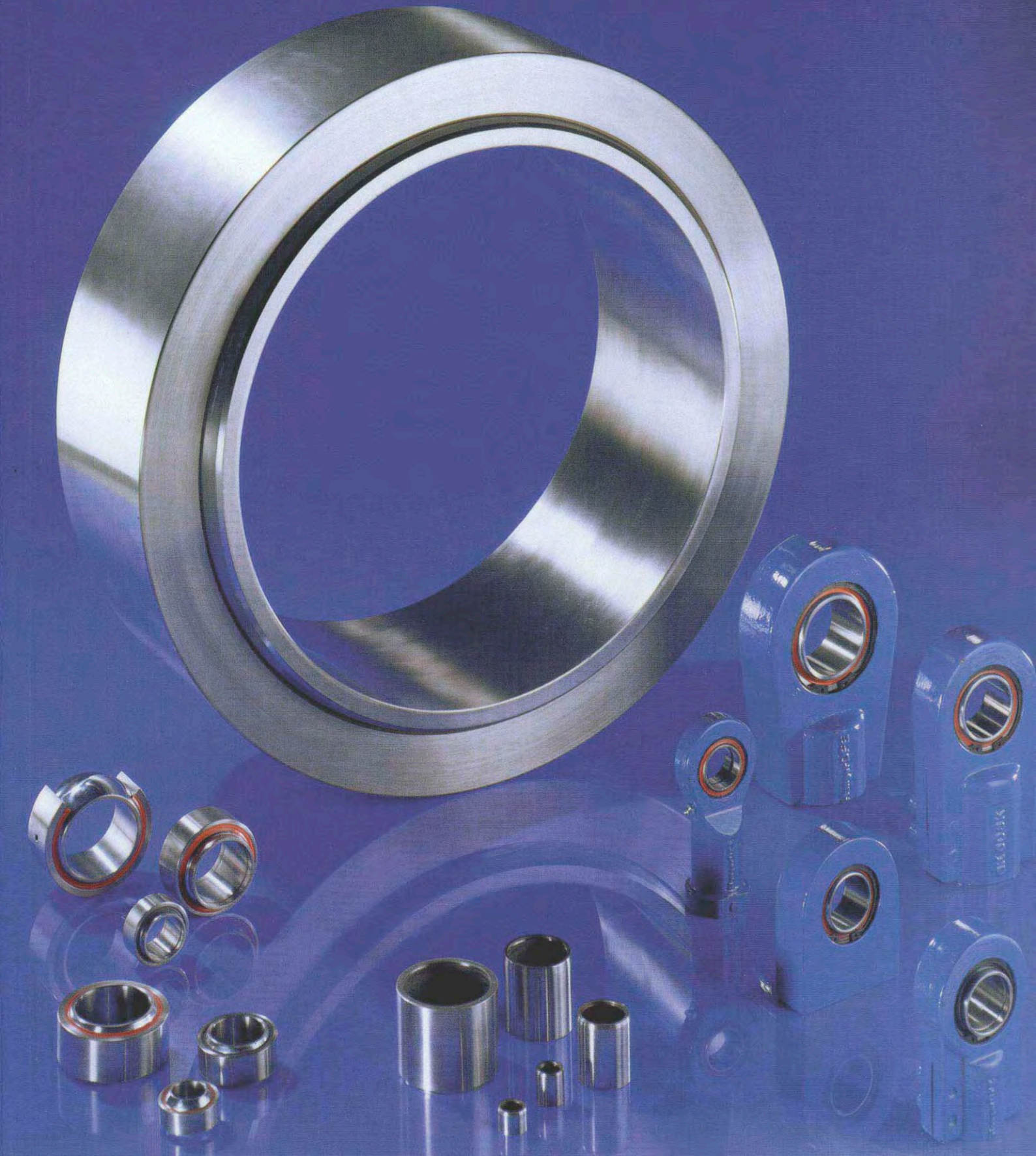
HUNGER
Maschinen
EIN UNTERNEHMEN DER HUNGER-GRUPPE

# Spherical Plain Bearings
# Rod Ends



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## Preface

On a tide of development and technical progress, this new edition of our spherical plain bearing catalogue will be a valuable aid to the solution of your bearing problems.

Through experience gained and the use of modern development techniques, the previous version of this catalogue has been extensively updated in line with the latest advances in bearing technology.

In addition, our know-how in successfully combining bearings with special hydraulic cylinders in many different areas of engineering like civil engineering, metallurgical and transport industries puts us in a unique position to develop and manufacture custom designed spherical plain bearings economically.

## General

**Our Company:**

In addition to spherical plain bearings, **Hunger Maschinen GmbH**, based in Würzburg, in conjunction with **Walter Hunger KG**, based in Lohr, have been involved for more than 15 years now with the development and manufacture of hydraulic system components. Hydraulic systems and controls for presses and cranes within the mining and metallurgical industries, and for hydroelectric projects, are built in Würzburg. System components include rotary distributors and rotary actuators in addition to our spherical plain bearings which, for hydroelectric projects, connect hydraulic cylinders to sluice and radial gates in dams all over the world.

**Our Spherical Plain Bearings:**

Ever since spherical plain bearings were first used in the construction of airplanes, the advantages of torque-free linking and power generation in the connection of moving parts has been seen. Spherical plain bearings also offer a simple way of avoiding secondary bending moments in moving parts caused, for example, by misalignment due to manufacturing tolerances and thermal expansion.

The widely spread introduction of spherical plain bearings into the mechanical engineering has created many spherical plain bearing types, tailored in most cases to the specific bearing problems. The varying demands on spherical plain bearings have been taken into account by the use of different material and construction combinations.

In particular, spherical plain bearings using composite bearing materials have required detail changes and adjustments to design and construction to cater for advances in composite material technology.

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HUNGER GE 125 BNW - A
HUNGER GE 80
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HUNGER GE 30 HW - A

# 1. Product range spherical plain bearings

| Design | Type | Nominal size bore inner diameter | Material combi-nations | Design features |
|---|---|---|---|---|
|  | GE...H-A | 20-300 | Steel/ Steel | Radial spherical plain bearings with outer ring split for mounting inner ring<br>- with single fractured outer ring or<br>- with outer ring fractured into two pieces held together by retaining rings or screws<br>bearings hardened and superfinished |
| | GE...H-A | 320-1000 | Steel/ Steel | Large diameter radial spherical plain bearings |
|  | GE...BN-A | 20-320 | | same as H-A-Type but with<br>- extended inner ring and turned shoulder<br>- inner ring width = bore diamter<br>installation into forks without spacer rings at full tilting angle |
|  | GE...B-A | 20-280 | Steel/ Steel | same as H-A-Type but with<br>- larger sphere diameter<br>- wider inner ring<br>- larger tilting angle<br>- and higher load carrying capacity |
|  | GE...HW-A | 20-300 | Steel/ PTFE-Foil | Maintenance-free radial spherical plain bearing<br>Outer ring fractured for mounting inner ring<br>- with single fractured outer ring or<br>- with outer ring fractured into two pieces held together by retaining rings or screws<br>bearings superfinished |
| | GE...HW-A | 320-1000 | Steel/ PTFE-Foil | Maintenance-free large diameter spherical plain bearings |
|  | GE...BNW-A | 20-320 | Steel/ PTFE-Foil | same as HW-A-Type but with<br>- extended inner ring and turned shoulder<br>- inner ring width = bore diameter<br>Installation into forks without spacer rings at full tilting angle |
|  | GE...BW-A | 20-280 | Steel/ PTFE-Foil | same as HW-A-Type but with<br>- larger sphere diameter<br>- wider inner ring<br>- larger tilting angle<br>- and higher load carrying capacity |

# 1. Product range spherical plain bearings

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| Recommended C/P-ratio AL.....CL | | Operating temperature short-term (max). | Applications | Page |
|---|---|---|---|---|
| 3...1 | 4...1,8 | -60...120°C<br>without seal (200°) | Robust bearings for difficult operating conditions, alternating loads and shock loading<br>e.g. construction equipment, double-acting hydraulic cylinders | 36 |
| 3...1,1 | 4...1,7 | -20...70°C | large spherical plain bearings for ship-building, crane boom support bearings | 38 |
| 3...1 | 4...1,8 | -60...120°C<br>without seal (200°) | same as H-A-Type particularly suitable for fork joints | 40 |
| 3...1 | 4...1,8 | -60...120°C<br>without seal (200°) | for large tilting angle<br>for applications with constructional limitations (housing diameter) higher load carrying capacity | 42 |
| o. c. | 3...1 | -60...120°C<br>without seal (130°) | spherical plain bearings for constant, shock-free load direction and low speed rotary/swivel movements<br>e.g. foundation and top bearings of tilting cylinders, lifting gears, elevating platforms | 44 |
| o. c. | 3...1,5 | -60...120°C (130°) | maintenance-free large spherical plain bearings for ship building and steel engineering with shock-fee loading and constant load direction | 46 |
| o. c. | 3...1 | -60...120°C<br>without seal (130°C) | application as for Type HW-A, in fork joints without spacer rings | 48 |
| o. c. | 3...1 | -60...120°C<br>without seal (130°C) | application as for Type HW-A, but at higher loads for the same outer diameter | 50 |

o. c. = on consultation, AL = alternating load, CL = constant load

# 1. Product range spherical plain bearings

| Design | Type | Nominal size bore inner diameter | Material combi-nations | Design features |
|---|---|---|---|---|
|  | GE...HS | 100-300 | Steel/ GFK +PTFE composite | Special radial spherical plain bearing for civil engineering, following initial greasing during assembly maintenance-free |
| | GE...HS | 320-1000 | Steel/ GFK +PTFE composite | As above |
|  | GE...HSS | 25-300 | Steel/ Steel | Angular contact spherical plain bearing to take radial and axial loads of approx. the same order |
|  | GE...HSW | 25-300 | Steel/ PTFE-Foil | maintenance-free angular contact spherical plain bearing to take radial and axial loads of approx. the same order |
|  | GE...HX | 20-360 | Steel/ Steel | Robust axial spherical plain bearings to withstand high shock loading |
|  | GE...HXW | 20-360 | Steel/ PTFE-Foil | Maintenance-free axial sperical plain bearings |

# 1. Product range spherical plain bearings

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| Recommended C/P-ratio AL.....CL | | Operating temperature short-term (max). | Applications | Page |
|---|---|---|---|---|
| o. c. | 2...1,2 | -30...90°C<br>(100°C) | Hydro cylinder bearings for civil engineering projects<br>e.g. gate bearings on river barrages and sluices | 52 |
| o. c. | 2...1,2 | -30...90°C<br>(100°C) | large spherical plain bearings for civil engineering<br>e.g. main bearing of radial lock gates | 54 |
| for constant loads only | 2...1,2 | -60...180°C<br>(200°C) | installation space and dimensions as for tapered roller bearings series 320 X DIN 720<br>Plain bearing alternative to shock-loaded tapered roller bearings with slow swivel movements under tolerance compensation (pivot angle approx. 1°) | 56 |
| for constant loads only | 2...1,2 | -60...100°C<br>(130°C) | as Type HSS in maintenance-free version for shock-free loading | 58 |
| for constant loads only | 2...1,2 | -60...180°C<br>(200°C) | Spherical plain bearing for high axial loads<br>e.g. as support bearing directly next to radial spherical plain bearings<br>as foundation bearing of support frames | 60 |
| for constant loads only | 2...1,2 | -60...100°C<br>(130°C) | as Type HX in maintenance-free version for shock-free loads | 62 |

o. c. = on consultation, AL = alternating load, CL = constant load

# 2. Product range rod ends

| Design | Type | Nominal size bore inner diameter | Material combi-nations | Spherical plain bearing type | Design features |
|---|---|---|---|---|---|
|  | GK...NKS | 20-120 | Steel/ Steel | GE...H-A | Rod ends in compact design with metric fine female clamping thread standard: right-handed |
|  | GK...SKS | 25-160 | Steel/ Steel | GE...H-A | Rod ends in heavy-duty version for higher static loads than type GK...NKS |
|  | GK...CKS | 20-100 | Steel/ Steel | GE...BN-A | Rod ends with dimensions according to DIN 24 338 for Hunger hydraulic cylinders according to DIN 24 554 (CETOP 160 bar) |
|  | GK...LS | 20-80 | Steel/ Steel | GE...H-A | Rod ends according to DIN 648, dimension series E (table 9) light duty type |
|  | GK...NK | 20-120 | Steel/ PTFE-Foil | GE...HW-A | Maintenance-free rod ends in compact design with metric fine female clamping thread standard: right-handed |
|  | GK...SK | 20-120 | Steel/ PTFE-Foil | GE...HW-A | Maintenance-free rod ends in heavy-duty design for higher static loads than type GK...NK |
|  | GK...CK | 20-120 | Steel/ PTFE-Foil | GE...BNW-A | Maintenance-free rod ends with dimensions according to DIN 24 338 |
|  | GK...L | 20-80 | Steel/ PTFE-Foil | GE...HW-A | Rod ends according to DIN 648, dimension series E (table 9) light duty type |

# 2. Product range rod ends

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| Lubrication | allowable nature of load | Applications | Page |
|---|---|---|---|
| by lubricating nipple | shock and alternating loads | for piston rod connection on double-acting hydraulic cylinders | 64 |
| by lubricating nipple | shock and alternating loads | for piston rod connection on double-acting hydraulic cylinders | 66 |
| by lubricating nipple | shock and alternating loads | for piston rod connection on double-acting hydraulic cylinders | 68 |
| by lubricating nipple | shock and alternating loads | for piston rod connection on double-acting hydraulic cylinders | 70 |
| maintenance-free | constant load direction<br>low shocks | for piston rod connection on double-acting hydraulic cylinders<br>e.g. plunger cylinders<br>lifting cylinders in elevating platforms | 72 |
| maintenance-free | constant load direction<br>low shocks | for piston rod connection in difficult operating conditions | 74 |
| maintenance-free | constant load direction<br>low shocks | for piston rod connection on<br>HUNGER hydraulic cylinders acc. to. DIN 24 554<br>(CETOP 160 bar) | 76 |
| maintenance-free | constant load direction<br>low shocks | for piston rod connection on single-acting hydraulic cylinders | 78 |

# 3. Bearing joint design for spherical plain bearings

Spherical plain bearings are precision components similar to roller bearings with nationally and internationally standardised installation dimensions, which allow full interchangeability of spherical plain bearings from different manufacturers.

This catalogue contains special bearing types like angular contact and axial spherical plain bearings together with the standardised types and special series for special applications which have made their way onto the market and must therefore be interchangeable.

## 3.1 Tolerances

The tolerances given in the following tables are valid for the spherical plain bearings stated in the catalogue. The radial splitting of outer rings, necessary for mounting, results in slight deviations in dimension and shape which, however, will be re-established to the original size after mounting into the respective housing bores.

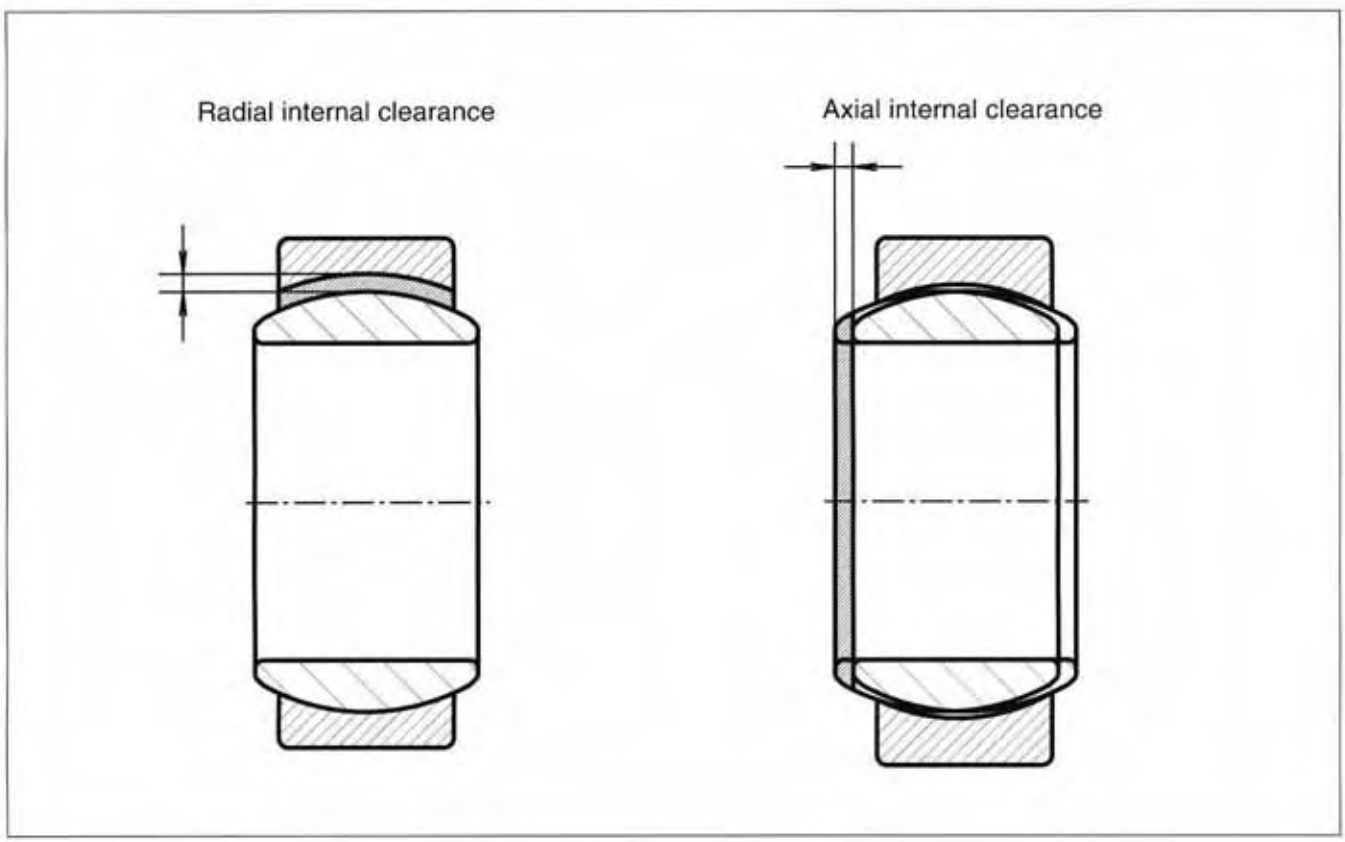
## 3.2 Chamfer dimensions, bearing housing

The bearing rings have to be supported in a solid and constant way over the whole sliding surface to ensure full utilisation of the load carrying capacity of spherical plain bearings. This demands accuracy requirements of the bearing seats in regard to not only the dimensional accuracy but also the geometrical tolerances of the stated chamfer dimensions. The safe fixing of the bearing rings must avoid „creeping" of the bearing rings in their seats, particularly with swivel and rotary movements. Loose bearing rings cause expensive damages to the bearings and the adjacent components.

## 3.3 Internal clearance

Steel/Steel radial spherical plain bearings are manufactured with a defined internal clearance. Under normal operating conditions and in combination with the recommended housings and shaft tolerances an optimum operating clearance is achieved. For tighter fits and large temperature differences the internal clearance may have to be adjusted.

Figure 1



## 3.4 Radial Fixing

The interference fit in the housing and on the shaft is achieved by the selection of suitable fits. The shaft and housing for heavily loaded spherical plain bearings should therefore be checked for sufficient dimensional stability and stiffness.

**Fits/interference fit** Table 1

| Type | Housing | Shaft |
|---|---|---|
| Radial spherical plain bearing Steel/Steel GE...H-A, GE...B-A equiring maintenance | M7 | m6 |
| Radial spherical plain bearing Steel/Steel GE...BN-A requiring maintenance | M7 | r6 |
| Radial spherical plain bearing Steel/PTFE-Foil, GE...HW-A, GE...BW-A<br>Radial spherical plain bearing Steel/GFK+PTFE GE...HS d < 320 mm | K7 | j6 |
| Radial spherical plain bearing Steel/PTFE-Foil, GE...BNW-A, maintenance-free | K7 | p6 |
| Radial spherical plain bearing Steel/GFK+PTFE d ≥ 320 mm | J7 | j6 |
| Angular contact spherical plain bearing Steel/Steel requiring maintenance | M7 | n6 |
| Angular contact spherical plain bearing Steel/PTFE-Foil maintenance-free | K7 | m6 |
| Axial spherical plain bearing Steel/Steel requiring maintenance | M7 | n6 |
| Axial spherical plain bearing Steel/PTFE-Foil maintenance-free | J7 | m6 |

## 3.5 Axial Fixing

Spherical plain bearings with axially split outer ring can be fixed sufficiently at low axial loads with suitable circlips, e.g. according to DIN 471 and DIN 472. This axial fixing of the outer ring is mainly used with rod ends.

The following fits are recommended if, for mounting reasons, tight fits are not feasible or an axial displacement is necessary in case of nonlocating bearings:

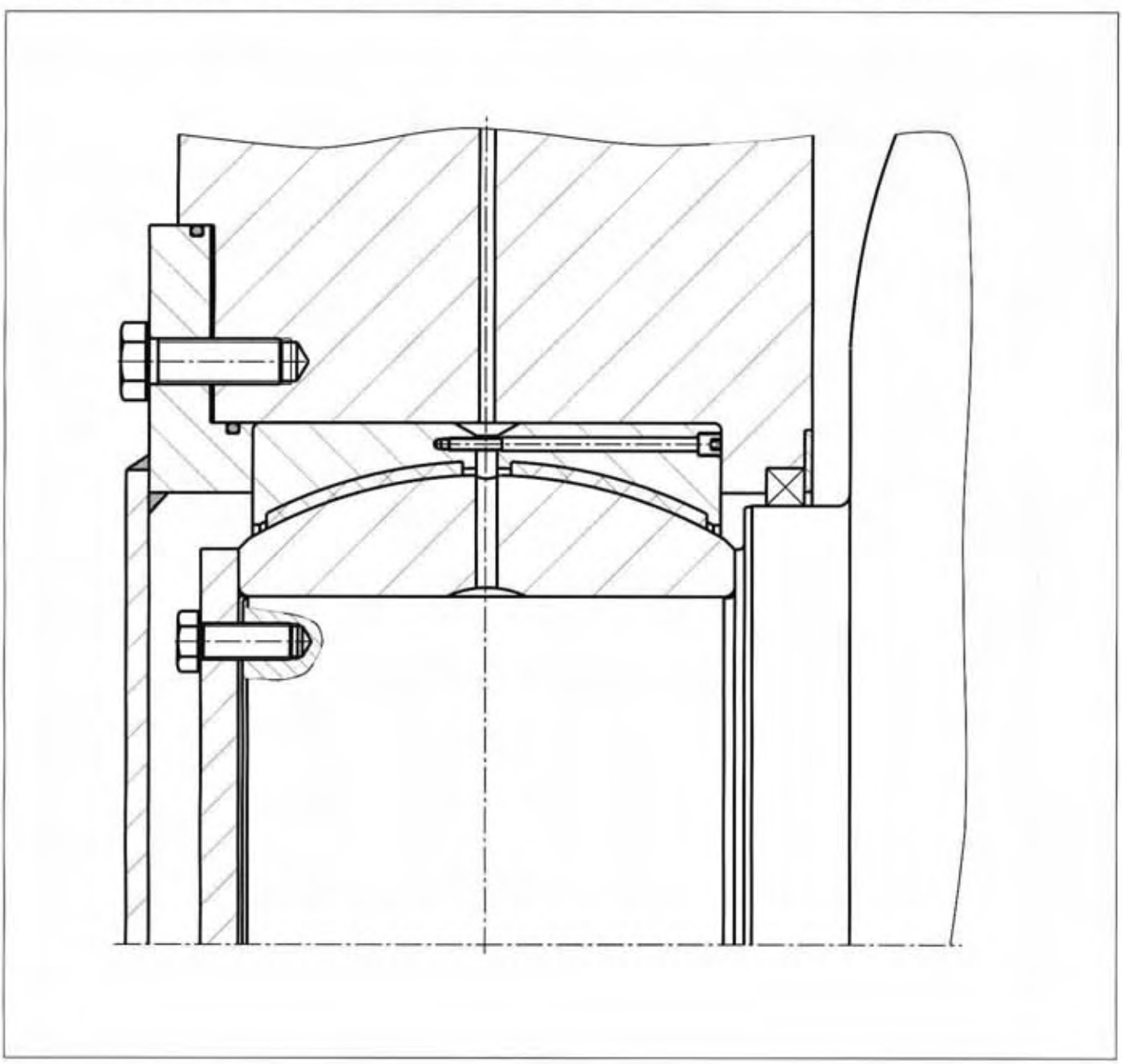
**Fits/close sliding fit/non-locating bearing** Table 2

| Type | Housing | Shaft |
|---|---|---|
| Radial spherical plain bearing Steel/Steel requiring maintenance | J7 | j6 |
| Radial spherical plain bearing d < 320 with axial fixing after fitting | H7 | h6 |
| Large radial spherical plain bearing d ≥ 320 with axial fixing after fitting | G7 | g7 |

The axial fixing is important for the safe operation of **large diameter spherical plain bearings with split outer rings.** The connecting screws in the outer ring are sized only for the self-locking of the bearing during transport and mounting. The expanding effect on the outer ring halves resulting from radial forces must be avoided by suitable bearing housings with axial fixing.

Such a fixing guarantees an interference seat of the bearing rings even with close sliding fits.

Figure 2 Axial fixing of a spherical plain bearing for civil engineering with proper mounting fits



# 4. Technical features of spherical plain bearings

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## 4.1 Sliding contact surface

The sliding contact surfaces are of essential importance for tribological conditions in spherical plain bearings. These conditions are influenced by wear resistance, friction resistance, thermal behaviour, sliding velocity, fatigue resistance, ductility, dirt tolerance and corrosion resistance of the sliding partners.

As a special version of sliding bearings the spherical plain bearing offers multiaxial movement by the spherical form of the sliding surfaces, but have basically the same tribological conditions. Due to the normally low sliding velocities in spherical plain bearings caused by alignment or rotating movements a hydro-dynamical sliding condition is not to be expected, even when lubricated.

In many applications lubrication by liquid and solid lubricants is not possible and should not be carried out. With maintenance-free bearings which can be operated without external lubrication, one sliding surface consists of a composite material with integrated lubricant. The condition prevailing in the bearing is then in between dry and lubricated friction.

Under such conditions the selection of the materials is of particular importance.

Metallic materials like fine-grained structural steel, rolling bearing steel, high-alloy high-temperature steel and stainless steel are used for our spherical plain bearings. The sliding surfaces are super-finished, hard-chromium plated, nitrided, carbonised or ceramic coated and polished to a high surface finish. Composite materials used as mating surfaces include our metal fabric reinforced, patented PTFE foil or glass fibre reinforced plastic layers.

## 4.2 Construction types

Our standard spherical plain bearings in Steel/Steel versions, type GE...H-A/GE...B-A/GE...BN-A and the maintenance-free types GE...HW-A/GE...BW-A/GE...BNW-A are dimensionally to the spherical plain bearing standards DIN 648 „spherical plain bearings", DIN 24 338 „Rod ends" and to ISO 6982. Among the radial spherical plain bearings the series GE...BW or GE...BW-A are distinguished by larger tilting angles for use in special applications.

Our angular contact spherical plain bearings type GE...HSS and the maintenance-free series GE...HSW are particularly suitable for bearing joints with approx. equal combined radial and axial loading.

With mainly axial acting loads our spherical plain bearings of the series GE...HX and GE...HXW should be used.

## 4.3 Permissible operating temperatures

The permissible operating temperature depends on the materials used for the sealing rings and on the sliding contact surface materials. The materials used for our spherical plain bearings are suitable for a continuous temperature of 120°C (393 K).

Higher operating temperatures require special sealing elements and high-temperature/high-alloy steels for the sphere and the outer ring of the bearing.

## 4.4 Sealing

In order to prevent entrance of moisture and dirt our radial spherical plain bearings are generally equipped with elastic sealing rings with contoured sealing faces to give optimal sealing effect onto the bearing sphere. As maintenance-free spherical plain bearings are particularly sensitive to foreign particles and dirt, the sealing rings play a very important role.

For particularly harsh application conditions we offer special sealing solutions including fully encapsulated spherical plain bearing arrangements.

## 4.5 Load carrying capacity – load ratings

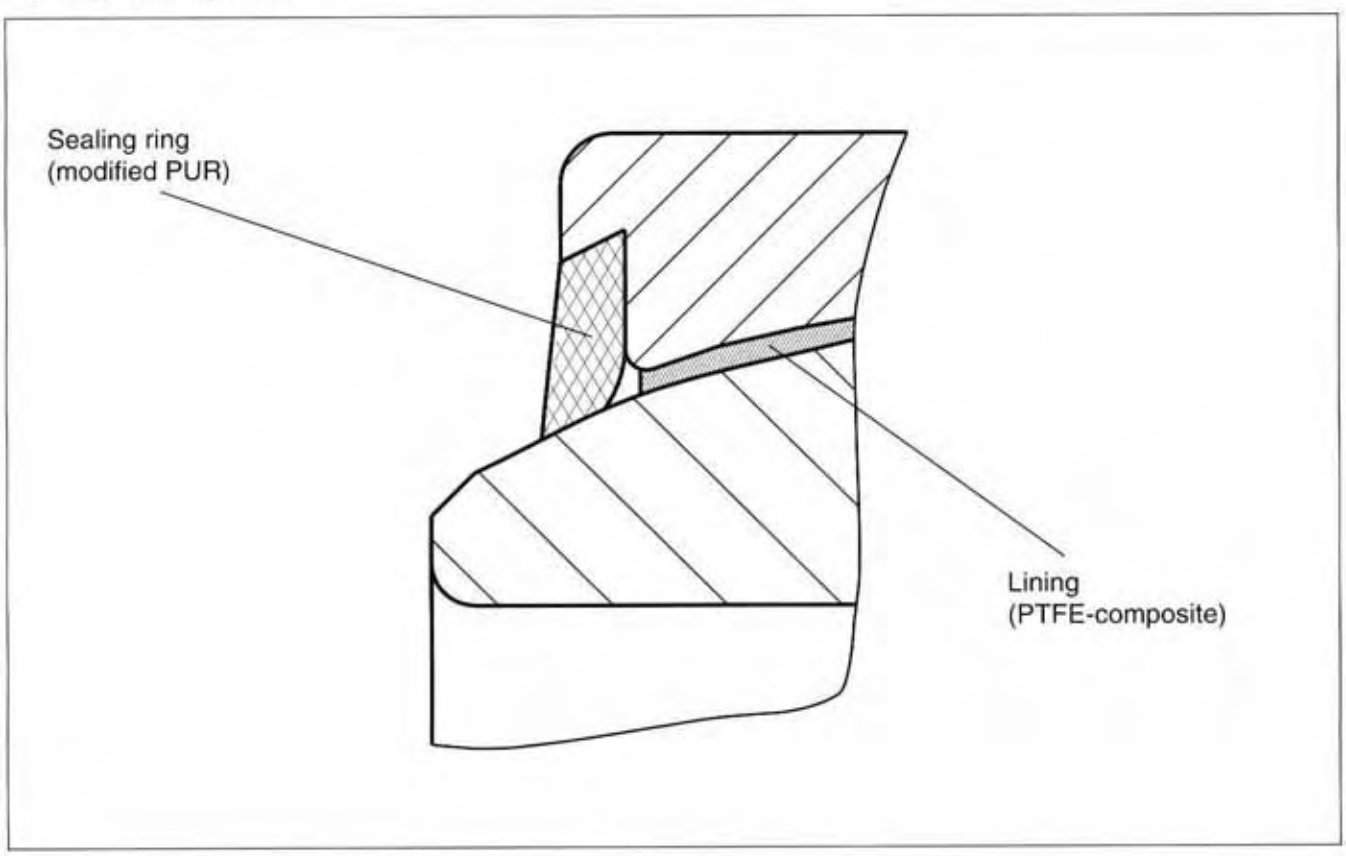
The stated load ratings are critical for the calculation and selection of spherical plain bearings.

The static load rating represents the maximum load that a spherical plain bearing is able to withstand without damage and permanent deformation when stationary and during minimal alignment movement (e.g. caused by thermal expansion).

The dynamic load rating is the maximum permissible bearing load of dynamically loaded spherical plain bearings, effective during tilting, swivelling or rotating movements. The service life is influenced by the ratio between dynamic load rating and actual dynamic load. Sufficient service life will be achieved in many application cases if the full load carrying capacity is used. In certain application cases, e.g. the series GE...HS for civil engineering projects where service life requirements of several decades are required, adjusted dynamic load ratings are used which must not be exceeded especially when considering difficult operating conditions (salt water, ice).

A precondition of bearing load ratings is a constant load, that is to say a load that remains unchanged in magnitude and direction, which acts ideally (i.e. with radial spherical plain bearings purely radially, with axial spherical plain bearings purely axially). Since in practice the spherical plain bearing is often subjected simultaneously to a combination of axial and radial loads, the equivalent dynamic bearing load has to be calculated as a comparative value.

