SANKYO OILLESS Industry GmbH

# BOS-11, BOS-12 & BOS-13
# Spherical bearings

## Stepping foreard together with our customers

For more than 50 years, ***SANKYO OILLESS*** has been one of the leading manufacturers of maintenance-free sliding elements. As a leading supplier and pioneer in the production of stamping and press tool components for the automotive industry, ***SANKYO OILLESS*** supplies an products for many other applications such as mold making, engineering, packaging, heavy industry, aerospace and many more.

The technologies developed by ***SANKYO OILLESS*** have reduced or eliminated friction, wear and tear. In addition, ***SANKYO OILLESS*** provides services and quality products to offer you the best possible solutions for your requirements at all times.

## The benefits of slide bearings versus roller bearings

In a variety of applications, designers are increasingly replacing roller bearings with slide bearings. In addition to ease of installation and cost effectiveness, slide bearings offer a number of distinct advantages. Slide bearings require less installation space, have a larger load bearing capacity, are maintenance-free or require little maintenance, are easier to assemble and are less susceptible to noise and vibration.

The following list gives an overview of the general advantages of bearings compared to bearings.

### Slide bearing

- Higher load bearing capacity and reduced footperint
- Higher resistance to vibration and increased lifetime
- Easier installation
- Lower installation costs
- Increased shaft tolerances possible
- Compensates misalignment and reduces the edge load

### Roller bearing

- sensitive to shock, vibration and edge load
- high costs for bearings, housings, counterfaces and - fixing materials
- large space required
- is prone to noise development

## Technologies for top performance

SANKYO products are manufactured in our own plants and distributed worldwide.

We offer high quality maintenance-free sliding elements acc. to international standards and standards for use in

- pressing tools
- injection molds
- general engineering

As an experienced specialist, we have the appropriate know-how in tribology to always offer the best solutions for your needs. We supply a large portfolio of lubrication-free sliding elements and also offer custom products acc. to customer drawing.

Quality and performance are our constant commitment!

## Bushings with graphite

For a good distribution of the solid lubricant between the sliding element and the sliding partner, a small sliding gap is needed. This happens once by abrasion and by swelling from the depots in the micrometer range. As a result, pairing with clearance „0“ is not possible using our bronze lubricants with solid lubricant, which would inevitably result in jamming.

Bronze bushings with for example type SOB, narrows in the bore after insertion of the tolerance range F7 to a tolerance range H7. Prerequisites for this are:

- H7 *(the tolerance of the housing bore)*
- a corresponding wall thickness of the housing
- the control of the best wall strength of the socket
-

From the experience of the most diverse use cases, the following tolerance fields should be used when against run partner preferred:

- h6 *(for the highest precision in cutting tool / mold construction)*
- f7, e7 *(for highest accuracy in general engineering)*
- d8, e8 *(for highest accuracy in general engineering)*
- e8 + D9 *(for highest accuracy in general engineering)*

### Attention

The graphite cannot be deposited on the entire surface with very small movements. Please contact the technical department if you want to realise very small movements.

## Sliding partners

Suitable sliding partners for Sankyo Oilless Bushes and Plates are **gas nitrated or hardened steel** alloys with **HRC > 35**.

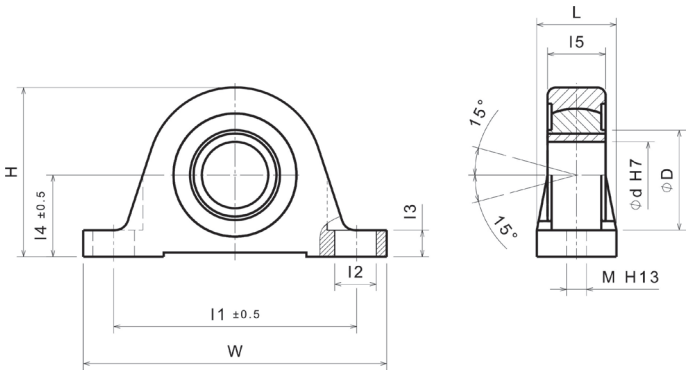
In order to ensure an optimal sliding beahaviour, the difference in hardeness between the sliding material and sliding partner should at least be **100 HB**.

