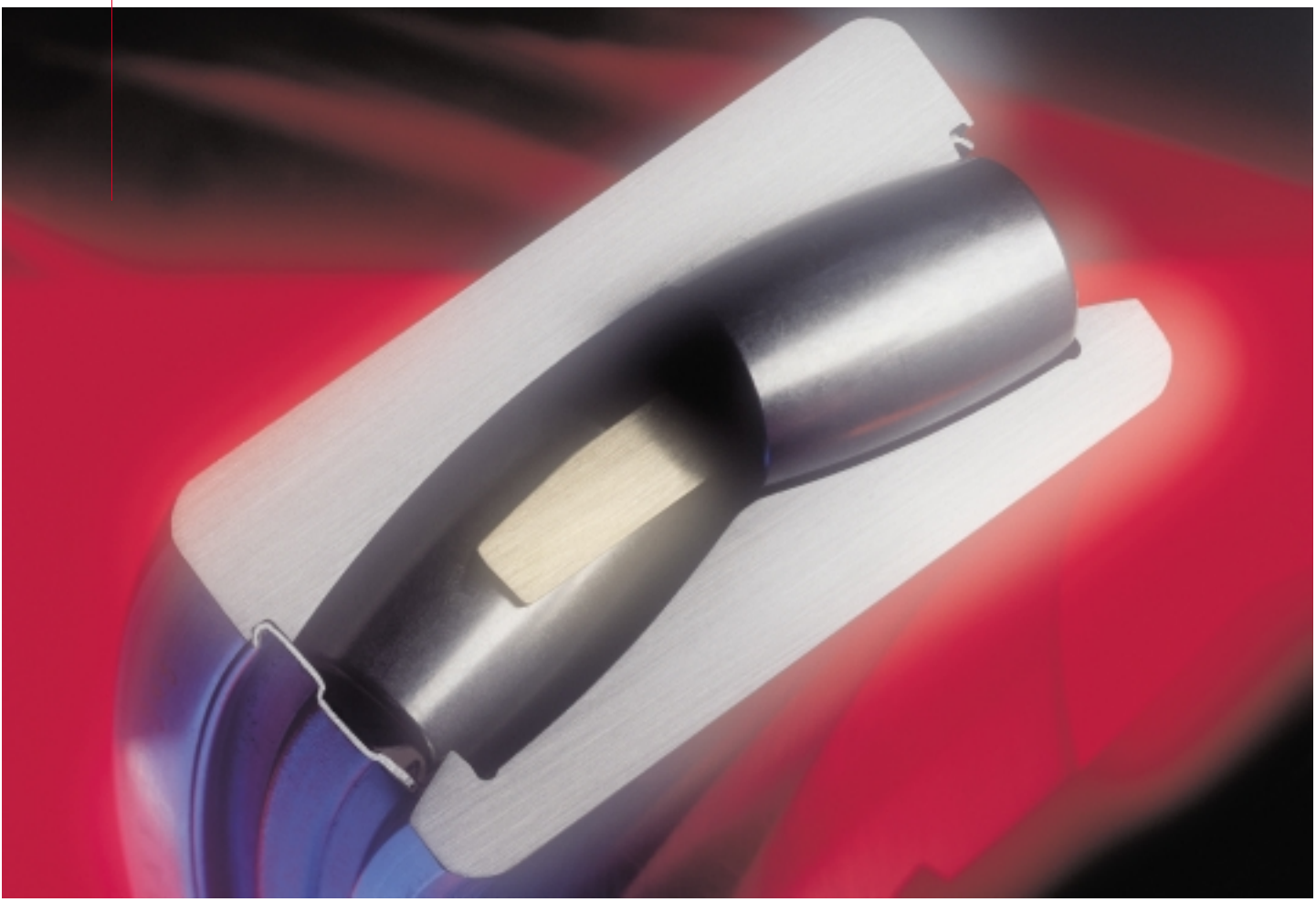
SEALED FAG SPHERICAL ROLLER BEARINGS



The cost-effective and environmentally friendly solution

FAG OEM und Handel AG

Application

Continuous casting plants feature a large number of spherical roller bearings. Most of the bearings are grease-lubricated. Ensuring continuous supply of many bearings means that an enormous amount of grease is used. Therefore, in order to reduce costs and meet increasingly stringent obligations to protect the environment, the operators of continuous casting plants are eager to reduce the grease consumption.

