



Metal/Polymer Composite Plain Bearings

Maintenance-free
Low-maintenance
Special designs, special materials

SCHAEFFLER

Foreword

Metal/polymer composite plain bearings are bearings for very small radial or axial design envelopes. They run with little noise and are particularly suitable where high loads in conjunction with relatively slow rotary and swivel motion must be supported.

The products are available as bushes, flanged bushes, thrust washers and strips and in two material groups.

High performance and environmentally safe

The special characteristics of the metal/polymer composite plain bearings are due to the combination of plastic and metal. This material combination allows low-wear sliding characteristics together with high load carrying capacity and thermal conductivity. The static load carrying capacity reaches values of up to 250 N/mm^2 .

All metal/polymer composite plain bearings are free from lead in accordance with the End of Life Vehicles Directive, Directive 2000/53/EC as well as the Directive 2011/65/EU (RoHS-II) for the restriction of hazardous substances. They are thus environmentally safe.

Maintenance-free

The maintenance-free plain bearing material E40 is, due to the dry lubricant PTFE, intended for dry running. These bearings are thus particularly suitable where the bearing position must be maintenance-free, there is a risk of lubricant starvation or where lubricant is unacceptable or undesirable. The material E40 can be used not only for rotary and oscillating motion but also for short stroke linear motion.

Typical areas of application can be found, for example, in fluid technology, in sports gear, in medical or electrical equipment as well as in automotive engineering.

Low-maintenance

The low-maintenance plain bearing material E50 is a low-wear material with good damping characteristics and long relubrication intervals. The bearings have a sliding layer made from polyoxymethylene POM. E50 can be used for rotary and oscillating motion and is recommended for long stroke linear motion. It is only slightly sensitive to edge loads and is insensitive to shocks.

Application examples can be found in particular in the area of production machinery, construction and agricultural equipment as well as commercial vehicles.

Current level of technology

Technical Product Information TPI 211 describes the core range of metal/polymer composite plain bearings. The data represent the current level of technology and manufacture as of October 2017. They reflect not only progress in plain bearing technology but also the experience gathered in practical applications.

Any information in previous publications that does not concur with the data in this TPI is therefore invalid.

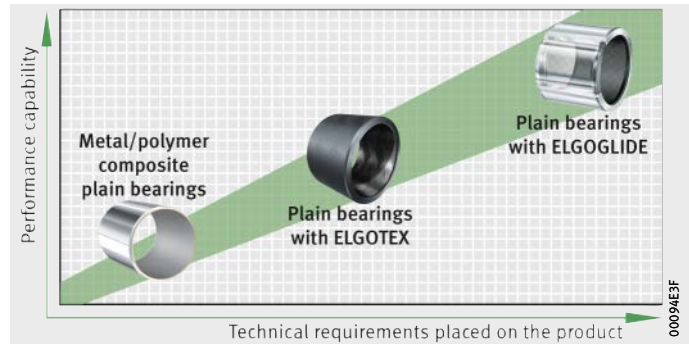
Foreword

Overview of available plain bushes

Schaeffler supplies plain bushes and metal/polymer composite plain bearings for diverse requirements, *Figure 1* and table.

ELGOTEX and ELGOGLIDE plain bushes, see Catalogue HG 1, Plain Bearings

Figure 1
Product spectrum



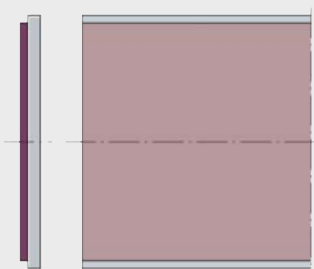
Comparison of technical data

Plain bearings	Metal/polymer composite plain bearings E40, E40-B	
Type of maintenance	Maintenance-free	
Permissible specific bearing load	Static	250 N/mm ²
	Dynamic	140 N/mm ²
Permissible sliding velocity	2,5 m/s	
Maximum permissible pv value in continuous operation	1,8 N/mm ² · m/s	
Permissible operating temperature ⁴⁾	-200 °C to +280 °C	
Coefficient of friction	0,03 to 0,25	
Dry running	✓	
Grease and oil lubrication	-	
Hydrodynamic operation	✓	
Media lubrication	✓	
Increased corrosion resistance	E40-B ■ E40 □	
Use in water	E40-B □	
Integrated sealing possible	-	
Standard designs	EGB, EGF, EGW, EGS	

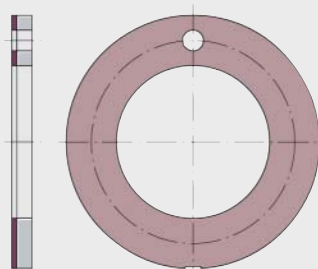
- ✓ Possible
- Standard design
- Optional

Metal/polymer composite plain bearings E50 	ELGOTEX	ELGOTEX-WA	ELGOGLIDE 
			
Low-maintenance	Maintenance-free	Water-resistant	Maintenance-free
140 N/mm ²	200 N/mm ² ¹⁾	150 N/mm ²	500 N/mm ² ²⁾
70 N/mm ²	140 N/mm ²	50 N/mm ² ³⁾	300 N/mm ²
2,5 m/s	0,18 m/s	0,024 m/s	0,3 m/s
3 N/mm ² · m/s	2,8 N/mm ² · m/s	1,2 N/mm ² · m/s	7 N/mm ² · m/s
-40 °C to +110 °C	-20 °C to +130 °C		-50 °C to +150 °C
0,02 to 0,2	0,03 to 0,2	0,05 to 0,15	0,02 to 0,2
-	✓	✓	✓
✓	✓	✓	-
-	-	-	-
-	✓	✓	-
□	■	■	□
-	□	■	-
-	□	□	□
EGB, EGW, EGS 	ZWB, ZWB...WA 	ZGB 	

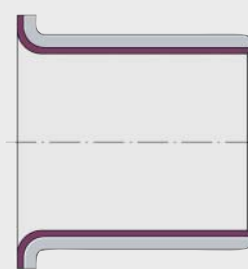
- 1) For static loads of more than 180 N/mm², the design of ELGOTEX filament wound bushes must be checked by the Schaeffler engineering service.
- 2) Standard bushes have a static load carrying capacity of 300 N/mm². If a material of higher strength is used for the steel support body, this value can be increased to 500 N/mm².
- 3) Certified specific bearing load $p_{max} = 15 \text{ N/mm}^2$ for use in rudder carrier bearings in accordance with MCM-0112 (Germanischer Lloyd).
- 4) Valid for open design (without seals).



