# We have the solution...







..the future has a name

aS







The high efficiency of the LUBCON lubricants is proven by

- Iong service life
- good running properties
  high operational reliability





# TURMOGREASE® LI 802 EP for

- rolling bearings subject to high loads
- high temperatures up to +140 °C
- low up to high speeds
- low up to high bearing load
- the lubrication of various types and sizes of bearings

### **Advantages**

- good protection against corrosion and ageing
- compatible with non-ferrous metals, NBR elastomers, PA 66-GF 25 plastics
- favourable noise behaviour
- good oxidation stability
- excellent load-carrying capacity
- suitable for application in critical types of rolling bearings
- service life of grease and the achievable bearing life is above average
- the multipurpose application allows to reduce the high number of different grease types actually used in many companies

The friction behaviour of small to medium-size deep groove ball bearings lubricated with **TURMOGREASE**<sup>®</sup> Li 802 EP is very good. Friction is generally low, the grease spreads within a relatively short time and grease losses in 2RSR bearings are comparatively low.

This grease meets the requirements of grease class J in accordance with FAG specifications, a fact proven in several tests.

Service temperature range: -35 °C up to +140 °C, short time up to +160 °C

Suitable for the following rolling bearings: Deep groove ball and cylindrical roller bearings Speed factor  $n \cdot d_m (min^{-1} \cdot mm)$ up to 1 000 000 for P/C < 0.05 up to 1 000 for P/C < 0.5 up to +70 °C

Spherical and conical roller bearings Speed factor  $n \cdot d_m$  (min<sup>-1</sup> · mm) up to 300 000 for P/C < 0.05 up to 1 000 for P/C < 0.3 up to +70 °C

## **Practical Application**

This high-performance lubricating grease for high demands has successfully been used in construction machines, high-lifter trucks, tracklaying vehicles and also in spinning and grinding spindles. Furthermore, appliances and wheelset bearings exposed to high vibrations in rail vehicles and rotary stretchers are lubricated with this grease.

This brochure only contains product information. For specific information please refer to our technical data and safety data sheets. The indications made represent the present state of development and knowledge of **LUBRICANT CONSULT GMBH**. Subject to change. The products are subject to severe controls of manufacture and comply in full with the specifications set forth by our company, but due to the multitude of different influencing factors, we cannot assume any warranty for the successful application in each individual case.

Therefore, we recommend to perform field tests. We strictly refuse any liability.

# Application in Rolling Bearings

### Requirements

- proper bearing assembly
- sufficient lubricant quantity on all functional surfaces
- selection of appropriate rolling bearings (cage design and material, dimensional accuracy of the bearings and the surrounding components)
- Extremely low-speed bearings and their housings generally require a complete grease fill.
- At low and medium speeds (corresponding to  $n \cdot d_m < 200\,000$  min<sup>-1</sup> · mm) the bearings have to be completely filled with grease, the adjacent housing space, however, only to such an extent that the grease emerging from the bearing can be incorporated easily.
- In case of higher rotational speeds the bearings should only be filled to 40 60 % of the free bearing space.

If the free space adjacent to the bearing is large, we recommend to use seals or shields to ensure that a sufficient grease quantity is retained in the bearing.

# Relubrication Intervals

Relubrication quantities are indicated in **table 2**, **p. 5**. The relubrication interval  $t_f$  for favourable operating and ambient conditions is indicated in the **diagram 1**, **p. 5**. **Table 3**, **p. 5** shows the reducing factors  $f_1$  to  $f_5$  applicable in case of unfavourable operating and ambient conditions.

**TURMOGREASE**<sup>®</sup> Li 802 EP is a high-performance grease ensuring extended relubrication intervals: the upper limit of the wide curve shown in the **diagram 1**, **p. 5** is valid for this grease. To obtain the actual lubrication interval  $t_{fq}$  multiply the relubrication interval as given in the **diagramm 1** with the reducing factors:

# $t_{fq} = t_f \cdot f_1 \dots f_5$

In case of extremely high loads, it is absolutely necessary to control the presence of grease in the bearing; if a grease deficiency occurs, the lubricating intervals have to be reduced. The technical data of this grease including information on compatibility with sealing and cage materials are listed on **table 1**, **p.4**.

## Noise Test with FAG MGG 11

The noise behaviour was tested on an MGG 11 noise tester. The result (noise class II) is good, taking into consideration that the range from I to IV covers very good moderate results.





## Determination of the Application Range

The upper limit of the service temperature range was derived from the result of the FAG FE9 test run according to DIN 51821 at +140 °C with an operating time of  $F_{50}$  = 200 hours, see diagram 2, p. 6.

A good standard grease on lithium base renders only a time of  $F_{50} = 147 \text{ h}$  at a temperature of +120 °C. Therefore, the application temperature of **TURMOGREASE**<sup>®</sup> Li 802 EP is by 20 °C higher than that of a usual standard grease.

The lower temperature limit was deducted from the flow pressure at -35  $^\circ C$  specified in DIN 51805.

Owing to the low flow pressure of 1380 hPa as determined in the DIN test, relubrication is still possible at -35 °C.

# The defined rolling bearing application range is based on results of the FAG FE8 test:

- At a low rotating speed and a high load the specified 500 operating hours were achieved without any failures and with only very little wear of bearing elements. This test was carried out with angular contact ball bearings at temperatures from +30 °C up to +40 °C as well as with taper roller bearings at a temperature of +60 °C. The detailed test results are shown in the diagrams 3 and 4, p. 7.
- The higher speed range was tested at speeds near the upper limit of the admissible speed factor using angular contact ball bearings at temperatures from +90 °C up to +120 °C, the result is shown in the **diagram 5**, **p. 8**, as well as taper roller bearings at +90 °C up to +120 °C, the result is shown in **diagram 6**, **p. 8**.

### The test runs were evaluated by comparing the wear results with the requirements for lubricating greases of the FAG grease classification (= FAG specification).

For the evaluation it was decisive that the 500 hour tests were completed without failures and that wear was only moderate.

All test runs were repeated several times, i. e. the results can be considered reliable.

Even though these were short-period tests, they clearly showed that the suitability of **TURMOGREASE®** Li 802 EP for the indicated application range is above average.

Satisfactory operational results can be expected, when observing the indicated lubricating intervals. The test speed differed from the speed factor, due to the test bench; the higher speed factor was choosen as a result of referring field experiences.

# **Friction Behaviour**

The friction behaviour was tested on an FAG R6 test rig. **Diagram 7**, **p. 9** shows the test results, whereby the quick distribution of grease is remarkable. This becomes obvious by the early reduction of friction over the running time.

The low friction in the steady-state condition and the moderate loss of grease show that this product is suitable for sealed and shielded bearings.

| Technical Data                                     | TURMOGREASE <sup>®</sup> Li 802 EP | proved acc. to |
|--|------------------------------------|----------------|
| Colour   | brown                              |                |
| Thickener  | Lithium soap                       |                |
| Base oil viscosity +40 °C/+100 °C (mm²/s)          | Mineral/Synth. 85/12.5             | DIN 51562      |
| Drop point (°C)                                    | 190                                | DIN ISO 2176   |
| Worked penetration 60 TT (mm/10)                   | 265 - 295                          | DIN ISO 2137   |
| Water resistance +90 °C                            | 1 - 90                             | DIN 51807T1    |
| SKF Emcor Corrosion protection                     | 0 - 0                              | DIN 51802      |
| Oxidation resistance 100 h/+100 °C (bar)           | 0.4                                | DIN 51808      |
| Copper corrosion +120 °C                           | Rating 1                           | DIN 51811      |
| Flow pressure at -35 °C (hPa)                      | 1380                               | DIN 51805      |
| Oil separation (% by wt.) +40 °C/+100 °C           | approx. 3.5/6                      | DIN 51817      |
| Content of solid matters, particles 25 µm (mg)     | < 5                                | DIN 51813      |
| Behaviour towards NBR elastomer, 7 days at +100 °C |                                    |                |
| Change of Shore A hardness $\pm$ 15 SAH            | +2 SAH                             | DIN 53505      |
| Tearing elongation 150 %                           | -19.8 %                            | DIN 53504      |
| Change of volume max. $\pm$ 10 %                   | -3.4 %                             | DIN 53521      |
| PA66-GF25 42 days at +120 °C                       |                                    |                |
| Tearing strength 130 N/mm <sup>2</sup>             | 184 N/mm <sup>2</sup>              | DIN EN 61      |
| Tearing elongation 2 %                             | +18.8 %                            | DIN EN 61      |
| Impact tenacity 20 mJ/mm <sup>2</sup>              | -17.8 mJ/mm <sup>2</sup>           | DIN 53453      |

