

# SKF Cooper split spherical roller bearings

Reduce mean time to repair for increased productivity – and improve worker safety



# Cut downtime to a minimum

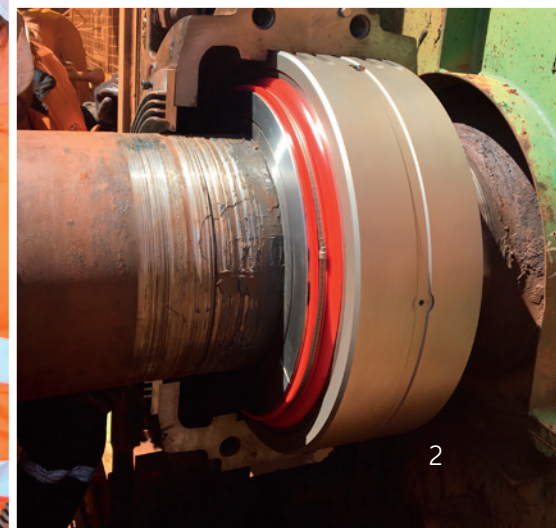
For customers looking for bearings designed to be easily replaced with little disturbance to the shaft alignment or driveline, SKF Cooper split spherical roller bearings offer a solution – reducing mean time to repair (MTTR) by 70%.

- Allows safer and time-saving bearing replacements in the trapped position on conveyor pulleys, stacker reclaimers and other machinery
- Sealed version available for increased protection against contamination and reduced maintenance
- Longer service life (MTBF) compared to other split bearings, thanks to the wire cut inner and outer ring manufacturing technique and sealed versions
- Sealed version reduces grease consumption – and cuts environmental impact
- Compatible with SKF inch and metric split block housings e.g. SAF / SDAF and SNLD, SMS
- Reduced risk of shaft fretting with better axial clamping
- Interchangeable with competitors' split spherical roller bearings and split block housings



**MTTR:  
FROM 24 HOURS  
TO 8 HOURS\***

\* In-field reports of bearing changes for mining customers



Decrease your:

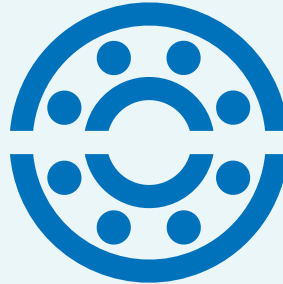
Increase your:

MTTR



Productivity

Worker exposure to accidents



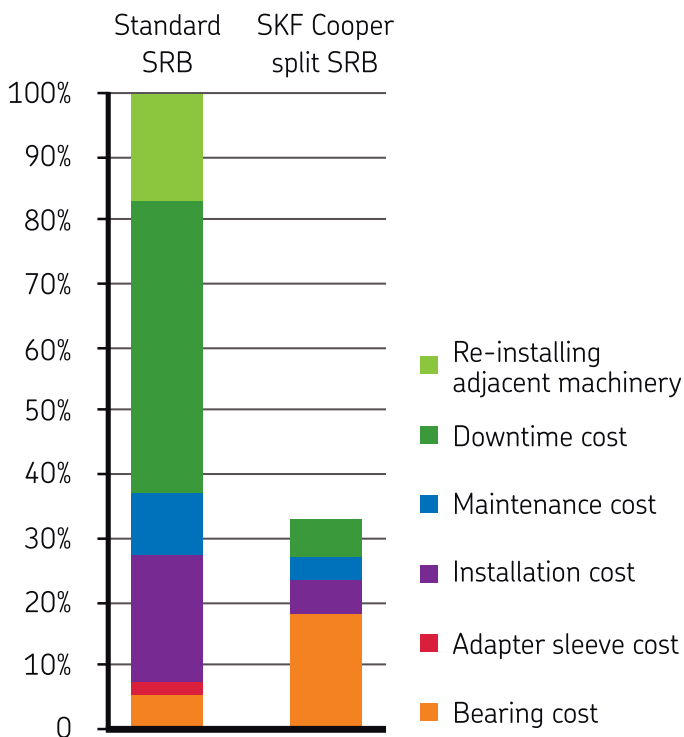
Bearing reliability

Contaminant ingress



Machine performance

### Cost savings



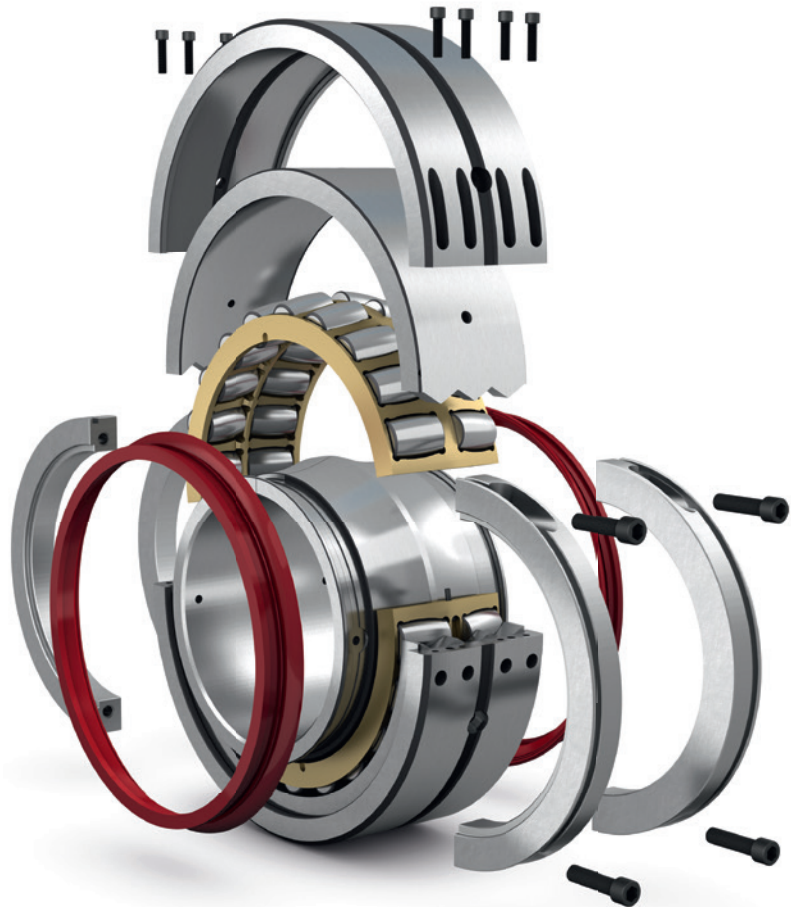
# Taking on your biggest challenge

## Tough enough for heavy-duty industries

- Mining
- Mineral processing
- Cement

## And a wide range of applications

- Conveyor pulleys
- Rope sheaves
- Bucket elevators
- Stackers/reclaimers
- Hoists and winches
- Horizontal grinding mill pinions



## Boost worker safety

43% of accidents in the mining and cement industry occur while workers perform maintenance or checks on conveyors. With the SKF Cooper split spherical roller bearings there is no need to dismantle the drive coupling or the cantilevered drive to replace the bearing thus avoiding realignment. This greatly reduces the safety risk to workers.

# Meet your requirements

SKF Cooper split spherical roller bearings are manufactured to ISO Normal precision and running accuracy. The mounted internal radial clearance of the split bearing is slightly more than the mounted clearance of a standard (CN) spherical roller bearing mounted on an adapter sleeve. Other bearing internal clearances (e.g. C3) are available upon request.

The SKF Cooper split spherical roller bearing can be used with SKF metric and inch split block housings. The split bearing outer shroud is the same dimension as a standard ISO spherical bearing outer ring.

