

12.10 SPLIT ROLLER BEARINGS

Our company currently devotes special attention to particular bearings, designed primarily for heavy industrial applications. Here we refer to split roller bearings, whose design and production technology are validated at ZKL on special cylindrical roller bearings and spherical roller bearings up to an outer diameter of 1600 mm. We are constantly expanding our product line, and ZKL ranks among the world's leading manufacturers.

Split roller bearings are preferred in settings, where axial installation of bearings in housings is unfeasible, which applies, for example, to multiple bearing shafts, crankshafts, long transmission shafting, or in cases, where installation of the bearing in the housing would be too time-consuming and where any prolonged shutdown of equipment could lead to large disruptions in operations.

The most commonly used split roller bearings in the world are single row cylindrical roller (fig. 12.10.1) and double row spherical roller bearings (fig. 12.10.2). ZKL includes both of the specified assemblies in its production program. These bearings have a radially split outer ring, inner ring, and cage for guiding rolling elements. Cages are usually made of massive brass. Both halves of the cage are connected to withstand dynamic forces, which the cage is exposed to during operation. Both halves of the inner ring are secured on the shaft by means of clamping rings with a screw lock element to prevent their release. The separating gap between the halves of the outer ring may be perpendicular to the face of the ring. The dividing plane of the inner ring, in contrast, should be inclined at an angle to prevent shock in the loaded zone at the edge of the dividing plane when the elements are rolling.

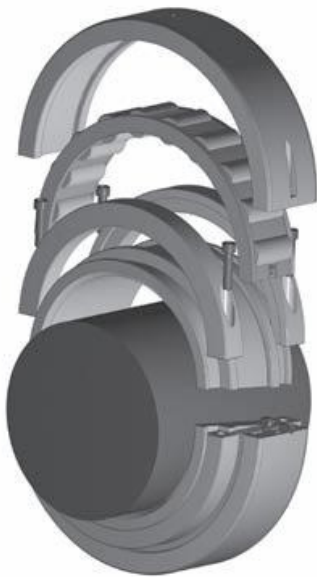


Fig. 12.10.1

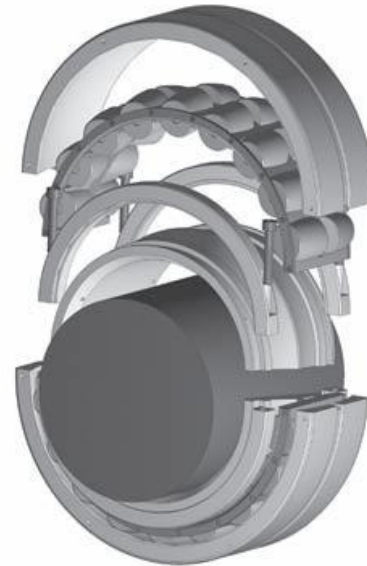


Fig. 12.10.2

Size range of split roller and spherical roller bearings

The size of special split roller bearings ranges, in the internal ring bore from $\varnothing d = 150$ mm to 1 200 mm and in the outer ring diameter up to 1 600 mm.

ZKL split roller bearings can be designed to manage either radial and axial loads, or only radial loads.



ZKL split spherical roller bearings are able to carry primarily radial, but also partial axial external loads in both directions.

Split spherical roller and roller bearings are designed with clamping rings that fit in the circular grooves of the inner rings. The screw assemblies of the split raceways are connected with special screws and the manufacturer specifies the tightening torque for individual sizes.

Installing bearings

When installing bearings with split rings, we recommend that the shaft diameter have an h6, or in extreme cases, an h7 to h9 tolerance rating. Shape variations of loading surfaces can be utilized at a maximum of up to 50% of the fitting tolerance. IT6 precision of loading surfaces is most often required. Prior to installing the bearings into the housing, we recommend that fitting paste be sparingly applied to loading surfaces to limit the formation of contact-borne corrosion. Installation of bearings into the loading should be performed by trained and experienced work personnel.

Lubrication of split bearings

Split bearing lubrication is subject to normal roller bearing requirements. Either an oil or grease lubricant may be used. The type of lubricant is selected, based on the operating conditions, the given maximum speed, the operating temperature, and the magnitude of the external load. The Technical and Consultation Services Department can assist in selecting a suitable lubricant.