The surface roughness of the sliding partner should be **Rz = 3...6,3 µm (grinding)**.

If guides, like in large dies of punching tools, are continuously moved apart during operation, the counterpart partner should be provided with correspondingly generous centering chamfers.

# BOS-11, BOS-12 & BOS-13 - Spherica bearings

Article informationen



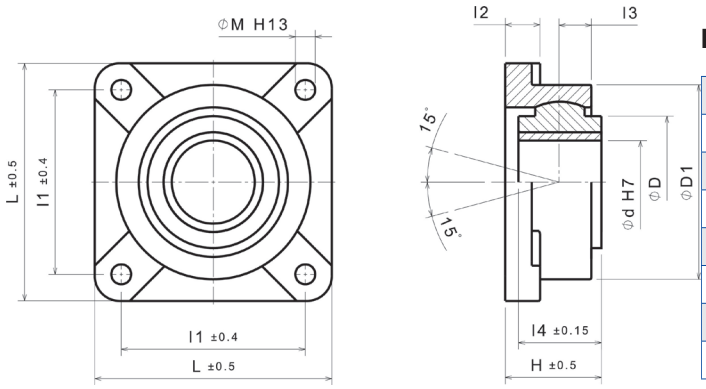

**Properties:**

| | |
|---|---|
| **Base material** | Special brass (SO#50SP2) |
| **Self-lubricating** | Yes |
| **Lubricant** | Graphite |
| **Max. surface pressure P** | 100 N/mm² |
| **Max. sliding speed v** | 30 m/min |
| **Max. P*v-Wert** | 200 N/mm² x m/min |
| **Operating temperature** | -50°C / +200°C (max. 300°C) |
| **Friction coefficient** | 0,07 |

| Article no.: | Article name: | Inner Ø d: | Outer Ø D: | Width W: | Height H: | Length L: | l1: | l2: | l3: | l4: | l5: | M (DIN EN 20273): | Max. load (kN): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63511010 | BOS-11-10 | 10 | 33,3 | 102 | 56 | 25 | 76 | 13 | 10 | 28,6 | 15 | M8 | 4,32 |
| 63511012 | BOS-11-12 | 12 | | | | | | | | | | | |
| 63511015 | BOS-11-15 | 15 | | | | | | | | | | | |
| 63511020 | BOS-11-20 | 20 | 39,7 | 124 | 65 | 32 | 95 | 16 | 13 | 33,3 | 20 | M10 | 7,7 |
| 63511025 | BOS-11-25 | 25 | | | | | | | | | 25 | | |
| 63511030 | BOS-11-30 | 30 | 51 | 159 | 81 | 41 | 122 | 22 | 16 | 41,3 | 30 | M12 | 9,55 |
| 63511035 | BOS-11-35 | 35 | 60,3 | 183 | 102 | 48 | 137 | | | 49,2 | 35 | | 17,3 |
| 63511040 | BOS-11-40 | 40 | | | | | | | | | 40 | | |
| 63511045 | BOS-11-45 | 45 | 73 | 194 | 113 | 54 | 152 | | | 54 | 45 | | 23 |
| 63511050 | BOS-11-50 | 50 | 79,3 | 214 | 122 | 57 | 168 | | 19 | 61,9 | 50 | M16 | 25 |
| 63511055 | BOS-11-55 | 55 | 83 | 251 | 135 | 64 | 197 | | 22 | 66,7 | 55 | | 30,5 |
| 63511060 | BOS-11-60 | 60 | | | | | | | | | 60 | | |
| 63511080 | BOS-11-80 | 80 | 108 | 295 | 175 | 89 | 235 | 27 | 32 | 87,3 | 80 | M20 | 45,5 |
| 63511090 | BOS-11-90 | 90 | 130 | 330 | 206 | 102 | 279 | 30 | | 101,6 | | | 74,5 |
| 63511100 | BOS-11-100 | 100 | | | | | | | | | | | |

