USE AND MAINTENANCE

▪ Operating temperature for our rod ends and spherical-plain bearings

Bearing	Temperature range
Rolling bearing	-45 °C to + 120 °C
Polyamide PTFE glass fibre compound (Glide)	-30 °C to + 60 °C
Steel / sintered bronze (or sintered steel)	-30 °C to + 120 °C (+150 °C peak)
Steel/brass	-40 °C to + 110 °C
Steel/PTFE	-40 °C to + 200 °C (+250 °C peak)
Steel/PTFE with -2RS	-40 °C to + 120 °C
Steel/steel	-40 °C to + 200 °C (+250 °C peak)
Steel/steel with - 2RS	-45 °C to + 120 °C

A loss in load rating capacity occures at higher temperatures, which must be accounted for in the operating life estimate with the temperature factor C_2.

Tab.1

▪ Terms and definitions

Loads

The decisive parameters for the selection and calculation of our heavy-duty rod ends and spherica-plain bearings are size, direction and type of load.

Radial and combined loads

Rod ends and spherical-plain bearings have been especially designed to adopt high radial loads Fr. They can furthermore be used for combined loads. The axial load share Fa of which does not exceed 30 % of the corresponding radial load. .

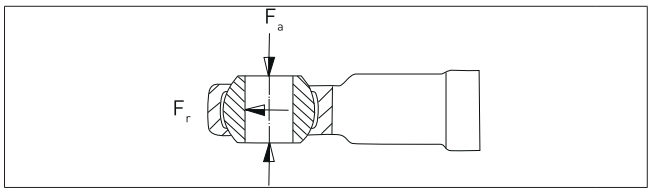


Fig.1

Unilaterally acting load

In this case the load acts only in the same direction, which means that the load area is always in the same bearing section.

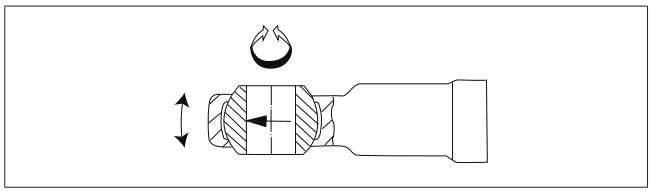


Fig.2

Alternately acting load

In case of alternating loads, the load areas facing each other are alternately loaded and/or relieved, which means that the load changes its direction constantly by approx. 180°.

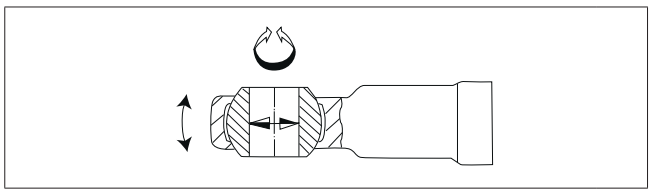


Fig.3

Swivelling angles

The swivelling angle is the excursion of the rod end from one final position to the other. Half the swivelling angle β is used to calculate the working life.

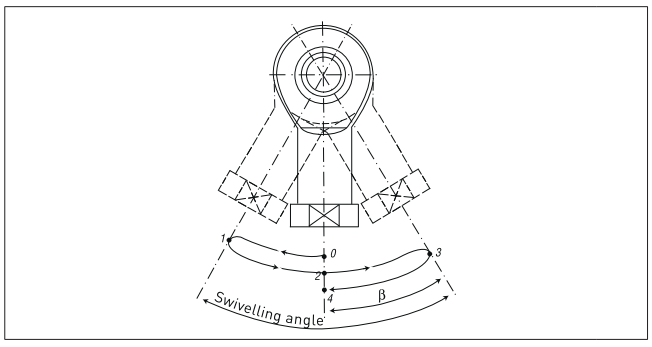


Fig.4

Tilt angle

The tilt angle refers to the possible excursion of the joint ball and/ or the inner ring to the rod end axis in degrees. The tilt angle α indicated in the table corresponds to the maximum possible ex- cursion. It is important that this tilt angle is not exceeded either during installation or operation.