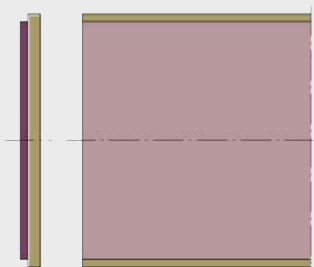
EGS..-E40



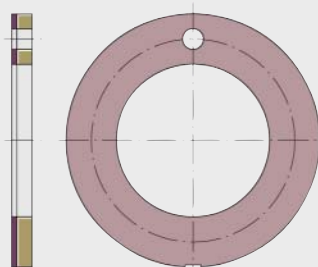
EGW..-E40



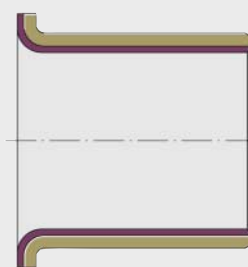
EGF..-E40



EGS..-E40-B

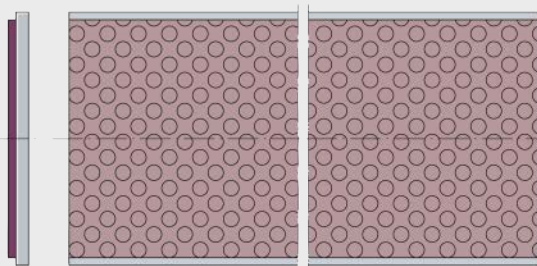


EGW..-E40-B

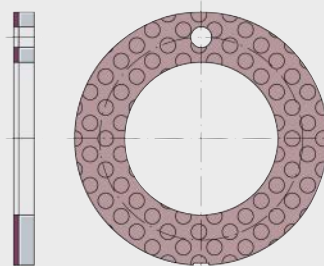


EGF..-E40-B

00017449



EGS..-E50

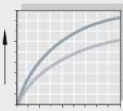


EGW..-E50

00017448



0001741D

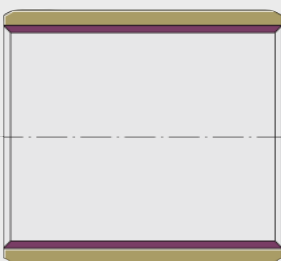


00015CE8

Technical principles



EGB...-E40,
EGBZ...-E40

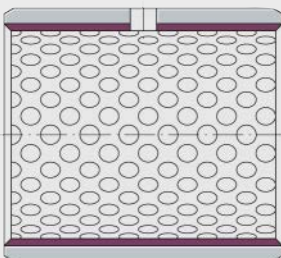


EGB...-E40-B

000174A8

Metal/polymer composite plain bearings, maintenance-free

- Bushes
- Flanged bushes
- Thrust washers
- Strips

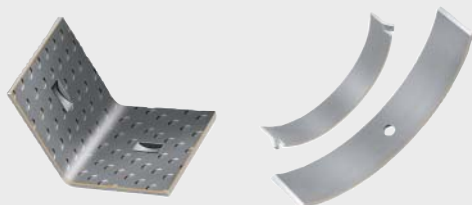


EGB...-E50

000174AA

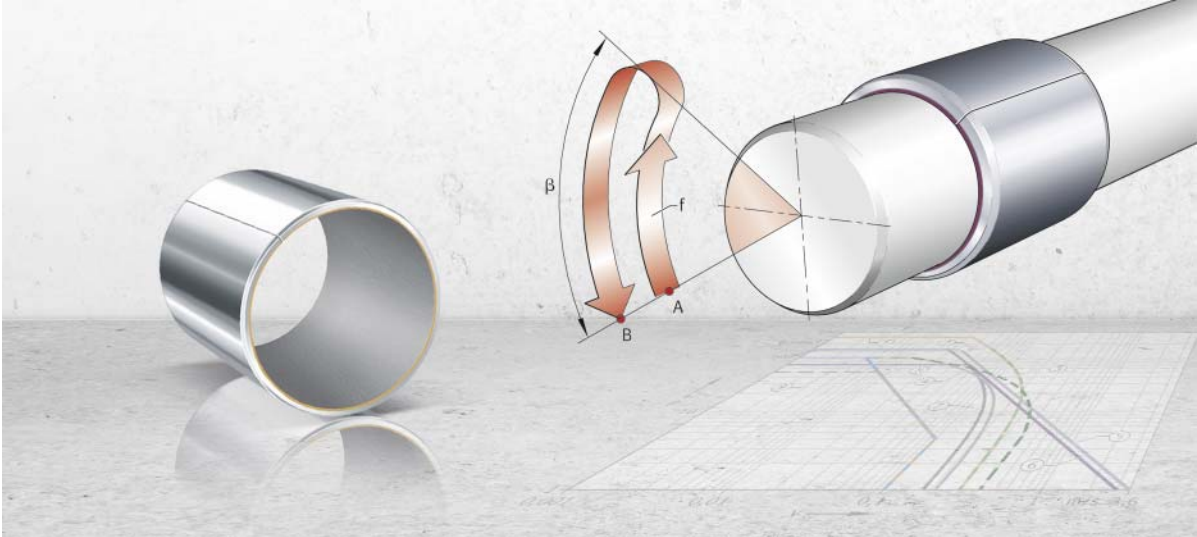
Metal/polymer composite plain bearings, low-maintenance

- Bushes
- Thrust washers
- Strips



0001741E

Special designs Special materials



Technical principles

Plain bearing materials

Load carrying capacity and life

Design of bearing arrangements

Bearing clearance and mounting tolerances

Mounting and dismounting



Technical principles

	Page
Plain bearing materials	Maintenance-free plain bearing material 8
	Low-maintenance plain bearing material 10
Load carrying capacity and life	Bearing load 11
	Static load safety factor 12
	Specific bearing load 12
	Bearing motion 16
	Specific frictional energy pv 17
	Rating life 18
	Failure criteria 18
	Influences on the rating life 18
	Operating life 19
	Basic rating life 19
	Calculation of the basic rating life 21
	Correction factors 24
	Calculation example for flanged bush EGF30260-E40 29
Friction and increases in temperature	Friction and wear 32
	Bearing frictional torque 33
	Heat dissipation 34
Design of bearing arrangements	Bushes 35
	Flanged bushes 36
	Thrust washers and strips 37
	Design of mating surfaces 38
	Protection against corrosion 39
	Misalignment of plain bushes 40
	Edge loading of metal/polymer composite plain bushes 40
Sealing	Seals for plain bushes 41
Bearing clearance and mounting tolerances	Theoretical bearing clearance of metal/polymer composite plain bushes 42
	Interference fit and bearing clearance of metal/polymer composite plain bushes 48
	Tables of deviations and wall thicknesses 50
Mounting and dismounting	General guidelines 53
	Checking the adjacent construction 54
	Pressing in of bushes 55
	Machining of plain bearings 57
	Alternative joining methods 57

Plain bearing materials

There are different materials for metal/polymer composite plain bearings, the maintenance-free E40 and E40-B or the low-maintenance E50.

The maintenance-free and low-maintenance materials conform to the regulations for lead-free plain bearings. They thus comply with Directive 2000/53/EC (End of Life Vehicles Directive) as well as the Directive 2011/65/EU (RoHS-II) for the restriction of hazardous substances.

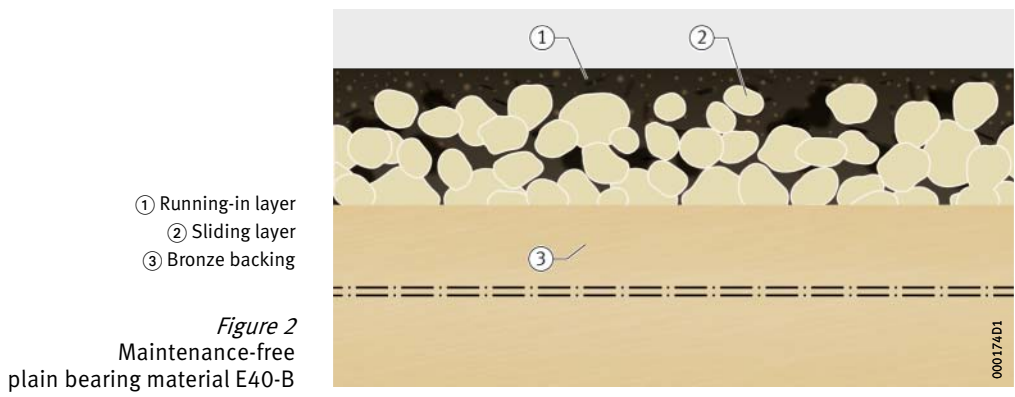
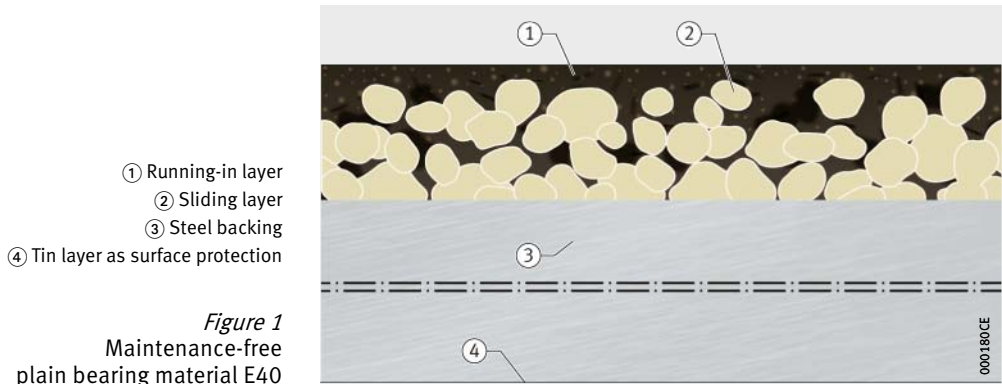
Maintenance-free plain bearing material

For maintenance-free metal/polymer composite plain bearings from Schaeffler, the sliding material E40 and E40-B is used. The basis of the dry lubricant is polytetrafluoroethylene PTFE with embedded chemically non-reactive additives.