# BOS-11, BOS-12 & BOS-13 - Spherica bearings

Article informationen



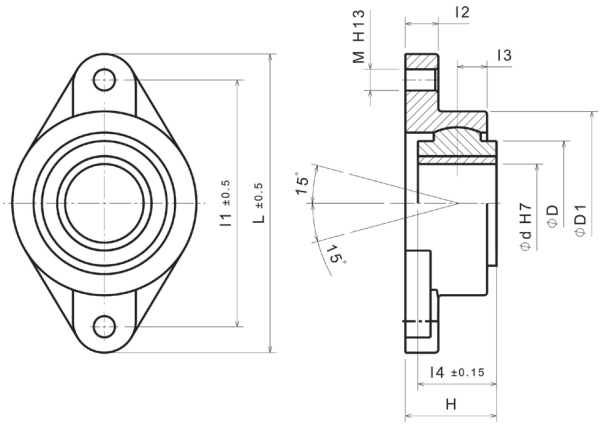

## Properties:

| | |
|---|---|
| Base material | Special brass (SO#50SP2) |
| Self-lubricating | Yes |
| Lubricant | Graphite |
| Max. surface pressure P | 100 N/mm² |
| Max. sliding speed v | 30 m/min |
| Max. P*v-Wert | 200 N/mm² x m/min |
| Operating temperature | -50°C / +200°C (max. 300°C) |
| Friction coefficient | 0,07 |

| Article no.: | Article name: | Inner Ø d: | Outer Ø D: | Length L: | D1: | l1: | l2: | l3: | l4: | Height H: | M (DIN EN 20273): | Max. load (kN): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63512010 | BOS-12-10 | 10 | 33,3 | 76 | 54 | 57 | 8 | 6 | 15 | 23 | 4xM8 | 3,86 |
| 63512012 | BOS-12-12 | 12 | | | | | | | | | | |
| 63512015 | BOS-12-15 | 15 | | | | | | | | | | |
| 63512020 | BOS-12-20 | 20 | 39,7 | 89 | 64 | 64 | 10 | 10 | 20 | 27 | 4xM10 | 5,9 |
| 63512025 | BOS-12-25 | 25 | | | | | | | 25 | 30 | | |
| 63512030 | BOS-12-30 | 30 | 51 | 110 | 79 | 79 | 11 | 13 | 30 | 36 | 4xM12 | 8,18 |
| 63512035 | BOS-12-35 | 35 | 60,3 | 121 | 95 | 92 | 14 | 16 | 35 | 43 | | 11 |
| 63512040 | BOS-12-40 | 40 | | | | | | | 40 | 45 | | |
| 63512045 | BOS-12-45 | 45 | 73 | 133 | 108 | 102 | 16 | | 45 | 51 | | 12 |
| 63512050 | BOS-12-50 | 50 | 79,3 | 143 | 117 | 111 | | 21 | 50 | 58 | 4xM12 | 14,5 |
| 63512055 | BOS-12-55 | 55 | 83 | 165 | 137 | 130 | 17 | 22 | 55 | 62 | 4xM16 | 16 |
| 63512060 | BOS-12-60 | 60 | | | | | | | 60 | 65 | | |
| 63512080 | BOS-12-80 | 80 | 108 | 197 | 171 | 152 | 22 | 29 | 80 | 81 | 4xM20 | 27 |
| 63512090 | BOS-12-90 | 90 | 130 | 241 | 210 | 197 | 25 | 32 | | 91 | | 30,5 |
| 63512100 | BOS-12-100 | 100 | | | | | | | | | | |