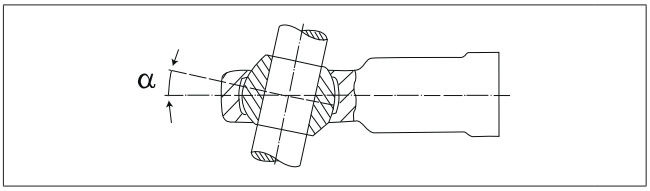


Fig.5

Internal clearance

The radial internal clearance is defined as the distance by which the inner ring can be moved in a radial direction relative to the outer ring from one extreme position to the other. The axial internal clearance is defined as the amount by whichthe inner ring can be moved in an axial direction relative to the outer ring from one extreme position to the other. See Fig.6.

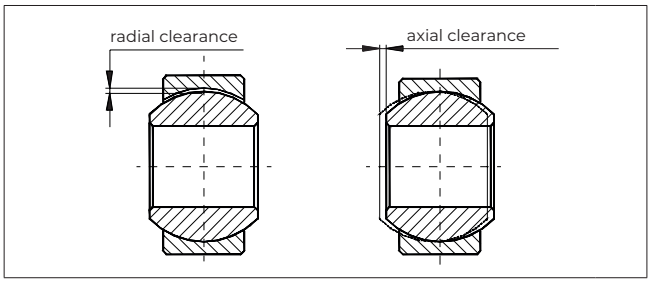


Fig.6

Static load rating

The static basic load rating C_0 of an rolling bearing rod end and spherical-plain bearing corresponds to that of a static radial load causing a lasting overall deformation of 1/10.000 of the roller body diameter at the contact point most highly stressed between roller body and raceway.
The static basic load rating C_0 of a plain bearing rod end corresponds to the static radial load that does not yet cause a lasting deformation at the weakest housing section. It contains up to 1.2 fold security compared to the yield stress of the material used for the rod end housing.

Dynamic load rating

The dynamic basic load rating C of an rolling bearing rod end and spherical-plain bearing is the external radial load, unchangeable in size and direction, at which 90 % of a large quantity of obviously identical rod ends will reach or exceed 1 million of rotations or swiveling movements. The dynamic basic load rating C of a sliding bearing rod ends or spherical-plain bearing is a variable applied in estimating the expected operating life of dynamically stressed sliding bearing rod ends and spherical-plain bearings.

Important note:

Basic load ratings always depend on the definitions they are based on. For this reason it is not always possible to compare basic load rating data supplied by different manufactures.

Working life

The term "working life" is used with rod ends respectively with spherical-plain bearings. It represents the number of swivelling motions or rotations and/or the number of service hours the rod ends/spherical-plain bearings perform before becoming unserviceable because of material fatigue, wear, increased bearing clearance or increase of the bearing friction moment. The working life is not only influenced by the size and the type of load, it is also affected by a number of factors, which are partially difficult to assess. A calculation of the exact service life is therefore impossible. Field experienced standard values for the approximate working life can nevertheless be determined by using the calculation procedure which is based on numerous results from endurance test runs and values from decades of experience. The values determined by this formula are achieved, normally even exceeded, by the majority of the rod ends and spherical-plain bearings. The specific loading of rod ends and spherical-plain bearings differs in each application. Therefore general statements in a catalog may not totally fit to the single application. In all cases the user has to coordinate the theoretical selection criteria with the concrete installation situation and check the suitability of the rod end respectively spherical-plain bearing. In this context the user has to define sufficient security factors and maintenance intervals.

▪ Installation instructions

Please note as a general rule that during installation of spherical-plain bearings, forces must not be applied to the bearing. This kind of spherical plain-bearing is designed as a radial spherical-plain bearing. Avoid any axial forces because this kind of spherical-plain bearing can easily destroyed hereby.

Installation of the outer ring in a bearing housing

As shown (see Fig.7) you have to use an appropriate device (3, 6, 7) in order to apply the force on the outer ring only (1) and no forces affect the joint ball (2). Please note that bearings of the series GLK ... GLKS ..., GLE ... or GLG ... the force on the outer ring is applied to the front side only. The front side with visible windows (3) has to abut in the housing (4) on a stop collar in kind of a retaining ring (5) or on a coil (see Fig.8). On the opposite side the bearing must be held with a retaining ring.