In the three-layered material, the steel or bronze backing has a sintered porous tin/bronze sliding layer whose pores are filled with the superimposed running-in layer, see table, *Figure 1* and *Figure 2*. The running-in layer is a plastic composite comprising PTFE and additives.

Sliding and running-in layer E40, E40-B

Chemical element	Proportion of mass w %		Layer thickness mm	
	Sliding layer	Running-in layer	Sliding layer	Running-in layer
Molybdenum disulphide MoS ₂	–	max. 8	0,2 – 0,4	0,01 – 0,05
Polytetrafluoroethylene PTFE	–	80 – 86		
Fillers	max. 5,5	max. 19		
Tin Sn	7 – 12	–		
Copper Cu	Balance	–		



Plain bearing materials

Low-maintenance plain bearing material

For low-maintenance metal/polymer composite plain bearings from Schaeffler, the sliding material E50 is used. The basis of the sliding layer is polyoxymethylene POM.

In the three-layered material, the steel backing has a sintered porous tin/bronze intermediate layer whose pores are filled with the superimposed sliding layer, see table and *Figure 3*.

Sliding and intermediate layer E50

Chemical element	Proportion of mass w %		Layer thickness mm	
	Inter-mediate layer	Sliding layer	Inter-mediate layer	Sliding layer
Polyoxymethylene POM	–	99,6 – 99,8	0,15 – 0,5	0,2 – 0,5
Fillers	max. 0,95	max. 0,4		
Tin Sn	10 – 12	–		
Copper Cu	Balance	–		

- ① Sliding layer
- ② Intermediate layer
- ③ Steel backing
- ④ Surface protection
- ⑤ Lubrication pocket

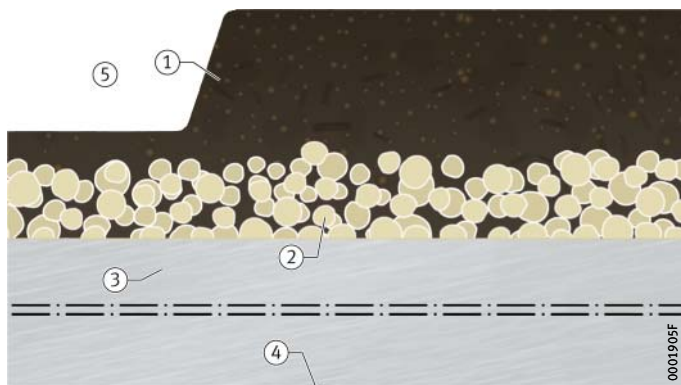


Figure 3
Low-maintenance plain bearing material E50

Surface protection

As standard, the plain bearing has a tin layer as surface protection. Strips EGS..-E50 with steel backing do not have a tin layer and have a copper layer on the back.



Load carrying capacity and life

Bearing load

The bearing load describes the external forces acting on the bearing.

Concentric constant force F

For calculation of the static load safety factor, the specific load and the rating life, load values can be taken directly into consideration under the following preconditions, *Figure 1*:

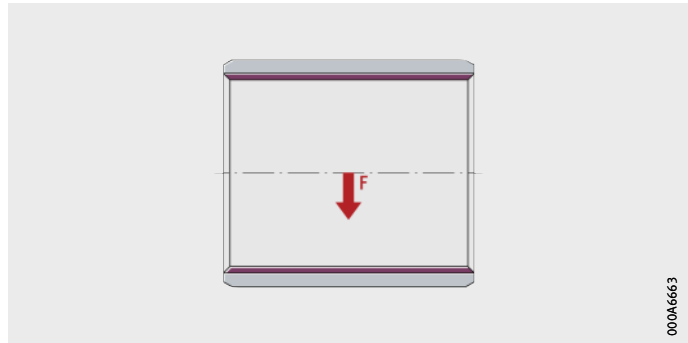
- Loads on plain bushes act in a radial direction only.
- Loads do not vary in their magnitude and direction during operation.

$$P = F$$

$$P_0 = F_0$$

Figure 1

Concentric constant radial force F



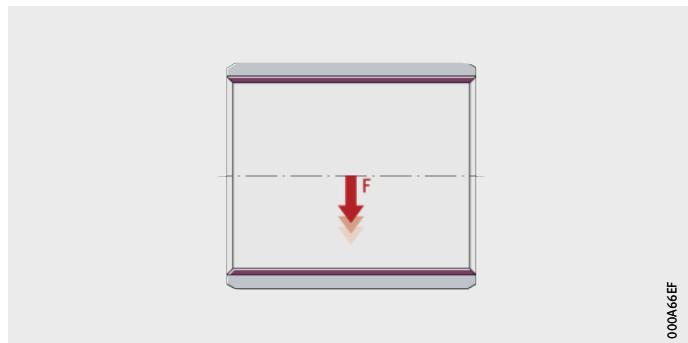
Concentric variable force F

If the concentric force varies in magnitude during motion, rating life calculation and checking of the permissible specific load must be carried out on the basis of the maximum force F_{max} , *Figure 2*.

$$P = F_{max}$$

Figure 2

Variable bearing load



Load carrying capacity and life

Static load safety factor

Before the rating life is calculated, it is advisable to check the static load safety factor.

The static load safety factor S_0 is the ratio between the basic static load rating C_0 and the equivalent static load P_0 :

$$S_0 = \frac{C_0}{P_0}$$

S_0 –
Static load safety factor
 C_0 N
Basic static load rating
 P_0 N
Equivalent static bearing load.



The static load safety factor must always be >1 . Any instructions relating to specific series must be observed.

Specific bearing load

The specific bearing load describes the contact pressure present in the bearing in the dynamic state. It is the decisive criterion for assessing the suitability of a plain bearing in the particular application.

The specific bearing load occurring in a bearing is dependent on the load, the sliding contact surface, the lubrication conditions and the mounting situation. Due to the influence of these factors, precise calculation is not possible.

If the required operating life is to be achieved, the specific bearing load must be matched to the actual operating conditions.



Calculation The specific bearing load p for a plain bearing is calculated with the aid of the specific load parameter K .

Bushes and radial component of flanged bushes:

$$p = K \cdot \frac{F_r}{C_r}$$

Thrust washers and axial component of flanged bushes:

$$p = K \cdot \frac{F_a}{C_a}$$

- p Specific bearing load N/mm^2
- K Specific dynamic load parameter, see table N/mm^2
- P Equivalent dynamic bearing load, see page 11 N
- F_r Radial dynamic bearing load N
- F_a Axial dynamic bearing load N
- C_r, C_a Radial or axial basic dynamic load rating N

Specific load parameter

Sliding layer, sliding contact surface	Specific dynamic load parameter K N/mm^2
E40, E40-B	140
E50	70

Load carrying capacity and life

Alternative calculation method for bushes and thrust washers

Due to the simple geometry of plain bushes EGB, ZWB and ZGB as well as flanged bushes EGF and thrust washers EGW, their specific bearing load can alternatively be determined by means of the following relationships. It is assumed in this case that there is uniform load distribution over the projected area, *Figure 3*.

