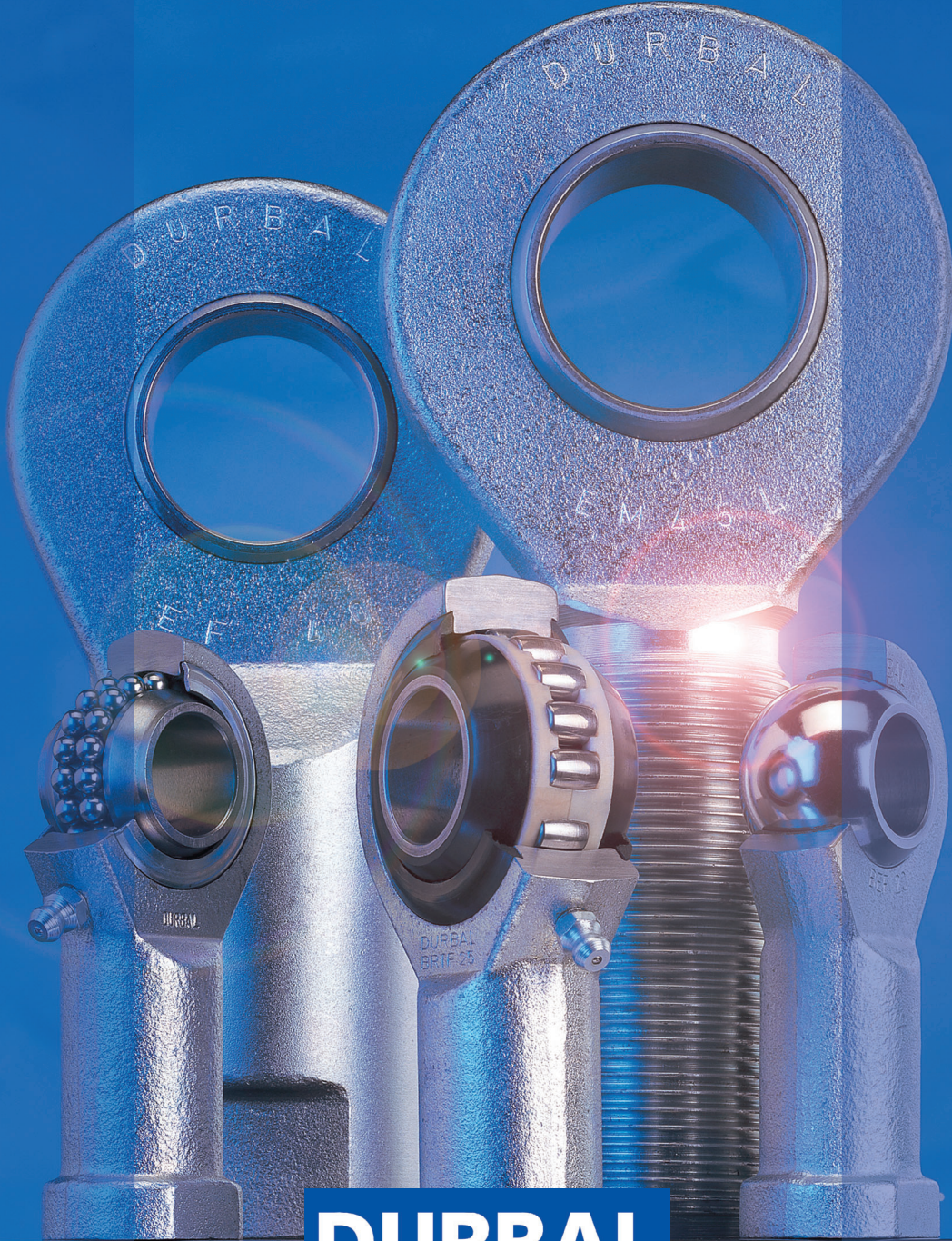
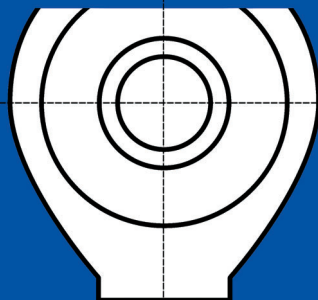


DURBAL

THE PERFECT ROD END



DURBAL





DURBAL heavy-duty rod ends are standardized ready-to-be-installed machine components serving the transmission of static and dynamic forces in combination with swiveling, tilting or rotating movement. Bearing the Name »Schlegel«, the rod ends with integrated self-aligning ball bearing were initially used in the aircraft industry. In the meantime, our heavy-duty rod ends have become a standard concept in all industrial applications, under the name »DURBAL«.

The DURBAL heavy duty rod ends are distinguished by their high precision and reliability. The quality of DURBAL products is systematically planned, manufactured and controlled by the QM-System, which was certified official-

ly in March 1996 and is in accordance with DIN ISO 9001 which is valid for all areas of enterprise.

The universal product range is available ex stock and consists of DURBAL heavy-duty rod ends with maintenance-free plain bearings or low-maintenance antifriction bearings, offering an optimal choice for a wide range of different applications.

The selection criteria and calculation basics contained in this catalogue are based on numerous endurance test runs and more than 50 years of experience. This enables an individual adoption of the features of our DURBAL heavy-duty rod ends to the requirements of the individual application.

DURBAL heavy-duty rod ends are available with connections in metric dimensions according to DIN 648, CETOP RP 103 P, or in INCHES.

This catalogue represents the latest state of our technical and manufacturing developments and therefore earlier catalogues are not longer valid. The given specifications are subject to change due to technical improvements.

Our experienced staff is always at your service to answer any query you may have.



Fachauschüsse Eisen und Metall III
und Hebezeuge II
Prüf- und Zertifizierungsstelle
im BG-PRÜFZERT

Hauptverband der gewerblichen
Berufsgenossenschaften

Zertifikat

Nr.

96161

gültig bis

30.06.2001

Das **Qualitätsmanagementsystem** der

Firma DURBAL GmbH & Co.
Verrenberger Weg 2-2A, 74604 Öhringen

für **das Gesamtunternehmen**

entspricht der **DIN EN ISO 9001 : 1994.**

Düsseldorf, den 22.03.1996

Unterschrift
(Dipl. Ing. Bührmann)

ZQ801
03/95



Postadresse:
Postfach 10 10 15
40001 Düsseldorf

Hausadresse:
Graf-Recke-Str. 69
40239 Düsseldorf ZQS01

Telefon:
02 11/6 70 08-0

Telefax:
02 11/6 70 08-44

DURBAL Inc.
14115 - 63rd Way North
Clearwater Florida
33760 USA











Phone 727-539-7824

Fax 727-539-7824

www.durbal.com
email; durbal@durbal.com



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DURBAL heavy-duty rod ends are sturdy, robust, precision bearings that are maintenance-free or with greasable rolling elements. The selection tables in this catalog incorporate a broad choice of rod ends to meet your specific requirements.

DURBAL heavy-duty rod ends with integral self-aligning ball bearings, Series BRM, BRF, PM, PF

This design is especially suitable for high speeds, large swiveling angles or rotating movements with relatively low or medium loads. Prominent technical features are the low bearing friction, sealing

against rough dirt penetration by means of shields on both sides. Under normal operating conditions the rod ends are maintenance-free. A Grease nipple is provided for lubrication during rough service and maximum loads.

To avoid incompatibility with the initial lubrication, we recommend lubricating with a calcium-complex-soap-grease or Polyrex EP2.

A special heat treatment procedure matches the rod end housing raceway hardness to the antifriction bearings, ensuring the same time high stability with changing loads.

DURBAL heavy-duty rod ends with integral self-aligning roller bearings, Series BRTM, BRTF

The design based on the structure of a self-aligning roller bearing is preferably used for high speed, large tilting angles or rotating motion with medium loads. Compared to rod ends with self-aligning ball bearings, rod ends with self-aligning roller bearings have essentially higher basic load ratings. This design is equipped with a cage to minimize the rolling friction and heat built-up. These rod ends are

under normal operating conditions maintenance-free. A Grease nipple is provided for lubrication in case of rough operation and maximum load.

To avoid incompatibility with the initial lubrication, we recommend lubricating with a calcium-complex-soap-grease or Polyrex EP2. Shields on both sides prevent dirt particles from penetrating into the bearing. The rod ends with self-aligning roller bearings are, just as the design with self-aligning ball bearings, subjected to a special heat treatment procedure to match the raceway hardness to the antifriction bearings, ensuring at the same time a high stability with changing loads and temperature.

DURBAL heavy-duty rod ends with a integral maintenance-free spherical plain bearing, Series BEM, BEF, EM, EF

In many cases DURBAL heavy-duty rod ends with integrated spherical plain bearing serve their purpose. They are primarily used for small swiveling or tilting movements at low speeds. They stand out for their high loadability and can also be used for shock loads. The ball slides on a composite bearing shell consisting of a glass fiber-filled nylon/teflon component. This design ensures an absolutely maintenance-free rod end. DURBAL heavy-duty plain bearing rod ends have a slight initial stress and virtually no clearance. The composite material used has a favorable secondary advantage in that it absorbs any foreign particles and embeds them so that no damage can occur. The joint balls of DURBAL heavy-duty rod ends with integrated spherical plain bearings are hard chrome plated.

This reliable corrosion protection ensures that the function of the rod end will not be affected by a corroded ball surface under humid operating conditions.

Basic load ratings

Static basic load rating of antifriction bearing rod ends

The static basic load rating C_0 of an antifriction bearing rod end corresponds to that of a static radial load causing a lasting overall deformation of 1/10.000 of the roller body diameter at the contact point.

Static basic load ratings of plain bearing rod ends

The static basic load rating C_0 of a plain bearing rod end corresponds to that of the static radial load that does not yet cause a lasting deformation at the weakest housing section. It contains at least a 1.2 safety factor compared to the yield stress of the material used for the rod end housing.

Dynamic basic load rating of antifriction bearing rod ends

The dynamic basic load rating C of an antifriction bearing rod end is the external radial load, unchangeable in size and direction, at which 90 % of a statistical sample of identical rod ends will reach or exceed 1 million of rotations or swiveling movements.

Dynamic basic load ratings of plain bearing rod ends

The dynamic basic load rating C is the parameter for the calculation of dynamically loaded maintenance-free DURBAL heavy-duty rod ends with integrated spherical plain bearing, in other words, making tilting, swiveling or rotating movements under load.

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

Operating temperatures

DURBAL heavy-duty antifriction bearing rod ends can be used for operating temperatures between $-20\text{ }^{\circ}\text{C}$ and $+120\text{ }^{\circ}\text{C}$.

The temperature range of DURBAL heavy-duty rod ends with integral spherical plain bearing is between $-30\text{ }^{\circ}\text{C}$ and $+60\text{ }^{\circ}\text{C}$, without affecting the loadability. Higher temperatures will reduce the loadability taken into account for the calculation of the working life under the temperature factor C_2 .

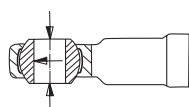
Loads

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

Radial or combined loads

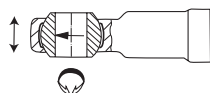
The DURBAL heavy-duty rod ends have been especially designed to adopt high radial loads.

They can furthermore be used for combined loads, the axial load share of which does not exceed 20% of the corresponding radial load.



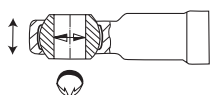
Unilaterally acting load

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



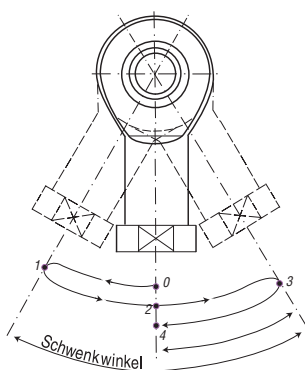
Alternately acting load

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



Swivelling angle

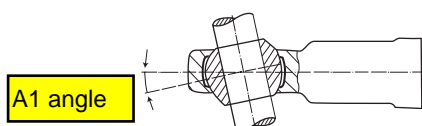
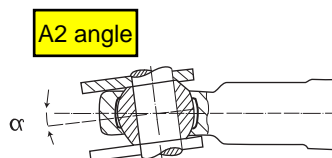
The swivelling angle is the excursion of the rod end from one final position to the other. Half the swivelling angle β is used to calculate the service or working life.



Angle of Misalignment

The angle of tilt, also called ^{misalignment} angle, refers to the possible excursion of the joint ball and/or the inner ring to the rod end axis in degrees. The tilting angle indicated in the table for the DURBAL heavy-duty antifriction bearing rod ends corresponds to the max. Possible excursion being limited by the shields on both sides. It is important that this tilting angle is not exceeded either during installation or operation, as otherwise the shields may be damaged. As far as DURBAL heavy-duty plain bearing rod ends are concerned, distinction is made between the tilting angles α_1 and α_2 .

If the excursion is not limited by adjacent components, excursion angle α_1 can fully be used without affecting the rod end capacity. Tilting angle α_2 is the excursion limit when connecting a forked component.



Nominal service life

The term »nominal service life« is used for DURBAL heavy-duty antifriction bearing rod ends and represents the number of swivelling motions or rotations and/or the number of service hours the rod end performs before showing the first signs of material fatigue at the raceway or roller bodies. In view of many influence factors that are difficult or impossible to assess, the service life of several obviously identical bearings differ under the same operating conditions. For this reason, the following method for the service life determination of DURBAL heavy-duty antifriction rod ends results in a nominal service life being achieved or exceeded by at least 90 % of a larger quantity of identical rod ends.

Working life

The term »working life« is used with DURBAL heavy-duty plain bearing rod ends. It represents the number of swivelling motions or rotations and/or the number of services hours the DURBAL heavy-duty plain bearing rod end performs before becoming unserviceable because of material fatigue, wear, increased bearing clearance or increase of the bearing friction moment. The working life is not only influenced by the size and the type of load, it is also affected by a number of factors, which are partially difficult to assess. A calculation of the exact servicelife is therefore impossible. Field-experienced standard values for the approximate working life can nevertheless be determined by using the following calculation procedure which is based on numerous results from endurance test runs and values from decades of experience. The values determined by this formula are achieved, if not exceeded, by the majority of the DURBAL heavy-duty rod ends.

