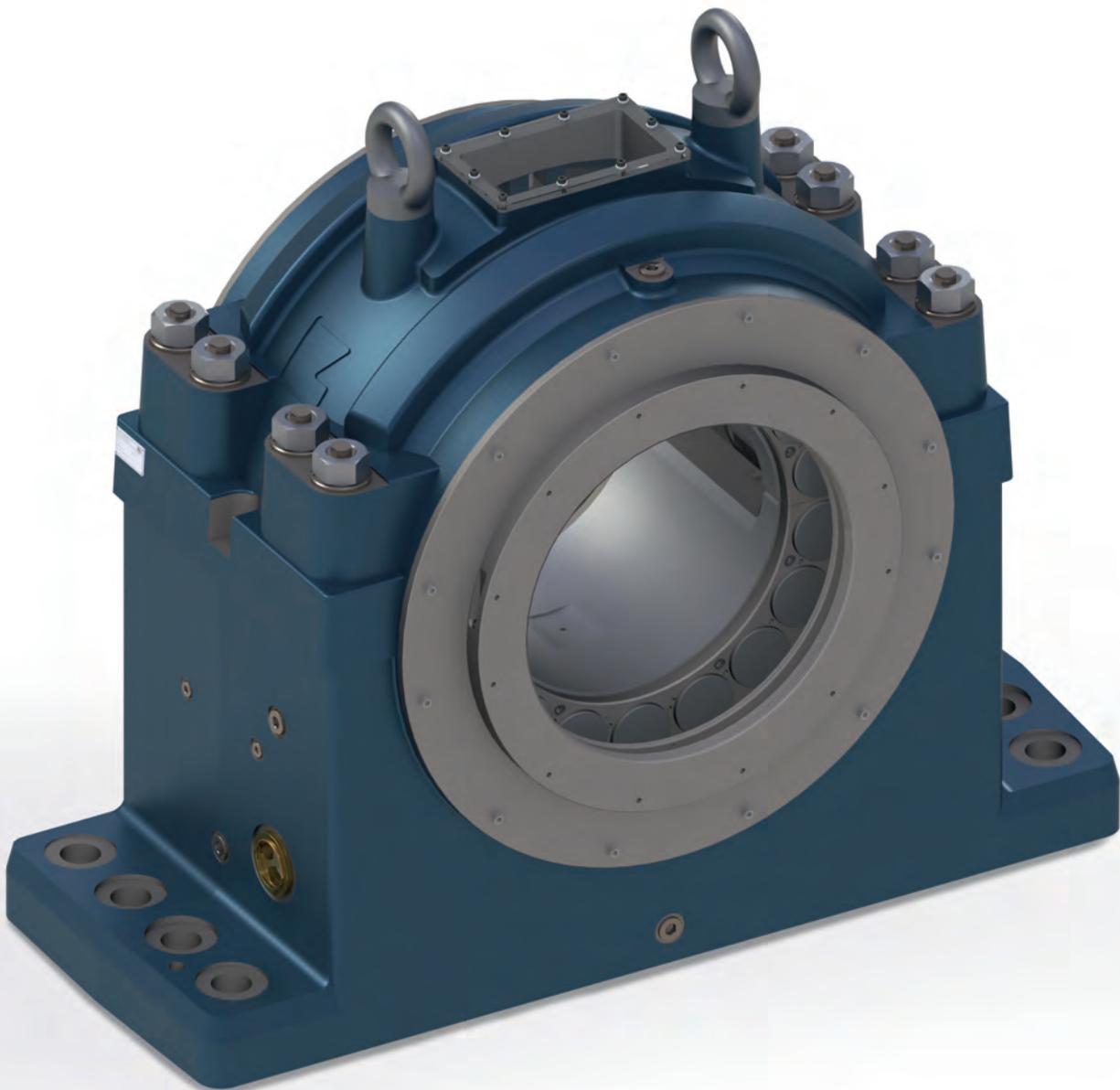


Miba Industrial Bearings Pedestal Bearing ZR/ZG





Miba Industrial Bearings

The Industrial Bearing Branch of the Miba Bearing Group produces hydrodynamic bearings and labyrinth seals for use in mechanical and plant engineering which are used in a wide range of high-performance applications.

Our highly inspired teams, work diligently to serve our customers the best bearing solutions for each and every application.

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Description of the pedestal bearing

The Miba pedestal horizontal bearing (type ZR and ZG) is designed according to DIN 31690 norm specifications for a wide range of heavy duty applications (electrical machines, turbines, blowers and test rigs). The modular system applies to the different types of bearings (pedestal, end flange and center flange), i.e. it is always possible to combine different modules of this system such as shell, lubricating ring and other equipment. Thus, assembly is simple and mistakes due to the positioning of screws and pins are avoided during installation, commissioning and maintenance procedures.