# Table 1: Technical Data of TURMOGREASE® Li 802 EP





Diagram 1: Lubricating interval for favourable operating and environmental conditions

| Deep groove ball bearingsingle-row<br>double-row $0.9 \dots 1.1$<br>1.5 $m_1 = D \cdot B \cdot x [g]$ Angular contact ball bearing $\alpha = 15^{\circ}$<br>$\alpha = 25^{\circ}$ $0.75$<br>$0.75$<br>$\alpha = 25^{\circ}$ $0.9$<br>$1.6$ Four-point contact bearing<br>Spherical ball bearing $\alpha = 15^{\circ}$<br>$\alpha = 25^{\circ}$ $0.9$<br>$1.6$ $0.75$<br>$\alpha = 25^{\circ}$ Four-point contact bearing<br>Spherical ball bearing $1.6$<br>$1.4$ $1.3 \dots 1.6$<br>$5 \dots 6^{\circ}$ Relubrication quantity $m_2$ for extremely short relubrication<br>intervalsType of bearing $k_t$ $0.002$<br>$monthly0.004Cylindrical roller bearingColler bearingsingle-rowdouble-row3 \dots 3.55.3^{\circ}Relubrication quantity m_2 for extremely short relubricationintervalsThrust cylindrical roller bearingConical roller bearingSpherical roller bearingstrongsingle-rowdouble-row3 \dots 3.55.5Influence of dust and moisture at the functional surfaces ofthe bearingInfluence of high loadsInfluence of dust and moisture at the functional surfaces ofthe bearingInfluence of high loadsInfluence of impact loads, vibrations and oscillationsmoderatestrongf_1 = 0.7 \dots 0.9f_2 = 0.4 \dots 0.7P/C = 0.45 \dots 0.45Influence of f_1 = 0.5 \dots 0.7F_1 = 0.4 \dots 0.7P/C = 0.45 \dots 0.45Influence of increased bearing temperaturesmoderatef_2 = 0.7 \dots 0.9f_2 = 0.4 \dots 0.7P/C = 0.45 \dots 0.6Influence of current streaming through the bearingf_2 = 0.1 \dots 0.45Influence of increased bearing temperaturesmoderatef_2 = 0.7 \dots 0.9f_2 = 0.4 \dots 0.7P/C = 0.45 \dots 0.6Influ$   | Type of bearing   |                          | k <sub>f</sub>         | Relubrication quantity m <sub>1</sub> for weekly or annual |  |
|---|---|--------------------------|------------------------|--|--|
| Angular contact ball bearingdouble-row<br>double-row<br>21.5<br>m, = D · B · x [g]Spindle bearing $\alpha = 15^{\circ}$<br>$\alpha = 25^{\circ}$ 0.75<br>0.9mothly0.002<br>mothlyFour-point contact bearing<br>Spherical ball bearing<br>Deep groove ball thrust bearing double-row1.6<br>1.6<br>1.6Relubrication interval<br>weekly<br>annualN.002<br>mothlyAngular contact ball bearing<br>Deep groove ball thrust bearing double-row1.4Relubrication quantity m2 for extremely short relubrication<br>intervals<br>$m_2 = (0.5 20) \cdot V [kg/h]$<br>Relubrication quantity m3 before starting reoperation after a<br>standstill of severals years<br>$m_3 = D \cdot B \cdot 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = 0 \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = 0 \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = 0 \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = 0 \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = 0 \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = 0 \cdot B - 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = 0 \cdot B - 0.01 [g]$<br>V = free space in  | Deep groove ball bearing  | single-row               | 0.9 1.1                | relubrication interval                                     | 5  |
| Angular contact ball bearing<br>Spindle bearingsingle-row<br>$\alpha = 15^{\circ}$<br>$\alpha = 25^{\circ}$ 1.0<br>2<br>$\alpha = 25^{\circ}$ Relubrication intervalx<br>weeklyFour-point contact bearing<br>Spherical bal bearing<br>Deep grove ball thrust bearing double-row0.75<br>$\alpha = 25^{\circ}$ Relubrication intervalxFour-point contact bearing<br>Spherical bal bearing<br>Angular contact ball thrust bearing double-row1.6<br>$1.3 \dots 1.6$<br>$5 \dots 6$ Relubrication quantity $m_2$ for extremely short relubrication<br>intervalsType of bearing<br>Cylindrical roller bearing<br>Concal roller bearing<br>Spherical roller bearing without flanges ( $\gg E_4$ )<br>Spherical roller bearing with centre flange $x$<br>$m_3 = D \cdot B \cdot 0.01 [g]$<br>$V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20m_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearingm_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20m_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20m_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20m_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20m_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20m_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20m_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20m_3 = D \cdot B \cdot 0.01 [g]V = free space in the bearing for m_3^{\circ} = 0.5 \dots 20Influence of dust and moisture at the functional surfaces ofthe bearing with centre flangeInfluence of high loadsInfluence of impact loads, vibrations and oscillationsstrongp/C = 0.25 \dots 0.25 \dots 0.45 \dots 0.2f_2 = 0.1 \dots 0.4Influence of increased bearin$   |   | double-row               | 1.5                    |  | $m_1 = D \cdot B \cdot x [g]$                      |
| Spindle bearing $\alpha = 15^{\circ}$ $0.75$ weekly $0.002$ Four-point contact bearing $\gamma = 25^{\circ}$ $0.9$ $\alpha = 25^{\circ}$ $0.9$ Spherical ball bearing $1.6$ $1.3$ $1.6$ $\alpha = 10^{\circ}$ Deep groove ball thrust bearing double-row $1.4$ Relubrication quantity $m_2$ for extremely short relubricationType of bearing $1.4$ Relubrication quantity $m_2$ for extremely short relubricationCylindrical roller bearingsingle-row $33.5$ Cylindrical roller bearing $33.5$ $3.5$ Corliad roller bearing $3.5.5$ $25^{\circ}$ Concal roller bearing $3.5.5$ $25^{\circ}$ Barrel-shaped roller bearing $3.5$ $4^{\circ}$ Barrel-shaped roller bearing $3.5$ $4^{\circ}$ Spherical roller bearing without flanges (»E«) $79$ $9^{\circ}$ Spherical roller bearing with centre flange $9^{\circ}$ $1.2^{\circ}$ Influence of dust and moisture at the functional surfaces ofInfluence of high loadsInfluence of impact loads, vibrations and oscillations $P/C = 0.1 \dots 0.15$ $f_a = 1$ Influence of impact loads, vibrations and oscillations $P/C = 0.3 \dots 0.45$ $f_a = 0.2 \dots 0.25$ Strong $f_2 = 0.7 \dots 0.9$ $P/C = 0.4 \dots 0.45$ $f_a = 0.2 \dots 0.45$ Influence of increased bearing three arting $f_b = 0.7 \dots 0.9$ $P/C = 0.3 \dots 0.45$ Influence of inpact loads, vibrations and oscillations $P/C = 0.2 \dots 0.45$ $f_a = 0.2 \dots 0.7$ P/C = 0.3 \dots 0.45 $f_a = 0.2 \dots 0.45$ $f_a = 0.5 \dots 0.7$ Strong(up t   | Angular contact ball bearing                                    | single-row<br>double-row | 1.6                    | Relubrication interval                                     | x  |
| A monthly0.003<br>annualSpherical ball bearing<br>Deep groove ball thrust bearing<br>Angular contact ball bearing<br>   | Spindle bearing   | $\alpha = 15^{\circ}$    | 0.75                   | weekly   | 0.002  |
| Four-point contact bearing<br>Spherical ball bearing<br>Deep groove ball thrust bearing double-row1.6<br>1.3<br>1.6<br>5<br>6<br>1.4annual $(0.004)$ Relubrication quantity m2 for extremely short relubrication<br>intervalsRelubrication quantity m2 for extremely short relubrication<br>intervalsType of bearingk_tCylindrical roller bearing<br>weedle bearing $3 \dots 3.5$<br>double-row<br>full-rowThrust cylindrical roller bearing<br>Needle bearing $3 \dots 3.5$<br>double-row<br>full-rowPressent of ler bearing<br>Spherical roller bearing $3 \dots 3.5$<br>double-row<br>full-rowRelubrication coller bearing<br>Spherical roller bearing<br>strong $3 \dots 3.5$<br>for extremely short relubrication<br>intervalsInfluence of dust and moisture at the functional surfaces of<br>strongInfluence of intract loads, vibrations and oscillations<br>fg = 0.4 \dots 0.7<br>fg = 0.4 \dots 0.7Influence of intraces deering temperatures<br>moderate<br>strongf1 = 0.1 \dots 0.4<br>fg = 0.4 \dots 0.7<br>fg = 0.4 \dots 0.7Influence of intraces deering temperatures<br>moderate<br>strongf2 = 0.4 \dots 0.7<br>fg = 0.4 \dots 0.7Influence of intraces deering temperatures<br>moderate<br>strongf2 = 0.4 \dots 0.7<br>fg = 0.4 \dots 0.7Influence of intraces deering temperatures<br>moderatef2 = 0.7 \dots 0.9<br>fg = 0.4 \dots 0.7Influence of intraces deering temperatures<br>moderatef2 = 0.7 \dots 0.9<br>fg = 0.4 \dots 0.7Influence of intraces deering temperatures<br>moderatef2 = 0.7 \dots 0.9<br>fg = 0.4 \dots 0.7Influence of intraces deering temperatures<br>moderatef2 = 0.7 \dots 0.9<br>fg = 0.4 \dots 0.7 <td></td> <td><math>\alpha = 25^{\circ}</math></td> <td>0.9</td> <td>monthly</td> <td>0.003</td>   |   | $\alpha = 25^{\circ}$    | 0.9                    | monthly  | 0.003  |