Calculations

Antifriction bearing construction

DURBAL – heavy-duty rod ends with integral self-aligning ball bearing Series BRM, BRF, PM, PF

Normal service life

rotating
$$L_{h_{rot.}} = 10^6 \frac{\left(\frac{C}{P}\right)^3}{60 \cdot n} \quad [h] \quad (1)$$

oscillating
$$L_{h_{osz.}} = 10^6 \frac{\left(\frac{C}{P^3 \sqrt{\frac{\beta}{90}}}\right)^3}{60 \cdot f} \quad [h] \quad (2)$$

condition:
swivelling angle $\beta \geq 3^\circ$
For swiveling angles $\beta \geq 3^\circ$ we
recommend the use of DURBAL
heavy-duty plain bearing rod ends.

Static load

constant $P_0 \leq C_0 [N] \quad (3)$

DURBAL – heavy-duty rod ends with integral self-aligning roller bearing Series BRTF, BRTM

Nominal service life

rotating:
$$L_{h_{rot.}} = 10^6 \frac{\left(\frac{C}{P}\right)^{3,333}}{60 \cdot n} \quad [h] \quad (4)$$

oscillating:
$$L_{h_{osz.}} = 10^6 \frac{\left(\frac{C}{P^3 \sqrt{\frac{\beta}{90}}}\right)^{3,333}}{60 \cdot f} \quad [h] \quad (5)$$

Condition:
swivelling angle $\beta \geq 3^\circ$
For swiveling angles $\beta \geq 3^\circ$ we
recommend the use of DURBAL
heavy-duty plain bearing rod ends.

Static load

constant $P_0 \leq C_0 [N] \quad (6)$



$L_{h\ rot}$ nominal service life for rotation [hours of operation]
 $L_{h\ osz}$ nominal service life for oscillating movement [hours or operation]
 C basic dynamic load rating [N], see tables
 C_0 basic static rating [N], see tables

P Dynamic equivalent load [N]

Rod ends with integral self-aligning ball bearing: $P = F_r + y \cdot F_a$ (7)

Rod ends with integral self-aligning roller bearing: $P = F_r + 9,5 \cdot F_a$ (8)

P_0 Static equivalent load [N]

Rod ends with integral self-aligning ball bearing: $P_0 = F_r + y_0 \cdot F_a$ (9)

Rod ends with integral self-aligning roller bearing: $P_0 = F_r + 5 \cdot F_a$ (10)

F_a axial load [N]
 F_r radial load [N]
 F_r axial factor, dynamic, see tables
 Y axial factor, static, see tables
 Y_0 half the swiveling angle [degrees]
 β $\beta = 90^\circ$ should be used for rotation
 n rotation speed limit [min-1]
 f frequency of oscillation [min-1]

Calculation example

At the rotating side of crank mechanism, a DURBAL heavy-duty antifriction bearing rod end should be installed. The expected service life amounts to at least 5,000 hours.

Known: rotation speed $n = 300 \text{ min}^{-1}$, radial load $F_r = 750 \text{ N}$

Selected: BRF 8
 $C = 4000 \text{ N}$

$$\begin{aligned}
 L_{h\ rot.} &= 10^6 \frac{\left(\frac{C}{P}\right)^3}{60 \cdot n} \\
 &= 10^6 \frac{\left(\frac{4000}{750}\right)^3}{60 \cdot 300} = \underline{\underline{8428 \text{ h} > 5000 \text{ h}}}
 \end{aligned}$$

Calculations

Plain bearing construction

Working life

$$G = C_1 \cdot C_2 \cdot C_3 \cdot \frac{3}{d_8 \cdot \beta} \cdot \frac{C}{P} \cdot 10^8 \quad (11)$$

$$G = C_1 \cdot C_2 \cdot C_3 \cdot \frac{5}{d_8 \cdot \beta} \cdot \frac{C}{P} \cdot 10^6 \quad (12)$$

| | |
|----------------|---|
| G | working life [number of oscillating or revolutions] |
| Gh | Working life [hours of operation] |
| C | basic dynamic load rating [N], see tables |
| d _g | joint ball diameter [mm] |
| β | half the swiveling angle [degrees], β = 90° should be used for rotation |
| f | frequency of oscillation [min-1] |
| C ₁ | load direction factor, see following table |
| C ₂ | temperature factor, see following table |
| C ₃ | material factor, see following table |
| C ₄ | factor for type of load, see following table |
| P | Equivalent dynamic load [N] |

$$P = F_r + F_a \leq P_{zul} \quad (13)$$

| | |
|----------------|--|
| F _r | radial load component [N] |
| F _a | axial load component [N], condition: F _a ≤ 0,2 · F _r |

P_{max.} maximum permissible rod end [N]

$$P_{zul} = C_0 \cdot C_2 \cdot C_4 \quad (14)$$

C₀ Basic static load rating, [N], see tables

Load direction factor c₁

Single load direction:

$$c_1 = 1,0$$

alternating load direction, at f < 30 min-1:

$$c_1 = 0,25$$

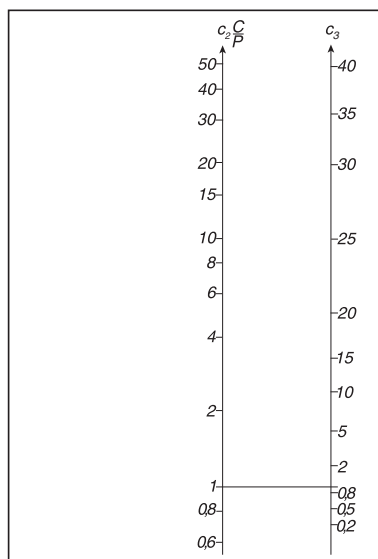
alternating load direction, at f > 30 min-1:

$$c_1 = 0,125$$

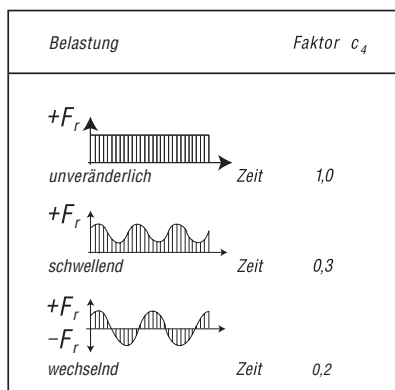
Temperature factor c₂

| | |
|----------------|----------------|
| temperature | C ₂ |
| ≤ 60°C | 1,0 |
| 60°C to 80°C | 0,8 |
| 80°C to 100°C | 0,7 |
| 100°C to 110°C | 0,6 |

Material factor c₃



Factor for type of load C₄



Static load

If DURBAL heavy-duty rod ends support loads while stationary or with very little movement, the maximum permissible load is not a result of wear but a function of the material strength of the race or the rod end housing.

If static loads are a combination of radial and axial loads, the equivalent static bearing load will have to be calculated.

Calculation are identical with those of the equivalent dynamic bearing load – see equation (13), page 8.

Permissible sliding velocity

The permissible sliding velocity of DURBAL heavy-duty rod ends depends mainly on the load and temperature conditions. Heat generated through friction in the rod end housing itself is the main limitation on sliding velocity. When selecting the rod end size, it is necessary, to determine the sliding velocity and the pv-value, which is a product of the specific bearing load p [N/mm²] and the sliding velocity v [m/s].

The following standard values refer to swiveling and rotating movements. With improved cooling, speeds may be increased.

Permissible pv-value = 0,5 N/mm² · m/s

Permissible sliding velocity

$$V_{max.} = 0,15 \text{ m/s} \geq V_m$$

Specific bearing load

$$p = k \cdot \frac{P}{C} \quad (15)$$

- p specific bearing load [N/mm²]
 P equivalent dynamic load [N], see equation (13), page 8
 C basic dynamic load rating [N], see tables
 k specific load factor [N/mm²] for sliding contact surfaces steel on nylon/teflon/fiber glass
 $k = 50 \text{ N/mm}^2$

Mean sliding velocity

$$V_m = 5,82 \cdot 10^{-7} \cdot d_g \cdot \beta \cdot f \quad (16)$$

- V_m mean sliding velocity [m/s]
 d_g joint ball diameter [mm], see tables
 β half the swiveling angle [degrees], $\beta = 90^\circ$ should be used for rotation
 f frequency of oscillation [min⁻¹]

Calculation example

The rod assembly of a conveyor equipment calls for a DURBAL heavy-duty rod end with a working life of 8,000 hours in conjunction with an alternating acting load of 5,000 N.

25 swiveling movements with a swiveling angle of 30° take place per minute. The operating temperature amounts to approx. 60 °C.

The choice is a DURBAL heavy-duty rod end EF 15 with $C = 19415 \text{ N}$, $d_g = 22 \text{ mm}$.

Working life

$$G_h = C_1 \cdot C_2 \cdot C_3 \cdot \frac{5}{d_g \cdot \beta \cdot f} \cdot \frac{C}{P} \cdot 10^6$$

$$c_1 = 0,25 \text{ (alternating load direction, } f = 25 \text{ min}^{-1} < 30 \text{ min}^{-1}\text{)}$$

$$c_2 = 1,0 \text{ (operating temperature } 60 \text{ °C)}$$

$$C_3 = 17 \cdot \left(c_2 \cdot \frac{C}{P} = 1,0 \cdot \frac{19415}{5000} = 3,88. \right)$$

$$d_g = 22 \text{ mm}$$

$$f = 25 \text{ min}^{-1}$$

$$b = 15^\circ \text{ (half the swiveling angle: } 30^\circ : 2 = 15^\circ\text{)}$$

$$C = 19415 \text{ N}$$

$$P = 5000 \text{ N}$$

$$G_h = 0,25 \cdot 1,0 \cdot 17 \cdot \frac{5}{22 \cdot 15 \cdot 25} \cdot \frac{19415}{5000} \cdot 10^6$$

$$\underline{\underline{= 10000 \text{ h} > 8000 \text{ h}}}$$

Checking the permissible load of the rod end

$$P_{zul} = C_o \cdot c_2 \cdot c_4$$

$$C_o = 48545 \text{ N}$$

$$c_2 = 1,0 \text{ (operating temperature } 60 \text{ °)}$$

$$c_4 = 0,2 \text{ (alternating load)}$$

$$P_{zul} = 48545 \cdot 1,0 \cdot 0,2 = \underline{\underline{9709 \text{ N} > 5000 \text{ N}}}$$

Checking the permissible sliding velocity

$$V_m = 5,82 \cdot 10^{-7} \cdot d_g \cdot \beta \cdot f = 5,82 \cdot 10^{-7} \cdot 22 \cdot 15 \cdot 25$$

$$= \underline{\underline{0,0048 \text{ m/s} < 0,15 \text{ m/s}}}$$

Checking the $p \cdot v$ -value

$$p = k \cdot \frac{P}{C} = 50 \cdot \frac{5000}{19415} = 12,87 \text{ N/mm}^2$$

$$p \cdot V_m = 12,87 \cdot 0,0048$$

$$= \underline{\underline{0,061 \text{ N/mm}^2 \cdot \text{m/s} < 0,5 \text{ N/mm}^2 \cdot \text{m/s}}}$$



Tolerances

DURBAL-heavy-duty rod ends, series BRM, BRF, BRTM, BRTF, BEM, BEF

| d1 | | Δd_{1mp} tolerance limit | | V_{d1p} | V_{d1mp} | Δb_{1s} tolerance limit | | $\Delta h_{s,h1s,h2s}$ tolerance limit | |
|------|-------|-------------------------------------|-------|-----------|------------|------------------------------------|--------|---|-------|
| over | incl. | upper | lower | max. | max. | upper | lower | upper | lower |
| | 6 | +0,012 | 0 | 0,012 | 0,009 | 0 | - 0,12 | +0,8 | -1,2 |
| 6 | 10 | +0,015 | 0 | 0,015 | 0,011 | 0 | - 0,12 | +0,8 | -1,2 |
| 10 | 18 | +0,018 | 0 | 0,018 | 0,014 | 0 | - 0,12 | +1,0 | -1,7 |
| 18 | 30 | +0,021 | 0 | 0,021 | 0,016 | 0 | - 0,12 | +1,4 | -2,1 |
| 30 | 50 | +0,025 | 0 | 0,025 | 0,019 | 0 | - 0,12 | +1,8 | -2,7 |

DURBAL-heavy-duty rod ends, series EM, EF, PM, PF

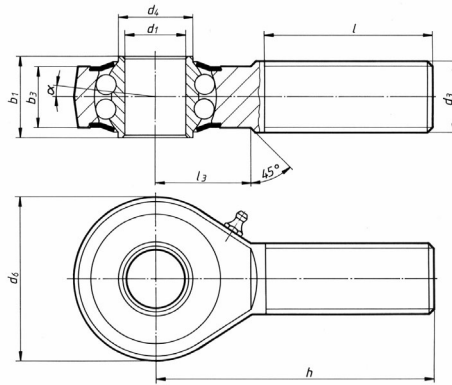
| d1 | | Δd_{1mp} tolerance limit | | V_{d1p} | V_{d1mp} | Δb_{1s} tolerance limit | | $\Delta h_{s,h1s,h2s}$ tolerance limit | |
|------|-------|-------------------------------------|--------|-----------|------------|------------------------------------|-------|---|-------|
| over | incl. | upper | lower | max. | max. | upper | lower | upper | lower |
| | 10 | +0,002 | -0,010 | 0,008 | 0,006 | 0 | -0,12 | +0,8 | -1,2 |
| 10 | 18 | +0,003 | -0,011 | 0,008 | 0,006 | 0 | -0,12 | +0,8 | -1,2 |
| 18 | 30 | +0,003 | -0,013 | 0,010 | 0,008 | 0 | -0,12 | +1,0 | -1,7 |
| 30 | 50 | +0,003 | -0,015 | 0,012 | 0,009 | 0 | -0,12 | +1,4 | -2,1 |
| 50 | 80 | +0,004 | -0,019 | 0,015 | 0,011 | 0 | -0,15 | +1,8 | -2,7 |