Housing

The bearing housings are finned (size 35) or smooth (sizes 45, 56, 71) and manufactured from nodular cast iron EN-GJS-400-15 (formerly GGG 40) giving high strength. Upon request, they can be supplied in gray cast iron EN-GJL-300 (formerly GG 30) or in nodular cast iron EN-GJS-400-18-LT (formerly GGG 40.3). The spherical seat in the housing ensures easy alignment during assembly and the loads are evenly distributed into the lower part of the housing. Therefore, these bearings are designed for high-stress applications. Thread holes for monitoring the temperature, for oil inlet and outlet, as well as for oil level, are provided on both sides of the housing as standard. The housing comes with an oil

sight glass on one side. The opposite side is supplied plugged and may be used as an oil outlet. If needed, their positions can be exchanged by reversing these parts. In the top half of the housing, a sight glass, which permits the loose oil ring to be viewed, and a plugged manual oil feeder are provided. The basic design can be easily amended, if required, to incorporate water cooling tubes, oil sump heater, vibration detectors (angled at 45°), horizontal, vertical and axial vibration sensors and earthing devices. Upon request, thread holes can be provided in the ZR housing to meet all 541 and 546 requirements for API norms.

Bearing shells

The shell is supplied in halves and spherically seated in the housing, ensuring easy self-alignment during assembly. The material is low carbon steel, lined with high tin-based white metal. This construction ensures an easy assembly and a long life cycle. Bearing shells with plain cylindrical bore and loose oil ring are used in most cases, but other shapes of bore are possible. When the specific load on start-up is too high, or for very slow speed applications, a hydrostatic jacking system can be incorporated. Bearing shells can be provided with or without thrust faces.

Q-type shells have no thrust capability for non-locating bearings.

B-type shells with plain white metal lined shoulders with oil grooves are suitable for small, temporary thrust loads.

K-type shells have taper land faces for medium thrust loads and both directions of rotation.

D-type shells, with taper land faces suitable for only one direction of rotation, are capable of absorbing higher thrust loads.

A-type shells, for the highest loads, are equipped with thrust tilting pads.



Oil supply

Fully self-contained lubrication is achieved by using a loose oil ring. Alternatively, where bearings are lubricated by an external oil circulation system, this loose oil ring can be used to permit an emergency shutdown without damage in case an oil system failure occurs. Z-bearings can be used for marine applications, where an oil ring guide assures proper lubrication even if extreme vessel motions occur.

Electrical insulation

To prevent stray currents conducted by the shaft, Z-bearings can optionally be supplied electrically insulated. In this case, the spherical seat of the housing is coated with a wear-resistant and temperature-resistant synthetic material. Upon request, a grounding wire is provided to short out this insulation, passing through a thread hole (Pg 7) in the housing.

Sealing

The seals are selected for the different operation conditions, environments and requested protection level. It can be a floating labyrinth seal (IP 44) made of high heat resistant fiber reinforced synthetic material or with adjustable rigid seals (IP 44) made of aluminum alloy. Both types of seals can be equipped with bolt-on baffles (IP 55) or dust flingers (IP 54) if the bearing is operating in a dusty or a wet environment, or if rotating parts (clutches, couplings, fans etc.) are fitted close to the bearing. Special seals offering higher protection, or pressurized seals etc., can be supplied for special applications upon request. An end cover is used when the end of the shaft is inside the bearing housing.

Temperature control

Provisions for the fitting of thermo sensors in the journal bush and oil sump are provided as standard. The type of sensor used depends on the type required by the readout equipment used (direct reading, centralized control system, recording instrument, etc.). For bearings with high thrust loads, additional thermometers for the thrust part can be integrated.

Selection of oil

It is recommended that any branded mineral oil which is inhibited against foaming, ageing and oxidation is used as lubricant. The viscosity is suggested by Miba Industrial Bearings if the customer doesn't have preferences.

Bearing calculation

Miba Industrial Bearings uses a state of the art calculation program which can provide the following outputs:

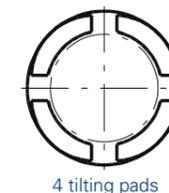
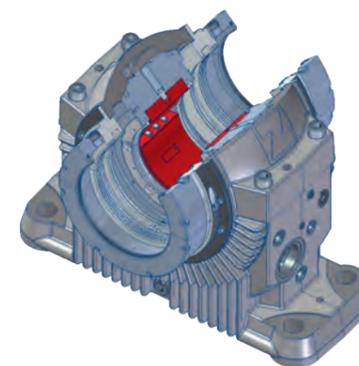
- Minimum oil film thickness
- Maximum hydrodynamic pressure
- Maximum bearing temperature
- Oil outlet temperature
- Minimum permissible oil flow
- Frictional power loss
- Stiffness and damping coefficients
- Clearance for bearing / shaft seat

Radial bore profile selection

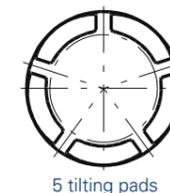
The radial bore profile type selection depends on several conditions. Among them we have the circumferential speed and the specific pressure. The following table should help in a preliminary selection.

