



OKS Speciality lubricants for  
***Rolling bearing lubrication***

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Speciality Lubricants  
Maintenance Products

## Right rolling bearing lubrication reduces machine failures through bearing damage ...

### Functional principle and types of a rolling bearing

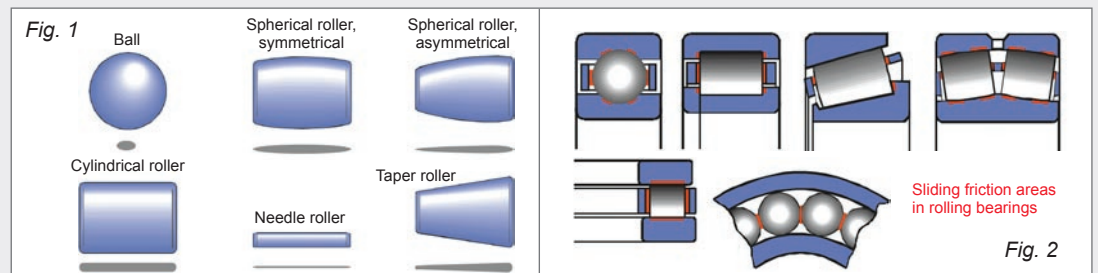
Rolling bearings allow friction-reduced rotary movements between various machine components. In engineering, rolling bearings are therefore used, amongst others, to guide and support shafts and axles. Rolling bearings are based on the principle of rolling friction: They consist of an inner and outer ring between which rolling elements roll, which can be kept separated by a cage to reduce friction and wear further. Depending on the application and load, different forms, such as ball or rollers, are used as rolling elements (see Fig. 1). Thanks to the rolling friction arising from their rolling element form, ball bearings are particularly suitable for high rotational speeds, whereas roller bearings are better suitable for high loads.

### Decision criteria for grease or oil lubrication

Grease lubrication is used at approximately 90 % of all rolling bearings. The main advantages of grease lubrication are:

- ❑ Low constructional demand
- ❑ Good support for sealing of the bearing
- ❑ Long periods of use
- ❑ Low frictional torque
- ❑ Good emergency running properties at solid lubricants
- ❑ Good noise-dampening properties

When selected correctly, greases ensure reliable lubrication for a wide range of speeds and loads for all types of bearings with the exception of axial spherical roller bearings.



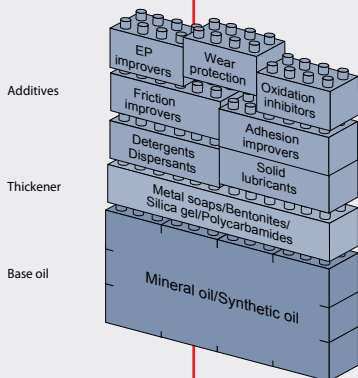
### Tasks of the rolling bearing lubricant

The aim of rolling bearing lubrication is to prevent metal contacting of the rolling and sliding surfaces through a lubricating film, in order to reduce sliding friction in the rolling bearing further (Fig. 2). In addition, lubrication of the rolling bearings results in improvement of the wear protection. This avoids damage to bearings, extends the durability of the bearing and increases operational reliability. Further tasks fulfilled by the lubricant in the rolling bearing are, depending on the type of lubricant (oil or grease with corresponding additives), corrosion protection, extraction of heat from the bearing, protection of the bearing against inner and outer soiling, damping of the bearing running noise, as well as support in the sealing effect of bearing seals.

### Structure and characterization of greases

Lubricating greases consist of a base oil that is bound by a thickener. This ensures that the oil remains at the lubricating point. There it ensures effective protection against friction and wear and seals the lubricating point against external influences such as moisture and foreign matter. Greases are therefore ideal for use in rolling bearings. The typical performance characteristics of a grease, such as the drop point, load capacity and resistance to water, are determined by the base oil and the thickener. Improvement of the corrosion and wear protection, load-bearing and adhesive capacity and the resistance to ageing is realized through the additives added to the grease (Fig. 3).

Fig. 3



## ... and increases the operational reliability

### Characteristics for selecting a rolling bearing grease

The choice of a rolling bearing grease depends on the design of the rolling bearing and the material of the rolling bearing cage (metal or plastics) as well as the conditions of use and application, such as the application temperature, speed range, pressure load and ambient influences (water, dust or aggressive media). The following data are used to characterize a rolling bearing grease.

#### 1. NLGI grade

At lubricating greases the consistency is the characteristic for assessing the strength of a grease. The classification of greases according to NLGI ranges from very soft (Class 000) to very firm (Class 6). Lubricant greases of the NLGI grades 1–4 are suitable for use in rolling bearings.

