

SCHAEFFLER



Sealed Spherical Roller Bearings

With reliable protection against contamination

FAG

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Sealed spherical roller bearings

Features Spherical roller bearings are double row, self-retaining units comprising solid outer rings with a concave raceway, solid inner rings and barrel rollers with cages.

The symmetrical barrel rollers orient themselves freely on the concave outer ring raceway. As a result, shaft flexing and misalignment of the bearing seats are compensated.

Sealed spherical roller bearings are characterised by having sealing shields mounted on the external edge of both sides of the bearing. These protect against particles entering the bearing and act as a barrier against the lubricant leaving the bearing.

Sealed spherical roller bearings offer many benefits for a wide range of applications:

- longer operating life of the bearing
- lower grease consumption and disposal costs
- fewer expensive relubrication systems required
- reduced maintenance outlay
- Schaeffler's reconditioning service is available for outside diameters >160 mm
- environmentally friendly characteristics.

They have the following properties:

- very high basic dynamic and static load ratings
- contact seal
- bearing materials dimensionally stabilised up to +200 °C (S1)
- two different sealing materials
- angular adjustment facility 0,5° from the central position
- standard dimensions in many cases; extra-wide bearings have a WS prefix
- standard greases
- limiting speed n_g depending on the grease and grease fill level
- X-life quality.

Sealed spherical roller bearings are suitable for areas of operation such as continuous casting plant, conveyor belts, elevator plant or the food industry.

X-life

X-life is the premium brand that identifies particularly high performance products under the INA and FAG brands. They are characterised by longer rating life and operating life.

This improved performance results from the use of state of the art manufacturing techniques and improved internal constructions. Products identified as the X-life premium brand have an increase in the basic dynamic load rating.

At Schaeffler, basic load ratings are systematically calculated using the “Method to investigate rolling bearing rating life” procedure. This describes all calculation and test methods that are necessary in order to determine all the reference values that influence rating life. This procedure has been certified by Germanischer Lloyd (GL-CER-002-2015).



Figure 1
Germanischer Lloyd certificate

Sealed spherical roller bearings

Seal materials Two different proven elastomers are available to choose from when selecting the material:

- nitrile rubber (NBR), suffix 2RSR
- fluoro rubber (FKM, FPM), suffix 2VSR.

Nitrile rubber (NBR)

- Suitable for temperatures from -30 °C to $+100\text{ °C}$
- Standard for series 222, 223 and 231
- Standard for use with the lubricant Arcanol LOAD400 recommended by Schaeffler for a temperature range of -20 °C to $+130\text{ °C}$, grease filling level 25% to 40%; other greases available on request.

Fluoro rubber (FKM, FPM)

- Suitable for temperatures from -20 °C to $+200\text{ °C}$
- Standard for series 240 and 241
- Standard for use with the lubricant Arcanol TEMP120 recommended by Schaeffler for a temperature range of -30 °C to $+180\text{ °C}$, grease filling level 55% to 65%; other greases available on request.



Seals made of fluoro rubber (FKM, FPM) are made from particularly high performance materials that may release vapour when heated to approx. $+300\text{ °C}$. This may occur if, for example, a welding torch is used to dismount the bearing. In these cases, please refer to the relevant safety instructions which are available on request.

Sealing concepts

The sealed spherical roller bearings are fitted with different sealing concepts depending on the size. This ensures that a reliable working seal is achieved for each bearing size.

Smaller diameter sealed spherical roller bearings are sometimes wider than standard bearings. In spite of the lateral sealing shields, it was possible to achieve a high degree of swivel motion and the same basic load ratings as for unsealed spherical roller bearings. Extra-wide spherical roller bearings are indicated by the prefix WS (WS = Wide Size).

The comparison between a sealed spherical roller bearing and an unsealed basic bearing such as a 22212 is shown in *Figure 2*.

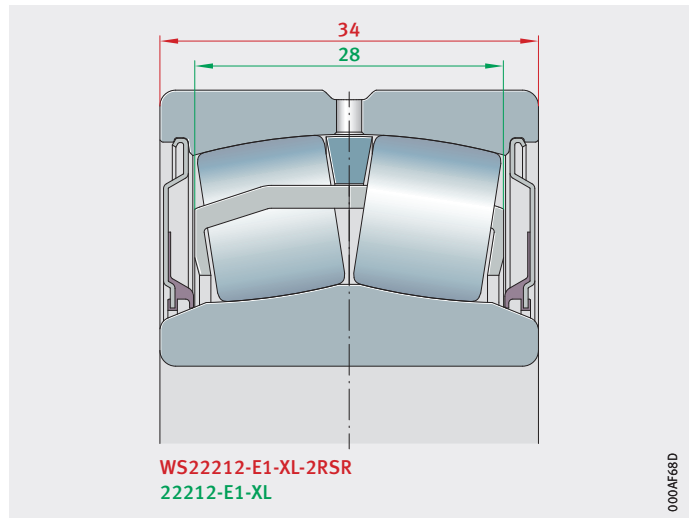


Figure 2
Extra width on
WS22212-E1-XL-2RSR
compared to 22212-E1-XL
standard bearing

Sealed spherical roller bearings

Sealing concept 1 (outside diameter ≤ 160 mm)

Sealed spherical roller bearings with a pressed-in sheet steel seal with elastomer coating are supplied if the outside diameter of the spherical roller bearing is less than or equal to 160 mm, *Figure 3*.



Figure 3
WS22212-E1-XL-2RSR-H40

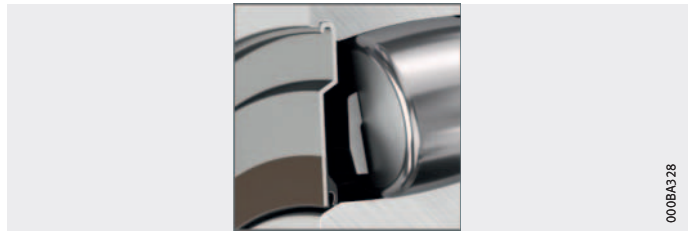


Figure 4
Sealing concept 1

Sealing concept 2
(160 mm < outside diameter
≤ 320 mm)

If the outside diameter of the spherical roller bearing is between 160 mm and 320 mm, a snapped-in seal is always supplied. The sealing shield is made from sheet steel with an elastomer coating. The sealing shield is pressed into a groove in the outer ring and is thus self-retaining, *Figure 5*. Most spherical roller bearings have standard ISO dimensions; extra-wide bearings are indicated by the prefix WS (WS = Wide Size).



