
**Plain bearings — Pedestal plain
bearings —**

**Part 1:
Pillow blocks**

*Paliers lisses — Paliers lisses à chaise sur le sol —
Partie 1: Supports de paliers*

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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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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 123, *Plain bearings*, Subcommittee SC 3, *Dimensions, tolerances and construction details*.

This second edition cancels and replaces the first edition (ISO 11687-1:1995), which has been technically revised.

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

- [Clause 2](#) has been updated;
- the former [Clause 6](#) (now [Clause 7](#)) has been updated.

A list of all parts in the ISO 11687 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.

Plain bearings — Pedestal plain bearings —

Part 1: Pillow blocks

1 Scope

This document specifies design characteristics for pillow blocks for size ranges 9 to 28 and 35 to 71, as well as design characteristics for shafts.

It is applicable to pillow blocks used mainly in electrical and turbo engineering industries.

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 185, *Grey cast iron — Classification*

ISO 630-2, *Structural steels — Part 2: Technical delivery conditions for structural steels for general purposes*

ISO 683-3, *Heat-treatable steels, alloy steels and free-cutting steels — Part 3: Case-hardening steels*

ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

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 4381, *Plain bearings — Tin casting alloys for multilayer plain bearings*

ISO 8062-3, *Geometrical product specifications (GPS) — Dimensional and geometrical tolerances for moulded parts — Part 3: General dimensional and geometrical tolerances and machining allowances for castings*

ISO 12129-1, *Plain bearings — Tolerances — Part 1: Fits*

ISO 12129-2, *Plain bearings — Tolerances — Part 2: Tolerances on form and position and surface roughness for shafts and thrust collars*

ISO 14737, *Carbon and low alloy cast steels for general applications*

ASTM B124/B124M, *Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes*

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 Types of pillow block

4.1 General

According to their design, pillow blocks can be classified as per 4.2 to 4.5, each characteristic being designated by a letter symbol.

Figure 1 and Figure 2 show examples of pillow blocks. These represent pillow blocks which are ready to be installed, in the size ranges 9 to 28 and 35 to 71, respectively.

The symbols above Figure 1 and Figure 2 explain only the type illustrated; the complete type required shall be specified in the below-mentioned sequence when ordering.

For reasons of design (e.g. on account of limited space) and economy, it is only possible to construct the size range 35 to 71 with thrust bearings (A) with the dimensions given in Table 4.

4.2 Housing

- G Pillow block, without cooling fins
- R Pillow block, with cooling fins

4.3 Heat dissipation

- N Natural cooling
- W Water cooling in oil sump
- U Circulation pump and natural cooling
- T Circulation pump and water cooling in oil sump
- Z Recirculating oil lubrication with external cooling of oil

4.4 Shape of bore for journal bearing and type of lubrication

- C Circular cylindrical bore without oil ring
- L Circular cylindrical bore with split oil ring not fixed on a rotating shaft
- Y Lobed bearing with two sliding surfaces without oil ring
- V Lobed bearing with four sliding surfaces without oil ring

4.5 Thrust bearing

- Q Without sliding surfaces [non-locating (free) bearing]
 - B Plain sliding surfaces with oil grooves (guide bearing)
 - K Wedge surfaces
 - A Tilting pads
- } (design and dimensions at the manufacturer's discretion)

4.6 Seal

The type and dimensions shall be subjected to agreement.

5 Dimensions

The dimensions of [Table 1](#) and [Table 2](#) (see [Figure 1](#) and [Figure 2](#)) shall apply.

The pillow blocks are not expected to conform to the designs illustrated in [Figure 1](#) and [Figure 2](#); conformance is only required with respect to the dimensions specified.

NOTE Unless otherwise specified, all dimensions are given in millimetres.

Details which are not specified shall be chosen as appropriate.

6 Shaft design

The dimensions of [Table 3](#) and [Table 4](#) (see [Figure 3](#) and [Figure 4](#)) shall apply.

7 Materials

The materials shall meet the following criteria.