#### 2. Drop point (in °C)

The drop point of a lubricant is the temperature at which liquefaction of the grease arises. It lies notably over the recommended operating temperature which at a rolling bearing is determined not only by the ambient temperature, but also by the heat that develops during operation of the rolling bearing in the bearing.

#### 3. Four-ball test rig value

The four-ball test rig is a testing device for lubricants used at high surface pressures. It consists of a rotating moving ball which slides on three fixed balls. During the test for the maximum load-bearing capacity of the lubricant, a test force acts on the moving ball, which is increased in steps until the four-ball system is welded together as a result of the friction heat produced.

#### 4. DN factor (rotating speed factor)

The DN factor specifies up to which maximum rotating speeds a lubricant can be used in rolling bearings. It is calculated from the bearing rotational speed, the mean bearing diameter (in mm) and a factor considering the sliding friction component of the bearing design.

#### 5. SKF-Empcor value

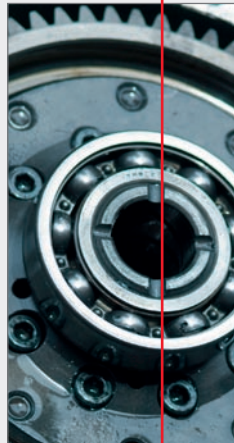
The SKF-Empcor process is used to assess the corrosion protection properties of rolling bearing greases. In the process water is added to the grease and examined for corrosion self-aligning ball bearings with defined running duration, speed and specified standstill periods to DIN 51 802802. If there is no corrosion at the visible inspection of the test rings, the degree of corrosion is 0. At very strong corrosion the degree of corrosion amounts to 5.

#### Lubrication of rolling bearings

An important prerequisite for high operational reliability of a rolling bearing is the continuous supply with lubricant. The instructions of the bearing manufacturer have to be observed during initial greasing or renewed greasing of the bearings. It has to be filled such that all functional surfaces are certain of being greased. Bearings running slowly (DN value < 50,000) and their housing can be filled completely, high-speed bearings (DN value > 400,000) up to 1/4 of the free space inside the bearing. Otherwise we recommend filling up to 1/3.

Grease-lubricated bearings have sufficient operational reliability if the relubrication intervals are not exceeded. Relubrication is necessary when the grease operating life is lower than the expected bearing operating life. Relubrication is carried out by means of a grease gun or automatic lubrication systems. If possible, relubrication should be carried out during operation. The relubrication quantity lies at 50–80 % of the initial filling. If old grease cannot be removed, the quantity of grease should be restricted so as to avoid overlubricating the bearing. If lubrication frequencies tend to be low, you should aim for a full grease change.

Before switching to a different grease sort, clean the rolling bearing thoroughly or respectively relubricate with grease until the old grease has been pressed completely out of the bearing. In this case the miscibility of the lubricants and the material compatibility has to be tested beforehand.



The enclosed product overview will help you when selecting a suitable rolling bearing lubricant for your individual case.