Figure 3: Sealing detail



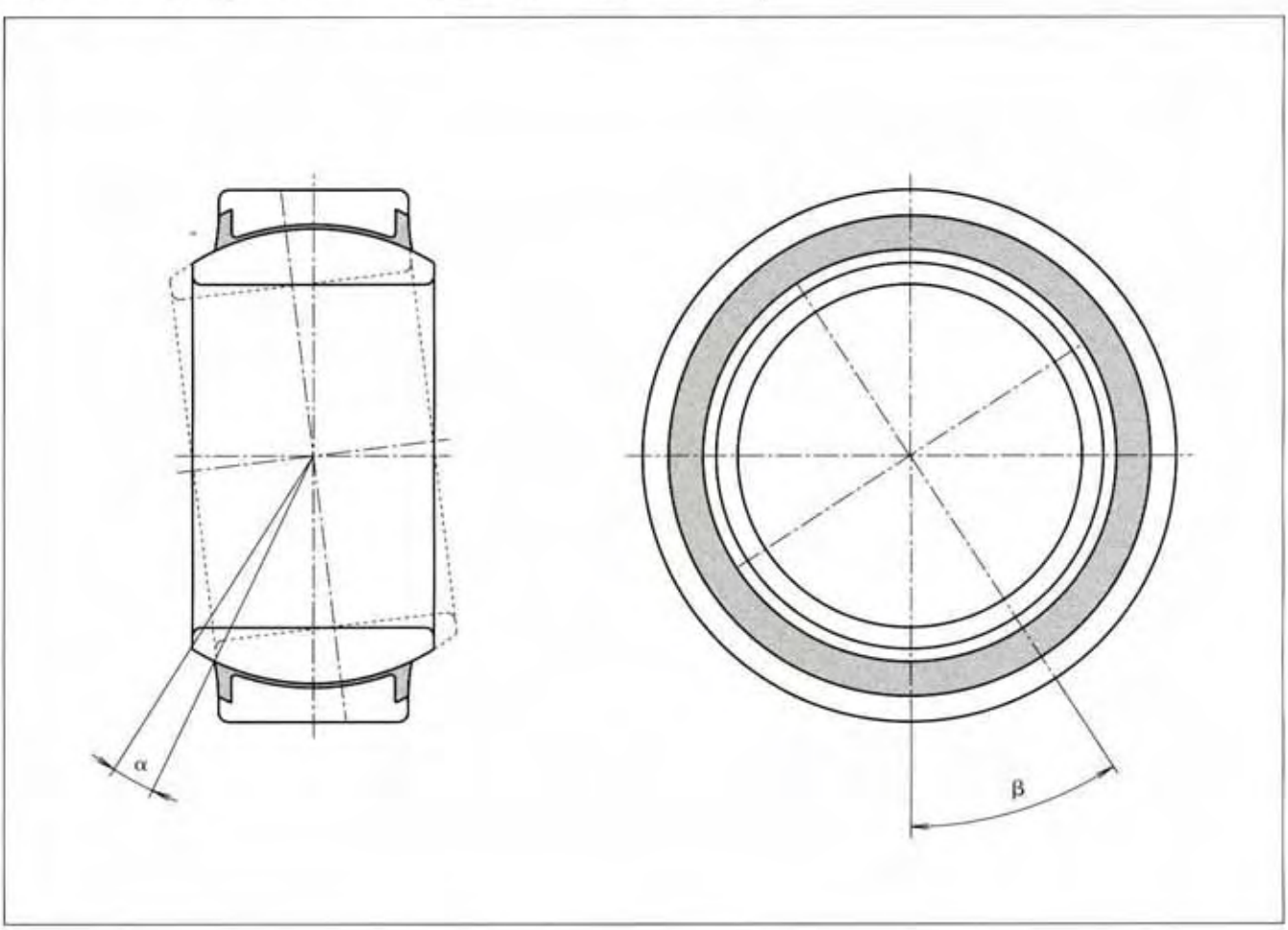
## 4.6 Bearing movement – oscillation

Spherical plain bearings are often used to transfer high loads under slow swivel movements. The swivel movement repeats continuously and leads to an oscillating movement. The angle in the plane parallel to the axis of symmetry is called the tilting angle and that in the vertical plane is called the swivel angle.

When the angle amplitude is given (e.g. ±7° from mean position) the swivel angle will be double the given amplitude. The possible tilting angle of a spherical plain bearing is always stated as angle amplitude in catalogues and standards.

Oscillation is a movement cycle from end position 1 to end position 2 and back to end position 1. The total sliding distance within the bearing corresponds to twice the swivel angle or four times the angle amplitude. A swivel angle of 180° or an angle amplitude of ±90° should be used for a slow rotational movement.

Figure 4: Tilting angle $\alpha$ and swivel angle $\beta$ of spherical plain bearings



# 5. Fitting and removal of spherical plain bearings

High-quality manufacture and proper installation of spherical plain bearings prevents damage and guarantees long service-life. Premature bearing failure can often be traced back to improper fitting. If non-self-locking bearings like axial and angular contact spherical plain bearings are disassembled during fitting, any contamination or damage of the sliding surfaces must be avoided.

## 5.1 Fitting

Exact concentric alignment of the spherical plain bearing is the basic requirement for proper fitting as well as clean bearing seats. Lead chamfers of approx. 15° at the ends of the shaft and the housing on the assembly side are proven to be of assistance together with the radius at the bearing rings.
With tight fits the assembly surfaces can be lightly oiled. Maintenance-free bearings, however, should wherever possible be mounted dry. The split joints of the outer rings should be positioned at 90° to the main load direction during fitting.
For the transfer of fitting forces a fitting sleeve or a piece of tube should be used. Combining this with a hydraulic press as a force generator will ensure gentle fitting and proper seating of the spherical plain bearing.

The fitting or removal forces must not be directed through the bearing since otherwise, due to the internal geometry, additional expanding forces will occur and cause jamming of the spherical plain bearing.
Lifting slings according to DIN 61360 should be used for the handling and transport of large spherical plain bearings. The eye bolts supplied with these bearings can be fitted safely into the threaded holes in the side faces of the outer rings.
If fitted in vertical position one loop of the lifting sling can be put against the bearing surface as the bearing is lifted in front of the bore or shaft. During the fitting the self weight of the bearing should be supported by the lifting arrangement as long as possible.

## 5.2 Removal

It is recommended that suitable provisions for removal are made in the design of the bearing arrangement. Threaded holes for ejection bolts or recesses in the shaft for the insertion of a retraction tool will facilitate the removal of the spherical plain bearing even after long operating periods.

Figure 5 Lead chamfers

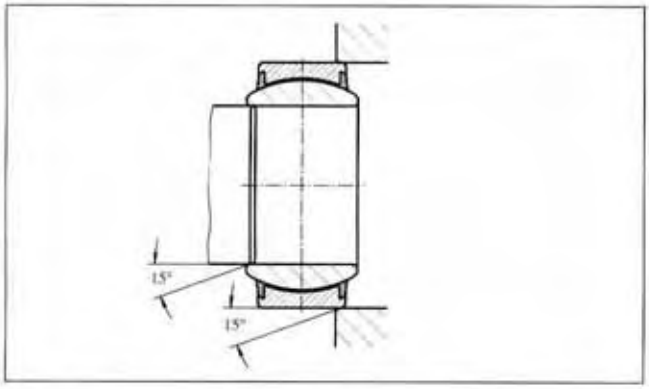



Figure 6 bearing fitting; jacking screw

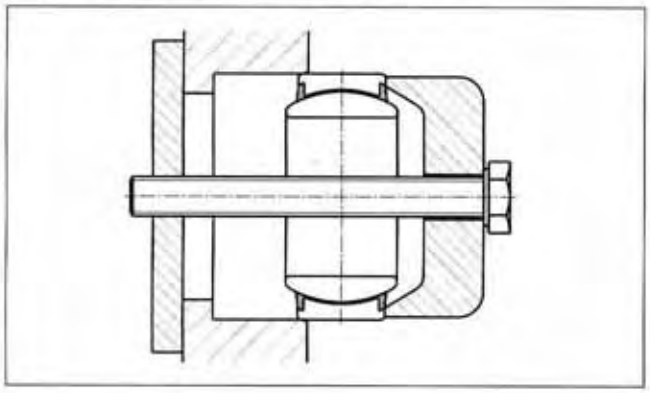


Figure 7 Simultaneous fitting into shaft and housing

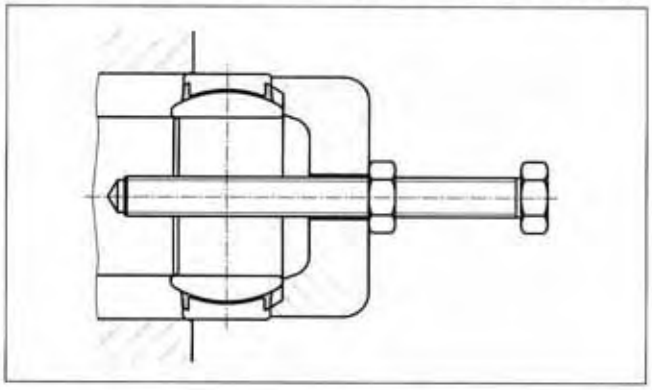
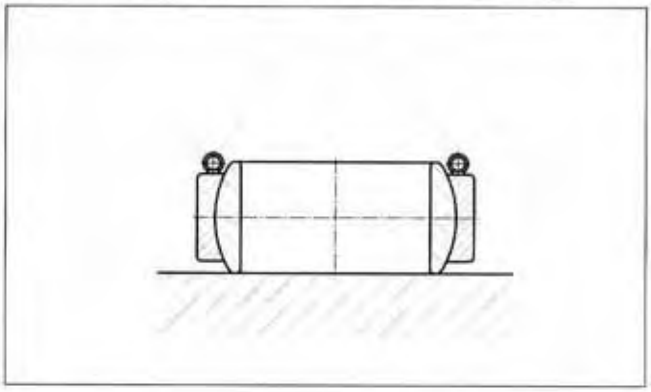


Figure 8 Lifting arrangement for the fitting of large bearings



# 6. Maintenance of spherical plain bearings

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## 6.1 Lubricants

We recommend the use of commercially available lithium base greases with EP and solid lubricant additives for normal applications of spherical plain bearings.

Experience has shown that the choice of the lubricant depends on the particular application conditions.

A suitable lubricant can be selected for the particular application cases in co-operation with recognised lubricant manufacturers on the basis of the following criterions:

bearing load/surface contact pressure
sliding conditions
maintenance intervals
required service life
treatment of the sliding surfaces
sealing of the bearing joint
environmental conditions

## 6.2 Initial greasing

**Steel/Steel spherical plain bearings requiring maintenance**

Initial greasing is the first greasing after fitting. Although our Steel/Steel spherical plain bearings are already greased during assembly at our works, initial greasing is required for optimal distribution of the lubricant and to fill the lubrication channels and the installation space completely with lubricant.

**Maintenance-free spherical plain bearings**

**self-lubricating sliding contact surface Steel/PTFE**
The self-lubricating effect is the transfer of PTFE particles from the outer ring bearing foil to the bearing sphere. Particularly during the running-in phase this effect creates smooth surfaces on the sphere and ensures long operating life. Relubrication would impair or eliminate this effect due to insufficient adhesion of the PTFE particles to the sphere surface.

**self-lubricating sliding contact surface Steel/GFK + PTFE**
With this sliding contact surface the particle transfer effect is limited due to the smaller concentration of PTFE in the bearing shell. The steel/plastic sliding contact surface therefore has to be supported by a non-ageing lubricant. To prevent corrosion it is important that the bearing is fully sealed and the installation space is completely filled with lubricant prior to use of the bearing.

## 6.3 Relubrication

**Steel/Steel spherical plain bearings requiring maintenance**

The spherical plain bearing is flushed out by relubrication. Lubricant residues, abrasion products and impurities are forced out. The grease deposit on the bearing gap is essential to support the sealing effect.

The maintenance or relubrication interval depends on the operating conditions, environmental conditions and lubricant ageing (see maintenance frequency, service life Steel/Steel spherical plain bearings)

The lubricant quantity for relubrication has to be calculated accurately so that all lubricating channels/pockets are completely filled with new lubricant. If relubrication is done by hand this has to be continued until the new lubricant is visually expelled out of the bearing joint.

# 7. Frictional behaviour and wear

Frictional behaviour, frictional resistance and wear of a spherical plain bearing depend mainly on the surface pressure, sliding velocity, surface temperature and type of load as well as the sliding contact surface combination.

The frictional torque of spherical plain bearings can be determined by using the following formula:

$$M_r = 0{,}5 \cdot 10^{-3} \cdot \mu \cdot P \cdot d_k \ [Nm] \qquad (1)$$

| | | |
|---|---|---|
| Mr | frictional torque of bearing | [Nm] |
| $\mu$ | coefficient of friction of the sliding surfaces material combination | |
| P | equivalent dynamic bearing load | [kN] |
| $d_k$ | sphere diameter | [mm] see dimension table |
| | for radial spherical plain bearings: $d_k$ | |
| | for angular contact spherical plain bearings: 0,9 $d_k$ | |
| | for axial spherical plain bearings: 0,7 $d_k$ | |

**Coefficient of friction for sliding contact surfaces**

| Sliding contact surface | coefficient of friction $\mu$ |
|---|---|
| Steel/Steel | 0,08...0,22 |
| Steel/Bronze, Brass | 0,10...0,25 |
| Hard chromium steel/composite material | 0,05...0,20 |
| Steel/PTFE-Foil | 0,05...0,15 |
| Hard chromium steel/PTFE-fabric | 0,03...0,15 |
| Hard chromium steel/GFK+PTFE | 0,08...0,12 |

Table 3

Consideration should be given to the fact that frictional behaviour varies during the operating life of a spherical plain bearing. At the beginning of its operating life, during the running in phase, mid-range coefficients of friction should be used, which may then reduce to the lowest values with well run-in bearings. At the end of its operating life the sliding contact surfaces will be worn out to such an extent that maximum coefficients of friction will result. Such values should always be used when designing static linkings and when calculating the required drive power for rotating and swivel movements.

# 8. Calculation of the bearing size

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**General**
The operating life calculation tries to consider a variety of influencing factors. In practice, however, there are additional contributing factors which cannot be assessed exactly but which may lead to a deviation in service life. A useful service life calculation can be done using appropriate calculation programmes. The form on page 24 lists the operating life determining factors for a spherical plain bearing. (Copy, fill in and return to your HUNGER representative, if correct selection and an offer is required).

Energy conversion, specific surface pressure, velocity and the total sliding distance are important for the use of a spherical plain bearing apart from the main selection criteria like dimensions and load ratings.

## 8.1 Equivalent dynamic bearing load

If magnitude and direction of bearing load do not vary during operation and act ideally, i.e. purely radially on radial and purely axially on axial spherical plain bearings, their values can be put directly into the formula for the operating life as bearing load P.

In any other case the equivalent bearing load must be determined in accordance with the following formula.

### 8.1.1 Combined radial and axial constant bearing loads

$$P = X \cdot F_R \quad [kN]$$ for radial and angular contact spherical plain bearings (2)

$$P = Y \cdot F_A \quad [kN]$$ for axial spherical plain bearings (3)

| | | |
|---|---|---|
| P | equivalent dynamic bearing load | [kN] |
| X | resultant factor | |
| $F_R$ | radial load | [kN] |
| Y | resultant factor | |
| $F_A$ | axial load | [kN] |

Varying radial or axial loads are first summarised as a „constant" average value and the equivalent bearing load is then determined by above formula.

In order to evaluate the load carrying capacity of the spherical plain bearing (specific bearing load) the maximum bearing loads have to be taken as P.

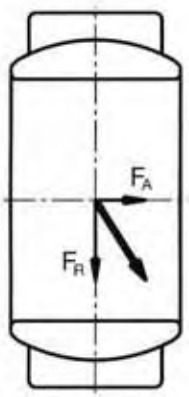



Figure 9 Radial spherical plain bearing

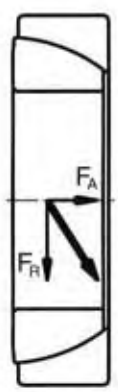



Figure 10 Angular contact spherical plain bearing

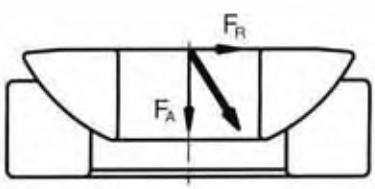
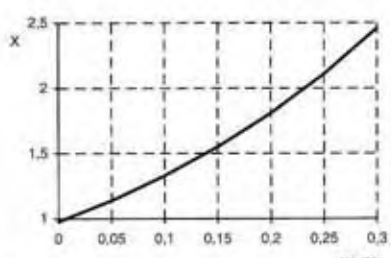
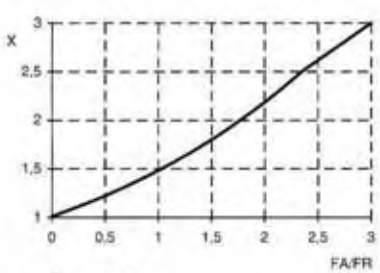


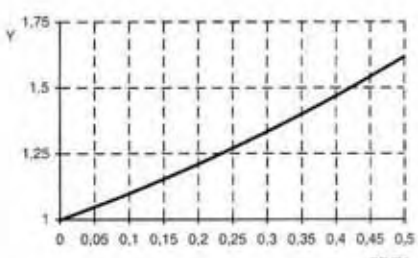

Figure 11
Axial spherical plain bearing




Graph 1
resultant factor X for
radial spherical plain bearings




Graph 2
resultant factor X for angular
contact spherical plain bearings

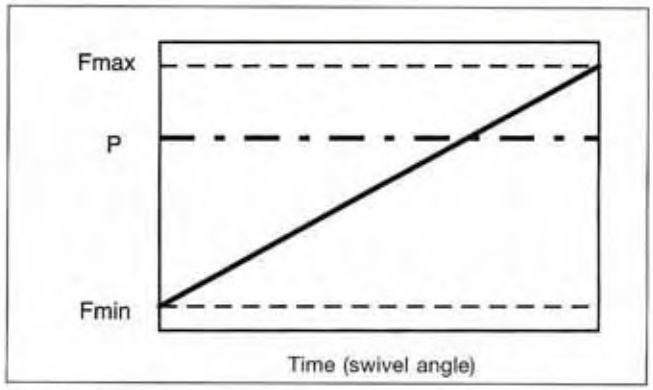



Graph 3
resultant factor Y for
axial spherical plain bearings

### 8.1.2 Linear varying load during swivelling or tilting movement:

$$P = \sqrt{\frac{(F_{max})^2 + (F_{min})^2}{2}} \text{ [kN]} \quad (4)$$

| | | |
|---|---|---|
| P | equivalent dynamic bearing load | [kN] |
| $F_{max}$ | maximum bearing load | [kN] |
| $F_{min}$ | minimum bearing load | [kN] |

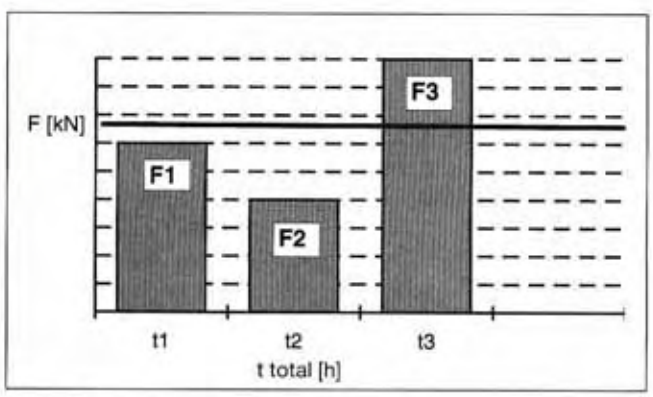


Graph 4

### 8.1.3 Operating life under varying load duty (5)

$$L_h = \frac{1}{\frac{t_1}{\sum t \cdot L_{h1}} + \frac{t_2}{\sum t \cdot L_{h2}} + \frac{t_3}{\sum t \cdot L_{h3}} + \frac{t_n}{\sum t \cdot L_{hn}}} \text{ [h]}$$

| | | |
|---|---|---|
| $L_h$ | total nominal operating life | [h] |
| $t_1$; $t_2$ | proportional operating time in hours or as percentage | |
| $\Sigma t$ | Total operating time in hours or as percentage | |
| $L_{h1}$; $L_{h2}$ | Nominal life of the proportional operating periods | [h] |



Graph 5

## 8.2 Specific bearing load

The actual bearing load of spherical sliding surfaces in spherical plain bearings is difficult to determine and depends on the particular application conditions.

By using a material-related specific bearing load, necessary for a long service life, the load carrying capacity or load ratings of a spherical plain bearing can be determined with the selected sliding surface material combination.

Table 4

| sliding contact surface | specific contact pressure parameter K |
|---|---|
| Steel/Steel | 100 N/mm² |
| Steel/Bronze | 50 N/mm² |
| Steel/Brass | 50 N/mm² |
| Steel/PTFE-Foil | 100 N/mm² |
| Hard chromium steel/PTFE-composite material | 100 N/mm² |
| Hard chromium steel/PTFE-fabric | 150 N/mm² |

$$p = K \cdot \frac{P}{C} \quad [N/mm^2] \qquad (6)$$

| | | |
|---|---|---|
| p | specific bearing load | [N/mm²] |
| K | specific contact pressure parameter of the sliding contact surface | [N/mm²] |
| P | equivalent dynamic bearing load | [kN] |
| C | dynamic load rating of the spherical plain bearing see dimension table | [kN] |

In case of varying loads the maximum values of P must not exceed the load rating C.

## 8.3 Mean sliding velocity

$$v = 2{,}91 \cdot 10^{-4} \cdot d_k \cdot \beta \cdot f \quad \left[\frac{mm}{s}\right] \qquad (7)$$

| | | |
|---|---|---|
| v | mean sliding velocity | [mm/s] |
| $d_k$ | sphere diameter see dimension table | [mm] |
| | with radial spherical plain bearings: | dk |
| | with angular contact spherical plain bearings: | 0,9 dk |
| | with axial spherical plain bearings: | 0,7 dk |
| β | swivel angle | [degree] |
| f | swivel frequency | [1/min] |

If during the course of swivel movement a simultaneous tilting occurs with a tilting angle $\alpha > 0{,}2\ \beta$ both movements are to be added together to give a total swivel angle β1.

$$\beta_1 = \sqrt{\beta^2 + \left(\alpha_1' + \alpha_2'\right)^2} \quad [degree] \qquad (8)$$

| | | |
|---|---|---|
| $\alpha'$ | tilting angle amplitude | [degree] |

With intermittent operation the swivel angle is mostly given in time. In this case the mean sliding velocity is calculated as follows:

$$v = \frac{\pi \cdot d_k}{360°} \cdot \frac{\varphi}{t} \quad \left[\frac{mm}{s}\right] \qquad (9)$$

| | | |
|---|---|---|
| v | mean sliding velocity | [mm/s] |
| φ | double swivel angle (2 β) | [degree] |
| t | swivel angle time over the total swivel angle up to end position | [s] |

**p • v parameter**

The product p • v gives information about the energy conversion within the spherical plain bearing. Due to its dependence on the sliding contact surfaces and the different permissible p, v and p • v values of the individual material combinations, further calculations are required to determine appropriate bearing design and material combination.

# Questionnaire spherical plain bearings/rod ends

**Company:**
.....

Attention:
.....

Department:
.....

Tel/Fax:
.....

**1. Application:**

Machine/device:
.....
.....

Manufacturer:
.....

**2. Bearing situation**

**2.1. Installation space (if determined):**

Housing/bore Ø of the bearing location
Ø =.....mm

Pin/shaft Ø
Ø = mm

**2.2. Bearing load**

**Radial load** ❑ shock-free ❑ shock-loaded
❑ constant
❑ varying by load influences
❑ varying during movement
❑ alternating (pull/push)

Radial load
min. Fr.....kN max. Fr.....kN

**Radial loading duty**
Load kN


Axial load
min. Fr.....kN max. Fr.....kN

**Axial load** ❑ shock-free ❑ shock-loaded
❑ constant
❑ varying by load influences
❑ varying during movement
❑ alternating (left/right)

**Axial loading duty**
Load kN


**2.3. Bearing movement**

❑ swivel movement
swivel angle: .....°(degree)
swivel amplitude: ±.....° (degree)

❑ tilting movement
tilting angle amplitude: ±.....°(degree)
tilting movement caused by:
❑ operation movement ❑ fitting, removal
❑ thermal expansion ❑ tolerance expansion

**2.4. Operating parameters**

❑ continuous operation; length of shift
..... h
number of movement cycles per hour/day/week
.....1/.....

❑ intermittent operation
Time for one movement cycle
.....
Time for one movement
.....
Number of movement cycles per hour/day/week
.....1/.....

**3. Bearing type (if already determined):**

❑ Radial bearing ❑ Axial bearing
❑ Bearing combination (radial + axial)

**4. Lubrication/maintenance**

❑ maintenance-free, required
❑ maintenance-free, desired
❑ relubrication possible (accessibility.....)
❑ lubrication required, dirt prevention
❑ automatic lubrication provided or existing
❑ lubrication by hand

**5. Environment conditions**

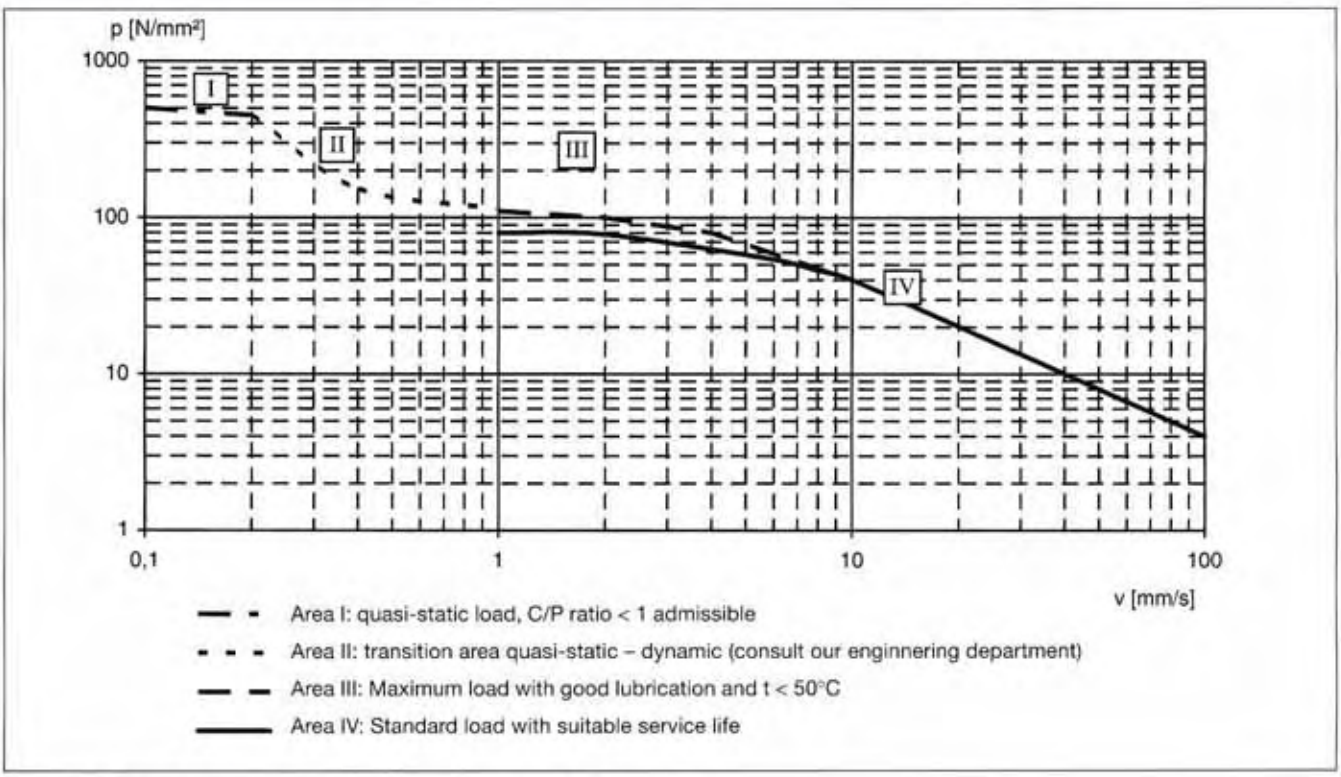
❑ environment temperature .....°C
❑ estimated ❑ measured

environment influences
❑ drinking water ❑ river water
❑ sea and brackish water ❑ ice
❑ steam
❑ gases .....
❑ acids/solutions
❑ electrical flows ❑ magnetic fields
❑ dust ❑ sand, mud
❑ other .....

**6. Expected operating time .....h**

Remarks:
.....
.....
.....
.....

# 9. Operating life calculation for steel/steel spherical plain bearings requiring maintenance




Graph 6 p • v-parameter for material combination steel/steel

## 9.1 Operating life with initial lubrication without relubrication

$$L = 1{,}28 \cdot 10^7 \cdot f_{lr} \cdot f_t \cdot \frac{v^{0,5} \cdot \beta^{0,2}}{f_b \cdot (f_{lb} \cdot d_k)^{0,64}} \cdot \frac{C}{P} \quad \text{[Oscillations]} \qquad (10)$$

$$L_h = \frac{L}{f \cdot 60} \quad \text{[h]} \qquad (11)$$

| | | |
|---|---|---|
| L | operating life with initial lubrication | [Oscillations] |
| $L_h$ | operating life with initial lubrication | [h] |
| $f_{lr}$ | load direction factor | |
| $f_t$ | Temperature factor | t > 200°C high temperature materials/lubricants required |
| v | mean sliding velocity | [mm/s] |
| β | swivel angle | [degree] |
| C | dynamic load rating | [kN] |
| $f_b$ | contact pressure factor | |
| $f_{lb}$ | bearing type factor | |
| $d_k$ | sphere diameter | [mm] |
| P | equivalent bearing load | [kN] |

**Factors** Table 5

| Sliding contact surfaces | Load rating parameter K | Load direction factor $f_{lr}$ | | Temperature factor $f_t$ | | | | Contact pressure factor $f_b$ | | | Bearing type factor $f_{lb}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | constant load | alternating load | t≥150°C | t>150°C t≥180°C | t>180°C t≥200°C | t>200°C t≥250°C | p = 1-12,5 | p = 12,5-50 | p = 50-100 | Radial bearing | Angular contact bearing |
| Steel/Steel | 100 | 1 | 2 | 1 | 0,9 | 0,7 | - | 42 | $p^{1,48}$ | $p^{1,48}$ | 1 | 0,9 |
| St/Bronze St/brass | 50 | 1 | 2 | 1 | 0,9 | 0,8 | 0,5 | 4,6 | $p^{0,6}$ | - | - | - |

### 9.1.1 Maintenance interval

Number of oscillations between two maintenance intervals

$$W = W_h \cdot f \cdot 60 \quad \text{[Oscillations]} \tag{12}$$

condition: $W \leq 0{,}5 \bullet L$

| | | |
|---|---|---|
| W | Maintenance interval between two lubrications | [Oscillations] |
| $W_h$ | maintenance interval between two lubrications | [h] |
| | e.g. building machinery $W_h = 25...30$ | |
| | metallurgical industry $W_h = 16...25$ | |
| | civil engineering $W_h = 4000$ (1/2 year) | |
| f | swivel frequency | [1/min] |

### 9.1.2 Relubrication factor, depending on swivel angle

$$f_\beta = \beta \cdot 0{,}21 \cdot 0{,}66 \tag{13}$$

$\beta > 30° \Rightarrow$ use 30°

| | | |
|---|---|---|
| $f_\beta$ | relubrication factor, depending on swivel angle | |
| $\beta$ | swivel angle | [degree] |

### 9.1.3 Relubrication angle, depending on frequency

$$f_h = \left(\frac{L}{W} - 1\right) \cdot 0{,}121 + 1{,}28 \tag{14}$$

| | | |
|---|---|---|
| $f_h$ | relubrication factor, depending on frequency | |
| W | maintenance interval | [Oscillations] |

A maintenance frequency of $W_h > 35$ has no advantages with regard to operating life from the tribological view but may be useful to prevent contamination and corrosion.