| Spherical ball bearing<br>Deep groove ball thrust bearing<br>Angular contact ball thrust bearing double-row1.31.6<br>56<br>1.4Relubrication quantity $m_2$ for extremely short relubrication<br>intervals<br>$m_2 = (0.520) \cdot V [kg/h]$<br>Relubrication quantity $m_3$ before starting reoperation after a<br>standstill of severals years<br>$m_3 = D \cdot B \cdot 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B \cdot 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B \cdot 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B \cdot 0.01 [g]$<br>V = free space in the bearing<br>D = outer diameter of the bearing full-row<br>$g_2$<br>Spherical roller bearing<br>Spherical roller bearing without flanges (»E«)<br>Spherical roller bearing with centre flangeN = 0<br>$m_2 = (0.520) \cdot V [kg/h]$<br>Relubrication quantity $m_3$ before starting reoperation after a<br>standstill of severals years<br>$m_3 = D \cdot B \cdot 0.01 [g]$<br>V = free space in the bearing<br>$m_3 = D \cdot B \cdot 0.01 [g]$<br>V = free space in the bearing<br>D = outer diameter of the bearing full-row<br>$g_2 = 0.1 \dots 0.15$<br>$f_4 = 1$<br>$f_1 = 0.4 \dots 0.7$<br>$P/C = 0.1 \dots 0.15$<br>$f_4 = 1$<br>$P/C = 0.1 \dots 0.15$<br>$f_4 = 0.7 \dots 1$<br>$P/C = 0.25 \dots 0.35$<br>$f_4 = 0.7 \dots 1$<br>$P/C = 0.35 \dots 0.45$<br>$f_4 = 0.25 \dots 0.45$<br>$f_4 = 0.25 \dots 0.45$<br>$f_4 = 0.25 \dots 0.45$<br>$f_4 = 0.05 \dots 0.25$<br>$P/C = 0.35 \dots 0.45$<br>$f_4 = 0.05 \dots 0.25$<br>$P/C = 0.4 \dots 0.7$<br>$P/C = 0.45 \dots 0.6$<br>$P/C = 0.45 \dots 0.6$<br>$P/C = 0.50 \dots 0.5$<br>$P/C = 0.50 \dots 0.5$<br>< | Four-point contact bearing                                      |                          | 1.6                    | annual   | 0.004  |
| Deep groove ball thrust bearing<br>Angular contact ball thrust bearing double-row5 6<br>1.4Relubrication quantity $m_2$ for extremely short relubrication<br>intervalsType of bearingk_rCylindrical roller bearing<br>wedle bearingsingle-row<br>double-row<br>full-row3 3.5<br>3.5<br>2.5Main and the bearingThrust cylindrical roller bearing<br>Barrel-shaped roller bearing<br>Barrel-shaped roller bearing without flanges (»E«)<br>Spherical roller bearing with centre flange90<br>90<br>90d = diameter of the bearing bore [mm]<br>D = outer diameter of the bearing [mm]<br>B = bearing width [fmm]<br>G = bearing weight [kg]Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderatef_1 = 0.7 0.9<br>f_2 = 0.4 0.7P/C = 0.1 0.15<br>P/C = 0.25 0.35<br>F_4 = 0.4 0.7<br>P/C = 0.25 0.35<br>F_4 = 0.4 0.7<br>P/C = 0.25 0.6f_4 = 0.2 0.4<br>F_4 = 0.2 0.4Influence of impact loads, vibrations and oscillations<br>moderatef_2 = 0.7 0.9<br>f_2 = 0.4 0.7P/C = 0.4 0.7<br>P/C = 0.35 0.6<br>P/C = 0.35 0.6<br>F_4 = 0.2 0.4Influence of increased bearing temperatures<br>moderatef_2 = 0.7 0.9<br>f_2 = 0.4 0.7P/C = 0.25 0.6 0.7<br>f_5 = 0.1 0.5Influence of increased bearing temperatures<br>moderatef_2 = 0.7 0.9<br>f_2 = 0.4 0.7P/C = 0.35 0.6 f_4 = 0.2 0.4Influence of increased bearing temperatures<br>moderatef_2 = 0.7 0.9<br>f_2 = 0.4 0.7P/C = 0.35 0.6 f_5 = 0.7 0.5Influence of increased bearing temper  | Spherical ball bearing  |                          | 1.3 1.6                |  |  |
| Angular contact ball thrust bearing double-row1.4IntervalsAngular contact ball thrust bearing double-row1.4 $m_2 = (0.5 \dots 20) \cdot V [kg/h]$ Type of bearingkrCylindrical roller bearingsingle-rowdouble-row33.5 $full$ -row33.5Thrust cylindrical roller bearing33.5Needle bearing3.5Conical roller bearing3.5Barrel-shaped roller bearing3.5Spherical roller bearing without flanges (»E«)79Spherical roller bearing without flanges (»E«)79Spherical roller bearingf. = 0.7 0.9Influence of dust and moisture at the functional surfaces of<br>the bearingInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderatef. = 0.7 0.9<br>f. = 0.4 0.7P/C = 0.25 0.35f. = 0.7 0.9<br>P/C = 0.35 0.45Influence of increased bearing tropf. = 0.7 0.9<br>f. = 0.4 0.7Influence of increased bearing tropf. = 0.7 0.9<br>f. = 0.4 0.7Needle to f. (a to the toto)f. = 0.7 0.9<br>P/C = 0.25 0.35Influence of impact loads, vibrations and oscillations<br>moderatef. = 0.7 0.9<br>f. = 0.1 0.4Influence of increased bearing tropf. = 0.7 0.9<br>f. = 0.1 0.4Influence of increased bearing tropf. = 0.7 0.9<br>f. = 0.1 0.4Influence of increased bearing tropf. = 0.7 0.9<br>f. = 0.1 0.4Influence of increased bearing tropf. = 0.7 0.9<br>f. = 0.1 0.4Influence of increa   | Deep groove ball thrust bearing                                 |                          | 5 6                    | Relubrication quantity                                     | m <sub>2</sub> for extremely short relubrication   |
| $m_2 = (0.5 \dots 20) \cdot V [Kg/n]$ Type of bearingCylindrical roller bearingsingle-row<br>double-row<br>full-row3 3.5<br>3.5<br>2.5Relubrication quantity $m_3$ before starting reoperation after a<br>standstill of severals yearsType of bearingsingle-row<br>double-row<br>full-row3 3.5<br>2.5 $M_f$ Thrust cylindrical roller bearing90<br>3.5 $= 4$<br>4 $= 6 (2 - d^2) \cdot 10^{\circ} - \frac{G}{7800} [m^3]$ Thrust cylindrical roller bearing90<br>3.5 $= 4$<br>4 $= 4$<br>B could a diameter of the bearing bore [mn]<br>D = outer diameter of the bearing [mm]<br>B = bearing weight [kg]Spherical roller bearing<br>Spherical roller bearing<br>moderate10<br>f_1 = 0.7 0.9<br>yery strongTable 2: Relubrication quantitiesInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderate $p/C = 0.7 \dots 0.9$<br>f_2 = 0.4 0.7<br>$P/C = 0.45 \dots 0.65$ $f_4 = 0.4 \dots 0.7$<br>$P/C = 0.45 \dots 0.6$<br>$f_4 = 0.05 \dots 0.45$ Influence of increased bearing temperatures<br>moderate $f_2 = 0.7 \dots 0.9$<br>f_2 = 0.4 0.7Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_2 = 0.7 \dots 0.9$<br>f_2 = 0.4 0.7Table 3: Reducing factors f_1 f_5 on unavorable operational<br>and any intermented coordinanceInfluence of increased bearing temperatures<br>moderate $f_2 = 0.4 \dots 0.7$<br>f_2 = 0.1 0.4Table 3: Reducing factors f_1 f_5 on unavorable operational<br>and any intermented coordinance <td>Angular contact ball thrust bearing do</td> <td>puble-row</td> <td>1.4</td> <td>intervals</td> <td></td>   | Angular contact ball thrust bearing do                          | puble-row                | 1.4                    | intervals  |  |
| Reluctication quantity $m_3$ before starting reoperation after a standstill of severals yearsType of bearingkrCylindrical roller bearing33.5Cylindrical roller bearing33.5Thrust cylindrical roller bearing90Needle bearing3.5Conical roller bearing4Barrel-shaped roller bearing without flanges (»E«)912Spherical roller bearing without flanges (»E«)912Influence of dust and moisture at the functional surfaces of the bearing moderate10, 12015Influence of dust and moisture at the functional surfaces of the bearing110.4Influence of impact loads, vibrations and oscillations moderate $f_1 = 0.1 \dots 0.4$ Influence of increased bearing temperatures moderate $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperatures moderate $(up to +85 °C)$ Influence of increased bearing temperatures moderate $(up to +100 °C)$ Influence of increased bearing temperatures moderate $(up to +100 °C)$ Influence of increased bearing temperatures $f_3 = 0.1 \dots 0.4$ Influence of increased bearing temperatures $f_3 = 0.1 \dots 0.4$ Influence of increased bearing temperatures $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperatures $f_3 = 0.1 \dots 0.4$ Influence of increased bearing temperatures $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperatures $f_3 = 0.1 \dots 0.4$ Influence of increased bearing temperatures $f_3 = 0.1 \dots 0.4$ Influence of increased bearing temperatures $f_3 = 0.1 \dots 0.4$ Influence o  |   |                          |                        | m <sub>2</sub> :   | = (0.5 20) · V [kg/h]                              |