Field experience shows that sealed spherical roller bearings are an excellent solution to this problem. They require up to 80% less grease than open bearings.

The new, improved design of sealed spherical roller bearings is also suitable for other fields of application, e.g. pumps, transmissions, materials handling engineering. If necessary, the bearing design has to be adapted accordingly.

Characteristics of the new design of sealed spherical roller bearings:

- Main dimensions identical with those of open bearings, facilitating in many cases simple substitution
- Load ratings of most sizes comparable with those of open bearings with metal cage
- E-design, i.e. inner ring without centre lip
- Machined brass cage or pressed steel cage
- Greasing with a lubricant tested by FAG (DIN 51502 KP2R-30), for temperature range –35...+180 °C
- Dimensionally stable up to 200 °C
- Radial clearance C4
- Rubbing seals made of fluorocaoutchouc, suitable for temperatures of –30...+180 °C – for a short period +200 °C

Safety note: FAG use fluorinated materials for seals made of fluorocaoutchouc (FKM, FPM, e.g. Viton®). It has to be taken into account that the very efficient fluorinated materials, when heated above +300 °C, can give off gasses and vapours which are detrimental to health. This has to be remembered especially if bearing parts are dismounted with a welding torch. Where high temperatures cannot be avoided the safety data sheet for the fluorinated material in question should be observed. The data sheet is available on request.

- Self-aligning capability 0.5° from centre position
- Special design with circumferential groove and three lubricating holes in the outer ring available (suffix H40F)

Programme

The FAG product programme covers sealed spherical roller bearings with bore diameters ranging from 40 to 200 mm. The delivery periods for sealed spherical roller bearings will be indicated upon inquiry.

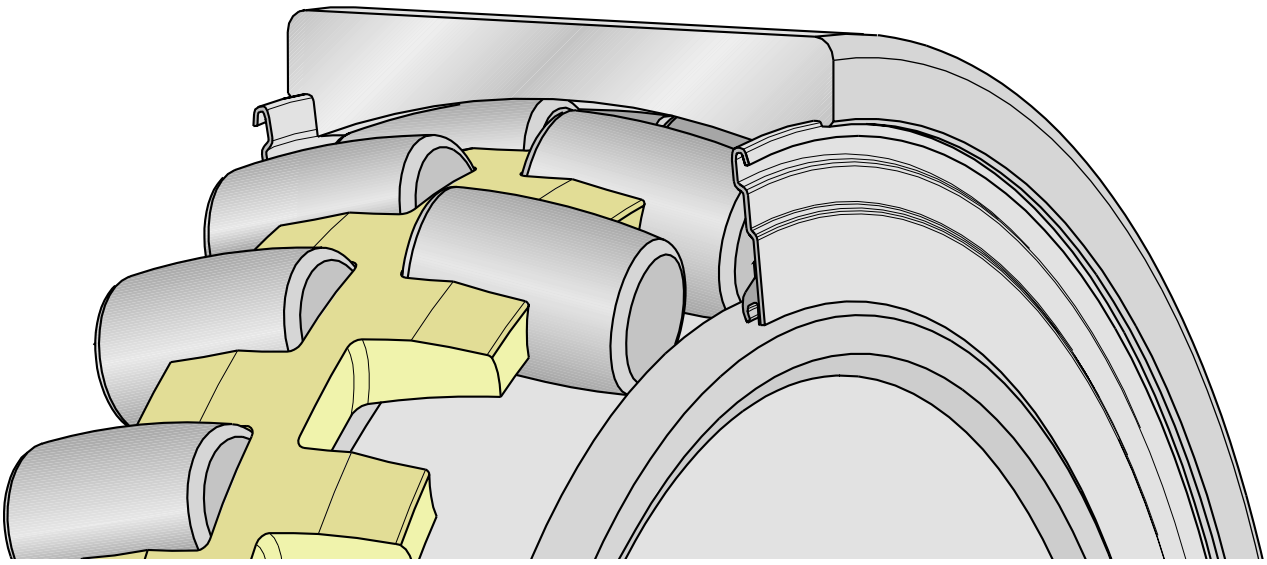
Equivalent dynamic load

$P = F_r + Y_1 \cdot F_a$ [kN] for $F_a/F_r \leq e$
$P = 0.67\ F_r + Y_2 \cdot F_a$ [kN] for $F_a/F_r > e$