1 // Type of radial bearing bore profile

Type of bore	Circumferential speed U (m/s)	Specific load p (MPa)
C/L/F Cylindrical	0 ... 30	0 ... 4
Y Two-lobe	25 ... 75	0 ... 3
V Four-lobe	25 ... 100	0 ... 2
K Radial tilting pads	15 ... 100	0 ... 2



4 tilting pads



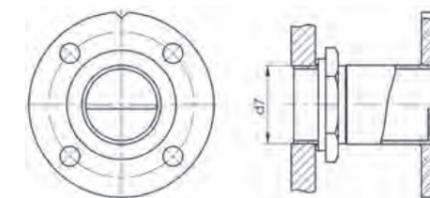
5 tilting pads

- MIBA housing bearings of all sizes 9 - 45 can be provided with tilting pad journal bearings for the highest demands
- Very high load capacity at highest circumferential speeds up to 100 m/s
- Highest stability properties

Oil flow

Z-bearings are supplied without oil inlet or outlet flanges. Upon request, as additional items, Miba Industrial Bearings can supply these flanges according to DIN 2573 or ANSI B16.5 norms. Oil outlet flanges with weir are to be mounted with the weir horizontal at the bottom. The mark on the flange will then be visible in the center of the top side.

Larger oil quantities with special outlets on request.



1 // Oil flow

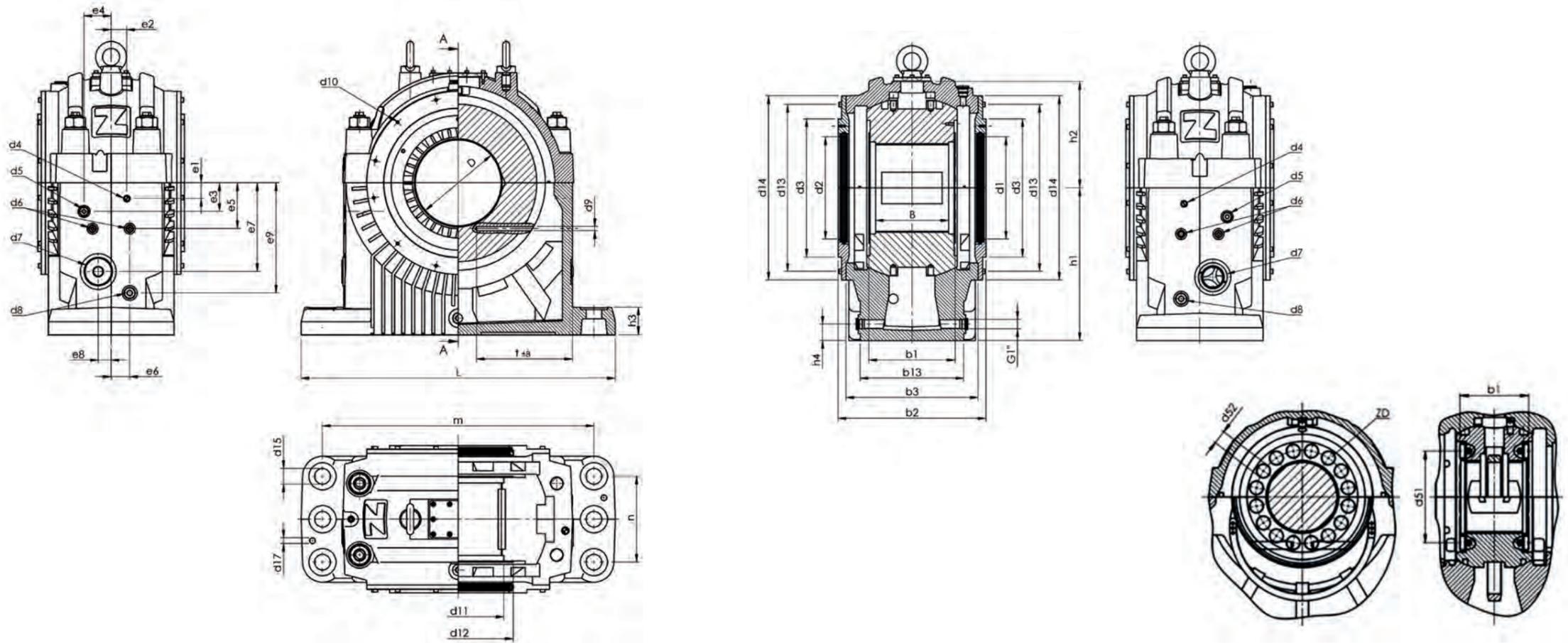
Size	Oil outlet thread Std	Maximum flow for oil ISO VG 32 and 46 at 40°C (l/min)	Maximum flow for oil ISO VG 68 and 100 at 40°C (l/min)	Oil outlet thread enlarged*	Maximum flow for oil ISO VG 32 and 46 at 40°C (l/min)	Maximum flow for oil ISO VG 68 and 100 at 40°C (l/min)
35	G3 (DN 80)	42	35	G4 (DN 100)	53	50
45	G3 (DN 80)	42	35	G4 (DN 100)	53	50
56	G3 (DN 80)	42	35	G4 (DN 100)	53	50
71	G3 (DN 80)	42	35	G4 (DN 100)	53	50

