INTERNATIONAL STANDARD

ISO 11687-1

First edition
1995-02-01

Plain bearings — Pedestal plain bearings —

Part 1:
Pillow blocks

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

Reference number
ISO 11687-1:1995(E)

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.

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.

International Standard ISO 11687-1 was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 3, *Dimensions, tolerances and construction details*.

ISO 11687 consists of the following parts, under the general title *Plain bearings — Pedestal plain bearings*:

— *Part 1: Pillow blocks*

— *Part 2: Side flange bearings*

— *Part 3: Centre flange bearings*

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

Plain bearings — Pedestal plain bearings —

Part 1:
Pillow blocks

1 Scope

This part of ISO 11687 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 standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 11687. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11687 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 185:1988, *Grey cast iron — Classification.*

ISO 426-1:1983, *Wrought copper-zinc alloys — Chemical composition and forms of wrought products — Part 1: Non-leaded and special copper-zinc alloys.*

ISO 426-2:1983, *Wrought copper-zinc alloys — Chemical composition and forms of wrought products — Part 2: Leaded copper-zinc alloys.*

ISO 630:1980, *Structural steels.*

ISO 683-11:1987, *Heat-treatable steels, alloy steels and free-cutting steels — Part 11: Wrought case-hardening steels.*

ISO 1302:1992, *Technical drawings — Method of indicating surface texture.*

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

ISO 2768-2:1989, *General tolerances — Part 2: Geometrical tolerances for features without individual tolerance indications.*

ISO 3755:1991, *Cast carbon steels for general engineering purposes.*

ISO 4381:1991, *Plain bearings — Lead and tin casting alloys for multilayer plain bearings.*

ISO 8062:1994, *Castings — System of dimensional tolerances and machining allowances.*

ISO 12129-1:—[1], *Plain bearings — Part 1: Fits.*

ISO 12129-2:—[1], *Plain bearings — Part 2: Tolerances on form and position and surface roughness for shafts, flanges and thrust collars.*

1) To be published.

3 Types of pillow block

According to their design, pillow blocks can be devised as follows, each characteristic being designated by a letter symbol.

Housing:

G Pillow block, without cooling fins

R Pillow block, with cooling fins

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

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

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)

Seal:

Type and dimensions subject to agreement

Figures 1 and 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 figures 1 and 2 explain only the type illustrated; the complete type required shall be specified in the above-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 3.

4 Dimensions

See figures 1 to 4 and tables 1 to 4.

The pillow blocks are not expected to conform to the designs illustrated in figures 1 and 2; compliance is only required with respect to the dimensions specified.

NOTE 1 All dimensions are given in millimetres

Details which are not specified shall be chosen as appropriate.

5 Shaft design

See figures 3 and 4 and tables 3 and 4.

6 Materials

Housing:

Grade 300 in accordance with ISO 185; other materials subject to agreement

Half-bearing:

Bearing back:

Fe 360 B in accordance with ISO 630

C10 or C15 E 4 in accordance with ISO 683-11

200 to 400 in accordance with ISO 3755

} Type of material at the manufacturer's discretion

Bearing metal:

Lead-tin-alloy in accordance with ISO 4381, or subject to agreement

Seal:

Copper alloy, aluminium alloy or plastic, subject to agreement

Oil ring, not fixed on rotating shaft:

Copper-zinc alloy in accordance with ISO 426, or subject to agreement

7 Design

General tolerances:

For machined surfaces:

ISO 2768-1 and ISO 2768-2 - mH

For unmachined surfaces:

ISO 8062 - CT 9 (for grade 300), or corresponding standards for other materials agreed upon.

Surface roughness in accordance with ISO 1302:

Pillow block:

Mounted surfaces: $R_a = 3{,}2\ \mu m$
Sliding surfaces: $R_a = 0{,}8\ \mu m$

Shaft:

See tables 3 and 4, footnote 1.

Housing:

Pillow block housing 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 on both sides; other connecting dimensions and arrangements than those given in figures 1 and 2 as well as additional connections subject to agreement.

Type of inspection plate at the manufacturer's discretion.

With two pull-off screws at housing base at the manufacturer's discretion.

With bolts and screws for housing parts and seals, at the manufacturer's discretion.

Bolts and screws and dowel pins for the housing base do not form part of the delivery.