Figure 5
24024-BE-XL-2VSR



Figure 6
Sealing concept 2

Sealed spherical roller bearings

Sealing concept 3 (outside diameter > 320 mm)

Two sealing concepts are used for outside diameters > 320 mm. The bearing size at which the sealing concept switches from one to the other depends on the series. Sealing concept 3 is used more frequently for smaller bearings than sealing concept 4.

In sealing concept 3, the bearing seal is achieved using a sealing shield and a retaining ring. The elastomer-coated sheet steel sealing shield is axially located in the outer ring with a retaining ring, *Figure 7*.

Sealed spherical roller bearings with this sealing concept have standard ISO dimensions.



Figure 7
23160-BEA-XL-2RSR-MB1

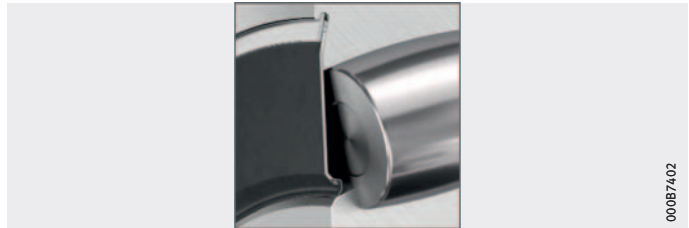


Figure 8
Sealing concept 3

Sealing concept 4

In sealing concept 4, the sealing shield consists of an elastomer sealing lip attached to a steel washer. The sealing shield is fixed to the outer ring with screws, *Figure 9*. Sealed spherical roller bearings with this sealing concept have standard ISO dimensions.



Figure 9
23180-BEA-XL-2RSR-MB1

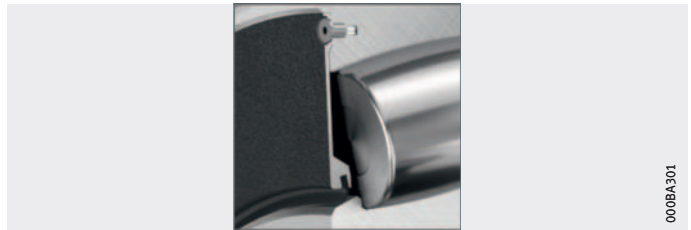
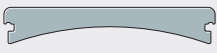
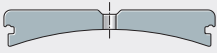


Figure 10
Sealing concept 4

Sealed spherical roller bearings

Outer ring variants Sealed spherical roller bearings have a circumferential groove and three lubrication holes in the outer ring as standard (no suffix). This allows easy relubrication. In some applications, relubrication is not required. In this case, a closed outer ring can be requested using the suffix H40.

Outer ring options

Description		Example
	Closed outer ring	24028-BE-XL-2VSR-H40
	Circumferential groove and three lubrication holes, with relubrication facility	24028-BE-XL-2VSR

Cages Sealed spherical roller bearings have a sheet steel cage as standard (no suffix) or a solid brass cage (suffix MB, MB1). A polyamide cage can be used in special cases (suffix TVPA, TVPB).

Internal clearance Sealed spherical roller bearings with cylindrical and tapered bore are manufactured as standard with the internal clearance CN (no suffix). These bearings are also available on request with reduced internal clearance C2, or larger internal clearances C3 and C4. The required internal clearance depends on the specific application and installation situation.

In some applications with conical shaft seats, it may be necessary for the internal clearance of the sealed spherical roller bearing to be more accurate than the internal clearance groups allow. In this case, there is an option for ordering the sealed bearing with a specific actual internal clearance using the suffix J15D. With this suffix, the actual internal clearance is permanently written on the outer ring and the packaging which means it remains with the bearing even after extended periods of storage or multiple relocations.

Lubricating greases

Sealed spherical roller bearings are always supplied greased and sealed. This ensures that the bearing is correctly lubricated from the outset and no contaminants can enter the bearing from the outside.

Two greases are available as standard which have proven themselves in practice and are used in many instances.

Arcanol LOAD400 (suffix L016) is a grease that is also suitable for high demands and shocks. It is used as standard in combination with NBR seals (suffix 2RSR): a special suffix is not required in this instance.

Arcanol TEMP120 (suffix L195) is a grease that is also suitable for increased temperatures and loads. Bearings with an FKM seal (suffix 2VSR) are lubricated as standard with this grease. In this instance, where the bearing has a suffix of 2VSR, the special suffix for the grease TEMP120 is not used.

Other greases are available for specific applications.

In these instances, Schaeffler can draw on a wide range of proven greases. If the standard grease does not meet your requirements, please raise this with your Schaeffler contact.

Further information

Further information on greases is available in:

- TPI 168, Rolling Bearing Greases Arcanol
- TPI 176, Lubrication of Rolling Bearings.

Adapter sleeves

The Schaeffler adapter sleeves have been adapted specially for the sealed spherical roller bearings in order to fulfil the particular requirements of these designs.

For sealed spherical roller bearings, please use the adapter sleeves with the suffix T, e.g. H24026-T.

Appropriate adapter sleeves for the relevant spherical roller bearing can be found in the dimension tables, page 20 onwards.

Sealed spherical roller bearings

Housings Sealed spherical roller bearings can in many cases be mounted in our split FAG plummer block housings. The housings are specifically designed for the location of spherical roller bearings. Split FAG plummer block housings and the associated bearings form bearing arrangement units that can be matched to a wide range of requirements through the specific selection of the housing seal design, lubrication type, and bearing mounting. The suitable housing for your sealed FAG spherical roller bearing can be found in the catalogue GK 1, Bearing Housings.



Figure 11
FAG plummer block housing unit SNS

In order to ensure selection of the correct combination of housing and bearing when using sealed spherical roller bearings, please contact Schaeffler.

Hydraulic nut HYDNUT-E

The new Schaeffler hydraulic nut HYDNUT-E can be used for easy and reliable mounting of sealed spherical roller bearings with tapered bore. The HYDNUT-E is a further development of the proven HYDNUT. The displacement distance can be precisely determined using a dial gauge mounted in the press ring. This method ensures safe installation, especially for sealed rolling bearings, and precise adjustment of the internal clearance, particularly when combined with the specific actual radial internal clearance (suffix J15D).

In addition to this, the HYDNUT-E has many useful new features such as a safety marking to indicate the maximum stroke or easy dismantling using extraction screws.

Further information

- TPI 196, HYDNUT Hydraulic Nut
- BA 04, Hydraulic Nuts.

Bearing designations

The designation of bearings follows a set model. The composition of designations is subject to DIN 623-1.