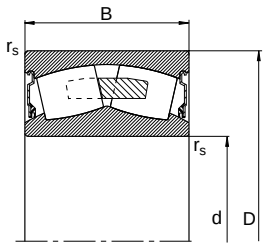
Equivalent static load

$P_0 = F_r + Y_0 \cdot F_a$ [kN]

Sealed FAG spherical roller bearing for continuous casting mills

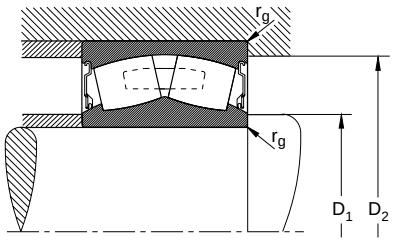


Sealed spherical roller bearings



Dimension				Load rating · Factor						Weight
				dyn.				stat.		≈
d	D	B	r_s min	C	e	Y_1	Y_2	C_0	Y_0	
mm				kN				kN		kg
40	80	28	1.1	88	0.28	2.41	3.59	95	2.35	0.62
45	85	28	1.1	93	0.26	2.62	3.9	106	2.56	0.69
50	90	28	1.1	98	0.24	2.81	4.19	114	2.75	0.72
55	100	31	1.5	120	0.23	2.92	4.35	146	2.86	1.03
60	110	34	1.5	143	0.24	2.84	4.23	166	2.78	1.32
65	120	38	1.5	173	0.24	2.81	4.19	208	2.75	1.8
70	125	38	1.5	173	0.23	2.95	4.4	228	2.89	1.85
70	150	51	2.1	305	0.29	2.32	3.45	345	2.26	4.2
75	130	38	1.5	183	0.22	3.1	4.62	236	3.03	2
80	140	40	2	212	0.22	3.14	4.67	270	3.07	2.43
85	150	44	2	260	0.22	3.04	4.53	325	2.97	3.05
90	150	72	2.5[1)]	390	0.43	1.59	2.36	600	1.55	5.5
90	160	48	2	285	0.23	2.9	4.31	360	2.83	3.9
90	160	52.4	2	325	0.26	2.55	3.8	425	2.5	4.4
100	150	50	2	255	0.26	2.6	3.87	430	2.54	3.1
100	165	52	2	335	0.26	2.62	3.9	480	2.56	4.2
100	170	65		415	0.32	2.09	3.11	655	2.04	6.1
100	180	60.3	2.1	405	0.24	2.84	4.23	550	2.78	7.2
100	180	55	2.1	360	0.28	2.43	3.61	465	2.37	5.74
110	170	45	2	275	0.20	3.31	4.92	440	3.23	3.7
110	170	60	2	355	0.28	2.39	3.56	600	2.34	5
110	180	69	2	450	0.33	2.06	3.06	680	2.01	7
110	200	62	2.1	455	0.25	2.71	4.04	585	2.65	8
120	180	46	2	300	0.28	2.43	3.61	450	2.37	4
120	180	60	2	400	0.28	2.39	3.56	695	2.34	5.4
130	200	52	2	390	0.20	3.46	5.15	600	3.38	5.75
130	200	69	2	480	0.29	2.3	3.42	850	2.25	7.9
130	210	80	2	600	0.32	2.09	3.11	1000	2.04	10.8
140	210	69	2	520	0.27	2.49	3.71	915	2.43	8.2
140	225	85	2.1	655	0.32	2.09	3.11	1140	2.04	12.7
150	225	75	2.1	600	0.27	2.49	3.71	1060	2.43	10.3
150	250	100	2.1	880	0.35	1.95	2.9	1530	1.91	20
160	240	80	2.1	655	0.28	2.45	3.64	1200	2.39	12.7
160	270	86	2.1	865	0.25	2.67	3.97	1290	2.61	19.4
170	260	90	2.1	830	0.18	3.66	5.46	1460	3.58	15.5
170	280	109	2.1	1040	0.34	1.99	2.96	1800	1.94	26.3
180	280	100	2.1	965	0.29	2.33	3.47	1730	2.28	22.8
190	290	75	2.1	800	0.2	3.46	5.15	1270	3.38	17.2
200	310	109	3	1180	0.29	2.33	3.47	2240	2.28	30.5
200	340	140	3	1660	0.37	1.83	2.72	2900	1.79	52.5