## 9.2 Operating life with relubrication/ maintenance

$$L_N = L \cdot f_\beta \cdot f_h \quad \text{[Oscillations]} \tag{15}$$

$$L_{hN} = \frac{L_N}{f \cdot 60} \quad \text{[h]} \tag{16}$$

| | | |
|---|---|---|
| $L_N$ | operating life with periodical relubrication | [Oscillations] |
| L | operating life with initial lubrication | [Oscillations] |
| $f_\beta$ | relubrication factor, depending on swivel angle | |
| $f_h$ | relubrication factor, depending on frequency | |
| $L_{hN}$ | operating life with periodical relubrication | [h] |
| f | swivel frequency | [1/min] |

## 9.3 Calculation example: spherical plain bearings steel/steel, requiring maintenance

| | | | |
|---|---|---|---|
| Given: | Operating temperature | $t = -10°C$ up to $60°C$ | |
| | Alternating bearing load | $F_R = 60$ kN | $F_A = 15$ kN |
| | Swivel angle | $\beta = 40°$ | |
| | Swivel frequency | $f = 6\ min^{-1}$ | |
| | Maintenance interval | $W_h = 16$ hours | |
| | Pin diameter | $d = 80$ mm | |
| | **Bearing Type** | **Radial spherical plain bearing GE 80 H-A** | |
| | Dynamic load rating | $C = 400$ kN | |
| | Sphere diameter | $d_k = 105$ mm | |
| | Load direction factor | $F_{lr} = 2$ | |
| | Temperature factor | $f_t = 1$ | |
| | Bearing type factor | $f_{lb} = 1$ | |

**Equivalent dynamic bearing load**

$$P = X \cdot F_R \qquad \frac{F_A}{F_R} = \frac{15kN}{60kN} = 0{,}25$$

X from graph 1 $\Rightarrow 2{,}1$ (2)

$$P = 2{,}1 \cdot 60kN = 126kN$$

**Specific bearing load**

$$p = K \cdot \frac{P}{C}$$

K from table 4 $\Rightarrow 100\ N/mm^2$ (6)

$$p = 100 \cdot \frac{126kN}{400kN} = 31{,}5N/mm^2$$

**Mean sliding velocity**

$$v = 2{,}91 \cdot 10^{-4} \cdot d_k \cdot \beta \cdot f \qquad v = 2{,}91 \cdot 10^{-4} \cdot 105 \cdot 40 \cdot 6 = 7{,}33\ mm/s$$ (7)

**Operating life without relubrication** (10)

$$L = 1{,}28 \cdot 10^{+7} \cdot f_{lr} \cdot f_t \cdot \frac{v^{0,5} \cdot \beta^{0,2}}{f_b \cdot (f_{lb} \cdot d_k)^{0,64}} \cdot \frac{C}{P} \qquad L = 1{,}28 \cdot 10^{+7} \cdot 2 \cdot 1 \cdot \frac{7{,}33^{0,5} \cdot 40^{0,2}}{31{,}5^{1,48} \cdot (1 \cdot 105)^{0,64}} \cdot \frac{400}{126} = 141851\ Oscillations$$

**Maintenance interval between two lubrications**

$$W = W_h \cdot f \cdot 60 \qquad W = 16 \cdot 6 \cdot 60 = 5760\ Oscillations$$

condition: Lw ≤ 0,5L is fulfilled (12)

**Relubrication factor - depending on swivel angle**

$$f_\beta = \beta \cdot 0{,}21\text{-}0{,}66 \qquad f_\beta = 30 \cdot 0{,}21 \cdot 0{,}66 = 5{,}64$$

$\beta > 30° \Rightarrow$ use 30° (13)

**Relubrication factor - depending on frequency**

$$f_h = \left(\frac{L}{W} - 1\right) \cdot 0{,}121 + 1{,}28 \qquad f_h = \left(\frac{141851}{5760} - 1\right) \cdot 0{,}121 + 1{,}28 = 4{,}1$$ (14)

**Operating life with periodical relubrication**

$$L_N = L \cdot f_\beta \cdot f_h \qquad L_N = 141851 \cdot 5{,}64 \cdot 4{,}1 = 3280163\ Oscillations$$ (15)

**Operating life with periodical relubrication [h]**

$$L_{hN} = \frac{L_N}{f \cdot 60} = \frac{3280163}{6 \cdot 60}$$ (16)

$L_{hN} = 9112$ operating hours

# 10. Operating life calculation for maintenance-free spherical plain bearings Steel / PTFE

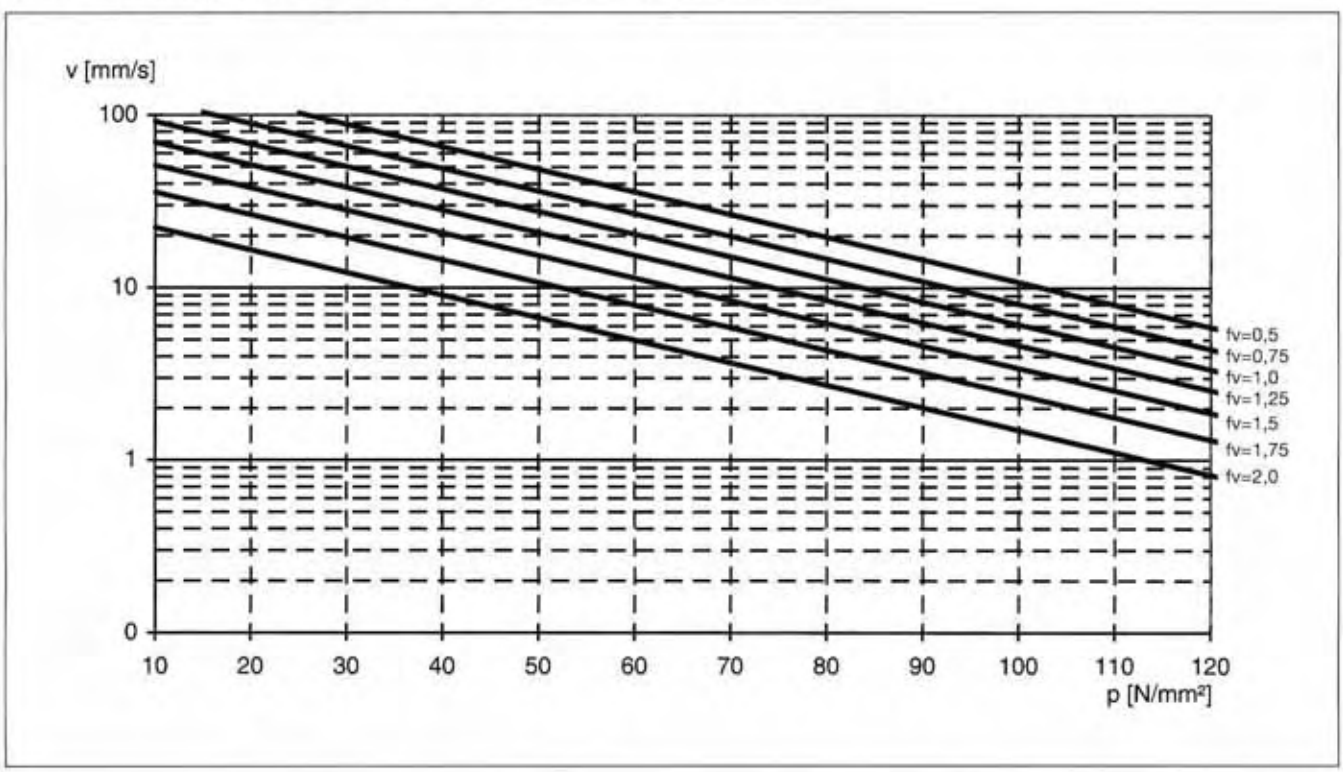
## 10.1 Operating life with constant load

$$L = f_t \cdot f_v \cdot \frac{s \cdot f}{v} \cdot 14 \quad \text{[Oscillations]} \tag{17}$$

$$L_h = \frac{L}{f \cdot 60} \quad \text{[h]} \tag{18}$$

| | | |
|---|---|---|
| L | Operating life with constant load | [oscillations] |
| $L_h$ | Operating life with constant load | [h] |
| $f_t$ | Temperature factor | |
| $f_v$ | Sliding velocity factor from graph 7 | |
| s | Sliding distance | [m] |
| f | Swivel frequency | [$min^{-1}$] |
| v | Mean sliding velocity | [mm/s] |

Graph 7 Sliding velocity factor fv
Normal operating range fv =1...2
Special operating range fv < 1 good heat emission required t < 50 °C



## 10.2 Operating life with alternating load (alternating load/pulsating load)

$$L_s = L \cdot f_{lf} \cdot f_{la} \quad \text{[Oscillations]} \tag{19}$$

$$f_{lf} = 0{,}433 - \frac{L_f \cdot p^{1,6}}{790{,}5} \tag{20}$$

$$L_f = \frac{1}{T} \ \text{[Hz]} \tag{21}$$

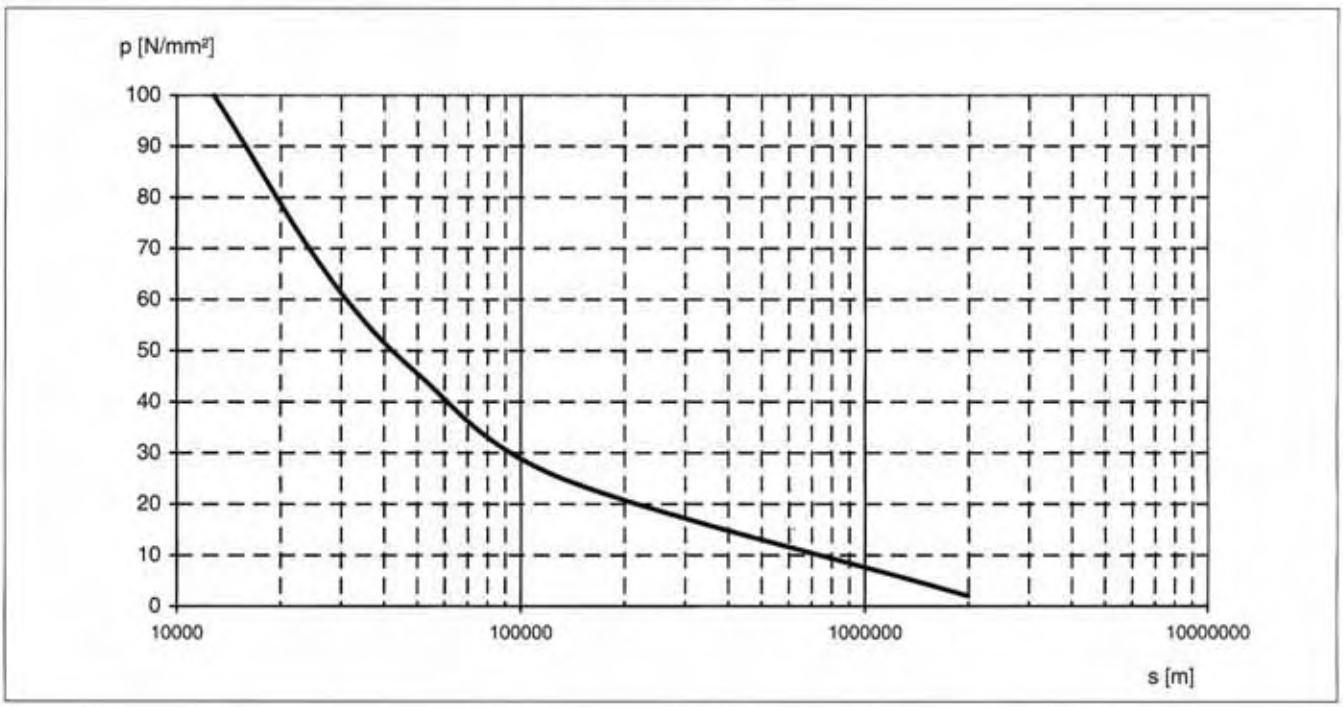
$$L_{hs} = \frac{L_s}{f \cdot 60} \ \text{[h]} \tag{22}$$

| | | |
|---|---|---|
| $L_s$ | Operating life with alternating load | [Oscillations] |
| $L$ | Operating life with constant load | [Oscillations] |
| $f_{lf}$ | Load frequency factor | |
| $f_{la}$ | Load type factor | |
| $L_f$ | Load frequency | [Hz] |
| $p$ | Specific bearing load | [N/mm²] |
| $T$ | Time period | [s] |
| $L_{hs}$ | Operating life with alternating load | [h] |
| $f$ | Swivel frequency | [1/min] |

**Factor** Table 6

| Material combination | | PTFE-Foil | |
|---|---|---|---|
| Contact pressure factor K N/mm² | | 100 | |
| Temperature factor $f_t$ | | -50...100° C | >100...150° C |
| | | 1 | 1,5 - 0,005·t |
| Load type factor $f_{la}$ | alternating load | 1 | |
| | dynamic load | 1,4 | |

graph 8 Sliding distance of material combination Steel/PTFE-Foil



## 10.3 Calculation example: spherical plain bearing Steel/PTFE-foil

| Given: | | |
|---|---|---|
| | Operating temperature | t = -10°C up to 60°C |
| | Constant bearing load | $F_{R\,max}$ = 300 kN |
| | | $F_{R\,min}$ = 15 kN |
| | Swivel angle | $\beta = 45°$ |
| | Swivel frequency | f = 6 $min^{-1}$ |
| | Load frequency | $L_f$ = 0,1 Hz |
| | **Bearing type** | **Radial bearing maintenance-free GE 120 HW-A** |
| | Dynamic load rating | C = 1340 kN |
| | Sphere diameter | $d_k$ = 160 mm |

**Equivalent dynamic bearing load**

$$P = \sqrt{\frac{(F_{Rmax})^2 + (F_{Rmin})^2}{2}} \qquad P = \sqrt{\frac{300^2 + 15^2}{2}} = 212{,}39 \text{ kN} \tag{4}$$

**Specific bearing load**

$$p = K \cdot \frac{P}{C} \qquad p = 100 \cdot \frac{212{,}39}{1340\text{kN}} = 15{,}85 \text{ N/mm}^2$$

K from table 4 $\Rightarrow$ 100 N/mm² (6)

**Mean sliding velocity**

$$v = 2{,}91 \cdot 10^{-4} \cdot d_k \cdot \beta \cdot f \qquad v = 2{,}91 \cdot 10^{-4} \cdot 160 \cdot 45 \cdot 6 = 12{,}5 \text{ mm/s} \tag{7}$$

**Operating life with constant load**

$$L = f_t \cdot f_v \cdot \frac{s \cdot f}{v} \cdot 14 \tag{17}$$

$$L = 1 \cdot 2 \cdot \frac{240000 \cdot 6}{12{,}5} \cdot 14 = 3225600 \text{ [Oscillations]}$$

$f_t$ from table 6 $\Rightarrow$ 1
fv from graph 7 $\Rightarrow$ 2
s from graph 8 $\Rightarrow$ 240000 m

**Operating life with alternating load**

$$L_s = L \cdot f_{lt} \cdot f_{la} = 3225600 \cdot 0{,}42 \cdot 1{,}4$$

$f_{la}$ from table 6 $\Rightarrow$ 1,0 (19)

**$L_s$ = 1 896 653 Oscillations**

$f_{lf}$ Load frequency factor

$$f_{lf} = 0{,}433 - \frac{L_f \cdot p^{1.6}}{790{,}5} = 0{,}433 - \frac{0{,}1 \cdot 15{,}85^{1.6}}{790{,}5} = 0{,}42 \tag{20}$$

$L_f$ Load frequency

$$L_f = \frac{1}{T}\ [\text{Hz}] = \frac{1}{10} = 0{,}1\ [\text{Hz}] \tag{21}$$

**Operating life with alternating load [h]**

$$L_{hs} = \frac{L_s}{f \cdot 60} = \frac{1896653}{6 \cdot 60} = 5268 \text{ operating hours} \tag{22}$$

# Special spherical plain bearing for civil engineering

HUNGER Maschinen

The HUNGER special spherical plain bearings type GE...HS are distinguished by particularly wide and compact design and fulfil the operation requirements for high axial and radial load rating and small mounting conditions.

The HS bearings allow compact design and maintenance-free operation and are an economically advantageous choice.

# 11. Rod Ends

**Hunger rod ends:**

**Steel/Steel rod ends:**

| | |
|---|---|
| Hydraulic rod ends | GK...NKS |
| Hydraulic rod ends heavy duty | GK...SKS |
| Hydraulic rod ends to Cetop dimensions | GK...CKS |
| DIN 648 light duty with internal thread | GK...LS |

**Maintenance-free Rod ends:**

| | |
|---|---|
| Hydraulic rod ends | GK...NK |
| Hydraulic rod ends heavy duty | GK...SK |
| Hydraulic rod ends to Cetop dimensions | GK...CK |
| DIN 648 light duty with internal thread | GK...L |

## 11.1 Design features of Rod ends

Hunger rod ends consist of a housing and a radial spherical plain bearing which is firmly seated and located in the housing bore. This ready to assemble design can be easily integrated into any connecting system by means of connecting threads.

They are available with right or left hand internal threads according to DIN 13. For special applications rod ends with welding shanks are available, particularly as head or rod end mountings for hydraulic cylinders. Hunger rod ends are available with steel/steel spherical plain bearings or with maintenance-free Steel/PTFE-foil bearings. The steel/steel rod ends are suitable for applications with high loads and alternating load direction due to their highly wear resistant sliding surfaces which give good emergency running properties. The maintenance-free rod ends are manufactured from modern materials and have only small frictional values due to their special sliding surfaces. They are mainly used for applications where high demands regarding operating life are required, especially with single acting loads.

Hunger hydraulic rod ends with steel/steel and steel/PTFE-foil bearings are generally offered with female mounting threads. The rod ends are made from spheroidal graphite cast iron GGG 40 and protected from corrosion by a preservative on the surfaces. Except of the series GK...L and GK...LS they have a slot in the shank which can be clamped firmly on the mating male thread by means of two hexagon socket screws. Optimum results are achieved if the rod end is screwed up to the thread shoulder beforehand. The spherical plain bearings used for these types are axially located in the housing bore by two circlips. Rod ends of the series GK...CKS and GK...CK were developed in collaboration with CETOP (European Oil Hydraulic and Pneumatic Committee) and conform to their recommendation RP 88H as well as to DIN 24338.

Hunger rod ends DIN 648 of the series GK...LS are made from spheroidal graphite cast iron GGG 40 and also protected from corrosion by a preservative on the surfaces. They are optionally available with right or left hand threads according to DIN 13. The spherical plain bearings used for this series are located axially in the housing bore by annular staking.

Maintenance-free steel/GFK+PTFE rod ends consist of a rod head and a spherical plain bearing with a maintenance free sliding surface of glass reinforced, PTFE filled plastic. The internal ring is made of rolling bearing steel, hardened and polished.

The dimensions of the rod ends conform to DIN 648 or ISO 6126.

## 11.2 Load ratings of rod ends

The load rating C given in the dimension tables for rod ends refers to the fitted spherical plain bearing and serves as a calculation parameter for the operating life calculation of the bearing itself.

If additional load components, apart from the alternating loads parallel to the shank axis, act on the bearing or perpendicular to the rod end shank axis, the equivalent bearing load has to be considered and additional bending stresses in the shank must be calculated.

The static load raring $C_0$, given in the dimension tables for rod ends, refers only to the load carrying capacity of the rod end housing and indicates the maximum permissible constant tensile load at approx. 83 % utilisation of the material yield strength in the most highly stressed cross section area.

## 11.3 Temperature application range of rod ends

Steel/steel rod ends have a permissible temperature application range between –50 and +300°C, however, the load carrying capacity will reduce at temperatures from +180°C.

The permissible temperature application range of maintenance-free steel/PTFE-foil rod ends lies between –30 and +100°C. It is determined by the sealing material (polyester elastomer).

Maintenance-free rod ends of the material combination steel/GFK+PTFE can be used for temperatures between –30 and +90°C, however, the load carrying capacity will reduce at temperatures from +50°C.

## 11.4 Maintenance of rod ends

Hunger rod ends with steel/steel spherical plain bearings are generally offered with relubrication facilities.

# Steel/Steel radial spherical plain bearings

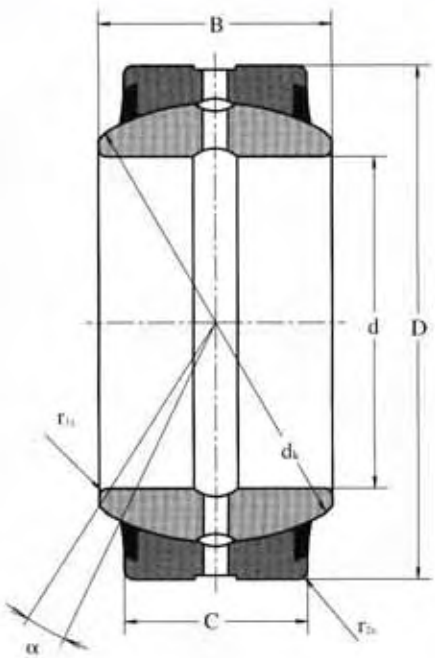
GE ... H-A

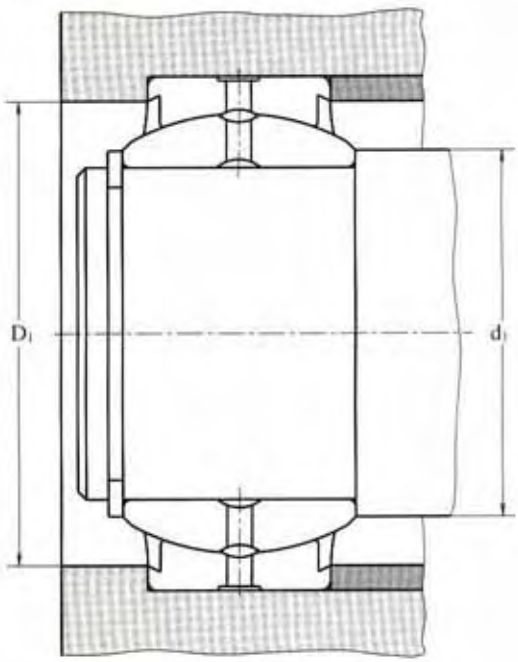
d = 20 ... 300 mm

Dimensions:
DIN 648, Dimension series E (table 1)

Order example for nominal diameter d = 140 mm **radial spherical plain bearing GE 140 H-A**

| Type | d | D | B | C | $d_k$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 20 H-A | 20 -0,010 | 35 -0,011 | 16 -0,12 | 12 -0,24 | 29 | 146 | 30 |
| GE 25 H-A | 25 -0,010 | 42 -0,011 | 20 -0,12 | 16 -0,24 | 35,5 | 240 | 48 |
| GE 30 H-A | 30 -0,010 | 47 -0,011 | 22 -0,12 | 18 -0,24 | 40,7 | 310 | 62 |
| GE 35 H-A | 35 -0,012 | 55 -0,013 | 25 -0,12 | 20 -0,30 | 47 | 400 | 80 |
| GE 40 H-A | 40 -0,012 | 62 -0,013 | 28 -0,12 | 22 -0,30 | 53 | 500 | 100 |
| GE 45 H-A | 45 -0,012 | 68 -0,013 | 32 -0,12 | 25 -0,30 | 60 | 640 | 127 |
| GE 50 H-A | 50 -0,012 | 75 -0,013 | 35 -0,12 | 28 -0,30 | 66 | 780 | 156 |
| GE 60 H-A | 60 -0,015 | 90 -0,015 | 44 -0,15 | 36 -0,40 | 80 | 1220 | 245 |
| GE 70 H-A | 70 -0,015 | 105 -0,015 | 49 -0,15 | 40 -0,40 | 92 | 1560 | 315 |
| GE 80 H-A | 80 -0,015 | 120 -0,015 | 55 -0,15 | 45 -0,40 | 105 | 2000 | 400 |
| GE 90 H-A | 90 -0,020 | 130 -0,018 | 60 -0,20 | 50 -0,50 | 115 | 2450 | 490 |
| GE 100 H-A | 100 -0,020 | 150 -0,018 | 70 -0,20 | 55 -0,50 | 130 | 3050 | 610 |
| GE 110 H-A | 110 -0,020 | 160 -0,025 | 70 -0,20 | 55 -0,50 | 140 | 3250 | 655 |
| GE 120 H-A | 120 -0,020 | 180 -0,025 | 85 -0,20 | 70 -0,50 | 160 | 4750 | 950 |
| GE 140 H-A | 140 -0,025 | 210 -0,030 | 90 -0,25 | 70 -0,60 | 180 | 5400 | 1080 |
| GE 160 H-A | 160 -0,025 | 230 -0,030 | 105 -0,25 | 80 -0,60 | 200 | 6800 | 1370 |
| GE 180 H-A | 180 -0,025 | 260 -0,035 | 105 -0,25 | 80 -0,70 | 225 | 7650 | 1530 |
| GE 200 H-A | 200 -0,030 | 290 -0,035 | 130 -0,30 | 100 -0,70 | 250 | 10600 | 2120 |
| GE 220 H-A | 220 -0,030 | 320 -0,040 | 135 -0,30 | 100 -0,80 | 275 | 11600 | 2320 |
| GE 240 H-A | 240 -0,030 | 340 -0,040 | 140 -0,30 | 100 -0,80 | 300 | 12700 | 2550 |
| GE 260 H-A | 260 -0,035 | 370 -0,040 | 150 -0,35 | 110 -0,80 | 325 | 15300 | 3050 |
| GE 280 H-A | 280 -0,035 | 400 -0,040 | 155 -0,35 | 120 -0,80 | 350 | 18000 | 3550 |
| GE 300 H-A | 300 -0,035 | 430 -0,045 | 165 -0,35 | 120 -0,90 | 375 | 19000 | 3800 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_1$ | $D_1$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|
| | ° | mm | | | | kg | |
| GE 20 H-A | 9 | 0,8 | 1,0 | 24 | 29 | 0,06 | 025 630 |
| GE 25 H-A | 7 | 0,8 | 1,0 | 29 | 34 | 0,10 | 025 631 |
| GE 30 H-A | 6 | 0,8 | 1,0 | 34 | 39 | 0,15 | 025 632 |
| GE 35 H-A | 6 | 1,0 | 1,2 | 39 | 45 | 0,22 | 025 633 |
| GE 40 H-A | 7 | 1,0 | 1,2 | 45 | 51 | 0,28 | 025 634 |
| GE 45 H-A | 7 | 1,0 | 1,2 | 50 | 58 | 0,37 | 025 635 |
| GE 50 H-A | 6 | 1,0 | 1,2 | 56 | 64 | 0,50 | 025 636 |
| GE 60 H-A | 6 | 1,2 | 1,5 | 66 | 75 | 0,90 | 025 637 |
| GE 70 H-A | 6 | 1,2 | 1,5 | 77 | 87 | 1,35 | 025 638 |
| GE 80 H-A | 6 | 1,2 | 1,5 | 89 | 100 | 2,1 | 025 639 |
| GE 90 H-A | 5 | 1,5 | 1,5 | 98 | 110 | 2,5 | 025 640 |
| GE 100 H-A | 7 | 1,5 | 1,5 | 109,5 | 124 | 4,4 | 025 641 |
| GE 110 H-A | 6 | 1,5 | 1,5 | 121 | 135 | 5,0 | 025 642 |
| GE 120 H-A | 6 | 1,5 | 1,5 | 135,5 | 156 | 8,1 | 025 643 |
| GE 140 H-A | 7 | 1,5 | 1,5 | 155,5 | 179 | 11,4 | 025 644 |
| GE 160 H-A | 8 | 1,5 | 1,5 | 170 | 196 | 14,4 | 025 645 |
| GE 180 H-A | 6 | 2,0 | 2,0 | 199 | 224 | 18,9 | 025 646 |
| GE 200 H-A | 7 | 2,0 | 2,0 | 213,5 | 245 | 28,1 | 025 647 |
| GE 220 H-A | 8 | 2,0 | 2,0 | 239,5 | 272 | 36,1 | 025 648 |
| GE 240 H-A | 8 | 2,0 | 2,0 | 265 | 299 | 40,4 | 025 649 |
| GE 260 H-A | 7 | 2,0 | 2,0 | 288 | 323 | 52,0 | 025 650 |
| GE 280 H-A | 6 | 2,0 | 2,0 | 313,5 | 346 | 66,0 | 025 651 |
| GE 300 H-A | 7 | 2,0 | 2,0 | 336,5 | 373 | 76,0 | 025 652 |

# Steel/Steel large diameter spherical plain bearings

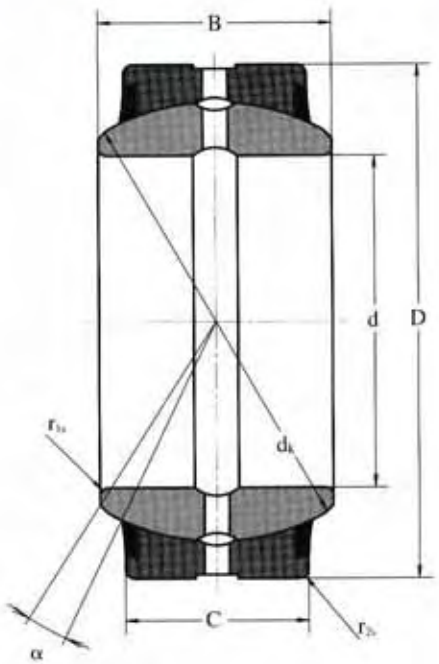
GE ... H-A

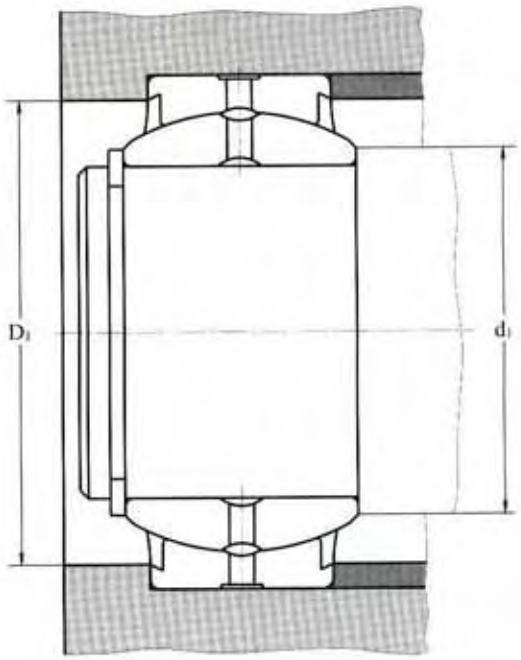
d = 320 ... 1000 mm

Dimensions:
DIN 648 Dimension series (table 3)

Order example for nominal diameter d = 320 mm **radial spherical plain bearing GE 320 H-A**

| Type | d | D | B | C | $d_k$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 320 H-A | 320 -0,040 | 440 -0,045 | 160 -0,40 | 135 -0,9 | 380 | 22000 | 4400 |
| GE 340 H-A | 340 -0,040 | 460 -0,045 | 160 -0,40 | 135 -0,9 | 400 | 22800 | 4550 |
| GE 360 H-A | 360 -0,040 | 480 -0,045 | 160 -0,40 | 135 -0,9 | 420 | 24000 | 4800 |
| GE 380 H-A | 380 -0,040 | 520 -0,050 | 190 -0,40 | 160 -1,0 | 450 | 30500 | 6100 |
| GE 400 H-A | 400 -0,040 | 540 -0,050 | 190 -0,40 | 160 -1,0 | 470 | 32000 | 6400 |
| GE 420 H-A | 420 -0,045 | 560 -0,050 | 190 -0,45 | 160 -1,0 | 490 | 33500 | 6700 |
| GE 440 H-A | 440 -0,045 | 600 -0,050 | 218 -0,45 | 185 -1,0 | 520 | 40500 | 8150 |
| GE 460 H-A | 460 -0,045 | 620 -0,050 | 218 -0,45 | 185 -1,0 | 540 | 42500 | 8500 |
| GE 480 H-A | 480 -0,045 | 650 -0,075 | 230 -0,45 | 195 -1,1 | 565 | 46500 | 9300 |
| GE 500 H-A | 500 -0,045 | 670 -0,075 | 230 -0,45 | 195 -1,1 | 585 | 48000 | 9650 |
| GE 530 H-A | 530 -0,050 | 710 -0,075 | 243 -0,50 | 205 -1,1 | 620 | 54000 | 10800 |
| GE 560 H-A | 560 -0,050 | 750 -0,075 | 258 -0,50 | 215 -1,1 | 655 | 60000 | 12000 |
| GE 600 H-A | 600 -0,050 | 800 -0,075 | 272 -0,50 | 230 -1,1 | 700 | 68000 | 13700 |
| GE 630 H-A | 630 -0,050 | 850 -0,100 | 300 -0,50 | 260 -1,2 | 740 | 81500 | 16300 |
| GE 670 H-A | 670 -0,075 | 900 -0,100 | 308 -0,75 | 260 -1,2 | 785 | 86500 | 17300 |
| GE 710 H-A | 710 -0,075 | 950 -0,100 | 325 -0,75 | 275 -1,2 | 830 | 96500 | 19300 |
| GE 750 H-A | 750 -0,075 | 1000 -0,100 | 335 -0,75 | 280 -1,2 | 875 | 104000 | 20800 |
| GE 800 H-A | 800 -0,075 | 1060 -0,125 | 355 -0,75 | 300 -1,3 | 930 | 118000 | 23600 |
| GE 850 H-A | 850 -0,100 | 1120 -0,125 | 365 -1,00 | 310 -1,3 | 985 | 129000 | 26000 |
| GE 900 H-A | 900 -0,100 | 1180 -0,125 | 375 -1,00 | 320 -1,3 | 1040 | 140000 | 28500 |
| GE 950 H-A | 950 -0,100 | 1250 -0,125 | 400 -1,00 | 340 -1,3 | 1100 | 160000 | 31500 |
| GE 1000 H-A | 1000 -0,100 | 1320 -0,160 | 438 -1,00 | 370 -1,6 | 1160 | 183000 | 36500 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_1$ | $D_1$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|
| | ° | mm | | | | kg | |
| GE 320 H-A | 4 | 4,0 | 4,0 | 344 | 405 | 77 | 025 653 |
| GE 340 H-A | 3 | 4,0 | 4,0 | 365 | 425 | 82 | 027 079 |
| GE 360 H-A | 3 | 4,0 | 4,0 | 385 | 445 | 88 | 027 080 |
| GE 380 H-A | 4 | 5,0 | 5,0 | 405 | 480 | 127 | 027 081 |
| GE 400 H-A | 3 | 5,0 | 5,0 | 425 | 500 | 132 | 027 082 |
| GE 420 H-A | 3 | 5,0 | 5,0 | 450 | 520 | 145 | 027 083 |
| GE 440 H-A | 3 | 5,0 | 5,0 | 470 | 555 | 190 | 027 084 |
| GE 460 H-A | 3 | 5,0 | 5,0 | 494 | 575 | 200 | 027 085 |
| GE 480 H-A | 3 | 6,0 | 6,0 | 516 | 600 | 237 | 027 086 |
| GE 500 H-A | 3 | 6,0 | 6,0 | 535 | 620 | 244 | 027 087 |
| GE 530 H-A | 3 | 6,0 | 6,0 | 570 | 660 | 290 | 027 088 |
| GE 560 H-A | 4 | 6,0 | 6,0 | 600 | 695 | 340 | 027 089 |
| GE 600 H-A | 3 | 6,0 | 6,0 | 640 | 745 | 409 | 027 090 |
| GE 630 H-A | 3 | 8,0 | 8,0 | 675 | 790 | 526 | 027 091 |
| GE 670 H-A | 3 | 8,0 | 8,0 | 720 | 835 | 596 | 027 092 |
| GE 710 H-A | 3 | 8,0 | 8,0 | 760 | 880 | 693 | 027 093 |
| GE 750 H-A | 3 | 8,0 | 8,0 | 800 | 930 | 784 | 027 094 |
| GE 800 H-A | 3 | 8,0 | 8,0 | 850 | 990 | 925 | 027 095 |
| GE 850 H-A | 3 | 8,0 | 8,0 | 910 | 1045 | 1055 | 027 096 |
| GE 900 H-A | 3 | 8,0 | 8,0 | 940 | 1100 | 1190 | 027 097 |
| GE 950 H-A | 3 | 10,0 | 10,0 | 1060 | 1160 | 1424 | 027 098 |
| GE 1000 H-A | 3 | 10,0 | 10,0 | 1100 | 1230 | 1755 | 027 099 |