* nonstandard enlarged oil outlet threads for bigger oil quantity applications, upon request. Additional cost will be applied.

ZR bearing dimensions

1 // ZR bearing dimensions

Size	D (H7)	B	b1	b2	b3	b13	d1 and d2	d3	d5	d7	d8	d9	d10	d11	d12	d51	d52	d13	d14	d15	d17 ¹	e1	e2	e3	e4	e5	e6	e7	e8	e9	h1	h2	h3	h4	L	m	n	t	ZD tilting Pads per size	appr. weight (kg)	appr. Oil content (l)		
35	300	254	300	562	460	360	300; 315 335; 355 375; 400 425; 450	480	G3/4	G3	G1	18	M10 12(x)	320	385	390	63	600	640	55 to M42	20	55	55	120	95	190	65	310	45	385	530	370	95	57	1100	950	300	332	16	1300	33		
	315	254						480						335	400	405	63																						170			295	18
	335	254						480						355	425	425	63																						180			310	18
	355	254						480						375	445	445	63																						190			310	20
	375	264						525						395	455	455	50																						200			320	24
	400	264						525						420	470	470	50																						210			320	24
	425	264						525						445	515	-	-																						225			320	-
	450	264						525						-	-	-	-																						235			320	-



Thrust face type A

- d4 = Earthing device or plug - Pg7
- d5 = Oil inlet (oil circulation or recirculating pump)
- d6 = Provision for thermometer G 1/2"
- d7 = Oil sight glass or oil outlet (oil circulation)
- d8 = Plug (connection for heater, oil sump thermometer, water cooler)
- t = Depth of thermometer bore

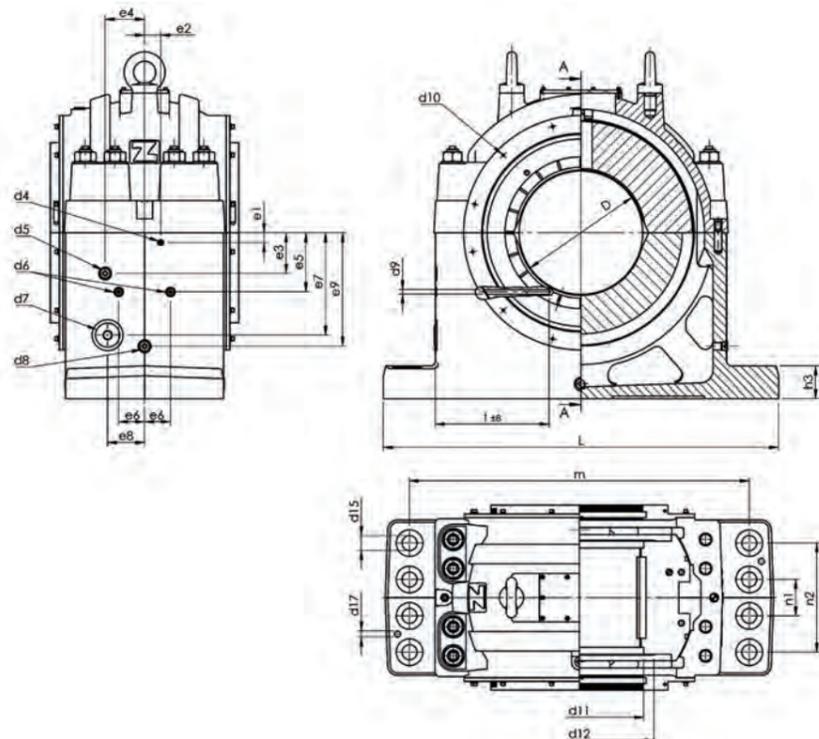
1) bore for dowel pin

Drawings shown here are for reference only. Some fin details, for example, may vary from size to size.

