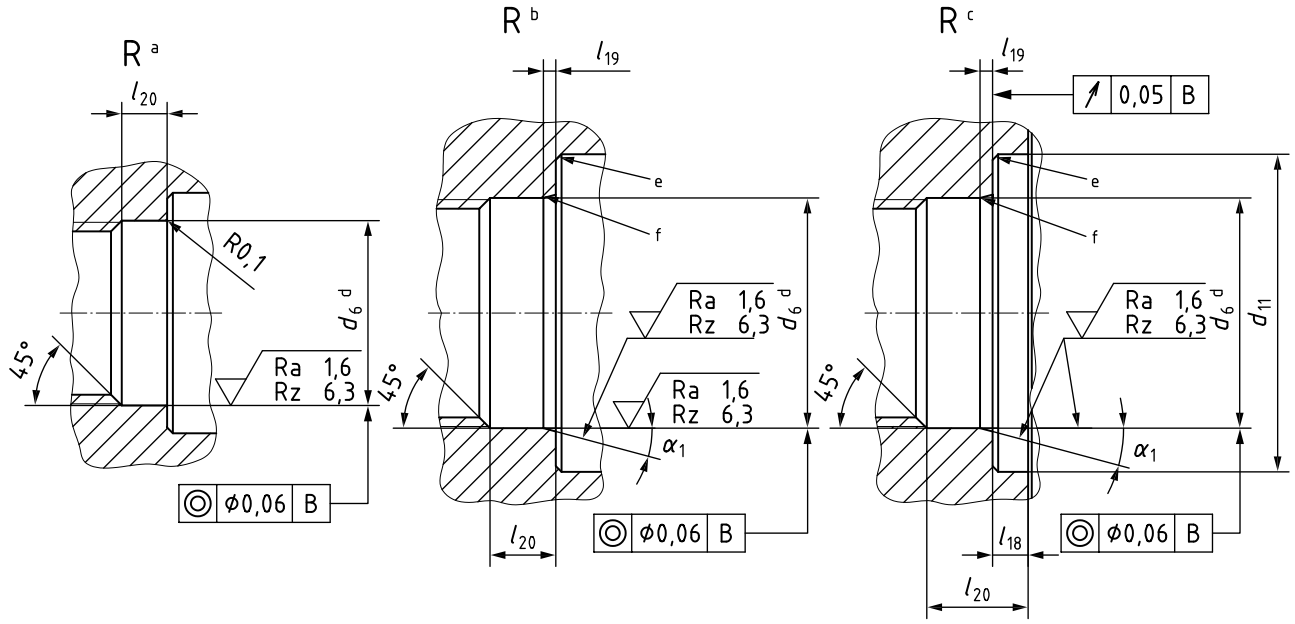
Figure 3 — Dimensions of polygon shanks (overview)



a Gauge ball.

NOTE An overview and the location of details S, T, U, V and W are shown in Figure 3.

Figure 4 — Dimensions of polygon shanks (details S, T, U, V and W)



a Sizes 32 to 50.

b Sizes 63 and 80.

c Size 100.

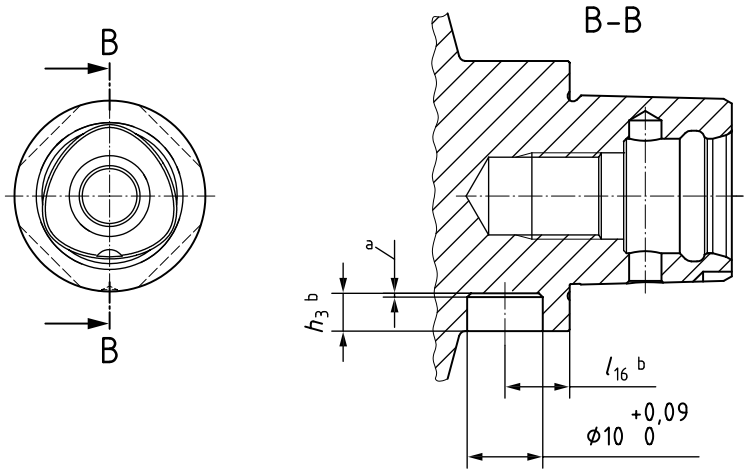
d Machined at the same set-up as d4.

e 0,5 × 45° or R0,5.

f Rounded.