| standstill of severals yearsm_3 = D · B · 0.01 [g]Type of bearingsingle-row<br>double-row33.5<br>3.5<br>2.5Cylindrical roller bearing33.5<br>3.5<br>2.533.5<br>3.5Thrust cylindrical roller bearing90<br>3.5<br>2.5 $x = \frac{\pi}{4} \cdot B (D^2 - d^2) \cdot 10^4 - \frac{G}{7800} [m^3]$ Conical roller bearing4<br>4<br>Barrel-shaped roller bearing without flanges (»E«)<br>Spherical roller bearing with centre flange79<br>9Spherical roller bearing<br>moderate10<br>f_1 = 0.7 0.9<br>strongTable 2: Relubrication quantitiesInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderatef_2 = 0.7 0.9<br>f_2 = 0.1 0.4Influence of increased bearing trongf_2 = 0.7 0.9<br>f_2 = 0.1 0.4Influence of increased bearing trongf_2 = 0.7 0.9<br>f_2 = 0.1 0.4Influence of increased bearing trongf_2 = 0.7 0.9<br>f_2 = 0.1 0.4Influence of increased bearing trongf_2 = 0.7 0.9<br>f_3 = 0.1 0.4  |   |                          |                        | Relubrication quantity                                     | m <sub>3</sub> before starting reoperation after a |
| Type of bearingkrCylindrical roller bearingsingle-row<br>double-row<br>full-row3 3.5<br>3.5<br>253 3.5<br>25Thrust cylindrical roller bearing90<br>90 $3.5$<br>25 $\approx \frac{\pi}{4} + B (D^2 - d^2) \cdot 10^6 - \frac{G}{7800} [m^8]$ Needle bearing<br>Needle bearing3.5<br>25 $25$<br>25Conical roller bearing<br>Barrel-shaped roller bearing without flanges (»E«)7 9<br>9Spherical roller bearing without flanges (»E«)7 9<br>9Spherical roller bearing with centre flange9 12Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderatef1 = 0.7 0.9<br>f2 = 0.1 0.4Influence of increased bearing temperatures<br>moderatef2 = 0.7 0.9<br>f2 = 0.1 0.4Influence of increased bearing temperatures<br>moderatef2 = 0.7 0.9<br>f2 = 0.1 0.4Influence of increased bearing temperatures<br>moderatef2 = 0.7 0.9<br>f3 = 0.7 0.9Strongf2 = 0.1 0.4Influence of increased bearing temperatures<br>moderatef3 = 0.7 0.9<br>f3 = 0.1 0.4Influence of increased bearing temperatures<br>moderatef3 = 0.7 0.9<br>f3 = 0.7 0.9Strong(up to +185 °C)<br>f3 = 0.7 0.9Strong(up to +100 °C)<br>f3 = 0.1 0.4Influence of increased bearing temperatures<br>moderatef2 = 0.1 0.7<br>f3 = 0.1 0.7Influence of increased bearing temperatures<br>moderatef3 = 0.1 0.7<br>f3 = 0.1 0.7Influence of inc  |   |                          |                        | standstill of severals y                                   | ears   |
| Type of bearingkr<br>double-row<br>full-rowV = free space in the bearingCylindrical roller bearingsingle-row<br>double-row<br>full-row3 3.5<br>3.5<br>3.5 $\approx \frac{\pi}{4} \cdot B (D^2 - d^2) \cdot 10^4 - \frac{G}{7800} [m^3]$ Thrust cylindrical roller bearing90<br>3.5 $=$ diameter of the bearing bore [mm]<br>D = outer diameter of the bearing [mm]<br>B = bearing without flanges (>E«) $=$ outer diameter of the bearing [mm]<br>G = bearing with [mm]<br>G = bearing weight [kg]Spherical roller bearing<br>Spherical roller bearing<br>moderate $f_1 = 0.7 \dots 0.9$<br>$f_1 = 0.4 \dots 0.7$ $P/C = 0.1 \dots 0.15$<br>$P/C = 0.15 \dots 0.25$<br>$P/C = 0.25 \dots 0.35$ $f_4 = 1$<br>$f_4 = 0.4 \dots 0.7$ Influence of impact loads, vibrations and oscillations<br>moderate<br>strong $f_2 = 0.4 \dots 0.7$<br>$f_2 = 0.4 \dots 0.7$ $P/C = 0.06$<br>$P/C = 0.6$ $f_4 = 0.05 \dots 0.2$<br>$f_4 = 0.05 \dots 0.25$ Influence of increased bearing temperatures<br>moderate<br>strong $f_2 = 0.1 \dots 0.4$ Influence of current streaming through the bearing<br>$P/C = 0.06$ Influence of increased bearing temperatures<br>moderate<br>(up to +430 °C) $f_3 = 0.7 \dots 0.9$ Influence of current streaming through the bearing<br>$f_5 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>strong $f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>$f_5 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>strong $f_3 = 0.4 \dots 0.7$ $f_5 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate<br>(up to +430 °C) $f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational<br>and environmental conditions   |   |                          |                        | r  | n <sub>3</sub> = D · B · 0.01 [g]                  |
| Cylindrical roller bearing<br>double-row<br>full-row3 3.5<br>3.5<br>25 $\approx \frac{\pi}{4} \cdot B (D^2 - d^2) \cdot 10^9 - \frac{G}{7800} [m^3]$ Thrust cylindrical roller bearing<br>Needle bearing<br>Conical roller bearing<br>Barrel-shaped roller bearing without flanges (»E«)<br>Spherical roller bearing with centre flange90<br>3.5<br>4<br>4<br>10 $= \text{diameter of the bearing bore [mm]}$<br>$B = \text{bearing width [mm]}$<br>$G = 0.1 \dots 0.15$<br>$f_4 = 0.7 \dots 1$<br>$P/C = 0.1 \dots 0.15$<br>$f_4 = 0.7 \dots 1$<br>$P/C = 0.25 \dots 0.35$<br>$f_4 = 0.7 \dots 1$<br>$P/C = 0.35 \dots 0.45$<br>$f_4 = 0.2 \dots 0.4$<br>$P/C = 0.45 \dots 0.6$<br>$f_4 = 0.2 \dots 0.4$<br>$P/C = 0.45 \dots 0.6$<br>$f_4 = 0.05 \dots 0.2$<br>$P/C = 0.45 \dots 0.6$<br>$f_4 = 0.05 \dots 0.2$<br>$f_5 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate<br>(up to $+85 ^\circ$ C)<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>slight current<br>$f_5 = 0.5 \dots 0.7$<br>$f_5 = 0.1 \dots 0.4$ Influence of increased bearing temperatur                                 | Type of bearing   |                          | к <sub>f</sub>         | V = free space in the t                                    | bearing  |
| double-row<br>full-row3.5<br>25 $\approx \frac{\pi}{4} \cdot B (D^2 - d^2) \cdot 10^3 - \frac{G}{7800} [m^3]$ Thrust cylindrical roller bearing<br>Needle bearing90<br>3.5 $=$ diameter of the bearing bore [mm]<br>D = outer diameter of the bearing [mm]<br>B = bearing with [kg]Barrel-shaped roller bearing<br>Spherical roller bearing with centre flange10<br>7 9<br>9 12 $=$ bearing width [mm]<br>G = bearing weight [kg]Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>strong $f_1 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ $P/C = 0.1 \dots 0.15$<br>$P/C = 0.15 \dots 0.25$ Influence of impact loads, vibrations and oscillations<br>revery strong $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ $P/C = 0.25 \dots 0.35$<br>$P/C = 0.35 \dots 0.45$ Influence of increased bearing temperatures<br>moderate<br>strong $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ $P/C = 0.06$ Influence of increased bearing temperatures<br>moderate<br>(up to +130 °C) $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.7 \dots 0.9$ $f_4 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate<br>(up to +130 °C) $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ $f_5 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate<br>(up to +130 °C) $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.7 \dots 0.9$ $f_4 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate<br>moderate<br>(up to +130 °C) $f_5 = 0.4 \dots 0.7$ $f_5 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br><td>Cylindrical roller bearing</td> <td>single-row</td> <td>3 3.5</td> <td></td> <td></td>   | Cylindrical roller bearing                                      | single-row               | 3 3.5                  |  |  |
| full-row2547000Needle bearing903.5D = outer diameter of the bearing bore [mm]Decide bearing3.5D = outer diameter of the bearing mm]Barrel-shaped roller bearing10G = bearing width [mm]Spherical roller bearing with centre flange7 9Spherical roller bearing9 12Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>  |   | double-row               | 3.5                    | $\approx \frac{\pi}{4} \cdot B$                            | $(D^2 - d^2) \cdot 10^{-9} - \frac{G}{7800} [m^3]$ |