[1)] inner ring chamfer r_{smin} = 0.6 mm

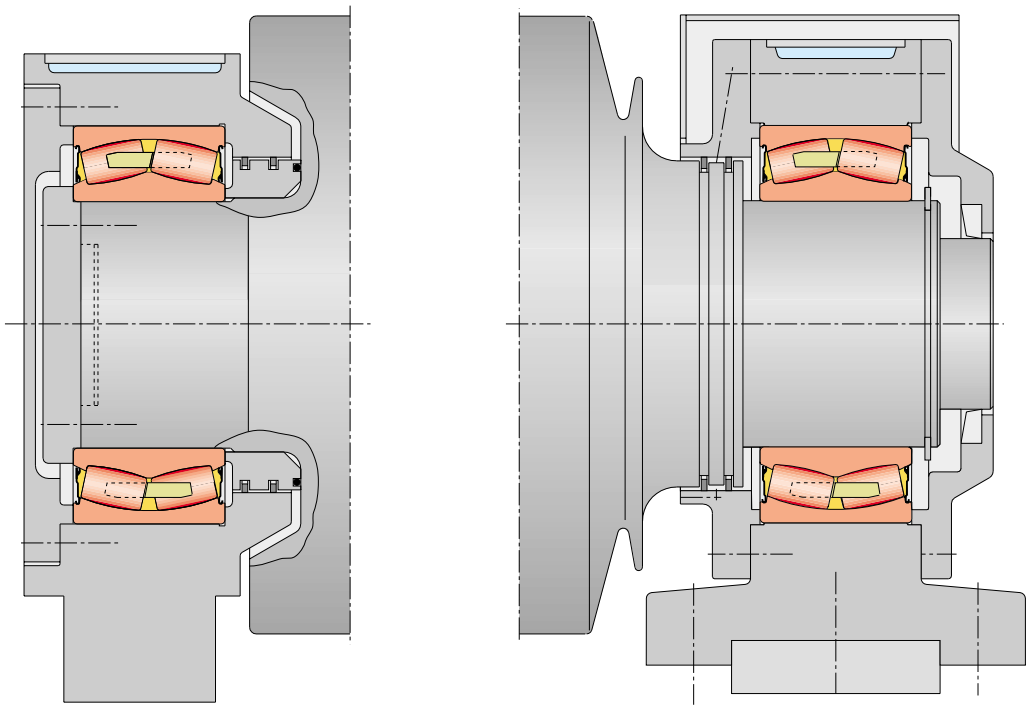


Code sealed bearing	**permissible speed[3])**	**Abutment**			**Code** open bearing	**Dimension**		
		D_1 min	D_2 max	r_g max		d	D	B
FAG	min^{-1}	mm			**FAG**	mm		
803019	2400	47	73	1	**22208E**	40	80	23
803020	2400	52	78	1	**22209E**	45	85	23
803021	2200	57	83	1	**22210E**	50	90	23
803022	1900	64	91	1.5	**22211E**	55	100	25
803023	1700	69	101	1.5	**22212E**	60	110	28
803024	1500	74	111	1.5	**22213E**	65	120	31
803014	1400	79	116	1.5	**22214E**	70	125	31
803030	1000	82	138	2.1	**22314E.M**	70	150	51
803025	1400	84	121	1.5	**22215E**	75	130	31
803026	1300	91	129	2	**22216E**	80	140	33
803015	1200	96	139	2	**22217E**	85	150	36
803007	750	96	138	2[2])	**541019**	90	150	72
803027	1000	101	149	2	**22218E**	90	160	40
803031	950	101	149	2	**23218EAS.M**	90	160	52.4
803041	1200	107	143	1.5	**24020S.M**	100	150	50
803000	900	111	154	2	**23120EAS.M**	100	165	52
803008	700	111	156	2	**533653M**	100	170	65
803032	750	112	168	2.1	**23220EAS.M**	100	180	60.3
803028	900	112	168	2	**22220E**	100	180	46
803013	950	119	161	2	**23022EAS.M**	110	170	45
803033	800	119	161	2	**24022S.M**	110	170	60
803004	750	121	169	2	**24122S.M**	110	180	69
803029	800	122	188	2.1	**22222E.M**	110	200	53
803034	950	129	171	2	**23024EAS.M**	120	180	46
803001	750	129	171	2	**24024S.M**	120	180	60
803045	900	139	191	2	**23026E.M**	130	200	52
803002	630	139	191	2.1	**24026S.M**	130	200	69
803005	530	141	199	2	**24126B.M**	130	210	80
803003	670	149	201	2	**24028S.M**	140	210	69
803006	530	152	213	2.1	**24128S.M**	140	225	85
803035	630	160	215	2.1	**24030S.M**	150	225	75
803036	400	162	238	2.1	**24130B.M**	150	250	100