Dimension and tolerance symbols

- d_1 = nominal bore diameter of the inner ring or joint ball
- Δd_{1mp} = mean bore diameter deviation in one plane, arithmetical mean of the largest and smallest bore diameter
- V_{d1p} = bore diameter variation in one plane, difference between the largest and smallest bore diameter
- V_{d1mp} = mean bore diameter variation, difference between the largest and smallest bore diameter of one inner ring or joint ball
- b_1 = inner ring or joint ball width
- Δb_{1s} = single inner ring or joint ball width deviation
- h, h_1, h_2 = system length from inner ring or ball bore center to shank end
- $\Delta h_s, \Delta h_{1s}, \Delta h_{2s}$ = system length variation of a single rod end

Male thread
greasable,
low maintenance,
shields adapter sizes
according to DIN 648,
series K

Heavy-duty rod ends with integral self-aligning ball bearing



rod end housing:

forged steel, tempered, case hardened, bearing race, ground and lapped, rolled thread, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: Polyrex EP2 or soap complex
temperature range -20 °C to +120 °C

lubrication nipple:

DIN 3405 D1/A (sizes 6 to 10)
DIN 71412 H1 (sizes 12 to 30)

bearing clearance:

15 - 40 µm radial

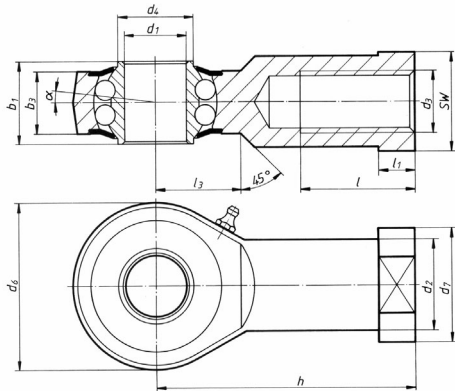
tolerances:

see page 10

| type | order number right hand thread | order number left hand thread | d ₁ | d ₃ | d ₄ | d ₆ | b ₁ | b ₃ | h |
|--------|-----------------------------------|----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----|
| BRM 06 | 00-501 | 00-502 | 6 | M 6 X 1.0 | 9 | 20 | 9 | 6,75 | 36 |
| BRM 08 | 00-501 | 00-502 | 8 | M 8 X 1.25 | 10,5 | 24 | 12 | 9 | 42 |
| BRM 10 | 00-501 | 00-502 | 10 | M 10 X 1.5 | 12 | 28 | 14 | 10,5 | 48 |
| BRM 12 | 00-501 | 00-502 | 12 | M 12 X1.75 | 14,5 | 32 | 16 | 12 | 54 |
| BRM 14 | 00-501 | 00-502 | 14 | M 14X 2.0 | 17 | 36 | 19 | 13,5 | 60 |
| BRM 16 | 00-501 | 00-502 | 16 | M 16 X2.0 | 19 | 42 | 21 | 15 | 66 |
| BRM 18 | 00-501 | 00-502 | 18 | M 18 x 1,5 | 21,5 | 46 | 23 | 16,5 | 72 |
| BRM 20 | 00-501 | 00-502 | 20 | M 20 x 1,5 | 24,5 | 50 | 25 | 18 | 78 |
| BRM 22 | 00-501 | 00-502 | 22 | M 22 x 1,5 | 26 | 54 | 28 | 20 | 84 |
| BRM 25 | 00-501 | 00-502 | 25 | M 25 x 2 | 29,5 | 64 | 31 | 22 | 94 |
| BRM 30 | 00-501 | 00-502 | 30 | M 30 x 2 | 34,5 | 70 | 37 | 25 | 110 |

| type | l | l ₃ | α [°] | weight [kg] | calculation- factors | | speed- limit n _{max} ^[min-1] | basic load rating [N] | |
|--------|----|----------------|----------|----------------|-------------------------|----------------|--|-----------------------|-------------------------|
| | | | | | Y | Y ₀ | | dyn. C | stat. C ₀ |
| BRM 06 | 22 | 12 | 8,0 | 0,019 | 2,09 | 2,19 | 1350 | 2750 | 650 |
| BRM 08 | 25 | 15 | 8,5 | 0,036 | 1,80 | 1,89 | 1300 | 4000 | 1000 |
| BRM 10 | 29 | 15 | 8,0 | 0,060 | 1,90 | 1,81 | 1225 | 4450 | 1450 |
| BRM 12 | 33 | 19 | 7,5 | 0,087 | 1,74 | 1,82 | 1125 | 4950 | 1800 |
| BRM 14 | 36 | 20 | 6,0 | 0,135 | 2,36 | 2,48 | 1025 | 5600 | 2000 |
| BRM 16 | 40 | 22 | 8,0 | 0,190 | 2,24 | 2,35 | 975 | 6250 | 2350 |
| BRM 18 | 44 | 25 | 8,5 | 0,270 | 2,21 | 2,31 | 900 | 7100 | 2900 |
| BRM 20 | 47 | 28 | 7,0 | 0,338 | 2,46 | 2,58 | 825 | 7900 | 3450 |
| BRM 22 | 51 | 26 | 8,0 | 0,450 | 2,35 | 2,24 | 725 | 9300 | 3980 |
| BRM 25 | 57 | 30 | 5,0 | 0,602 | 2,02 | 2,12 | 600 | 11030 | 5680 |
| BRM 30 | 66 | 35 | 7,5 | 0,922 | 2,24 | 2,35 | 450 | 14150 | 7450 |

Heavy-duty rod ends with integral self-aligning ball bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: Polyrex EP2 or soap complex
temperature range -20 °C to +120 °C

lubrication nipple:

DIN 3405 D1/A (sizes 6 to 10)
DIN 71412 H1 (sizes 12 to 30)

bearing clearance:

15 - 40 µm radial

tolerances:

see page 10

Female thread

Greasable,

low maintenance,

shields adapter sizes

according to DIN 648,
series K



| type | order number right hand thread | order number left hand thread. | d ₁ | d ₂ | d ₃ | d ₄ | d ₆ | d ₇ | b ₁ | b ₃ | h |
|----------|-----------------------------------|-----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|
| BRF 06 | 00-501 | 00-502 | 6 | 10 | M 6 X 1.0 | 9 | 20 | 13 | 9 | 6,75 | 30 |
| BRF 08 | 00-501 | 00-502 | 8 | 12,5 | M 8 X 1.25 | 10,5 | 24 | 16 | 12 | 9 | 36 |
| BRF 10 | 00-501 | 00-502 | 10 | 15 | M 10 X 1.5 | 12 | 28 | 19 | 14 | 10,5 | 43 |
| BRF 12 | 00-501 | 00-502 | 12 | 17,5 | M 12 X1.75 | 14,5 | 32 | 22 | 16 | 12 | 50 |
| BRF 14 | 00-501 | 00-502 | 14 | 20 | M 14 X2.0 | 17 | 36 | 25 | 19 | 13,5 | 57 |
| BRF 16 | 00-501 | 00-502 | 16 | 22 | M 16 X2.0 | 19 | 42 | 27 | 21 | 15 | 64 |
| BRF 16SO | 01-501 | 01-502 | 16 | 22 | M 16 X1.5 | 19 | 42 | 27 | 21 | 15 | 64 |

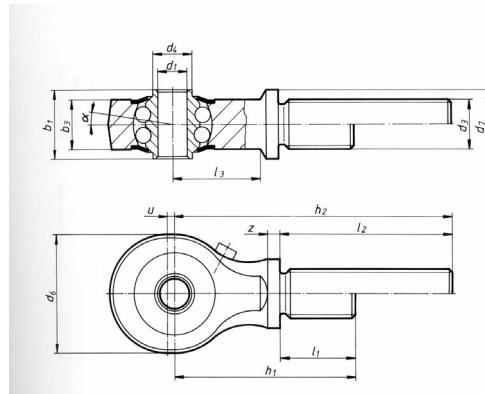
| | | | | | | | | | | | |
|--------|--------|--------|----|------|------------|------|----|----|----|------|----|
| BRF 18 | 00-501 | 00-502 | 18 | 25 | M 18 x 1,5 | 21,5 | 46 | 31 | 23 | 16,5 | 71 |
| BRF 20 | 00-501 | 00-502 | 20 | 27,5 | M 20 x 1,5 | 24,5 | 50 | 34 | 25 | 18 | 77 |
| BRF 22 | 00-501 | 00-502 | 22 | 30 | M 22 x 1,5 | 26 | 54 | 38 | 28 | 20 | 84 |

| | | | | | | | | | | | |
|--------|--------|--------|----|----|----------|------|----|----|----|----|-----|
| BRF 25 | 00-501 | 00-502 | 25 | 30 | M 24 x 2 | 29,5 | 64 | 35 | 31 | 22 | 94 |
| BRF 30 | 00-501 | 00-502 | 30 | 40 | M 30 x 2 | 34,5 | 70 | 50 | 37 | 25 | 110 |

| Typ | Nr. | l | l ₁ | l ₃ | SW | α [°] | weight [kg] | calculation- factors Y | speed- limit n _{max} [min ⁻¹] | basic load rating [N] dyn. C | stat. C ₀ |
|----------|-----|-----|----------------|----------------|-----|----------|----------------|------------------------------|--|------------------------------------|-------------------------|
| BRF 6 | 12 | 5 | 10 | 11 | 8.0 | 0,024 | 2,09 | 2,19 | 1350 | 2750 | 650 |
| BRF 8 | 16 | 5 | 12 | 14 | 8.5 | 0,044 | 1,80 | 1,89 | 1300 | 4000 | 1000 |
| BRF 10 | 20 | 6,5 | 15 | 17 | 8.0 | 0,072 | 1,90 | 1,81 | 1225 | 4450 | 1450 |
| BRF 12 | 22 | 6,5 | 16 | 19 | 7.5 | 0,107 | 1,74 | 1,82 | 1125 | 4950 | 1800 |
| BRF 14 | 25 | 8 | 20 | 22 | 6.0 | 0,160 | 2,36 | 2,48 | 1025 | 5600 | 2000 |
| BRF 16 | 28 | 8 | 22 | 22 | 8.0 | 0,224 | 2,24 | 2,35 | 975 | 6250 | 2350 |
| BRF 16SO | 28 | 8 | 22 | 22 | 8.0 | 0,224 | 2,24 | 2,35 | 975 | 6250 | 2350 |
| BRF 18 | 32 | 10 | 24 | 27 | 8,5 | 0,293 | 2,21 | 2,31 | 900 | 7100 | 2900 |
| BRF 20 | 33 | 10 | 26 | 30 | 7,0 | 0,367 | 2,46 | 2,58 | 825 | 7900 | 3450 |
| BRF 22 | 37 | 12 | 26 | 32 | 8,0 | 0,480 | 2,35 | 2,24 | 725 | 9300 | 3980 |
| BRF 25 | 42 | 10 | 32 | 30 | 5,0 | 0,572 | 2,02 | 2,12 | 600 | 11030 | 5680 |
| BRF 30 | 51 | 15 | 35 | 41 | 7,5 | 0,978 | 2,24 | 2,35 | 450 | 14150 | 7450 |

Male thread
greasable,
low maintenance,
shields

Heavy-duty rod ends with integral self-aligning ball bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, rolled thread, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: Polyrex EP2 or soap complex

temperature range -20 °C to +120 °C

lubrication nipple:

DIN 3405 D1/A

bearing clearance:

15 - 40 µm radial

tolerances:

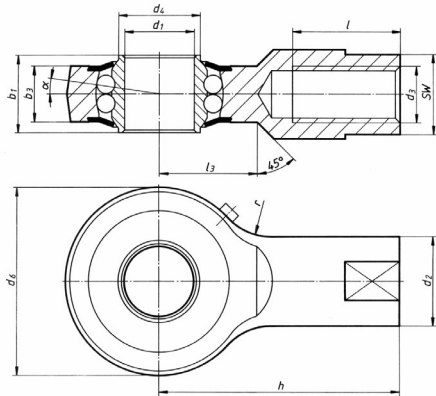
see page 10

| type | order number right hand thread | order number left hand thread. | d ₁ | d ₃ | d ₄ | d ₆ | d ₇ | b ₁ | b ₃ |
|-------|-----------------------------------|-----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| PM 05 | 00-501 | 00-502 | 5 | M 8 x 1 | 7,5 | 19 | 12 | 12 | 8 |
| PM 05 | 01-501 | 01-502 | 5 | M 8 x 1 | 7,5 | 19 | 12 | 12 | 8 |
| PM 06 | 00-501 | 00-502 | 6 | M 10 x 1 | 8,5 | 24 | 14 | 14 | 10 |
| PM 06 | 02-501 | 02-502 | 6 | M 10 x 1 | 8,5 | 24 | 14 | 14 | 10 |
| PM 08 | 00-501 | 00-502 | 8 | M 12 x 1,5 | 11 | 30 | 17 | 15 | 10 |
| PM 08 | 02-501 | 02-502 | 8 | M 12 x 1,5 | 11 | 30 | 17 | 15 | 10 |
| PM 10 | 00-501 | 00-502 | 10 | M 14 x 1,5 | 13,5 | 36 | 19 | 20 | 14 |
| PM 10 | 03-501 | 03-502 | 10 | M 14 x 1,5 | 13,5 | 36 | 19 | 20 | 14 |
| PM 12 | 00-501 | 00-502 | 12 | M 16 x 1,5 | 15 | 40 | 21 | 20 | 14 |
| PM 12 | 02-501 | 02-502 | 12 | M 16 x 1,5 | 15 | 40 | 21 | 20 | 14 |
| PM 15 | 00-501 | 00-502 | 15 | M 20 x 1,5 | 18,5 | 42 | 26 | 20 | 14 |
| PM 15 | 02-501 | 02-502 | 15 | M 20 x 1,5 | 18,5 | 42 | 26 | 20 | 14 |
| PM 17 | 00-501 | 00-502 | 17 | M 20 x 1,5 | 21 | 48 | 26 | 22 | 16 |
| PM 17 | 01-501 | 01-502 | 17 | M 20 x 1,5 | 21 | 48 | 26 | 22 | 16 |
| PM 20 | 00-501 | 00-502 | 20 | M 24 x 1,5 | 24 | 56 | 30 | 24 | 18 |
| PM 20 | 02-501 | 02-502 | 20 | M 24 x 1,5 | 24 | 56 | 30 | 24 | 18 |