## Minimum load

The requisite minimum load to be applied to spherical roller bearings can be estimated using  $P_m = 0.01 C_0$  where:

- $P_m$  = equivalent minimum load, kN
- $C_0$  = basic static load rating, kN

## Shaft and housing fitting

- Shaft ISO h9 (IT5/2 and surface roughness,  $R_a = 0.8$ )
- Housing ISO G7 (IT6/2)

## Grease lubrication (grease ordered separately)

Fill the bearing with one of the following recommended SKF greases at assembly:

### Ambient conditions

- Normal LGEP 2
- High temperatures (to +248 °F (+120 °C)) LGHB 2
- Cold temperatures (to -22 °F (-30 °C)) LGWM 2

Alternative Lithium/Lithium Complex NLGI 2 greases with suitable base oil viscosity can be used.

The bearing should be relubricated with grease through its W33 groove according to the following formula:  
 $G_p = 0,0015 \times D \times B$  for sealed bearings where:

- $G_p$  = grease quantity, grams
- $D$  = bearing outside diameter, mm
- $B$  = bearing outer ring width, mm

The frequency of the relubrication should be according to the SKF General Catalogue and based on the bearing size, shaft speed, operating temperature, etc.

SKF SYSTEM 24 automatic lubricators with SKF LGWA 2 grease can be used to relubricate the bearings.

## Oil lubrication

Use ISO VG 220 oil or ISO VG 320 oil as required.

### Temperature limits

Bearing components are heat stable up to 248 °F (120 °C) at continuous operation. The seals have a limit of -40 °F to +194 °F (-40 ° to +90 °C). Check that the bearing is adequately lubricated for normal operating conditions.

## Bearing rating life

SKF Cooper uses ISO 281:2007 to calculate the  $L_{10m}$  modified rating life of the split spherical roller bearing. The sealed split bearing will have minimum two times longer rating life than the open (unsealed) bearings because of the improved exclusion of contamination.

## Bearing equivalent load, $P_r$

The bearing equivalent dynamic load is calculated the same as a standard (non-split) spherical roller bearing with a dynamic factor,  $fd$ . See table.

- $P_r = fd (X F_r + Y F_a)$

## ISO modified rating life, $L_{10mh}$

The modified rating life is calculated the same as a standard spherical bearing using the following:

$$L_{10mh} = a_{ISO} \left( \frac{C_r}{P_r} \right)^{\frac{10}{3}} \frac{1000000}{60n}$$

Consult SKF Applications Engineering for assistance.

## Permissible axial load

Owing to the steel inner ring clamp ring design, the SKF Cooper split spherical roller bearings have 50–100% higher permissible axial shaft clamp load capability compared to competitor's bearings.