Housings for split bearings

Comprehensive bearing loading solutions can be designed for individual split bearings and loadings, which consists of a split bearing, the bearing housing, the lubrication system, and bearing diagnostics per customer specifications. Comprehensive solutions may be applied to both new loadings, which are in the prototype design phase, as well as for existing loadings that require substitution of a regular non-split bearing for a split bearing. Complete specifications are needed in both cases to achieve the optimal loading design. A complete specifications form, on the basis of which we produce an optimal structural design of the given loading, is available from the supplier upon request or, as necessary, following consultation by the ZKL Technical and Consultation Services Department.

Recommendations

Manufacturing of split bearings is a demanding process, and ZKL achieves this by mastering specialized steel heat-treatment procedures and individual component separation techniques, which eliminate any undesired stress and subsequent deformation of the material. The special approach in designing personal loadings and creating installation procedures demands close cooperation with the customer. For example, the standard equations usually cannot be used when calculating the bearing durability without first determining the correcting factors. We therefore recommend that the loading design and installation procedures always be consulted with ZKL Technical and Consultation Department personnel.

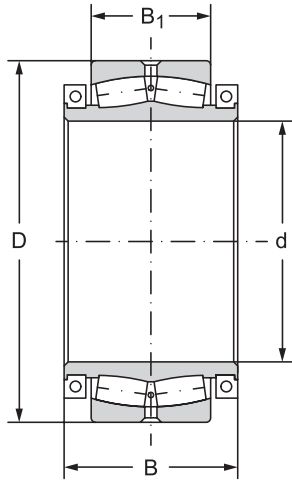
Split roller bearings may also be offered in different types and designs (e.g. radial ball, thrust ball, etc.).

When substituting an original non-split bearing with a split bearing, we recommend that the customer also contacts ZKL Technical Office personnel.



Split spherical roller bearings d = 25 to 1120 mm

d = 280 to 850 mm



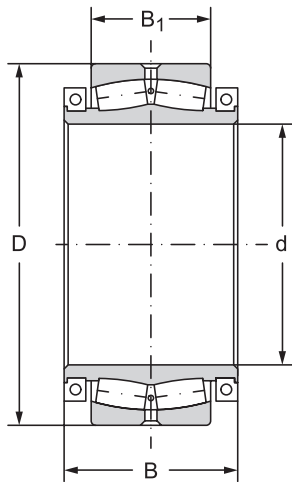
12.10.1	Main dimensions				Basic load rating	
	d	D	B	B ₁	Dynamic C _r	Static C _{or}
	mm				kN	
280	500	260	176	2760	4890	
300	500	240	160	2790	5100	
360	540	220	134	2340	4650	
400	600	240	148	3020	5970	
420	620	238	150	2940	6140	
460	700	245	165	3380	6810	
470	720	270	167	3710	7730	
560	800	230	150	3500	8310	
	870	330	200	5160	1160	
600	920	310	212	5810	12500	
	980	515	375	10800	22200	
630	920	310	212	5920	12200	
670	980	350	230	6570	14700	
	1150	500	345	13000	23500	
710	950	375	243	5920	15900	
	1030	360	236	7300	16100	
750	1000	360	250	6380	17200	
	1090	475	335	10100	25200	
800	1060	370	258	7100	19300	
	1150	490	325	13000	31900	
850	1120	390	272	7730	21200	
	1180	331	206	6570	17900	
	1280	430	280	10400	24100	
	1280	540	375	12900	31900	

Fatigue load limit	Weight	Bearing designation
P_u	~	
kN	kg	
396	175	PLC512-40
410	150	PLC512-41
361	155	PLC512-42
449	205	PLC512-43
457	215	PLC512-44
490	340	PLC512-45
552	375	PLC512-46
570	320	PLC512-47
78	580	PLC512-48
830	690	PLC512-49
1460	1350	PLC512-50
805	630	PLC512-51
952	800	PLC512-52
1480	1710	PLC512-39
1030	700	PLC512-53
1030	880	PLC512-54
1090	1220	PLC512-37
1580	1300	PLC512-56
1210	810	PLC512-57
1960	1980	PLC512-58
1300	830	PLC512-59
1090	880	PLC512-60
1450	1550	PLC512-61
1910	2350	PLC512-62