General:

Particular agreements shall be made for applications under special conditions (e.g. inclined positions).

Chamfered edges: type of edge chamfering at the manufacturer's discretion.

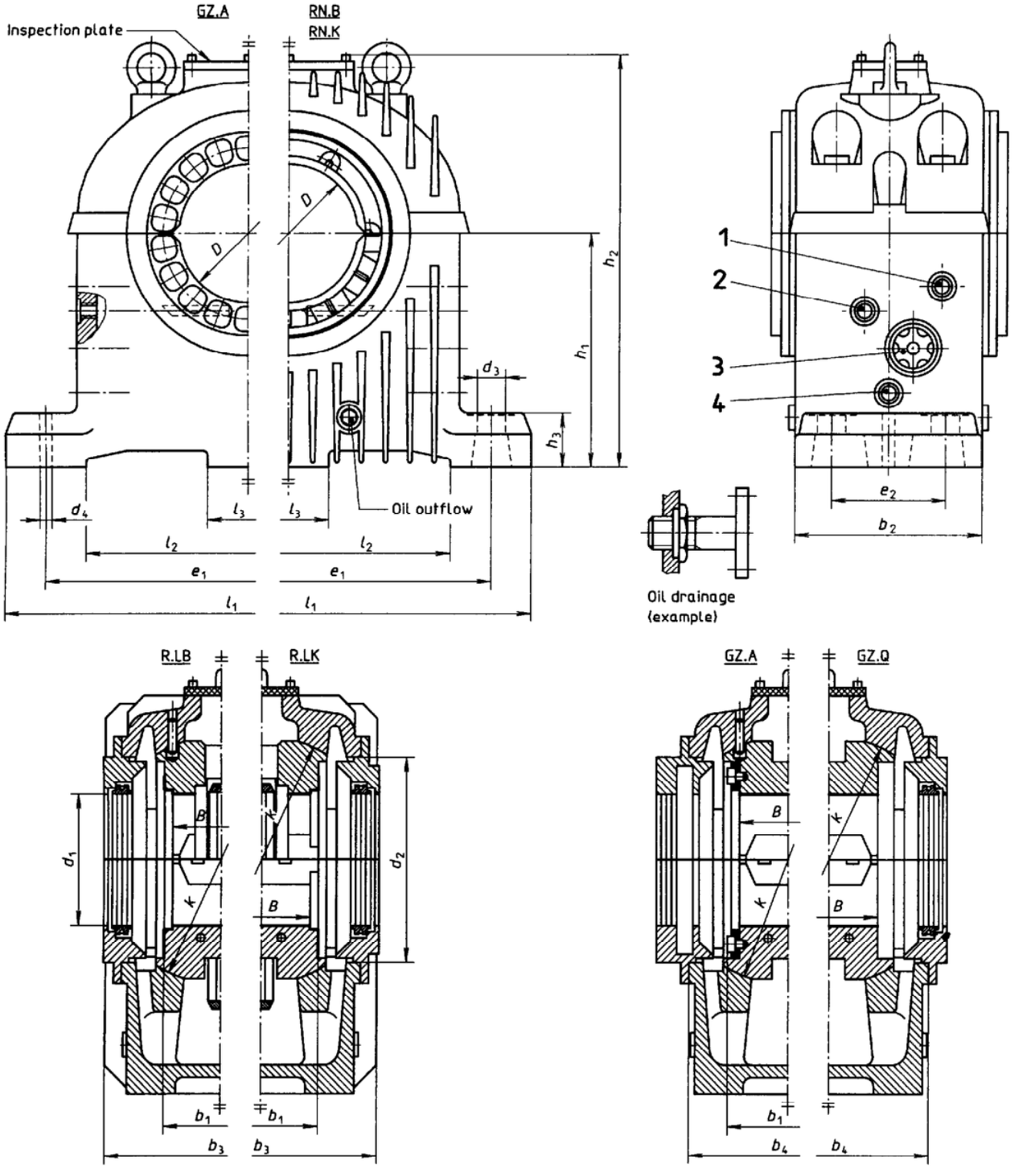
If the bearing is only applicable to one direction of rotation, a directional arrow shall be provided.