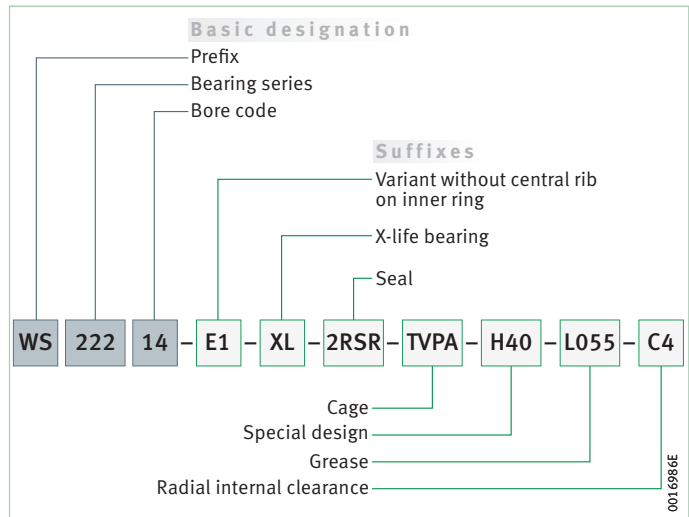


Figure 12
Bearing designations

Prefixes, suffixes

Prefix, suffix	Description
WS	Bearing is wider than the standard ISO width
2RSR	Steel-reinforced lip seal on both sides made from nitrile rubber (NBR), grease filling level 25% – 40%, filled with high-pressure grease
2VSR	Steel-reinforced lip seal on both sides made from fluoro rubber (FKM), grease filling level 55% – 65%, filled with high-temperature grease
H40	Closed outer ring without lubrication hole
K	Tapered bore, taper 1:12
BE	Floating rib washer on inner ring
BEA	Floating rib washer on inner ring, two rigid external ribs
E1	Variant without central rib on inner ring
MB	Two solid brass cages, guided on inner ring
MB1	Single-piece solid brass cage, guided on inner ring
TVPA	Polyamide cage, guided on outer ring
TVPB	Polyamide cage, guided on inner ring
XL	Bearing in X-life quality
J15D	Measured radial internal clearance, written on outer ring
C2	Radial internal clearance C2/Group 2 (smaller than normal)
C3	Radial internal clearance C3/Group 3 (larger than normal)
C4	Radial internal clearance C4/Group 4 (larger than C3)

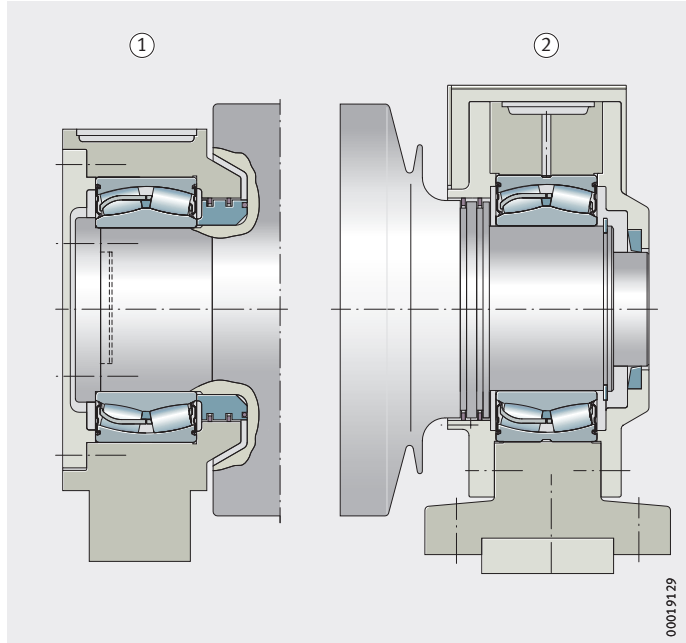
Sealed spherical roller bearings

Potential savings

In continuous slab casting plants, sealed spherical roller bearings are mounted as locating bearings and as non-locating bearings, *Figure 13*.

- ① Locating bearing
- ② Non-locating bearing

Figure 13
Mounting example



The following comparison from the continuous casting sector shows the savings that are possible by the use of sealed spherical roller bearings instead of open bearings.

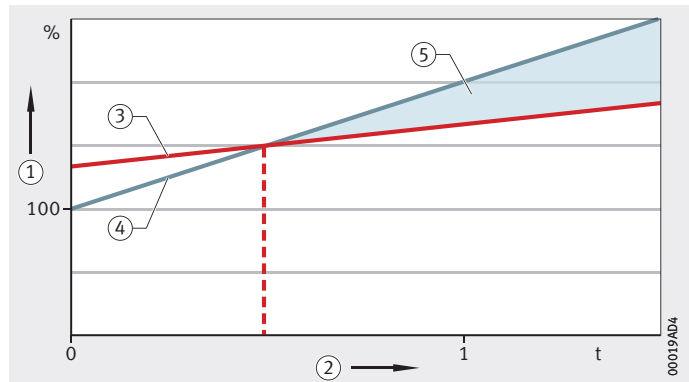
The grease costs for relubrication of an open bearing and a sealed bearing (seal lubrication of the housing) were taken into consideration along with the specific disposal and separation of the grease from the cooling circuit.

Due to the lower maintenance outlay and the generally longer life of the sealed spherical roller bearing, the higher purchase price compared to the open bearing is recouped after only a short time.

An example of the cost ratio in the life cycle of a sealed and an open bearing for a selected bearing position in a bearing position in a continuous casting plant (bearing price for the open bearing = 100%) is shown in *Figure 14*. The cost ratio and its development over time is decisively dependent on the bearing size.

① Cumulative costs in %
 ② Amortisation time in years
 ③ Sealed spherical roller bearing
 ④ Open spherical roller bearing
 ⑤ Saving

Figure 14
 Cost comparison of open and sealed spherical roller bearings



Sealed spherical roller bearings

Design and safety guidelines

Basic rating life

The basic rating lives L_{10} and L_{10h} are determined as follows:

$$L_{10} = \left(\frac{C}{P}\right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left(\frac{C}{P}\right)^p$$

L_{10} 10^6 revolutions
The basic rating life in millions of revolutions is the life reached or exceeded by 90% of a sufficiently large group of apparently identical bearings before the first evidence of material fatigue develops

C N
Basic dynamic load rating

P N

Equivalent dynamic bearing load for radial and axial bearings

p -

Life exponent;

for roller bearings: $p = 10/3$

for ball bearings: $p = 3$

L_{10h} h

The basic rating life in operating hours according to the definition for L_{10}

n min^{-1}

Operating speed.

Equivalent dynamic bearing load

The equivalent dynamic bearing load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0,67 \cdot F_r + Y_2 \cdot F_a$

F_a N

Axial dynamic bearing load

F_r N

Radial dynamic bearing load

e, Y_1 , Y_2 -

Factors, see dimension tables

P N

Equivalent dynamic bearing load for combined load.