Split spherical roller bearings

d = 900 to 1120 mm



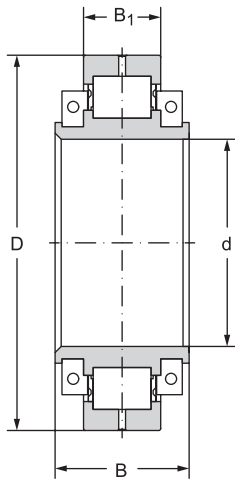
12.10.1	Main dimensions				Basic load rating	
	d	D	B	B ₁	Dynamic C _r	Static C _{or}
	mm				kN	
900	1180	400	280	8580	23300	
	1340	490	325	12600	31500	
950	1250	300	220	6400	20000	
	1250	420	300	9240	26500	
1000	1470	530	345	15200	37600	
1020	1280	352	218	6280	20000	
1060	1460	500	335	11700	35100	
1060,355	1400	490	335	11600	33300	
1120	1460	500	335	12000	34600	
	1540	525	335	14000	39800	

Fatigue load limit	Weight	Bearing designation
P_u	~	
kN	kg	
1410	1100	PLC512-63
1860	1800	PLC512-64
1190	987	PLC512-55
1570	1300	PLC512-65
2160	3000	PLC512-66
1170	950	PLC512-67
2000	2470	PLC512-68
1910	1800	PLC512-69
1960	2070	PLC512-70
2230	2950	PLC512-71



Split cylindrical roller bearings d = 150 to 600 mm

d = 150 to 238 mm



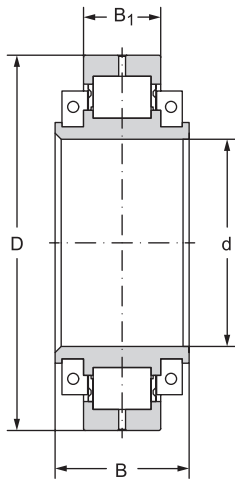
12.10.2	Main dimensions				Basic load rating	
	d	D	B	B ₁	Dynamic C _r	Static C _{or}
	mm				kN	
150	254	98,4	55,6	454	653	
	292,1	123,8	68,3	810	1090	
	330,2	160	81	1180	1520	
155	254	98,4	55,6	454	652	
	292,1	123,8	68,3	810	1090	
160	273,05	109	60,3	513	750	
	317,5	140	83,3	854	1120	
	355,6	171	103,2	1370	1960	
165	317,5	140	83,3	854	1120	
170	285,75	109	55,5	551	840	
	355,6	171	103,2	1370	1960	
180	285,75	109	55,5	551	841	
	330,2	140	83,3	942	1290	
	374,65	178	92,1	1480	2130	
190	311,15	109	60,3	576	936	
	368,3	156	90,5	1100	1570	
195	419,1	191	97,7	1580	2530	
	368,3	156	90,5	1100	1570	
200	311,15	109	60,3	576	936	
	419,1	191	97,7	1580	2530	
203,2	368,36	156	90,5	1040	1520	
218	393,76	156	90,5	1200	1760	
220	393,76	156	90,5	1200	1760	
	342,9	115	63,5	623	1040	
	469,9	212	109,6	1900	2700	
238	440,07	156	90,5	1250	1920	

Fatigue load limit	Weight	Bearing designation
P_u	~	
kN	kg	
65	16,6	PLC410-49
105	64,0	PLC411-36
143	57,0	PLC411-43
64	16,6	PLC410-50
104	64,0	PLC411-37
73	20,0	PLC411-29
105	39,0	PLC411-38
180	72,0	PLC411-44
105	39,0	PLC411-39
80	23,0	PLC411-30
179	72,0	PLC411-45
80	23,0	PLC411-31
119	45,0	PLC411-40
191	79,0	PLC411-46
87	25,0	PLC411-32
141	59,0	PLC411-41
221	105	PLC412-43
140	59,0	PLC411-42
86	25,0	PLC411-33
220	105	PLC412-44
135	62,0	PLC411-28
153	83,8	PLC411-27-1
153	83,0	PLC411-27
93	32,0	PLC411-34
227	145	PLC412-45
162	92,0	PLC412-7-1