| type | l ₁ | l ₂ | l ₃ | h ₁ | h ₂ | u | z | α [°] | weight [kg] | calculation- factors Y Y ₀ | speed- limit n _{max} [min ⁻¹] | basic load rating [N] dyn. stat. C C ₀ |
|-------|----------------|----------------|----------------|----------------|----------------|-----|-----|----------|----------------|---|--|--|
| PM 05 | | 39,5 | 13 | | 57 | 1,5 | 2,5 | 7,0 | 0,037 | 1,51 1,58 | 1350 | 1610 480 |
| PM 05 | 16 | | 13 | 33,5 | | 1,5 | 2,5 | 7,0 | 0,033 | 1,51 1,58 | 1350 | 1610 480 |
| PM 06 | | 42,5 | 17 | | 64 | 1,5 | 2,5 | 10,5 | 0,062 | 1,28 1,34 | 1300 | 2445 765 |
| PM 06 | 19 | | 17 | 40,5 | | 1,5 | 2,5 | 10,5 | 0,057 | 1,28 1,34 | 1300 | 2445 765 |
| PM 08 | | 46,5 | 20 | | 72 | 2 | 2,5 | 8,5 | 0,097 | 1,9 1,81 | 1225 | 2605 985 |
| PM 08 | 23 | | 20 | 48,5 | | 2 | 2,5 | 8,5 | 0,088 | 1,9 1,81 | 1225 | 2605 985 |
| PM 10 | | 49,5 | 28 | | 82 | 2,5 | 2,5 | 9,5 | 0,168 | 1,69 1,77 | 1100 | 5120 1905 |
| PM 10 | 26 | | 28 | 58,5 | | 2,5 | 2,5 | 9,5 | 0,154 | 1,69 1,77 | 1100 | 5120 1905 |
| PM 12 | | 53,5 | 31 | | 90 | 3 | 2,5 | 7,5 | 0,226 | 1,81 1,90 | 1050 | 5345 2065 |
| PM 12 | 29 | | 31 | 65,5 | | 3 | 2,5 | 7,5 | 0,204 | 1,81 1,90 | 1050 | 5345 2065 |
| PM 15 | | 62,5 | 30 | | 100 | 3 | 2,5 | 6,5 | 0,310 | 2,07 2,17 | 975 | 5485 3270 |
| PM 15 | 36 | | 30 | 73,5 | | 3 | 2,5 | 6,5 | 0,273 | 2,07 2,17 | 975 | 5485 3270 |
| PM 17 | | 62,5 | 36 | | 105 | 3,5 | 2,5 | 7,0 | 0,401 | 2,35 2,46 | 875 | 5575 2680 |
| PM 17 | 36 | | 36 | 78,5 | | 3,5 | 2,5 | 7,0 | 0,354 | 2,35 2,46 | 875 | 5575 2680 |
| PM 20 | | 68,5 | 41 | | 117 | 3,5 | 3 | 5,5 | 0,587 | 2,76 2,90 | 775 | 6165 3140 |
| PM 20 | 41 | | 41 | 89,5 | | 3,5 | 3 | 5,5 | 0,519 | 2,76 2,90 | 775 | 6165 3140 |



Heavy-duty rod ends with integral self-aligning ball bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: Polyrex EP2 or soap-complex
temperature range -20 °C to +120 °C

lubrication nipple:

DIN 3405 D1/A

bearing clearance:

15 - 40 µm radial

tolerances:

see page 10

"Female thread
GREASABLE,
low maintenance,
shields"



| type | order number right hand thread | order number left hand thread | d ₁ | d ₂ | d ₃ | d ₄ | d ₆ | b ₁ | b ₃ |
|-------|-----------------------------------|----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| PF 10 | 00-501 | 00-502 | 10 | 15 | M 8X1.25 | 13 | 30 | 13 | 9 |
| PF 15 | 00-501 | 00-502 | 15 | 19 | M 12X1.75 | 17,5 | 40 | 16,5 | 12 |
| PF 20 | 00-501 | 00-502 | 20 | 22 | M 16X2 | 24 | 48 | 20,5 | 15 |

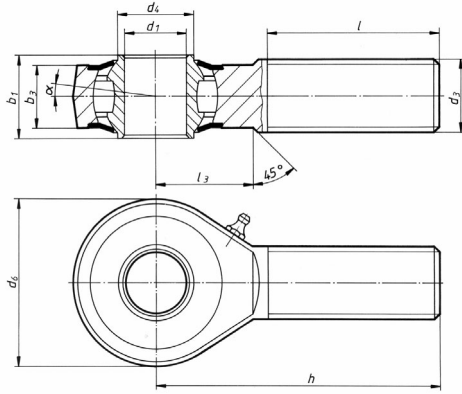
| type | h | l | l ₃ | r | SW | α [°] | weight [kg] | calculation- factors | | speed- limit n _{max} ^[min-1] | basic load rating [N] | |
|-------|----|----|----------------|----|----|----------|----------------|-------------------------|----------------|--|-----------------------|-------------------------|
| | | | | | | | | Y | Y ₀ | | dyn. C | stat. C ₀ |
| PF 10 | 38 | 17 | 14,5 | 10 | 13 | 7,0 | 0,063 | 1,90 | 1,81 | 1225 | 2605 | 985 |
| PF 15 | 51 | 24 | 20 | 15 | 17 | 7,0 | 0,140 | 2,30 | 2,41 | 1025 | 5000 | 1890 |
| PF 20 | 65 | 32 | 22 | 20 | 19 | 6,5 | 0,223 | 2,34 | 2,45 | 850 | 6105 | 2955 |



DURBAL BRTM

Male thread
GREASABLE,
low maintenance,
shields adapter sizes
according to DIN 648,
series K

Heavy-duty rod ends with integral self-aligning roller bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, rolled thread, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: Polyrex EP2 or soap-complex

temperature range -20 °C to +120 °C

lubrication nipple:

DIN 71412 HZ

bearing clearance:

15 – 30 µm radial

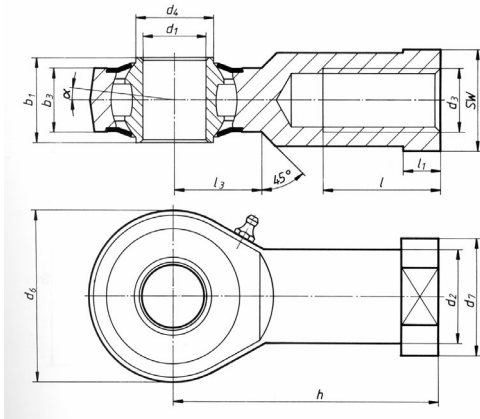
tolerances:

see page 10

| type | order number right hand thread | order number left hand thread | d ₁ | d ₃ | d ₄ | d ₆ | b ₁ | b ₃ |
|---------|-----------------------------------|----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| BRTM 12 | 01-501 | 01-502 | 12 | M 12 X1.5 | 14,5 | 32 | 16 | 12 |
| BRTM 16 | 03-501 | 03-502 | 16 | M 16 X2.0 | 19 | 42 | 21 | 15 |
| BRTM 20 | 00-501 | 00-502 | 20 | M 20 x 1,5 | 24,5 | 50 | 25 | 18 |
| BRTM 25 | 00-501 | 00-502 | 25 | M 24 x 2 | 29,5 | 64 | 31 | 22 |
| BRTM 30 | 00-501 | 00-502 | 30 | M 30 x 2 | 34,5 | 70 | 37 | 25 |

| type | h | l | l ₃ | α [°] | weight [kg] | speed- limit n _{max} ^[min-1] | basic load rating [N] dyn. C | stat. C ₀ |
|---------|-----|----|----------------|----------|----------------|--|------------------------------------|-------------------------|
| BRTM 12 | 54 | 33 | 19 | 7,5 | 0,088 | 1125 | 10250 | 6600 |
| BRTM 16 | 66 | 40 | 22 | 7,0 | 0,185 | 975 | 13300 | 8900 |
| BRTM 20 | 78 | 47 | 28 | 7,0 | 0,340 | 825 | 17000 | 11700 |
| BRTM 25 | 94 | 57 | 30 | 5,0 | 0,596 | 600 | 24900 | 18500 |
| BRTM 30 | 110 | 66 | 35 | 7,5 | 0,912 | 450 | 32500 | 24850 |

Heavy-duty rod ends with integral self-aligning roller bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: Polyrex EP2 or soap-complex
temperature range -20 °C to +120 °C

lubrication nipple:

DIN 71412 H1

bearing clearance:

15 - 30 µm radial

tolerances:

see page 10

Female thread

GREASABLE,

low maintenance,

shields adapter sizes

according to DIN 648,

series K



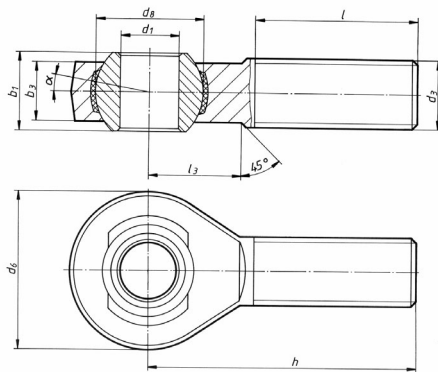
| type | order number | | d ₁ | d ₂ | d ₃ | d ₄ | d ₆ | d ₇ | b ₁ | b ₃ |
|---------|-------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | right hand thread | left hand thread | | | | | | | | |
| BRTF 12 | 04-501 | 04-502 | 12 | 17,5 | M 12 X 1.5 | 14,5 | 32 | 22 | 16 | 12 |
| BRTF 16 | 03-501 | 03-502 | 16 | 22 | M 16 X 2 | 19 | 42 | 27 | 21 | 15 |
| BRTF 20 | 00-501 | 00-502 | 20 | 27,5 | M 20 x 1,5 | 24,5 | 50 | 34 | 25 | 18 |
| BRTF 25 | 00-501 | 00-502 | 25 | 30 | M 24 x 2 | 29,5 | 64 | 35 | 31 | 22 |
| BRTF 30 | 01-501 | 01-502 | 30 | 40 | M 30 x 2 | 34,5 | 70 | 50 | 37 | 25 |

| type | h | l | l ₁ | l ₃ | SW | α [°] | weight [kg] | speed- limit n _{max} [min ⁻¹] | basic load rating [N] | |
|---------|-----|----|----------------|----------------|----|----------|----------------|--|-----------------------|-------------------------|
| | | | | | | | | | dyn. C | stat. C ₀ |
| BRTF 12 | 50 | 22 | 6,5 | 16 | 19 | 7,5 | 0,109 | 1125 | 10250 | 6600 |
| BRTF 16 | 64 | 28 | 8 | 22 | 22 | 7,0 | 0,220 | 975 | 13300 | 8900 |
| BRTF 20 | 77 | 33 | 10 | 26 | 30 | 7,0 | 0,361 | 825 | 17000 | 11700 |
| BRTF 25 | 94 | 42 | 10 | 32 | 30 | 5,0 | 0,565 | 600 | 24900 | 18500 |
| BRTF 30 | 110 | 51 | 15 | 35 | 41 | 7,5 | 1,000 | 450 | 32500 | 24850 |

Male thread
maintenance free
adapter sizes according
to DIN 648,
series K



Heavy-duty rod ends with integral spherical plain bearing



rod end housing:

forged steel, tempered, rolled thread,
surface galvanized

joint ball:

ball bearing steel, hardened and ground,
surface superfinished and chromium plated

race:

Nylon/Teflon/Glass compound

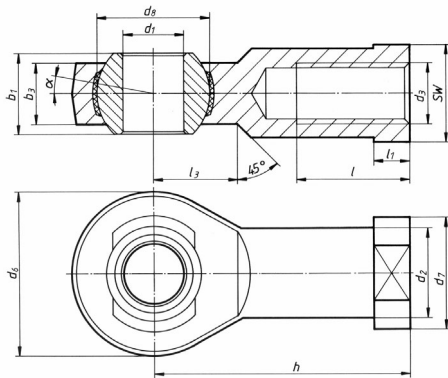
tolerances:

see page 10

| type | order number right hand thread | order number left hand thread | d ₁ | d ₃ | d ₆ | d ₈ | b ₁ | b ₃ |
|--------|-----------------------------------|----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| BEM 05 | 20-501 | 20-502 | 5 | M 5 X 0.8 | 18 | 11,06 | 8 | 6 |
| BEM 06 | 20-501 | 20-502 | 6 | M 6 X 1 | 20 | 12,65 | 9 | 6,75 |
| BEM 08 | 20-501 | 20-502 | 8 | M 8 X 1.25 | 24 | 15,82 | 12 | 9 |
| BEM 10 | 20-501 | 20-502 | 10 | M 10 X 1.5 | 28 | 19,00 | 14 | 10,5 |
| BEM 12 | 20-501 | 20-502 | 12 | M 12 X 1.75 | 32 | 22,17 | 16 | 12 |
| BEM 14 | 20-501 | 20-502 | 14 | M 14 X 2 | 36 | 25,35 | 19 | 13,5 |
| BEM 16 | 20-501 | 20-502 | 16 | M 16 X 2 | 42 | 28,52 | 21 | 15 |
| BEM 18 | 20-501 | 20-502 | 18 | M 18 x 1,5 | 46 | 31,70 | 23 | 16,5 |
| BEM 20 | 20-501 | 20-502 | 20 | M 20 x 1,5 | 50 | 34,87 | 25 | 18 |
| BEM 22 | 20-501 | 20-502 | 22 | M 22 x 1,5 | 54 | 38,05 | 28 | 20 |
| BEM 25 | 20-501 | 20-502 | 25 | M 24 x 2 | 60 | 42,80 | 31 | 22 |
| BEM 30 | 20-501 | 20-502 | 30 | M 30 x 2 | 70 | 50,75 | 37 | 25 |

| type | h | l | l ₃ | α ¹⁾ [°] | α ²⁾ [°] | weight [kg] | basic load rating [N] dyn. C | stat. C ₀ |
|--------|-----|----|----------------|------------------------|------------------------|----------------|------------------------------------|-------------------------|
| BEM 05 | 33 | 20 | 9 | 13,0 | 7,5 | 0,014 | 3910 | 5390 |
| BEM 06 | 36 | 22 | 12 | 13,0 | 6,5 | 0,020 | 4590 | 7510 |
| BEM 08 | 42 | 25 | 15 | 14,5 | 7,5 | 0,038 | 6965 | 13700 |
| BEM 10 | 48 | 29 | 15 | 13,5 | 8,0 | 0,060 | 10420 | 21705 |
| BEM 12 | 54 | 33 | 19 | 13,0 | 8,0 | 0,092 | 12425 | 31060 |
| BEM 14 | 60 | 36 | 20 | 16,0 | 9,5 | 0,127 | 15440 | 38610 |
| BEM 16 | 66 | 40 | 22 | 15,5 | 8,5 | 0,202 | 22410 | 56020 |
| BEM 18 | 72 | 44 | 25 | 15 | 9,5 | 0,250 | 26325 | 65810 |
| BEM 20 | 78 | 47 | 28 | 14,5 | 9,0 | 0,327 | 30805 | 77010 |
| BEM 22 | 84 | 51 | 26 | 15,5 | 10,0 | 0,440 | 38230 | 95580 |
| BEM 25 | 94 | 57 | 30 | 15,0 | 10,0 | 0,630 | 45350 | 113380 |
| BEM 30 | 110 | 66 | 35 | 17,0 | 10,5 | 1,015 | 55010 | 137520 |