- The housing shall be of grade 300 in accordance with ISO 185; other materials may be used subject to agreement.
- Half-bearing: the bearing back shall be of:

S235 B in accordance with ISO 630-2,	}	type of material at the manufacturer's discretion
C10R or C15R in accordance with ISO 683-3, or		
GE 200 or GS 200 in accordance with ISO 14737		
- The bearing metal shall be tin-casting-alloy in accordance with ISO 4381, or subject to agreement.
- The seal shall be made of copper alloy, aluminium alloy or plastic, subject to agreement.
- The oil ring, not fixed on rotating shaft, shall be made of copper-zinc alloy in accordance with ASTM B124/B124M, or subject to agreement.

8 Design

8.1 General tolerances

General tolerances shall be as follows.

- For machined surfaces, general tolerances shall be in accordance with ISO 2768-1 and ISO 2768-2 — mH.
- For unmachined surfaces, general tolerances shall be in accordance with ISO 8062-3 — DCTG 9 (for grade 300), or corresponding standards for other materials agreed upon.

8.2 Surface roughness

Surface roughness shall be in accordance with ISO 1302.

The pillow block shall meet the following criteria:

- mounted surfaces: $R_a = 3,2 \mu\text{m}$;
- sliding surfaces: $R_a = 0,8 \mu\text{m}$.

For the shaft, see [Table 3](#) and [Table 4](#), footnote a.

8.3 Housing

The following applies to the housing.

- The pillow block housing shall be equipped with lifting eye bolts or means of conveyance at the manufacturer's discretion.
- The inner surfaces of the housing shall be clean and shall have a coat of paint resistant to oil and solvents.
- The outer surfaces of the housing shall be protected against corrosion.
- For the purpose of pressure compensation, the individual oil spaces within the pillow block housing shall be connected to each other by means of appropriate openings above the oil level.
- All bearing housing connections shall be provided on both sides; other connecting dimensions and arrangements than those given in [Figure 1](#) and [Figure 2](#) as well as additional connections shall be subject to agreement.
- The type of inspection plate shall be at the manufacturer's discretion.
- Two lifting screws shall be provided at housing base at the manufacturer's discretion.
- Bolts and screws for housing parts and seals shall be supplied, at the manufacturer's discretion.
- Bolts and screws and dowel pins for the housing base do not form part of the delivery.

