FAG

Split Cylindrical Roller Bearings For Rolling Mill Drive Shafts

SCHAEFFLER

LuK INA FAG

Bearings

The work rolls of large four-high rolling stands are driven via universal joint drive shafts (Figure 1). After every rolling cycle the height of the rolls is adjusted.
The drive shafts must follow the adjusting movement. Therefore they have universal joints. Due to the height adjustment, the shaft length varies as well, which has to be compensated in a coupling sleeve.

The universal joint shafts are generally very long to ensure that the deflection angles do not become too large. Because of the high torques which have to be transmitted they are strong and heavy.

In larger rolling mills, the weight of universal joint shafts is supported in split single or double row cylindrical roller bearings in order to relieve the joints and couplings from the weight. Changes in the position of the universal joint shafts are compensated in the housing suspensions.

The split bearing design is necessary as the flanges forged to the universal joint shaft are considerably larger than the shaft diameter at the bearing seats.

In the past few years, several rolling mills were already successfully converted from sliding bearings to rolling bearings.
This has reduced the maintenance expenditure and, in particular, grease consumption siginificantly.

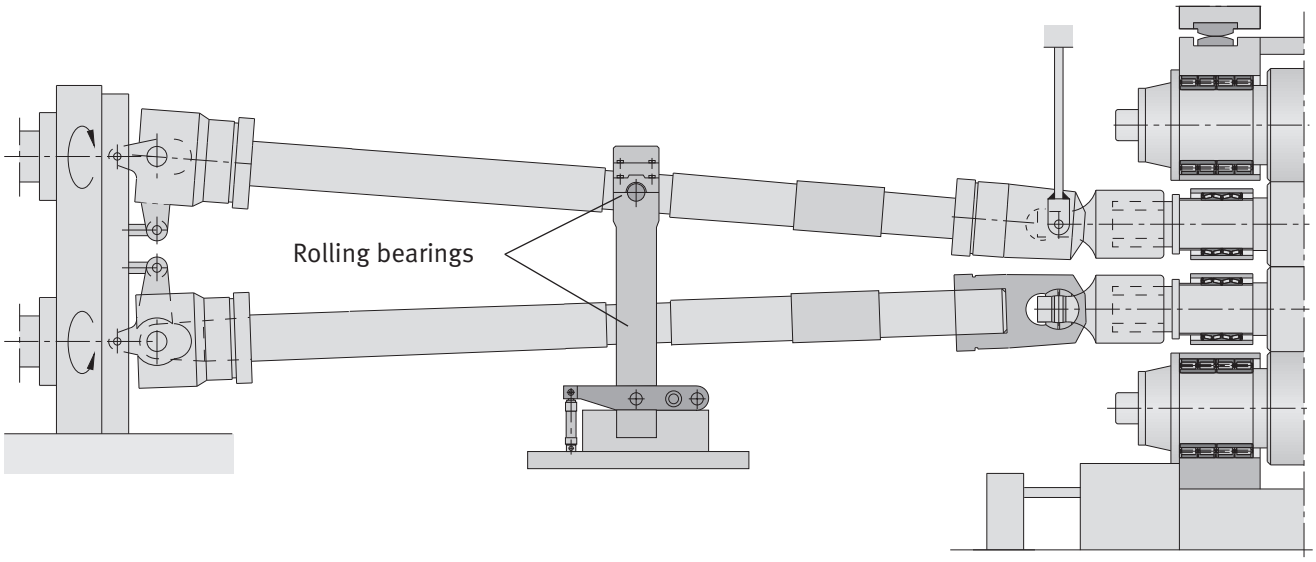


Figure 1: Bearings supporting the heavy universal joint drive shafts of large rolling stands

Bearing designs · Load limit · Lubrication · Bearing programme

Bearing designs

The split cylindrical roller bearings for the locating and floating bearing positions have one or two roller rows (Figure 2).
The bearing outer rings, inner rings and rollers are made of casehardening steel. This makes the bearings more insensitive to vibration and axial shock loads occurring in operation.
Inner rings, outer rings and cages are split.
The split inner rings are located on the shaft by locking rings.