803012	560	170	230	2.1	**24032S.M**	160	240	80
803010	560	172	258	2.1	**23132EAS.M**	160	270	86
803037	530	180	250	2.1	**24034BS.M**	170	260	90
803038	380	182	268	2.1	**24134BS.M**	170	280	109
803011	450	190	270	2.1	**24036BS.M**	180	280	100
803039	600	200	280	2.1	**23038EAS.M**	190	290	75
803044	400	210	300	2.1	**24040BS.M**	200	310	109
803040	280	215	325	2.5	**24140B.M**	200	340	140

[2]) radius on shaft shoulder r_{gmax} = 0.6 mm

[3]) At the indicated speeds, taking into account the prevailing operating conditions, sealed spherical roller bearings have to be relubricated if necessary. In such cases the special design of these bearings should be ordered (suffix .H40F).

Examples for continuous slab casting plant



Locating bearing

Floating bearing

Customer benefit

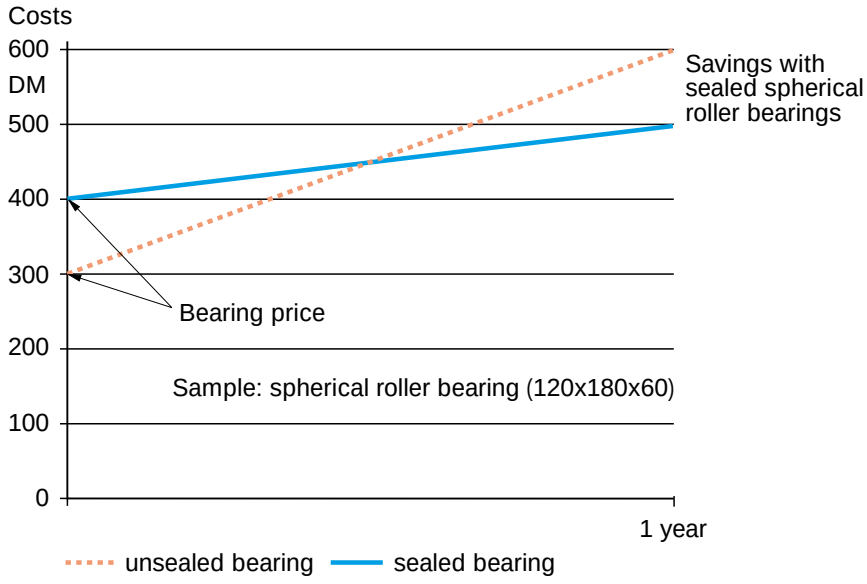
The following comparison for a continuous casting plant shows the extent of savings made possible by using sealed spherical roller bearings instead of open bearings.

The following costs were taken into account in the calculation: grease for relubricating the open bearing and for presealing the sealed bearing (DM 3.00/kg); disposal and removal of the grease from the coolant circuit (same amount).

The production costs of new plants are reduced due to the fact that no pumping units and lubricating lines are needed. In addition, less maintenance is required.

As a rule, sealed spherical roller bearings reach significantly longer lives than open bearings. Thus the higher bearing price pays off quickly.

Cost comparison unsealed/sealed spherical roller bearings



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