ZG bearing dimensions

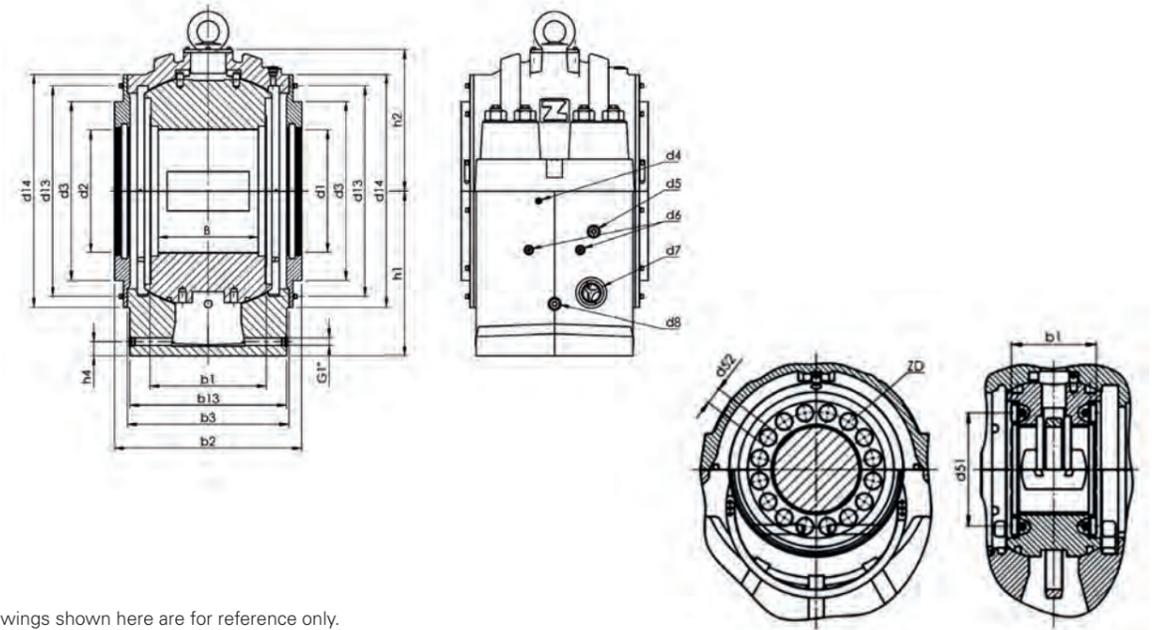
1 // ZG bearing dimensions

Size	D (H7)	B	b1	b2	b3	b13	d1 and d2	d3	d5	d7	d8	d9	d10	d11	d12	d51	d52	d13	d14	d15	d17 ¹	e1	e2	e3	e4	e5	e6	e7	e8	e9	h1	h2	h3	h4	L	m	n1	n2	t	ZD tilting pads per size	appr. weight (kg)	appr. Oil content (l)							
45	375	319						530						400	480	485	80								190		335													16									
	400	319						530						425	505	510	80								205		335														18								
	425	319						530						450	530	535	80								215		350														18								
	450	319					375; 400	600					M10	475	555	560	80							45	45	130	120	230	75	350	90	420	600	475	120	60	1350	1150	-	355	396		2300	63					
	475	329	375	652	550	530	425; 450	600	G3/4	G3	G1	18	12(x)	500	580	580	63		730	780	62 to M48	20				245		360																					
	500	329					475; 500	600						525	605	590	63									255		360																					
	530	329					530; 560	600						555	635	-	-									270		360																					
	560	329						600						585	635	-	-									285		360																					
56	475	409												505	590	610	100																										16						
	500	409												530	615	635	100																											18					
	530	409												560	645	665	100																												18				
	560	419	475	762	660	640	475; 500						M10	590	675	670	80									270		415	150	460	670	575	130	58	1600	1400	150	450	450		4000	76							
	600	419					530; 560	730	G1	G3	G1	18	12(x)	630	715	700	80		890	950	62 to M48	25	105	190	165	160	295	105	415	150	460																		
	630	429					600; 630							660	745	715	63																																
	670	429					670; 710							-	-	-	-																																
	710	429					750; 800							-	-	-	-																																
71	600	522												635	725	765	125																																
	630	522												665	755	795	125																																
	670	522												705	795	835	125											500																					
	710	534	600	912	810	780	600; 630						M10	745	835	850	100									320																							
	750	534					670; 710	2)	G1	G3	G1	18	12(x)	785	875	-	-		1076	1165	70 to M64	25	125	240	175	200	340	140		190	540	750	720	160	62	2000	1800	200	560	560		6400	125						
	800	549					750; 800							835	925	-	-																																
	850	549					850; 900							875	965	-	-																																
	900	549												910	980	-	-																																



- d4 = Earthing device or plug - Pg7
- d5 = Oil inlet (oil circulation or recirculating pump)
- d6 = Provision for thermometer G 1/2"
- d7 = Oil sight glass or oil outlet (oil circulation)
- d8 = Plug (connection for heater, oil sump thermometer, water cooler)
- t = Depth of thermometer bore

1) Bore for dowel pin
2) Details on request



Drawings shown here are for reference only. Some details may vary from size to size.