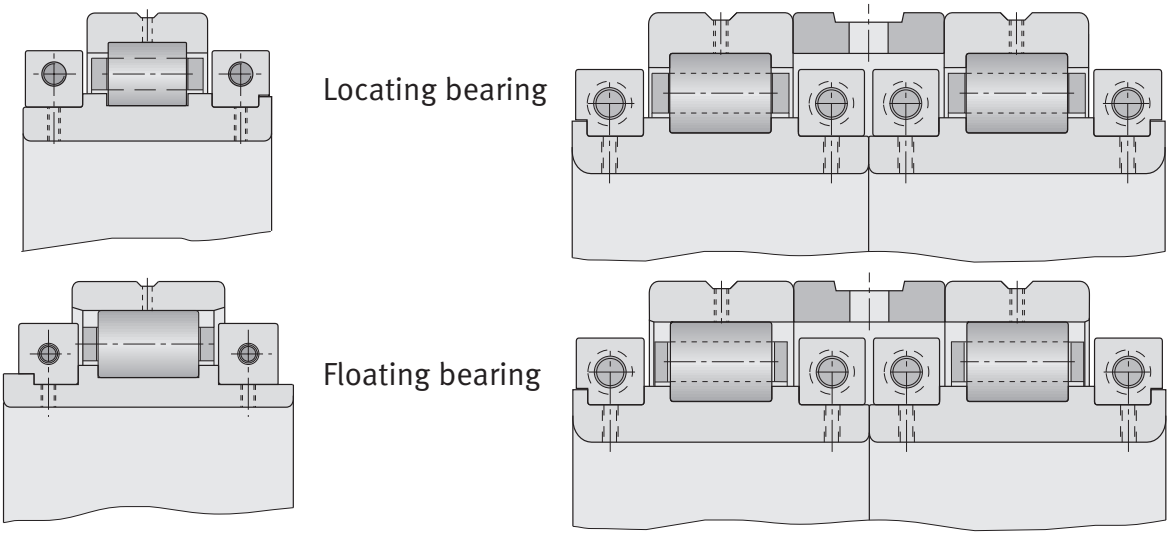


Figure 2: Split single and double row FAG cylindrical roller bearings for drive shafts

Load limit

The load ratings of the split cylindrical roller bearings are listed in the bearing tables (pp. 6, 7).
The load accommodated by split bearings must be limited. A load limit of $P/C_r \leq 0{,}2$ should be observed.
Axial loads are supported by the cylindrical roller bearings' lips.
Experience shows that the axial load F_a amounts to 10...20 % of the radial load F_r. These axial loads are supported reliably. If higher axial loads are expected to occur, please send us an enquiry – indicating the load and speed – to have the lips' load carrying capacity checked.

Lubrication

Split cylindrical roller bearings are lubricated with grease or oil mist.
Grease-lubricated split cylindrical roller bearings should be relubricated once per shift. For this purpose the bearings have a circumferential groove and lubricating holes in the outer ring.
Replenishment quantities required for specific applications will be indicated on enquiry.
We recommend to use KP2K grease to DIN 51502 for high pressure loads or the FAG Arcanol rolling bearing greases LOAD220 (a grease for high loads), or LOAD400 (a grease for high loads and shock loads).
On mounting, the cavities of the cylindrical roller bearing and the lateral spaces in the housing should be packed with grease to capacity.

Bearing programme

The bearing tables show a selection of split cylindrical roller bearings for drive shafts. If other designs are required, please send us an enquiry. The bearings are produced on order.
Delivery periods for split cylindrical roller bearings will be indicated on enquiry.

Fits · Shaft and housing tolerances

Fits

Shaft diameter and bearing bore should fit as closely as possible. If a shaft diameter is too large, it will not fit well (Figure 3). We recommend to machine the shaft to tolerance g6 or h6 to obtain a probable fit clearance of a few microns.

After tightening the screws of the locking rings, a gap of 0,3 to 0,4 mm (Figure 3) will be obtained at the joints. This produces a tight fit of the bearing inner ring on the shaft. The housing bore should be machined to H6 or H7.

Shaft tolerances

Nominal shaft diameter in mm

over	180	250	315	400	500	630	800
up to	250	315	400	500	630	800	1000

Shaft tolerances in microns

g6	−15	−17	−18	−20	−22	−24	−26
	−44	−49	−54	−60	−66	−74	−82
h6	0	0	0	0	0	0	0
	−29	−32	−36	−40	−44	−50	−56