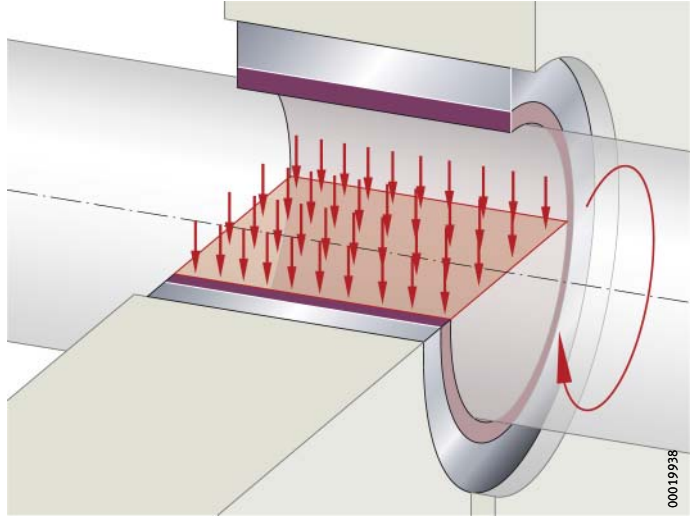


Figure 3
Projected area of a bush

Further information

Plain bushes ZWB and ZGB are not part of the family of metal/polymer composite plain bearings, see page 2. For descriptions and dimension tables, see:

- Catalogue HG 1, Plain Bearings.



Alternative calculation Bush:

$$p = \frac{F_r}{D_i \cdot B}$$

Flanged bush, radial force:

$$p = \frac{F_r}{D_i \cdot (B - R - s_{fl})}$$

Flanged bush, axial force:

$$p = \frac{4 \cdot F_a}{(D_{fl}^2 - (D_o + 2 \cdot R)^2) \cdot \pi}$$

Thrust washer:

$$p = \frac{4 \cdot F_a}{(D_o^2 - D_i^2) \cdot \pi}$$

p	N/mm ²
Specific bearing load	
F _r	N
Radial dynamic bearing load	
D _i	mm
Inside diameter of bush, flanged bush or thrust washer	
B	mm
Width of bearing	
R	mm
Radius of flange	
s _{fl}	mm
Thickness of flange	
F _a	N
Axial dynamic bearing load	
D _{fl}	mm
Outside diameter of flange	
D _o	mm
Outside diameter of bush or thrust washer.	

Load carrying capacity and life

Bearing motion The bearing motion describes the dynamic conditions in the bearing. These are essentially indicated by the swivel angle and tilt angle, the velocity of motion and the frequency of motion.

Sliding velocity The sliding velocity is dependent on the plain bearing and its diameter.

Rotary motion:

$$v = \frac{d_x \cdot \pi \cdot n}{60 \cdot 10^3}$$

Swivel motion:

$$v = \frac{d_x \cdot \pi}{60 \cdot 10^3} \cdot \frac{2\beta \cdot f}{360^\circ}$$

v m/s

Sliding velocity

d_x mm

Specific diameter, see table

n min^{-1}

Operating speed

β °

Swivel angle, *Figure 4*, page 17

f min^{-1}

Swivel frequency, *Figure 4*, page 17.

Specific diameter

Plain bearings	Specific diameter d_x
Bush	D_i
Flanged bush (radial sliding surface)	D_i
Flanged bush (axial sliding surface)	D_{fl}
Thrust washer	D_o

Frequency of motion

The number of motions per time period, the frequency, has a significant influence on the operating life of spherical plain bearings.

In addition to the load, the coefficient of friction and the motion parameter, the frequency influences the frictional energy generated in the bearing. This is dependent on the relevant sliding contact surface and must not exceed the permissible pv values, see table, page 20.



The frequency can only be used for calculating the sliding velocity in applications with continuous operation or periodic stationary periods.



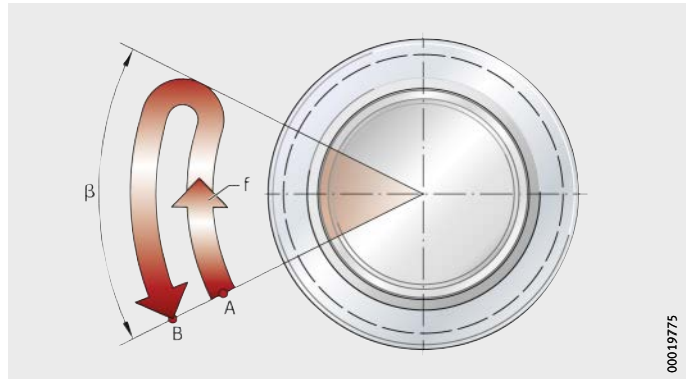
Swivel angle

Swivel motion is defined as relative motion with reversing direction about the bearing axis. In the case of spherical plain bearings, the two bearing rings move relative to each other, in the case of bushes the shaft and bush move relative to each other.

The centring angle described by the two return points is described as the swivel angle β , *Figure 4*. This describes the motion between the two extreme points.

β = swivel angle
A = start point
B = end point
f = swivel frequency
(number of motions from A to B per minute)

Figure 4
Swivel motion and swivel frequency taking the example of a spherical plain bearing



Specific frictional energy pv

The specific bearing load p and the sliding velocity v are in a reciprocal relationship. The product $p \cdot v$ gives the specific frictional energy pv and is an important key value for a plain bearing.

$$pv = p \cdot v$$

pv $\text{N/mm}^2 \cdot \text{m/s}$
Specific frictional energy
 p N/mm^2
Specific bearing load
 v m/s
Sliding velocity.



In the case of intermittent operation, the sliding velocity during one motion cycle must be used.

Load carrying capacity and life

Rating life

Calculation of the theoretical rating life is based on a large number of laboratory tests and takes account of certain operational data.

The rating life is defined as the number of motion cycles or operating hours that can be achieved by the majority of a sufficiently large number of plain bearings under identical operating conditions before certain failure criteria are met.

The amount of wear and increase in friction are dependent on the sliding contact surface and the application. Under identical operating conditions, the operating life achieved may therefore differ significantly.

The calculation of the theoretical rating life gives comparative values for the bearings. It gives information about the higher or lower performance of the selected bearings.

Failure criteria

In plain bearings, wear occurs as a result of solid body and mixed friction conditions. The failure criteria are test limit values that are related to a quantity of wear, see table.

Wear of the load zone as a failure criterion

Failure criterion	Sliding layer	
	E40	E50
	%	
Wear of sliding layer thickness in the load zone by	80	90

Influences on the rating life

Calculation of the basic rating life applies to plain bearings that perform rotary, swivel or linear motion.

The significant factors for a long rating life are the pv value and the design of the mating surface. In the case of metal/polymer composite plain bearings as well as ELGOGLIDE and ELGOTEX bushes, particular attention must be paid to the material, roughness depth and surface structure of the mating surface. In the case of spherical plain bearings, an optimum mating surface is provided by the inner ring.

The ambient temperature, heat dissipation via the shaft, bearing and housing as well as the operating duration have a fundamental influence on the operating temperature and thus on the rating life.

Extraordinary factors

The following parameters are not taken into consideration in rating life calculation and may in certain circumstances have a very considerable influence on the operating life:

- corrosion
- ageing of the lubricant
- contamination
- humidity
- vibrations
- shocks.



Operating life

The operating life is the life actually achieved by a plain bearing. It may deviate from the calculated rating life.

Basic rating life

Due to the large number of influences, the calculated basic rating life is a guide value. In the case of plain bearings, the values may therefore be excessively high at very low bearing loads or very low sliding velocities.