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For a world in motion



Product	Designation	Fields of application										Colour, composition	Technical data	Characterisation		
		DN factor (dm x n) (mm/min)	Four-ball welding load (N)	Temperature application range (°C)												
				-80	-60	-40	-20	0	+20	+40	+60				+80	+100
<b>OKS 402</b>	Ball-Bearing High-Performance Grease  DIN 51 502: K2K-30	500,000	2,000	-30°C to +120°C										<ul style="list-style-type: none"> <li>beige</li> <li>mineral oil</li> <li>lithium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 110 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>For machine elements such as rolling and friction bearings, spindles and slideways under normal loads</li> <li>Resistant to ageing and oxidation, reduces wear</li> <li>Good resistance to pressure and water, multipurpose grease</li> <li>Also available in NLGI grade 3</li> </ul>
<b>OKS 403</b>	Marine Grease  DIN 51 502: KP1-2E-20	350,000	3,000	-25°C to +80°C										<ul style="list-style-type: none"> <li>brown</li> <li>EP additives</li> <li>mineral oil</li> <li>calcium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 1-2</li> <li>Base oil viscosity (40 °C): 100 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>Lubrication of machine elements subjected to water or sea water</li> <li>Excellent corrosion protection, adheres well</li> <li>Has proven itself in wet operating environments and in coastal and marine areas</li> <li>Suitable as water pump grease</li> </ul>
<b>OKS 404</b>	High-Performance and High-Temperature Grease  DIN 51 502: KP2P-30	350,000	2,800	-30°C to +150°C										<ul style="list-style-type: none"> <li>light-coloured</li> <li>EP additives</li> <li>semi-synthetic oil</li> <li>lithium-complex soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 100 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>For lubricating high pressure loaded rolling and friction bearings in a wide temperature range</li> <li>Reduces wear, resistant to ageing and oxidation</li> <li>Good resistance to pressure and water</li> <li>Good corrosion protection</li> <li>Modern grease with a wide range of applications</li> </ul>
<b>OKS 410</b>  <b>Mo<sub>x</sub>-Active</b>	MoS <sub>2</sub> High-Pressure Long-Life Grease  DIN 51 502: KPF2K-20	500,000	3,600	-20°C to +130°C										<ul style="list-style-type: none"> <li>grey MoS<sub>2</sub></li> <li>Mo<sub>x</sub>-Active</li> <li>mineral oil lithium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 185 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>Long-term lubrication of lubrication points subjected to pressure or impacts also under outdoor exposure</li> <li>Good emergency running properties, resistance to water</li> <li>Excellent wear protection, highly adhesive</li> <li>For harsh conditions, e.g. in rolling mills, construction and agricultural machines, in mining and port operations</li> </ul>
<b>OKS 416</b>	Low-Temperature and High-Speed Grease  DIN 51 502: KPE2K-50	1,000,000	2,400	-50°C to +120°C										<ul style="list-style-type: none"> <li>yellow</li> <li>EP additives</li> <li>semi-synthetic oil</li> <li>lithium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 15 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>Supple consistency, also at low temperatures</li> <li>Good wear protection, good corrosion protection</li> <li>High dynamic load-bearing capacity</li> <li>Reliable lubrication of conveying equipment and spindle bearings in cold storage houses</li> <li>Suitable as instrument grease</li> </ul>
<b>OKS 420</b>  <b>Mo<sub>x</sub>-Active</b>	High-Temperature Multi-purpose Grease  DIN 51 502: KP1-2P-10	300,000	3,200	-10°C to +160°C										<ul style="list-style-type: none"> <li>beige</li> <li>Mo<sub>x</sub>-Active</li> <li>mineral oil</li> <li>polycarbamide</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 1-2</li> <li>also available as fluid grease (NLGI 00)</li> <li>Base oil viscosity (40 °C): 490 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>Rolling and friction bearings, slow-running gears and chains at high temperatures, impact and pressure loads or water influences</li> <li>Extremely impact and pressure-resistant, highly adhesive</li> <li>Good wear protection</li> <li>For universal use at increased requirements</li> </ul>
<b>OKS 422</b>	Universal Grease for Long-Life Lubrication  DIN 51 502: KPHC2N-40	800,000	3,400	-40°C to +140°C										<ul style="list-style-type: none"> <li>light-coloured</li> <li>EP additives</li> <li>polyalphaolefin (PAO)</li> <li>barium-complex soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 50 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>For rolling and friction bearings and spindles at extreme temperatures or high speeds</li> <li>Extremely impact and pressure-resistant</li> <li>Long regreasing intervals</li> <li>Excellent wear protection</li> <li>Use outside normal performance areas</li> </ul>
<b>OKS 428</b>	Fluid Grease for Gears, synthetic  DIN 51 502: GPPG00K-40	600,000	3,000	-30°C to +120°C										<ul style="list-style-type: none"> <li>brown</li> <li>EP additives</li> <li>polyglycol</li> <li>lithium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 00</li> <li>Base oil viscosity (40 °C): 120 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>For heavily loaded gearing exposed to weather outdoors and/or low temperatures, as well as angled or vertical shafts, also with gears which are not oil-tight</li> <li>For friction bearings with low clearance or high speeds</li> <li>For high pressures and impact loads</li> </ul>