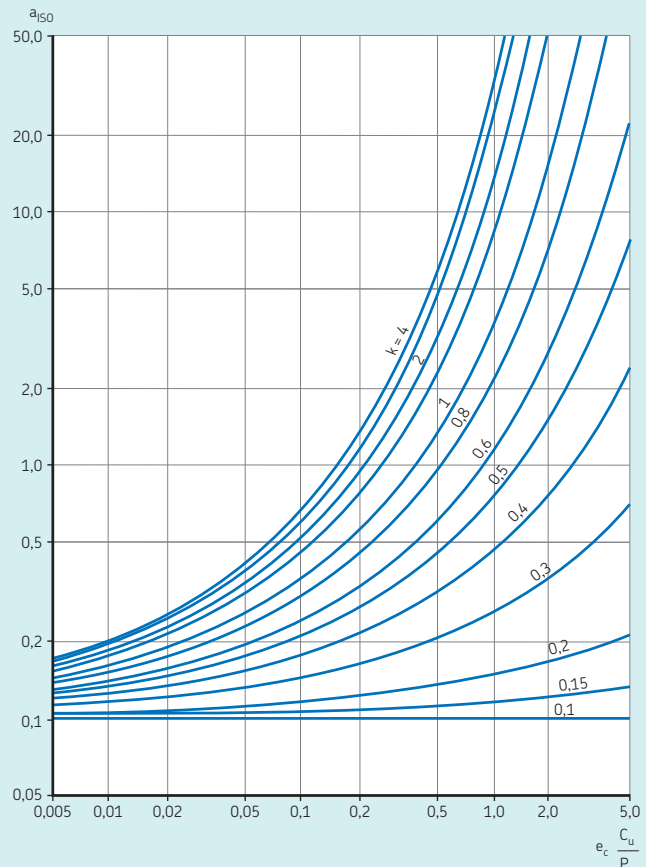
## Misalignment

The split spherical roller bearing has a permissible angular misalignment between the inner and outer ring of  $2^\circ$  for bearings with shaft diameter less than 11 inches (280 mm) and  $3^\circ$  for bearings with 11 inches (280 mm) shaft diameter and larger. Sealed bearings have a permissible misalignment of  $\pm 0.5^\circ$ . This is the same permissible misalignment as the SKF TK taconite seal mounted in the SKF split block housings.

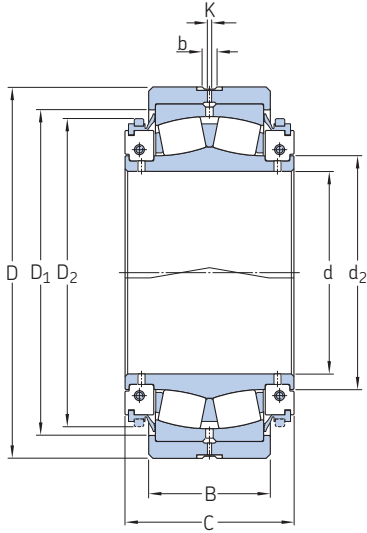
## Dynamic factor

The appropriate dynamic factor ( $fd$ ) may be taken from the chart.

Conditions	$fd$
Steady load or small fluctuations	1.0–1.3
Light shock	1.3–2.3
Heavy shock, vibration or reciprocation	2.0–3.5



Life modification factor,  $a_{ISO}$  for radial roller bearings based on ISO 281



Calculation factors					Designations		
e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	Mass	open	sealed	
					kg	-	
0,3	2,3	3,4	2,2	120	231S240M	231S240M-2SRS	
0,31	2,1	3,3	2,2	131	231S260M	231S260M-2SRS	
0,3	2,3	3,4	2,2	171	231S280M	231S280M-2SRS	
0,3	2,3	3,4	2,2	212	231S300M	231S300M-2SRS	
0,31	2,2	3,3	2,2	272	231S320M	231S320M-2SRS	
0,31	2,2	3,3	2,2	293	231S340M	231S340M-2SRS	
0,3	2,3	3,4	2,2	308	231S360M	231S360M-2SRS	
0,3	2,3	3,4	2,2	344	231S380M	231S380M-2SRS	
0,28	2,4	3,6	2,5	438	231S400M	231S400M-2SRS	
0,28	2,4	3,6	2,5	464	231S410M	231S410M-2SRS	
0,3	2,3	3,4	2,2	564	231S430M	231S430M-2SRS	
0,3	2,3	3,4	2,2	613	231S450M	231S450M-2SRS	