Thrust face type A

Dimensions of shaft

1 // Dimensions of shaft

Size	D ¹⁾	b20 ²⁾	b21 ³⁾	b22	b23 ⁴⁾	b24	b25	b26	d29	d30	d31 (e8) d32	d33	R1 ⁵⁾	R2 ⁵⁾	R3		
35	300								385	458	300	315	335				
	315								400	473	—	300	315				
	335								425	493	355	375	400				
	355								450	513	335	355	375				
	375	300,5	315	360	16	115	335	130	470	510					8	12	2,5
	400								495	525	425	450					
	425								515	-	400	425					
	450								-	-							500
45	375								480	570	375	400	425				
	400								505	595	—	375	400				
	425								530	620	450	475	500				
	450								555	645	425	450	475				
	475	375,5	400	445	16	120	425	130	580	648	530	560			10	16	4
	500								605	658	500	530					
	530								645	-							600
	560								-	-							630
56	475								590	715	475	500	530				
	500								615	740	—	475	500				
	530								645	770							
	560								675	755	560	600	630				
	600	475,5	500	555	16	120	530	135	715	785	530	560	600		10	16	4
	630								745	782							710
	670								-	-	710						740
	710								-	-	670						780
71	600								725	900	600	630	670				
	630								755	925	—	600	630				
	670								795	965							750
	710								835	955	710	750	800				
	750	600,5	630	690	20	125	670	135	875	975	670	710	750		10	16	6
	800								925	-							900
	850								965	-	850						920
	900								980	-	800						970

Dimensions in millimeters

¹⁾ Limit dimensions of the shaft acc. DIN 31 698, form and positional tolerance and surfaces roughness acc. to DIN 31 699.

²⁾ Standard thrust clearance is 0,6 mm. If reversible thrust loads or shock load occur, dimension b20 can be reduced by 0,3 mm. If a locating bearing (shell type B,K) is needed only for test runs, dimension b20 can be enlarged by 4 up to 6 mm.

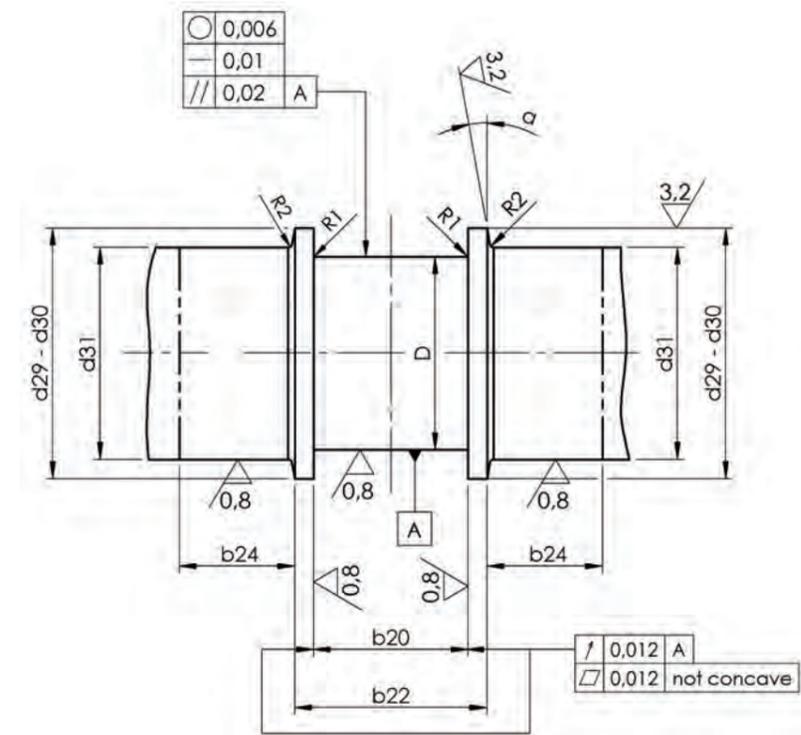
³⁾ If the non-locating bearing must allow larger motions (due to heat expansion or to large thrust clearances caused by the unit), dimension b21 can be enlarged.

⁴⁾ The plunge cut d32 is dropped, if it is equal or smaller as the shaft diameter D.

⁵⁾ Radii R1 and R2 can be replaced by a plunge cut acc. to DIN 509.