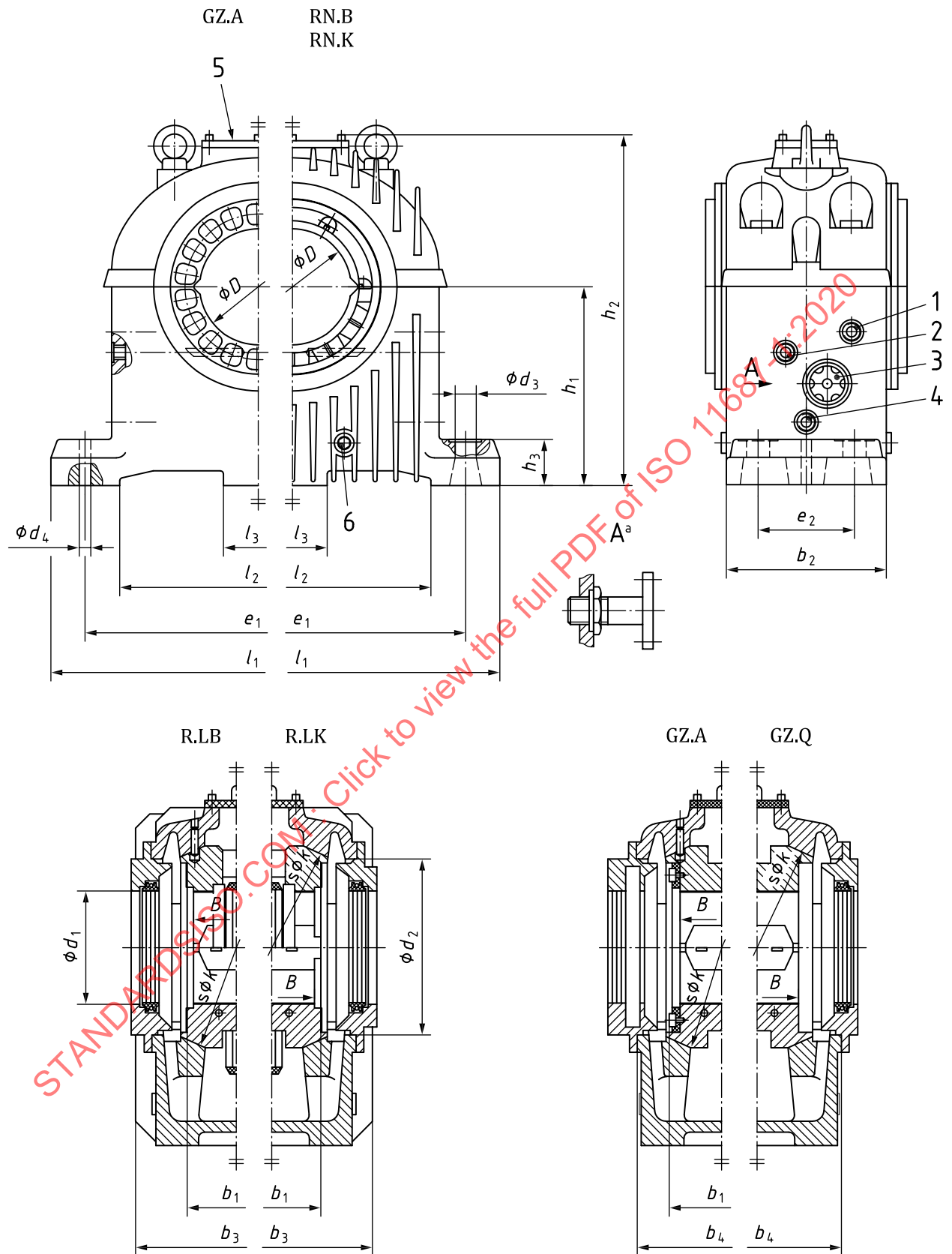
8.4 General

- Particular agreements shall be made for applications under special conditions (e.g. inclined positions).
- For chamfered edges, the type of edge chamfering shall be at the manufacturer's discretion.
- If the bearing is only applicable to one direction of rotation, a directional arrow shall be provided.

9 Designation

EXAMPLE Designation of a pillow block of size 14, shaft diameter 125 mm, housing with cooling fins (R), for recirculating oil lubrication with external cooling of oil (Z), circular cylindrical bore with split oil ring not fixed on a rotating shaft for emergency run (L) and thrust bearing with wedge surfaces (K):

Pillow block ISO 11687-1 — 14 — 125 — RZLK



Key

- 1 oil inlet (recirculating plant, circulation pump), see Table 1, size d_5
- 2 thread G 1/2 connection for thermoprobe
- 3 oil-level indicator or oil drainage for recirculating plant, see Table 1, size d_6

- 4 screw plug (connection for radiator, oil-sump thermometer, suction line of circulation pump, finned cooler)
 5 inspection plate
 6 oil drain plug
 a Example of oil drain.