# Steel/Steel radial spherical plain bearings

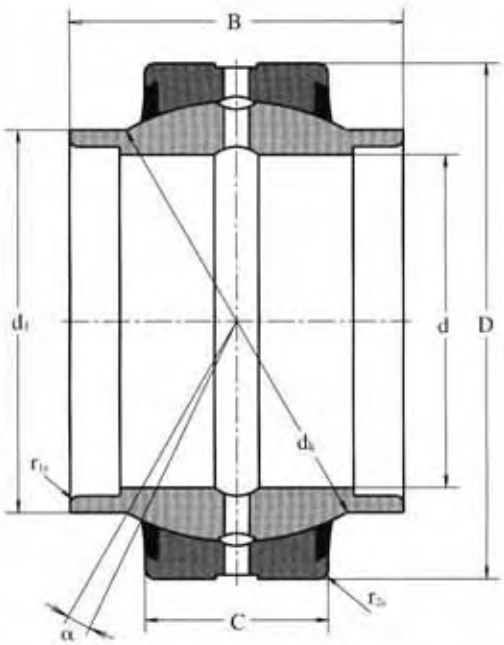
GE ... BN-A

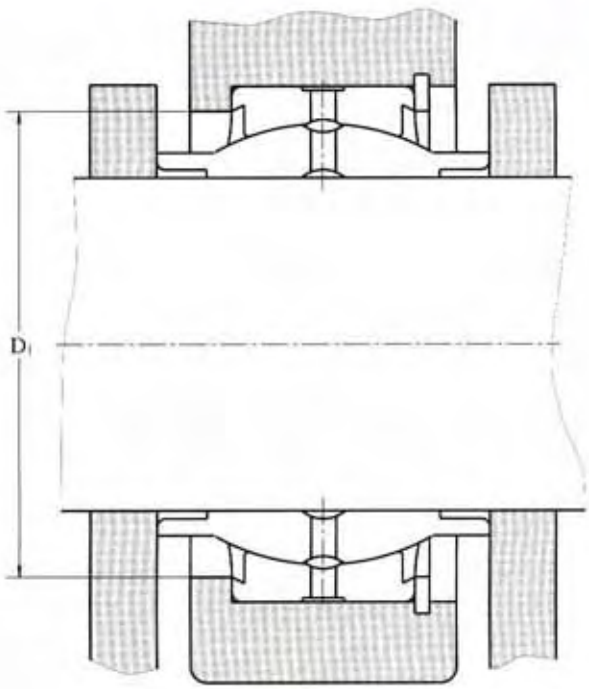
d = 20 ... 320 mm

Dimensions:
DIN 648 Dimension series EW (table 5)- ISO 6124/2

Order example for nominal diameter d = 160 mm **radial spherical plain bearing GE 160 BN-A**

| Type | d | D | B | C | $d_K$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 20 BN-A | 20 +0,021 | 35 -0,011 | 20 -0,21 | 12 -0,24 | 29 | 146 | 30 |
| GE 25 BN-A | 25 +0,021 | 42 -0,011 | 25 -0,21 | 16 -0,24 | 35,5 | 240 | 48 |
| GE 32 BN-A | 32 +0,025 | 52 -0,013 | 32 -0,25 | 18 -0,24 | 44 | 335 | 67 |
| GE 40 BN-A | 40 +0,025 | 62 -0,013 | 40 -0,25 | 22 -0,30 | 53 | 500 | 100 |
| GE 50 BN-A | 50 +0,025 | 75 -0,013 | 50 -0,25 | 28 -0,30 | 66 | 780 | 156 |
| GE 63 BN-A | 63 +0,030 | 95 -0,015 | 63 -0,30 | 36 -0,40 | 83 | 1270 | 255 |
| GE 70 BN-A | 70 +0,030 | 105 -0,015 | 70 -0,30 | 40 -0,40 | 92 | 1560 | 315 |
| GE 80 BN-A | 80 +0,030 | 120 -0,015 | 80 -0,30 | 45 -0,40 | 105 | 2000 | 400 |
| GE 90 BN-A | 90 +0,035 | 130 -0,018 | 90 -0,35 | 50 -0,50 | 115 | 2450 | 490 |
| GE 100 BN-A | 100 +0,035 | 150 -0,018 | 100 -0,35 | 55 -0,50 | 130 | 3050 | 610 |
| GE 110 BN-A | 110 +0,035 | 160 -0,025 | 110 -0,35 | 55 -0,50 | 140 | 3250 | 655 |
| GE 125 BN-A | 125 +0,040 | 180 -0,025 | 125 -0,40 | 70 -0,50 | 160 | 4750 | 950 |
| GE 160 BN-A | 160 +0,040 | 230 -0,030 | 160 -0,40 | 80 -0,60 | 200 | 6800 | 1370 |
| GE 200 BN-A | 200 +0,046 | 290 -0,035 | 200 -0,46 | 100 -0,70 | 250 | 10600 | 2120 |
| GE 250 BN-A | 250 +0,046 | 400 -0,040 | 250 -0,46 | 120 -0,80 | 350 | 18000 | 3550 |
| GE 320 BN-A | 320 +0,057 | 520 -0,050 | 320 -0,57 | 160 -0,90 | 450 | 30500 | 6100 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_1$ | $D_1$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|
| | ° | mm | | | | kg | |
| GE 20 BN-A | 4 | 0,8 | 1,0 | 25 | 29 | 0,1 | 025 150 |
| GE 25 BN-A | 4 | 0,8 | 1,0 | 30,5 | 34 | 0,1 | 025 151 |
| GE 32 BN-A | 4 | 0,8 | 1,2 | 38 | 43 | 0,2 | 025 152 |
| GE 40 BN-A | 4 | 1,0 | 1,2 | 46 | 51 | 0,3 | 025 153 |
| GE 50 BN-A | 4 | 1,0 | 1,2 | 57 | 64 | 0,5 | 025 154 |
| GE 63 BN-A | 4 | 1,2 | 1,5 | 71,5 | 81 | 1,2 | 025 155 |
| GE 70 BN-A | 4 | 1,2 | 1,5 | 79 | 90 | 1,7 | 025 148 |
| GE 80 BN-A | 4 | 1,2 | 1,5 | 91 | 100 | 2,4 | 025 156 |
| GE 90 BN-A | 4 | 1,5 | 1,5 | 99 | 115 | 3,2 | 025 149 |
| GE 100 BN-A | 4 | 1,5 | 1,5 | 113 | 124 | 4,8 | 025 157 |
| GE 110 BN-A | 4 | 1,5 | 1,5 | 124 | 135 | 5,8 | 025 158 |
| GE 125 BN-A | 4 | 1,5 | 1,5 | 138 | 156 | 8,5 | 025 159 |
| GE 160 BN-A | 4 | 1,5 | 1,5 | 177 | 196 | 16,5 | 025 160 |
| GE 200 BN-A | 4 | 2,0 | 2,0 | 221 | 245 | 32 | 025 161 |
| GE 250 BN-A | 4 | 2,0 | 2,0 | 317 | 346 | 99 | 025 162 |
| GE 320 BN-A | 4 | 4,0 | 4,0 | 405 | 444 | 240 | 025 163 |

# Steel/Steel radial spherical plain bearings

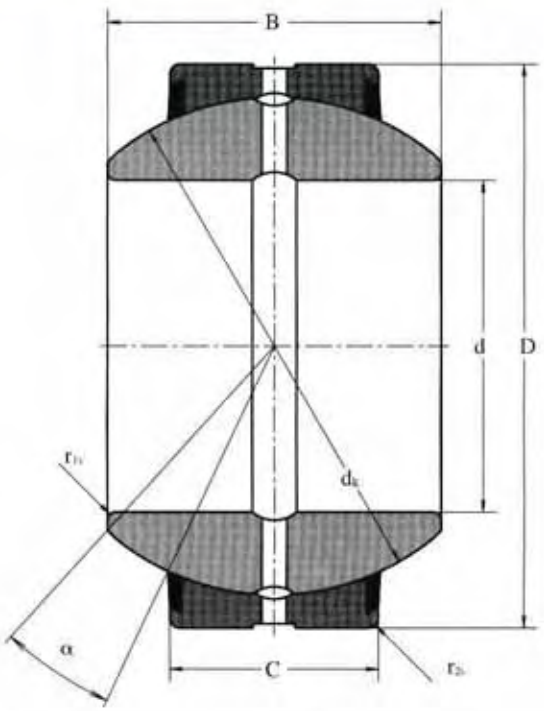
GE ... B-A

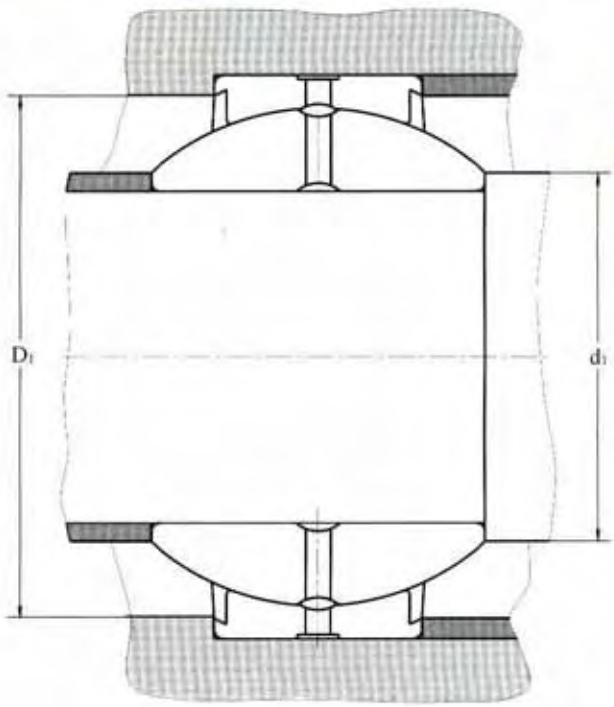
d = 20 ... 280 mm

Dimensions:
DIN 648 Dimension series G (table 2)
with larger tilting angle and higher load carrying capacity than Type GE...H-A

Order example for nominal diameter d = 180 mm **radial spherical plain bearing GE 180 B-A**

| Type | d | D | B | C | $d_K$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 20 B-A | 20 -0,010 | 42 -0,011 | 25 -0,12 | 16 -0,24 | 35,5 | 240 | 48 |
| GE 25 B-A | 25 -0,010 | 47 -0,011 | 28 -0,12 | 18 -0,24 | 40,7 | 310 | 62 |
| GE 30 B-A | 30 -0,010 | 55 -0,013 | 32 -0,12 | 20 -0,30 | 47 | 400 | 80 |
| GE 35 B-A | 35 -0,012 | 62 -0,013 | 35 -0,12 | 22 -0,30 | 53 | 500 | 100 |
| GE 40 B-A | 40 -0,012 | 68 -0,013 | 40 -0,12 | 25 -0,30 | 60 | 640 | 127 |
| GE 45 B-A | 45 -0,012 | 75 -0,013 | 43 -0,12 | 28 -0,30 | 66 | 780 | 156 |
| GE 50 B-A | 50 -0,012 | 90 -0,015 | 56 -0,15 | 36 -0,40 | 80 | 1220 | 245 |
| GE 60 B-A | 60 -0,015 | 105 -0,015 | 63 -0,15 | 40 -0,40 | 92 | 1560 | 315 |
| GE 70 B-A | 70 -0,015 | 120 -0,015 | 70 -0,15 | 45 -0,40 | 105 | 2000 | 400 |
| GE 80 B-A | 80 -0,015 | 130 -0,018 | 75 -0,20 | 50 -0,50 | 115 | 2450 | 490 |
| GE 90 B-A | 90 -0,020 | 150 -0,018 | 85 -0,20 | 55 -0,50 | 130 | 3050 | 610 |
| GE 100 B-A | 100 -0,020 | 160 -0,025 | 85 -0,20 | 55 -0,50 | 140 | 3250 | 655 |
| GE 110 B-A | 110 -0,020 | 180 -0,025 | 100 -0,20 | 70 -0,50 | 160 | 4750 | 950 |
| GE 120 B-A | 120 -0,020 | 210 -0,030 | 115 -0,25 | 70 -0,60 | 180 | 5400 | 1080 |
| GE 140 B-A | 140 -0,025 | 230 -0,030 | 130 -0,25 | 80 -0,60 | 200 | 6800 | 1370 |
| GE 160 B-A | 160 -0,025 | 260 -0,035 | 135 -0,25 | 80 -0,70 | 225 | 7650 | 1530 |
| GE 180 B-A | 180 -0,025 | 290 -0,035 | 155 -0,30 | 100 -0,70 | 250 | 10600 | 2120 |
| GE 200 B-A | 200 -0,030 | 320 -0,040 | 165 -0,30 | 100 -0,80 | 275 | 11600 | 2320 |
| GE 220 B-A | 220 -0,030 | 340 -0,040 | 175 -0,30 | 100 -0,80 | 300 | 12700 | 2550 |
| GE 240 B-A | 240 -0,030 | 370 -0,040 | 190 -0,35 | 110 -0,80 | 325 | 15300 | 3050 |
| GE 260 B-A | 260 -0,035 | 400 -0,040 | 205 -0,35 | 120 -0,80 | 350 | 18000 | 3550 |
| GE 280 B-A | 280 -0,035 | 430 -0,045 | 210 -0,35 | 120 -0,90 | 375 | 19000 | 3800 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_1$ | $D_1$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|
| | ° | mm | | | | kg | |
| GE 20 B-A | 17 | 0,8 | 1,0 | 25 | 34 | 0,15 | 025 735 |
| GE 25 B-A | 17 | 0,8 | 1,0 | 29 | 39 | 0,21 | 025 736 |
| GE 30 B-A | 17 | 0,8 | 1,2 | 34 | 45 | 0,31 | 025 737 |
| GE 35 B-A | 16 | 1,0 | 1,2 | 39 | 51 | 0,39 | 025 738 |
| GE 40 B-A | 17 | 1,0 | 1,2 | 44 | 58 | 0,51 | 025 739 |
| GE 45 B-A | 15 | 1,0 | 1,2 | 50 | 64 | 0,65 | 025 740 |
| GE 50 B-A | 17 | 1,0 | 1,5 | 57 | 75 | 1,5 | 025 741 |
| GE 60 B-A | 17 | 1,2 | 1,5 | 67 | 87 | 2,1 | 025 742 |
| GE 70 B-A | 16 | 1,2 | 1,5 | 78 | 100 | 2,9 | 025 743 |
| GE 80 B-A | 14 | 1,2 | 1,5 | 87 | 110 | 3,6 | 025 744 |
| GE 90 B-A | 15 | 1,5 | 1,5 | 98 | 124 | 5,5 | 025 745 |
| GE 100 B-A | 14 | 1,5 | 1,5 | 111 | 135 | 6,1 | 025 746 |
| GE 110 B-A | 12 | 1,5 | 1,5 | 124 | 156 | 9,7 | 025 747 |
| GE 120 B-A | 16 | 1,5 | 1,5 | 138 | 179 | 15,1 | 025 748 |
| GE 140 B-A | 16 | 1,5 | 1,5 | 152 | 196 | 18,9 | 025 749 |
| GE 160 B-A | 16 | 1,5 | 2,0 | 180 | 224 | 24,8 | 025 750 |
| GE 180 B-A | 14 | 2,0 | 2,0 | 196 | 245 | 34,6 | 025 751 |
| GE 200 B-A | 15 | 2,0 | 2,0 | 220 | 272 | 43,2 | 025 752 |
| GE 220 B-A | 16 | 2,0 | 2,0 | 243 | 299 | 51,3 | 025 753 |
| GE 240 B-A | 15 | 2,0 | 2,0 | 263 | 323 | 65,5 | 025 754 |
| GE 260 B-A | 15 | 2,0 | 2,0 | 283 | 346 | 81,3 | 025 755 |
| GE 280 B-A | 15 | 2,0 | 2,0 | 310 | 373 | 98,4 | 025 756 |

# Radial spherical plain bearings, maintenance-free

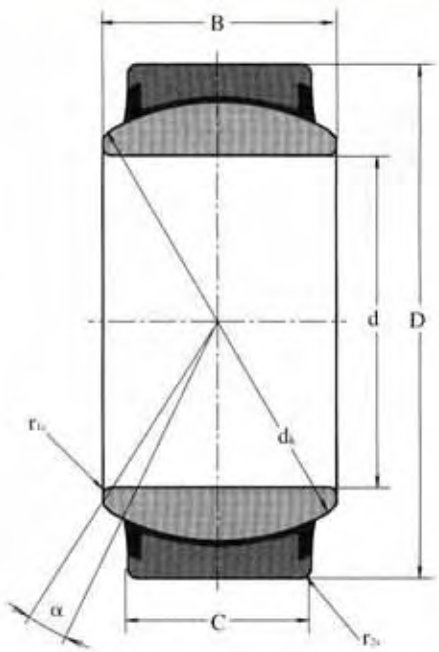
GE ... HW-A

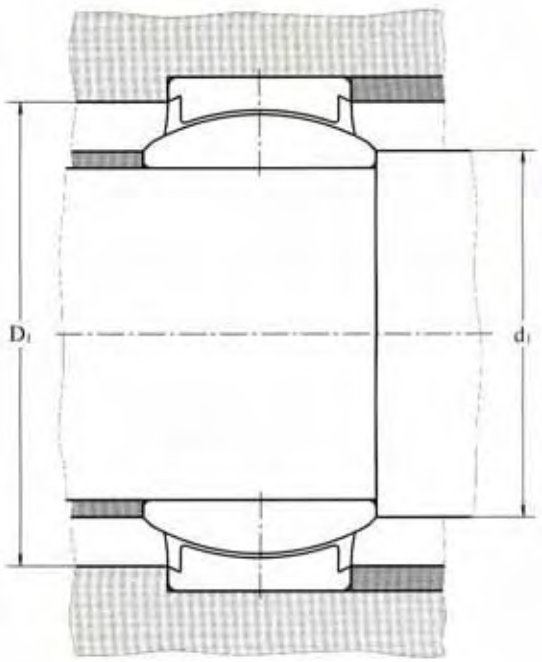
d = 20 ... 300 mm

Dimensions:
DIN 648, dimension series E (table 1)

Order example for nominal diameter d = 140 mm **radial spherical plain bearing GE 140 HW-A**

| Type | d | D | B | C | $d_K$ | Load ratings | |
|---|---|---|---|---|---|---|---|
| | | | | | | static Co | dynamic C |
| | mm | | | | | kN | kN |
| GE 20 HW-A | 20 -0,010 | 35 -0,011 | 16 -0,12 | 12 -0,24 | 29 | 78 | 31,5 |
| GE 25 HW-A | 25 -0,010 | 42 -0,011 | 20 -0,12 | 16 -0,24 | 35,5 | 127 | 51 |
| GE 30 HW-A | 30 -0,010 | 47 -0,011 | 22 -0,12 | 18 -0,24 | 40,7 | 166 | 65,5 |
| GE 35 HW-A | 35 -0,012 | 55 -0,013 | 25 -0,12 | 20 -0,30 | 47 | 224 | 112 |
| GE 40 HW-A | 40 -0,012 | 62 -0,013 | 28 -0,12 | 22 -0,30 | 53 | 280 | 140 |
| GE 45 HW-A | 45 -0,012 | 68 -0,013 | 32 -0,12 | 25 -0,30 | 60 | 360 | 180 |
| GE 50 HW-A | 50 -0,012 | 75 -0,013 | 35 -0,12 | 28 -0,30 | 66 | 440 | 220 |
| GE 60 HW-A | 60 -0,015 | 90 -0,015 | 44 -0,15 | 36 -0,40 | 80 | 695 | 345 |
| GE 70 HW-A | 70 -0,015 | 105 -0,015 | 49 -0,15 | 40 -0,40 | 92 | 880 | 440 |
| GE 80 HW-A | 80 -0,015 | 120 -0,015 | 55 -0,15 | 45 -0,40 | 105 | 1140 | 570 |
| GE 90 HW-A | 90 -0,020 | 130 -0,018 | 60 -0,20 | 50 -0,50 | 115 | 1370 | 695 |
| GE 100 HW-A | 100 -0,020 | 150 -0,018 | 70 -0,20 | 55 -0,50 | 130 | 1730 | 865 |
| GE 110 HW-A | 110 -0,020 | 160 -0,025 | 70 -0,20 | 55 -0,50 | 140 | 1860 | 930 |
| GE 120 HW-A | 120 -0,020 | 180 -0,025 | 85 -0,20 | 70 -0,50 | 160 | 2700 | 1340 |
| GE 140 HW-A | 140 -0,025 | 210 -0,030 | 90 -0,25 | 70 -0,60 | 180 | 3000 | 1500 |
| GE 160 HW-A | 160 -0,025 | 230 -0,030 | 105 -0,25 | 80 -0,60 | 200 | 3800 | 1930 |
| GE 180 HW-A | 180 -0,025 | 260 -0,035 | 105 -0,25 | 80 -0,70 | 225 | 4300 | 2160 |
| GE 200 HW-A | 200 -0,030 | 290 -0,035 | 130 -0,30 | 100 -0,70 | 250 | 6000 | 3000 |
| GE 220 HW-A | 220 -0,030 | 320 -0,040 | 135 -0,30 | 100 -0,80 | 275 | 6550 | 3350 |
| GE 240 HW-A | 240 -0,030 | 340 -0,040 | 140 -0,30 | 100 -0,80 | 300 | 7200 | 3600 |
| GE 260 HW-A | 260 -0,035 | 370 -0,040 | 150 -0,35 | 110 -0,80 | 325 | 8650 | 4300 |
| GE 280 HW-A | 280 -0,035 | 400 -0,040 | 155 -0,35 | 120 -0,80 | 350 | 10000 | 5000 |
| GE 300 HW-A | 300 -0,035 | 430 -0,045 | 165 -0,35 | 120 -0,90 | 375 | 10800 | 5400 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_1$ | $D_1$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|
| | ° | mm | | | | kg | |
| GE 20 HW-A | 9 | 0,8 | 1,0 | 24 | 29 | 0,06 | 025 000 |
| GE 25 HW-A | 7 | 0,8 | 1,0 | 29 | 34 | 0,10 | 025 001 |
| GE 30 HW-A | 6 | 0,8 | 1,0 | 34 | 39 | 0,15 | 025 002 |
| GE 35 HW-A | 6 | 1,0 | 1,2 | 39 | 45 | 0,25 | 025 003 |
| GE 40 HW-A | 7 | 1,0 | 1,2 | 45 | 51 | 0,3 | 025 004 |
| GE 45 HW-A | 7 | 1,0 | 1,2 | 50 | 58 | 0,4 | 025 005 |
| GE 50 HW-A | 6 | 1,0 | 1,2 | 56 | 64 | 0,5 | 025 006 |
| GE 60 HW-A | 6 | 1,2 | 1,5 | 66 | 75 | 1 | 025 007 |
| GE 70 HW-A | 6 | 1,2 | 1,5 | 77 | 87 | 1,4 | 025 008 |
| GE 80 HW-A | 6 | 1,2 | 1,5 | 89 | 100 | 2 | 025 009 |
| GE 90 HW-A | 5 | 1,5 | 1,5 | 98 | 110 | 2,5 | 025 010 |
| GE 100 HW-A | 7 | 1,5 | 1,5 | 109,5 | 124 | 4 | 025 011 |
| GE 110 HW-A | 6 | 1,5 | 1,5 | 121 | 135 | 4,5 | 025 012 |
| GE 120 HW-A | 6 | 1,5 | 1,5 | 135,5 | 156 | 7 | 025 013 |
| GE 140 HW-A | 7 | 1,5 | 1,5 | 155,5 | 179 | 10,5 | 025 014 |
| GE 160 HW-A | 8 | 1,5 | 1,5 | 170 | 196 | 13,4 | 025 015 |
| GE 180 HW-A | 6 | 2,0 | 2,0 | 199 | 224 | 17 | 025 016 |
| GE 200 HW-A | 7 | 2,0 | 2,0 | 213,5 | 245 | 26 | 025 017 |
| GE 220 HW-A | 8 | 2,0 | 2,0 | 239,5 | 272 | 33 | 025 018 |
| GE 240 HW-A | 8 | 2,0 | 2,0 | 265 | 299 | 36,5 | 025 019 |
| GE 260 HW-A | 7 | 2,0 | 2,0 | 288 | 323 | 48 | 025 020 |
| GE 280 HW-A | 6 | 2,0 | 2,0 | 313,5 | 346 | 62 | 025 021 |
| GE 300 HW-A | 7 | 2,0 | 2,0 | 336,5 | 373 | 70 | 025 022 |

# Large diameter radial spherical plain bearings, maintenance-free

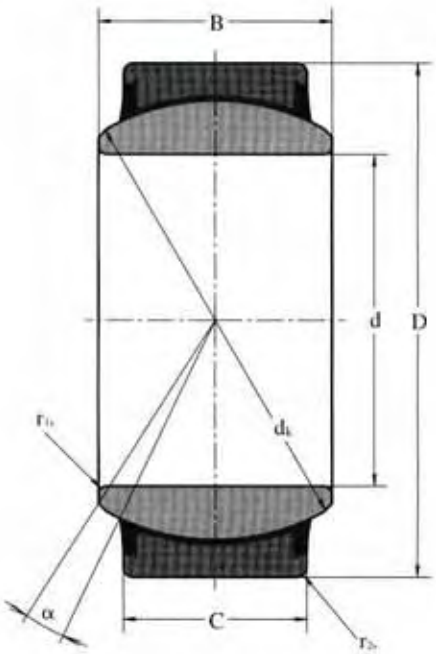
GE ... HW-A

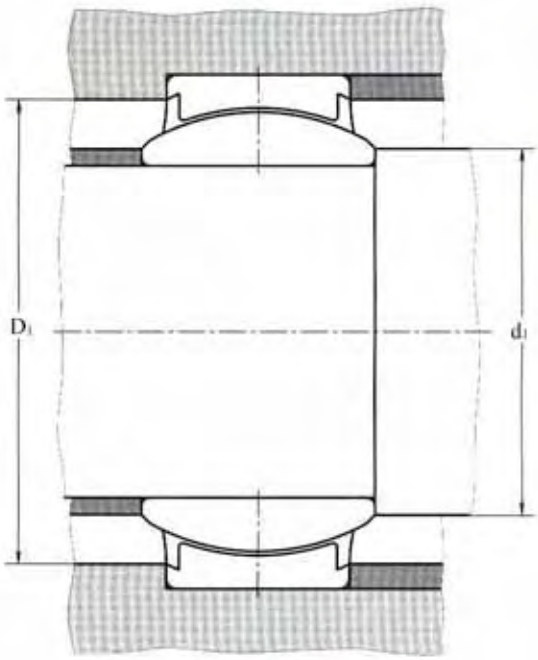
d = 320 ... 1000 mm

Dimensions:
DIN 648 dimension series C (table 3)

Order example for nominal diameter d = 320 mm **radial spherical plain bearing GE 320 HW-A**

| Type | d | D | B | C | $d_K$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 320 HW-A | 320 -0,040 | 440 -0,045 | 160 -0,40 | 135 -0,9 | 380 | 13000 | 6550 |
| GE 340 HW-A | 340 -0,040 | 460 -0,045 | 160 -0,40 | 135 -0,9 | 400 | 13500 | 6950 |
| GE 360 HW-A | 360 -0,040 | 480 -0,045 | 160 -0,40 | 135 -0,9 | 420 | 14000 | 7200 |
| GE 380 HW-A | 380 -0,040 | 520 -0,050 | 190 -0,40 | 160 -1,0 | 450 | 19000 | 9500 |
| GE 400 HW-A | 400 -0,040 | 540 -0,050 | 190 -0,40 | 160 -1,0 | 470 | 19600 | 9800 |
| GE 420 HW-A | 420 -0,045 | 560 -0,050 | 190 -0,45 | 160 -1,0 | 490 | 20000 | 10200 |
| GE 440 HW-A | 440 -0,045 | 600 -0,050 | 218 -0,45 | 185 -1,0 | 520 | 25000 | 12900 |
| GE 460 HW-A | 460 -0,045 | 620 -0,050 | 218 -0,45 | 185 -1,0 | 540 | 26000 | 13400 |
| GE 480 HW-A | 480 -0,045 | 650 -0,075 | 230 -0,45 | 195 -1,1 | 565 | 30000 | 15000 |
| GE 500 HW-A | 500 -0,045 | 670 -0,075 | 230 -0,45 | 195 -1,1 | 585 | 30000 | 15300 |
| GE 530 HW-A | 530 -0,050 | 710 -0,075 | 243 -0,50 | 205 -1,1 | 620 | 34000 | 17300 |
| GE 560 HW-A | 560 -0,050 | 750 -0,075 | 258 -0,50 | 215 -1,1 | 655 | 38000 | 19300 |
| GE 600 HW-A | 600 -0,050 | 800 -0,075 | 272 -0,50 | 230 -1,1 | 700 | 44000 | 22000 |
| GE 630 HW-A | 630 -0,050 | 850 -0,100 | 300 -0,50 | 260 -1,2 | 740 | 53000 | 26500 |
| GE 670 HW-A | 670 -0,075 | 900 -0,100 | 308 -0,75 | 260 -1,2 | 785 | 57000 | 28500 |
| GE 710 HW-A | 710 -0,075 | 950 -0,100 | 325 -0,75 | 275 -1,2 | 830 | 63000 | 31500 |
| GE 750 HW-A | 750 -0,075 | 1000 -0,100 | 335 -0,75 | 280 -1,2 | 875 | 68000 | 34000 |
| GE 800 HW-A | 800 -0,075 | 1060 -0,125 | 355 -0,75 | 300 -1,3 | 930 | 78000 | 39000 |
| GE 850 HW-A | 850 -0,100 | 1120 -0,125 | 365 -1,00 | 310 -1,3 | 985 | 85000 | 43000 |
| GE 900 HW-A | 900 -0,100 | 1180 -0,125 | 375 -1,00 | 320 -1,3 | 1040 | 93000 | 46500 |
| GE 950 HW-A | 950 -0,100 | 1250 -0,125 | 400 -1,00 | 340 -1,3 | 1100 | 106000 | 53000 |
| GE 1000 HW-A | 1000 -0,100 | 1320 -0,160 | 438 -1,00 | 370 -1,6 | 1160 | 122000 | 61000 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_1$ | $D_1$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|
| | ° | mm | | | | kg | |
| GE 320 HW-A | 4 | 4,0 | 4,0 | 344 | 405 | 76 | 025 023 |
| GE 340 HW-A | 3 | 4,0 | 4,0 | 365 | 425 | 80 | 027 058 |
| GE 360 HW-A | 3 | 4,0 | 4,0 | 385 | 445 | 86 | 027 059 |
| GE 380 HW-A | 4 | 5,0 | 5,0 | 405 | 480 | 125 | 027 060 |
| GE 400 HW-A | 3 | 5,0 | 5,0 | 425 | 500 | 130 | 027 061 |
| GE 420 HW-A | 3 | 5,0 | 5,0 | 450 | 520 | 143 | 027 062 |
| GE 440 HW-A | 3 | 5,0 | 5,0 | 470 | 555 | 188 | 027 063 |
| GE 460 HW-A | 3 | 5,0 | 5,0 | 494 | 575 | 199 | 027 064 |
| GE 480 HW-A | 3 | 6,0 | 6,0 | 516 | 600 | 236 | 027 065 |
| GE 500 HW-A | 3 | 6,0 | 6,0 | 535 | 620 | 243 | 027 066 |
| GE 530 HW-A | 3 | 6,0 | 6,0 | 570 | 660 | 288 | 027 067 |
| GE 560 HW-A | 4 | 6,0 | 6,0 | 600 | 695 | 338 | 027 068 |
| GE 600 HW-A | 3 | 6,0 | 6,0 | 640 | 745 | 407 | 027 069 |
| GE 630 HW-A | 3 | 8,0 | 8,0 | 675 | 790 | 524 | 027 070 |
| GE 670 HW-A | 3 | 8,0 | 8,0 | 720 | 835 | 594 | 027 071 |
| GE 710 HW-A | 3 | 8,0 | 8,0 | 760 | 880 | 690 | 027 072 |
| GE 750 HW-A | 3 | 8,0 | 8,0 | 800 | 930 | 780 | 027 073 |
| GE 800 HW-A | 3 | 8,0 | 8,0 | 850 | 990 | 920 | 027 074 |
| GE 850 HW-A | 3 | 8,0 | 8,0 | 910 | 1045 | 1050 | 027 075 |
| GE 900 HW-A | 3 | 8,0 | 8,0 | 940 | 1100 | 1186 | 027 076 |
| GE 950 HW-A | 3 | 10,0 | 10,0 | 1060 | 1160 | 1420 | 027 077 |
| GE 1000 HW-A | 3 | 10,0 | 10,0 | 1100 | 1230 | 1750 | 027 078 |