8 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 d_5 Oil inlet (recirculating plant, circulation pump)

2 Thread G 1/2 Connection for thermoprobe

3 d_6 Oil-level indicator or oil drainage for recirculating plant

4 Screw plug (connection for radiator, oil-sump thermometer, suction line of circulation pump, finned cooler)

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

Table 1 — Pillow blocks — Size range 9 to 28 (see figure 1)

Size	9			11			14			18			22			28		
D H7 [1]	80	90	100	100	110	125	125	140	160	160	180	200	200	225	250	250	280	300
B [2]	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 90 100 110			100 110 125 140			125 140 160 180			160 180 200 225			200 225 250 280			250 280 315 355		
d_2	150			180			230			275			340			440		
d_3	22 for M16			26 for M20			30 for M24			40 for M30			46 for M36			55 for M42		
d_4 [3]	10,4			10,4			10,4			15,5			15,5			20,6		
d_5 [4]	G 3/8			G 3/8			G 3/8			G 1/2			G 3/4			G 3/4		
d_6 [4]	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 $^{0}_{-0,5}$	190			225			265			315			375			450		
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		
ϕk [5] (spherical) h6	190			212			280			335			425			530		

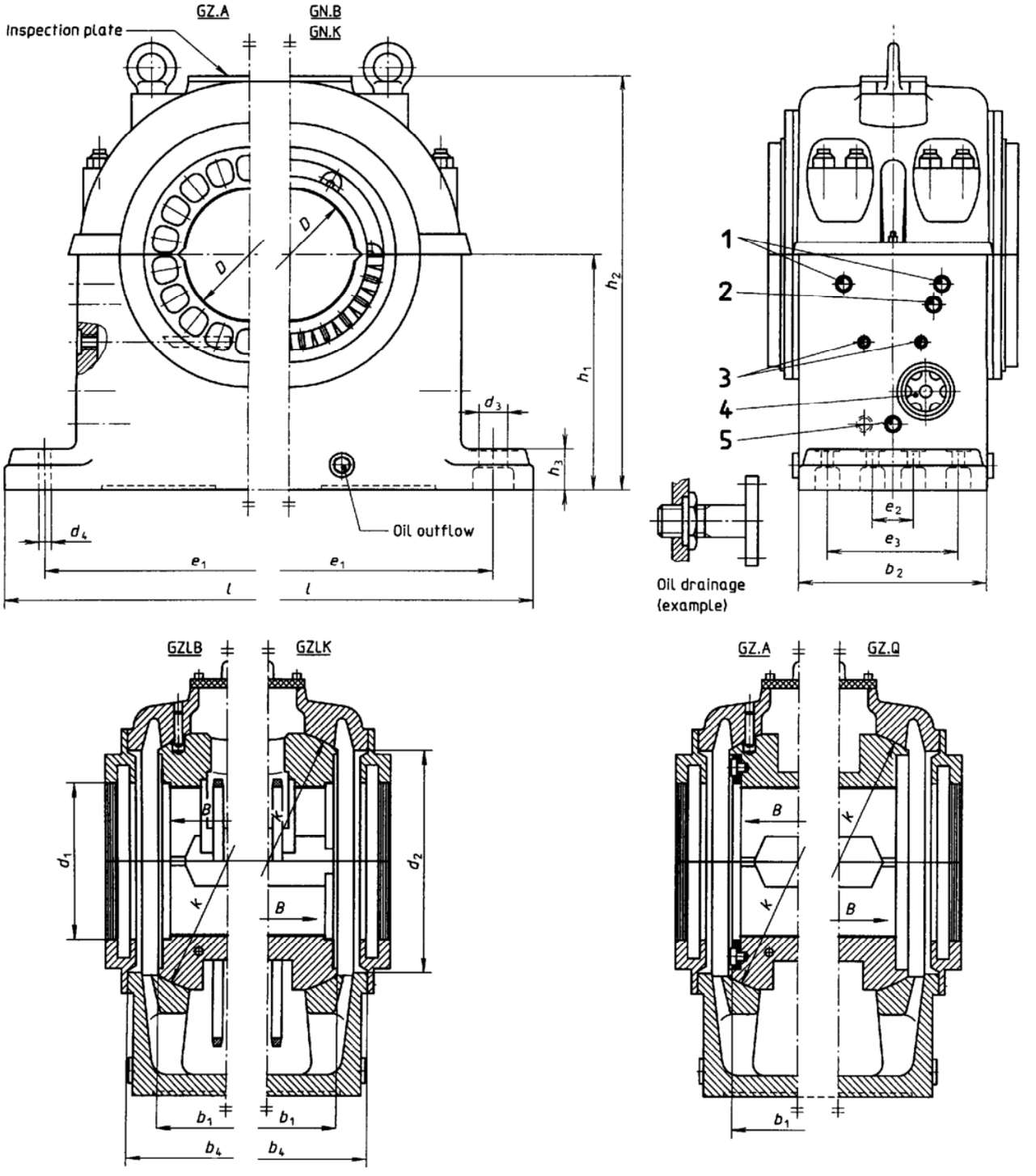
1) Applies only to circular cylindrical bores.