Heavy-duty rod ends with integral spherical plain bearing



rod end housing:

forged steel, tempered, surface galvanized

joint ball:

ball bearing steel, hardened and ground, surface superfinished and chromium plated

race:

Nylon/Teflon/Glass compound

tolerances:

see page 10

Female thread
maintenance free
adapter sizes according
to DIN 648,
series K
thread according to
Cetrop RP 103 P



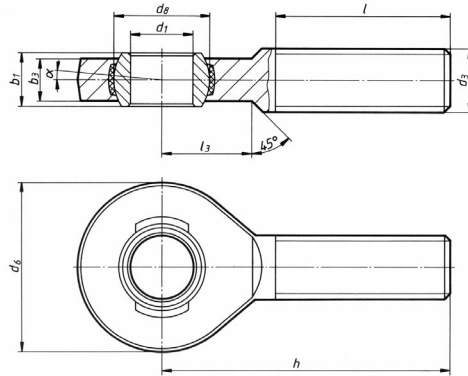
| type | order number right hand thread | order number left hand thread | d ₁ | d ₂ | d ₃ | d ₆ | d ₇ | d ₈ | b ₁ | b ₃ |
|-----------|-----------------------------------|----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| BEF 05 | 20-501 | 20-502 | 5 | 9 | M 5 X 0.8 | 18 | 11 | 11,06 | 8 | 6 |
| BEF 05 SO | 22-501 | 22-502 | 5 | 9 | M 4 X 0.7 | 18 | 11 | 11,06 | 8 | 6 |
| BEF 06 | 20-501 | 20-502 | 6 | 10 | M 6 X 1.0 | 20 | 13 | 12,65 | 9 | 6,75 |
| BEF 08 | 20-501 | 20-502 | 8 | 12,5 | M 8 X 1.25 | 24 | 16 | 15,82 | 12 | 9 |
| BEF 10 | 20-501 | 20-502 | 10 | 15 | M 10 X 1.5 | 28 | 19 | 19,00 | 14 | 10,5 |
| BEF 10 SO | 21-501 | 21-502 | 10 | 15 | M 10 X 1,25 | 28 | 19 | 19,00 | 14 | 10,5 |
| BEF 12 | 20-501 | 20-502 | 12 | 17,5 | M 12 X 1.75 | 32 | 22 | 22,17 | 16 | 12 |
| BEF 12 SO | 22-501 | 22-502 | 12 | 17,5 | M 12 x 1,25 | 32 | 22 | 22,17 | 16 | 12 |
| BEF 14 | 20-501 | 20-502 | 14 | 20 | M 14 X 2 | 36 | 25 | 25,35 | 19 | 13,5 |
| BEF 16 | 20-501 | 20-502 | 16 | 22 | M 16 X 2 | 42 | 27 | 28,52 | 21 | 15 |
| BEF 16 SO | 21-501 | 21-502 | 16 | 22 | M 16 x 1,5 | 42 | 27 | 28,52 | 21 | 15 |
| BEF 18 | 20-501 | 20-502 | 18 | 25 | M 18 x 1,5 | 46 | 31 | 31,70 | 23 | 16,5 |
| BEF 20 | 20-501 | 20-502 | 20 | 27,5 | M 20 x 1,5 | 50 | 34 | 34,87 | 25 | 18 |
| BEF 22 | 20-501 | 20-502 | 22 | 30 | M 22 x 1,5 | 54 | 38 | 38,05 | 28 | 20 |
| BEF 25 | 20-501 | 20-502 | 25 | 33,5 | M 24 x 2 | 60 | 42 | 42,80 | 31 | 22 |
| BEF 30 | 20-501 | 20-502 | 30 | 40 | M 30 x 2 | 70 | 50 | 50,75 | 37 | 25 |
| BEF 30 SO | 22-501 | 22-502 | 30 | 40 | M 27 x 2 | 70 | 50 | 50,75 | 37 | 25 |

| type | h | l | l ₁ | l ₃ | SW | α ₁ ¹⁾ [°] | α ₂ ¹⁾ [°] | weight [kg] | basic load rating [N] | |
|-----------|-----|----|----------------|----------------|----|-------------------------------------|-------------------------------------|----------------|-----------------------|-------------------------|
| | | | | | | | | | dyn. C | stat. C ₀ |
| BEF 05 | 27 | 10 | 4 | 10 | 9 | 13,0 | 7,5 | 0,018 | 3910 | 9775 |
| BEF 05 SO | 27 | 10 | 4 | 10 | 9 | 13,0 | 7,5 | 0,018 | 3910 | 9775 |
| BEF 06 | 30 | 12 | 5 | 10 | 11 | 13,0 | 6,5 | 0,024 | 4590 | 11490 |
| BEF 08 | 36 | 16 | 5 | 12 | 14 | 14,5 | 7,5 | 0,045 | 6965 | 17420 |
| BEF 10 | 43 | 20 | 6,5 | 15 | 17 | 13,5 | 8,0 | 0,074 | 10420 | 26050 |
| BEF 10 SO | 43 | 20 | 6,5 | 15 | 17 | 13,5 | 8,0 | 0,074 | 10420 | 26050 |
| BEF 12 | 50 | 22 | 6,5 | 16 | 19 | 13,0 | 8,0 | 0,109 | 12425 | 31060 |
| BEF 12 SO | 50 | 22 | 6,5 | 16 | 19 | 13,0 | 8,0 | 0,109 | 12425 | 31060 |
| BEF 14 | 57 | 25 | 8 | 20 | 22 | 16,0 | 9,5 | 0,155 | 15440 | 38610 |
| BEF 16 | 64 | 28 | 8 | 22 | 22 | 15,5 | 8,5 | 0,233 | 22410 | 56020 |
| BEF 16 SO | 64 | 28 | 8 | 22 | 22 | 15,5 | 8,5 | 0,233 | 22410 | 56020 |
| BEF 18 | 71 | 32 | 10 | 24 | 27 | 15,0 | 9,5 | 0,310 | 26325 | 65810 |
| BEF 20 | 77 | 33 | 10 | 26 | 30 | 14,5 | 9,0 | 0,386 | 30805 | 77010 |
| BEF 22 | 84 | 37 | 12 | 26 | 32 | 15,5 | 10,0 | 0,520 | 38230 | 95580 |
| BEF 25 | 94 | 42 | 12 | 30 | 36 | 15,0 | 10,0 | 0,705 | 45350 | 113380 |
| BEF 30 | 110 | 51 | 15 | 35 | 41 | 17,0 | 10,5 | 1,084 | 55010 | 137520 |
| BEF 30 SO | 110 | 51 | 15 | 35 | 41 | 17,0 | 10,5 | 1,084 | 55010 | 137520 |

Male thread
maintenance free
adapter sizes
according to DIN 648,
series E



Heavy-duty rod ends with integral spherical plain bearing



rod end housing:

forged steel, tempered, rolled thread,
surface galvanized

joint ball:

ball bearing steel, hardened and ground,
surface superfinished and chromium plated

race:

Nylon/Teflon/Glass compound

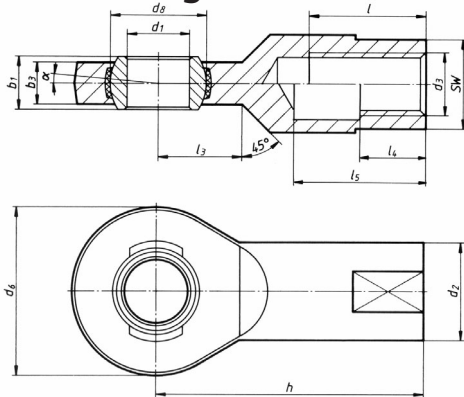
tolerances:

see page 10

| type | order number right hand thread | order number left hand thread | d ₁ | d ₃ | d ₆ | d ₈ | b ₁ | b ₃ | h |
|----------|-----------------------------------|----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----|
| EM 06 | 20-501 | 20-502 | 6 | M 6 X 1 | 20 | 10 | 6 | 4 | 36 |
| EM 08 | 20-501 | 20-502 | 8 | M 8 X 1.25 | 23 | 13 | 8 | 5 | 42 |
| EM 10 | 20-501 | 20-502 | 10 | M 10 X 1.5 | 28 | 16 | 9 | 6 | 48 |
| EM 12 | 20-501 | 20-502 | 12 | M 12 X 1.75 | 32 | 18 | 10 | 7 | 54 |
| EM 15 | 20-501 | 20-502 | 15 | M 14 X 2 | 38 | 22 | 12 | 9 | 63 |
| EM 17 | 20-501 | 20-502 | 17 | M 16 X 2 | 44 | 25 | 14 | 10 | 69 |
| EM 20 | 20-501 | 20-502 | 20 | M 20 x 1,5 | 51 | 29 | 16 | 12 | 78 |
| EM 25 | 20-501 | 20-502 | 25 | M 24 x 2 | 62 | 35,5 | 20 | 16 | 94 |
| EM 30 | 20-501 | 20-502 | 30 | M 30 x 2 | 70 | 40,7 | 22 | 18 | 110 |
| EM 35 | 20-501 | 20-502 | 35 | M 36 x 3 | 82 | 47 | 25 | 20 | 140 |
| EM 40 | 20-501 | 20-502 | 40 | M 42 x 3 | 92 | 53 | 28 | 22 | 145 |
| EM 40 SO | 21-501 | 21-502 | 40 | M 39 x 3 | 92 | 53 | 28 | 22 | 150 |
| EM 45 | 20-501 | 20-502 | 45 | M 45 x 3 | 102 | 60 | 32 | 25 | 165 |
| EM 45 SO | 22-501 | 22-502 | 45 | M 42 x 3 | 102 | 60 | 32 | 25 | 163 |
| EM 50 | 20-501 | 20-502 | 50 | M 52 x 3 | 112 | 66 | 35 | 28 | 195 |
| EM 50 SO | 22-501 | 22-502 | 50 | M 45 x 3 | 112 | 66 | 35 | 28 | 185 |
| EM 60 | 20-501 | 20-502 | 60 | M 60 x 4 | 135 | 80 | 44 | 36 | 225 |
| EM 60 SO | 21-501 | 21-502 | 60 | M 52 x 3 | 135 | 80 | 44 | 36 | 210 |

| type | l | l ₃ | α1 ¹⁾ [°] | α2 ¹⁾ [°] | weight [kg] | basic load rating [N] | |
|----------|-----|----------------|-------------------------|-------------------------|----------------|-----------------------|-------------------------|
| | | | | | | dyn. C | stat. C ₀ |
| EM 06 | 22 | 11 | 13,0 | 6,5 | 0,014 | 2500 | 6200 |
| EM 08 | 25 | 12 | 15,0 | 8,0 | 0,024 | 4200 | 10500 |
| EM 10 | 29 | 15 | 12,0 | 6,0 | 0,041 | 6400 | 16100 |
| EM 12 | 33 | 15 | 10,5 | 5,0 | 0,067 | 9200 | 22900 |
| EM 15 | 36 | 18 | 8,5 | 4,5 | 0,110 | 13400 | 33500 |
| EM 17 | 40 | 23 | 10,0 | 5,5 | 0,163 | 19200 | 48100 |
| EM 20 | 47 | 25 | 9,0 | 4,5 | 0,270 | 25200 | 63100 |
| EM 25 | 57 | 32 | 7,5 | 3,5 | 0,508 | 42400 | 106000 |
| EM 30 | 66 | 35 | 6,0 | 3,0 | 0,785 | 54000 | 135000 |
| EM 35 | 92 | 38 | 6,5 | 3,5 | 1,330 | 70400 | 176000 |
| EM 40 | 94 | 42 | 7,0 | 3,5 | 1,890 | 86000 | 215000 |
| EM 40 SO | 99 | 42 | 7,0 | 3,5 | 1,785 | 86000 | 215000 |
| EM 45 | 100 | 50 | 7,5 | 4,0 | 2,620 | 107000 | 268000 |
| EM 45 SO | 98 | 50 | 7,5 | 4,0 | 2,430 | 107000 | 268000 |
| EM 50 | 120 | 60 | 6,5 | 3,0 | 3,865 | 132000 | 330000 |
| EM 50 SO | 110 | 60 | 6,5 | 3,0 | 3,225 | 132000 | 330000 |
| EM 60 | 140 | 70 | 6,5 | 3,5 | 6,400 | 208000 | 520000 |
| EM 60 SO | 125 | 70 | 6,5 | 3,5 | 5,430 | 208000 | 520000 |