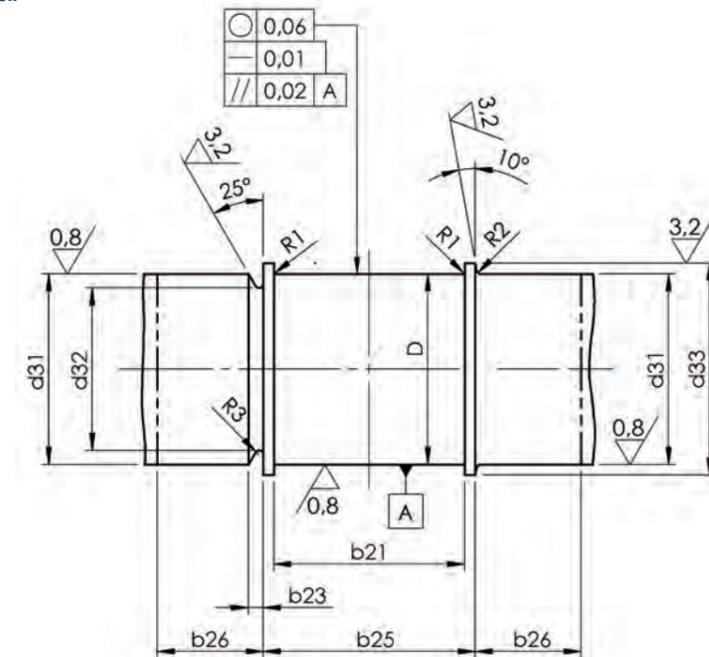
For locating bearing shell

Z...B (d29; $\alpha=10^\circ$)
 Z...K (d29; $\alpha=10^\circ$)
 Z...D (d29; $\alpha=10^\circ$)
 Z...A (d30; $\alpha=15^\circ$)



For non-locating bearing shell

Z...Q



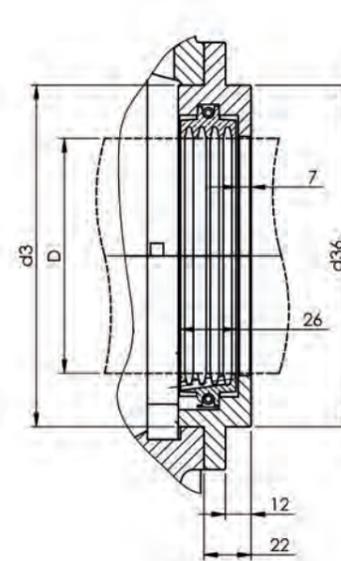
Types and dimensions of seals

1 // Types and dimensions of seals

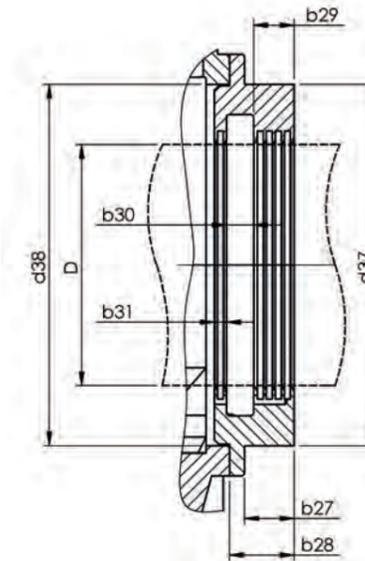
Size	D	b27	b28	b29	b30	b31	b32	d3	d14	d36	d37	d38	d39	d40
35	300 ¹⁾													
	315 ¹⁾													
	335 ¹⁾													
	355 ¹⁾	36	51	27	10	10	32	520	640	480	525	520	525	525
	375													
	400													
	425													
45	450													
	375													
	400													
	425													
	450	36	51	27	10	10	2)	-	780	-	600	657	600	600
	475													
	500													
56	530													
	560													
	475													
	500													
	530													
	560	36	51	27	10	10	2)	-	950	-	730	797	730	730
	600													
71	630													
	670													
	710													
	600													
	630													
	670													
	710	36	51	27	10	10	2)	-	1160	-	990	985	990	990
750														
800														
850														
900														

¹⁾ These sizes of seals can be manufactured in floating labyrinth seal or rigid seal. All other seal sizes can only be manufactured in rigid seal.

²⁾ Details on request.

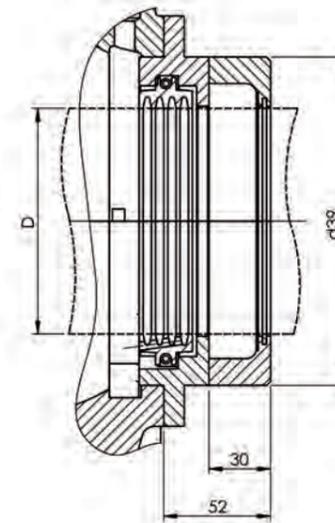


Floating labyrinth seal
(Protection IP 44)

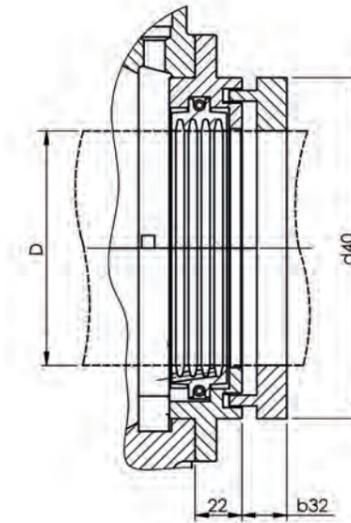


Rigid seal*
(Protection IP 44)