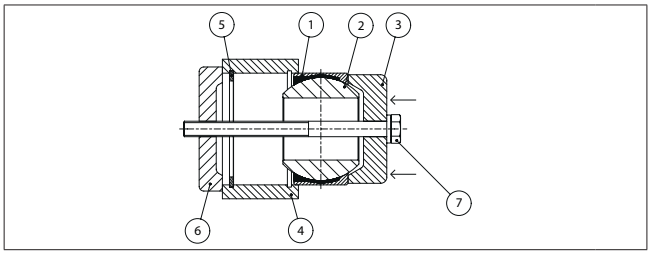


Fig.7

Installation of a shaft in the inner ring of the bearing

As illustrated (see Fig.10), the inner ring (2) has to be moved onto the shaft journal (4) with an appropriate device (3, 5, 6). Avoid any forces acting on the outer ring of the bearing (1). It is important to ensure to proceed with a constant force and not with irregular, rough hits. Once the inner ring is moved onto the shaft journal (see Fig.11), it has to be locked on the shaft by a securing ring.

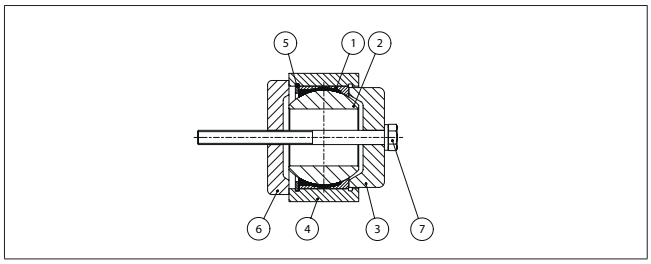
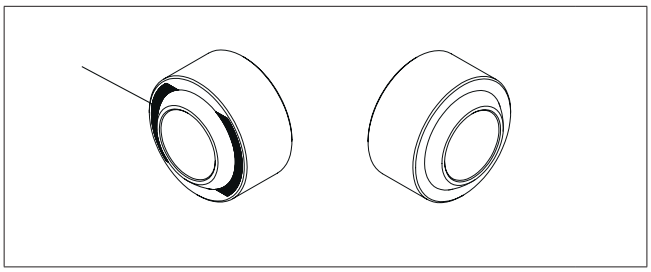


Fig.8

Installation of roller or ball bearing spherical-plain bearings

For the installation of our heavy-duty spherical-plain bearings with integral self-aligning roller bearing or ball bearing, type WLT or WLK (see Fig.11), the same installation instructions are valid as for the different types of spherical-plain bearings mentioned above. But additionally has to be considered that during assembly or subsequent usage the tilt angle (α) given in our catalog will never be exceeded. Disregard will inevitably lead to damage of the bearings because the rolling elements consequently press from inside against the cover plate.



GLK; GLKS; GLG; GLE

Fig.9

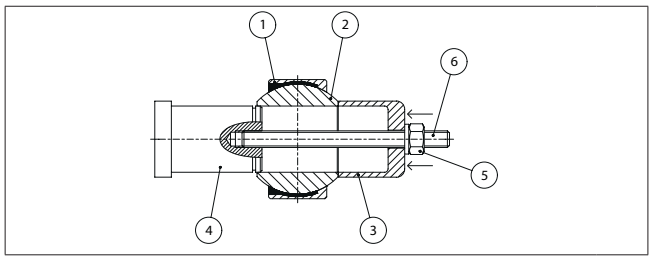


Fig.10

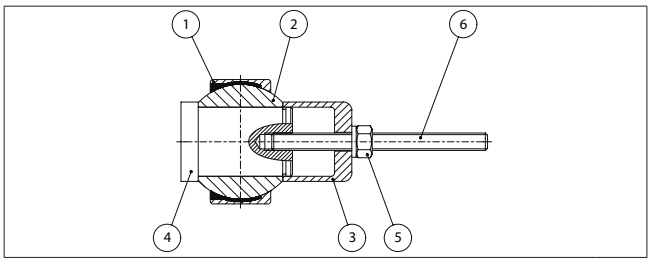
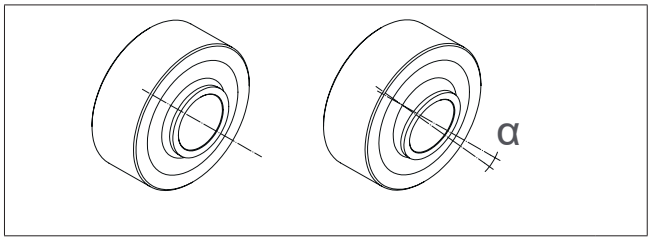


Fig.11

Fitting suggestions

Choosing the fit it has to be taken care for no movement between inner ring borehole and shaft resp. outer ring of the bearing and bore of housing. Extremely tight fit might affect the radial clearance in a negative way. The fit must be selected so that there is no movement between the joint ball bore and shaft, or between the outer ring of the bearing and the housing bore. Care must also be taken to ensure that excessively tight fits do not have an adverse effect on the bearing clearance.