| Inrust cylindrical roller bearing<br>Needle bearing90<br>3.5d = diameter of the bearing bore [mm]<br>D = outer diameter of the bearing bore [mm]<br>D = outer diameter of the bearing moderate<br>G = bearing width [mm]<br>G = bearing width [mm]<br>G = bearing width [mm]<br>G = bearing width [mm]<br>G = bearing wight [kg]Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderate $f_1 = 0.7 \dots 0.9$<br>$f_1 = 0.1 \dots 0.4$ P/C = 0.4 \loads, vibrations and oscillations<br>moderate $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$<br>$f_2 = 0.1 \dots 0.45$ Influence of increased bearing temperatures<br>moderate $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.1 \dots 0.45$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.4 \dots 0.7$<br>$f_3 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_5 = 0.1 \dots 0.9$<br>$f_5 = 0.1 \dots 0.5$ Influence of increased bearing temperatures<br>moderate $f_5 = 0.1 \dots 0.9$<br>$f_5 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_5 = 0.4 \dots 0.7$<br>$f_5 = 0.4 \dots 0.7$ Influen  |   | full-row                 | 25                     | 4  | 7800 -   |
| Neede bearing<br>Conical roller bearing<br>Barrel-shaped roller bearing without flanges (»E«)<br>Spherical roller bearing with centre flange3.5<br>4<br>4<br>10<br>7 9<br>9 12D = outer diameter of the bearing [mm]<br>B = bearing width [mm]<br>G = bearing weight [kg]Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderatef1 = 0.7 0.9<br>f2 = 0.1 0.4P/C = 0.15 0.25f4 = 0.7 1<br>P/C = 0.25 0.35Influence of impact loads, vibrations and oscillations<br>moderatef2 = 0.7 0.9<br>f2 = 0.4 0.7Strongf2 = 0.1 0.4<br>f2 = 0.1 0.4Influence of increased bearing temperatures<br>moderatef3 = 0.7 0.9<br>f3 = 0.4 0.7Influence of increased bearing temperatures<br>moderatef3 = 0.7 0.9<br>f3 = 0.4 0.7Strong(up to +100 °C)<br>f3 = 0.4 0.7Influence of increased bearing temperatures<br>moderatef3 = 0.7 0.9<br>f3 = 0.4 0.7Strong(up to +130 °C)<br>f3 = 0.4 0.7Table 3: Reducing factors f1 f5 or unfavourable operational<br>orditionsInductor of up to transport to the table operational<br>conditionsInfluence of increased bearing temperatures<br>moderateInfluence of increased bearing temperatures<br>moderateInfluence of increased bearing temperatures<br>mod  | I hrust cylindrical roller bearing                              |                          | 90                     | d = diameter of the be                                     | aring bore [mm]                                    |
| Contract foller bearing<br>Barrel-shaped roller bearing<br>Spherical roller bearing without flanges ( $\nu E \ll$ )4<br>4<br>10<br>7 9<br>9 12B = bearing width [mm]<br>G = bearing weight [kg]Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderate $f_1 = 0.1 \dots 0.4$ P/C = 0.25 \dots 0.35 $f_4 = 0.7 \dots 1$ P/C = 0.35 \dots 0.45 $f_4 = 0.2 \dots 0.4$ Influence of impact loads, vibrations and oscillations<br>moderate $f_2 = 0.7 \dots 0.9$ Strong $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$ Strong $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$ Strong $(\mu to + 485 °C)$ $f_3 = 0.7 \dots 0.9$ Strong $(\mu to + 100 °C)$ $f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational<br>and environmental conditions   | Conical roller bearing  |                          | 3.5                    | D = outer diameter of                                      | the bearing [mm]                                   |
| Date is larged foller bearingTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo<br>TTo  | Barrel-shaped roller bearing                                    |                          | 10                     | B = bearing width [mm                                      | ]  |
| Table 2: Relubrication quantitiesSpherical roller bearing with centre flange9 12Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of impact loads, vibrations and oscillations<br>moderate $f_1 = 0.1 \dots 0.4$ Influence of impact loads, vibrations and oscillations<br>moderate $f_2 = 0.7 \dots 0.9$ $f_2 = 0.4 \dots 0.7$<br>very strong $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$ $f_3 = 0.7 \dots 0.9$ $f_3 = 0.7 \dots 0.9$ $f_3 = 0.4 \dots 0.7$ $f_5 = 0.1 \dots 0.5$ $f_4 = 1 \dots 0.4$ $f_5 = 0.5 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.4 \dots 0.7$ $f_3 = 0.4 \dots 0.7$ $f_3 = 0.4 \dots 0.7$ $f_4 = 0.05 \dots 0.5$ $f_5 = 0.1 \dots 0.5$ $f_5 = 0.1 \dots 0.4$ $f_5 = 0.1 \dots 0.5$ $f_5 = 0.1 \dots 0.4$ $f_5 = 0.1 \dots 0.5$ $f_5 = 0.1 \dots 0.4$ $f_5 = 0.1 \dots 0.4$ $f_5 = 0.1 \dots 0.4$ $f_6 = 0.1 \dots 0.4$ $f_5 = 0.1 \dots 0.5$ $f_1 \dots 0.5$ $f_5 = 0.1 \dots 0.5$ $f_1 \dots 0.5$ $f_5 = 0.1 \dots 0.5$ $f_1 \dots 0.5$ $f_5 = 0.1 \dots 0.4$ $f_5 = 0.1 \dots 0.4$ $f_7 = 0.1 \dots 0.4$ $f_8 = 0.1 \dots 0.4$ $f_8 = 0.1 \dots 0.4$ $f_8 = 0.1 \dots 0.4$ <   | Subscript collection bearing without flanges ( $\nu E_{\ell}$ ) |                          | 7 9                    | G = bearing weight [kg                                     | ]]   |
| Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsstrong $f_1 = 0.7 \dots 0.9$<br>$f_1 = 0.4 \dots 0.7$ $P/C = 0.1 \dots 0.15$<br>$P/C = 0.15 \dots 0.25$ $f_4 = 1$<br>$f_4 = 0.7 \dots 1$ very strong $f_1 = 0.1 \dots 0.4$ $P/C = 0.15 \dots 0.25$<br>$P/C = 0.35 \dots 0.45$ $f_4 = 0.4 \dots 0.7$<br>$P/C = 0.35 \dots 0.45$ Influence of impact loads, vibrations and oscillations<br>moderate $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ $P/C = 0.45 \dots 0.6$ Influence of increased bearing temperatures<br>moderate $f_2 = 0.1 \dots 0.4$ $P/C = 0.05$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of $f_1 \dots f_5$ for unfavourable operational<br>and environmental conditions  | Spherical roller bearing with centre fl                         | ange                     | 9 12                   | Table 2: Relubrication                                     | quantities   |
| Influence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsInfluence of dust and moisture at the functional surfaces of<br>the bearing<br>moderateInfluence of high loadsstrong $f_1 = 0.7 \dots 0.9$<br>$f_1 = 0.1 \dots 0.4$ $P/C = 0.1 \dots 0.15$ very strong $f_1 = 0.1 \dots 0.4$ $P/C = 0.25 \dots 0.25$ Influence of impact loads, vibrations and oscillations<br>moderate $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ trong $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of increased bearing temperatures<br>moderate $f_3 = 0.4 \dots 0.7$<br>$f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational<br>and environmental conditions<br>and environmental conditions   |   | 0                        | I                      |  | •  |
| the bearing<br>moderate $f_1 = 0.7 \dots 0.9$<br>$f_1 = 0.4 \dots 0.7$ $P/C = 0.1 \dots 0.15$ $f_4 = 1$ strong $f_1 = 0.4 \dots 0.7$<br>$f_1 = 0.1 \dots 0.4$ $P/C = 0.15 \dots 0.25$ $f_4 = 0.7 \dots 1$ very strong $f_1 = 0.1 \dots 0.4$ $P/C = 0.25 \dots 0.35$ $f_4 = 0.4 \dots 0.7$ Influence of impact loads, vibrations and oscillations<br>moderate $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ $P/C = 0.45 \dots 0.6$ $f_4 = 0.05 \dots 0.2$ Influence of increased bearing temperatures<br>moderate $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>slight currentInfluence of current streaming through the bearing<br>slight currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>slight currentstrong<br>torug(up to +85 °C) $f_3 = 0.7 \dots 0.9$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational<br>and environmental conditions  | Influence of dust and moisture at the functional sur            |                          | rfaces of              | Influence of high loads                                    | 3  |
| moderate $f_1 = 0.7 \dots 0.9$<br>strong $P/C = 0.1 \dots 0.15$ $f_4 = 1$<br>$P/C = 0.15 \dots 0.25$ very strong $f_1 = 0.4 \dots 0.7$<br>$f_1 = 0.1 \dots 0.4$ $P/C = 0.15 \dots 0.25$ $f_4 = 0.7 \dots 1$<br>$P/C = 0.25 \dots 0.35$ Influence of impact loads, vibrations and oscillations<br>moderate $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$ $P/C = 0.45 \dots 0.6$ $f_4 = 0.05 \dots 0.2$<br>$P/C = 0.45 \dots 0.6$ Influence of increased bearing temperatures<br>moderate $f_2 = 0.1 \dots 0.4$ Influence of current streaming through the bearing<br>slight currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong (up to +100 °C)strong $(up to +100 °C)$ $f_3 = 0.4 \dots 0.7$<br>$f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational<br>and environmental conditions  | the bearing   |                          |                        | 5  |  |