# Radial spherical plain bearings, maintenance-free

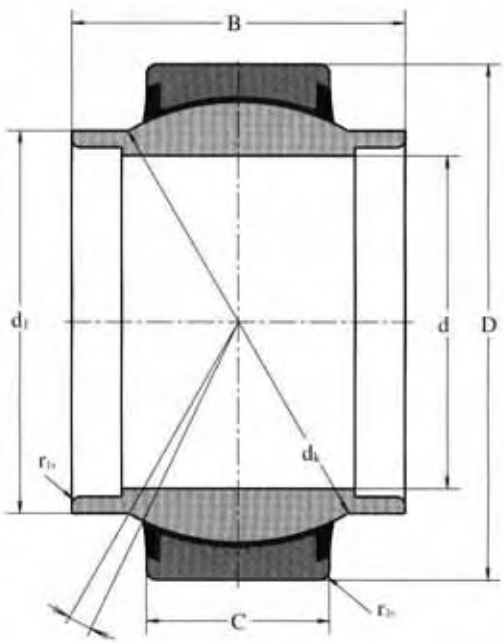
GE ... BNW-A

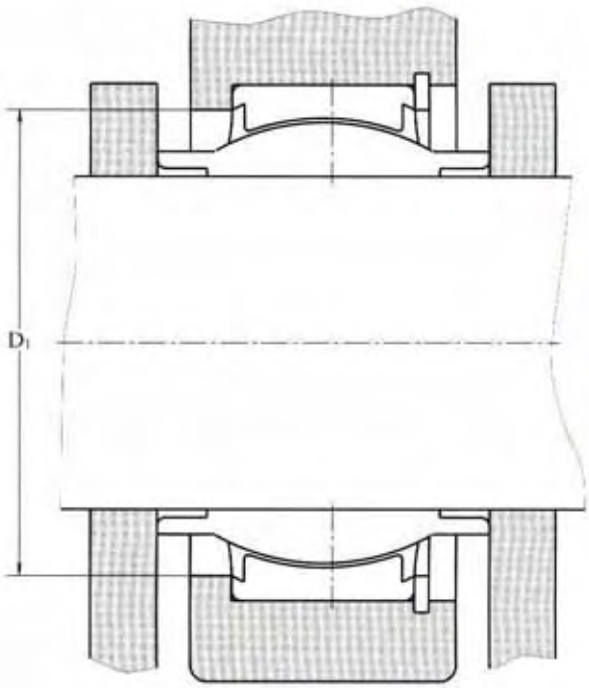
d = 20 ... 320 mm

Dimensions:
DIN 648 dimension series EW (table 5)- ISO 6124/2

Order example for nominal diameter d = 160 mm **radial spherical plain bearing GE 160 BNW-A**

| Type | d | D | B | C | $d_K$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 20 BNW-A | 20 +0,021 | 35 -0,011 | 20 -0,21 | 12 -0,24 | 29 | 78 | 31,5 |
| GE 25 BNW-A | 25 +0,021 | 42 -0,011 | 25 -0,21 | 16 -0,24 | 35,5 | 127 | 51 |
| GE 32 BNW-A | 32 +0,025 | 52 -0,013 | 32 -0,25 | 18 -0,24 | 44 | 180 | 66 |
| GE 40 BNW-A | 40 +0,025 | 62 -0,013 | 40 -0,25 | 22 -0,30 | 53 | 280 | 140 |
| GE 50 BNW-A | 50 +0,025 | 75 -0,013 | 50 -0,25 | 28 -0,30 | 66 | 440 | 220 |
| GE 63 BNW-A | 63 +0,030 | 95 -0,015 | 63 -0,30 | 36 -0,40 | 83 | 695 | 358 |
| GE 70 BNW-A | 70 +0,030 | 105 -0,015 | 70 -0,30 | 40 -0,40 | 92 | 850 | 440 |
| GE 80 BNW-A | 80 +0,030 | 120 -0,018 | 80 -0,30 | 45 -0,40 | 105 | 1117 | 570 |
| GE 90 BNW-A | 90 +0,035 | 130 -0,018 | 90 -0,35 | 50 -0,50 | 115 | 1400 | 718 |
| GE 100 BNW-A | 100 +0,035 | 150 -0,018 | 100 -0,35 | 55 -0,50 | 130 | 1730 | 865 |
| GE 110 BNW-A | 110 +0,035 | 160 -0,025 | 110 -0,35 | 55 -0,50 | 140 | 1860 | 930 |
| GE 125 BNW-A | 125 +0,040 | 180 -0,025 | 125 -0,40 | 70 -0,50 | 160 | 2700 | 1340 |
| GE 160 BNW-A | 160 +0,040 | 230 -0,030 | 160 -0,40 | 80 -0,60 | 200 | 3800 | 1930 |
| GE 200 BNW-A | 200 +0,046 | 290 -0,035 | 200 -0,46 | 100 -0,70 | 250 | 6000 | 3000 |
| GE 250 BNW-A | 250 +0,046 | 400 -0,040 | 250 -0,46 | 120 -0,80 | 350 | 10000 | 5000 |
| GE 320 BNW-A | 320 +0,057 | 520 -0,050 | 320 -0,57 | 160 -0,90 | 450 | 13000 | 6550 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_1$ | $D_1$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|
| | ° | mm | | | | kg | |
| GE 20 BNW-A | 4 | 0,8 | 1,0 | 25 | 29 | 0,1 | 025 100 |
| GE 25 BNW-A | 4 | 0,8 | 1,0 | 30,5 | 34 | 0,1 | 025 101 |
| GE 32 BNW-A | 4 | 0,8 | 1,2 | 38 | 43 | 0,2 | 025 102 |
| GE 40 BNW-A | 4 | 1,0 | 1,2 | 46 | 51 | 0,3 | 025 103 |
| GE 50 BNW-A | 4 | 1,0 | 1,2 | 57 | 64 | 0,5 | 025 104 |
| GE 63 BNW-A | 4 | 1,2 | 1,5 | 71,5 | 81 | 1,2 | 025 105 |
| GE 70 BNW-A | 4 | 1,2 | 1,5 | 79 | 90 | 1,7 | 025 146 |
| GE 80 BNW-A | 4 | 1,2 | 1,5 | 91 | 100 | 2,4 | 025 106 |
| GE 90 BNW-A | 4 | 1,5 | 1,5 | 99 | 115 | 3,2 | 025 147 |
| GE 100 BNW-A | 4 | 1,5 | 1,5 | 113 | 124 | 4,8 | 025 107 |
| GE 110 BNW-A | 4 | 1,5 | 1,5 | 124 | 135 | 5,8 | 025 108 |
| GE 125 BNW-A | 4 | 1,5 | 1,5 | 138 | 156 | 8,5 | 025 109 |
| GE 160 BNW-A | 4 | 1,5 | 1,5 | 177 | 196 | 16,5 | 025 110 |
| GE 200 BNW-A | 4 | 2,0 | 2,0 | 221 | 245 | 32,0 | 025 111 |
| GE 250 BNW-A | 4 | 2,0 | 2,0 | 317 | 346 | 99,0 | 025 112 |
| GE 320 BNW-A | 4 | 4,0 | 4,0 | 405 | 444 | 240,0 | 025 113 |

# Radial spherical plain bearings, maintenance-free

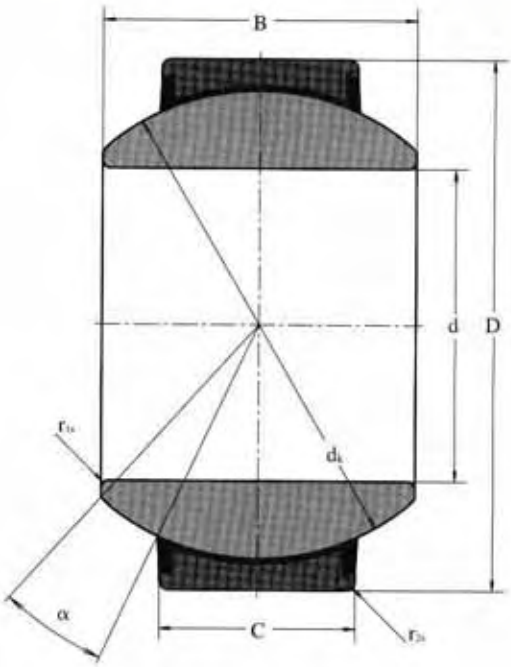
GE ... BW-A

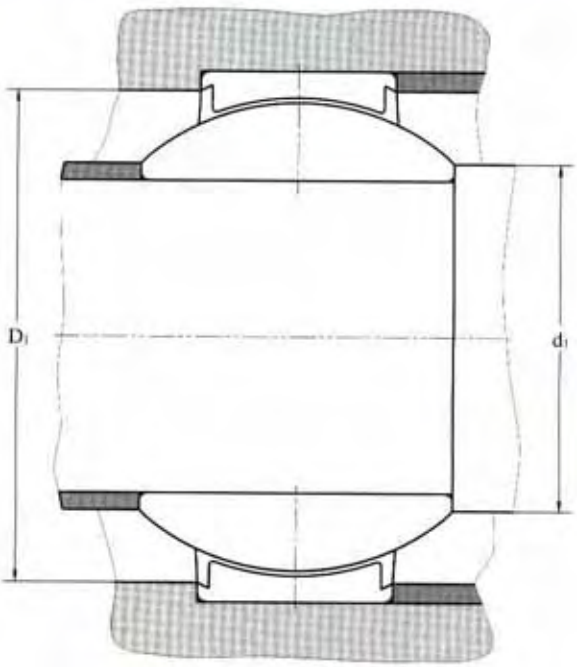
d = 20 ... 280 mm

Dimensions:
DIN 648 dimension series G (table 2)
with larger tilting angle and higher load carrying capacity than Type GE ... HW-A

Order example for nominal diameter d = 180 mm **radial spherical plain bearing GE 180 BW-A**

| Type | d | D | B | C | $d_k$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 20 BW-A | 20 -0,010 | 42 -0,011 | 25 -0,12 | 16 -0,24 | 35,5 | 127 | 51 |
| GE 25 BW-A | 25 -0,010 | 47 -0,011 | 28 -0,12 | 18 -0,24 | 40,7 | 166 | 65,5 |
| GE 30 BW-A | 30 -0,010 | 55 -0,013 | 32 -0,12 | 20 -0,30 | 47 | 224 | 112 |
| GE 35 BW-A | 35 -0,012 | 62 -0,013 | 35 -0,12 | 22 -0,30 | 53 | 280 | 140 |
| GE 40 BW-A | 40 -0,012 | 68 -0,013 | 40 -0,12 | 25 -0,30 | 60 | 360 | 180 |
| GE 45 BW-A | 45 -0,012 | 75 -0,013 | 43 -0,12 | 28 -0,30 | 66 | 440 | 220 |
| GE 50 BW-A | 50 -0,012 | 90 -0,015 | 56 -0,15 | 36 -0,40 | 80 | 695 | 345 |
| GE 60 BW-A | 60 -0,015 | 105 -0,015 | 63 -0,15 | 40 -0,40 | 92 | 880 | 440 |
| GE 70 BW-A | 70 -0,015 | 120 -0,015 | 70 -0,15 | 45 -0,40 | 105 | 1140 | 570 |
| GE 80 BW-A | 80 -0,015 | 130 -0,018 | 75 -0,20 | 50 -0,50 | 115 | 1370 | 695 |
| GE 90 BW-A | 90 -0,020 | 150 -0,018 | 85 -0,20 | 55 -0,50 | 130 | 1730 | 865 |
| GE 100 BW-A | 100 -0,020 | 160 -0,025 | 85 -0,20 | 55 -0,50 | 140 | 1860 | 930 |
| GE 110 BW-A | 110 -0,020 | 180 -0,025 | 100 -0,20 | 70 -0,50 | 160 | 2700 | 1340 |
| GE 120 BW-A | 120 -0,020 | 210 -0,030 | 115 -0,25 | 70 -0,60 | 180 | 3000 | 1500 |
| GE 140 BW-A | 140 -0,025 | 230 -0,030 | 130 -0,25 | 80 -0,60 | 200 | 3800 | 1930 |
| GE 160 BW-A | 160 -0,025 | 260 -0,035 | 135 -0,25 | 80 -0,70 | 225 | 4300 | 2160 |
| GE 180 BW-A | 180 -0,025 | 290 -0,035 | 155 -0,30 | 100 -0,70 | 250 | 6000 | 3000 |
| GE 200 BW-A | 200 -0,030 | 320 -0,040 | 165 -0,30 | 100 -0,80 | 275 | 6550 | 3350 |
| GE 220 BW-A | 220 -0,030 | 340 -0,040 | 175 -0,30 | 100 -0,80 | 300 | 7200 | 3600 |
| GE 240 BW-A | 240 -0,030 | 370 -0,040 | 190 -0,35 | 110 -0,80 | 325 | 8650 | 4300 |
| GE 260 BW-A | 260 -0,035 | 400 -0,040 | 205 -0,35 | 120 -0,80 | 350 | 10000 | 5000 |
| GE 280 BW-A | 280 -0,035 | 430 -0,045 | 210 -0,35 | 120 -0,90 | 375 | 10800 | 5400 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_1$ | $D_1$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|
| | ° | mm | | | | kg | |
| GE 20 BW-A | 17 | 0,8 | 1,0 | 25 | 34 | 0,15 | 025 200 |
| GE 25 BW-A | 17 | 0,8 | 1,0 | 29 | 39 | 0,21 | 025 201 |
| GE 30 BW-A | 17 | 0,8 | 1,2 | 34 | 45 | 0,32 | 025 202 |
| GE 35 BW-A | 16 | 1,0 | 1,2 | 39 | 51 | 0,39 | 025 203 |
| GE 40 BW-A | 17 | 1,0 | 1,2 | 44 | 58 | 0,50 | 025 204 |
| GE 45 BW-A | 15 | 1,0 | 1,2 | 50 | 64 | 0,63 | 025 205 |
| GE 50 BW-A | 17 | 1,0 | 1,5 | 57 | 75 | 1,4 | 025 206 |
| GE 60 BW-A | 17 | 1,2 | 1,5 | 67 | 87 | 2,0 | 025 207 |
| GE 70 BW-A | 16 | 1,2 | 1,5 | 78 | 100 | 2,8 | 025 208 |
| GE 80 BW-A | 14 | 1,2 | 1,5 | 87 | 110 | 3,4 | 025 209 |
| GE 90 BW-A | 15 | 1,5 | 1,5 | 98 | 124 | 5,1 | 025 210 |
| GE 100 BW-A | 14 | 1,5 | 1,5 | 111 | 135 | 5,7 | 025 211 |
| GE 110 BW-A | 12 | 1,5 | 1,5 | 124 | 156 | 9,2 | 025 212 |
| GE 120 BW-A | 16 | 1,5 | 1,5 | 138 | 179 | 14,6 | 025 213 |
| GE 140 BW-A | 16 | 1,5 | 1,5 | 152 | 196 | 18,3 | 025 214 |
| GE 160 BW-A | 16 | 1,5 | 2,0 | 180 | 224 | 24,4 | 025 215 |
| GE 180 BW-A | 14 | 2,0 | 2,0 | 196 | 245 | 33,1 | 025 216 |
| GE 200 BW-A | 15 | 2,0 | 2,0 | 220 | 272 | 41,7 | 025 217 |
| GE 220 BW-A | 16 | 2,0 | 2,0 | 243 | 299 | 48,2 | 025 218 |
| GE 240 BW-A | 15 | 2,0 | 2,0 | 263 | 323 | 62,0 | 025 219 |
| GE 260 BW-A | 15 | 2,0 | 2,0 | 283 | 346 | 77,8 | 025 220 |
| GE 280 BW-A | 15 | 2,0 | 2,0 | 310 | 373 | 93,4 | 025 221 |

# Radial spherical plain bearings, maintenance-free for Civil Engineering

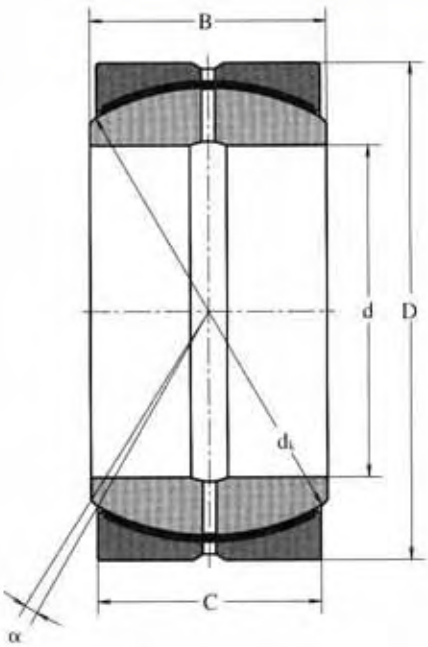
GE ... HS

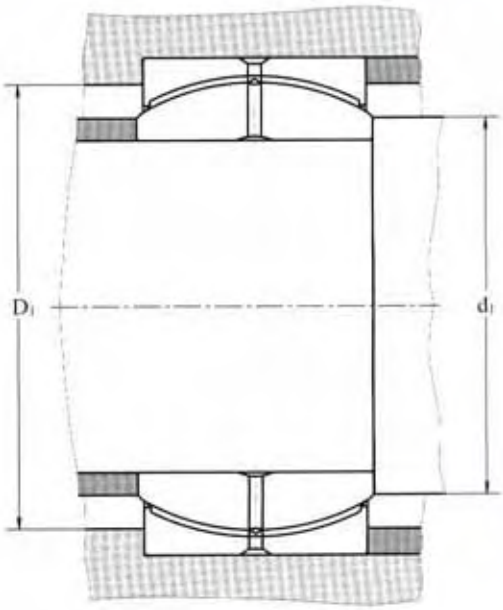
d = 100 ... 300 mm

After initial lubrication maintenance-free

Order example for nominal diameter d = 140 mm **radial spherical plain bearing GE 140 HS**

| Type | d | D | B | C | $d_k$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 100 HS | 100 -0,020 | 150 -0,018 | 71 -0,20 | 67 -0,20 | 135 | 750 | 600 |
| GE 110 HS | 110 -0,020 | 160 -0,025 | 78 -0,20 | 74 -0,25 | 145 | 880 | 720 |
| GE 120 HS | 120 -0,020 | 180 -0,025 | 85 -0,20 | 80 -0,25 | 160 | 1080 | 865 |
| GE 140 HS | 140 -0,025 | 210 -0,030 | 100 -0,25 | 95 -0,25 | 185 | 1530 | 1220 |
| GE 160 HS | 160 -0,025 | 230 -0,030 | 115 -0,25 | 109 -0,30 | 210 | 2000 | 1600 |
| GE 180 HS | 180 -0,025 | 260 -0,035 | 128 -0,25 | 122 -0,35 | 240 | 2600 | 2080 |
| GE 200 HS | 200 -0,030 | 290 -0,035 | 140 -0,30 | 134 -0,35 | 260 | 3100 | 2450 |
| GE 220 HS | 220 -0,030 | 320 -0,040 | 155 -0,35 | 148 -0,40 | 290 | 3800 | 3050 |
| GE 240 HS | 240 -0,030 | 340 -0,040 | 170 -0,40 | 162 -0,45 | 310 | 4500 | 3600 |
| GE 260 HS | 260 -0,035 | 370 -0,040 | 185 -0,40 | 175 -0,45 | 340 | 5300 | 4250 |
| GE 280 HS | 280 -0,035 | 400 -0,040 | 200 -0,45 | 190 -0,45 | 370 | 6300 | 5000 |
| GE 300 HS | 300 -0,035 | 430 -0,045 | 212 -0,45 | 200 -0,45 | 390 | 6950 | 5600 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_{1min}$ | $d_{1max}$ | $D_{1min}$ | $D_{1max}$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | kg | |
| GE 100 HS | 2 | 1,0 | 1,0 | 107,5 | 114,5 | 124,5 | 143,5 | 4,5 | 055 360 |
| GE 110 HS | 2 | 1,0 | 1,0 | 117,5 | 122 | 132 | 153,5 | 5,4 | 055 361 |
| GE 120 HS | 2 | 1,0 | 1,0 | 128 | 135,5 | 146 | 173 | 8 | 055 362 |
| GE 140 HS | 2 | 1,0 | 1,0 | 149 | 155,5 | 166,5 | 202,5 | 13,0 | 055 363 |
| GE 160 HS | 2 | 1,0 | 1,0 | 169,5 | 175,5 | 187,5 | 222 | 16,6 | 055 364 |
| GE 180 HS | 2 | 1,1 | 1,1 | 191,5 | 203 | 214,5 | 250 | 24,4 | 055 365 |
| GE 200 HS | 2 | 1,1 | 1,1 | 212 | 219 | 232 | 279,5 | 33,5 | 055 366 |
| GE 220 HS | 2 | 1,1 | 1,1 | 233 | 245 | 259 | 309 | 45,8 | 055 367 |
| GE 240 HS | 2 | 1,1 | 1,1 | 253,5 | 259 | 274 | 328,5 | 53,7 | 055 368 |
| GE 260 HS | 2 | 1,1 | 1,1 | 274,5 | 285 | 302 | 358 | 69,5 | 055 369 |
| GE 280 HS | 2 | 1,1 | 1,1 | 295,5 | 311 | 328 | 387,5 | 89,5 | 055 370 |
| GE 300 HS | 2 | 1,1 | 1,1 | 315,5 | 327 | 346 | 417 | 110 | 055 371 |

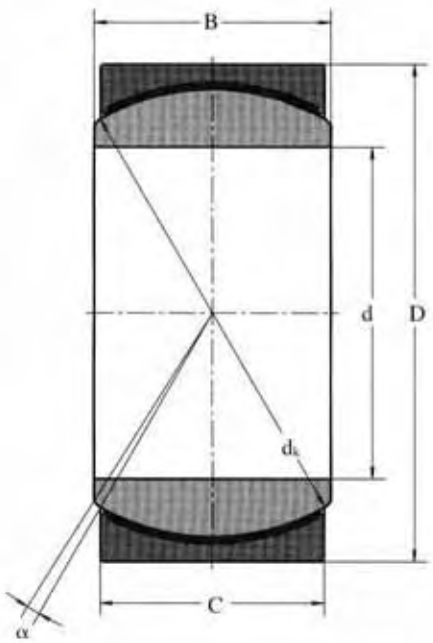
# Large diameter radial spherical plain bearings, maintenance-free

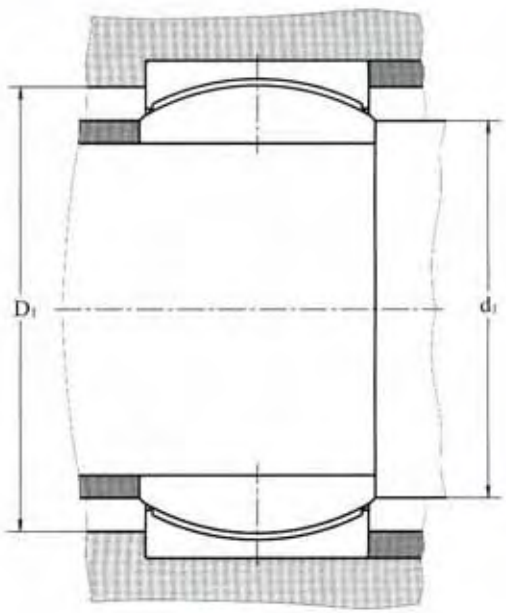
GE ... HS

d = 320 ... 1000 mm

Order example for nominal diameter d = 320 mm **radial spherical plain bearing GE 320 HS**

| Type | d | D | B | C | $d_k$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|
| | mm | | | | | kN | kN |
| GE 320 HS | 320 -0,040 | 460 -0,045 | 230 -0,45 | 218 -0,50 | 414 | 8000 | 6400 |
| GE 340 HS | 340 -0,040 | 480 -0,045 | 243 -0,50 | 230 -0,50 | 434 | 8900 | 7100 |
| GE 360 HS | 360 -0,040 | 520 -0,050 | 258 -0,50 | 243 -0,50 | 474 | 10250 | 8150 |
| GE 380 HS | 380 -0,040 | 540 -0,050 | 272 -0,50 | 258 -0,50 | 494 | 11300 | 9150 |
| GE 400 HS | 400 -0,040 | 580 -0,050 | 280 -0,50 | 265 -0,75 | 514 | 12000 | 9650 |
| GE 420 HS | 420 -0,045 | 600 -0,050 | 300 -0,50 | 280 -0,75 | 534 | 13300 | 10600 |
| GE 440 HS | 440 -0,045 | 630 -0,075 | 315 -0,75 | 300 -0,75 | 574 | 15300 | 12200 |
| GE 460 HS | 460 -0,045 | 650 -0,075 | 325 -0,75 | 308 -1,00 | 593 | 16250 | 12900 |
| GE 480 HS | 480 -0,045 | 680 -0,075 | 340 -0,75 | 320 -1,00 | 623 | 17700 | 14300 |
| GE 500 HS | 500 -0,045 | 710 -0,075 | 355 -0,75 | 335 -1,00 | 643 | 19000 | 15300 |
| GE 530 HS | 530 -0,050 | 750 -0,075 | 375 -1,00 | 355 -1,00 | 673 | 21300 | 17000 |
| GE 560 HS | 560 -0,050 | 800 -0,075 | 400 -1,00 | 380 -1,25 | 723 | 24500 | 19600 |
| GE 600 HS | 600 -0,050 | 850 -0,100 | 425 -1,00 | 400 -1,25 | 773 | 27500 | 22000 |
| GE 630 HS | 630 -0,050 | 900 -0,100 | 450 -1,25 | 425 -1,25 | 813 | 30750 | 24500 |
| GE 670 HS | 670 -0,075 | 950 -0,100 | 475 -1,25 | 450 -1,25 | 862 | 34500 | 27500 |
| GE 710 HS | 710 -0,075 | 1000 -0,100 | 500 -1,25 | 475 -1,25 | 912 | 38500 | 31000 |
| GE 750 HS | 750 -0,075 | 1060 -0,125 | 530 -1,25 | 500 -1,50 | 972 | 43250 | 34500 |
| GE 800 HS | 800 -0,075 | 1120 -0,125 | 565 -1,25 | 530 -1,50 | 1022 | 48200 | 39000 |
| GE 850 HS | 850 -0,100 | 1220 -0,125 | 600 -1,50 | 565 -1,50 | 1112 | 56000 | 45000 |
| GE 900 HS | 900 -0,100 | 1250 -0,125 | 635 -1,50 | 600 -1,50 | 1142 | 61000 | 49000 |
| GE 950 HS | 950 -0,100 | 1360 -0,160 | 670 -1,50 | 635 -1,50 | 1242 | 70200 | 56000 |
| GE 1000 HS | 1000 -0,100 | 1450 -0,160 | 710 -1,50 | 670 -1,50 | 1312 | 78250 | 63000 |




| Type | α | $r_{1s}$ | $r_{2s}$ | $d_{1min}$ | $d_{1max}$ | $D_{1min}$ | $D_{1max}$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | kg | |
| GE 320 HS | 2 | 1,1 | 3,0 | 341 | 351 | 363 | 431 | 135 | 055 372 |
| GE 340 HS | 2 | 1,1 | 3,0 | 358 | 366 | 379 | 449 | 150 | 055 373 |
| GE 360 HS | 2 | 1,1 | 4,0 | 389 | 404 | 419 | 485 | 200 | 055 374 |
| GE 380 HS | 2 | 1,5 | 4,0 | 406 | 419 | 433 | 503 | 220 | 055 375 |
| GE 400 HS | 2 | 1,5 | 4,0 | 426 | 438 | 452 | 544 | 275 | 055 376 |
| GE 420 HS | 2 | 1,5 | 4,0 | 440 | 449 | 467 | 562 | 300 | 055 377 |
| GE 440 HS | 2 | 1,5 | 4,0 | 471 | 487 | 501 | 589 | 360 | 055 378 |
| GE 460 HS | 2 | 1,5 | 5,0 | 489 | 504 | 521 | 612 | 380 | 055 379 |
| GE 480 HS | 2 | 2,0 | 5,0 | 514 | 530 | 549 | 635 | 435 | 055 380 |
| GE 500 HS | 2 | 2,0 | 5,0 | 531 | 544 | 563 | 664 | 500 | 055 381 |
| GE 530 HS | 2 | 2,0 | 5,0 | 556 | 567 | 586 | 707 | 585 | 055 382 |
| GE 560 HS | 2 | 2,0 | 5,0 | 594 | 610 | 629 | 749 | 730 | 055 383 |
| GE 600 HS | 2 | 2,0 | 6,0 | 636 | 654 | 678 | 794 | 860 | 055 384 |
| GE 630 HS | 2 | 3,0 | 6,0 | 668 | 685 | 709 | 841 | 1040 | 055 385 |
| GE 670 HS | 2 | 3,0 | 6,0 | 710 | 728 | 752 | 888 | 1210 | 055 386 |
| GE 710 HS | 2 | 3,0 | 6,0 | 752 | 772 | 796 | 936 | 1400 | 055 387 |
| GE 750 HS | 2 | 3,0 | 6,0 | 799 | 824 | 851 | 994 | 1670 | 055 388 |
| GE 800 HS | 2 | 3,0 | 6,0 | 841 | 861 | 891 | 1051 | 1940 | 055 389 |
| GE 850 HS | 2 | 3,0 | 7,5 | 912 | 945 | 977 | 1143 | 2600 | 055 390 |
| GE 900 HS | 2 | 3,0 | 7,5 | 940 | 958 | 991 | 1171 | 2690 | 055 391 |
| GE 950 HS | 2 | 4,0 | 7,5 | 1019 | 1055 | 1087 | 1279 | 3620 | 055 392 |
| GE 1000 HS | 2 | 4,0 | 7,5 | 1058 | 1112 | 1147 | 1367 | 4470 | 055 393 |

# Steel/Steel Angular Contact Spherical Plain Bearings

GE ... HSS

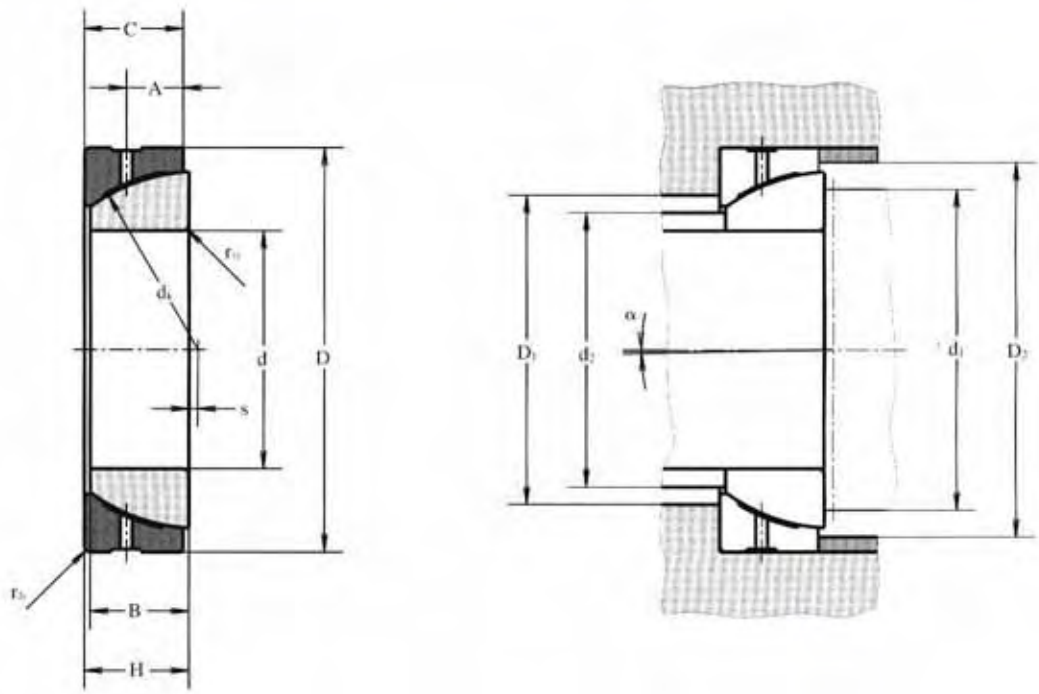
d = 25 ... 300 mm

Dimensions as for tapered roller bearing series 320-X DIN 720 or ISO 335

Tilting angle $\alpha$ 0,8...1,2°

Order example for nominal diameter d = 140 mm **angular contact spherical plain bearing GE 140 HSS**

| Type | d | D | H | C | s | $d_k$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | kN | kN |
| GE 25 HSS | 25 -0,012 | 47 -0,014 | 15 ±0,25 | 14 -0,20 | 1 | 42,5 | 236 | 47,5 |
| GE 30 HSS | 30 -0,012 | 55 -0,016 | 17 ±0,25 | 16 -0,20 | 2 | 50 | 315 | 63 |
| GE 35 HSS | 35 -0,012 | 62 -0,016 | 18 ±0,25 | 17 -0,24 | 2 | 56 | 390 | 76,5 |
| GE 40 HSS | 40 -0,012 | 68 -0,016 | 19 ±0,25 | 18 -0,24 | 1,5 | 60 | 450 | 90 |
| GE 50 HSS | 50 -0,012 | 80 -0,016 | 20 ±0,25 | 19 -0,24 | 4 | 74 | 585 | 118 |
| GE 60 HSS | 60 -0,015 | 95 -0,018 | 23 ±0,25 | 22 -0,30 | 5 | 86 | 800 | 160 |
| GE 70 HSS | 70 -0,015 | 110 -0,018 | 25 ±0,25 | 24 -0,30 | 7 | 102 | 1040 | 208 |
| GE 75 HSS | 75 -0,015 | 115 -0,018 | 25 ±0,25 | 24 -0,30 | 7 | 105 | 1080 | 216 |
| GE 80 HSS | 80 -0,015 | 125 -0,020 | 29 ±0,25 | 27 -0,30 | 10 | 115 | 1250 | 250 |
| GE 90 HSS | 90 -0,020 | 140 -0,020 | 32 ±0,25 | 30 -0,40 | 11 | 130 | 1600 | 320 |
| GE 100 HSS | 100 -0,020 | 150 -0,020 | 32 ±0,25 | 30 -0,40 | 12 | 140 | 1760 | 345 |
| GE 110 HSS | 110 -0,020 | 170 -0,025 | 38 ±0,25 | 36 -0,40 | 15 | 160 | 2360 | 475 |
| GE 120 HSS | 120 -0,020 | 180 -0,025 | 38 ±0,25 | 36 -0,40 | 17 | 170 | 2550 | 510 |
| GE 130 HSS | 130 -0,025 | 200 -0,030 | 45 ±0,35 | 42 -0,50 | 20 | 190 | 3200 | 640 |
| GE 140 HSS | 140 -0,025 | 210 -0,030 | 45 ±0,35 | 42 -0,50 | 20 | 200 | 3450 | 680 |
| GE 150 HSS | 150 -0,025 | 225 -0,030 | 48 ±0,35 | 45 -0,50 | 21 | 213 | 3900 | 780 |
| GE 160 HSS | 160 -0,025 | 240 -0,030 | 51 ±0,35 | 48 -0,50 | 21 | 225 | 4500 | 900 |
| GE 170 HSS | 170 -0,025 | 260 -0,035 | 57 ±0,35 | 54 -0,50 | 27 | 250 | 5500 | 1100 |
| GE 180 HSS | 180 -0,025 | 280 -0,035 | 64 ±0,35 | 61 -0,50 | 21 | 260 | 6700 | 1320 |
| GE 190 HSS | 190 -0,030 | 290 -0,035 | 64 ±0,35 | 61 -0,60 | 29 | 275 | 6950 | 1370 |
| GE 200 HSS | 200 -0,030 | 310 -0,035 | 70 ±0,35 | 66 -0,60 | 26 | 290 | 7800 | 1560 |
| GE 220 HSS | 220 -0,030 | 340 -0,040 | 76 ±0,35 | 72 -0,60 | 30 | 320 | 9500 | 1900 |
| GE 240 HSS | 240 -0,030 | 360 -0,040 | 76 ±0,35 | 72 -0,60 | 32 | 340 | 10200 | 2040 |
| GE 260 HSS | 260 -0,035 | 400 -0,040 | 87 ±0,35 | 83 -0,70 | 33,5 | 375 | 12500 | 2600 |
| GE 280 HSS | 280 -0,035 | 420 -0,045 | 87 ±0,35 | 83 -0,70 | 45 | 400 | 14200 | 2900 |
| GE 300 HSS | 300 -0,035 | 460 -0,045 | 100 ±0,35 | 96 -0,70 | 38 | 430 | 16500 | 3400 |