Equivalent static bearing load

The equivalent static bearing load for combined loads P_0 is valid for bearings that are subjected to static radial and axial loads.

It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

P_0	N
Equivalent static bearing load for combined load	
F_{0r}	N
Radial static bearing load	
Y_0	–
Factor, see dimension tables	
F_{0a}	N
Axial static bearing load.	

Sealed spherical roller bearings

Rolling bearing reconditioning

During the maintenance of machinery and plant, many rolling bearings are taken out of service and replaced by new ones as a precaution. In some cases, this safety-conscious approach blocks any appreciation of the potential cost savings. The fact is: reconditioned bearings generally give the same performance as new ones.

The reconditioning of rolling bearings and rolling bearing units is one of the core competences of the service arm of Schaeffler and is offered at several certified locations worldwide. Our services for rolling bearings of all types apply irrespective of manufacturer and are not restricted to Schaeffler products.

Schaeffler is able to recondition and modify rolling bearings with an outside diameter up to 4 250 mm, *Figure 15*. Schaeffler is thus an expert partner for customers from a very wide range of industrial sectors such as general and special machine building, steel and aluminium, pulp and paper production, wind power, shipbuilding, private and public railways, and mining.



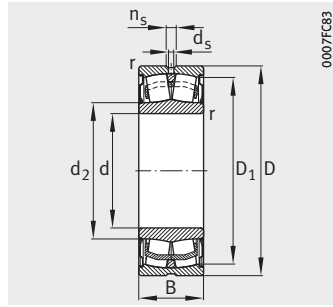
Figure 15
Bearing examination by Schaeffler reconditioning specialists

Further information

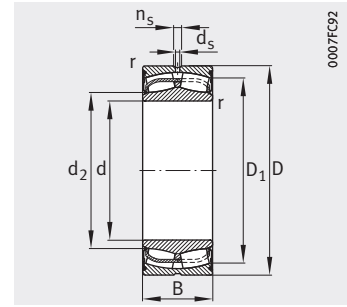
- For information on the reconditioning of rolling bearings, see Technical Product Information TPI 207, Reconditioning of Rolling Bearings.

Sealed spherical roller bearings

X-life



222, 223

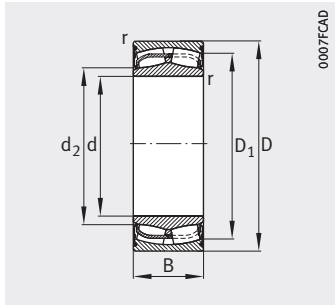


240, 241

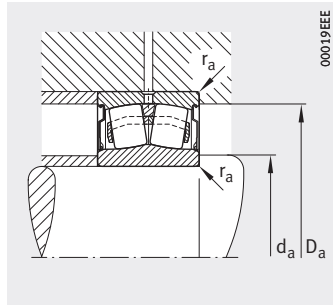
Dimension table · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions								Mounting dimensions		
		d	D	B	r _{min}	D ₁	d ₂	n _s	d _s	d _{a min}	D _{a max}	r _{a max}
WS22205-E1-XL-2RSR	0,235	25	52	23	1	46,1	29,8	4,8	3,2	29,8	46,4	1
WS22205-E1-XL-K-2RSR	0,235	25	52	23	1	46,1	29,8	4,8	3,2	29,8	46,4	1
WS22206-E1-XL-2RSR	0,4	30	62	25	1	55,5	35	4,8	3,2	35	56,4	1
WS22206-E1-XL-K-2RSR	0,4	30	62	25	1	55,5	35	4,8	3,2	35	56,4	1
WS22207-E1-XL-2RSR	0,6	35	72	28	1,1	64,2	40,1	4,8	3,2	40,1	65	1
WS22207-E1-XL-K-2RSR	0,6	35	72	28	1,1	64,2	40,1	4,8	3,2	40,1	65	1
WS22208-E1-XL-2RSR	0,7	40	80	28	1,1	72,6	45,9	4,8	3,2	45,9	73	1
WS22208-E1-XL-K-2RSR	0,7	40	80	28	1,1	72,6	45,9	4,8	3,2	45,9	73	1
WS22308-E1-XL-2RSR	1,16	40	90	38	1,5	78,1	48,9	6,5	3,2	48,9	81	1,5
WS22308-E1-XL-K-2RSR	1,16	40	90	38	1,5	78,1	48,9	6,5	3,2	48,9	81	1,5
WS22209-E1-XL-2RSR	0,67	45	85	28	1,1	77,8	51,4	4,8	3,2	51,4	78	1
WS22209-E1-XL-K-2RSR	0,67	45	85	28	1,1	77,8	51,4	4,8	3,2	51,4	78	1
WS22210-E1-XL-2RSR	0,8	50	90	28	1,1	83,1	56	4,8	3,2	56	83,1	1
WS22210-E1-XL-K-2RSR	0,8	50	90	28	1,1	83,1	56	4,8	3,2	56	83,1	1
WS22211-E1-XL-2RSR	1,1	55	100	31	1,5	91,9	63,5	4,8	3,2	63,5	91,9	1,5
WS22211-E1-XL-K-2RSR	1,1	55	100	31	1,5	91,9	63,5	4,8	3,2	63,5	91,9	1,5
WS22311-E1-XL-2RSR	2,9	55	120	49	2	104,1	64,8	6,5	3,2	64,8	109	2
WS22311-E1-XL-K-2RSR	2,9	55	120	49	2	104,1	64,8	6,5	3,2	64,8	109	2
WS22212-E1-XL-2RSR	1,5	60	110	34	1,5	100,7	67,6	6,5	3,2	67,6	101	1,5
WS22212-E1-XL-K-2RSR	1,5	60	110	34	1,5	100,7	67,6	6,5	3,2	67,6	101	1,5
WS22312-E1-XL-2RSR	3,4	60	130	53	2,1	110,2	71,4	6,5	3,2	71,4	118	2,1
WS22312-E1-XL-K-2RSR	3,4	60	130	53	2,1	110,2	71,4	6,5	3,2	71,4	118	2,1
WS22213-E1-XL-2RSR	2	65	120	38	1,5	110,2	76,2	6,5	3,2	76,2	111	1,5
WS22213-E1-XL-K-2RSR	2	65	120	38	1,5	110,2	76,2	6,5	3,2	76,2	111	1,5
WS22214-E1-XL-2RSR	2,1	70	125	38	1,5	113,5	82,5	6,5	3,2	82,5	116	1,5
WS22214-E1-XL-K-2RSR	2,1	70	125	38	1,5	113,5	82,5	6,5	3,2	82,5	116	1,5
WS22314-E1-XL-2RSR	5,4	70	150	60	2,1	130,4	80,7	9,5	4,8	80,7	138	2,1
WS22314-E1-XL-K-2RSR	5,4	70	150	60	2,1	130,4	80,7	9,5	4,8	80,7	138	2,1
WS22215-E1-XL-2RSR	2,2	75	130	38	1,5	120,2	85,6	6,5	3,2	84	121	1,5
WS22215-E1-XL-K-2RSR	2,2	75	130	38	1,5	120,2	85,6	6,5	3,2	84	121	1,5

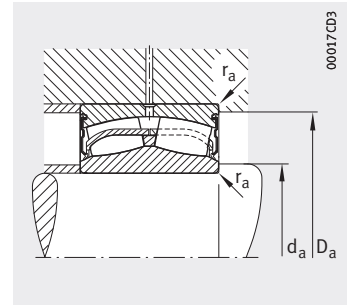
Other bearing sizes available by agreement.