Figure 1 — Examples of pillow blocks — Size range 9 to 28

Table 1 — Pillow blocks — Size range 9 to 28

Size	9			11			14			18			22			28		
D H_7^a	80	90	100	100	110	125	125	140	160	160	180	200	200	225	250	250	280	300
B^b	60			80			105			135			170			215		
b_1	80			100			125			160			200			250		
b_2	145			165			205			245			310			370		
b_3	190			205			255			300			380			450		
b_4	150			170			215			255			320			380		
d_1 (nominal dimension seal)	80			100			125			160			200			250		
	90			110			140			180			225			280		
	100			125			160			200			250			315		
	110			140			180			225			280			355		
d_2	150			180			230			275			340			440		
d_3	22			26			30			40			46			55		
	for M16			for M20			for M24			for M30			for M36			for M42		
d_4^c	10,4			10,4			10,4			15,5			15,5			20,6		
d_5^d	G 3/8			G 3/8			G 3/8			G 1/2			G 3/4			G 3/4		
d_6^d	G 1 1/4			G 1 1/4			G 1 1/2			G 1 1/2			G 2			G 2 1/2		
e_1	300			375			450			560			670			800		
e_2	90			100			125			150			200			250		
h_1	0			190			225			265			315			375		
	-0,5																	
h_2	325			380			460			565			680			830		
h_3	35			50			60			70			80			90		
l_1	355			450			540			660			800			950		
l_2	215			280			340			440			540			650		
l_3	28			30			40			50			60			85		
k^e h6	190			212			280			335			425			530		

NOTE See Figure 1.

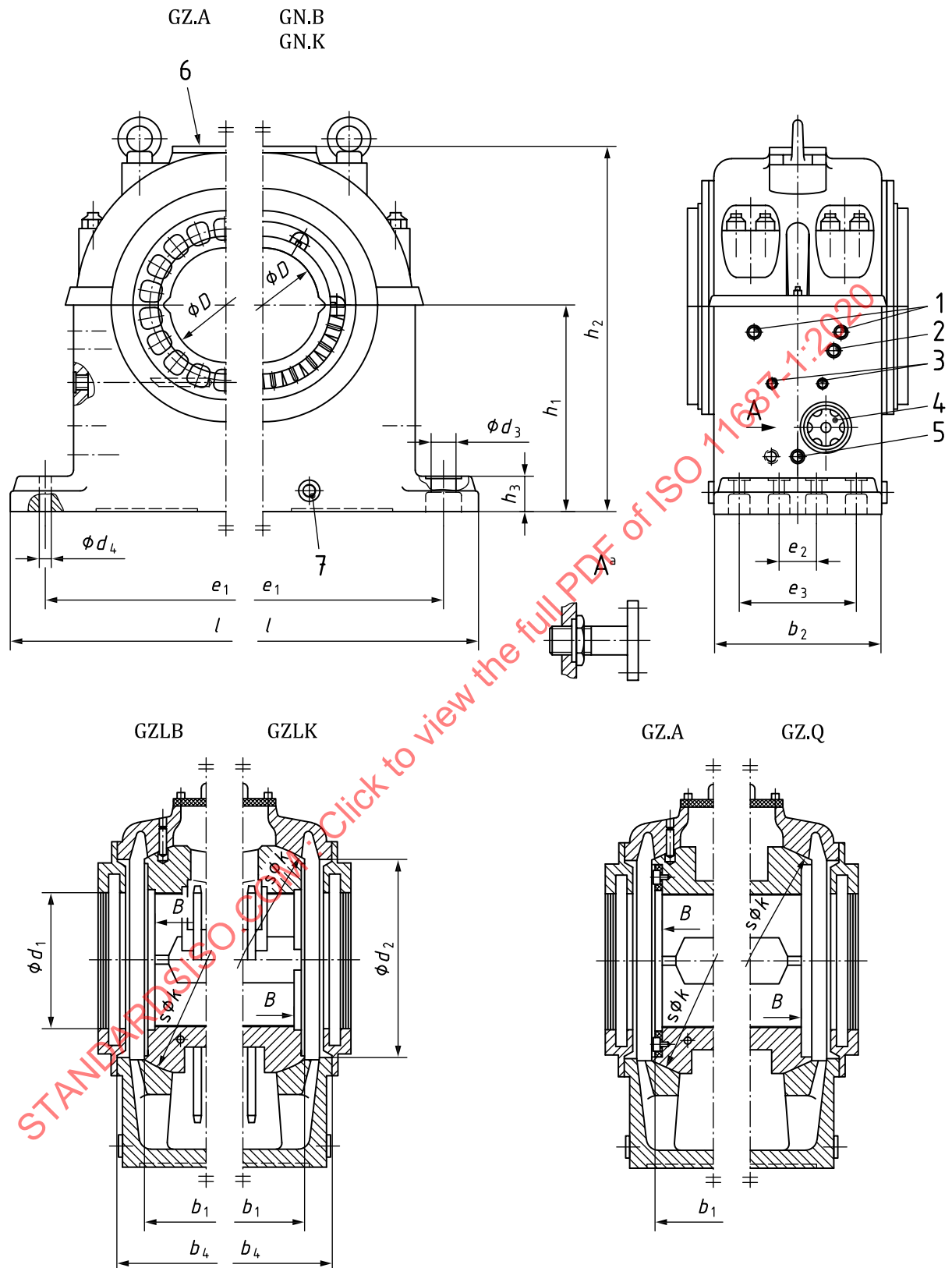
^a Applies only to circular cylindrical bores.