| Type | $d_9$ | B | A | $r_{1s}$ | $r_{2s}$ | $d_{1max}$ | $d_{2max}$ | $D_{1min}$ | $D_{2min}$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | | | kg | |
| GE 25 HSS | 31,4 | 14 -0,20 | 7,5 | 0,6 | 0,2 | 39,5 | 30,1 | 34 | 43 | 0,13 | 300 534 |
| GE 30 HSS | 36,1 | 16 -0,20 | 8,5 | 1,0 | 0,3 | 45 | 34,6 | 40,5 | 50,5 | 0,21 | 300 536 |
| GE 35 HSS | 42,4 | 17 -0,24 | 9 | 1,0 | 0,3 | 50 | 41,1 | 47 | 57 | 0,27 | 300 538 |
| GE 40 HSS | 46,8 | 18 -0,24 | 9,5 | 1,0 | 0,3 | 54 | 45,5 | 52 | 61 | 0,32 | 300 539 |
| GE 50 HSS | 59,1 | 19 -0,24 | 10 | 1,0 | 0,3 | 67 | 57,9 | 65 | 75 | 0,45 | 300 541 |
| GE 60 HSS | 68,1 | 22 -0,30 | 11,5 | 1,5 | 0,6 | 77 | 66,9 | 76 | 87 | 0,72 | 300 543 |
| GE 70 HSS | 82,2 | 24 -0,30 | 12,5 | 1,5 | 0,6 | 92 | 80,9 | 90 | 104 | 1 | 300 545 |
| GE 75 HSS | 85,9 | 24 -0,30 | 12,5 | 1,5 | 0,6 | 95 | 84,7 | 94 | 107 | 1,1 | 300 546 |
| GE 80 HSS | 90,5 | 27 -0,30 | 14,5 | 1,5 | 0,6 | 104 | 88 | 99 | 117 | 1,5 | 300 547 |
| GE 90 HSS | 103,3 | 30 -0,40 | 16 | 2,0 | 0,6 | 118 | 100,8 | 112 | 132 | 2,1 | 300 549 |
| GE 100 HSS | 114,3 | 30 -0,40 | 16 | 2,0 | 0,6 | 128 | 112 | 123 | 142 | 2,3 | 300 551 |
| GE 110 HSS | 125,8 | 36 -0,40 | 19 | 2,5 | 0,6 | 146 | 123,2 | 135 | 162 | 3,6 | 300 553 |
| GE 120 HSS | 135,4 | 36 -0,40 | 19 | 2,5 | 0,6 | 155 | 132,9 | 145 | 172 | 3,9 | 300 554 |
| GE 130 HSS | 148 | 42 -0,50 | 22,5 | 2,5 | 0,6 | 174 | 143,9 | 158 | 192 | 5,9 | 300 555 |
| GE 140 HSS | 160,6 | 42 -0,50 | 22,5 | 2,5 | 0,6 | 184 | 156,9 | 171 | 202 | 6,3 | 300 556 |
| GE 150 HSS | 170,9 | 45 -0,50 | 24 | 3,0 | 1,0 | 194 | 167,1 | 184 | 216 | 7,7 | 300 557 |
| GE 160 HSS | 181,4 | 48 -0,50 | 25,5 | 3,0 | 1,0 | 206 | 177,7 | 195 | 228 | 9,4 | 300 558 |
| GE 170 HSS | 194,3 | 54 -0,50 | 28,5 | 3,0 | 1,0 | 228 | 190,4 | 208 | 253 | 12 | 300 559 |
| GE 180 HSS | 205,5 | 61 -0,50 | 32 | 3,0 | 1,0 | 240 | 201,7 | 220 | 263 | 17 | 300 560 |
| GE 190 HSS | 211,8 | 61 -0,60 | 32 | 3,0 | 1,0 | 252 | 207,9 | 226 | 278 | 18 | 300 561 |
| GE 200 HSS | 229,2 | 66 -0,60 | 35 | 3,0 | 1,0 | 268 | 224,1 | 244 | 293 | 22,5 | 300 562 |
| GE 220 HSS | 251,6 | 72 -0,60 | 38 | 4,0 | 1,0 | 296 | 246,5 | 267 | 324 | 29,5 | 300 563 |
| GE 240 HSS | 273,8 | 72 -0,60 | 38 | 4,0 | 1,0 | 315 | 268,9 | 290 | 344 | 31,5 | 300 564 |
| GE 260 HSS | 298,8 | 83 -0,70 | 42 | 5,0 | 1,1 | 347 | 293,8 | 318 | 379 | 48 | 300 565 |
| GE 280 HSS | 312,5 | 83 -0,70 | 42 | 5,0 | 1,1 | 367 | 307,3 | 332 | 404 | 51 | 300 566 |
| GE 300 HSS | 341,2 | 96 -0,70 | 43 | 5,0 | 1,1 | 399 | 336,2 | 362 | 435 | 73 | 300 567 |

# Angular contact spherical plain bearings, maintenance-free

GE ... HSW

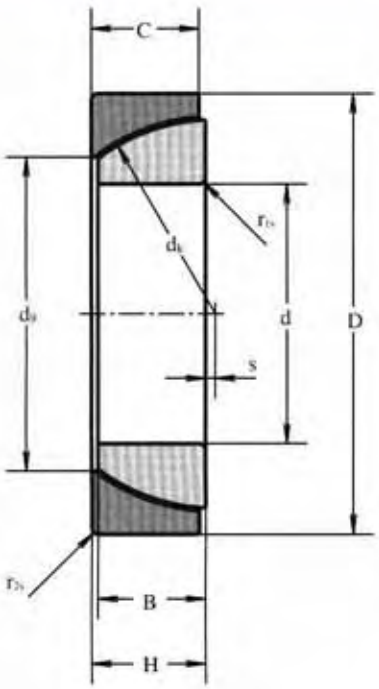
d = 25 ... 300 mm

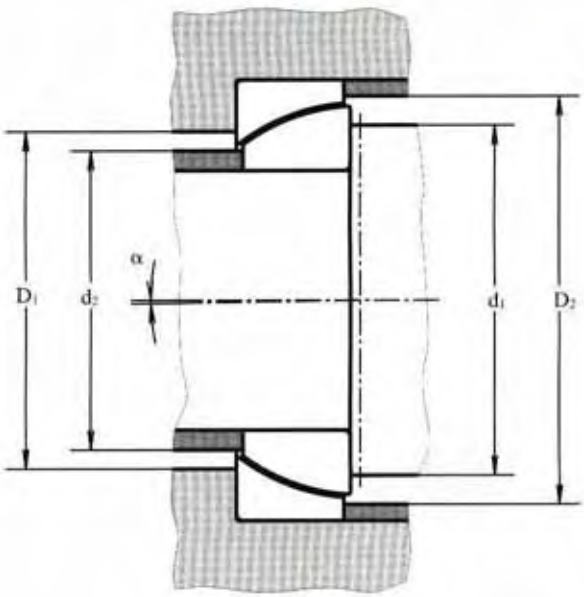
Dimensions as for tapered roller bearing series 320-X DIN 720 or ISO 335

Tilting angle $\alpha$ 0,8...1,2°

Order example for nominal diameter d = 140 mm **Angular contact spherical plain bearing GE 140 HSW**

| Type | d | D | H | C | s | $d_K$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | kN | kN |
| GE 25 HSW | 25 -0,012 | 47 -0,014 | 15 ±0,25 | 14 -0,20 | 1 | 42,5 | 140 | 71 |
| GE 30 HSW | 30 -0,012 | 55 -0,016 | 17 ±0,25 | 16 -0,20 | 2 | 50 | 190 | 95 |
| GE 35 HSW | 35 -0,012 | 62 -0,016 | 18 ±0,25 | 17 -0,24 | 2 | 56 | 232 | 116 |
| GE 40 HSW | 40 -0,012 | 68 -0,016 | 19 ±0,25 | 18 -0,24 | 1,5 | 60 | 270 | 134 |
| GE 50 HSW | 50 -0,012 | 80 -0,016 | 20 ±0,25 | 19 -0,24 | 4 | 74 | 355 | 176 |
| GE 60 HSW | 60 -0,015 | 95 -0,018 | 23 ±0,25 | 22 -0,30 | 5 | 86 | 480 | 240 |
| GE 70 HSW | 70 -0,015 | 110 -0,018 | 25 ±0,25 | 24 -0,30 | 7 | 102 | 630 | 315 |
| GE 75 HSW | 75 -0,015 | 115 -0,018 | 25 ±0,25 | 24 -0,30 | 7 | 105 | 655 | 325 |
| GE 80 HSW | 80 -0,015 | 125 -0,020 | 29 ±0,25 | 27 -0,30 | 10 | 115 | 750 | 375 |
| GE 90 HSW | 90 -0,020 | 140 -0,020 | 32 ±0,25 | 30 -0,40 | 11 | 130 | 965 | 480 |
| GE 100 HSW | 100 -0,020 | 150 -0,020 | 32 ±0,25 | 30 -0,40 | 12 | 140 | 1040 | 520 |
| GE 110 HSW | 110 -0,020 | 170 -0,025 | 38 ±0,25 | 36 -0,40 | 15 | 160 | 1430 | 710 |
| GE 120 HSW | 120 -0,020 | 180 -0,025 | 38 ±0,25 | 36 -0,40 | 17 | 170 | 1530 | 765 |
| GE 130 HSW | 130 -0,025 | 200 -0,030 | 45 ±0,35 | 42 -0,50 | 20 | 190 | 1930 | 965 |
| GE 140 HSW | 140 -0,025 | 210 -0,030 | 45 ±0,35 | 42 -0,50 | 20 | 200 | 2040 | 1020 |
| GE 150 HSW | 150 -0,025 | 225 -0,030 | 48 ±0,35 | 45 -0,50 | 21 | 213 | 2360 | 1180 |
| GE 160 HSW | 160 -0,025 | 240 -0,030 | 51 ±0,35 | 48 -0,50 | 21 | 225 | 2700 | 1340 |
| GE 170 HSW | 170 -0,025 | 260 -0,035 | 57 ±0,35 | 54 -0,50 | 27 | 250 | 3350 | 1660 |
| GE 180 HSW | 180 -0,025 | 280 -0,035 | 64 ±0,35 | 61 -0,50 | 21 | 260 | 4000 | 2000 |
| GE 190 HSW | 190 -0,030 | 290 -0,035 | 64 ±0,35 | 61 -0,60 | 29 | 275 | 4150 | 2080 |
| GE 200 HSW | 200 -0,030 | 310 -0,035 | 70 ±0,35 | 66 -0,60 | 26 | 290 | 4750 | 2360 |
| GE 220 HSW | 220 -0,030 | 340 -0,040 | 76 ±0,35 | 72 -0,60 | 30 | 320 | 5700 | 2850 |
| GE 240 HSW | 240 -0,030 | 360 -0,040 | 76 ±0,35 | 72 -0,60 | 32 | 340 | 6100 | 3050 |
| GE 260 HSW | 260 -0,035 | 400 -0,040 | 87 ±0,35 | 83 -0,70 | 33,5 | 375 | 7800 | 3900 |
| GE 280 HSW | 280 -0,035 | 420 -0,045 | 87 ±0,35 | 83 -0,70 | 45 | 400 | 8300 | 4150 |
| GE 300 HSW | 300 -0,035 | 460 -0,045 | 100 ±0,35 | 96 -0,70 | 38 | 430 | 10400 | 5200 |




| Type | $d_9$ | B | $r_{1s}$ | $r_{2s}$ | $d_{1max}$ | $d_{2max}$ | $D_{1min}$ | $D_{2min}$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | | kg | |
| GE 25 HSW | 31,4 | 14 -0,20 | 0,6 | 0,2 | 39,5 | 30,1 | 34 | 43 | 0,14 | 300 500 |
| GE 30 HSW | 36,1 | 16 -0,20 | 1,0 | 0,3 | 45 | 34,6 | 40,5 | 50,5 | 0,22 | 300 502 |
| GE 35 HSW | 42,4 | 17 -0,24 | 1,0 | 0,3 | 50 | 41,1 | 47 | 57 | 0,28 | 300 504 |
| GE 40 HSW | 46,8 | 18 -0,24 | 1,0 | 0,3 | 54 | 45,5 | 52 | 61 | 0,34 | 300 505 |
| GE 50 HSW | 59,1 | 19 -0,24 | 1,0 | 0,3 | 67 | 57,9 | 65 | 75 | 0,47 | 300 507 |
| GE 60 HSW | 68,1 | 22 -0,30 | 1,5 | 0,6 | 77 | 66,9 | 76 | 87 | 0,75 | 300 509 |
| GE 70 HSW | 82,2 | 24 -0,30 | 1,5 | 0,6 | 92 | 80,9 | 90 | 104 | 1 | 300 511 |
| GE 75 HSW | 85,9 | 24 -0,30 | 1,5 | 0,6 | 95 | 84,7 | 94 | 107 | 1,1 | 300 512 |
| GE 80 HSW | 90,5 | 27 -0,30 | 1,5 | 0,6 | 104 | 88 | 99 | 117 | 1,6 | 300 513 |
| GE 90 HSW | 103,3 | 30 -0,40 | 2,0 | 0,6 | 118 | 100,8 | 112 | 132 | 2,2 | 300 515 |
| GE 100 HSW | 114,3 | 30 -0,40 | 2,0 | 0,6 | 128 | 112 | 123 | 142 | 2,4 | 300 517 |
| GE 110 HSW | 125,8 | 36 -0,40 | 2,5 | 0,6 | 146 | 123,2 | 135 | 162 | 3,7 | 300 519 |
| GE 120 HSW | 135,4 | 36 -0,40 | 2,5 | 0,6 | 155 | 132,9 | 145 | 172 | 4 | 300 520 |
| GE 130 HSW | 148 | 42 -0,50 | 2,5 | 0,6 | 174 | 143,9 | 158 | 192 | 6 | 300 521 |
| GE 140 HSW | 160,6 | 42 -0,50 | 2,5 | 0,6 | 184 | 156,9 | 171 | 202 | 6,4 | 300 522 |
| GE 150 HSW | 170,9 | 45 -0,50 | 3,0 | 1,0 | 194 | 167,1 | 184 | 216 | 7,9 | 300 523 |
| GE 160 HSW | 181,4 | 48 -0,50 | 3,0 | 1,0 | 206 | 177,7 | 195 | 228 | 9,6 | 300 524 |
| GE 170 HSW | 194,3 | 54 -0,50 | 3,0 | 1,0 | 228 | 190,4 | 208 | 253 | 13 | 300 525 |
| GE 180 HSW | 205,5 | 61 -0,50 | 3,0 | 1,0 | 240 | 201,7 | 220 | 263 | 17,5 | 300 526 |
| GE 190 HSW | 211,8 | 61 -0,60 | 3,0 | 1,0 | 252 | 207,9 | 226 | 278 | 18 | 300 527 |
| GE 200 HSW | 229,2 | 66 -0,60 | 3,0 | 1,0 | 268 | 224,1 | 244 | 293 | 23 | 300 528 |
| GE 220 HSW | 251,6 | 72 -0,60 | 4,0 | 1,0 | 296 | 246,5 | 267 | 324 | 30 | 300 529 |
| GE 240 HSW | 273,8 | 72 -0,60 | 4,0 | 1,0 | 315 | 268,9 | 290 | 344 | 32,5 | 300 530 |
| GE 260 HSW | 298,8 | 83 -0,70 | 5,0 | 1,1 | 347 | 293,8 | 318 | 379 | 48 | 300 531 |
| GE 280 HSW | 312,5 | 83 -0,70 | 5,0 | 1,1 | 367 | 307,3 | 332 | 404 | 51 | 300 532 |
| GE 300 HSW | 341,2 | 96 -0,70 | 5,0 | 1,1 | 399 | 336,2 | 362 | 435 | 73 | 300 533 |

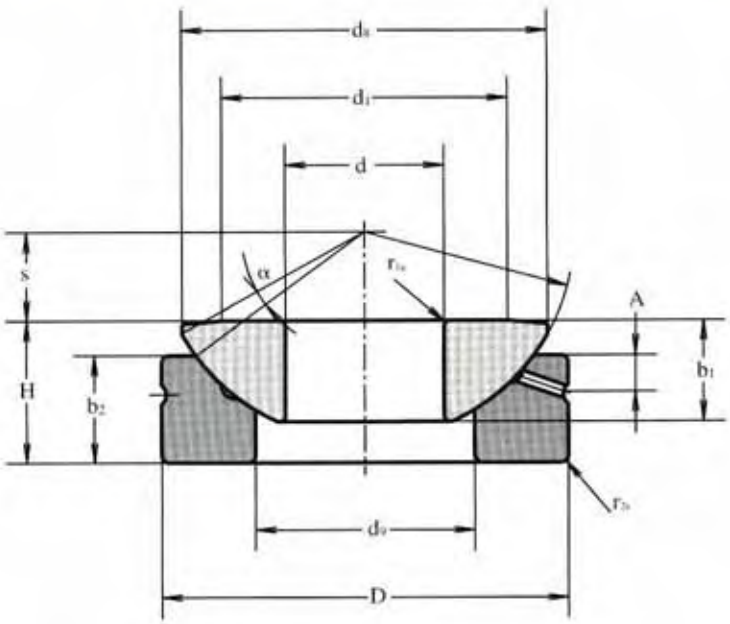
# Steel/Steel Axial spherical plain bearings

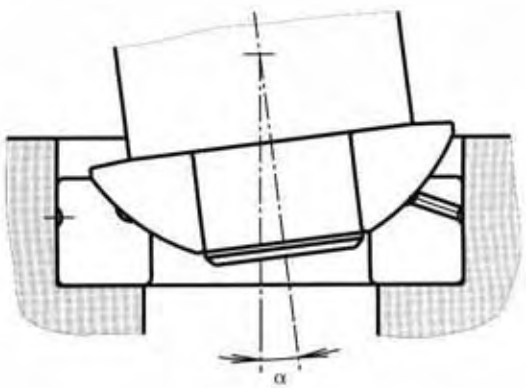
GE ... HX

d = 20 ... 360 mm

Order example for nominal diameter d = 200 mm **Axial spherical plain bearing GE 200 HX**

| Type | d | D | H | α | s | $d_k$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|
| | mm | | | ° | | | kN | kN |
| GE 20 HX | 20 -0,010 | 55 -0,013 | 20 -0,4 | 6 | 12,5 | 60 | 375 | 75 |
| GE 25 HX | 25 -0,010 | 62 -0,013 | 22,5 -0,4 | 7 | 14 | 66 | 640 | 129 |
| GE 25/68 HX | 25 -0,010 | 68 -0,013 | 23 -0,4 | 7 | 16 | 72 | 730 | 150 |
| GE 30 HX | 30 -0,010 | 75 -0,013 | 26 -0,4 | 6 | 17,5 | 80 | 850 | 170 |
| GE 35 HX | 35 -0,012 | 90 -0,015 | 28 -0,4 | 6 | 22 | 98 | 1290 | 260 |
| GE 40 HX | 40 -0,012 | 105 -0,015 | 32 -0,4 | 6 | 24,5 | 114 | 1860 | 370 |
| GE 45 HX | 45 -0,012 | 120 -0,015 | 36,5 -0,4 | 6 | 27,5 | 130 | 2450 | 490 |
| GE 50 HX | 50 -0,012 | 130 -0,018 | 42,5 -0,4 | 5 | 30 | 140 | 3250 | 655 |
| GE 60 HX | 60 -0,015 | 150 -0,018 | 45 -0,4 | 7 | 35 | 160 | 3650 | 730 |
| GE 70 HX | 70 -0,015 | 160 -0,025 | 50 -0,4 | 6 | 35 | 170 | 4050 | 800 |
| GE 80 HX | 80 -0,015 | 180 -0,025 | 50 -0,4 | 6 | 42,5 | 194 | 5200 | 1040 |
| GE 100 HX | 100 -0,020 | 210 -0,030 | 59 -0,4 | 7 | 45 | 220 | 6000 | 1200 |
| GE 120 HX | 120 -0,020 | 230 -0,030 | 64 -0,4 | 8 | 52,5 | 245 | 6200 | 1250 |
| GE 140 HX | 140 -0,025 | 260 -0,035 | 72 -0,5 | 6 | 52,5 | 272 | 8150 | 1630 |
| GE 160 HX | 160 -0,025 | 290 -0,035 | 77 -0,5 | 7 | 65 | 310 | 9500 | 1900 |
| GE 180 HX | 180 -0,025 | 320 -0,040 | 86 -0,5 | 8 | 67,5 | 335 | 10600 | 2120 |
| GE 200 HX | 200 -0,030 | 340 -0,040 | 87 -0,6 | 8 | 70 | 358 | 11800 | 2360 |
| GE 220 HX | 220 -0,030 | 370 -0,040 | 97 -0,6 | 7 | 75 | 388 | 14200 | 2850 |
| GE 240 HX | 240 -0,030 | 400 -0,040 | 103 -0,6 | 6 | 77,5 | 420 | 17100 | 3430 |
| GE 260 HX | 260 -0,035 | 430 -0,045 | 115 -0,7 | 7 | 82,5 | 449 | 19800 | 3970 |
| GE 280 HX | 280 -0,035 | 460 -0,045 | 110 -0,7 | 4 | 80 | 480 | 26800 | 5380 |
| GE 300 HX | 300 -0,035 | 480 -0,045 | 110 -0,7 | 3,5 | 80 | 490 | 27200 | 5440 |
| GE 320 HX | 320 -0,040 | 520 -0,050 | 116 -0,8 | 4 | 95 | 540 | 35200 | 7040 |
| GE 340 HX | 340 -0,040 | 540 -0,050 | 116 -0,8 | 4 | 95 | 550 | 39400 | 7900 |
| GE 360 HX | 360 -0,040 | 560 -0,050 | 125 -0,8 | 4 | 95 | 575 | 42400 | 8500 |




| Type | $b_1$ | $b_2$ | $d_1$ | $d_8$ | $d_9$ | A | $r_{1s}$ | $r_{2s}$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | | kg | |
| GE 20 HX | 14,3 -0,24 | 13 -0,24 | 40 | 50 | 33,5 | 6 | 0,8 | 1,2 | 0,25 | 027 154 |
| GE 25 HX | 16 -0,24 | 17 -0,24 | 45 | 57,5 | 34,5 | 6 | 0,8 | 1,2 | 0,38 | 027 155 |
| GE 25/68 HX | 17 -0,24 | 17 -0,24 | 50 | 62 | 37 | 7 | 0,8 | 1,2 | 0,49 | 027 156 |
| GE 30 HX | 18 -0,24 | 19,5 -0,24 | 56 | 69 | 44 | 8 | 0,8 | 1,2 | 0,65 | 027 157 |
| GE 35 HX | 22 -0,24 | 20 -0,24 | 66 | 84 | 52 | 8 | 1,0 | 1,5 | 1 | 027 158 |
| GE 40 HX | 27 -0,24 | 22 -0,24 | 78 | 98 | 59 | 9 | 1,0 | 1,5 | 1,6 | 027 159 |
| GE 45 HX | 31 -0,24 | 25 -0,24 | 89 | 112 | 68 | 11 | 1,0 | 1,5 | 2,4 | 027 160 |
| GE 50 HX | 33,5 -0,24 | 32 -0,24 | 98 | 122,5 | 69 | 10 | 1,0 | 1,5 | 3,3 | 027 161 |
| GE 60 HX | 37 -0,30 | 33 -0,30 | 108 | 140 | 86 | 12,5 | 1,2 | 1,5 | 4,5 | 027 162 |
| GE 70 HX | 40 -0,30 | 36 -0,30 | 121 | 149,5 | 95 | 13,5 | 1,2 | 1,5 | 5,5 | 027 163 |
| GE 80 HX | 42 -0,30 | 36 -0,30 | 130 | 168 | 108 | 14,5 | 1,2 | 1,5 | 7 | 027 164 |
| GE 100 HX | 50 -0,40 | 42 -0,40 | 155 | 195,5 | 133 | 15 | 1,5 | 1,5 | 10 | 027 165 |
| GE 120 HX | 52 -0,40 | 45 -0,40 | 170 | 214 | 154 | 16,5 | 1,5 | 1,5 | 13 | 027 166 |
| GE 140 HX | 61 -0,50 | 50 -0,50 | 198 | 244 | 176 | 23 | 1,5 | 2,0 | 18 | 027 167 |
| GE 160 HX | 65 -0,50 | 52 -0,50 | 213 | 272 | 199 | 23 | 1,5 | 2,0 | 23 | 027 168 |
| GE 180 HX | 70 -0,50 | 60 -0,50 | 240 | 300 | 224 | 26 | 2,0 | 2,0 | 31 | 027 169 |
| GE 200 HX | 74 -0,60 | 60 -0,60 | 265 | 321 | 246 | 27 | 2,0 | 2,0 | 34 | 027 170 |
| GE 220 HX | 82 -0,60 | 67 -0,60 | 289 | 350 | 265 | 28 | 2,0 | 2,0 | 44,4 | 027 892 |
| GE 240 HX | 87 -0,60 | 73 -0,60 | 314 | 382 | 294 | 30 | 2,0 | 2,0 | 55,6 | 027 893 |
| GE 260 HX | 95 -0,70 | 80 -0,70 | 336 | 409 | 317 | 33 | 2,0 | 2,0 | 69,4 | 027 894 |
| GE 280 HX | 100 -0,70 | 85 -0,70 | 366 | 445 | 337 | 35 | 4,0 | 4,0 | 82,6 | 027 895 |
| GE 300 HX | 100 -0,70 | 90 -0,70 | 388 | 460 | 356 | 37 | 4,0 | 4,0 | 87,4 | 027 896 |
| GE 320 HX | 105 -0,80 | 91 -0,80 | 405 | 500 | 380 | 38 | 5,0 | 5,0 | 109,5 | 027 897 |
| GE 340 HX | 105 -0,80 | 91 -0,80 | 432 | 510 | 380 | 38 | 5,0 | 5,0 | 114,4 | 027 898 |
| GE 360 HX | 115 -0,80 | 95 -0,80 | 452 | 535 | 400 | 40 | 5,0 | 5,0 | 129,0 | 027 899 |

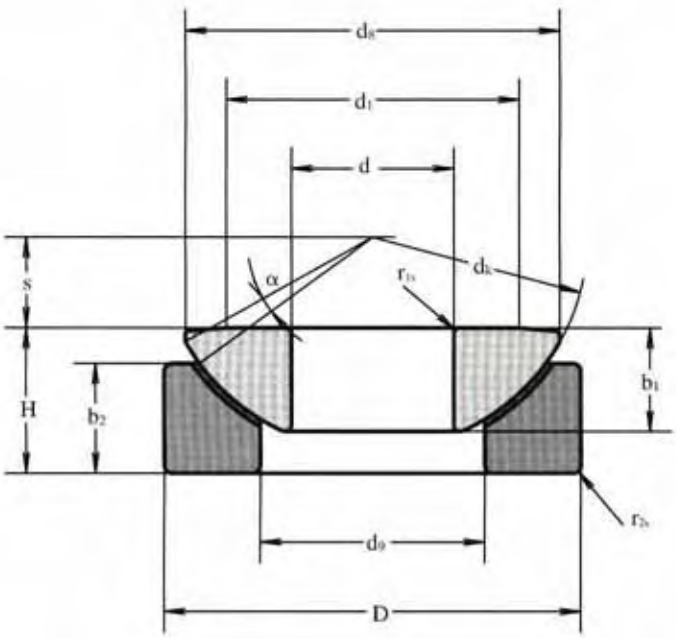
# Axial spherical plain bearings, maintenance-free

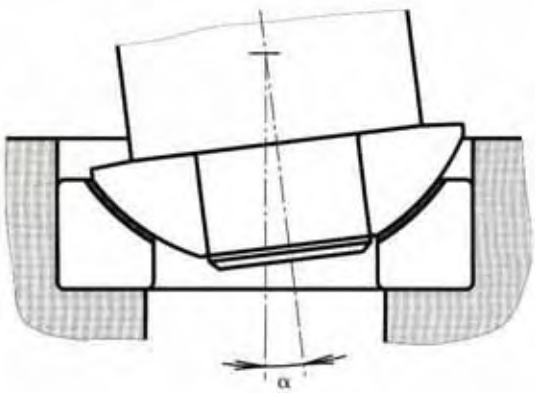
GE ... HXW

d = 20 ... 360 mm

Order example for nominal diameter d = 180 mm **Axial spherical plain bearing GE 180 HXW**

| Type | d | D | H | α | s | $d_K$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|
| | mm | | | ° | | | kN | kN |
| GE 20 HXW | 20 -0,010 | 55 -0,013 | 20 -0,3 | 6 | 12,5 | 60 | 224 | 112 |
| GE 25 HXW | 25 -0,010 | 62 -0,013 | 22,5 -0,3 | 7 | 14 | 66 | 390 | 193 |
| GZ 25/68HXW | 25 -0,010 | 68 -0,013 | 23 -0,3 | 7 | 16 | 72 | 440 | 224 |
| GE 30 HXW | 30 -0,010 | 75 -0,013 | 26 -0,3 | 6 | 17,5 | 80 | 510 | 255 |
| GE 35 HXW | 35 -0,012 | 90 -0,015 | 28 -0,3 | 6 | 22 | 98 | 780 | 390 |
| GE 40 HXW | 40 -0,012 | 105 -0,015 | 32 -0,3 | 6 | 24,5 | 114 | 1120 | 560 |
| GE 45 HXW | 45 -0,012 | 120 -0,015 | 36,5 -0,3 | 6 | 27,5 | 130 | 1460 | 735 |
| GE 50 HXW | 50 -0,012 | 130 -0,018 | 42,5 -0,3 | 5 | 30 | 140 | 1960 | 980 |
| GE 60 HXW | 60 -0,015 | 150 -0,018 | 45 -0,3 | 7 | 35 | 160 | 2200 | 1100 |
| GE 70 HXW | 70 -0,015 | 160 -0,025 | 50 -0,3 | 6 | 35 | 170 | 2400 | 1200 |
| GE 80 HXW | 80 -0,015 | 180 -0,025 | 50 -0,3 | 6 | 42,5 | 194 | 3100 | 1560 |
| GE 100 HXW | 100 -0,020 | 210 -0,030 | 59 -0,4 | 7 | 45 | 220 | 3600 | 1800 |
| GE 120 HXW | 120 -0,020 | 230 -0,030 | 64 -0,4 | 8 | 52,5 | 245 | 3750 | 1860 |
| GE 140 HXW | 140 -0,025 | 260 -0,035 | 72 -0,5 | 6 | 52,5 | 272 | 4900 | 2450 |
| GE 160 HXW | 160 -0,025 | 290 -0,035 | 77 -0,5 | 7 | 65 | 310 | 5700 | 2850 |
| GE 180 HXW | 180 -0,025 | 320 -0,040 | 86 -0,5 | 8 | 67,5 | 335 | 6400 | 3200 |
| GE 200 HXW | 200 -0,030 | 340 -0,040 | 87 -0,6 | 8 | 70 | 358 | 7100 | 3550 |
| GE 220 HXW | 220 -0,030 | 370 -0,040 | 97 -0,6 | 7 | 75 | 388 | 8800 | 4400 |
| GE 240 HXW | 240 -0,030 | 400 -0,040 | 103 -0,6 | 6 | 77,5 | 420 | 10400 | 5200 |
| GE 260 HXW | 260 -0,035 | 430 -0,045 | 115 -0,7 | 7 | 82,5 | 449 | 10800 | 5400 |
| GE 280 HXW | 280 -0,035 | 460 -0,045 | 110 -0,7 | 4 | 80 | 480 | 17000 | 8500 |
| GE 300 HXW | 300 -0,035 | 480 -0,045 | 110 -0,7 | 3,5 | 80 | 490 | 17300 | 8650 |
| GE 320 HXW | 320 -0,040 | 520 -0,050 | 116 -0,8 | 4 | 95 | 540 | 21200 | 10600 |
| GE 340 HXW | 340 -0,040 | 540 -0,050 | 116 -0,8 | 4 | 95 | 550 | 23600 | 11800 |
| GE 360 HXW | 360 -0,040 | 560 -0,050 | 125 -0,8 | 4 | 95 | 575 | 25500 | 12700 |




| Type | $b_1$ | $b_2$ | $d_1$ | $d_8$ | $d_9$ | $r_{1s}$ | $r_{2s}$ | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | kg | |
| GE 20 HXW | 14,3 -0,24 | 13 -0,24 | 40 | 50 | 33,5 | 0,8 | 1,2 | 0,25 | 027 175 |
| GE 25 HXW | 16 -0,24 | 17 -0,24 | 45 | 57,5 | 34,5 | 0,8 | 1,2 | 0,38 | 027 176 |
| GE 25/68 HXW | 17 -0,24 | 17 -0,24 | 50 | 62 | 37 | 0,8 | 1,2 | 0,49 | 027 177 |
| GE 30 HXW | 18 -0,24 | 19,5 -0,24 | 56 | 69 | 44 | 0,8 | 1,2 | 0,65 | 027 178 |
| GE 35 HXW | 22 -0,24 | 20 -0,24 | 66 | 84 | 52 | 1,0 | 1,5 | 1,00 | 027 179 |
| GE 40 HXW | 27 -0,24 | 22 -0,24 | 78 | 98 | 59 | 1,0 | 1,5 | 1,60 | 027 180 |
| GE 45 HXW | 31 -0,24 | 25 -0,24 | 89 | 112 | 68 | 1,0 | 1,5 | 2,40 | 027 181 |
| GE 50 HXW | 33,5 -0,24 | 32 -0,24 | 98 | 122,5 | 69 | 1,0 | 1,5 | 3,30 | 027 182 |
| GE 60 HXW | 37 -0,30 | 33 -0,30 | 108 | 140 | 86 | 1,2 | 1,5 | 4,50 | 027 183 |
| GE 70 HXW | 40 -0,30 | 36 -0,30 | 121 | 149,5 | 95 | 1,2 | 1,5 | 5,50 | 027 184 |
| GE 80 HXW | 42 -0,30 | 36 -0,30 | 130 | 168 | 108 | 1,2 | 1,5 | 7,00 | 027 185 |
| GE 100 HXW | 50 -0,40 | 42 -0,40 | 155 | 195,5 | 133 | 1,5 | 1,5 | 10,60 | 027 186 |
| GE 120 HXW | 52 -0,40 | 45 -0,40 | 170 | 214 | 154 | 1,5 | 1,5 | 12,80 | 027 187 |
| GE 140 HXW | 61 -0,50 | 50 -0,50 | 198 | 244 | 176 | 1,5 | 2,0 | 18,10 | 027 188 |
| GE 160 HXW | 65 -0,50 | 52 -0,50 | 213 | 272 | 199 | 1,5 | 2,0 | 23,10 | 027 189 |
| GE 180 HXW | 70 -0,50 | 60 -0,50 | 240 | 300 | 224 | 2,0 | 2,0 | 30,90 | 027 190 |
| GE 200 HXW | 74 -0,60 | 60 -0,60 | 265 | 321 | 246 | 2,0 | 2,0 | 34,10 | 027 191 |
| GE 220 HXW | 82 -0,60 | 67 -0,60 | 289 | 350 | 265 | 2,0 | 2,0 | 44,40 | 027 192 |
| GE 240 HXW | 87 -0,60 | 73 -0,60 | 314 | 382 | 294 | 2,0 | 2,0 | 55,60 | 027 193 |
| GE 260 HXW | 95 -0,70 | 80 -0,70 | 336 | 409 | 317 | 2,0 | 2,0 | 69,40 | 027 194 |
| GE 280 HXW | 100 -0,70 | 85 -0,70 | 366 | 445 | 337 | 4,0 | 4,0 | 82,60 | 027 195 |
| GE 300 HXW | 100 -0,70 | 90 -0,70 | 388 | 460 | 356 | 4,0 | 4,0 | 87,40 | 027 196 |
| GE 320 HXW | 105 -0,80 | 91 -0,80 | 405 | 500 | 380 | 5,0 | 5,0 | 109,50 | 027 197 |
| GE 340 HXW | 105 -0,80 | 91 -0,80 | 432 | 510 | 380 | 5,0 | 5,0 | 114,40 | 027 198 |
| GE 360 HXW | 115 -0,80 | 95 -0,80 | 452 | 535 | 400 | 5,0 | 5,0 | 129,00 | 027 199 |