If the sliding layer E50 is used in linear motion, advice should be sought from the Schaeffler engineering service.

The pv diagram shows the operating limits of E40 and E50 in addition to other plain bearing materials or material combinations in graphical form, *Figure 5*, page 19 (see Catalogue HG 1, Plain Bearings).



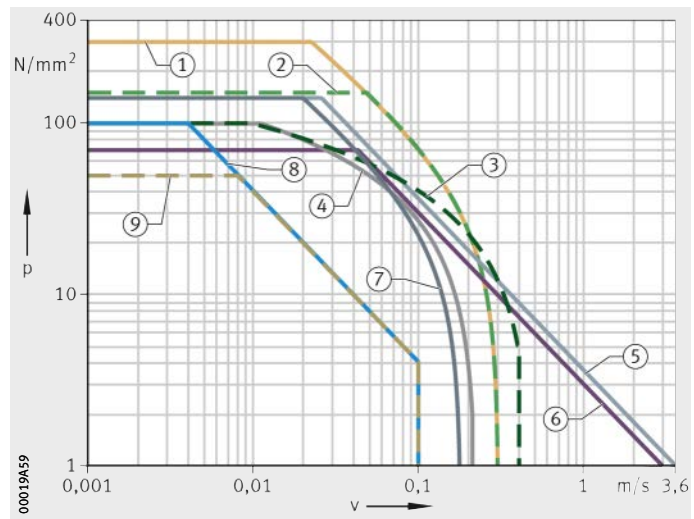
Theoretical rating life calculations are only valid for the products presented in this catalogue when used in accordance with the validity range (load, sliding velocity and operating temperature) and with the recommendations described, see tables, page 20, and section Design of bearing arrangements, page 35. Theoretical rating life calculations can under no circumstances be transferred to other products.

In the case of thrust washers EGW, the rating life calculation is only valid if the bearing runs free from clearance at all times and the mating surface is at least as large as the thrust washer.

p = specific bearing load
v = sliding velocity

- ① ELGOGLIDE
- ② ELGOGLIDE-W11
- ③ PTFE composite
- ④ PTFE film
- ⑤ E40
- ⑥ E50
- ⑦ ELGOTEX
- ⑧ Steel/steel
- ⑨ Steel/bronze

Figure 5
pv diagram



Dry friction, mixed friction and hydrodynamics

The preconditions for rating life calculation are as follows:

- Maintenance-free plain bearings must undergo dry running.
- Mixed friction in low-maintenance plain bearings
- Where hydrodynamic conditions are applied, the Schaeffler engineering service should be contacted.

Load carrying capacity and life

Range of validity of rating life calculation

Sliding layer, sliding contact surface	pv value ¹⁾		Specific load p		
	N/mm ² · m/s		N/mm ²		
	from	to	min.	max.	
				Constant	Variable
E40	0,01	1,8	0,01	140	140
E50	0,1	3	0,01	70	70

¹⁾ The maximum permissible bearing load as function of velocity is determined by means of pv diagrams, *Figure 5*, page 19.

Range of validity of rating life calculation (continued)

Sliding layer, sliding contact surface	Sliding velocity ¹⁾		Temperature	
	v		θ	
	m/s		°C	
	max.	from	to	
E40	2,5	-200	+280	
E50	2,5	-40	+110	

¹⁾ In the case of values lower than 0,001 m/s, calculation of the basic rating life must be carried out using the value v = 0,001 m/s.

Operating conditions

Certain operating conditions may lead to a reduction or increase in the rating life, see table. If the plain bearings are to be used under such conditions, please contact the Schaeffler engineering service.

Guide values

Operating precondition	Rating life of E40 L _h %
Dry running, intermittent	200
Alternating between dry running and running in water	20
Running in water	200
Continuous operation in fluid lubricants	300
Continuous operation in greases	50 – 150

Calculation service

In the product selection and information system **medias**, <http://medias.schaeffler.de>, it is possible to carry out computer-aided rating life calculation of individual bearings.

In addition, the versatile calculation software BEARINX facilitates the calculation and estimation of rating life of plain bearings in shaft systems. BEARINX is available in a simplified and freely accessible form as an “Easy” module and as a complete, powerful calculation module in various versions; information can be found at www.schaeffler.de/en ➤ Products & Services ➤ Industrial ➤ Calculation.



Calculation of the basic rating life

The basic rating life is calculated using the following equations and is dependent on the specific plain bearing factor and any correction factors necessary, see page 22 and tables, page 24.

The procedure for rating life calculation is shown in a diagram, *Figure 6*. Ordering examples are given in the corresponding product descriptions.



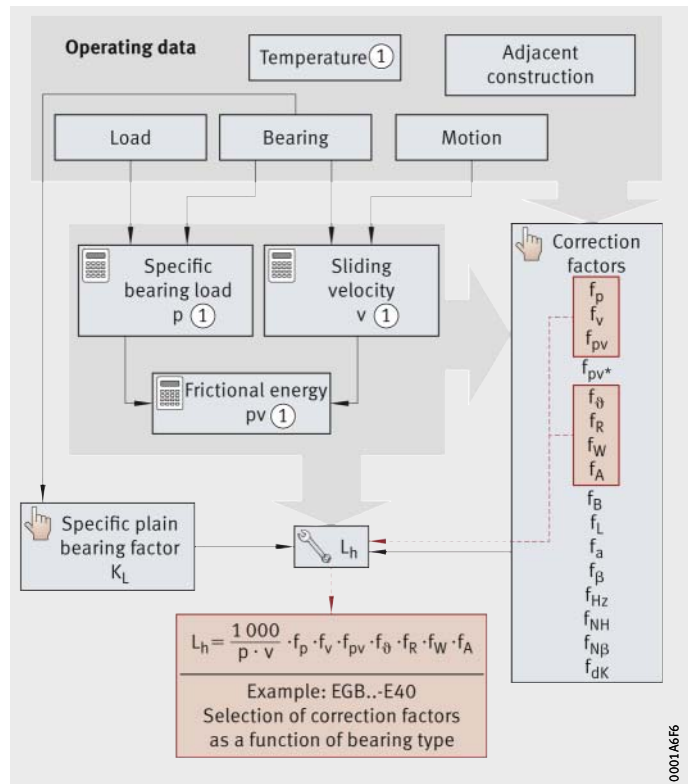
Before calculation of the rating life, it is absolutely essential to check the permissible loads, sliding velocities and temperatures, see tables, page 20.

For flanged bushes, the rating life must be checked for both the radial sliding surface and the axial sliding surface (flange).

Symbols, units and definitions, see page 23

① Checking of the range of validity, see tables, page 20

Figure 6
Procedure for rating life calculation



Load carrying capacity and life

Maintenance-free and low-maintenance bearings

Rating life of maintenance-free and low-maintenance bearings:

$$L_h = \frac{K_L}{p \cdot v} \cdot f_p \cdot f_v \cdot f_{pv} \cdot f_{pv^*} \cdot f_{\vartheta} \cdot f_R \cdot f_W \cdot f_A \cdot f_B \cdot f_L \cdot f_{\alpha} \cdot f_{\beta} \cdot f_{Hz}$$

The comprehensive rating life calculation method for plain bearings as catalogue products (including spherical plain bearings and rod ends) is described in Catalogue HG 1, Plain Bearings:

- For this purpose, other correction factors, on an analogous basis *Figure 6*, are required.
- The following relates only to the product-specific, corrected rating life calculation method for maintenance-free and low-maintenance metal/polymer composite plain bearings.