2) 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).

3) Rough bore for pinned fitting.

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

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



Key

1 d_5 Oil inlet for thrust bearing part (A)

2 d_5 Oil inlet (recirculating plant, circulation pump)

3 Thread G 1/2 Connection for thermoprobe

4 d_6 Oil-level indicator or oil drainage for recirculating plant

5 Screw plug (connection for radiator, oil-sump thermometer, suction line of circulation pump, finned cooler)

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

Table 2 — Pillow blocks — Size range 35 to 71 (see figure 2)

Size	35					45					56					71				
D H7 [1]	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 [2]	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)	300 315 335 355 375 400 425						375 400 425 450 475 500 530 560						475 500 530 560 600 630 670 710						600 630 670 710 750 800 850 900					
d_2	520						660						800						985					
d_3	55 for M42						62 for M48						62 for M48						66 for M56					
d_4 [3]	20,5						20,5						25,5						25,5					
d_5 [4]	G 3/4						G 3/4						G 1						G 1					
d_6 [4]	G 2 1/2						G 2 1/2						G 3						G 3					
e_1	950						1150						1400						1800					
e_2 [5]	—						—						150						200					
e_3 [5]	300						355						450						560					
h_1 $^{0}_{-0,5}$	530						600						670						750					
h_2	940						1135						1280						1515					
h_3	95						120						130						160					
l	1 100						1 350						1 600						2 000					
ϕk [6] (spherical) h6	630						800						950						1180					

1) Applies only to circular cylindrical bores.

2) 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).

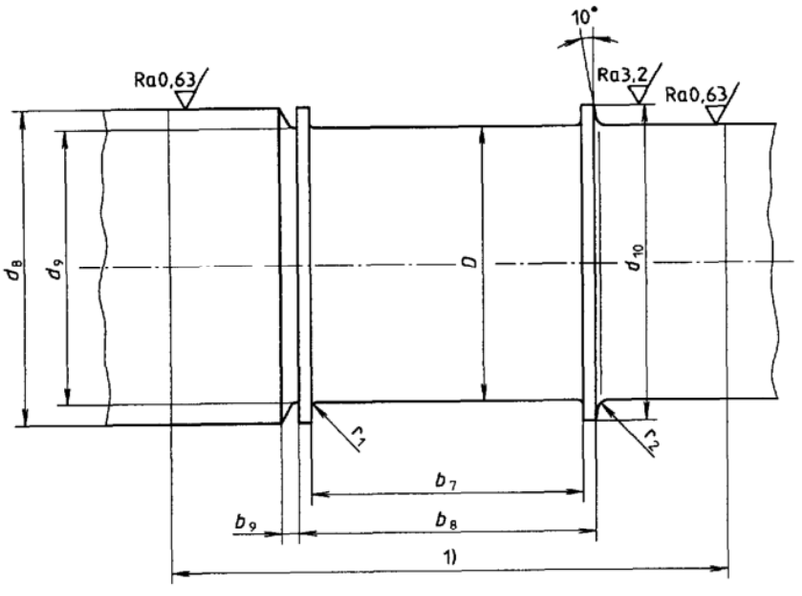
3) Rough bore for pinned fitting.

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

5) Size range 35 and 45: 6 plate screws; size range 56 and 71: 8 plate screws.