# Steel/Steel Rod Ends

GK ... NKS

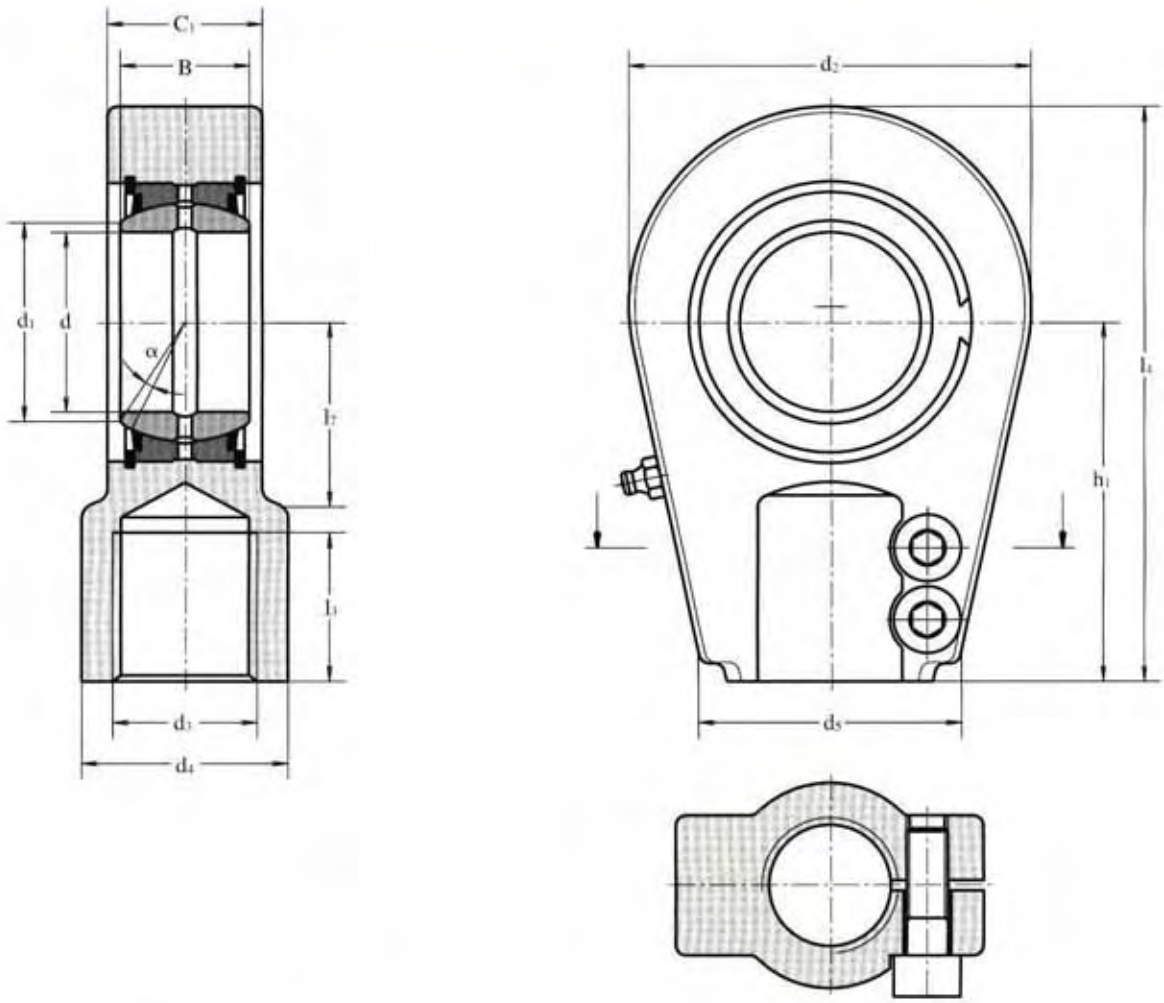
d = 20 ... 120 mm

Spherical plain bearing: GE...H-A to DIN 648, Dimension series E (Table 1)

Dimensions: compact design with fine female clamping thread

Order example for nominal diameter d = 120 mm **Rod end GK 120 NKS**

| Type | d | B | $h_1$ | $d_3$ | $l_3$ | $d_2$ | $d_5$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | kN | kN |
| GK 20 NKS | 20 -0,010 | 16 -0,12 | 50 | M 16 x 1,5 | 17 | 56 | 36 | 72 | 30 |
| GK 25 NKS | 25 -0,010 | 20 -0,12 | 50 | M 16 x 1,5 | 17 | 56 | 36 | 72 | 48 |
| GK 30 NKS | 30 -0,010 | 22 -0,12 | 60 | M 22 x 1,5 | 23 | 64 | 40 | 106 | 62 |
| GK 35 NKS | 35 -0,012 | 25 -0,12 | 70 | M 28 x 1,5 | 29 | 78 | 50 | 153 | 80 |
| GK 40 NKS | 40 -0,012 | 28 -0,12 | 85 | M 35 x 1,5 | 36 | 94 | 60 | 250 | 100 |
| GK 50 NKS | 50 -0,012 | 35 -0,12 | 105 | M 45 x 1,5 | 46 | 116 | 72 | 365 | 156 |
| GK 60 NKS | 60 -0,015 | 44 -0,15 | 130 | M 58 x 1,5 | 59 | 130 | 90 | 400 | 245 |
| GK 70 NKS | 70 -0,015 | 49 -0,15 | 150 | M 65 x 1,5 | 66 | 154 | 100 | 540 | 315 |
| GK 80 NKS | 80 -0,015 | 55 -0,15 | 170 | M 80 x 2 | 81 | 176 | 125 | 670 | 400 |
| GK 90 NKS | 90 -0,020 | 60 -0,20 | 210 | M 100 x 2 | 101 | 206 | 146 | 980 | 490 |
| GK 100 NKS | 100 -0,020 | 70 -0,20 | 235 | M 110 x 2 | 111 | 230 | 166 | 1120 | 610 |
| GK 110 NKS | 110 -0,020 | 70 -0,20 | 265 | M 120 x 3 | 125 | 265 | 190 | 1700 | 655 |
| GK 120 NKS | 120 -0,020 | 85 -0,20 | 310 | M 130 x 3 | 135 | 340 | 217 | 2900 | 950 |




| Type | α | $d_1$ | $d_4$ | $C_1$ | $l_4$ | $l_7$ | Mv | Cylinder screw DIN 912-8.8 | MA | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | | Nm | kg | |
| GK 20 NKS | 9 | 24 | 25 | 19 | 80 | 25 | 2 | M 6 x 16 | 10 | 0,37 | 025 450 |
| GK 25 NKS | 7 | 29 | 25 | 23 | 80 | 28 | 2 | M 6 x 20 | 10 | 0,43 | 025 451 |
| GK 30 NKS | 6 | 34 | 32 | 28 | 94 | 30 | 2 | M 6 x 25 | 10 | 0,70 | 025 452 |
| GK 35 NKS | 6 | 39,5 | 40 | 30 | 112 | 38 | 3 | M 8 x 25 | 25 | 1,10 | 025 453 |
| GK 40 NKS | 7 | 45 | 49 | 35 | 135 | 45 | 3 | M 8 x 30 | 25 | 1,30 | 025 454 |
| GK 50 NKS | 6 | 56 | 61 | 40 | 168 | 55 | 5 | M 10x35 | 49 | 3,20 | 025 455 |
| GK 60 NKS | 6 | 66,5 | 75 | 50 | 200 | 65 | 5 | M 10x45 | 49 | 5,40 | 025 456 |
| GK 70 NKS | 6 | 77,5 | 86 | 55 | 232 | 75 | 5 | M 12x50 | 86 | 8,50 | 025 457 |
| GK 80 NKS | 6 | 89 | 102 | 60 | 265 | 80 | 7 | M 16x50 | 210 | 12,10 | 025 458 |
| GK 90 NKS | 5 | 98 | 124 | 65 | 323 | 90 | 10 | M 16x60 | 210 | 21,40 | 025 459 |
| GK 100 NKS | 7 | 109,5 | 138 | 70 | 360 | 105 | 10 | M 20x60 | 410 | 27,40 | 025 460 |
| GK 110 NKS | 6 | 121 | 152 | 80 | 407,5 | 115 | 10 | M 20x70 | 410 | 40,70 | 025 461 |
| GK 120 NKS | 6 | 135,5 | 172 | 90 | 490 | 140 | 10 | M 24x80 | 710 | 76,30 | 025 462 |

# Steel/Steel Rod Ends

GK ... SKS

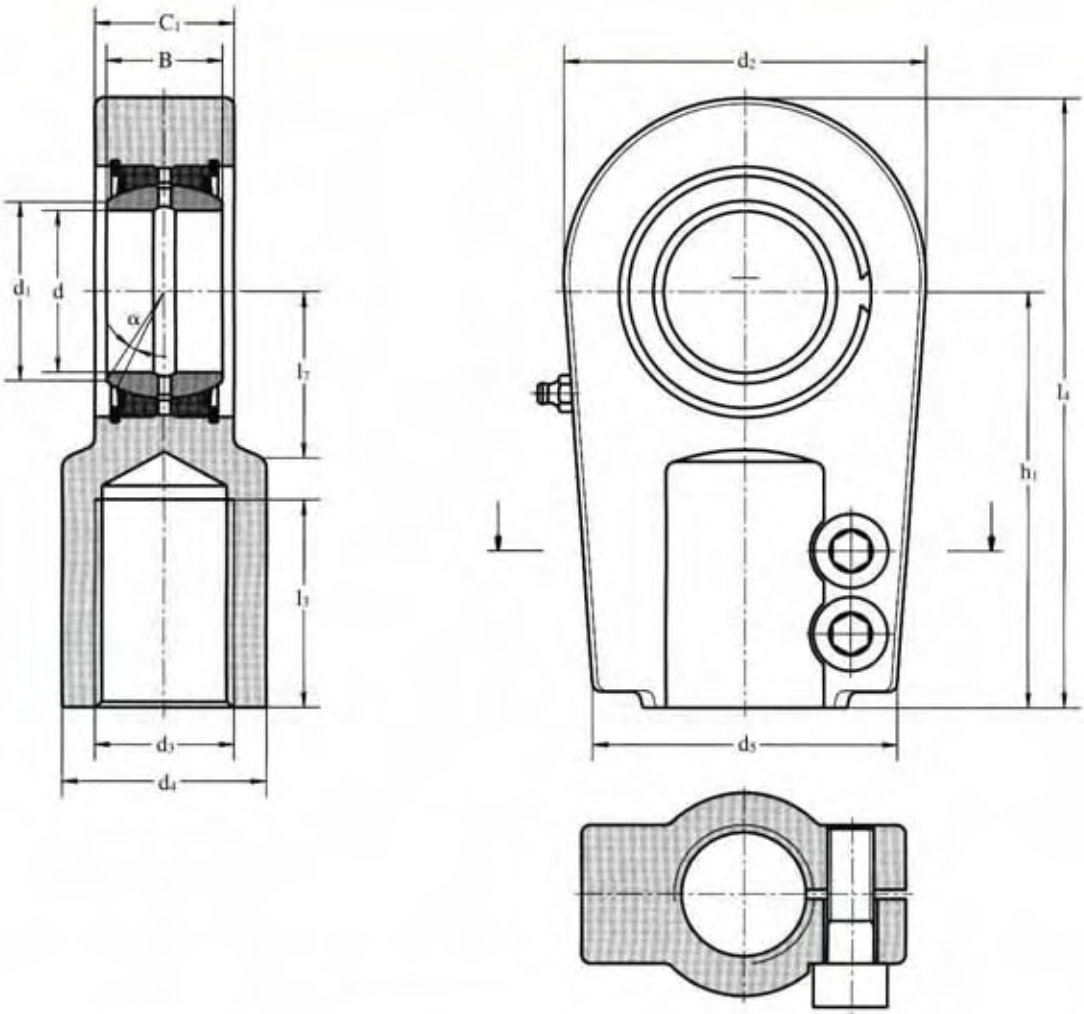
d = 25 ... 160 mm

Spherical plain bearing: GE...H-A to DIN 648, Dimension series E

Dimensions:
heavy duty design, for higher static loads than type GK...NKS
with fine female clamping thread

Order example for nominal diameter d = 120 mm **Rod end GK 120 SKS**

| Type | d | B | $h_1$ | $d_3$ | $l_3$ | $d_2$ | $d_5$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | kN | kN |
| GK 25 SKS | 25 -0,010 | 20 -0,120 | 65 | M 18 x 2 | 30 | 56 | 48 | 82 | 48 |
| GK 30 SKS | 30 -0,010 | 22 -0,120 | 75 | M 24 x 2 | 35 | 64 | 54 | 122 | 62 |
| GK 35 SKS | 35 -0,012 | 25 -0,120 | 90 | M 30 x 2 | 45 | 78 | 66 | 177 | 80 |
| GK 40 SKS | 40 -0,012 | 28 -0,120 | 105 | M 39 x 3 | 55 | 94 | 78 | 287 | 100 |
| GK 50 SKS | 50 -0,012 | 35 -0,120 | 135 | M 50 x 3 | 75 | 116 | 90 | 422 | 156 |
| GK 60 SKS | 60 -0,015 | 44 -0,150 | 170 | M 64 x 3 | 95 | 130 | 118 | 522 | 245 |
| GK 70 SKS | 70 -0,015 | 49 -0,150 | 195 | M 80 x 3 | 110 | 154 | 130 | 707 | 315 |
| GK 80 SKS | 80 -0,015 | 55 -0,150 | 210 | M 90 x 3 | 120 | 176 | 158 | 870 | 400 |
| GK 90 SKS | 90 -0,020 | 60 -0,200 | 250 | M 100 x 3 | 140 | 206 | 162 | 1284 | 490 |
| GK 100 SKS | 100 -0,020 | 70 -0,200 | 275 | M 110 x 4 | 150 | 230 | 172 | 1460 | 610 |
| GK 110 SKS | 110 -0,020 | 70 -0,200 | 300 | M 120 x 4 | 160 | 264 | 194 | 2024 | 655 |
| GK 120 SKS | 120 -0,020 | 85 -0,200 | 360 | M 150 x 4 | 190 | 340 | 224 | 2970 | 950 |
| GK 160 SKS | 160 -0,025 | 105 -0,250 | 460 | M 180 x 4 | 220 | 480 | 290 | 4302 | 1370 |




| Type | α | $d_1$ | $d_4$ | $C_1$ | $l_4$ | $l_7$ | Mv | Cylinder screw DIN 912-8.8 | MA | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | | Nm | kg | |
| GK 25 SKS | 7 | 29 | 28 | 23 | 95 | 25 | 2 | M 8 x 20 | 25 | 0,65 | 025 550 |
| GK 30 SKS | 6 | 34 | 34 | 28 | 109 | 30 | 2 | M 8 x 20 | 25 | 1 | 025 551 |
| GK 35 SKS | 6 | 39 | 44 | 30 | 132 | 40 | 3 | M 10 x 25 | 49 | 1,3 | 025 552 |
| GK 40 SKS | 7 | 45 | 55 | 35 | 155 | 45 | 3 | M 12 x 30 | 86 | 2,4 | 025 553 |
| GK 50 SKS | 6 | 56 | 70 | 40 | 198 | 55 | 5 | M 12 x 30 | 86 | 4,1 | 025 554 |
| GK 60 SKS | 6 | 66 | 87 | 50 | 240 | 65 | 5 | M 16 x 40 | 210 | 6,5 | 025 555 |
| GK 70 SKS | 6 | 77 | 105 | 55 | 278 | 75 | 6 | M 16 x 40 | 210 | 9,5 | 025 556 |
| GK 80 SKS | 6 | 89 | 125 | 60 | 305 | 80 | 7 | M 20 x 50 | 410 | 16 | 025 557 |
| GK 90 SKS | 5 | 98 | 150 | 65 | 363 | 90 | 10 | M 20 x 50 | 410 | 28 | 025 558 |
| GK 100 SKS | 7 | 109,5 | 170 | 70 | 400 | 105 | 10 | M 20 x 50 | 410 | 34 | 025 559 |
| GK 110 SKS | 6 | 121 | 180 | 80 | 442 | 115 | 10 | M 24 x 60 | 710 | 44 | 025 560 |
| GK 120 SKS | 6 | 135,5 | 210 | 90 | 540 | 140 | 10 | M 24 x 60 | 710 | 75 | 025 561 |
| GK 160 SKS | 8 | 170 | 260 | 110 | 710 | 200 | 10 | M 30 x 80 | 1450 | 160 | 025 562 |

# Steel/Steel Rod Ends

GK ... CKS

d = 20 ... 320 mm

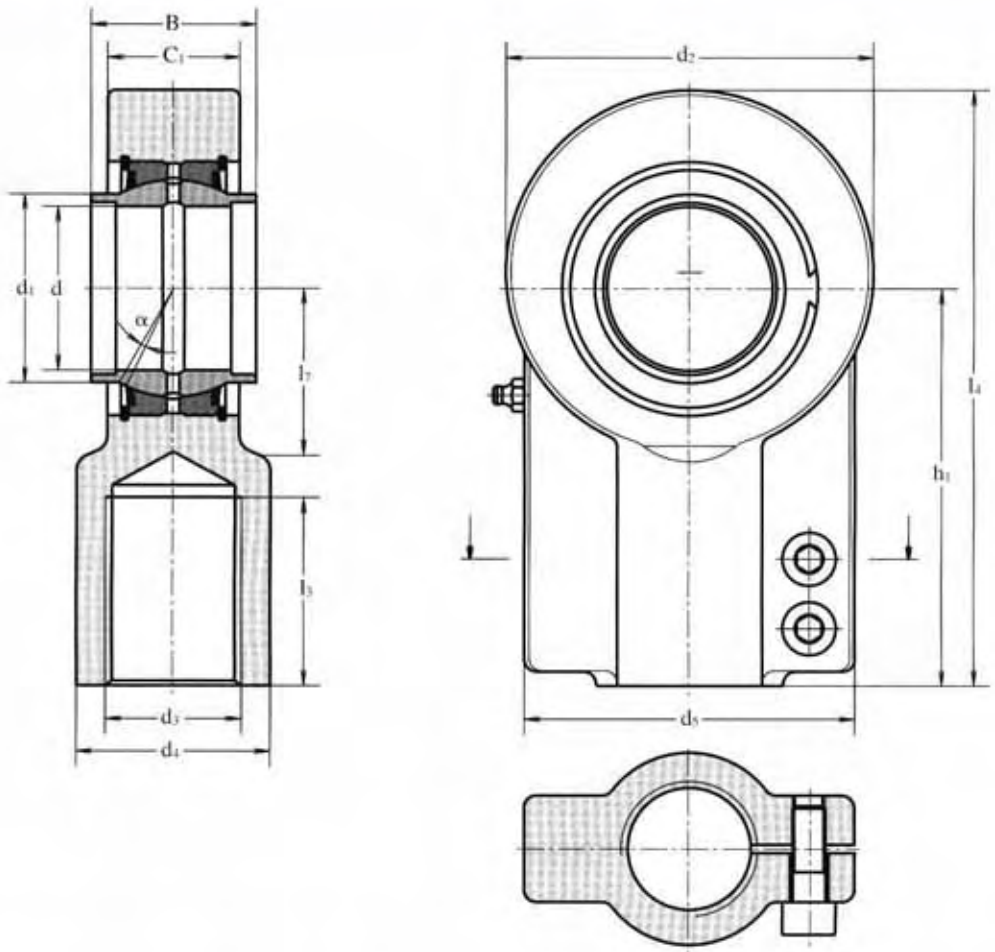
Spherical plain bearing: GE...BN-A to DIN 648 Dimension series EW (Table 5), ISO 6124/2

Dimensions:
DIN 24 338 (Dimensioning symbol to DIN 648)
with fine female clamping thread

for Hunger hydraulic cylinder HHN 813 to DIN 24554 (160 bar)

Order example for nominal diameter d = 100 mm **Rod end GK 100 CKS**

| Type | d | B | $h_1$ | $d_3$ | $l_3$ | $d_2$ | $d_5$ | $d_4$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | | kN | kN |
| GK 20 CKS | 20 $^{+0,021}$ | 20 $_{-0,21}$ | 52 | M 16 x 1,5 | 23 | 47 | 47 | 25 | 48 | 30 |
| GK 25 CKS | 25 $^{+0,021}$ | 25 $_{-0,21}$ | 65 | M 20 x 1,5 | 29 | 58 | 54 | 30 | 78 | 48 |
| GK 32 CKS | 32 $^{+0,025}$ | 32 $_{-0,25}$ | 80 | M 27 x 2 | 37 | 70 | 66 | 38 | 114 | 67 |
| GK 40 CKS | 40 $^{+0,025}$ | 40 $_{-0,25}$ | 97 | M 33 x 2 | 46 | 89 | 80 | 47 | 204 | 100 |
| GK 50 CKS | 50 $^{+0,025}$ | 50 $_{-0,25}$ | 120 | M 42 x 2 | 57 | 108 | 96 | 58 | 310 | 156 |
| GK 63 CKS | 63 $^{+0,030}$ | 63 $_{-0,30}$ | 140 | M 48 x 2 | 64 | 132 | 114 | 70 | 430 | 255 |
| GK 80 CKS | 80 $^{+0,030}$ | 80 $_{-0,30}$ | 180 | M 64 x 3 | 86 | 168 | 148 | 90 | 695 | 400 |
| GK 100 CKS | 100 $^{+0,030}$ | 100 $_{-0,35}$ | 210 | M 80 x 3 | 96 | 210 | 178 | 110 | 1060 | 610 |
| GK 125 CKS | 125 $^{+0,040}$ | 125 $_{-0,40}$ | 260 | M 100 x 3 | 113 | 262 | 200 | 135 | 1430 | 950 |
| GK 160 CKS | 160 $^{+0,040}$ | 160 $_{-0,40}$ | 310 | M 125 x 4 | 126 | 326 | 250 | 165 | 2200 | 1370 |
| GK 200 CKS | 200 $^{+0,046}$ | 200 $_{-0,46}$ | 390 | M 160 x 4 | 161 | 418 | 320 | 215 | 3650 | 2120 |
| GK 250 CKS | 250 $^{+0,046}$ | 250 $_{-0,46}$ | 530 | M 200 x 4 | 205 | 580 | 420 | 300 | 6400 | 3550 |
| GK 320 CKS | 320 $^{+0,057}$ | 320 $_{-0,57}$ | 640 | M 250 x 6 | 260 | 700 | 520 | 360 | 8650 | 6100 |




| Type | α | $d_1$ | $C_1$ | $C_2$ | $l_4$ | $l_7$ | Mv | Cylinder screw DIN 912-8.8 | MA | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | | Nm | kg | |
| GK 20 CKS | 4 | 25 | 17 | 14 | 77 | 22 | 1,5 | M 6 x 16 | 10 | 0,4 | 025 350 |
| GK 25 CKS | 4 | 30,5 | 21 | 17 | 96 | 27 | 2 | M 6 x 16 | 10 | 0,6 | 025 351 |
| GK 32 CKS | 4 | 38 | 27 | 22 | 118 | 32 | 3 | M 8 x 20 | 25 | 1,2 | 025 352 |
| GK 40 CKS | 4 | 46 | 32 | 26 | 145,5 | 41 | 4 | M 8 x 25 | 25 | 2,1 | 025 353 |
| GK 50 CKS | 4 | 57 | 40 | 32 | 179 | 50 | 5 | M 10 x 30 | 49 | 4,4 | 025 354 |
| GK 63 CKS | 4 | 71,5 | 52 | 38 | 211 | 62 | 5 | M 12 x 35 | 86 | 7,6 | 025 355 |
| GK 80 CKS | 4 | 91 | 66 | 48 | 270 | 78 | 6 | M 16 x 45 | 210 | 14,5 | 025 356 |
| GK 100 CKS | 4 | 113 | 84 | 62 | 322 | 98 | 7 | M 20 x 60 | 410 | 28 | 025 357 |
| GK 125 CKS | 4 | 138 | 102 | 72 | 405 | 120 | 14 | M 20 x 70 | 410 | 43 | 025 375 |
| GK 160 CKS | 4 | 177 | 130 | 82 | 488 | 150 | 15 | M 24 x 80 | 710 | 80 | 025 376 |
| GK 200 CKS | 4 | 221 | 162 | 102 | 620 | 195 | 21 | M 30 x100 | 1450 | 165 | 025 377 |
| GK 250 CKS | 4 | 315 | 192 | 142 | 847 | 265 | 27 | M 36 x140 | 2100 | 425 | 025 593 |
| GK 320 CKS | 4 | 405 | 260 | 170 | 1015 | 325 | 25 | M 36 x160 | 2100 | 790 | 025 594 |

# Steel/Steel Rod Ends

GK ... LS

d = 20 ... 80 mm

Spherical plain bearing: GE...H-A to DIN 648, Dimension series E (Table 1)

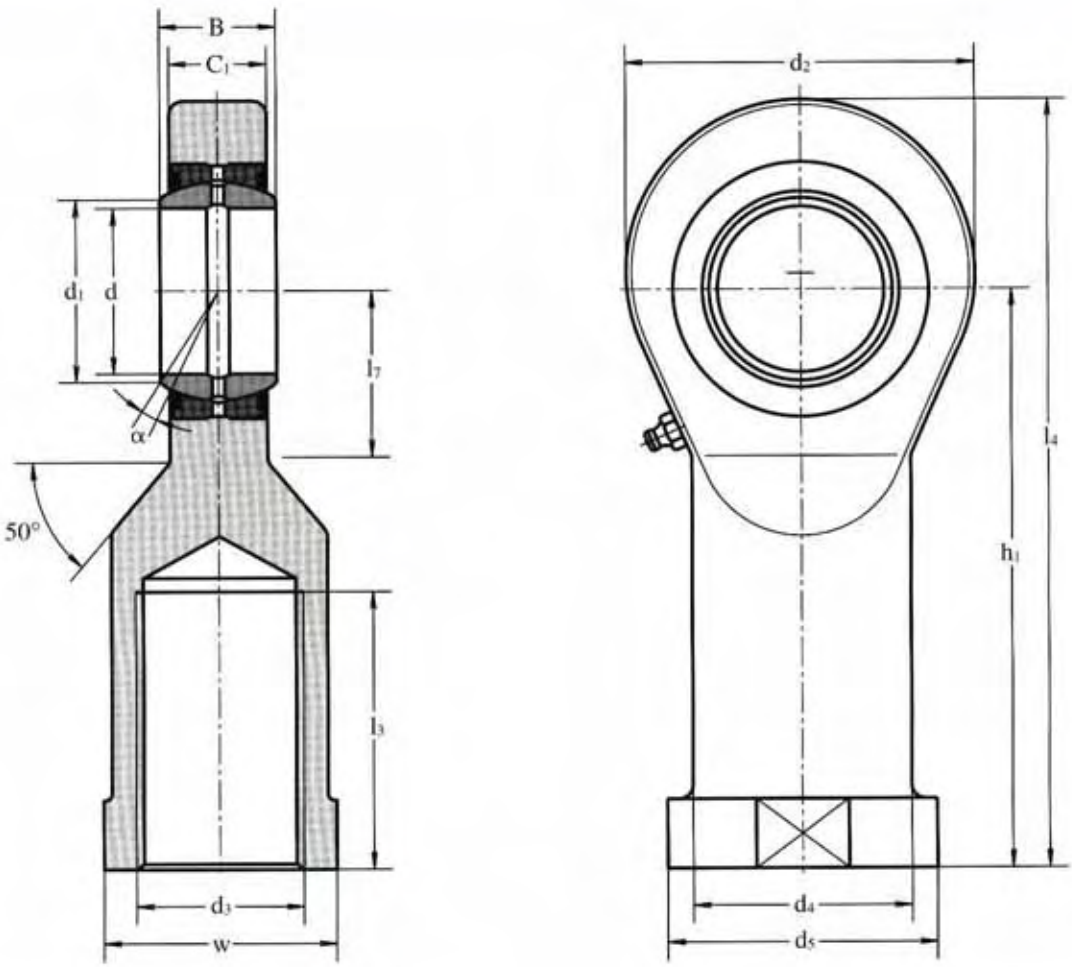
Dimensions:
DIN 648, Dimensions series E (Table 9)

light duty design

for Hunger hydraulic cylinder HHN 816

Order example for nominal diameter d = 80 mm **Rod end GK 80 LS**

| Type | d | B | $h_1$ | $d_3$ | $l_3$ | $d_2$ | $d_5$ | w | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | | kN | kN |
| GK 20 LS | 20 -0,010 | 16 -0,120 | 77 | M 20 x 1,5 | 40 | 47 | 34 | 32 | 60 | 30 |
| GK 25 LS | 25 -0,010 | 20 -0,120 | 94 | M 24 x 2 | 48 | 55 | 42 | 36 | 83 | 48 |
| GK 30 LS | 30 -0,010 | 22 -0,120 | 110 | M 30 x 2 | 56 | 65 | 50 | 41 | 110 | 62 |
| GK 35 LS | 35 -0,012 | 25 -0,120 | 125 | M 36 x 3 | 60 | 78 | 58 | 50 | 146 | 80 |
| GK 40 LS | 40 -0,012 | 28 -0,120 | 142 | M 39 x 3 | 65 | 88 | 65 | 55 | 180 | 100 |
| GK 45 LS | 45 -0,012 | 32 -0,120 | 145 | M 42 x 3 | 65 | 98 | 70 | 60 | 240 | 127 |
| GK 50 LS | 50 -0,012 | 35 -0,120 | 160 | M 45 x 3 | 68 | 111 | 75 | 65 | 290 | 156 |
| GK 60 LS | 60 -0,015 | 44 -0,150 | 175 | M 52 x 3 | 70 | 130 | 88 | 75 | 450 | 245 |
| GK 70 LS | 70 -0,015 | 49 -0,150 | 200 | M 56 x 4 | 80 | 149 | 98 | 85 | 610 | 315 |
| GK 80 LS | 80 -0,015 | 55 -0,150 | 230 | M 64 x 4 | 85 | 172 | 110 | 100 | 750 | 400 |




| Type | α | $d_1$ | $C_1$ | $l_4$ | $l_7$ | $l_5$ | $d_4$ | Mv | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | | kg | |
| GK 20 LS | 9 | 24,0 | 13 | 103,5 | 23 | 10 | 27,5 | 2 | 0,33 | 026 400 |
| GK 25 LS | 7 | 29,0 | 17 | 126,0 | 27 | 12 | 33,5 | 2,5 | 0,61 | 026 401 |
| GK 30 LS | 6 | 34,0 | 19 | 146,5 | 30 | 15 | 40,0 | 2,5 | 0,95 | 026 402 |
| GK 35 LS | 6 | 39,5 | 21 | 166,0 | 37 | 15 | 47,0 | 3,5 | 1,40 | 026 403 |
| GK 40 LS | 7 | 45,0 | 23 | 188,0 | 44 | 18 | 52,0 | 4 | 2,00 | 026 404 |
| GK 45 LS | 7 | 50,5 | 27 | 196,0 | 48 | 20 | 58,0 | 4,5 | 2,50 | 026 405 |
| GK 50 LS | 6 | 56,0 | 30 | 216,0 | 58 | 20 | 62,0 | 5,5 | 3,50 | 026 406 |
| GK 60 LS | 6 | 66,5 | 38 | 242,5 | 68 | 20 | 70,0 | 6 | 5,60 | 026 407 |
| GK 70 LS | 6 | 77,5 | 42 | 280,0 | 78 | 20 | 80,0 | 7 | 8,40 | 026 408 |
| GK 80 LS | 6 | 89,0 | 47 | 320,0 | 91 | 25 | 95,0 | 8 | 12,30 | 026 409 |