^b For the design with thrust bearing part (A), dimensions B may slightly deviate in order to obtain (depending on the type of tilting pad) a constant dimension b_1 (interchangeability of the half-bearing shell).

^c Rough bore for pinned fitting.

^d If larger connections are necessary, this shall be the subject of a special agreement.

^e The fit of the half-bearing and housing shall be a transition fit or shall be subject to agreement.



Key

- 1 oil inlet for thrust bearing part (A), see [Table 2](#), size d_5
- 2 oil inlet (recirculating plant, circulation pump), see [Table 2](#), size d_5
- 3 thread G 1/2 connection for thermoprobe
- 4 oil-level indicator or oil drainage for recirculating plant, see [Table 2](#), size d_6

- 5 screw plug (connection for radiator, oil-sump thermometer, suction line of circulation pump, finned cooler)
- 6 inspection plate
- 7 oil drain plug
- ^a Example of oil drain.

Figure 2 — Examples of pillow blocks — Size range 35 to 71

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Table 2 — Pillow blocks — Size range 35 to 71

Size		35							45							56							71						
D	H ₇ ^a	300	315	335	355	375	400	375	400	425	450	475	500	475	500	530	560	600	630	600	630	670	710	750	800				
B ^b		260							325							415							530						
b ₁		300							375							475							600						
b ₂		440							530							640							780						
b ₄		460							550							660							810						
d ₁ (nominal dimension seal)		300							375							475							600						
		315							400							500							630						
		335							425							530							670						
		355							450							560							710						
		375							475							600							750						
		400							500							630							800						
		425							530							670							850						
d ₂		520							660							800							985						
d ₃		55							62							62							66						
		for M42							for M48							for M48							for M56						
d ₄ ^c		20,5							20,5							25,5							25,5						
d ₅ ^d		G 3/4							G 3/4							G 1							G 1						
d ₆ ^d		G 2 1/2							G 2 1/2							G 3							G 3						
e ₁		950							1 150							1 400							1 800						

NOTE See Figure 2.

^a Applies only to circular cylindrical bores.^b For the design with thrust bearing part (A), dimension B may slightly deviate in order to obtain (depending on the type of tilting pad) a constant dimension b_1 (interchangeability of the half-bearing shell).^c Rough bore for pinned fitting.^d If larger connections are necessary, this shall be the subject of a special agreement.^e Size range 35 and 45: 6 plate screws; size range 56 and 71: 8 plate screws.^f The fit of the half-bearing and housing shall be a transition fit or shall be subject to agreement.

Table 2 (continued)

Size	35	45	56	71
e_2^d	—	—	150	200
e_3^e	300	355	450	560
h_1 0 -0,5	530	600	670	750
h_2	940	1 135	1 280	1 515
h_3	95	120	130	160
l	1 100	1 350	1 600	2 000
k^f	h6	800	950	1 180

NOTE See Figure 2.

^a Applies only to circular cylindrical bores.