Heavy-duty rod ends with integral spherical plain bearing



rod end housing:

forged steel, tempered, surface galvanized

joint ball:

ball bearing steel, hardened and ground, surface superfinished and chromium plated

race:

Nylon/Teflon/Glass compound

tolerances:

see page 10

Female thread

maintenance free

adapter sizes

according to DIN 648,

series E



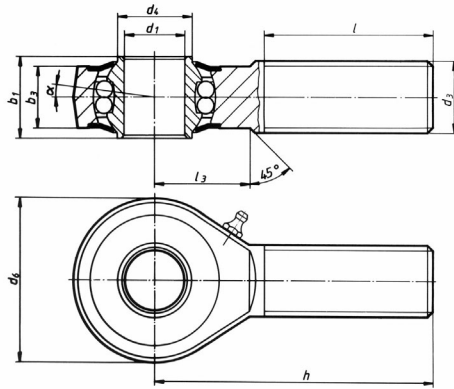
| type | order number right hand thread | order number left hand thread | d ₁ | d ₂ | d ₃ | d ₆ | d ₈ | b ₁ | b ₃ | h |
|----------|--------------------------------|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----|
| EF 06 | 20-501 | 20-502 | 6 | 10 | M 6 X 1 | 20 | 10 | 6 | 4 | 30 |
| EF 08 | 20-501 | 20-502 | 8 | 13 | M 8 X 1.25 | 23 | 13 | 8 | 5 | 36 |
| EF 10 | 20-501 | 20-502 | 10 | 16 | M 10 X 1.5 | 28 | 16 | 9 | 6 | 43 |
| EF 10 SO | 22-501 | 22-502 | 10 | 16 | M 10 x 1,25 | 28 | 16 | 9 | 6 | 43 |
| EF 12 | 20-501 | 20-502 | 12 | 19 | M 12 X 1.75 | 32 | 18 | 10 | 7 | 50 |
| EF 12 SO | 22-501 | 22-502 | 12 | 19 | M 12 x 1,25 | 32 | 18 | 10 | 7 | 50 |
| EF 15 | 20-501 | 20-502 | 15 | 22 | M 14 X 2 | 38 | 22 | 12 | 9 | 61 |
| EF 17 | 20-501 | 20-502 | 17 | 25 | M 16 X 2 | 44 | 25 | 14 | 10 | 67 |
| EF 20 | 20-501 | 20-502 | 20 | 28 | M 20 x 1,5 | 51 | 29 | 16 | 12 | 77 |
| EF 25 | 20-501 | 20-502 | 25 | 35 | M 24 x 2 | 62 | 35,5 | 20 | 16 | 94 |
| EF 30 | 20-501 | 20-502 | 30 | 42 | M 30 x 2 | 70 | 40,7 | 22 | 18 | 110 |
| EF 35 | 20-501 | 20-502 | 35 | 48 | M 36 x 3 | 82 | 47 | 25 | 20 | 125 |
| EF 35 SO | 22-501 | 22-502 | 35 | 48 | M 36 x 2 | 82 | 47 | 25 | 20 | 130 |
| EF 40 | 20-501 | 20-502 | 40 | 58 | M 42 x 3 | 92 | 53 | 28 | 22 | 145 |
| EF 40 SO | 22-501 | 22-502 | 40 | 52 | M 39 x 3 | 92 | 53 | 28 | 22 | 142 |
| EF 45 | 20-501 | 20-502 | 45 | 65 | M 45 x 3 | 102 | 60 | 32 | 25 | 165 |
| EF 45 SO | 21-501 | 21-502 | 45 | 58 | M 42 x 3 | 102 | 60 | 32 | 25 | 145 |
| EF 50 | 20-501 | 20-502 | 50 | 70 | M 52 x 3 | 112 | 66 | 35 | 28 | 195 |
| EF 50 SO | 21-501 | 21-502 | 50 | 62 | M 45 x 3 | 112 | 66 | 35 | 28 | 160 |
| EF 60 | 20-501 | 20-502 | 60 | 82 | M 60 x 4 | 135 | 80 | 44 | 36 | 225 |
| EF 60 SO | 21-501 | 21-502 | 60 | 71 | M 52 x 3 | 135 | 80 | 44 | 36 | 175 |

| type | l | l ₃ | l ₄ | l ₅ | SW | α ¹) [°] | α ²) [°] | weight [kg] | basic load rating [N] | |
|----------|----|----------------|----------------|----------------|----|-------------------------|-------------------------|----------------|-----------------------|-------------------------|
| | | | | | | | | | dyn. C | stat. C ₀ |
| EF 06 | 12 | 11 | | | 9 | 13,0 | 6,5 | 0,017 | 2500 | 8500 |
| EF 08 | 16 | 12 | | | 11 | 15,0 | 8,0 | 0,031 | 4200 | 10500 |
| EF 10 | 20 | 13 | | | 14 | 12,0 | 6,0 | 0,054 | 6400 | 16100 |
| EF 10 SO | 20 | 13 | | | 14 | 12,0 | 6,0 | 0,054 | 6400 | 16100 |
| EF 12 | 22 | 15 | | | 17 | 10,5 | 5,0 | 0,086 | 9200 | 22900 |
| EF 12 SO | 22 | 15 | | | 17 | 10,5 | 5,0 | 0,086 | 9200 | 22900 |
| EF 15 | 25 | 18 | | | 19 | 8,5 | 4,5 | 0,142 | 13400 | 33500 |
| EF 17 | 28 | 20 | | | 22 | 10,0 | 5,5 | 0,208 | 19200 | 48100 |
| EF 20 | 33 | 23 | | | 24 | 9,0 | 4,5 | 0,290 | 25200 | 63100 |
| EF 25 | 42 | 30 | | | 30 | 7,5 | 3,5 | 0,573 | 42400 | 106000 |
| EF 30 | 51 | 32 | | | 36 | 6,0 | 3,0 | 0,908 | 54000 | 135000 |
| EF 35 | | 38 | 36 | 61 | 41 | 6,5 | 3,5 | 1,230 | 70400 | 176000 |
| EF 35 SO | | 38 | 41 | 66 | 41 | 6,5 | 3,5 | 1,230 | 70400 | 176000 |
| EF 40 | | 42 | 42 | 71 | 50 | 7,0 | 3,5 | 2,075 | 86000 | 215000 |
| EF 40 SO | | 42 | 39 | 66 | 46 | 7,0 | 3,5 | 1,880 | 86000 | 215000 |
| EF 45 | | 50 | 45 | 76 | 55 | 7,5 | 4,0 | 3,085 | 107000 | 268000 |
| EF 45 SO | | 50 | 42 | 66 | 50 | 7,5 | 4,0 | 2,500 | 107000 | 268000 |
| EF 50 | | 60 | 52 | 89 | 60 | 6,5 | 3,0 | 3,975 | 132000 | 330000 |
| EF 50 SO | | 60 | 45 | 69 | 55 | 6,5 | 3,0 | 3,200 | 132000 | 330000 |
| EF 60 | | 70 | 60 | 103 | 70 | 6,5 | 3,5 | 7,300 | 208000 | 520000 |
| EF 60 SO | | 70 | 52 | 71 | 60 | 6,5 | 3,5 | 5,900 | 208000 | 520000 |



Male thread
greasable,
low maintenance,
shields dimensions
in inches

Heavy-duty rod ends with integral self-aligning ball bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, rolled thread, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: Polyrex EP2 or calcium-complex

temperature range -20 °C to +120 °C

lubrication nipple:

DIN 3405 D1/A (sizes 1/4 to 3/8)

DIN 71412 H1 (sizes 1/2 to 1/1)

bearing clearance:

15 - 40 µm radial

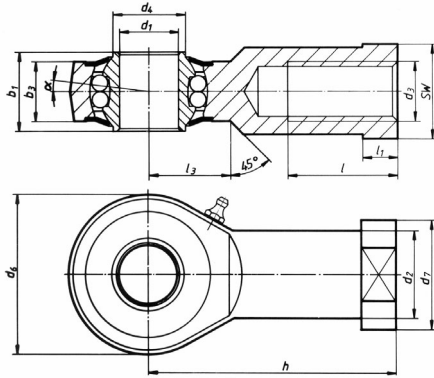
tolerances:

see page 10

| type | order number right hand thread | left hand thread | d ₁ | d ₃ class 2 | d ₄ | d ₆ | b ₁ | | | | |
|---------|--------------------------------------|---------------------|----------------|---------------------------|----------------|----------------|----------------------------------|------|--|---|------|
| BRM 3/8 | 00-501 | 00-502 | .375 | .3750-24 UNF | .468 | 1.000 | .551 | | | | |
| BRM 1/2 | 00-501 | 00-502 | .500 | .5000-20 UNF | .574 | 1.311 | .624 | | | | |
| BRM 5/8 | 00-501 | 00-502 | .625 | .6250-18 UNF | .744 | 1.654 | .826 | | | | |
| BRM 3/4 | 00-501 | 00-502 | .750 | .7500-16 UNF | .956 | 1.750 | .984 | | | | |
| BRM 1/1 | 00-501 | 00-502 | 1.000 | 1.0000-12 UNF | 1.161 | 2.362 | 1.220 | | | | |
| BRM 1/1 | 01-501 | 01-502 | 1.000 | 1.0000-14 UNF | 1.161 | 2.362 | 1.220 | | | | |
| type | b ₃ | h | l | l ₃ | α [°] | weight [kg] | calculation - factors Y Yo | | speedlimit n _{max} [min ⁻¹] | basic load rating [N] dyn. stat. C C0 | |
| BRM 3/8 | .413 | 1.909 | 1.141 | .748 | 8,0 | 0,060 | 1,87 | 1,83 | 1225 | 4360 | 1425 |
| BRM 1/2 | .472 | 2.460 | 1.496 | .846 | 7,5 | 0,109 | 1,74 | 1,81 | 1125 | 4850 | 1850 |
| BRM 5/8 | .590 | 2.618 | 1.574 | .944 | 8,0 | 0,200 | 2,24 | 2,35 | 975 | 6250 | 2350 |
| BRM 3/4 | .708 | 3.090 | 1.850 | 1.102 | 7,0 | 0,341 | 2,32 | 2,43 | 825 | 7750 | 3380 |
| BRM 1/1 | .866 | 3.720 | 2.244 | 1.279 | 5,0 | 0,590 | 2,02 | 2,12 | 600 | 11030 | 5680 |
| BRM 1/1 | .866 | 3.720 | 2.244 | 1.279 | 5,0 | 0,590 | 2,02 | 2,12 | 600 | 11030 | 5680 |



Heavy-duty rod ends with integral self-aligning ball bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: Polyrex EP2 or calcium-complex

temperature range -20 °C to +120 °C

lubrication nipple:

DIN 3405 D1/A (sizes 1/4 to 3/8)

DIN 71412 H1 (sizes 1/2 to 1/1)

bearing clearance:

15 - 40 µm radial

tolerances:

see page 10

Female thread
greasable,
low maintenance,
shields dimensions
in inches



| type | | order number right hand thread | order number left hand thread | d ₁ | d ₂ | d ₃ | d ₄ | d ₆ | d ₇ |
|------|-----|--------------------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| BRF | 3/8 | 00-501 | 00-502 | .375 | .567 | .3750-24 UNF | .468 | 1.102 | .748 |
| BRF | 1/2 | 00-501 | 00-502 | .500 | .748 | .5000-20 UNF | .574 | 1.311 | .874 |
| BRF | 5/8 | 00-501 | 00-502 | .625 | .866 | .6250-18 UNF | .744 | 1.653 | 1.062 |
| BRF | 3/4 | 00-501 | 00-502 | .750 | 1.000 | .7500-16 UNF | .956 | 1.750 | 1.125 |
| BRF | 1/1 | 00-501 | 00-502 | 1.000 | 1.319 | 1.0000-12 UNF | 1.161 | 2.519 | 1.377 |
| BRF | 1/1 | 01-501 | 01-502 | 1.000 | 1.319 | 1.0000-14 UNS | 1.161 | 2.519 | 1.377 |

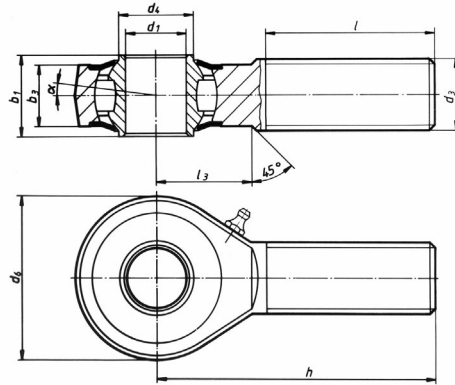
| type | b ₁ | b ₃ | h | l | l ₁ | l ₃ | SW | α [°] | weight [kg] | calculation- factors | | speed- limit n _{max} [min-1] | basic load rating [N] | |
|---------|----------------|----------------|-------|-------|----------------|----------------|-------|----------|----------------|-------------------------|----------------|--|--------------------------|----------------------|
| | | | | | | | | | | Y | Y ₀ | | dyn. C | stat. C ₀ |
| BRF 3/8 | .551 | .413 | 1.712 | .787 | .299 | .590 | .669 | 8,0 | 0,072 | 1,87 | 1,83 | 1225 | 4360 | 1425 |
| BRF 1/2 | .624 | .472 | 2.145 | 1.102 | .279 | .649 | .757 | 7,5 | 0,127 | 1,74 | 1,82 | 1125 | 4850 | 1850 |
| BRF 5/8 | .826 | .590 | 2.539 | 1.102 | .322 | .885 | .866 | 8,0 | 0,220 | 2,24 | 2,35 | 975 | 6250 | 2350 |
| BRF 3/4 | .984 | .688 | 3.051 | 1.299 | .409 | .854 | 1.007 | 7,0 | 0,2390 | 2,32 | 2,43 | 825 | 7750 | 3380 |
| BRF 1/1 | 1.220 | .866 | 3.720 | 1.653 | .236 | 1.279 | 1.181 | 5,0 | 0,570 | 2,02 | 2,12 | 600 | 11030 | 5680 |
| BRF 1/1 | 1.220 | .866 | 3.720 | 1.653 | .236 | 1.279 | 1.181 | 5,0 | 0,570 | 2,02 | 2,12 | 600 | 11030 | 5680 |