# Rod ends, maintenance-free

GK ... NK

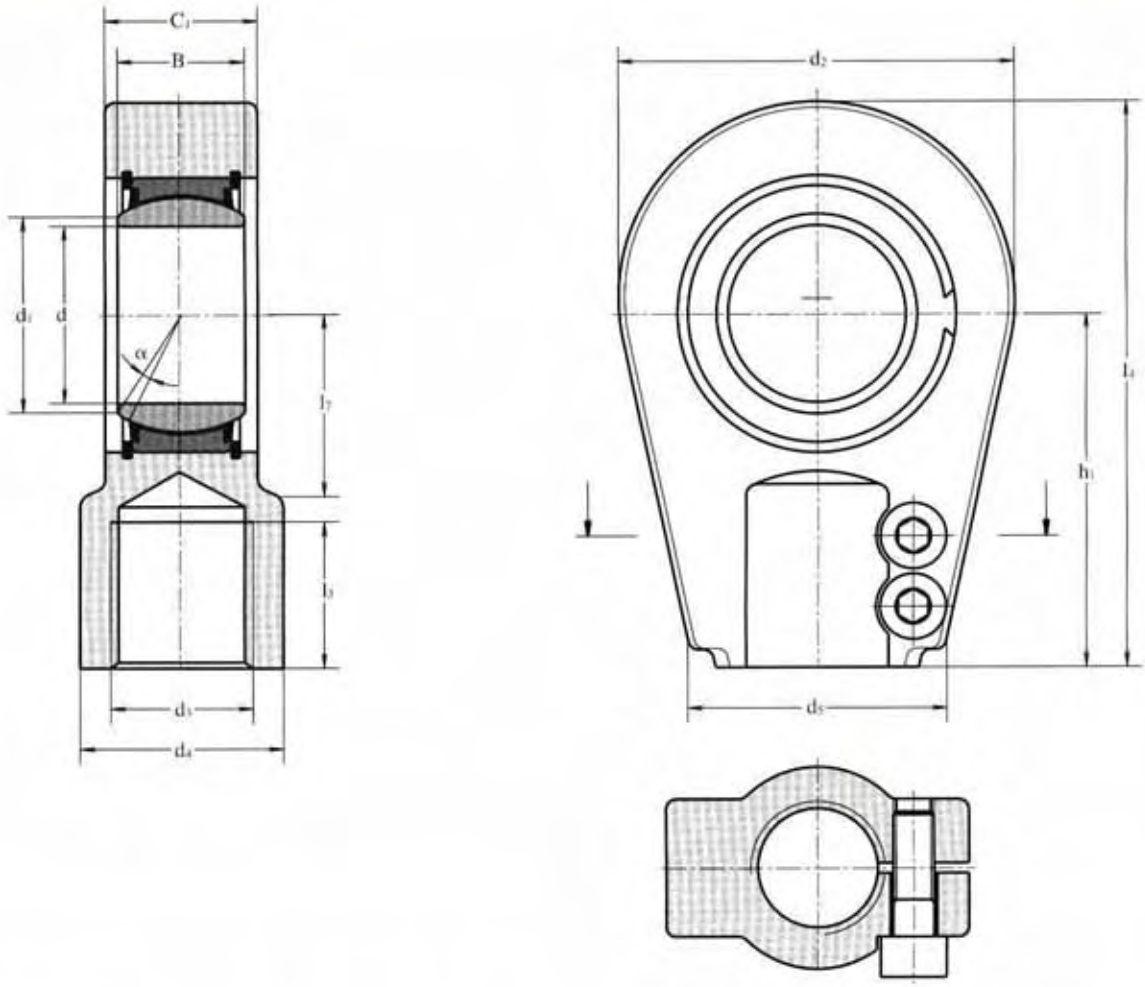
d = 20 ... 120 mm

Spherical plain bearing: GE...HW-A to DIN 648, dimension series E (Table 1)

Dimensions: compact design with fine female clamping thread

Order example for nominal diameter d = 120 mm **Rod end GK 120 NK**

| Type | d | B | $h_1$ | $d_3$ | $l_3$ | $d_2$ | $d_5$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | kN | kN |
| GK 20 NK | 20 -0,010 | 16 -0,120 | 50 | M 16x1,5 | 17 | 56 | 36 | 53 | 31,5 |
| GK 25 NK | 25 -0,010 | 20 -0,120 | 50 | M 16x1,5 | 17 | 56 | 36 | 54 | 51 |
| GK 30 NK | 30 -0,010 | 22 -0,120 | 60 | M 22x1,5 | 23 | 64 | 40 | 69 | 65,5 |
| GK 35 NK | 35 -0,012 | 25 -0,120 | 70 | M 28x1,5 | 29 | 78 | 50 | 118 | 112 |
| GK 40 NK | 40 -0,012 | 28 -0,120 | 85 | M 35x1,5 | 36 | 94 | 60 | 184 | 140 |
| GK 50 NK | 50 -0,012 | 35 -0,120 | 105 | M 45x1,5 | 46 | 116 | 72 | 231 | 220 |
| GK 60 NK | 60 -0,015 | 44 -0,150 | 130 | M 58x1,5 | 59 | 130 | 90 | 363 | 345 |
| GK 70 NK | 70 -0,015 | 49 -0,150 | 150 | M 65x1,5 | 66 | 154 | 100 | 463 | 440 |
| GK 80 NK | 80 -0,015 | 55 -0,150 | 170 | M 80x2 | 81 | 176 | 125 | 600 | 570 |
| GK 90 NK | 90 -0,020 | 60 -0,200 | 210 | M100x2 | 101 | 206 | 146 | 815 | 695 |
| GK 100 NK | 100 -0,020 | 70 -0,200 | 235 | M 110x2 | 111 | 230 | 166 | 1068 | 865 |
| GK 110 NK | 110 -0,020 | 70 -0,200 | 265 | M120x3 | 125 | 265 | 190 | 1180 | 930 |
| GK 120 NK | 120 -0,020 | 85 -0,200 | 310 | M130x3 | 135 | 340 | 217 | 2546 | 1340 |




| Type | α | $d_1$ | $d_4$ | $C_1$ | $l_4$ | $l_7$ | Mv | Cylinder screw | MA | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | DIN 912-8.8 | Nm | kg | |
| GK 20 NK | 9 | 24 | 25 | 19 | 80,0 | 25 | 2 | M 6 x 16 | 10 | 0,37 | 025 400 |
| GK 25 NK | 7 | 29 | 25 | 23 | 80,0 | 28 | 2 | M 6 x 20 | 10 | 0,43 | 025 401 |
| GK 30 NK | 6 | 34 | 32 | 28 | 94,0 | 30 | 2 | M 6 x 25 | 10 | 0,70 | 025 402 |
| GK 35 NK | 6 | 39,5 | 40 | 30 | 112,0 | 38 | 3 | M 8 x 25 | 25 | 1,10 | 025 403 |
| GK 40 NK | 7 | 45 | 49 | 35 | 135,0 | 45 | 3 | M 8 x 30 | 25 | 1,30 | 025 404 |
| GK 50 NK | 6 | 56 | 61 | 40 | 168,0 | 55 | 5 | M 10x35 | 49 | 3,20 | 025 405 |
| GK 60 NK | 6 | 66,5 | 75 | 50 | 200,0 | 65 | 5 | M 10x45 | 49 | 5,40 | 025 406 |
| GK 70 NK | 6 | 77,5 | 86 | 55 | 232,0 | 75 | 5 | M 12x50 | 86 | 8,50 | 025 407 |
| GK 80 NK | 6 | 89 | 102 | 60 | 265,0 | 80 | 7 | M 16x50 | 210 | 12,10 | 025 408 |
| GK 90 NK | 5 | 98 | 124 | 65 | 323,0 | 90 | 10 | M 16x60 | 210 | 21,40 | 025 409 |
| GK 100 NK | 7 | 109,5 | 138 | 70 | 360,0 | 105 | 10 | M 20x60 | 410 | 27,40 | 025 410 |
| GK 110 NK | 6 | 121 | 152 | 80 | 407,5 | 115 | 10 | M 20x70 | 410 | 40,70 | 025 411 |
| GK 120 NK | 6 | 135,5 | 172 | 90 | 490,0 | 140 | 10 | M 24x80 | 710 | 76,30 | 025 412 |

# Rod ends, maintenance-free

GK ... SK

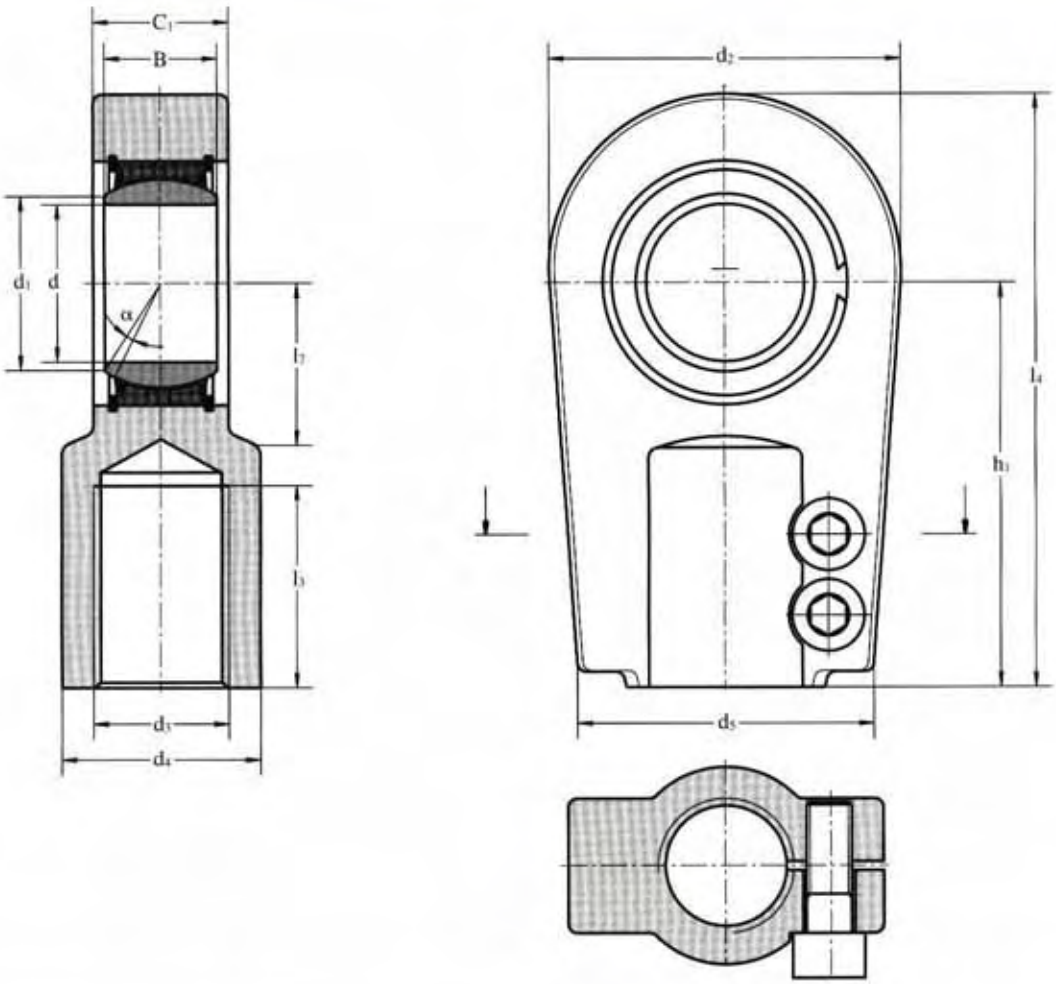
d = 25 ... 160 mm

Spherical plain bearing: GE...HW-A to DIN 648, dimension series E (Table 1)

Dimensions:
heavy duty design, higher loads than GK...NK
with fine female clamping thread

Order example for nominal diameter d = 160 mm **Rod end GK 160 SK**

| Type | d | B | $h_1$ | $d_3$ | $l_3$ | $d_2$ | $d_5$ | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | kN | kN |
| GK 25 SK | 25 -0,010 | 20 -0,120 | 65 | M 18 x 2 | 30 | 56 | 48 | 66 | 51 |
| GK 30 SK | 30 -0,010 | 22 -0,120 | 75 | M 24 x 2 | 35 | 64 | 54 | 96 | 65,5 |
| GK 35 SK | 35 -0,012 | 25 -0,120 | 90 | M 30 x 2 | 45 | 78 | 66 | 185 | 112 |
| GK 40 SK | 40 -0,012 | 28 -0,120 | 105 | M 39 x 3 | 55 | 94 | 78 | 297 | 140 |
| GK 50 SK | 50 -0,012 | 35 -0,120 | 135 | M 50 x 3 | 75 | 116 | 90 | 442 | 220 |
| GK 60 SK | 60 -0,015 | 44 -0,150 | 170 | M 64 x 3 | 95 | 130 | 118 | 539 | 345 |
| GK 70 SK | 70 -0,015 | 49 -0,150 | 195 | M 80 x 3 | 110 | 154 | 130 | 721 | 440 |
| GK 80 SK | 80 -0,015 | 55 -0,150 | 210 | M 90 x 3 | 120 | 176 | 158 | 895 | 570 |
| GK 90 SK | 90 -0,020 | 60 -0,200 | 250 | M 100 x 3 | 140 | 206 | 162 | 1330 | 695 |
| GK 100 SK | 100 -0,020 | 70 -0,200 | 275 | M 110 x 4 | 150 | 230 | 172 | 1500 | 865 |
| GK 110 SK | 110 -0,020 | 70 -0,200 | 300 | M 120 x 4 | 160 | 264 | 194 | 2070 | 930 |
| GK 120 SK | 120 -0,020 | 85 -0,200 | 360 | M 150 x 4 | 190 | 340 | 224 | 2980 | 1340 |
| GK 160 SK | 160 -0,025 | 105 -0,250 | 460 | M 180 x 4 | 220 | 480 | 290 | 4290 | 1930 |




| Type | α | $d_1$ | $d_4$ | $C_1$ | $l_4$ | $l_7$ | Mv | Cylinder screw DIN 912-8.8 | MA | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | | Nm | kg | |
| GK 25 SK | 7 | 29 | 28 | 23 | 95 | 25 | 2 | M 8 x 20 | 25 | 0,65 | 025 500 |
| GK 30 SK | 6 | 34 | 34 | 28 | 109 | 30 | 2 | M 8 x 20 | 25 | 1,00 | 025 501 |
| GK 35 SK | 6 | 39 | 44 | 30 | 132 | 40 | 3 | M 10 x 25 | 49 | 1,30 | 025 502 |
| GK 40 SK | 7 | 45 | 55 | 35 | 155 | 45 | 3 | M 12 x 30 | 86 | 2,40 | 025 503 |
| GK 50 SK | 6 | 56 | 70 | 40 | 198 | 55 | 5 | M 12 x 30 | 86 | 4,10 | 025 504 |
| GK 60 SK | 6 | 66 | 87 | 50 | 240 | 65 | 5 | M 16 x 40 | 210 | 6,50 | 025 505 |
| GK 70 SK | 6 | 77 | 105 | 55 | 278 | 75 | 6 | M 16 x 40 | 210 | 9,50 | 025 506 |
| GK 80 SK | 6 | 89 | 125 | 60 | 305 | 80 | 7 | M 20 x 50 | 410 | 16,00 | 025 507 |
| GK 90 SK | 5 | 98 | 150 | 65 | 363 | 90 | 10 | M 20 x 50 | 410 | 28,00 | 025 508 |
| GK100 SK | 7 | 109,5 | 170 | 70 | 400 | 105 | 10 | M 20 x 50 | 410 | 34,00 | 025 509 |
| GK110 SK | 6 | 121 | 180 | 80 | 442 | 115 | 10 | M 24 x 60 | 710 | 44,00 | 025 510 |
| GK120 SK | 6 | 135,5 | 210 | 90 | 540 | 140 | 10 | M 24 x 60 | 710 | 75,00 | 025 511 |
| GK160 SK | 8 | 170 | 260 | 110 | 710 | 200 | 10 | M 30 x 80 | 1450 | 160,00 | 025 512 |

# Rod ends, maintenance-free

GK ... CK

d = 20 ... 320 mm

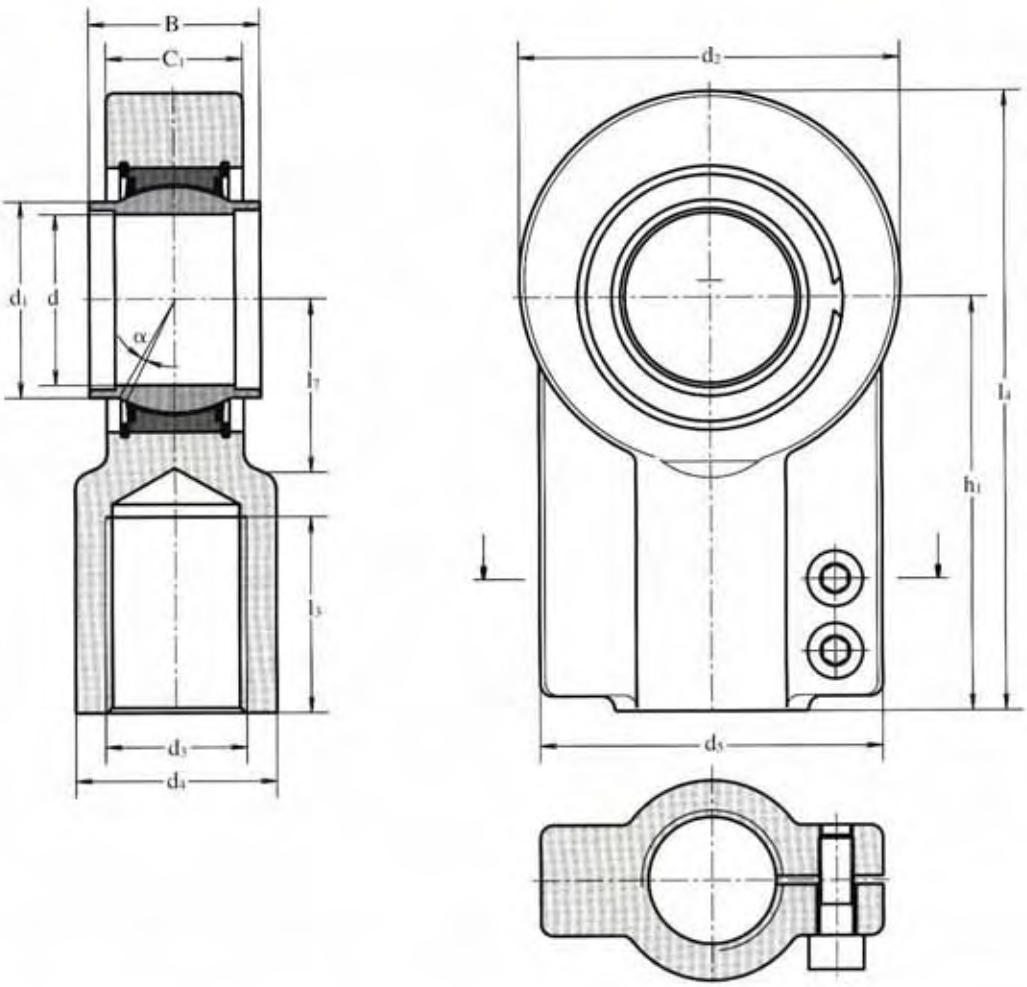
Spherical plain bearing: GE...BNW-A to DIN 648 dimension series EW (Table 5), ISO 6124/2

Dimensions:
DIN 24 338 (Dimensioning symbol to DIN 648)
with fine female clamping thread

for Hunger hydraulic cylinder HHN 813 to DIN 24554 (160 bar)

Order example for nominal diameter d = 100 mm **Rod end GK 100 CK**

| Type | d | B | $h_1$ | $d_3$ | $l_3$ | $d_2$ | $d_5$ | $d_4$ | Load ratings static Co kN | Load ratings dynamic C kN |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | | | |
| GK 20 CK | 20 $^{+0,021}$ | 20 $_{-0,210}$ | 52 | M 16 x 1,5 | 23 | 47 | 47 | 25 | 33 | 31,5 |
| GK 25 CK | 25 $^{+0,021}$ | 25 $_{-0,210}$ | 65 | M 20 x 1,5 | 29 | 58 | 54 | 30 | 54 | 51 |
| GK 32 CK | 32 $^{+0,025}$ | 32 $_{-0,250}$ | 80 | M 27 x 2 | 37 | 70 | 66 | 38 | 69 | 65,5 |
| GK 40 CK | 40 $^{+0,025}$ | 40 $_{-0,250}$ | 97 | M 33 x 2 | 46 | 89 | 80 | 47 | 146 | 140 |
| GK 50 CK | 50 $^{+0,025}$ | 50 $_{-0,250}$ | 120 | M 42 x 2 | 57 | 108 | 96 | 58 | 186 | 220 |
| GK 63 CK | 63 $^{+0,030}$ | 63 $_{-0,300}$ | 140 | M 48 x 2 | 64 | 132 | 114 | 70 | 377 | 358 |
| GK 80 CK | 80 $^{+0,030}$ | 80 $_{-0,300}$ | 180 | M 64 x 3 | 86 | 168 | 148 | 90 | 600 | 570 |
| GK 100 CK | 100 $^{+0,030}$ | 100 $_{-0,350}$ | 210 | M 80 x 3 | 96 | 210 | 178 | 110 | 910 | 865 |
| GK 125 CK | 125 $^{+0,040}$ | 125 $_{-0,040}$ | 260 | M 100 x 3 | 113 | 262 | 200 | 135 | 1430 | 950 |
| GK 160 CK | 160 $^{+0,040}$ | 160 $_{-0,040}$ | 310 | M 125 x 4 | 126 | 326 | 250 | 165 | 2200 | 1370 |
| GK 200 CK | 200 $^{+0,046}$ | 200 $_{-0,046}$ | 390 | M 160 x 4 | 161 | 418 | 320 | 215 | 3650 | 2120 |
| GK 250 CK | 250 $^{+0,046}$ | 250 $_{-0,046}$ | 530 | M 200 x 4 | 205 | 580 | 420 | 300 | 6400 | 3550 |
| GK 320 CK | 320 $^{+0,057}$ | 320 $_{-0,057}$ | 640 | M 250 x 6 | 260 | 700 | 520 | 360 | 8650 | 6100 |




| Type | α | $d_1$ | $C_1$ | $C_2$ | $l_4$ | $l_7$ | Mv | Cylinder screw DIN 912-8.8 | MA | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | | Nm | kg | |
| GK 20 CK | 4 | 25 | 17 | 14 | 77 | 22 | 1,5 | M 6 x 16 | 10 | 0,4 | 025 600 |
| GK 25 CK | 4 | 30,5 | 21 | 17 | 96 | 27 | 2 | M 6 x 16 | 10 | 0,6 | 025 601 |
| GK 32 CK | 4 | 38 | 27 | 22 | 118 | 32 | 3 | M 8 x 20 | 25 | 1,2 | 025 602 |
| GK 40 CK | 4 | 46 | 32 | 26 | 145,5 | 41 | 4 | M 8 x 25 | 25 | 2,1 | 025 603 |
| GK 50 CK | 4 | 57 | 40 | 32 | 179 | 50 | 5 | M 10 x 30 | 49 | 4,4 | 025 604 |
| GK 63 CK | 4 | 71,5 | 52 | 38 | 211 | 62 | 5 | M 12 x 35 | 86 | 7,6 | 025 605 |
| GK 80 CK | 4 | 91 | 66 | 48 | 270 | 78 | 6 | M 16 x 45 | 210 | 14,5 | 025 606 |
| GK 100 CK | 4 | 113 | 84 | 62 | 322 | 98 | 7 | M 20 x 60 | 410 | 28 | 025 607 |
| GK 125 CK | 4 | 138 | 102 | 72 | 405 | 120 | 14 | M 20 x 70 | 410 | 43 | 025 625 |
| GK 160 CK | 4 | 177 | 130 | 82 | 488 | 150 | 15 | M 24 x 80 | 710 | 80 | 025 626 |
| GK 200 CK | 4 | 221 | 162 | 102 | 620 | 195 | 21 | M 30 x 100 | 1450 | 165 | 025 441 |
| GK 250 CK | 4 | 315 | 192 | 142 | 847 | 265 | 27 | M 36 x 140 | 2100 | 425 | 025 442 |
| GK 320 CK | 4 | 405 | 260 | 170 | 1015 | 325 | 25 | M 36 x 160 | 2100 | 790 | 025 443 |

# Rod ends, maintenance-free

GK ... L

d = 20 ... 80 mm

Spherical plain bearing: GE...HW-A to DIN 648, dimension series E (Table 1)

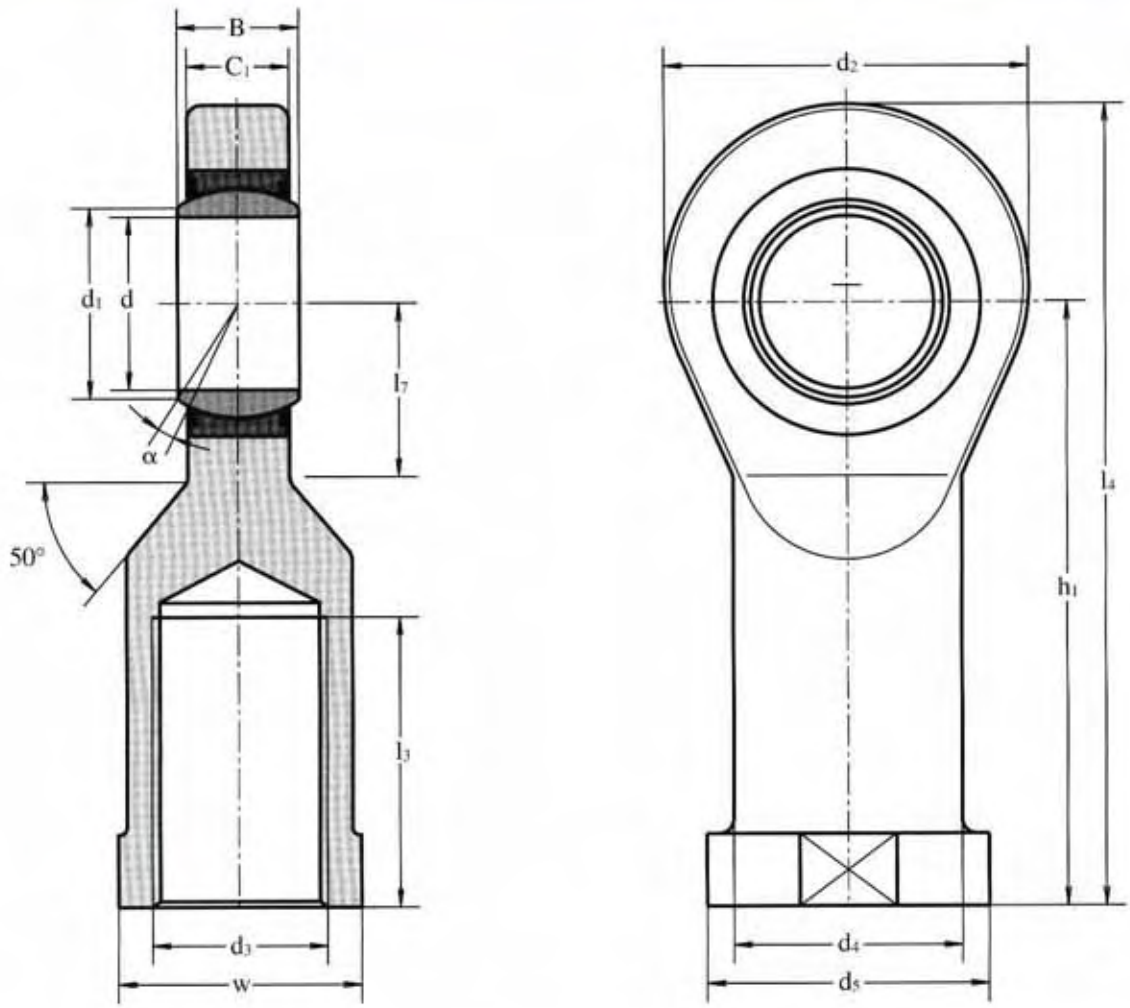
Dimensions:
DIN 648, dimension series E (Table 9)

light duty design

for Hunger hydraulic cylinder HHN 816

Order example for nominal diameter d = 80 mm **Rod end GK 80 L**

| Type | d | B | $h_1$ | $d_3$ | $l_3$ | $d_2$ | $d_5$ | w | Load ratings static Co | Load ratings dynamic C |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | | kN | kN |
| GK 20 L | 20 -0,010 | 16 -0,120 | 77 | M 20 x 1,5 | 40 | 47 | 34 | 32 | 43 | 31,5 |
| GK 25 L | 25 -0,010 | 20 -0,120 | 94 | M 24 x 2 | 48 | 55 | 42 | 36 | 60 | 51 |
| GK 30 L | 30 -0,010 | 22 -0,120 | 110 | M 30 x 2 | 56 | 65 | 50 | 41 | 80 | 65,5 |
| GK 35 L | 35 -0,012 | 25 -0,120 | 125 | M 36 x 3 | 60 | 78 | 58 | 50 | 153 | 112 |
| GK 40 L | 40 -0,012 | 28 -0,120 | 142 | M 39 x 3 | 65 | 88 | 65 | 55 | 190 | 140 |
| GK 45 L | 45 -0,012 | 32 -0,120 | 145 | M 42 x 3 | 65 | 98 | 70 | 60 | 257 | 180 |
| GK 50 L | 50 -0,012 | 35 -0,120 | 160 | M 45 x 3 | 68 | 111 | 75 | 65 | 324 | 220 |
| GK 60 L | 60 -0,015 | 44 -0,150 | 175 | M 52 x 3 | 70 | 130 | 88 | 75 | 460 | 345 |
| GK 70 L | 70 -0,015 | 49 -0,150 | 200 | M 56 x 4 | 80 | 149 | 98 | 85 | 551 | 440 |
| GK 80 L | 80 -0,015 | 55 -0,150 | 230 | M 64 x 4 | 85 | 172 | 110 | 100 | 730 | 570 |




| Type | α | $d_1$ | $C_1$ | $l_4$ | $l_7$ | $l_5$ | $d_4$ | Mv | Mass | Item no. |
|---|---|---|---|---|---|---|---|---|---|---|
| | ° | mm | | | | | | | kg | |
| GK 20 L | 9 | 24,0 | 13 | 103,5 | 23 | 10 | 27,5 | 2 | 0,33 | 025 700 |
| GK 25 L | 7 | 29,0 | 17 | 126,0 | 27 | 12 | 33,5 | 2,5 | 0,61 | 025 701 |
| GK 30 L | 6 | 34,0 | 19 | 146,5 | 30 | 15 | 40,0 | 2,5 | 0,95 | 025 702 |
| GK 35 L | 6 | 39,5 | 21 | 166,0 | 37 | 15 | 47,0 | 3,5 | 1,40 | 025 703 |
| GK 40 L | 7 | 45,0 | 23 | 188,0 | 44 | 18 | 52,0 | 4 | 2,00 | 025 704 |
| GK 45 L | 7 | 50,5 | 27 | 196,0 | 48 | 20 | 58,0 | 4,5 | 2,50 | 025 705 |
| GK 50 L | 6 | 56,0 | 30 | 216,0 | 58 | 20 | 62,0 | 5,5 | 3,50 | 025 706 |
| GK 60 L | 6 | 66,5 | 38 | 242,5 | 68 | 20 | 70,0 | 6 | 5,60 | 025 707 |
| GK 70 L | 6 | 77,5 | 42 | 280,0 | 78 | 20 | 80,0 | 7 | 8,40 | 025 708 |
| GK 80 L | 6 | 89,0 | 47 | 320,0 | 91 | 25 | 95,0 | 8 | 12,30 | 025 709 |

# Type Comparison List

## Spherical plain bearings

**Manufacturer:**

| Hunger | Elges | SKF | ASK | IKO | NTN |
|---|---|---|---|---|---|
| GE...H-A | GE...DO-2RS | GE...ES-2RS | GE...2RS | GE...ES-2RS | SA1...BSS |
| GE...HW-A | GE...UK-2RS | GE...C | GE...-D2RS | GE...EC-2RS | SAR1...SS |
| GE...B-A | GE...FO-2RS | GEH...ES-2RS | | | |
| GE...BW-A | GE..FW-2RS | GEH...C* | | | |
| GE...BN-A | GE...LO* | GEG...ES* | | | |
| GE...BNW-A | GE...LW-2RS | | | | |
| GE...HS | | GEP...F/ ...FS | | | |
| GE...HSS | GE...SX | GAC... | | | |
| GE...HSW | GE...SW | GAC...F | | | |
| GE...HX | GE...AX | | | | SAT |
| GE...HXW | GE...AW | GX...F | | | |

## Rod Ends:

**Manufacturer:**

| Hunger | Elges | SKF | ASK | NMB | NTN |
|---|---|---|---|---|---|
| GK...NKS | GIHR-K...DO* | SIR...ES* | | | |
| GK...CKS | GIHN-K...LO* | SIQG...E(S) * | | | |
| GK...LS | GIR...DO-2RS | SIA...ES* | EJ...2RS* | | |
| GK...NK | GIHR-K...UK2RS | | | | |
| GK...L | GIR...UK-2RS | SIA...TE-2RS | EJ...D2RS | | |

* Types without wiper or sealing ring