Housing bore tolerances

Nominal housing bore diameter in mm

over	180	250	315	400	500	630	800
up to	250	315	400	500	630	800	1000

Housing tolerances in microns

H6	+29	+32	+36	+40	+44	+50	+56
	0	0	0	0	0	0	0
H7	+49	+52	+57	+63	+70	+80	+90
	0	0	0	0	0	0	0

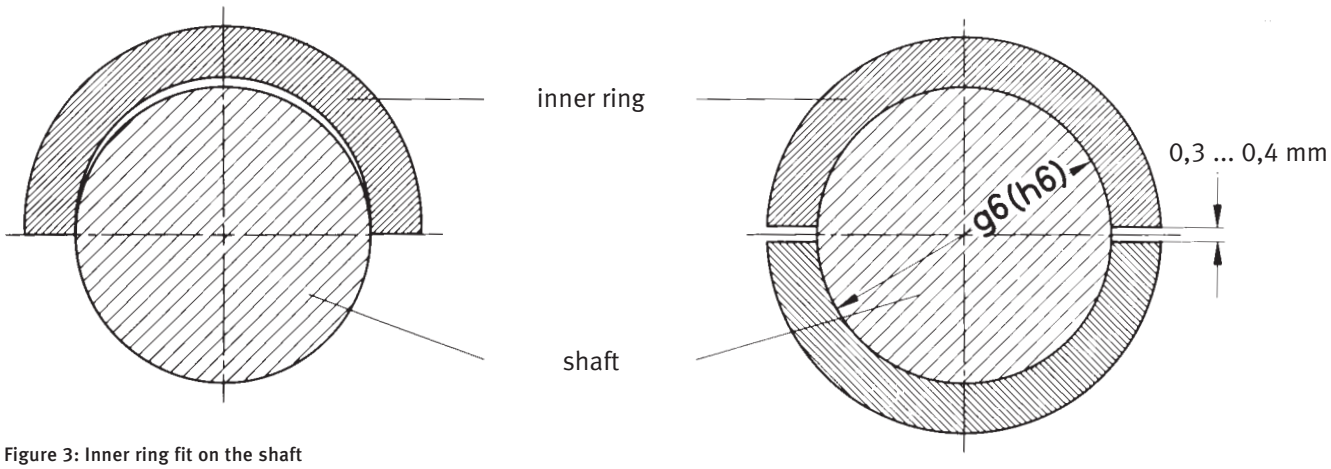
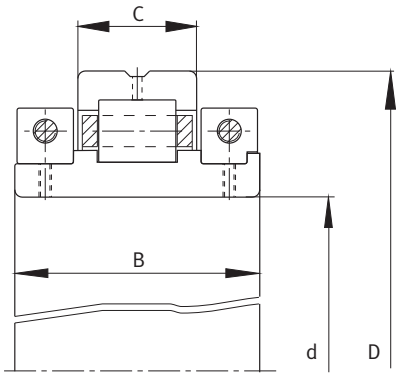


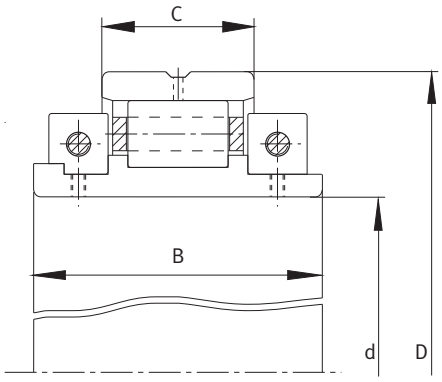
Figure 3: Inner ring fit on the shaft

Split cylindrical roller bearings

single and double row



Design 1



Design 1L

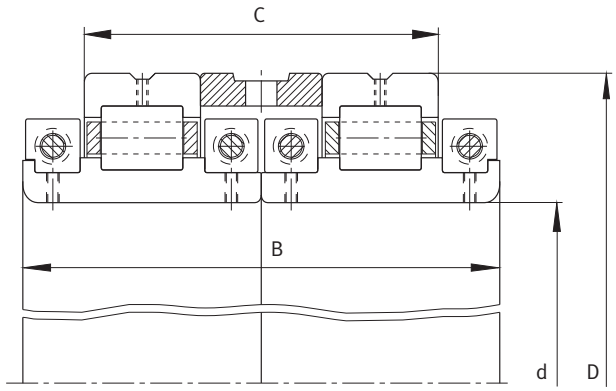
Split cylindrical roller bearings, d = 279,4 – 580 mm