| strong $f_1 = 0.4 \dots 0.7$ $P/C = 0.15 \dots 0.25$ $f_4 = 0.7 \dots 1$ very strong $f_1 = 0.1 \dots 0.4$ $P/C = 0.25 \dots 0.35$ $f_4 = 0.4 \dots 0.7$ Influence of impact loads, vibrations and oscillations $P/C = 0.25 \dots 0.35$ $f_4 = 0.2 \dots 0.4$ Influence of impact loads, vibrations and oscillations $P/C = 0.45 \dots 0.6$ $f_4 = 0.05 \dots 0.2$ moderate $f_2 = 0.7 \dots 0.9$ $P/C = 0.45 \dots 0.6$ $f_4 = 0.05 \dots 0.2$ strong $f_2 = 0.4 \dots 0.7$ $P/C = 0.6$ $f_4 = 0.05 \dots 0.2$ very strong $f_2 = 0.1 \dots 0.4$ Influence of current streaming through the bearingInfluence of increased bearing temperatures $f_3 = 0.7 \dots 0.9$ Influence of current streaming through the bearingstrong(up to +85 °C) $f_3 = 0.7 \dots 0.9$ strong current $f_5 = 0.1 \dots 0.5$ strong(up to +100 °C) $f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operationaland environmental conditions $f_1 = 0.1 \dots 0.4$ $f_2 = 0.1 \dots 0.4$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational   | moderate  | f <sub>1</sub>           | = 0.7 0.9              | P/C = 0.1 0.15   | $f_4 = 1$  |
| very strong $f_1 = 0.1 \dots 0.4$ $P/C = 0.25 \dots 0.35$ $f_4 = 0.4 \dots 0.7$ Influence of impact loads, vibrations and oscillations $P/C = 0.25 \dots 0.45$ $f_4 = 0.2 \dots 0.4$ moderate $f_2 = 0.7 \dots 0.9$ $P/C = 0.45 \dots 0.6$ $f_4 = 0.05 \dots 0.2$ strong $f_2 = 0.4 \dots 0.7$ $P/C = >0.6$ $f_4 = < 0.05$ very strong $f_2 = 0.1 \dots 0.4$ Influence of current streaming through the bearingInfluence of increased bearing temperatures $f_3 = 0.7 \dots 0.9$ Influence of current streaming through the bearingstrong(up to +85 °C) $f_3 = 0.7 \dots 0.9$ strong current $f_5 = 0.5 \dots 0.7$ strong(up to +100 °C) $f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operationalvery strong $f_2 = 0.1 \dots 0.4$ and environmental conditions   | strong  | f <sub>1</sub>           | = 0.4 0.7              | P/C = 0.15 0.25  | $f_4 = 0.7 \dots 1$                                |
| P/C = 0.35 0.45 $f_4 = 0.2 0.4$ Influence of impact loads, vibrations and oscillations<br>moderate $f_2 = 0.7 0.9$<br>$f_2 = 0.4 0.7$ $P/C = 0.45 0.6$ $f_4 = 0.05 0.2$<br>$P/C = >0.6$ strong $f_2 = 0.4 0.7$ $P/C = 0.45 0.6$ $f_4 = 0.05 0.2$ very strong $f_2 = 0.1 0.4$ Influence of current streaming through the bearing<br>slight currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 0.9$ Influence of current streaming through the bearing<br>slight currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 0.9$ Influence of current streaming through the bearing<br>slight currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 0.9$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 0.9$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.4 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.4 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.4 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_5 = 0.1 0.5$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f$  | very strong   | f <sub>1</sub>           | = 0.1 0.4              | P/C = 0.25 0.35  | $f_4 = 0.4 \dots 0.7$                              |
| Influence of impact loads, vibrations and oscillations<br>moderate $P/C = 0.45 \dots 0.6$<br>$f_4 = 0.05 \dots 0.2$<br>$P/C = >0.6$ strong<br>very strong $f_2 = 0.7 \dots 0.9$<br>$f_2 = 0.4 \dots 0.7$<br>$f_2 = 0.1 \dots 0.4$ $P/C = 0.45 \dots 0.6$<br>$P/C = >0.6$ $f_4 = 0.05 \dots 0.2$<br>$f_4 = < 0.05$ Influence of increased bearing temperatures<br>moderate $f_2 = 0.1 \dots 0.4$ Influence of current streaming through the bearing<br>slight currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.4 \dots 0.7$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.4 \dots 0.7$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.4 \dots 0.7$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.4 \dots 0.7$<br>$f_3 = 0.4 \dots 0.7$ Influence of current streaming through the bearing<br>strong currentInfluence of increased bearing temperatures<br>moderate $f_3 = 0.4 \dots 0.7$<br>$f_3 = 0.4 \dots$   |   |                          |                        | P/C = 0.35 0.45  | $f_4 = 0.2 \dots 0.4$                              |
| moderate $f_2 = 0.7 \dots 0.9$ $P/C = >0.6$ $f_4 = < 0.05$ strong $f_2 = 0.4 \dots 0.7$ Influence of current streaming through the bearingvery strong $f_2 = 0.1 \dots 0.4$ Influence of current streaming through the bearingInfluence of increased bearing temperatures $f_3 = 0.7 \dots 0.9$ Influence of current streaming through the bearingInfluence of increased bearing temperatures $f_3 = 0.7 \dots 0.9$ strong current $f_5 = 0.1 \dots 0.5$ strong(up to +85 °C) $f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operationalvery strong(up to +100 °C) $f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational   | Influence of impact loads, vibrations and oscillation           |                          | าร                     | P/C = 0.45 0.6   | $f_4 = 0.05 \dots 0.2$                             |
| strong $f_2 = 0.4 \dots 0.7$ very strong $f_2 = 0.1 \dots 0.4$ Influence of increased bearing temperaturesInfluence of current streaming through the bearing<br>slight currentInfluence of increased bearing temperatures $f_5 = 0.5 \dots 0.7$ moderate(up to +85 °C) $f_3 = 0.7 \dots 0.9$ strong(up to +100 °C) $f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational $f_5 = 0.1 \dots 0.4$   | moderate  | f <sub>2</sub>           | = 0.7 0.9              | P/C = >0.6   | $t_4 = < 0.05$                                     |
| very strong $f_2 = 0.1 \dots 0.4$ Influence of current streaming through the bearing<br>slight currentInfluence of increased bearing temperatures $f_5 = 0.5 \dots 0.7$<br>strong currentmoderate(up to +85 °C) $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ strong(up to +100 °C) $f_3 = 0.4 \dots 0.7$ the bearing temperatures $f_5 = 0.1 \dots 0.9$ strong(up to +130 °C) $f_5 = 0.1 \dots 0.4$ temperatures $f_5 = 0.1 \dots 0.9$ strong(up to +130 °C)temperatures $f_5 = 0.1 \dots 0.7$ temperatures $f_5 = 0.1 \dots 0.9$ temperatures $f_5 = 0.1 \dots 0.7$ temperatures $f_5 = 0.1 \dots 0.9$ temperatures $f_5 = 0.1 \dots 0.7$ temperatures $f_5 = 0$  | strong  | f <sub>2</sub>           | = 0.4 0.7              | la fluir a state of summary to the                         |  |
| Influence of increased bearing temperatures<br>moderate $f_5 = 0.5 \dots 0.7$<br>strong currentstrong(up to +85 °C) $f_3 = 0.7 \dots 0.9$<br>$f_3 = 0.4 \dots 0.7$ strong(up to +100 °C) $f_3 = 0.4 \dots 0.7$ very strong(up to +130 °C) $f_4 = 0.1 \dots 0.4$   | very strong   | f <sub>2</sub>           | = 0.1 0.4              | Influence of current st                                    | reaming through the bearing                        |
| Influence of increased bearing temperatures<br>moderate (up to +85 °C) $f_3 = 0.7 \dots 0.9$<br>strong (up to +100 °C) $f_3 = 0.4 \dots 0.7$<br>very strong (up to +130 °C) $f_3 = 0.4 \dots 0.7$<br>Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operational<br>and environmental conditions   |   |                          |                        | slight current   | $I_5 = 0.5 \dots 0.7$<br>f = 0.1 0.5               |
| Indecrate(up to +65°C) $I_3 = 0.7 \dots 0.9$ strong(up to +100°C) $f_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $f_1 \dots f_5$ for unfavourable operationalvery strong(up to +130°C) $f_2 = 0.1 \dots 0.4$ and environmental conditions  | Influence of increased bearing temp                             | eratures                 | - 0 7 0 0              | strong current   | 1 <sub>5</sub> - 0.1 0.5                           |
| Situation (up to +100 C) $I_3 = 0.4 \dots 0.7$ Table 3: Reducing factors $I_1 \dots I_5$ for unfavourable operational very strong (up to +130 °C) $f = 0.1 \dots 0.4$ and environmental conditions  | trong (up to +85 °C   | $f_3$                    | = 0.7 0.9              | Table 2. Deducing for                                      | toro f for unforcements and the second             |
|   | strong (up to $\pm 100$ °C)                                     | ) T <sub>3</sub>         | - 0.4 0.7<br>= 0 1 0 4 | and environmental co                                       | dors 11 15 for unlavourable operational            |