Corrected rating life equation for E40

Rotary and swivel motion:

$$L_h = \frac{1000}{pv} \cdot f_p \cdot f_v \cdot f_{pv} \cdot f_{\vartheta} \cdot f_R \cdot f_W \cdot f_A$$

Linear motion:

$$L_h = \frac{1000}{pv} \cdot f_p \cdot f_v \cdot f_{pv} \cdot f_{\vartheta} \cdot f_R \cdot f_W \cdot f_A \cdot f_L$$

Corrected rating life equation for E50

Rotary and swivel motion:

$$L_h = \frac{2500}{pv} \cdot f_p \cdot f_v \cdot f_{pv} \cdot f_{\vartheta} \cdot f_R \cdot f_A$$

Conversion of rating life value

Conversion of the rating life from operating hours to revolutions:

$$L_{osc} = L_h \cdot f \cdot 60$$

Specific plain bearing factor

Sliding layer, sliding contact surface	Specific plain bearing factor K_L
E40, E40-B	1 000
E50	2 500



Symbols, units and definitions

L_h	h
Rating life of plain bearing	
L_{osc}	revolutions
Rating life in oscillations	
K_L	–
Specific plain bearing factor, see table, page 22	
p	N/mm^2
Specific load, for calculation see page 13	
v	m/s
Sliding velocity, for calculation see page 16	
C_r	N
Basic radial load rating, see dimension tables	
C_a	N
Basic axial load rating, see dimension tables	
f	min^{-1}
Swivel frequency, <i>Figure 4</i> , page 17	
f_p	–
Correction factor for load, <i>Figure 7</i> , page 24	
f_v	–
Correction factor for sliding velocity, <i>Figure 8</i> , page 25	
f_{pv}	–
Correction factor for frictional energy, <i>Figure 9</i> , page 25	
f_{ϑ}	–
Correction factor for temperature, <i>Figure 10</i> , page 26	
f_R	–
Correction factor for roughness depth, <i>Figure 11</i> , page 26	
f_W	–
Correction factor for material, see table, page 27	
f_A	–
Correction factor for condition of rotation, see page 27	
f_L	–
Correction factor for linear motion, see page 28.	

Load carrying capacity and life

Correction factors

Calculation of the basic rating life requires numerous correction factors. These take account of influences due to the type of load, the specific bearing load, the material used, the sliding speed, the temperature and the roughness depth of the mating surface. Linear motion is taken into consideration by means of a corresponding correction factor.

The values for the correction factors for load f_p , sliding speed f_v , frictional energy f_{pv} , temperature f_{θ} and roughness depth f_R can be derived from the diagrams, *Figure 7* to *Figure 11*, page 26.

Preselection of correction factors

The correction factors are selected as a function of the sliding layer or the sliding contact surface and applied in the appropriate rating life equation, see tables.

Maintenance-free and low-maintenance bushes, flanged bushes and thrust washers

Series	Sliding layer	Motion	Correction factors												
			f_p	f_v	f_{pv}	f_{pv}^*	f_{θ}	f_R	f_W	f_A	f_B	f_L	f_{α}	f_{β}	f_{Hz}
EGB	E50	Rotary	■	■	■	-	■	■	-	■	-	-	-	-	-
EGF	E40		■	■	■	-	■	■	■	■	-	-	-	-	-
EGW		Linear	■	■	■	-	■	■	■	■	-	■	-	-	

Legend

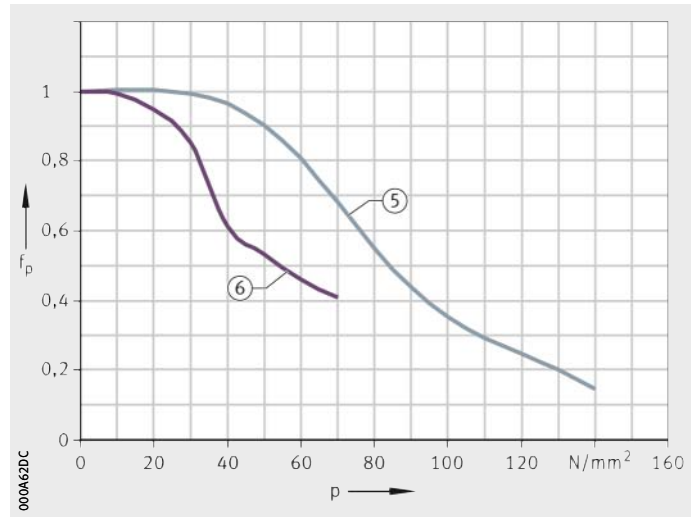
■ The selected correction factor must be applied in the rating life equation. The value is determined from the diagrams and tables.