WLT; WLK **Fig.12**

Bore of housing for installation of spherical plain-bearings

- Series K: M7 / N7 (normal / strong load type)
- Series E, G: M6 / J6

Shaft fits for spherical plain-bearings

- Series K: k6 / m6
- Series E, G: j6 / h6

▪ Grease press

Hydraulic grease nipples	Funnel type grease nipples
 Hydraulic nozzle	 Needle point nozzle
 Hollow nozzle	 Nozzle pipe 9 mm
	

Tab.2

One-hand high pressure grease gun

Practical grease gun for one-hand operation. Short lever movements allow high pressures with little effort.

Heavy quality design, special collar, with nozzle pipe and 4-jaw hydraulic coupling, hollow nozzle or needle point nozzle.

Content ccm	Dimensions mm	Length mm	Output / Stroke cc	Working pressure bar	Connecting thread	Filling
120	Ø 40 x 140	230	0.5	400	R 1/8''	manual / fillin grease nipple

Tab.3

Hand lever grease gun for 400 grease cartridges

Hand lever grease gun, sturdy design made of steel, painted silver with red handle sleeve and filling nipple. Double sleeve enables filling also by suction.

Wide swinging lever indicates output (0-1.5 cc). Filler neck at the press head for fast filling.

Content ccm	Dimensions mm	Length mm	Output / Stroke cc	Working pressure bar	Connecting thread	Filling
400	Ø 56.5 x 300	400	1.4	400	M10 x 1.0	manual / fillin grease nipple

Tab.4

Shock grease gun for loose grease	
Funnel-type grease nipples that are hidden and hard to access, are lubricated in a process-safe manner with this press. Extra thin nozzle tube, only 6 mm diameter Nozzle tube extended to 200 mm (also available in 300 mm on request) extra fine pointed nozzle with thread M 4 – On request, it is possible to angle the nozzle pipe (single or double angles).	

Content ccm	Dimensions mm	Length mm	Connecting thread	Filling
330	Ø 75 x 170	430	M10 x 1.0	manual

Tab.5

Grease technical details

Information on the grease used for initial greasing in products of the durbal-premium- line.

The company Durbal greases all Premium articles as standard with a high-performance grease that can also be used in the food industry.

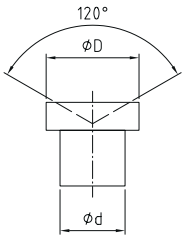
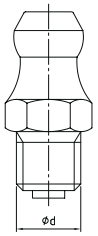
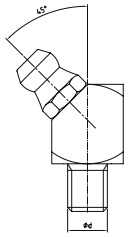
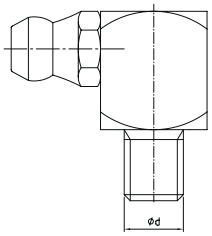
We use Klübersynth UH 1 14-151, synthetic grease for the food and pharmaceutical industry.

Advantages for your application:

- Reduces the risk of premature bearing failure due to its good corrosion protection
- Avoidance of inadequate lubrication due to the good pumpability in central lubrication systems
- Applicable over a wide range of service temperatures due to its soft consistency
- Service temperature range from -45°C to +120°C
- NSF-H 1 registration, registration number 056354

According to the manufacturer, this special grease is intended for the lubrication of roller and sliding bearings, lifting cylinders, joints and guide rods.

For further information and complete product informa- tion please contact our technical management or the manufacturer directly.

Standard grease nipple	DIN-NORM	Order number
	DIN 3405 D1/A	03SMD1-A3, 5K4
	DIN 71412 H1	03SMH1-M5E-SK1750
Special grease nipples in different sizes	**DIN-NORM**	**Order number**
	DIN 71412 H2	03SMH2-M5 x 45GRAD
	DIN 71412 H3	03SMH3-M5 x 90GRAD

Please note, that the use of a non standard lubricating nipple causes a cross sectional variation for the housing which means a reduction of the static load capacity Co.

Tab.6