# FAG FE9 Test Run







# Diagram 2:

FE9 test run with angular contact ball bearing 529689 ( $\geq$ 7206 B), assembly A, i. e. open bearing; axial load F<sub>a</sub> = 1.5 kN; speed n = 6000 min<sup>-1</sup>; temperature +140 °C

Lubrication with **TURMOGREASE**<sup>®</sup> Li 802 EP Grease service life of the bearings in h: determination in Weilbull diagram of  $F_{50}$  = 237 h;  $F_{10}$  = 185 h

Requirements acc. to FAG and DIN 51825  $\rm F_{50}$  = 100 h  $\rightarrow$  Evaluation: very good

6



# FAG FE9 Test Run







# Diagram 3:

FE8 test run with angular contact ball bearing 536050 ( $\ge$  7312 B); axial load F<sub>a</sub> = 80 kN; speed n = 7.5 min<sup>-1</sup>; time of operation 500 h Lubrication with **TURMOGREASE®** Li 802 EP



# Diagram 4:

FE8 test run with taper roller bearing 536048 ( $\triangleq$  31312); axial load F<sub>a</sub> = 50 kN; speed n = 75 min<sup>-1</sup>; time of operation 500 h Lubrication with **TURMOGREASE**<sup>®</sup> Li 802 EP

| Parameters   | Test run 1  | Test run 2  | FAG<br>requirement                       |
|--|---|---|--|
| Steady-state<br>temperature in °C  | 29  | 37  | <b>s</b><br>30 40                        |
| Peak temperature<br>in °C  | 37  | 45  | 30 40                                    |
| Wear in mg of<br>- the rolling elements<br>- the cage<br>- the inner ring<br>- the outer ring<br>Frictional behaviour<br>over the time<br>(see diagram left) | 5/16<br><br>5/9<br>13/18<br>very<br>smooth<br>behaviour | 8/11<br><br>6/7<br>14/17<br>very<br>smooth<br>behaviour | < 35<br><100<br>Evaluation:<br>very good |

| Parameters   | Test run 1   | Test run 2  | FAG<br>requirement                       |
|--|--|---|--|
| Steady-state temperature in °C   | 45   | 35  | <b>s</b><br>60                           |
| Peak temperature<br>in °C  | 77   | 60  | 60                                       |
| Wear in mg of<br>- the rolling elements<br>- the cage<br>- the inner ring<br>- the outer ring<br>Frictional behaviour<br>over the time<br>(see diagram left) | 18/23<br>52/69<br>15/13<br>13/13<br>Running-<br>in not yet<br>finished | 24/25<br>44/47<br>32/28<br>16/13<br>Running-<br>in almost<br>finished | < 35<br><100<br>Evaluation:<br>very good |











| Parameters   | Test run 1  | Test run 2  | FAG<br>requirement                       |
|--|---|---|--|
| Steady-state temperature in °C   | 90  | 84  | <b>s</b><br>≤120                         |
| Peak temperature<br>in °C  | 125   | 132   | 120                                      |
| Wear in mg of<br>- the rolling elements<br>- the cage<br>- the inner ring<br>- the outer ring<br>Frictional behaviour<br>over the time<br>(see diagram left) | 6/7<br><br>1/8<br>2/6<br>Running-<br>in not yet<br>finished | 0/0<br><br>0/0<br>0/0<br>Running-in<br>finished,<br>very smooth | < 35<br><100<br>Evaluation:<br>very good |