Load f_p and sliding velocity f_v

p = specific bearing load
 f_p = correction factor

- ⑤ E40
- ⑥ E50

Figure 7
Correction factor for load



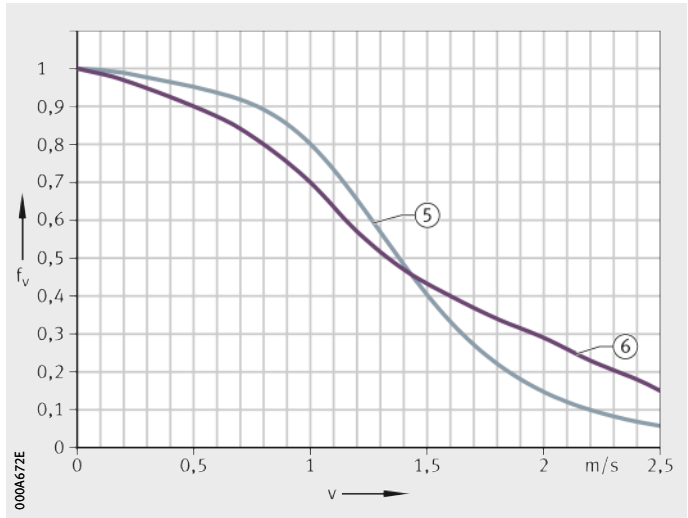


v = sliding velocity
 f_v = correction factor

- ⑤ E40
- ⑥ E50

Figure 8
Correction factor
for sliding velocity

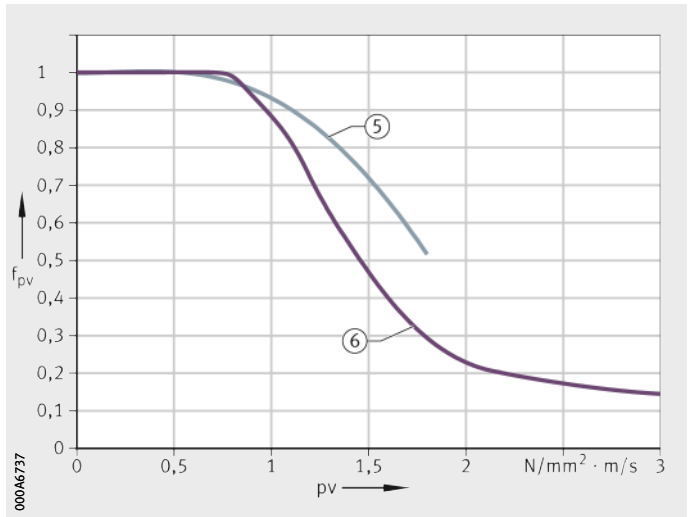
Frictional energy f_{pv}



pv = product of bearing load and speed
 f_{pv} = correction factor

- ⑤ E40
- ⑥ E50

Figure 9
Correction factor
for frictional energy



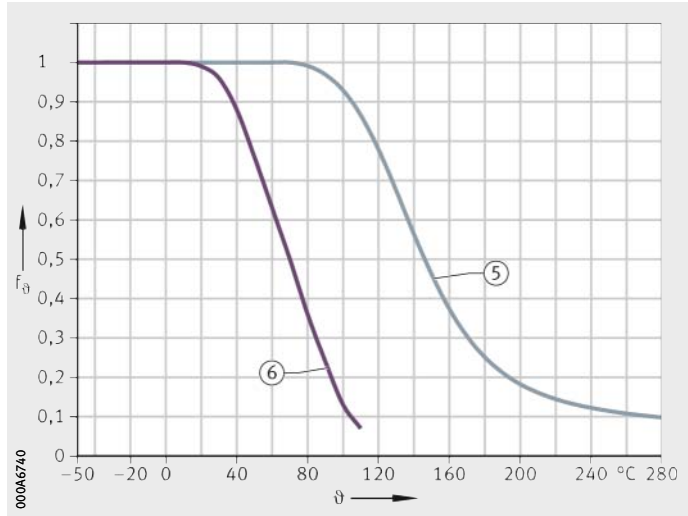
Load carrying capacity and life

Temperature f_{ϑ}

ϑ = temperature
 f_{ϑ} = correction factor

- ⑤ E40
- ⑥ E50

Figure 10
 Correction factor
 for temperature

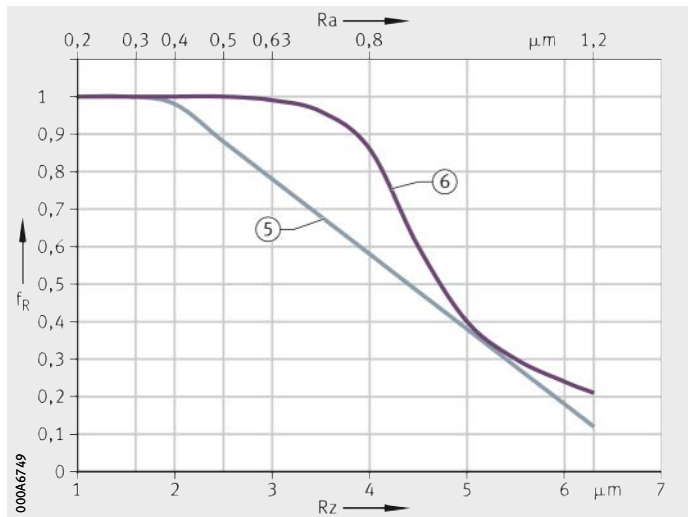


Roughness depth f_R

Rz, Ra = roughness depth
 f_R = correction factor

- ⑤ E40
- ⑥ E50

Figure 11
 Correction factor
 for roughness depth





Condition of rotation f_A

The correction factor f_A is dependent on the type of bearing and the type of load, *Figure 12*:

- plain bushes, thrust washers:
 - point load $f_A = 1$ (rotating shaft, stationary bush)
 - circumferential load $f_A = 2$ (stationary shaft, rotating bush)
 - thrust washer $f_A = 1$
 - linear motion $f_A = 1$

- F = load
n = speed
- ① Point load $f_A = 1$
 - ② Circumferential load $f_A = 2$

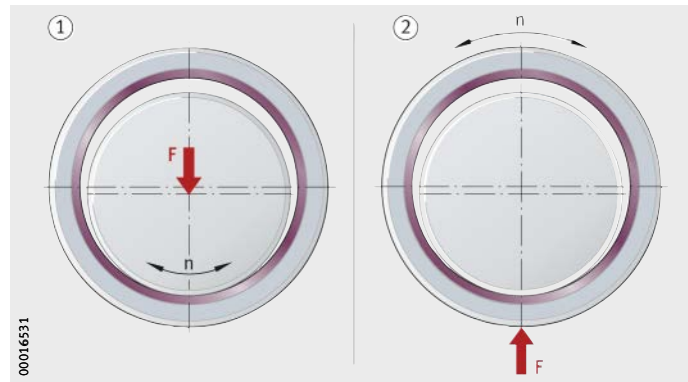


Figure 12
Correction factor
for condition of rotation

Correction factors for sliding layer E40



The correction factor f_W is dependent on the material of the mating surface with a roughness depth Rz 2 to Rz 3, see table.

Any references in tables or diagrams to bushes ZGB with ELGOGLIDE or ELGOGLIDE-W11 as well as bushes ZWB with ELGOTEX have no relevance to metal/polymer composite plain bearings. For corresponding bushes, see Catalogue HG 1, Plain Bearings
► <http://www.schaeffler.de/std/1B6D>.

Correction factor f_W

Mating surface material	Layer thickness mm	Correction factor f_W	
		E40	ELGOGLIDE ELGOGLIDE-W11 ELGOTEX
Steel ¹⁾			
Unalloyed	–	0,5	–
Nitrided	–	0,5	1
Corrosion-resistant	–	1	1
Hard chromium coating	≧ 0,013	1	1
Zinc plated	≧ 0,013	0,1	–
Phosphated	≧ 0,013	0,1	–
Flake graphite cast iron Rz 2	–	0,5	–
Anodised aluminium	–	0,2	–
Hard anodised aluminium 450 + 50 HV	0,025	1	–
Copper-based alloys	–	0,2	–
Nickel	–	0,1	–

Bushes ZGB with ELGOGLIDE or ELGOGLIDE-W11 and bushes ZWB with ELGOTEX are not part of the family of metal/polymer composite plain bearings.

For descriptions of these bearings, see Catalogue HG 1, Plain Bearings
► <http://www.schaeffler.de/std/1B6D>.

1) For increased loads, the steel hardness should correspond to the following values:

- in the case of E40, at least 25 HRC to 50 HRC
- in the case of ELGOGLIDE and ELGOTEX, at least 55 HRC.

Load carrying capacity and life

Linear motion f_L

The correction factor f_L is necessary in the case of linear motion with bushes with the sliding layer E40.



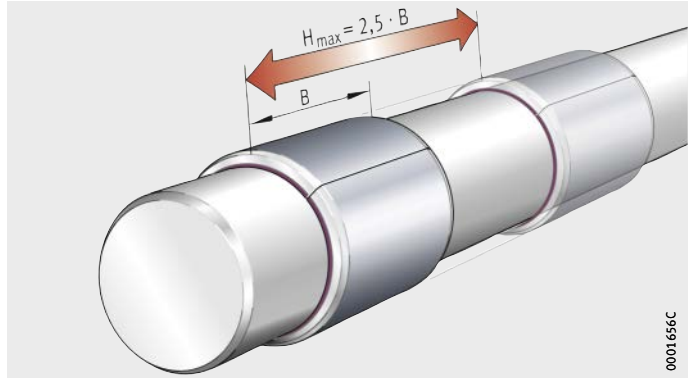
In the case of linear motion, the stroke length should not exceed the maximum stroke $H_{max} = 2,5 \cdot B$, *Figure 13*.

Correction factor f_L

$$f_L = 0,65 \cdot \frac{B}{H + B}$$

H_{max} = maximum stroke length
B = width of bush

Figure 13
Maximum stroke length
in linear motion





Calculation example for flanged bush EGF30260-E40

The rating life of the flanged bush is calculated on the basis of the sliding layer E40, see section Load carrying capacity and life, page 11. For flanged bushes, the rating life must be checked for both the radial sliding surface and the axial sliding surface (flange).

- Given data The given data for calculation of the rating life are as follows:
- bearing arrangement for an extruder shaft
 - shaft and axial running surface ground (unalloyed steel, roughness depth Rz 2)
 - point load (rotating shaft, stationary bush).

Operating parameters	Bearing load	F_r	= 14 000 N
		F_a	= 3 000 N
	Operating speed	n	= 25 min ⁻¹
	Operating temperature	ϑ	= +35 °C

Bearing data	Flanged bush		= EGF30260-E40
	Basic dynamic load rating	C_r	= 92 400 N
		C_a	= 35 200 N
	Inside diameter	D_i	= 30 mm
	Outside diameter of flange	D_{fl}	= 42 mm
	Sliding material		E40

Required Bearing with the required rating life $L_h \geq 500$ h.

Checking of permissible loads

For flanged bushes, the rating life must be checked for both the radial sliding surface and the axial sliding surface (flange).



The validity of the permissible loads and sliding velocities must be checked, since useful rating life calculation is only possible within this range, see tables, page 20.