# BOS-11, BOS-12 & BOS-13 - Spherica bearings

Article informationen




**Properties:**

| | |
|---|---|
| **Base material** | Special brass (SO#50SP2) |
| **Self-lubricating** | Yes |
| **Lubricant** | Graphite |
| **Max. surface pressure P** | 100 N/mm² |
| **Max. sliding speed v** | 30 m/min |
| **Max. P*v-Wert** | 200 N/mm² x m/min |
| **Operating temperature** | -50°C / +200°C (max. 300°C) |
| **Friction coefficient** | 0,07 |

| Article no.: | Article name: | Inner Ø d: | Outer Ø D: | Length L: | D1: | l1: | l2: | l3: | l4: | Height H: | M (DIN EN 20273): | Max. load (kN): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63513010 | BOS-13-10 | 10 | 33,3 | 103 | 54 | 81 | 8 | 6 | 15 | 23 | 2xM8 | 3,86 |
| 63513012 | BOS-13-12 | 12 | | | | | | | | | | |
| 63513015 | BOS-13-15 | 15 | | | | | | | | | | |
| 63513020 | BOS-13-20 | 20 | 39,7 | 116 | 64 | 89 | 10 | 10 | 20 | 27 | 2xM10 | 5,9 |
| 63513025 | BOS-13-25 | 25 | | | | | | | 25 | 30 | | |
| 63513030 | BOS-13-30 | 30 | 51 | 143 | 79 | 113 | 11 | 13 | 30 | 36 | 2xM12 | 8,18 |
| 63513035 | BOS-13-35 | 35 | 60,3 | 159 | 95 | 130 | 14 | 16 | 35 | 43 | | 11 |
| 63513040 | BOS-13-40 | 40 | | | | | | | 40 | 45 | | |
| 63513045 | BOS-13-45 | 45 | 73 | 175 | 108 | 144 | 16 | | 45 | 51 | | 12 |
| 63513050 | BOS-13-50 | 50 | 79,3 | 190 | 117 | 157 | | 21 | 50 | 58 | | 14,5 |
| 63513055 | BOS-13-55 | 55 | 83 | 216 | 137 | 184 | 17 | 22 | 55 | 62 | 2xM16 | 16 |
| 63513060 | BOS-13-60 | 60 | | | | | | | 60 | 65 | | |
| 63513080 | BOS-13-80 | 80 | 108 | 259 | 171 | 214 | 22 | 29 | 80 | 81 | 2xM20 | 27 |
| 63513090 | BOS-13-90 | 90 | 130 | 324 | 210 | 279 | 25 | 32 | | 91 | | 30,5 |
| 63513100 | BOS-13-100 | 100 | | | | | | | | | | |

## Finishing

*SANKYO OILLESS* - bronze is easy to machine. Basically, there is no great difference between the machining of our products and normal steel. No special tools are required but be sure to use sharp and preferably new tools.

### Milling

The use of cooling lubricants is recommended by using HSS or carbide tools. First pre-roughing to approx. distance of 0,3mm to nominal. In general: Milling / rough machining with little effort, slow forward feed, at high rotation-speeds and small depths of cut.

### Drilling

The use of cooling lubricants is recommended by using HSS or carbide tools. Drill as with normal steel and if it´s necessary increase the forward feed with same rotation-speed. Flat plates have to be drilled from backside and countersink on the sliding surface if it´s necessary to drill through a solid-lubricant depot.

### Grinding

The use of cooling lubricants is recommended by working with grinding wheels.

| | |
|---|---|
| **Grain size** | 46 - 60 |
| **Material** | Silicon carbid |
| **Rotation speed** | 1500 U/min |
| **Working speed** | 30 m/min |

### Reaming

The use of cooling lubricants is recommended by using HSS reamers. Proceed as with normal steel and if it´s necessary increase the forward feed with same rotation-speed.