Figure 5 — Dimensions of polygon shanks (detail R)

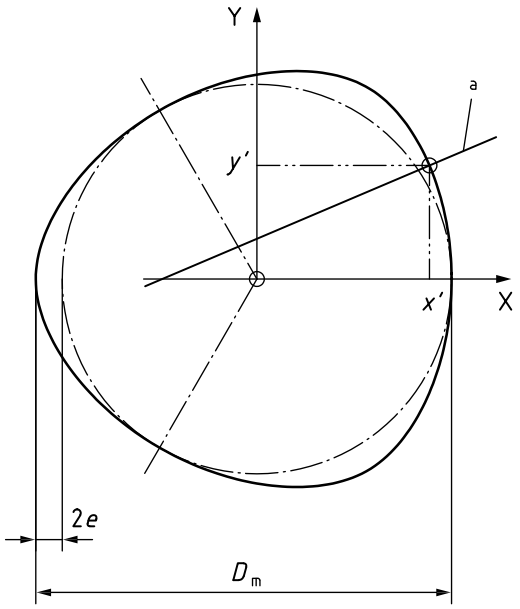
Dimensions in millimetres



a 0,3 × 45° or R0,3.

b Data chip hole only optional/if used.

Figure 6 — Polygon shanks (data chip hole design — if used)



$$x' = D_m/2 \times \cos\gamma - 2 \times e \times \cos(2\gamma) + e \times \cos(4\gamma)$$

$$y' = D_m/2 \times \sin\gamma + 2 \times e \times \sin(2\gamma) + e \times \sin(4\gamma)$$

[a] Normal to polygon curve.

Figure 7 — Theoretical polygon curve

4.3 Dimensions

The dimensions of polygon shanks shall be in conformance with Table 1.

Tolerances for linear dimensions and geometrical tolerance for features without individual tolerance indication shall be ±0,05 mm for dimensions from 0 mm up to 0,2 mm, and ± 0,1 mm for dimensions from 0,2 mm up to 0,499 mm, the others in accordance with ISO 2768-mk.

Tolerances for threads, where tolerance is not stated, shall be in accordance with ISO 965-2.

Table 1 — Polygon shanks — Dimensions

Dimensions in millimetres

Size		32	40	50	63	80	100
α_1			—		15	20	20
b_1	±0,1	39	46	59,3	70,7	86	110
b_2		28,3	35,3	44,4	55,8	71,1	88,7
b_3	±0,1	27,9	34,9	44	55,4	70,7	88,3
b_4		4,2	5,2	6,5	8,5	9,6	12,4
b_5		4,5	5,5	7	9	10,1	13,2
b_6		2,5	2,5	3,5	3,5	3,5	5
b_7		2,6	2,6	4,1	4,1	4,1	6,1
b_8		1,5	1,5	2	2	2	2

[a] Dimensions for dynamical balancing by design are specified in Figure A.1 and Table A.2.

[b] Alternative dimensions for stationary tools are specified in Annex B.

Table 1 *(continued)*

Size		32	40	50	63	80	100
d_1	±0,1	32	40	50	63	80	100
d_2	$^{+0,1}_{-0,05}$	15	18	21	28	32	43
d_3	±0,05	16,5	20	24	32	38	50,5
d_4		M12×1,5	M14×1,5	M16×1,5	M20×2	M20×2	M24×2
d_5	±0,1	3,6	4,6	6,1	8,1	9,1	12
d_6	H10	12,3	14,3	16,3	20,3	20,3	26
d_7		25,2	31,6	39,1	48,5	60,8	79,4
d_8	±0,1	21,6	28	35,5	44,9	57,2	75,8
d_9		1,5	2	3	4	6	7,5
d_{10}		5	5	7	7	7	10
d_{11}	±0,05	—					31
D_m		22	28	35	44	55	72
e		0,7	0,9	1,12	1,4	2	2,8
f_1		0,3 × 45°	0,3 × 45°	0,5 × 45°	0,5 × 45°	0,5 × 45°	0,5 × 45°
h_1		9	11	14	18	22,2	29
	tol.	±0,1				±0,2	
h_2		—	11	14	17,5	22	—
h_3	$^{+0,2}_{0}$	5,4	5,2	5,1	5	4,9	4,9
h_4		[a]					
h_5		[a]					
h_6		[a]					
h_7		[a]					
h_8		[a]					
l_1		2,5	2,5	3	3	3	3
l_2	±0,1	19	24	30	38	48	60
l_3	min	15	20	20	22	30	36
l_4		1	1,5	1,5	1,5	1,5	2
l_5		3,35	4,2	5,55	6,45	8,25	11,25
	tol.	±0,15	±0,2	±0,25			
l_6	±0,15	6	8	10	12	12	16
l_7	±0,15	6	9	10	11	20	20
l_8	min	6	6	7	9	0	10
l_9		[a]					
l_{10}	±0,2	8	11,5	14	15,5	25	26,5
l_{11}	±0,1	13,5	17,5	22	26	34	42,5
l_{12}		2,8	3,4	4,6	5,8	8,5	11
	tol.	±0,15					—
l_{13}		3,6	3,5	4	6,5	6,5	8
l_{14}		0,3	0,4	0,5	0,6	0,6	0,6
l_{15}	±0,2	2	1,4	1,5	1,6	1,6	1,9
l_{16}		9	12	12	12	12	16