Split cylindrical roller bearings

d = 240 to 420 mm



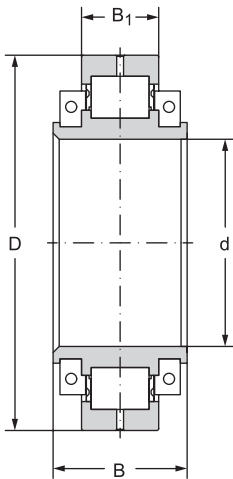
12.10.2	Main dimensions				Basic load rating	
	d	D	B	B ₁	Dynamic C _r	Static C _{or}
	mm				kN	
240	374,65	122	66,7	691	1240	
	440,07	156	90,5	1250	1920	
	482,6	211	105,6	2120	3190	
260	431,8	170	96,8	1140	1940	
	406,4	128	69	783	1410	
	482,6	211	105,6	2120	3190	
280	406,4	128	69	783	1410	
	463,55	186	101,6	1520	2320	
	495,3	244	139,7	2450	4040	
300	438,15	143	74,6	8230	1540	
	495,3	193	103,2	1620	2600	
	558,8	244	139,7	2520	4140	
320	622,37	272	160,4	3100	4950	
	463,55	136	74,6	915	1740	
	527,05	192	106,4	1730	2830	
340	488,95	136	74,6	940	1890	
	565,15	200	115,9	1920	3180	
	615,95	279	158	3190	5490	
360	520,7	140	76,2	1010	2050	
	565,15	200	115,9	1920	3180	
	615,95	279	158	3190	5490	
380	520,7	140	76,2	1010	2050	
	584,2	200	111,1	2020	3510	
	685,8	292	166,7	3530	6000	
400	546,1	140	76,2	1050	2200	
	615,95	200	115,9	2120	3710	
	685,8	292	166,7	3530	6000	
420	571,5	140	76,2	1070	2360	
	647,7	200	119,1	2230	4000	
	700	284	160	4020	7510	

Fatigue load limit	Weight	Bearing designation
P_u	~	
kN	kg	
108	40,0	PLC411-35
162	92,0	PLC412-7
265	150	PLC412-46
163	86,5	PLC412-11
120	50,0	PLC412-61
262	150	PLC412-47
119	50,0	PLC412-13
191	86,0	PLC412-28
328	182	PLC412-48
127	60,0	PLC412-14
210	123	PLC412-29
326	238	PLC412-49
379	353	PLC412-8
141	72,0	PLC412-15
224	150	PLC412-30
150	78,0	PLC412-16
247	182	PLC412-31
419	318	PLC412-50
160	86,0	PLC412-17
245	182	PLC412-32
416	318	PLC412-51
159	86,0	PLC412-18
267	186	PLC412-33
443	431	PLC412-52
168	95,0	PLC412-19
278	209	PLC412-34
440	431	PLC412-53
178	104	PLC412-20
295	241	PLC412-35
546	395	PLC412-54



Split cylindrical roller bearings

d = 440 to 600 mm



12.10.2	Main dimensions				Basic load rating	
	d	D	B	B ₁	Dynamic C _r	Static C _{or}
	mm				kN	
440	596,9	140	76,2	1110	2510	
	666,75	200	115,9	2370	4380	
	700	284	160	4020	7510	
460	596,9	140	76,2	1110	2510	
	666,75	200	115,9	2370	4380	
	740	294	170	4270	7700	
480	628,65	144	81	1150	2580	
	698,5	223	119,1	2500	4770	
500	654,05	168	80,2	1190	2750	
	717,55	226	115,9	2600	5160	
	850,9	300	187,4	4790	8800	
530	692,15	168	81	1230	2920	
	762	229	119,1	2850	5550	
	850,9	300	187,4	4790	8800	
560	717,55	168	81	1270	3090	
	793,75	233	122,2	2970	6000	
	863,6	310	196,9	5380	10600	
600	774,7	172	84,1	1400	3510	
	838,2	214	119,1	3070	6470	
	890	310	184	5610	11400	

Fatigue load limit	Weight	Bearing designation
P_u	~	
kN	kg	
187	114	PLC412-21
320	250	PLC412-36
543	395	PLC412-55
186	114	PLC412-22
318	250	PLC412-37
549	431	PLC412-56
188	128	PLC412-23
342	263	PLC412-38
198	136	PLC412-24
366	272	PLC412-39
605	730	PLC412-57
207	164	PLC412-25
387	309	PLC412-40
601	730	PLC412-58
216	175	PLC412-26
412	336	PLC412-41
717	635	PLC412-59
240	210	PLC412-27
437	381	PLC412-42
761	680	PLC412-60