### Turning

| Example (up to 100mm) | External turning | Internal turning |
|---|---|---|
| **Rotation speed** | approx. 1000 U/min | approx. 500 U/min |
| **Feed rate** | ca. 0,1 m/min | approx. 0,07 m/min |
| **Tool** | Carbide | Carbide |

## Material data

| Material | | SO#50SP2* | SO#50SP5 | SO#50SP7 | SO#50SP8 | SO#50SP13 | SO#50B |
|---|---|---|---|---|---|---|---|
| | | *Hard brass with graphite* | *Alu-bronze with graphite* | *Alu-bronze with graphite* | *Hard brass with graphite* | *Bronze with graphite* | *Red brass with graphite* |
| **Self-lubricating** | | Yes | Yes | Yes | Yes | Yes | Yes |
| **Lubricant** | | Graphite | Graphite | Graphite | Graphite | Graphite | Graphite |
| **Max. surface pressure** *[ N/mm² ]* | | 100 | 100 | 120 | 130 | 120 | 50 |
| **Max. sliding speed** *[ m/min ]* | | 30 | 10 | 10 | 15 | 10 | 50 |
| **Max. P*v-Wert** *[ N/mm² * m/min ]* | | 200 | 150 | 200 | 200 | 200 | 100 |
| **Temperature** *[ °C ]* | *Standard* *Max* | -50 / +200 +300 | -50 / +200 +300 | -50 / +200 +300 | -50 / +200 +300 | -50 / +200 +300 | -50 / +200 +400 |
| **Friction coefficient**** | *initial* *long term* | 0,15 0,07 | 0,15 0,07 | 0,15 0,07 | 0,15 0,07 | 0,2 0,15 | 0,15 0,07 |
| **Brinell hardeness** *[ HB ]* | | >210 | >210 | >260 | 220 ~ 260 | >280 | >60 |
| **Further informatio** | | | | | | | |
| **Elongation** *[ % ]* | | >12 | >18 | >2 | >3 | >0,5 | >15 |
| **Density** *[ kg/dm³ ]* | | 7,9 | 7,7 | 7,8 | 7,8 | 7,2 | 8,7 |
| **Tensile strength** *[ N/mm² ]* | | >755 | >686 | >833 | >700 | >550 | >195 |
| **Yield strength** *[ N/mm² ]* | | >412 | >372 | >509 | - | - | >105 |
| **E-Module** *[ N/mm² ]* | | 97000 | 108000 | 123600 | 108000 | 145000 | 96000 |
| **Thermal expansion** *[ 10-5 * grd.-1 ]* | | 1,9 | 1,6 | 1,6 | 1,9 | 1,71 | 1,8 |

**: Material used according to **SANKYO OILLESS** standards*

***: against steel, hardened and grinded*

| Tin bronze | Sinter-bronze | SO#50PB | CuSn8 | SO#50S45C | SO#50F | Polyacetal |
|---|---|---|---|---|---|---|
| | | *Ton bronze* | *acc. to DIN 17662* | *Steel with graphite* | *Grey cast iron with graphite* | *Plastic* |
| No | Yes | No | No | Yes | Yes | No |
| - | Oil | - | - | Graphite | Graphite | Graphite |
| 80 | 50 | 80 | 40 | 30 | 5 | 25<br>35 (with oil) |
| 20 | 300 | 50 | 120 | 10 | 10 | 50<br>200 (with oil) |
| - | 96 | 100 | - | 80 | 50 | 100<br>200 (with oil) |
| -50 / +200<br>+300 | -12 / +90 | -50 / +200<br>+300 | -200 / +200 | -50 / +150 | -50 / +150 | -50 / +80 |
| 0,16 | 0,09 | 0,15<br>0,07 | - | 0,01 | - | - |
| >80 | >25 | >80 | - | >375 | 160 ~ 220 | 115 (HRR) |
| **n** | | | | | | |
| >6 | - | >5 | - | 19 | - | 73 |
| 8,7 | 6,5 ~ 7,0 | 8,2 | 8,8 | 7,8 | 7,1 ~ 7,3 | 1,4 |
| >295 | - | >295 | - | >690 | >250 | 69 |
| >161 | - | >161 | - | - | - | - |
| 108000 | - | 108000 | 115000 | - | - | - |
| 1,8 | - | 1,8 | - | 1,1 | 1 | 7,7 |