[a] Dimensions for dynamical balancing by design are specified in Figure A.1 and Table A.2.

[b] Alternative dimensions for stationary tools are specified in Annex B.

Table 1 *(continued)*

Size		32	40	50	63	80	100
l_{17}		[b]					
l_{18}		—					3,8
l_{19}		—			1,1	1,5	1,5
l_{20}		3,9	4	4	5,8	5,8	9,5
r_1	±0,3	4	4	5	6	7	8
r_2		0,3	0,3	0,5	0,5	0,5	0,5
r_3	$^{0}_{-0,1}$	0,75	1	1,5	2	3	3,75
r_4		0,3	0,3	0,3	0,3	0,3	0,4
r_5		[a]					

[a] Dimensions for dynamical balancing by design are specified in Figure A.1 and Table A.2.

[b] Alternative dimensions for stationary tools are specified in Annex B.

5 Design

5.1 Medium-transfer unit

Medium-transfer units in accordance with ISO 22402-2 shall be used.

5.2 Clamping forces

The clamping system shall provide sufficient clamping force to ensure contact of the shank flange with the face of the receiver. A guide to clamping forces for polygon shank is given in Annex A.

6 Designation

A polygon shank in accordance with this document shall be designated by:

a) "POLYGON SHANK";

b) reference to this document (i.e. ISO 26623-1);

c) designation symbols PSC;

d) nominal size, in millimetres.

EXAMPLE Designation of a polygon shank for automatic and manual tool exchange with nominal size 32:

POLYGON SHANK ISO 26623-1 — PSC 32

Annex A
(informative)

Recommendations for use and application

A.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 A.1 will ensure that the portion of acting on the flange surface is never less than 80 % of the total. The flange contact is decisive for the stiffness of the polygonal taper interface.

Table A.1 — Clamping force

Nominal size, mm	32	40	50	63	80	100
Clamping force, kN	15	20	25	30	40	60

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).