Product	Designation	Fields of application										Colour, composition	Technical data	Characterisation		
		DN factor (dm x n) (mm/min)	Four-ball welding load (N)	Temperature application range (°C)												
				-80	-60	-40	-20	0	+20	+40	+60				+80	+100
<b>OKS 464</b>	Electrically Conductive Rolling Bearing Grease  DIN 51 502: KHC2N-40	350,000 		-40°C to +150°C										<ul style="list-style-type: none"> <li>black</li> <li>carbon</li> <li>polyalphaolefine (PAO)</li> <li>lithium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 150 mm<sup>2</sup>/s</li> <li>Specific resistivity: max. 10,000 Ω*cm</li> </ul>	<ul style="list-style-type: none"> <li>Special grease for long-term lubrication of rolling and friction bearings for avoiding electrostatic charging</li> <li>Good resistance to oxidation and ageing in rolling bearings</li> </ul>
<b>OKS 470</b> <b>OKS 471</b>  NSF	White Universal High-Performance Grease  DIN 51 502: KF2K-30	300,000 	3,600 	-30°C to +120°C										<ul style="list-style-type: none"> <li>white</li> <li>white solid lubricants</li> <li>mineral oil</li> <li>lithium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): approx. 110 mm<sup>2</sup>/s</li> <li>NSF H2 Reg. No. 137707</li> </ul>	<ul style="list-style-type: none"> <li>For heavily loaded rolling and friction bearings, spindles and slideways when dark-coloured lubricants cannot be used</li> <li>Good pressure properties, reduces wear</li> <li>Resistant to ageing and oxidation, waterproof</li> <li>Hygienically harmless</li> </ul>
<b>OKS 473</b>  NSF	Fluid Grease for Food Processing Technology  DIN 51 502: KPHC00K-40	500,000 		-45°C to +120°C										<ul style="list-style-type: none"> <li>light yellow</li> <li>polyalphaolefine (PAO)</li> <li>aluminium-complex soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 0-00</li> <li>Base oil viscosity (40 °C): 160 mm<sup>2</sup>/s</li> <li>NSF H1 Reg. No. 140485</li> </ul>	<ul style="list-style-type: none"> <li>For closed gears, rolling and friction bearings, joints or chains if grease lubrication is provided for</li> <li>Also suitable for higher speed, minimal bearing play or slight gear clearance</li> <li>Reduces wear, waterproof</li> <li>Can be conveyed well using central lubricating systems</li> </ul>
<b>OKS 475</b>  NSF	High-Performance Grease  DIN 51 502: KFHC2K-60	1,000,000 	2,000 	-60°C to +120°C										<ul style="list-style-type: none"> <li>beige</li> <li>PTFE</li> <li>polyalphaolefine (PAO)</li> <li>lithium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): approx. 30 mm<sup>2</sup>/s</li> <li>NSF H2 Reg. No. 137708</li> </ul>	<ul style="list-style-type: none"> <li>For bearings with minimal bearing play and high speeds, at low and high temperatures and for bearings with low coasting torque</li> <li>Good wear protection through PTFE</li> <li>Lubrication of components made of glass fibre reinforced plastic</li> </ul>
<b>OKS 480</b>  NSF	Waterproof High-Pressure Grease for Food Processing Technology  DIN 51 502: KPHC2P-30	400,000 	4,000 	-30°C to +160°C										<ul style="list-style-type: none"> <li>cream-coloured</li> <li>polyalphaolefine (PAO)</li> <li>calcium sulphonate complex soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 100 mm<sup>2</sup>/s</li> <li>NSF H2 Reg. No. 148971</li> </ul>	<ul style="list-style-type: none"> <li>For heavily loaded rolling and friction bearings in food processing technology</li> <li>Excellent resistance to hot and cold water as well as disinfectants and cleaning agents</li> <li>Excellent corrosion protection</li> <li>High shear, temperature and oxidation stability</li> </ul>
<b>OKS 1110</b>  NSF	Multi-Silicone Grease  DIN 51 502: MSI3S-40			-40°C to +200°C										<ul style="list-style-type: none"> <li>transparent</li> <li>silicone oil</li> <li>inorganic thickener</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 3</li> <li>Base oil viscosity (40 °C): 9,500 mm<sup>2</sup>/s</li> <li>NSF H2 Reg. No. 124381</li> </ul>	<ul style="list-style-type: none"> <li>For fittings, seals and plastic parts</li> <li>Resistant to media</li> <li>Excellent compatibility to plastic</li> <li>No drying out or bleeding</li> <li>Highly adhesive, tasteless and odourless</li> <li>Silicone grease for a broad range of applications</li> </ul>
<b>OKS 1133</b>	Low-Temperature Silicone Grease  DIN 51 502: KSI2S-70	200,000 	1,200 	-73°C to +200°C										<ul style="list-style-type: none"> <li>beige</li> <li>silicone oil</li> <li>lithium soap</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 100 mm<sup>2</sup>/s</li> </ul>	<ul style="list-style-type: none"> <li>Lubrication of rolling and friction bearings, bowden cables and fittings</li> <li>Neutral with regard to plastics and elastomers</li> <li>Lubrication of motors, drives, control systems under arctic conditions</li> </ul>
<b>OKS 4220</b>  NSF	Extreme-Temperature Bearing Grease  DIN 51 502: KFFK2U-20	300,000 	>10,000 	-20°C to +280°C										<ul style="list-style-type: none"> <li>white</li> <li>PTFE</li> <li>perfluoropolyether (PFPE)</li> </ul>	<ul style="list-style-type: none"> <li>NLGI grade: 2</li> <li>Base oil viscosity (40 °C): 510 mm<sup>2</sup>/s</li> <li>NSF H2 Reg. No. 124380</li> </ul>	<ul style="list-style-type: none"> <li>Long-term lubrication of rolling and friction bearings</li> <li>Excellent temperature resistance</li> <li>Excellent media resistance</li> <li>Excellent plastic and elastomer compatibility</li> <li>Excellent water, steam resistance</li> <li>Excellent wear protection</li> </ul>