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

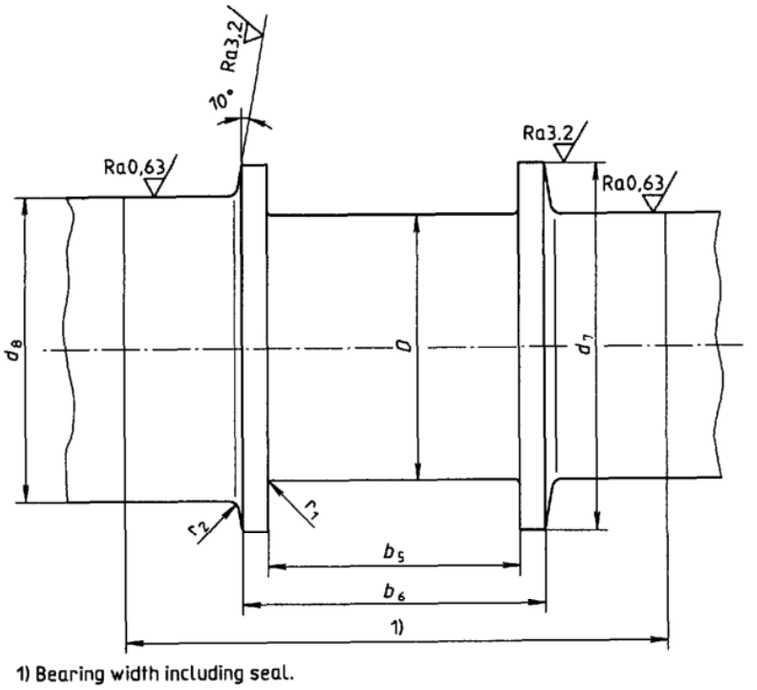
Surface roughness in micrometres



1) Bearing width including seal.

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

Surface roughness in micrometres



1) 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 (see figures 3 and 4)

Size		9			11			14			18			22			28		
D [1]		80	90	100	100	110	125	125	140	160	160	180	200	200	225	250	250	280	300
b_5 [2]	± 0,1	80,4			100,4			125,4			160,4			200,4			250,4		
b_6		100			120			150			190			240			300		
b_7 [3]		90			110			140			180			220			280		
b_8		100			120			150			190			240			300		
b_9 [4]		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 [4] 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 [5]		2,5			2,5			4			4			6			6		
r_2 [5]		4			4			6			6			10			10		

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

2) 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.

3) 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.

4) The clearance groove d_9 may be omitted if it is equal to or smaller than the shaft diameter D.

5) The radii r_1 and r_2 may be replaced by an undercut.

Table 4 — Shaft dimensions — Size range 35 to 71 (see figures 3 and 4)

Size		35					45					56					71					
D [1]		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_5 [2]	± 0,1	300,5						375,5						475,5						600,5					
b_6		360						445						555						690					
b_7 [3]		315						400						500						630					
b_8		335						425						530						670					
b_9 [4]		10						13						16						20					
d_7	Thrust bearing parts B, K	385	400	425	450	470	495	480	505	530	555	580	605	590	615	645	675	715	745	725	755	795	835	875	925
	Thrust bearing parts A	455	470	490	510	—	—	570	595	620	645	—	—	715	740	770	755	—	—	895	925	965	955	—	—
d_8 ; d_9 [4] e8		d_8	d_9					d_8	d_9					d_8	d_9					d_8	d_9				
		300	300					375	375					475	475					600	600				
		315	300					400	375					500	475					630	600				
		335	315					425	400					530	500					670	630				
		355	335					450	425					560	530					710	670				
		375	355					475	450					600	560					750	710				
		400	375					500	475					630	600					800	750				
		425	400					530	500					670	630					850	800				
								560	530					710	670					900	850				
d_{10}		335	355	375	400	425	450	425	450	475	500	530	560	530	560	600	630	670	710	670	710	750	800	850	900
r_1 [5]		8						10						10						10					
r_2 [5]		12						16						16						16					

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

2) 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 part B, K) is only needed for the test run, dimension b_5 may be increased.

3) 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.

4) The clearance groove d_9 may be omitted if it is equal to or smaller than the shaft diameter D.

5) The radii r_1 and r_2 may be replaced by an undercut.

ICS 21.100.10

Descriptors: bearings, plain bearings, specifications, materials specifications, manufacturing requirements, dimensions, designation.

Price based on 10 pages