240-H40, 241-H40



Mounting dimensions
222, 223

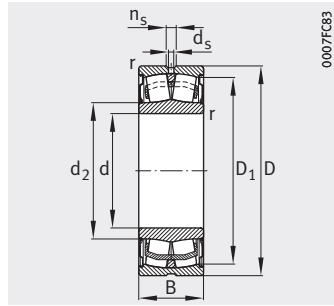


Mounting dimensions
240, 241

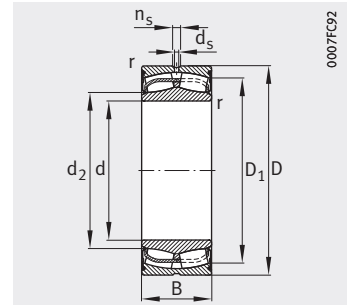
Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n min^{-1}	Adapter sleeve	With- drawal sleeve
dyn. C N	stat. C_{or} N	dyn. e	Y1	Y2	stat. Y0				
48 500	42 500	0,33	2,07	3,09	2,03	4 900	3 600	–	–
48 500	42 500	0,33	2,07	3,09	2,03	4 900	3 600	H305-T	–
64 000	57 000	0,3	2,26	3,37	2,21	7 000	3 150	–	–
64 000	57 000	0,3	2,26	3,37	2,21	7 000	3 150	H306-T	–
89 000	81 000	0,31	2,21	3,29	2,16	9 700	2 700	–	–
89 000	81 000	0,31	2,21	3,29	2,16	9 700	2 700	H307-T	–
101 000	91 000	0,27	2,49	3,71	2,43	12 100	2 600	–	–
101 000	91 000	0,27	2,49	3,71	2,43	12 100	2 600	H308-T	–
156 000	149 000	0,36	1,86	2,77	1,82	13 500	1 890	–	–
156 000	149 000	0,36	1,86	2,77	1,82	13 500	1 890	H3308-T	–
104 000	99 000	0,25	2,74	4,08	2,68	13 000	2 550	–	–
104 000	99 000	0,25	2,74	4,08	2,68	13 000	2 550	H309-T	–
109 000	107 000	0,23	2,95	4,4	2,89	14 600	2 440	–	–
109 000	107 000	0,23	2,95	4,4	2,89	14 600	2 440	H310-T	–
129 000	130 000	0,21	3,17	4,72	3,1	17 700	2 250	–	–
129 000	130 000	0,21	3,17	4,72	3,1	17 700	2 250	H311-T	–
265 000	260 000	0,36	1,89	2,81	1,84	24 600	1 460	–	–
265 000	260 000	0,36	1,89	2,81	1,84	24 600	1 460	H3311-T	–
160 000	155 000	0,23	2,98	4,44	2,92	20 700	2 030	–	–
160 000	155 000	0,23	2,98	4,44	2,92	20 700	2 030	H312-T	–
310 000	310 000	0,35	1,91	2,85	1,87	29 000	1 350	–	–
310 000	310 000	0,35	1,91	2,85	1,87	29 000	1 350	H3312-T	–
202 000	210 000	0,24	2,81	4,19	2,75	26 500	1 740	–	–
202 000	210 000	0,24	2,81	4,19	2,75	26 500	1 740	H313-T	–
211 000	226 000	0,23	2,95	4,4	2,89	28 500	1 670	–	–
211 000	226 000	0,23	2,95	4,4	2,89	28 500	1 670	H314-T	–
390 000	390 000	0,34	2	2,98	1,96	37 500	1 210	–	–
390 000	390 000	0,34	2	2,98	1,96	37 500	1 210	H3314-T	–
216 000	237 000	0,22	3,1	4,62	3,03	30 500	1 630	–	–
216 000	237 000	0,22	3,1	4,62	3,03	30 500	1 630	H315-T	–