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

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

A.3 Information about material and heat treatment

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

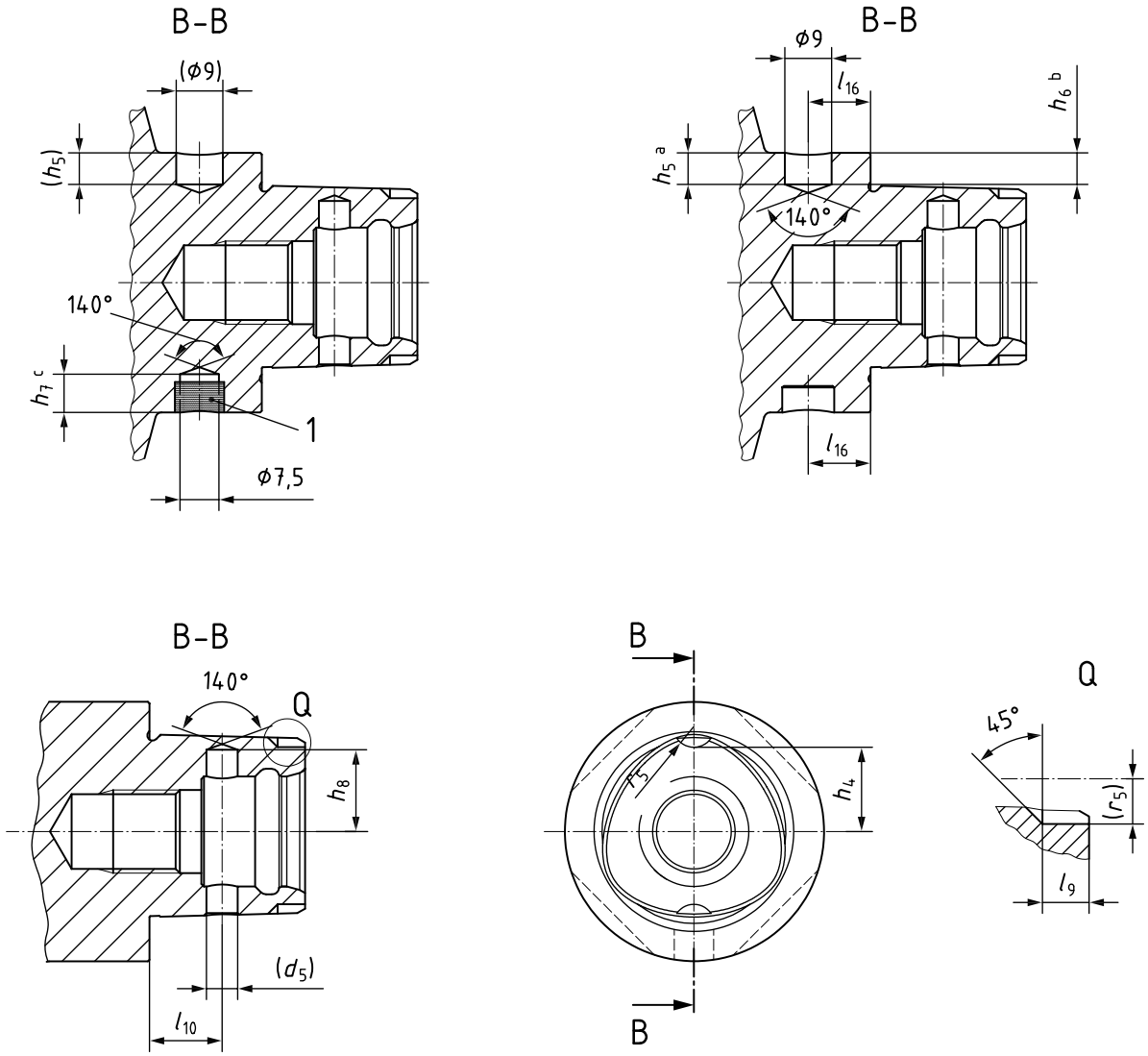
The coupling could be either through hardened or surface hardened depending on what is suitable for the range of application.

A.4 General surface hardness recommendations

Tapered polygon, internal clamping groove and axial contact surface: HRC 42 minimum. External gripper groove area: HRC 51 minimum.

A.5 Dynamical balancing by design

Especially for Polygon shank adapters and cutting tools with symmetrical front parts of small diameters, only the balancing measures at the polygon shank as described in Figure A.1 and Table A.2 can provide a dynamically balanced product as there are no other balancing areas available. Chip holes on tools that are dynamically balanced by design shall be made with a flat bottom when originally manufactured.



Key

1 data chip (dimensions for chip bore hole see Figure 6)

a Dimension is used for balancing when no data chip is initially mounted.

b Dimension is used for balancing when a data chip is initially mounted.

c Dimension is used to make rework for balancing when no data chip is initially mounted but is mounted afterwards.

Figure A.1 — Dimensions for dynamical balancing by design

Table A.2 — Dimensions for dynamical balancing

Dimensions in millimetres

Size	32	40	50	63	80	100
h_4	10,38	12,81	16,25	20,81	26,21	34,63
h_5	6,65	6,26	6,06	5,89	5,74	5,72
h_6	4,68	4,44	4,33	4,22	4,11	4,11
h_7	—	—	7,35	7,13	6,95	6,9
h_8	10	12,64	15,75	19,77	24,37	31,83
l_9	3,35	4,2	5,55	6,45	8,25	11,25
l_{16}	9	12	12	12	12	16
r_5	4	4	5	6	7	8

Annex B
(normative)

Polygon shanks for stationary tools

B.1 Polygon shanks — Design for stationary tools

See Figure B.1.

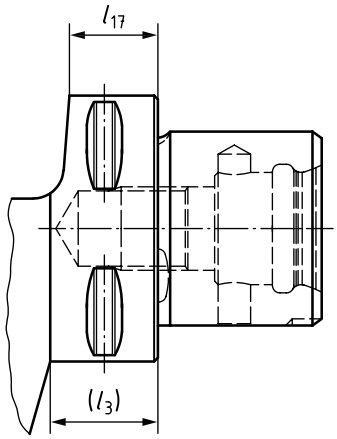


Figure B.1 — Polygon shanks for stationary tools

B.2 Polygon shanks — Dimensions for stationary tools

See Table B.1.

Table B.1 — Dimensions for stationary tools

Dimensions in millimetres

Nominal size	32	40	50	63	80	100
$l_{17,\min}$	12	16	16	18	20	36

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