## Chemical resistance

### Water

| Material | SO#50SP2<br>SO#50SP8 | SO#50B | SO#50SP5<br>SO#50SP7<br>SO#50SP13<br>SO#50AIB | SO#50F | SO#50S45C | Polyacetal |
|---|---|---|---|---|---|---|
| | *High strength brass casting* | *Red brass* | *Alu-bronze* | *Grey cast* | *Steel* | *Red brass mit FSS* |
| **Fresh Water** | O | ◎ | ◎ | X | ◎ | O |
| **Sea Water** | △ | O | O | X | ◎ | O |

### Acid

| Material | SO#50SP2<br>SO#50SP8 | SO#50B | SO#50SP5<br>SO#50SP7<br>SO#50SP13<br>SO#50AIB | SO#50F | SO#50S45C | Polyacetal |
|---|---|---|---|---|---|---|
| | *High strength brass casting* | *Red brass* | *Alu-bronze* | *Grey cast* | *Steel* | |
| **Alcohol** | ◎ | ◎ | ◎ | - | ◎ | - |
| **Formic acid** | - | - | - | - | - | X |
| **Chlorine (dry)** | ◎ | ◎ | ◎ | - | ◎ | - |
| **Chlorine (wet)** | X | △ | △ | - | - | - |
| **Chromic acid** | X | X | X | X | - | - |
| **Acetic acid** | X | X | ◎ (20°C)<br>△ (118°C) | X | ◎ | O |
| **Hydrochloric acid** | - | O | O | X | - | X |
| **Concentrated hydrochloric acid** | X | X | △ | X | X | - |
| **Lactic acid** | X | X | X | X | O | X |
| **Phenol** | - | - | - | - | - | X |
| **Phosporic acid** | X | O | O | X | △ | X |
| **Nitric acid** | X | X | X | X | O | - |
| **Sulfuric acid (40-80%)** | X | △ | △ | X | △ | X*<br>△** |
| **Sulfuric acid (80-95%)** | X | O | O | X | △ | X*<br>△** |
| **Diluted hydrocloric acid** | △ | - | - | - | - | X |
| **Hydrogen peroxide** | △ | O | O | X | O | - |

**: High concentration*

***: Low concentration*

| Explanation | | |
|---|---|---|
| ◎: Preferred | O: no problem in use | △: Affected |
| X: Not allowed for use | -: unknown | |

# Chemical resistance

## Alkali

| Material | SO#50SP2<br>SO#50SP8 | SO#50B | SO#50SP5<br>SO#50SP7<br>SO#50SP13<br>SO#50AIB | SO#50F | SO#50S45C | Polyacetal |
|---|---|---|---|---|---|---|
| | *High strength brass casting* | *Red brass* | *Alu-bronze* | *Grey cast* | *Steel* | |
| **Ammonia (dry)** | ◎ | ◎ | ◎ | O | ◎ (20°C)<br>X (Gas) | X |
| **Ammonia (wet)** | X | X | X | O | ◎ (20°C)<br>X (Gas) | X |
| **Ammonia (liquid)** | X | X | X | - | ◎ | X |
| **Iron chloride** | X | O | O | X | △ | - |
| **Potassium hydroxide** | O | O | O | - | - | - |
| **Calcium chloride** | X | O | O | △ | O | - |
| **Calcium hydroxide** | O | ◎ | ◎ | O | - | O |
| **Sodium hydroxide** | O | O | O | - | ◎ | - |
| **Sulfur (dry)** | ◎ | O | O | △ | - | O |
| **Sulfur (wet)** | X | X | X | △ | - | O |