Sealed spherical roller bearings

X-life



222, 223

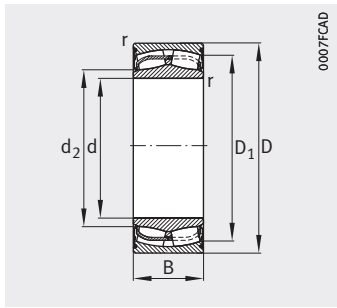


240, 241

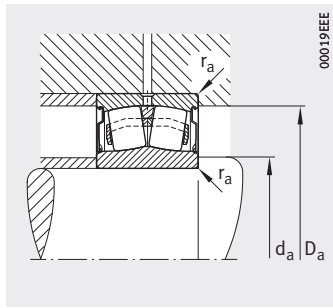
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions								Mounting dimensions		
		d	D	B	r _{min}	D ₁	d ₂	n _s	d _s	d _{a min}	D _{a max}	r _{a max}
WS22216-E1-XL-2RSR	2,7	80	140	40	2	128,6	91,3	6,5	3,2	91	129	2
WS22216-E1-XL-K-2RSR	2,7	80	140	40	2	128,6	91,3	6,5	3,2	91	129	2
WS22217-E1-XL-2RSR	3,4	85	150	44	2	137,1	96,5	6,5	3,2	96	139	2
WS22217-E1-XL-K-2RSR	3,4	85	150	44	2	137,1	96,5	6,5	3,2	96	139	2
WS22218-E1-XL-2RSR	4,3	90	160	48	2	146,7	101,4	6,5	3,2	101	149	2
WS22218-E1-XL-K-2RSR	4,3	90	160	48	2	146,7	101,4	6,5	3,2	101	149	2
WS22220-E1-XL-2RSR	6,3	100	180	55	2,1	169,1	115	9,5	4,8	112	169,1	2,1
WS22220-E1-XL-K-2RSR	6,25	100	180	55	2,1	169,1	115	9,5	4,8	112	169,1	2,1
24122-BE-XL-2VSR	6,8	110	180	69	2	167,1	120,8	6,5	3,2	121	169	2
WS22222-E1-XL-2RSR	9	110	200	63	2,1	182,6	124,9	9,5	4,8	122	188	2,1
WS22222-E1-XL-K-2RSR	9	110	200	63	2,1	182,6	124,9	9,5	4,8	122	188	2,1
24024-BE-XL-2VSR	5,6	120	180	60	2	170,5	131	6,5	3,2	128,8	171,2	2
24124-BE-XL-2VSR	10,4	120	200	80	2	184,5	131,1	6,5	3,2	131	189	2
WS22224-E1-XL-2RSR	11,3	120	215	69	2,1	203,4	136,8	12,2	6,3	132	203,4	2,1
WS22224-E1-XL-K-2RSR	11,3	120	215	69	2,1	203,4	136,8	12,2	6,3	132	203,4	2,1
24026-BE-XL-2VSR	8,4	130	200	69	2	187,2	142,1	6,5	3,2	138,8	191,2	2
24126-BE-XL-2VSR	11	130	210	80	2	196,1	143,1	6,5	3,2	141	199	2
WS22226-E1-XL-2RSR	12,8	130	230	75	3	217,5	146,6	12,2	6,3	144	217,5	2,5
WS22226-E1-XL-K-2RSR	12,8	130	230	75	3	217,5	146,6	12,2	6,3	144	217,5	2,5
24028-BE-XL-2VSR	8,4	140	210	69	2	198,5	153,3	6,5	3,2	148,8	201,2	2
24128-BE-XL-2VSR	13,8	140	225	85	2,1	209,9	153,5	9,5	4,8	152	213	2,1
22228-E1A-XL-2RSR-M	14,1	140	250	68	3	237	–	12,2	6,3	154	236	2,5
22228-E1A-XL-K-2RSR-M	13,7	140	250	68	3	237	–	12,2	6,3	154	236	2,5
24030-BE-XL-2VSR	11,1	150	225	75	2,1	213,2	164	6,5	3,2	160,2	214,8	2,1
24130-BE-XL-2VSR	20,6	150	250	100	2,1	228,9	163,1	9,5	4,8	162	238	2,1
24032-BE-XL-2VSR	12,7	160	240	80	2,1	226,9	174,8	9,5	4,8	170,2	229,8	2,1
24132-BE-XL-2VSR	25,4	160	270	109	2,1	245,6	175,5	9,5	4,8	172	258	2,1
22232-E1A-XL-2RSR-M	23,3	160	290	80	3	275	–	15	8	174	276	2,5
22232-E1A-XL-K-2RSR-M	22,4	160	290	80	3	275	–	15	8	174	276	2,5
24034-BE-XL-2VSR	17,2	170	260	90	2,1	243,3	184,8	9,5	4,8	180,2	249,8	2,1
24134-BE-XL-2VSR	26,4	170	280	109	2,1	257,3	186,7	9,5	4,8	182	268	2,1

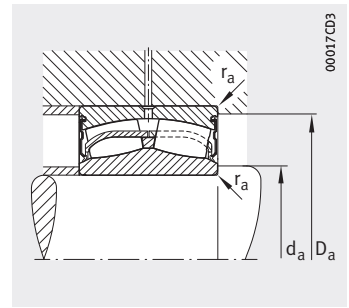
Other bearing sizes available by agreement.



240-H40, 241-H40



Mounting dimensions
222, 223

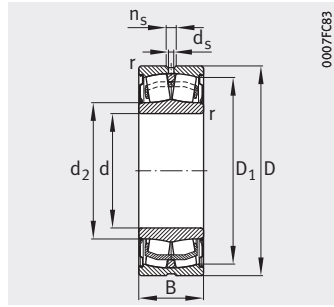


Mounting dimensions
240, 241

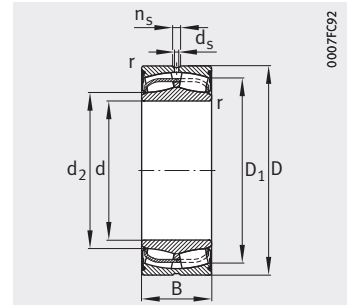
Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n min ⁻¹	Adapter sleeve	Withdrawal sleeve
dyn. C N	stat. C_{Or} N	dyn. e	Y1	Y2	stat. Y0				
250 000	270 000	0,22	3,14	4,67	3,07	34 500	1 540	-	-
250 000	270 000	0,22	3,14	4,67	3,07	34 500	1 540	H316-T	-
305 000	325 000	0,22	3,04	4,53	2,97	39 000	1 420	-	-
305 000	325 000	0,22	3,04	4,53	2,97	39 000	1 420	H317-T	-
345 000	375 000	0,23	2,9	4,31	2,83	43 500	1 300	-	-
345 000	375 000	0,23	2,9	4,31	2,83	43 500	1 300	H318-T	-
430 000	475 000	0,24	2,84	4,23	2,78	53 000	1 140	-	-
430 000	475 000	0,24	2,84	4,23	2,78	53 000	1 140	H3120-T	-
530 000	750 000	0,34	1,96	2,92	1,92	86 000	830	-	-
550 000	600 000	0,25	2,71	4,04	2,65	64 000	1 020	-	-
550 000	600 000	0,25	2,71	4,04	2,65	64 000	1 020	H3122-T	-
450 000	690 000	0,29	2,33	3,47	2,28	86 000	860	-	-
680 000	950 000	0,37	1,84	2,74	1,8	103 000	740	-	-
640 000	740 000	0,25	2,71	4,04	2,65	73 000	920	-	-
640 000	740 000	0,25	2,71	4,04	2,65	73 000	920	H3124-T	-
570 000	860 000	0,31	2,21	3,29	2,16	103 000	780	-	-
710 000	1 050 000	0,34	1,98	2,94	1,93	112 000	700	-	-
760 000	890 000	0,26	2,62	3,9	2,56	81 000	840	-	-
760 000	890 000	0,26	2,62	3,9	2,56	81 000	840	H3126-T	-
590 000	930 000	0,28	2,37	3,53	2,32	111 000	740	-	-
800 000	1 190 000	0,34	1,99	2,96	1,94	127 000	660	-	-
830 000	970 000	0,24	2,81	4,19	2,75	100 000	820	-	-
830 000	970 000	0,24	2,81	4,19	2,75	100 000	820	H3128	AHX3128
680 000	1 090 000	0,29	2,32	3,45	2,26	125 000	690	-	-
1 050 000	1 520 000	0,37	1,83	2,72	1,79	153 000	590	-	-
770 000	1 240 000	0,29	2,32	3,45	2,26	140 000	640	-	-
1 220 000	1 800 000	0,37	1,8	2,69	1,76	173 000	540	-	-
1 080 000	1 300 000	0,24	2,79	4,15	2,73	128 000	700	-	-
1 080 000	1 300 000	0,24	2,79	4,15	2,73	128 000	700	H3132-HG	AH3132A
940 000	1 480 000	0,31	2,2	3,27	2,15	162 000	600	-	-
1 260 000	1 900 000	0,36	1,9	2,83	1,86	184 000	530	-	-