# Diagram 5:

FE8 test run with angular contact ball bearing 536050 TVP ( $\triangleq$  7312 B with plastic cage); axial load F<sub>a</sub> = 5 kN; speed n = 6000 min<sup>-1</sup>; time of operation 500 h;

Lubrication with TURMOGREASE® Li 802 EP



# Diagram 6:

FE8 test run with taper roller bearing 536048 ( $\triangleq$  31312); axial load F<sub>a</sub> = 10 kN; speed n = 3000 min<sup>-1</sup>; time of operation 500 h Lubrication with **TURMOGREASE**<sup>®</sup> Li 802 EP

| Parameters   | Test run 1  | Test run 2  | FAG<br>requirements                      |
|--|---|---|--|
| Steady-state temperature in °C   | 100   | 95  | 120                                      |
| Peak temperature<br>in °C  | 116   | 110   | 120                                      |
| Wear in mg of<br>- the rolling elements<br>- the cage<br>- the inner ring<br>- the outer ring<br>Frictional behaviour<br>over the time<br>(see diagram left) | 14/11<br>15/11<br>4/4<br>1/2<br>Running-<br>in finished | 10/8<br>43/9<br>4/1<br>0/1<br>Running-<br>in finished | < 35<br><100<br>Evaluation:<br>very good |



# **R6 Test Run**





# Diagram 7:

R6 test run with deep groove ball bearing 6203.2ZR.C3; preservation of the test bearing with Fuchs TX 10A; axial load  $F_a = 179$  N; radial load  $F_r = 23$  N; speed n = 7500 min<sup>-1</sup>; running time 10 h

Lubrication with TURMOGREASE® Li 802 EP

Steady-state temperature +28 ... +30 °C; peak temperature +40 °C; grease loss 50 mg

# Lubricating Greases for Rolling Bearings

**TURMOGREASE®** Li 802 EP; often used lubricating grease for rolling bearings subject to high loads, proved successful for many applications. Modified versions with tailor-made formulations provide an extended range of performance for specific applications:

| Special application   | V <sub>40</sub> (mm²/s) | Name of grease                     |
|---|-------------------------|------------------------------------|
| Temperature -35 °C up to +140 °C,<br>speed factor $n \cdot d_m(min^{-1} \cdot mm) \le 1000000$                    | 85                      | TURMOGREASE <sup>®</sup> Li 802 EP |
| Temperature -25 °C up to +140 °C, water resistant, speed factor $n \cdot d_m (min^{-1} \cdot mm) \le 1\ 000\ 000$ | 85                      | TURMOGREASE <sup>®</sup> LC 802 EP |
| Favourable for impact loads, vibrations   | 200                     | TURMOPLEX <sup>®</sup> 2 MF        |
| Favourable also for high impact loads, vibrations, temperature up to +170 °C                                      | 400 500                 | TURMOPLEX <sup>®</sup> BN 5002     |
| Temperature up to +140 °C, water resistant, favourable for bearings with rolling outer ring                       | 400 500                 | TURMOGREASE® CAK 4003              |
| Favourable for extremely high impact loads  | 1000                    | TURMOPLEX <sup>®</sup> L 220       |

9

# The World of the LUBCON<sup>®</sup> Lubricants



#### EUROPE

### Austria

LUBRICANT CONSULT GMBH Office St. Gertraud GSM: +43-6644183187 Fax: +43-4352-720 64 E-mail: austria@lubcon.com www.lubcon.com

#### Belgium

Van Meeuwen Special Lubricants N.V. Tel.: +32-53-76 76 00 Fax: +32-53-21 52 03 E-mail: info@vanmeeuwen.be www.vanmeeuwen.com

#### **Czech Republic**

LUBCON s.r.o. Tel.: +420-577-34 36 18 Fax: +420-577-34 20 09 E-mail: czechrepublic@lubcon.com www.lubcon.com

#### Denmark

A.H. INTERNATIONAL A/S Tel.: +45-75-50 11 00 Fax: +45-75-50 20 21 E-mail: ahi@ahi.dk www.lubcon.dk

#### Finland

Jukka Majuri Oy Tel.: +358-3-515 41 26 Fax: +358-3-511 52 20 E-mail: jukka.majuri@lubcon.fi www.lubcon.fi

#### France

LUBCON FRANCE S.A.R.L. Tel.: +33-4-79 84 38 60 Fax: +33-4-79 84 38 61 E-mail: france@lubcon.com www.lubcon.com

#### Great Britain

LUBCON Lubricants UK Ltd. Tel.: +44-1943-601431 Fax: +44-1943-602645 E-mail: uk@lubcon.com www.lubcon.com

Italy LUBCON LUBRIFICANTI S.R.L. Tel.: +39-0111-97 03 964 Fax: +39-0111-97 03 974 E-mail: italia@lubcon.com www.lubcon.com

#### FUROPE

### Netherlands

Van Meeuwen Smeertechniek B.V. Tel.: +31-294-49 44 94 Fax: +31-294-49 44 90 E-mail: info@vanmeeuwen.nl www.vanmeeuwen.com

# Norway

NORIKO AS Tel.: +47-33-37 85 00 Fax: +47-33-37 85 01 E-mail: bww@noriko.no www.noriko.no

#### Poland

LUBCON POLSKA Sp. z o.o. Tel.: +48-81-7 21 68 30 Fax: +48-81-7 21 68 31 E-mail: polska@lubcon.com www.lubcon.com

LUBCON d.o.o. Tel.: +386-7-33 80 760 Fax: +386-7-33 80 763 E-mail: lubcon@lubcon.si www.lubcon.si

### Spain

LUBRITEC, S.A. Tel.: +34-93-719 11 13 Fax: +34-93-719 12 57 E-mail: lubritec@lubritec.com www.lubritec.com

#### Sweden

Ringdahl Maskiner AB Tel.: +46-8-14 02 75 Fax: +46-8-41 14 170 E-mail: clas@ringdahl-maskiner.se Internet: www.ringdahl-maskiner.se

#### Switzerland

LUBCON Lubricant Consult AG Tel.: +41-44-8 82 30 37 Fax: +41-44-8 82 30 38 E-mail: swiss@lubcon.com www.lubcon.com

Turkey GEOCON Ltd. Şti. Tel.: +90-216-561 15 26 Fax: +90-216-561 11 87 E-mail: geocon@geocon.com.tr www.geocon.com.tr

#### **EUROPE**

**Further Distributors** Bulgaria Ireland Cyprus Greece Portugal Russia Hungary

#### **NORTH AMERICA**

#### **United States**

LUBCON Turmo<sup>®</sup>Lubrication, Inc. Tel.: +1-616-575-6034 Fax: +1-616-575-6062 Toll free US+CAN: 877-887-6658 E-mail: inquiry@lubconusa.com www.lubconusa.com

**Further Distributors** Mexico

#### **SOUTH AMERICA**

#### Brazil

Fuchs do Brasil S.A. Tel.: +55-11-4789-2311 Fax: +55-11-4789-2670 E-mail: fuchs@fuchsbr.com.br www.fuchsbr.com.br

**Further Distributors** Ecuador

#### **AFRICA / MIDDLE EAST**

FOCHEM International (Pty) Ltd. Tel.: +27-11-903-9720 Fax: +27-11-903-9730 E-mail: info@focheminternational.com

#### Fu er Distribut Eg

| /pt    | Saudi Arabia |
|--------|--------------|
| ael    | Tunisia      |
| ו      | UAE          |
| kistan |              |

#### ASIA/PACIFIC

Isra

Irar Pal

Philippines LUBCON Lubricant Asia **Regional Headquarter** E-mail: apsales@lubcon.com

### **Further Distributors**

Korea Malaysia New Zealand Singapore Taiwan Thailand Vietnam

# LUBRICANT CONSULT GMBH

Lubricants - Lubrication Systems

Gutenbergstraße 13 · 63477 Maintal · GERMANY · P.O. Box 200 240 · 63469 Maintal · GERMANY Tel.: +49 6109/7650-0 • Fax: +49 6109/7650-51 • Email: webmaster@lubcon.com • www.lubcon.com