Principal dimensions				Dimensions				Basic load ratings		Fatigue load limit	Speed rating	Designations			
d	D	B	C	d <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	b	K	dynamic	static	C <sub>u</sub>	Limiting speed	open	sealed	
Shaft diameter									kN		r/min	-			
mm									mm		r/min		-		
240	440	144	200	277	386	365	16	9	1,675	2,885	246	170	510	231S240M	231S240M-2SRS
260	460	146	200	300	421	396	16	9	2,120	3,705	307	155	455	231S260M	231S260M-2SRS
280	500	160	220	321	446	422	16	9	2,140	3,805	311	145	455	231S280M	231S280M-2SRS
300	540	176	230	346	482	452	22	9	2,604	4,670	372	135	410	231S300M	231S300M-2SRS
320	580	190	254	370	522	482	22	12	3,041	5,530	432	125	385	231S320M	231S320M-2SRS
340	600	192	262	394	553	508	22	12	3,582	6,560	502	120	340	231S340M	231S340M-2SRS
360	620	194	262	415	576	534	22	12	3,638	6,710	506	115	340	231S360M	231S360M-2SRS
380	650	200	274	435	592	552	22	12	3,546	6,555	489	105	340	231S380M	231S380M-2SRS
400	700	224	292	455	632	575	22	12	3,790	7,075	521	105	320	231S400M	231S400M-2SRS
410	720	226	292	455	632	575	22	12	3,790	7,075	521	105	320	231S410M	231S410M-2SRS
430	760	240	306	484	682	628	22	12	4,791	8,990	648	95	295	231S430M	231S430M-2SRS
450	790	248	310	508	700	643	22	12	4,853	9,260	659	90	290	231S450M	231S450M-2SRS
in									lbs		r/min		-		
mm									mm		r/min		-		
9 1/2	17.323	5.669	7.874	10.905	15.197	14.370	0.630	0.354	37,6555	64,8574	55,303	170	510	231S908	231S908-2SRS
10	18.110	5.748	7.874	11.811	16.575	15.591	0.630	0.354	47,6595	83,2917	69,016	155	455	231S1000	231S1000-2SRS
10 1/2	18.110	5.748	7.874	11.811	16.575	15.591	0.630	0.354	47,6595	83,2917	69,016	155	455	231S1008	231S1008-2SRS*
10 15/16	19.685	6.299	8.661	12.638	17.559	16.614	0.866	0.354	481,091	855,398	69,916	145	455	231S1015	231S1015-2SRS
11	19.685	6.299	8.661	12.638	17.559	16.614	0.866	0.354	481,091	855,398	69,916	145	455	231S1100	231S1100-2SRS*
12	21.260	6.929	9.055	13.622	18.976	17.795	0.866	0.472	585,402	1,049,858	83,629	135	410	231S1200	231S1200-2SRS*
12 7/16	22.835	7.480	10.000	14.567	20.551	18.976	0.866	0.472	683,644	1,243,193	97,117	125	385	231S1207	231S1207-2SRS
12 1/2	22.835	7.480	10.000	14.567	20.551	18.976	0.866	0.472	683,644	1,243,193	97,117	125	385	231S1208	231S1208-2SRS*
13 7/16	23.622	7.559	10.315	15.512	21.772	20.000	0.866	0.472	805,266	1,474,747	112,854	120	340	231S1307	231S1307-2SRS
13 15/16	24.409	7.638	10.315	16.339	22.677	21.024	0.866	0.472	817,855	1,508,468	113,753	120	340	231S1315	231S1315-2SRS
15	25.591	7.874	10.787	17.126	23.307	21.732	0.866	0.472	797,173	1,473,623	109,932	105	320	231S1500	231S1500-2SRS
15 3/4	27.559	8.819	11.496	17.913	24.882	22.638	0.866	0.472	852,026	1,590,523	117,125	105	320	231S1512	231S1512-2SRS
17	29.921	9.449	12.047	19.055	26.850	24.724	0.866	0.472	1,077,060	2,021,032	145,676	95	295	231S1700	231S1700-2SRS
18	31.102	9.764	12.205	20.000	27.559	25.315	0.866	0.472	1,090,998	2,081,731	148,149	90	290	231S1800	231S1800-2SRS

\* Locally stocked in US.

### Installation

Mount the split spherical bearing according to the instructions provided with the packaging. Safety is very important. **Read all installation instructions carefully before starting work.**

Follow all warnings and precautions and wear proper PPE as required. The requisite minimum tightening torques for the screws are provided in the tables.

[skf.com](https://www.skf.com)

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