Sealed spherical roller bearings

X-life



222, 223

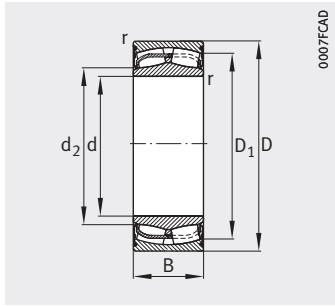


240, 241

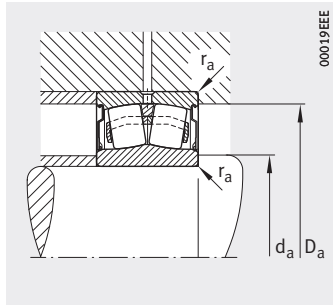
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions								Mounting dimensions		
		d	D	B	r _{min}	D ₁	d ₂	n _s	d _s	d _{a min}	D _{a max}	r _{a max}
24036-BE-XL-2VSR	22,7	180	280	100	2,1	259,6	195,6	9,5	4,8	190,2	269,8	2,1
24136-BE-XL-2VSR	33,2	180	300	118	3	276,3	196,2	12,2	6,3	194	286	2,5
24038-BE-XL-2VSR	23,7	190	290	100	2,1	271,1	206,2	9,5	4,8	200,2	279,8	2,1
24138-BE-XL-2VSR	41,5	190	320	128	3	292,6	208	12,2	6,3	204	306	2,5
24040-BE-XL-2VSR	30,1	200	310	109	2,1	287,8	217	12,2	6,3	210,2	299,8	2,1
23140-BE-XL-2RSR	41,5	200	340	112	3	319	224,6	17,7	9,5	214	326	2,5
23140-BE-XL-K-2RSR	40,9	200	340	112	3	319	224,6	17,7	9,5	214	326	2,5
24140-BE-XL-2VSR	49,5	200	340	140	3	309,5	216,2	12,2	6,3	214	326	2,5
23144-BE-XL-2RSR	52,2	220	370	120	4	345	249	17,7	9,5	237	353	3
23144-BE-XL-K-2RSR	50,5	220	370	120	4	345	249	17,7	9,5	237	353	3
24144-BE-XL-2VSR	64	220	370	150	4	338,5	236,2	12,2	6,3	237	353	3
23148-BE-XL-2RSR	64	240	400	128	4	374	269	17,7	9,5	257	383	3
23148-BE-XL-K-2RSR	62	240	400	128	4	374	269	17,7	9,5	257	383	3
23152-BE-XL-2RSR	90	260	440	144	4	412	295	17,7	9,5	277	423	3
23152-BE-XL-K-2RSR	87,2	260	440	144	4	412	295	17,7	9,5	277	423	3
23156-BE-XL-2RSR	96,3	280	460	146	5	431	315	17,7	9,5	300	440	4
23156-BE-XL-K-2RSR	93,1	280	460	146	5	431	315	17,7	9,5	300	440	4
23160-BEA-XL-2RSR-MB1	130	300	500	160	5	460	–	17,7	9,5	320	480	4
23160-BEA-XL-K-2RSR-MB1	126	300	500	160	5	460	–	17,7	9,5	320	480	4
23164-BEA-XL-2RSR-MB1	165	320	540	176	5	503	–	23,5	12,5	340	520	4
23164-BEA-XL-K-2RSR-MB1	161	320	540	176	5	503	–	23,5	12,5	340	520	4
23168-BEA-XL-2RSR-MB1	210	340	580	190	5	537	–	23,5	12,5	360	560	4
23168-BEA-XL-K-2RSR-MB1	204	340	580	190	5	537	–	23,5	12,5	360	560	4
23172-BEA-XL-2RSR-MB1	222	360	600	192	5	560	–	23,5	12,5	380	580	4
23172-BEA-XL-K-2RSR-MB1	215	360	600	192	5	560	–	23,5	12,5	380	580	4
23176-BEA-XL-2RSR-MB1	234	380	620	194	5	580	–	23,5	12,5	400	600	4
23176-BEA-XL-K-2RSR-MB1	227	380	620	194	5	580	–	23,5	12,5	400	600	4
23180-BEA-XL-2RSR-MB1	255	400	650	200	6	622	–	23,5	12,5	426	624	5
23180-BEA-XL-K-2RSR-MB1	246	400	650	200	6	622	–	23,5	12,5	426	624	5

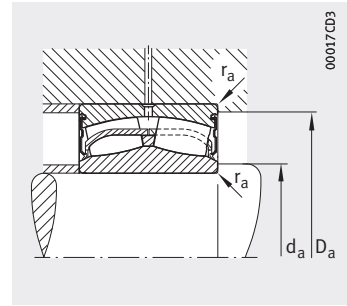
Other bearing sizes available by agreement.