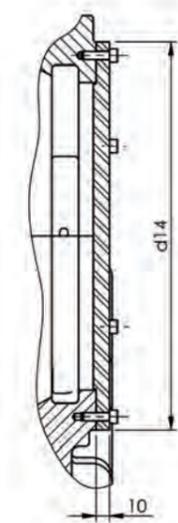
*Can be combined either with a bolt-on baffle (IP 55) or with a dust flinger (IP 54)



Floating labyrinth seal
with bolt-on baffle
(Protection IP 55)



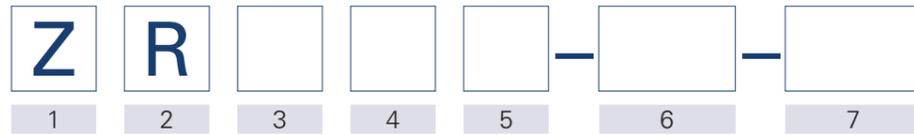
Floating labyrinth seal
with dust flinger
(Protection IP 54)



End cover

Special seal designs for specific applications upon request.

Bearing types and designations



1 // Type

Z Plain bearing

2 // Housing

R Pedestal bearing, finned
G Pedestal bearing, smooth

3 // Heat dissipation

N Naturally cooled by convection
Z Lubrication by oil circulation with external oil cooling
X Lubrication by oil circulation with external oil cooling for high oil throughput
W Finned water cooler in the oil sump
U Recirculating oil pump and natural cooling
T Recirculating oil pump and water cooler in the oil sump

4 // Shape of bore and type of lubrication

C Plain cylindrical bore without oil ring
L Plain cylindrical bore with loose oil ring
F Plain cylindrical bore with oil disk
Y Two-lobe bore without oil ring
V Four-lobe bore without oil ring
K Journal tilting pads without oil ring

5 // Geometry of thrust bearing

Q Without thrust capability
B Plain white metal lined shoulders with oil grooves
K Tapered land thrust faces for both sense of rotation
D Tapered land thrust faces for one sense of rotation
A Round tilting thrust pads, cup spring supported

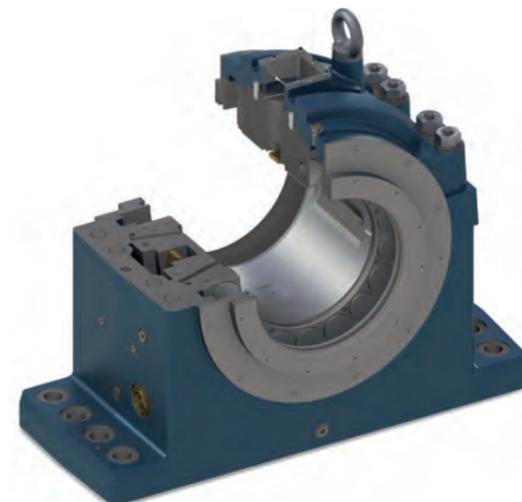
6 // Size

7 // Shaft diameter (mm)

Example of a bearing designation:

Z R N L B - 35 - 300

Pedestal bearing, finned, naturally cooled by convection, plain cylindrical bore with loose oil ring, plain white metal lined shoulders with oil grooves (locating or non-locating bearing), size 35, for shaft diameter 300 mm.



Checklist

- Operating conditions for calculation complete?
- Certification necessary (Lloyd's, RINA...)?
- Atex class?
- Watercooler required?
- Hydrostatic oil supply required?
- Oil inlet or outlet flanges required (flange DIN)?
- Connecting diagram filled out?
- Electrical insulation required?
- Earthing device required?
- Protection class specified?
- Sealing type and diameter (outside)?
- Sealing type and diameter (inside)?
- Sealing diameter of machine seal?
- Shaft drawing available?
- Shaft vibration sensors required (thread...)?
- Speed sensor required (thread...)?
- Absolute vibration sensor required (position, thread...)?

ZF - End flange mounted bearing

The type ZF horizontal bearing is designed acc. to DIN 31693 norm specifications for a wide range of heavy duty applications (electrical machines, turbines and test rigs).

ZM - Center flange bearing

The type ZM horizontal bearing is designed acc. to DIN 31694 norm specifications for a wide range of heavy duty applications (electrical machines, turbines and test rigs).

ZR - Pedestal bearing

The Miba type ZR horizontal bearing is designed acc. to DIN 31 690 norm specifications for a wide range of heavy duty applications (electrical machines, turbines, blowers and test rigs).

Disclaimer

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