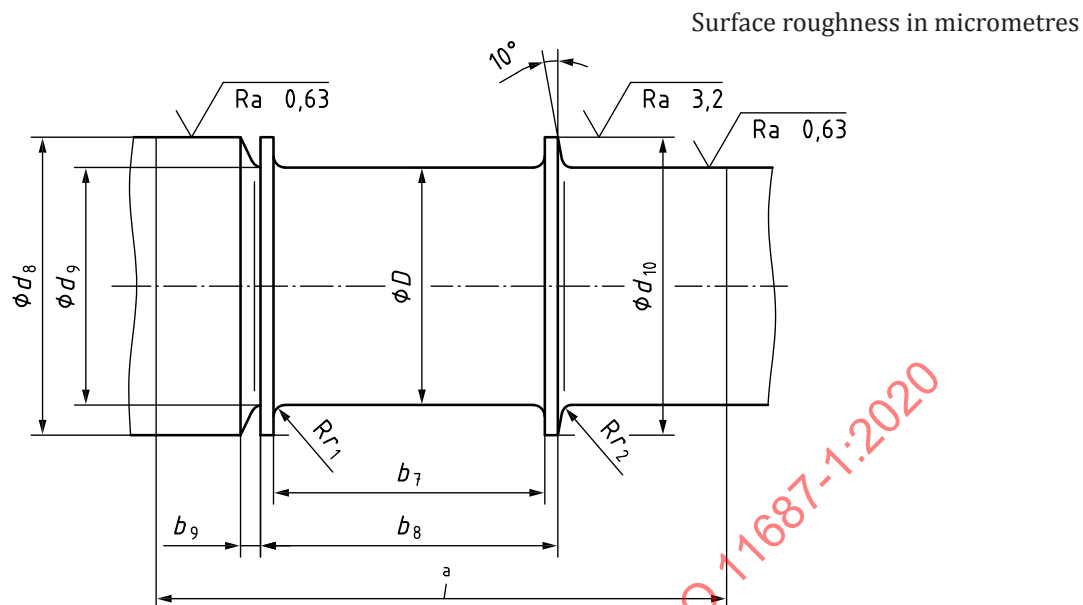
^b For the design with thrust bearing part (A), dimension B may slightly deviate in order to obtain (depending on the type of tilting pad) a constant dimension b_1 (interchangeability of the half-bearing shell).

^c Rough bore for pinned fitting.

^d If larger connections are necessary, this shall be the subject of a special agreement.

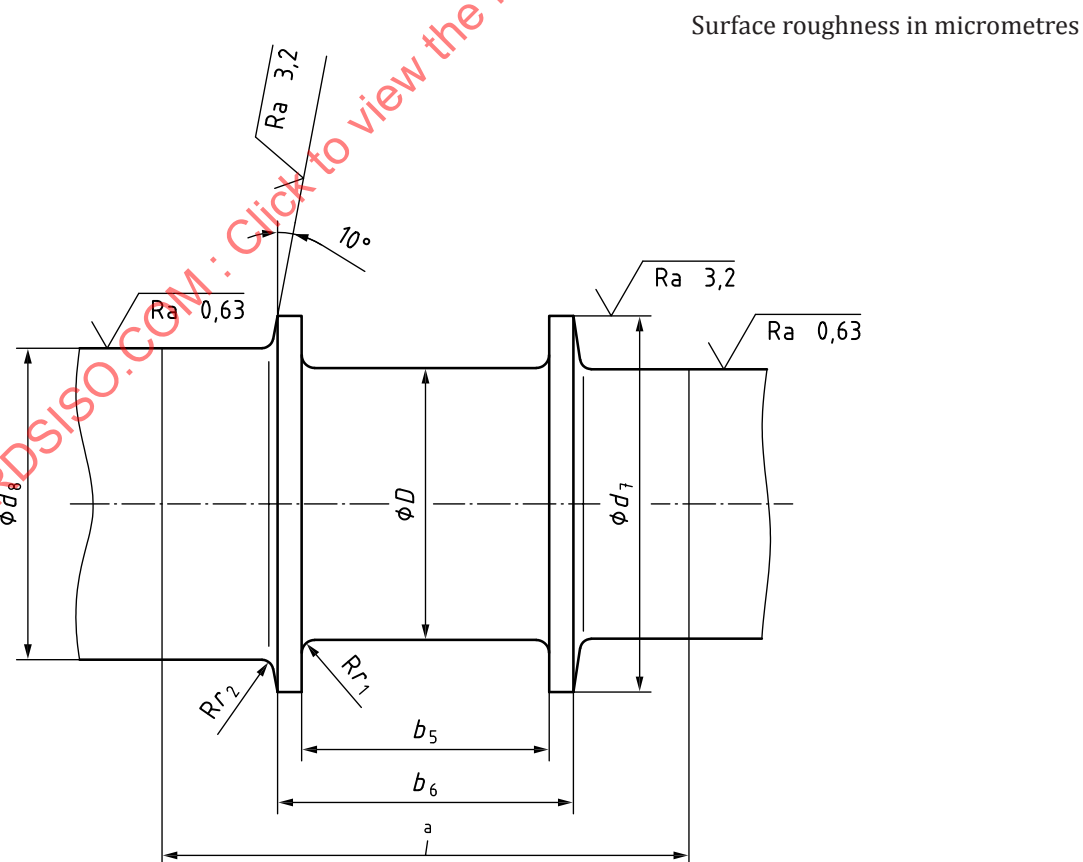
^e Size range 35 and 45: 6 plate screws; size range 56 and 71: 8 plate screws.