## Solvent

| Material | SO#50SP2<br>SO#50SP8 | SO#50B | SO#50SP5<br>SO#50SP7<br>SO#50SP13<br>SO#50AIB | SO#50F | SO#50S45C | Polyacetal |
|---|---|---|---|---|---|---|
| | *High strength brass casting* | *Red brass* | *Alu-bronze* | *Grey cast* | *Steel* | |
| **Acetone** | ◎ | ◎ | ◎ | O | ◎ | △ |
| **Benzene** | - | - | - | - | - | △ |
| **Ethylene glycol** | O | ◎ | ◎ | △ | - | - |
| **Carbon tetrachloride (dry)** | ◎ | ◎ | ◎ | X | ◎ | - |
| **Carbon tetrachloride (wet)** | X | O | O | X | - | - |
| **Methyl alcohol** | ◎ | ◎ | ◎ | O | O | △ |
| **Toluene** | ◎ | ◎ | ◎ | O | - | - |

| Explanation | | |
|---|---|---|
| ◎: Preferred | O: no problem in use | △: Affected |
| X: Not allowed for use | -: unknown | |

## Chemical resistance

### Grease and others

| Material | SO#50SP2<br>SO#50SP8 | SO#50B | SO#50SP5<br>SO#50SP7<br>SO#50SP13<br>SO#50AlB | SO#50F | SO#50S45C | Polyacetal |
|---|---|---|---|---|---|---|
| | *High strength brass casting* | *Red brass* | *Alu-bronze* | *Grey cast* | *Steel* | |
| **Gasoline** | ◎ | ◎ | ◎ | O | ◎ | O |
| **Diesel** | - | - | - | - | - | O |
| **Crude oil** | △ | O | O | O | O | - |
| **Lacquer** | ◎ | ◎ | ◎ | △ | - | - |
| **Kerosene** | ◎ | ◎ | ◎ | O | ◎ | - |
| **Vegetable oil** | ◎ | ◎ | ◎ | △ | - | - |
| **Lubricants** | ◎ | ◎ | ◎ | ◎ | ◎ | O |
| **Heavy oil** | O | ◎ | ◎ | O | O | - |
| **Animal oil** | ◎ | ◎ | ◎ | - | - | - |

| Explanation | | |
|---|---|---|
| ◎: Preferred | O: no problem in use | △: Affected |
| X: Not allowed for use | -: unknown | |

## Maintenance and lubrication

Before inserting the sliding elements, clear the mounting surfaces of the housing. An oil film on the back surface will make it easier to mount the bearing. Before mounting the axle, lubricate the sliding surfaces with a light greasy film to avoid wear of the inlet and to activate the solid lubricant.

The following greases should be preferred:

| | | | |
|---|---|---|---|
| ELKALUB GLS 364 | ELKALUB | 120°C | For the food industry |
| ELKALUB GLS 595/N2 | ELKALUB | 300°C | For the food industry |
| ELKALUB GLS 993 H1 | ELKALUB | 150°C | For the food industry |
| GLEITMO 805 | FUCHS | 110°C | |
| ALTEMP QNB 50 | KLÜBER | 150°C | |
| Klüberalfa DH 3-350 | KLÜBER | 230°C | |
| Klüberfood NH1 CH 2-150 | KLÜBER | 250°C | For the food & pharmaceutical industry |
| Klübertemp GR AR 555 | KLÜBER | 250°C | |
| PARALIQ P 68 | KLÜBER | 100°C | For the food & pharmaceutical industry |
| Gadus S2 V100 2 | SHELL | 130°C | |
| Gadus S3 V100 2 | SHELL | 160°C | |
| Multi-purpose grease Nr.12511 | PRESSOL | 80°C | |

**The greases have to be free of Additives like MoS2 (molybdenum disulfide) and EP.**

The work to be carried out is usually limited to an inspection of the wear in the period from ½ to 2 years, depending on the duration of use and load. After each disassembly, a single re-greasing should be carried out, but the sintered sliding film of solid lubricant should not be removed. Continuous introduction of lubricant is not necessary, as the parts are maintenance-free under consideration of the application criteria for sliding elements made of bronze with solid lubricant.

## Transport and storage

The parts are to be stored dust-free and dry, mechanical damages during transport and storage are to be avoidded. Contact with organic and inorganic solvents must also be prevented, as this may destroy the solid lubricant.