DURBAL BRTM

Male thread
greasable,
low maintenance,
shields dimensions
in inches

Heavy-duty rod ends with integral self-aligning roller bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, rolled thread, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: polyrex EP2 or calcium-complex

temperature range -20 °C to +120 °C

lubrication nipple:

DIN 71412 H1

bearing clearance:

15 – 30 µm radial

tolerances:

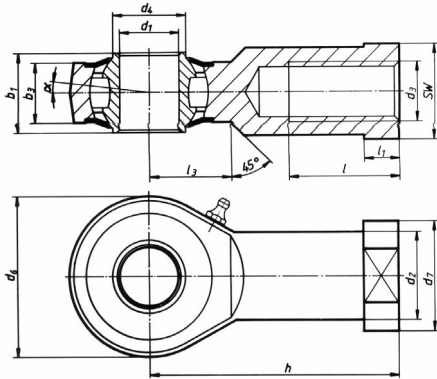
see page 10

| type | Nr. | order number | | d ₁ | d ₃ class 2 | d ₄ | d ₆ | b ₁ |
|------|-----|-------------------|------------------|----------------|---------------------------|----------------|----------------|----------------|
| | | right hand thread | left hand thread | | | | | |
| BRTM | 1/2 | 00-501 | 00-502 | .500 | .5000-20 UNF | .574 | 1.311 | .624 |
| BRTM | 5/8 | 00-501 | 00-502 | .625 | .6250-18 UNF | .748 | 1.653 | .826 |
| BRTM | 3/4 | 00-501 | 00-502 | .750 | .7500-16 UNF | .956 | 1.968 | .984 |
| BRTM | 1/1 | 00-501 | 00-502 | 1.000 | 1.0000-12 UNF | 1.161 | 2.519 | 1.220 |
| BRTM | 1/1 | 01-501 | 01-502 | 1.000 | 1.0000-14 UNS | 1.161 | 2.519 | 1.220 |

| type | | b ₃ | h | l | l ₃ | α [°] | weight [kg] | speedlimit n _{max} [min ⁻¹] | basic load rating [N] | |
|------|-----|----------------|-------|-------|----------------|----------|----------------|--|-----------------------|----------------------|
| | | | | | | | | | dyn. C | stat. C ₀ |
| BRTM | 1/2 | .472 | 2.460 | 1.496 | .846 | 7,5 | 0,109 | 1125 | 10250 | 6600 |
| BRTM | 5/8 | .590 | 2.618 | 1.574 | .944 | 7,0 | 0,182 | 975 | 13300 | 8900 |
| BRTM | 3/4 | .708 | 3.090 | 1.850 | 1.102 | 7,0 | 0,341 | 825 | 16655 | 11445 |
| BRTM | 1/1 | .866 | 3.720 | 2.244 | 1.279 | 5,0 | 0,590 | 600 | 24900 | 18500 |
| BRTM | 1/1 | .866 | 3.720 | 2.244 | 1.279 | 5,0 | 0,590 | 600 | 24900 | 18500 |



Heavy-duty rod ends with integral self-aligning roller bearing



rod end housing:

forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized

inner ring:

ball bearing steel, hardened, superfine ground

lubrication: polyrex EP2 or calcium-complex

temperature range -20 °C to +120 °C

lubrication nipple:

DIN 71412 H1

bearing clearance:

15 – 30 µm radial

tolerances:

see page 10

Female thread

greasable,

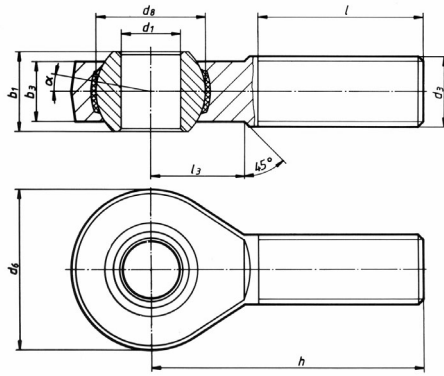
low maintenance, drawing dimension

in inches



| type | order number right hand thread | order number left hand thread | d ₁ | d ₂ | d ₃ class 2 | d ₄ | d ₆ | d ₇ |
|----------|--------------------------------------|-------------------------------------|----------------|----------------|---------------------------|----------------|----------------|----------------|
| BRTF 1/2 | 00-501 | 00-502 | .500 | .748 | .5000-20 UNF | .574 | 1.311 | .874 |
| BRTF 5/8 | 00-501 | 00-502 | .625 | .866 | .6250-18 UNF | .748 | 1.653 | 1.063 |
| BRTF 3/4 | 00-501 | 00-502 | .750 | 1.082 | .7500-16 UNF | .956 | 1.968 | 1.338 |
| BRTF 1/1 | 00-501 | 00-502 | 1.000 | 1.171 | 1.0000-12 UNF | 1.161 | 2.519 | 1.377 |
| BRTF 1/1 | 01-501 | 01-502 | 1.000 | 1.171 | 1.0000-14 UNS | 1.161 | 2.519 | 1.377 |

| type | b ₁ | b ₃ | h | l | l ₁ | l ₃ | SW | α [°] | weight [kg] | speed- limit n max [min-1] | basic load rating [N] dyn. stat. C C0 |
|----------|----------------|----------------|-------|-------|----------------|----------------|-------|----------|----------------|-------------------------------------|--|
| BRTF 1/2 | .624 | .472 | 2.145 | 1.102 | .251 | .649 | .757 | 7,5 | 0,127 | 1125 | 10250 6600 |
| BRTF 5/8 | .826 | .590 | 2.539 | 1.110 | .350 | .885 | .866 | 7,0 | 0,218 | 975 | 13300 8900 |
| BRTF 3/4 | .984 | .708 | 3.051 | 1.299 | .409 | 1.043 | 1.181 | 7,0 | 0,386 | 825 | 16655 11445 |
| BRTF 1/1 | 1.220 | .866 | 3.720 | 1.653 | .236 | 1.279 | 1.181 | 5,0 | 0,568 | 600 | 24900 18500 |
| BRTF 1/1 | 1.220 | .866 | 3.720 | 1.653 | .236 | 1.279 | 1.181 | 5,0 | 0,568 | 600 | 24900 18500 |



rod end housing:

forged steel, tempered, rolled thread, surface galvanized

joint ball:

ball bearing steel, hardened and ground, surface superfinished and chromium plated

race:

Nylon/Teflon/Glass compound

tolerances:

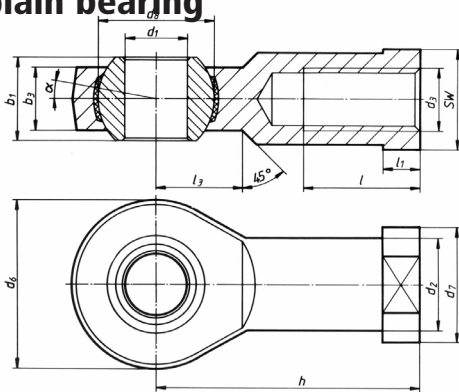
see page 10

| type | order number | | d ₁ | d ₃ | d ₆ | d ₈ | b ₁ |
|---------|-------------------|------------------|----------------|----------------|----------------|----------------|----------------|
| | right hand thread | left hand thread | | | | | |
| BEM 1/4 | 20-501 | 20-502 | .250 | .2500-28 UNF | .750 | .516 | .374 |
| BEM 3/8 | 20-501 | 20-502 | .375 | .3750-24 UNF | 1.000 | .719 | .499 |
| BEM 1/2 | 20-501 | 20-502 | .500 | .5000-20 UNF | 1.311 | .876 | .624 |
| BEM 1/4 | 20-501 | 20-502 | .625 | .6250-18 UNF | 1.654 | 1.125 | .827 |
| BEM 3/8 | 20-501 | 20-502 | .750 | .7500-16 UNF | 1.750 | 1.249 | .874 |
| BEM 1/1 | 20-501 | 20-502 | 1.000 | 1.0000-12 UNF | 2.362 | 1.688 | 1.220 |
| BEM 1/1 | 21-501 | 21-502 | 1.000 | 1.0000-14 UNF | 2.362 | 1.688 | 1.220 |

Red part numbers are discontinued. Remaining stock only.

| type | b ₃ | h | l | l ₃ | α ¹⁾ [°] | α ²⁾ [°] | weight [kg] | basic load rating [N] | |
|---------|----------------|-------|-------|----------------|------------------------|------------------------|----------------|-----------------------|-------------------------|
| | | | | | | | | dyn. C | stat. C ₀ |
| BEM 1/4 | .283 | 1.594 | 1.000 | .511 | 17,5 | 8,0 | 0,022 | 3610 | 9030 |
| BEM 3/8 | .405 | 1.948 | 1.240 | .629 | 9,5 | 5,5 | 0,049 | 7650 | 19120 |
| BEM 1/2 | .472 | 2.460 | 1.500 | .846 | 13,0 | 9,5 | 0,109 | 14649 | 36624 |
| BEM 5/8 | .590 | 2.618 | 1.574 | .944 | 15,5 | 8,5 | 0,202 | 22410 | 56020 |
| BEM 3/4 | .688 | 2.893 | 1.750 | 1.023 | 11,0 | 7,0 | 0,249 | 24870 | 62175 |
| BEM 1/1 | .866 | 3.720 | 2.244 | 1.200 | 15,5 | 10,0 | 0,562 | 45350 | 113380 |
| BEM 1/1 | .866 | 3.720 | 2.244 | 1.200 | 15,5 | 10,0 | 0,562 | 45350 | 113380 |

Heavy-duty rod ends with integral spherical plain bearing



rod end housing:

forged steel, tempered, surface galvanized

joint ball:

ball bearing steel, hardened and ground, surface superfinished and chromium plated

race:

Nylon/Teflon/Glass compound

tolerances:

see page 10

Female thread
maintenance free
dimensions
in inches



| type | | right hand thread | left hand thread | d ₁ | d ₂ | d ₃ Class 2 | d ₆ | d ₇ | d ₈ |
|------|-----|-------------------|------------------|----------------|----------------|---------------------------|----------------|----------------|----------------|
| BEF | 1/4 | 20-501 | 20-502 | .250 | .374 | .2500-28 UNF | .750 | .469 | .516 |
| BEF | 3/8 | 20-501 | 20-502 | .375 | .567 | .3750-24 UNF | 1.000 | .689 | .719 |
| BEF | 1/2 | 20-501 | 20-502 | .500 | .748 | .5000-20 UNF | 1.311 | .874 | .876 |
| BEF | 5/8 | 20-501 | 20-502 | .625 | .866 | .6250-18 UNF | 1.654 | 1.063 | 1.125 |
| BEF | 3/4 | 20-501 | 20-502 | .750 | 1.000 | .7500-16 UNF | 1.750 | 1.126 | 1.249 |
| BEF | 1/1 | 20-501 | 20-502 | 1.000 | 1.319 | 1.0000-12 UNF | 2.362 | 1.654 | 1.688 |
| BEF | 1/1 | 21-501 | 21-502 | 1.000 | 1.319 | 1.0000-14 UNF | 2.362 | 1.654 | 1.688 |

Red part numbers are discontinued. Remaining stock only.

| type | b1 | b3 | h | l | l1 | l3 | SW | α1 ¹⁾ [°] | α2 ¹⁾ [°] | weight [kg] | basic load rating [N] | |
|---------|-------|------|-------|-------|------|-------|-------|-------------------------|-------------------------|----------------|-----------------------|-------------------------|
| | | | | | | | | | | | dyn. C | stat. C ₀ |
| BEF 1/4 | .374 | .283 | 1.338 | .716 | .185 | .385 | .381 | 17,5 | 8,0 | 0,027 | 4290 | 10725 |
| BEF 3/8 | .499 | .405 | 1.641 | .874 | .275 | .503 | .570 | 9,5 | 5,5 | 0,059 | 7650 | 19120 |
| BEF 1/2 | .624 | .472 | 2.145 | 1.161 | .279 | .649 | .757 | 13,0 | 9,5 | 0,127 | 14649 | 36624 |
| BEF 5/8 | .826 | .590 | 2.539 | 1.102 | .350 | .885 | .866 | 15,5 | 8,5 | 0,231 | 22410 | 56020 |
| BEF 3/4 | .874 | .688 | 2.905 | 1.718 | .311 | .854 | 1.007 | 11,0 | 7,0 | 0,229 | 24870 | 62175 |
| BEF 1/1 | 1.220 | .866 | 3.720 | 1.653 | .511 | 1.200 | 1.417 | 15,5 | 10,0 | 0,663 | 45350 | 113380 |
| BEF 1/1 | 1.220 | .866 | 3.720 | 1.653 | .511 | 1.200 | 1.417 | 15,5 | 10,0 | 0,663 | 45350 | 113380 |