^f The fit of the half-bearing and housing shall be a transition fit or shall be subject to agreement.



a Bearing width including seal.

Figure 3 — Shaft design for non-locating (free) bearing (thrust bearing part Q)



a Bearing width including seal.

Figure 4 — Shaft design for fixed bearing (thrust bearing parts A, B and K)

Table 3 — Shaft dimensions — Size range 9 to 28

Size			9			11			14			18			22			28		
D^a			80	90	100	100	110	125	125	140	160	160	180	200	200	225	250	250	280	300
b_5^b ±0,1			80,4			100,4			125,4			160,4			200,4			250,4		
b_6			100			120			150			190			240			300		
b_7^c			90			110			140			180			220			280		
b_8			100			120			150			190			240			300		
b_9^d			5			6			8,5			10			13,5			19		
d_7	thrust bearing parts	B, K	110	120	130	135	150	160	170	190	200	215	240	250	265	290	315	325	355	375
		A	132	142	143	157	162	168	192	207	217	244	264	273	308	328	339	378	408	408
$d_8; d_9^d$ e8			d_8		d_9	d_8		d_9	d_8		d_9	d_8		d_9	d_8		d_9	d_8		d_9
			80		80	100		100	125		125	160		160	200		200	250		250
			90		80	110		100	140		125	180		160	225		200	280		250
			100		90	125		110	160		140	200		180	250		225	315		280
			110		100	140		125	180		160	225		200	280		250	355		315
d_{10}			90	100	110	110	125	140	140	160	180	180	200	225	225	250	280	280	315	315
r_1^e			2,5			2,5			4			4			6			6		
r_2^e			4			4			6			6			10			10		

NOTE See Figures 3 and 4.

^a Limit deviations for shafts and tolerances of form and position and surface roughness shall be in accordance with ISO 12129-1 and ISO 12129-2.

^b Normal axial clearance of 0,5 mm is provided for size range 9 to 28 and 0,6 mm for size range 35 to 71. If a change in direction of the axial loads or axial thrusts is to be expected, dimension b_5 may be reduced by 0,2 mm for size range 9 to 28 and by 0,3 mm for size range 35 to 71. If a fixed bearing (thrust bearing parts B, K) is only needed for the test run, dimension b_5 may be increased.

^c If the non-locating (free) bearing (thrust bearing part Q) has to allow major axial movements (e.g. due to thermal expansion or large constitutional axial clearance), dimension b_7 may be increased.

^d The clearance groove d_9 may be omitted if the diameter d_8 is equal to or smaller than the shaft diameter D .

^e The radii r_1 and r_2 may be replaced by an undercut.