Designation[1]	Design	Mass	Dimensions				Load rating	
							dyn.	stat.
		m	d	D	B	C	C_r	C_{or}
		kg	mm	mm	mm	mm	kN	kN
Z-533705.ZL	1	112	279,4	430	203,4	110	1 460	2 600
Z-541234.ZL	2	111	350	470	240	170	1 900	4 750
Z-577892.ZL	2	90	360	460	225	164	1 160	2 900
Z-572885.ZL	1L	190	400	615,95	200	115,9	2 080	3 750
Z-572886.ZL	1L	194	400	615,95	200	115,9	2 080	3 750
Z-581006.ZL	2	334	440	600	420	310	3 100	7 800
Z-579574.ZL	1	224	440	666,75	200	115,9	2 200	4 150
Z-538563.ZL	2	213	450	600	275	200	2 850	7 650
Z-527397.01.ZL	1	200	460	650	260	120	2 360	4 800
F-807475.ZL	1	89	480	600	160	75	1 060	2 500
F-804678.ZL	1	109	500	635	155	73	1 290	2 900
Z-577893.ZL	2	235	500	635	310	228	2 240	5 850
Z-545148.ZL	2	337	500	680	332	220	3 200	8 150
Z-548795.ZL	2	239	553	700	260	184	2 750	8 150
Z-563458.ZL	2	255	553	710	260	184	2 750	8 150
Z-580869.ZL	1	96	560	680	142	72	1 250	3 200
F-807125.ZL	2	459	560	730	460	350	3 750	10 000
F-801807.ZL	2	490	580	750	515	305	3 000	7 800
F-804627.ZL	1	214	580	750	257,5	172	1 730	3 900

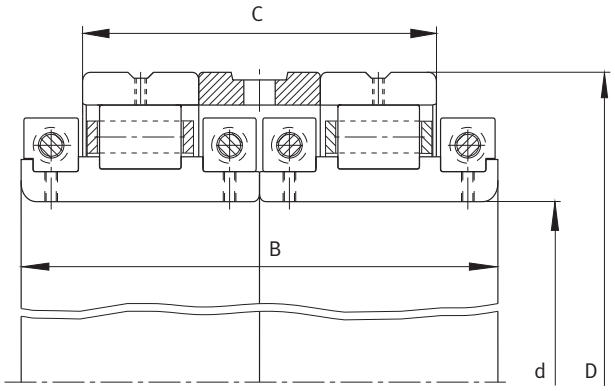
[1] The bearing design may vary from the above picture – an offer drawing will be provided on request.

Split cylindrical roller bearings

single and double row



Design 2



Design 2L

Split cylindrical roller bearings, d = 600 – 820 mm

Designation[1]	Design	Mass	Dimensions				Load rating	
							dyn.	stat.
		m	d	D	B	C	C_r	C_{or}
		kg	mm	mm	mm	mm	kN	kN
Z-577936.ZL	2	432	600	775	380	278	3 250	9 000
F-804300.ZL	2	307	600	735	380	278	3 000	8 800
Z-567618.ZL	1	200	610	775	190	88	1 900	4 500
Z-572298.ZL	1L	202	610	775	190	100	1 900	4 500
Z-581300.ZL	2	425	610	780	380	290	3 250	9 000
Z-526783.02.ZL	1L	200	630	794	190	88	1 900	4 650
Z-549642.ZL	1	190	630	794	190	88	1 900	4 650
Z-568614.ZL	1	209	640	805	190	88	1 960	4 650
Z-574879.ZL	2	426	640	805	380	290	3 750	11 000
F-568018.ZL	2L	508	650	840	390	300	4 400	11 800
Z-573047.ZL	1	694	650	940	320	200	5 600	11 800
Z-573048.ZL	1L	669	650	940	320	200	5 600	11 800
F-809831.ZL	1	730	650	980	320	200	5 600	10 400
F-809832.ZL	1L	709	650	980	320	200	5 600	10 400
F-585320.ZL	2	538	670	864	390	300	4 450	11 900
Z-526784.01.ZL	1L	203	690	864	196	94	2 240	5 400
Z-577902.ZL	2	531	690	864	390	284	3 550	10 200
F-809613.ZL	2	447	710	880	380	290	3 900	11 400
F-576544.ZL	2	496	710	890	370	280	4 150	11 600
Z-578276.ZL	2	551	750	920	400	300	3 900	12 000
F-580174.ZL	2	626	750	960	380	290	4 500	11 800
F-801623.01.ZL	1	220	775	945	165	80	1 830	4 550
F-809722.ZL	2	470	775	945	330	245	3 150	9 200
F-801572.ZL	2	552	820	990	380	290	4 300	14 000

[1] The bearing design may vary from the above picture – an offer drawing will be provided on request.

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Schaeffler Technologies
AG & Co. KG

Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Internet www.fag.com
E-Mail: steel@schaeffler.com

In Germany:
Phone 0180 5003872
Fax 0180 5003873

From other countries:
Phone +49 9721 91-0
Fax +49 9721 91-3435

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