Male thread
maintenance free
adapter sizes according
to DIN 648, series K

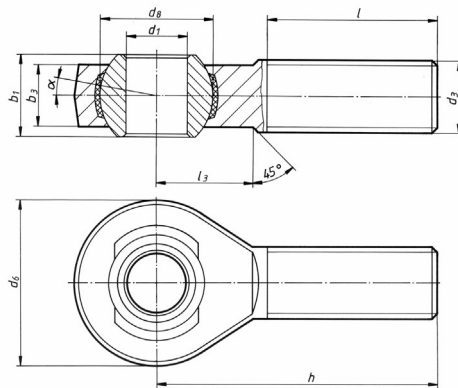
Heavy-duty rod ends with integral spherical plain bearing in stainless steel

rod end housing:
stainless steel 1.4301, rolled thread

joint ball:
stainless steel 1.4412, hardened and ground,
surface superfinished

race:
Nylon/Teflon/Glass compound

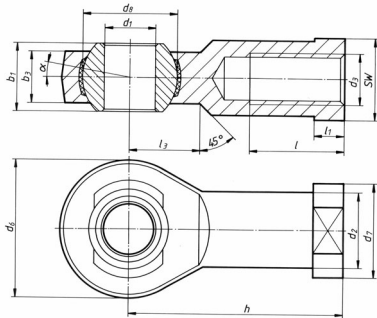
tolerances:
see page 10



| type | order number | | d ₁ | d ₃ | d ₆ | d ₈ | b ₁ | b ₃ |
|--------|-------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | right hand thread | left hand thread | | | | | | |
| BEM 05 | 60-501 | 60-502 | 5 | M 5 X 0.8 | 18 | 11,06 | 8 | 6 |
| BEM 06 | 60-501 | 60-502 | 6 | M 6 X 1 | 20 | 12,65 | 9 | 6,75 |
| BEM 08 | 60-501 | 60-502 | 8 | M 8 X 1.25 | 24 | 15,82 | 12 | 9 |
| BEM 10 | 60-501 | 60-502 | 10 | M 10 X 1.5 | 28 | 19,00 | 14 | 10,5 |
| BEM 12 | 60-501 | 60-502 | 12 | M 12 X 1.75 | 32 | 22,17 | 16 | 12 |
| BEM 14 | 60-501 | 60-502 | 14 | M 14 X 2 | 36 | 25,35 | 19 | 13,5 |
| BEM 16 | 60-501 | 60-502 | 16 | M 16 X 2 | 42 | 28,52 | 21 | 15 |
| BEM 18 | 60-501 | 60-502 | 18 | M 18 x 1,5 | 46 | 31,70 | 23 | 16,5 |
| BEM 20 | 60-501 | 60-502 | 20 | M 20 x 1,5 | 50 | 34,87 | 25 | 18 |
| BEM 22 | 60-501 | 60-502 | 22 | M 22 x 1,5 | 54 | 28,05 | 28 | 20 |
| BEM 25 | 60-501 | 60-502 | 25 | M 24 x 2 | 60 | 42,80 | 31 | 22 |
| BEM 30 | 60-501 | 60-502 | 30 | M 30 x 2 | 70 | 50,75 | 37 | 25 |

| type | h | l | l ₃ | α ¹⁾ [°] | α ²⁾ [°] | weight [kg] | basic load rating [N] | |
|--------|-----|----|----------------|------------------------|------------------------|----------------|-----------------------|-------------|
| | | | | | | | dyn. C | stat. C0 |
| BEM 05 | 33 | 20 | 9 | 13,0 | 7,5 | 0,014 | 2400 | 3220 |
| BEM 06 | 36 | 22 | 12 | 13,0 | 6,5 | 0,020 | 2820 | 4610 |
| BEM 08 | 42 | 25 | 15 | 14,5 | 7,5 | 0,038 | 4280 | 8420 |
| BEM 10 | 48 | 29 | 15 | 13,5 | 8,0 | 0,060 | 6400 | 13300 |
| BEM 12 | 54 | 33 | 19 | 13,0 | 8,0 | 0,092 | 7600 | 19100 |
| BEM 14 | 60 | 36 | 20 | 16,0 | 9,5 | 0,127 | 9480 | 23700 |
| BEM 16 | 66 | 40 | 22 | 15,5 | 8,5 | 0,202 | 13760 | 34400 |
| BEM 18 | 72 | 44 | 25 | 15 | 9,5 | 0,250 | 16160 | 40400 |
| BEM 20 | 78 | 47 | 28 | 14,5 | 9,0 | 0,327 | 18960 | 47400 |
| BEM 22 | 84 | 51 | 26 | 15,5 | 10,0 | 0,440 | 23480 | 58700 |
| BEM 25 | 94 | 57 | 30 | 15,0 | 10,0 | 0,630 | 27860 | 69650 |
| BEM 30 | 110 | 66 | 35 | 17,0 | 10,5 | 1,015 | 33800 | 84500 |

Heavy-duty rod ends with integral spherical plain bearing in stainless steel



rod end housing:
stainless steel 1.4301

joint ball:
stainless steel 1.4412, hardened and ground, surface superfinished

race:
Nylon/Teflon/Glass compound

tolerances:
see page 10

Female thread
maintenance free
adapter sizes according
to DIN 648, series K
thread according to
Cetrop RP 103 P



| type | order number | | d ₁ | d ₂ | d ₃ | d ₆ | d ₇ | d ₈ | b ₁ | b ₃ |
|-----------|-------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | right hand thread | left hand thread | | | | | | | | |
| BEF 05 | 60-501 | 60-502 | 5 | 9 | M 5 X 0.8 | 18 | 11 | 11,06 | 8 | 6 |
| BEF 05 SO | 61-501 | 61-502 | 5 | 9 | M 4 X 0.7 | 18 | 11 | 11,06 | 8 | 6 |
| BEF 06 | 60-501 | 60-502 | 6 | 10 | M 6 X 1 | 20 | 13 | 12,65 | 9 | 6,75 |
| BEF 08 | 60-501 | 60-502 | 8 | 12,5 | M 8 X 1.25 | 24 | 16 | 15,82 | 12 | 9 |
| BEF 10 | 60-501 | 60-502 | 10 | 15 | M 10 X 1.5 | 28 | 19 | 19,00 | 14 | 10,5 |
| BEF 10 SO | 61-501 | 61-502 | 10 | 15 | M 10 x 1,25 | 28 | 19 | 19,00 | 14 | 10,5 |
| BEF 12 | 60-501 | 60-502 | 12 | 17,5 | M 12 X 1.75 | 32 | 22 | 22,17 | 16 | 12 |
| BEF 12 SO | 61-501 | 61-502 | 12 | 17,5 | M 12 x 1,25 | 32 | 22 | 22,17 | 16 | 12 |
| BEF 14 | 60-501 | 60-502 | 14 | 20 | M 14 X 2 | 36 | 25 | 25,35 | 19 | 13,5 |
| BEF 16 | 60-501 | 60-502 | 16 | 22 | M 16 X 2 | 42 | 27 | 28,52 | 21 | 15 |
| BEF 16 SO | 61-501 | 61-502 | 16 | 22 | M 16 x 1,5 | 42 | 27 | 28,52 | 21 | 15 |
| BEF 18 | 60-501 | 60-502 | 18 | 25 | M 18 x 1,5 | 46 | 31 | 31,70 | 23 | 16,5 |
| BEF 20 | 60-501 | 60-502 | 20 | 27,5 | M 20 x 1,5 | 50 | 34 | 34,87 | 25 | 18 |
| BEF 22 | 60-501 | 60-502 | 22 | 30 | M 22 x 1,5 | 54 | 38 | 38,05 | 28 | 20 |
| BEF 25 | 60-501 | 60-502 | 25 | 33,5 | M 24 x 2 | 60 | 42 | 42,80 | 31 | 22 |
| BEF 30 | 60-501 | 60-502 | 30 | 40 | M 30 x 2 | 70 | 50 | 50,75 | 37 | 25 |
| BEF 30 SO | 61-501 | 61-502 | 30 | 40 | M 27 x 2 | 70 | 50 | 50,75 | 37 | 25 |

| type | h | l | l ₁ | l ₃ | SW | α ¹⁾ [°] | α ²⁾ [°] | weight [kg] | basic load rating [N] | |
|-----------|-----|----|----------------|----------------|----|------------------------|------------------------|----------------|-----------------------|-------------------------|
| | | | | | | | | | dyn. C | stat. C ₀ |
| BEF 05 | 27 | 10 | 4 | 10 | 9 | 13,0 | 7,5 | 0,018 | 2400 | 6000 |
| BEF 05 SO | 27 | 10 | 4 | 10 | 9 | 13,0 | 7,5 | 0,018 | 2400 | 6000 |
| BEF 06 | 30 | 12 | 5 | 10 | 11 | 13,0 | 6,5 | 0,024 | 2820 | 7060 |
| BEF 08 | 36 | 16 | 5 | 12 | 14 | 14,5 | 7,5 | 0,045 | 4280 | 10700 |
| BEF 10 | 43 | 20 | 6,5 | 15 | 17 | 13,5 | 8,0 | 0,074 | 6400 | 16000 |
| BEF 10 SO | 43 | 20 | 6,5 | 15 | 17 | 13,5 | 8,0 | 0,074 | 6400 | 16000 |
| BEF 12 | 50 | 22 | 6,5 | 16 | 19 | 13,0 | 8,0 | 0,109 | 7600 | 19100 |
| BEF 12 SO | 50 | 22 | 6,5 | 16 | 19 | 13,0 | 8,0 | 0,109 | 7600 | 19100 |
| BEF 14 | 57 | 25 | 8 | 20 | 22 | 16,0 | 9,5 | 0,155 | 9480 | 23700 |
| BEF 16 | 64 | 28 | 8 | 22 | 22 | 15,5 | 8,5 | 0,233 | 13760 | 34400 |
| BEF 16 SO | 64 | 28 | 8 | 22 | 22 | 15,5 | 8,5 | 0,233 | 13760 | 34400 |
| BEF 18 | 71 | 32 | 10 | 24 | 27 | 15,0 | 9,5 | 0,310 | 16160 | 40400 |
| BEF 20 | 77 | 33 | 10 | 26 | 30 | 14,5 | 9,0 | 0,386 | 18960 | 47400 |
| BEF 22 | 84 | 37 | 12 | 26 | 32 | 15,5 | 10,0 | 0,520 | 23480 | 58700 |
| BEF 25 | 94 | 42 | 12 | 30 | 36 | 15,0 | 10,0 | 0,705 | 27860 | 69650 |
| BEF 30 | 110 | 51 | 15 | 35 | 41 | 17,0 | 10,5 | 1,084 | 33800 | 84500 |
| BEF 30 SO | 110 | 51 | 15 | 35 | 41 | 17,0 | 10,5 | 1,084 | 33800 | 84500 |

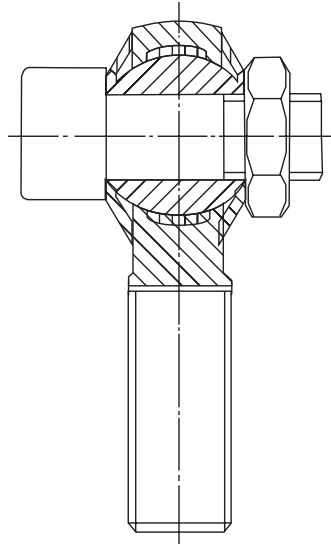
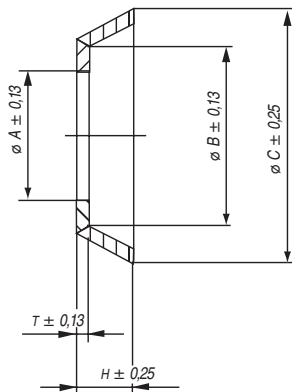


Durbal Dirt Shield

Note: Before installing, fill cup 1/2 with waterpump grease.

Seal:
neoprene rubber

washer:
stainless steel



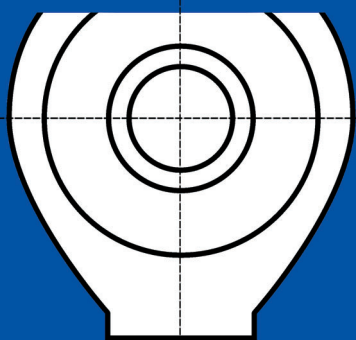
| type | order number | A | B | C | H | T |
|--------|--------------|-------|-------|-------|-------|------|
| DDS 05 | DDS 05 | 5,25 | 8,28 | 11,22 | 2,41 | 0,50 |
| DDS 06 | DDS 06 | 6,25 | 9,53 | 12,7 | 3,05 | 0,69 |
| DDS 08 | DDS 08 | 8,25 | 12,37 | 17,78 | 5,08 | 1,20 |
| DDS 10 | DDS 10 | 10,25 | 13,46 | 20,32 | 5,59 | 1,20 |
| DDS 12 | DDS 12 | 12,25 | 18,54 | 28,58 | 6,35 | 1,20 |
| DDS 14 | DDS 14 | 14,25 | 20,32 | 29,21 | 6,86 | 1,20 |
| DDS 16 | DDS 16 | 16,25 | 22,40 | 31,7 | 6,80 | 1,20 |
| DDS 18 | DDS 18 | 18,25 | 22,60 | 32,69 | 8,25 | 1,20 |
| DDS 20 | DDS 20 | 20,25 | 25,15 | 38,10 | 10,16 | 1,20 |
| DDS 25 | DDS 25 | 25,25 | 33,80 | 53,30 | 12,70 | 1,50 |
| DDS 30 | DDS 30 | 30,25 | 35,56 | 55,88 | 13,97 | 1,53 |

FRACTIONAL

| | | | | | | |
|---------|---------|-------|--------|-------|-------|-------|
| DDS 1/4 | DDS 1/4 | 0.260 | 0.375 | 0.500 | 0.120 | 0.027 |
| DDS 3/8 | DDS 3/8 | 0.385 | 0.530 | 0.800 | 0.220 | 0.047 |
| DDS 1/2 | DDS 1/2 | 0.510 | 0.730 | 1.126 | 0.250 | 0.047 |
| DDS 5/8 | DDS 5/8 | 0.635 | 0.882 | 1.235 | 0.267 | 0.047 |
| DDS 3/4 | DDS 3/4 | 0.760 | 0.1006 | 1.381 | 0.367 | 0.047 |
| DDS 1.0 | DDS 1/1 | 1.010 | 1.230 | 2.100 | 0.500 | 0.050 |



DURBAL



DURBAL Inc., 14115 - 63rd Way North
Clearwater, Florida 33760

Tel. 727-531-3040

Fax. 727-539-7824

E-mail: [durball@durball.com](mailto:durbal@durball.com)