240-H40, 241-H40



Mounting dimensions
222, 223



Mounting dimensions
240, 241

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n min^{-1}	Adapter sleeve	Withdrawal sleeve
dyn. C N	stat. C_{0r} N	dyn. e	Y1	Y2	stat. Y0				
1 130 000	1 770 000	0,32	2,1	3,13	2,06	185 000	550	–	–
1 460 000	2 170 000	0,36	1,86	2,77	1,82	208 000	500	–	–
1 160 000	1 860 000	0,31	2,2	3,27	2,15	197 000	540	–	–
1 680 000	2 550 000	0,37	1,82	2,7	1,78	232 000	460	–	–
1 350 000	2 150 000	0,32	2,13	3,17	2,08	221 000	500	–	–
1 620 000	2 270 000	0,3	2,25	3,34	2,2	194 000	510	–	–
1 620 000	2 270 000	0,3	2,25	3,34	2,2	194 000	510	H3140-HG-T	AH3140
1 880 000	2 800 000	0,39	1,71	2,54	1,67	260 000	445	–	–
1 860 000	2 700 000	0,29	2,32	3,45	2,26	224 000	465	–	–
1 860 000	2 700 000	0,29	2,32	3,45	2,26	224 000	465	H3144X-HG-T	AH3144
2 190 000	3 250 000	0,39	1,74	2,59	1,7	300 000	410	–	–
2 140 000	3 150 000	0,29	2,35	3,5	2,3	255 000	425	–	–
2 140 000	3 150 000	0,29	2,35	3,5	2,3	255 000	425	H3148X-HG-T	AH3148G
2 600 000	3 900 000	0,3	2,26	3,37	2,21	300 000	375	–	–
2 600 000	3 900 000	0,3	2,26	3,37	2,21	300 000	375	H3152X-HG-T	AH3152G
2 750 000	4 200 000	0,28	2,37	3,53	2,32	325 000	355	–	–
2 750 000	4 200 000	0,28	2,37	3,53	2,32	325 000	355	H3156X-HG-T	AH3156G
3 250 000	4 950 000	0,29	2,3	3,42	2,25	375 000	325	–	–
3 250 000	4 950 000	0,29	2,3	3,42	2,25	375 000	325	H3160-HG	AH3160G
3 800 000	5 900 000	0,3	2,26	3,37	2,21	425 000	290	–	–
3 800 000	5 900 000	0,3	2,26	3,37	2,21	425 000	290	H3164-HG	AH3164G-H
4 400 000	6 600 000	0,3	2,23	3,32	2,18	480 000	270	–	–
4 400 000	6 600 000	0,3	2,23	3,32	2,18	480 000	270	H3168-HG	AH3168G-H
4 550 000	7 100 000	0,29	2,3	3,42	2,25	510 000	260	–	–
4 550 000	7 100 000	0,29	2,3	3,42	2,25	510 000	260	H3172-HG	AH3172G-H
4 750 000	7 600 000	0,28	2,37	3,53	2,32	540 000	248	–	–
4 750 000	7 600 000	0,28	2,37	3,53	2,32	540 000	248	H3176-HG	AH3176G-H
5 100 000	8 100 000	0,28	2,41	3,59	2,35	590 000	236	–	–
5 100 000	8 100 000	0,28	2,41	3,59	2,35	590 000	236	H3180-HG	AH3180G-H

Continuous casting plants

In continuous casting plants, the cast strand is supported by rolls. In order to restrict deflection, the rolls are supported at several points along their length by rolling bearings. These bearings are subjected to high loads, low speeds, spray water and high temperatures. Spherical roller bearings of sealed design are used to support the rolls, *Figure 1*.



Figure 1
Continuous casting plant

Requirements

The demands on the design are:

- high static load carrying capacity
- maximum resistance to the ingress of foreign matter.

Design solution

Sealed spherical roller bearings E1 offer a high standard of reliability, cost-efficiency and technical performance capacity in the metal-producing and metal-processing industry.

Due to the particularly compact bearing seals in series 240 and 241, the internal construction used can be the same as in the open type, *Figure 2*. The advantages of the field tested X-life design are now also accessible for sealed spherical roller bearings. The external dimensions of course remain identical to those of the unsealed variant. The extremely reliable sealing arrangement using a high temperature elastomer (FKM) and a special high temperature lubricant allows a longer bearing operating life, leading to higher machine availability and thus to greater added value.

The maintenance-friendly sealing concept of series 240 and 241 also contributes to rapid amortisation.

For the specific applications, the grease operating life as well as the relubrication quantity and the service life must be checked.

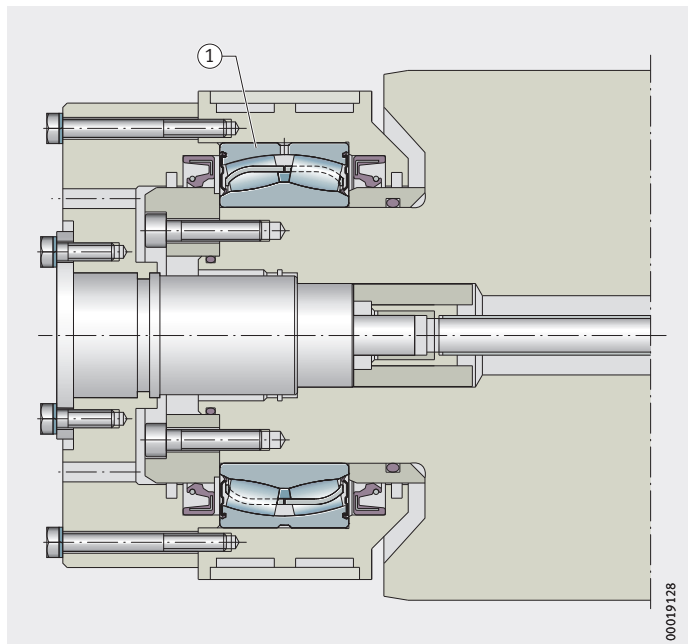


Figure 2
Strand guide roll

Products used

- ① 24028-BE-XL-2VSR-C4.

Elevator systems

Due to their optimised bearing kinematics and minimal frictional torque, sealed spherical roller bearings are an ideal choice for use in elevator plant, *Figure 1*.



Figure 1
Elevator system

Requirements

The demands on the design are:

- a low-maintenance bearing arrangement
- maximum operating life.

Design solution

The extremely reliable sealing arrangement using an elastomer already subjected to field tests allows extended operating life and thus a possibility of approaching freedom from maintenance.

The consistently very high basic load ratings of the spherical roller bearings also permit downsizing of existing bearing arrangements or in new designs. We are responding to the increasing requirements in terms of travel and travel speed of elevators with our sealed spherical roller bearings with high basic load ratings and smooth running characteristics, *Figure 2*.

Furthermore, a particularly low noise level can be achieved by ordering specially developed low noise designs with, for example, rollers with special surface and waviness properties (suffix T45C) or a different grease such as L055.

For the specific applications, the grease operating life as well as the relubrication quantity and the service life must be checked.

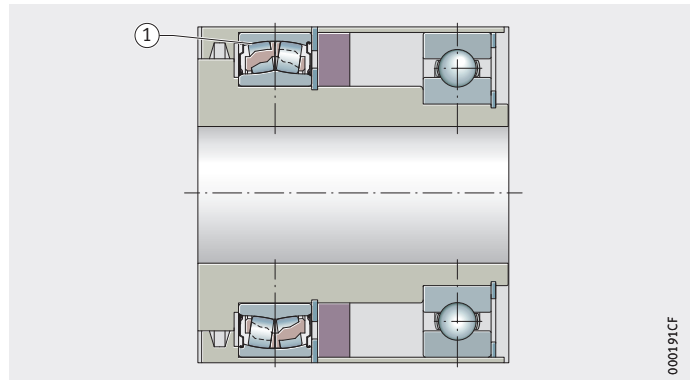


Figure 2
Elevator roller

Products used

① WS22212-E1-2RSR-TVPA-H40-L055.

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Issued: 2019, November

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TPI 218 GB-D