Load carrying capacity and life

Specific bearing load

The specific bearing load must be calculated with the aid of the specific load parameter K and checked for validity, see table, page 13, and table, page 20.

Radial component of flanged bushes:

$$p = K \cdot \frac{F_r}{C_r}$$

$$p = 140 \cdot \frac{14\,000}{92\,400} = 21,21 \text{ N/mm}^2$$

Axial component of flanged bushes:

$$p = K \cdot \frac{F_a}{C_a}$$

$$p = 140 \cdot \frac{3\,000}{35\,200} = 11,93 \text{ N/mm}^2$$

Sliding velocity in rotary motion

The sliding velocity must be calculated with the aid of the inside diameter D_i or the flange diameter D_{fl} and checked for validity, see table, page 16, and tables, page 20.

Radial sliding surface:

$$v = \frac{D_i \cdot \pi \cdot n}{60 \cdot 10^3}$$

$$v = \frac{30 \cdot \pi \cdot 25}{60 \cdot 10^3} = 3,9 \cdot 10^{-2} \text{ m/s}$$

Axial sliding surface:

$$v = \frac{D_{fl} \cdot \pi \cdot n}{60 \cdot 10^3}$$

$$v = \frac{42 \cdot \pi \cdot 25}{60 \cdot 10^3} = 5,5 \cdot 10^{-2} \text{ m/s}$$

Specific frictional energy pv

The specific frictional energy pv must be checked for validity, see table, page 20.

Radial component of flanged bushes:

$$pv = 21,21 \cdot 3,9 \cdot 10^{-2} = 0,83 \text{ N/mm}^2 \cdot \text{m/s}$$

Axial component of flanged bushes:

$$pv = 11,93 \cdot 5,5 \cdot 10^{-2} = 0,66 \text{ N/mm}^2 \cdot \text{m/s}$$



Determining the rating life equation

For calculation of the rating life, the valid rating life equation must be selected and then subjected to correction.

The correction factors necessary for the plain bearing material E40 must be selected from the matrix and used to correct the rating life equation appropriately, see table, page 24, and equation.

Correction factors, as a function of bearing type

Series	Sliding layer	Motion	Correction factors												
			f_p	f_v	f_{pv}	f_{pv*}	f_{ϑ}	f_R	f_W	f_A	f_B	f_L	f_{α}	f_{β}	f_{Hz}
EGF	E40	Rotary	■	■	■	-	■	■	■	■	-	-	-	-	-

Rating life equation following correction

$$L_h = \frac{K_L}{p_v} \cdot f_p \cdot f_v \cdot f_{pv} \cdot f_{\vartheta} \cdot f_R \cdot f_W \cdot f_A$$

Calculation of rating life

The values for the correction factors in the corrected rating life equation must be taken from the diagrams, see page 24 and table. The specific plain bearing factor $K_L = 1000$, see table, page 22.

Correction factors

Correction factor	Source	Value Sliding surface	
		radial	axial
Load f_p	Figure 7, page 24	1	1
Sliding velocity f_v	Figure 8, page 25	1	1
Frictional energy f_{pv}	Figure 9, page 25	0,96	0,98
Temperature f_{ϑ}	Figure 10, page 26	1	1
Roughness depth f_R	Figure 11, page 26	0,97	0,97
Material f_W	table, page 27	0,5	0,5
Condition of rotation f_A	page 27	1	1

Rating life L_h

The rating life for the radial sliding surface is calculated as follows:

$$L_h = \frac{1000}{0,83} \cdot 1 \cdot 1 \cdot 0,96 \cdot 1 \cdot 0,97 \cdot 0,5 \cdot 1 = 560 \text{ h}$$

The rating life for the axial sliding surface is calculated as follows:

$$L_h = \frac{1000}{0,66} \cdot 1 \cdot 1 \cdot 0,98 \cdot 1 \cdot 0,97 \cdot 0,5 \cdot 1 = 720 \text{ h}$$

Result

The basic rating life is determined by the radial sliding surface. The total rating life is therefore 560 h. The selected flanged bush fulfils the required rating life $L_h \geq 500 \text{ h}$.

Friction and increases in temperature

Friction and wear

Friction describe the force that acts in opposition to motion. The key value stated is the coefficient of friction μ .

Friction is essentially dependent on the following influencing factors:

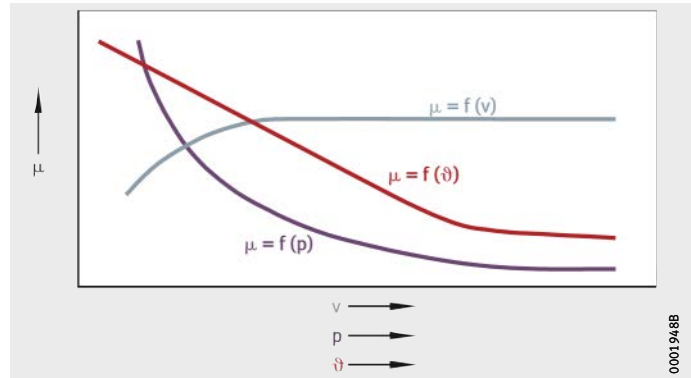
- the sliding contact surface
- the load
- the sliding velocity
- the bearing temperature
- the lubrication condition
- the quality of the sliding surfaces.

Fundamental curve of the coefficient of friction

For maintenance-free plain bearings based on PTFE, the fundamental curve of the coefficient of friction μ is shown as a function of sliding velocity, load and temperature, *Figure 1*. The coefficient of friction decreases with an increasing specific bearing load p and a decreasing sliding velocity v .

μ = coefficient of friction
 v = sliding velocity
 p = specific bearing load
 ϑ = temperature

Figure 1
Coefficient of friction,
fundamental curve





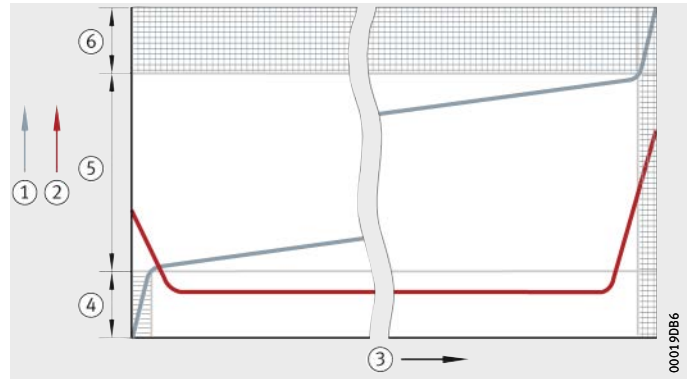
Friction and wear curve

The wear curve for maintenance-free plain bearings is divided into the running-in phase, main wear phase and failure phase, *Figure 2*. The main wear phase is approximately linear in character.

The friction curve of maintenance-free plain bearings shows a characteristic pattern in the three phases, *Figure 2*.

- ① Wear
- ② Friction
- ③ Rating life
- ④ Running-in phase
- ⑤ Main wear phase
- ⑥ Failure phase

Figure 2
Friction and wear curve



Bearing frictional torque

The bearing frictional torque M is valid for bushes under radial load. In the case of thrust washers, this is valid for axial load.

In the case of new plain bearings, the bearing frictional torque may be significantly higher during the early running-in phase. This is for the following reasons:

- Plastic transfer of the PTFE material occurs to the surface structure of the mating surface.
- The internal tribology of the bearing is not yet complete and PTFE particles are deposited on the mating surface and functional surface (PTFE/PTFE friction).



In the case of flanged bushes, the frictional torque must be calculated for both the radial sliding surface and the axial sliding surface on the flange.

Friction and increases in temperature

Calculation The bearing frictional torque M is determined as follows:

$$M = F \cdot \mu \cdot \frac{d_x}{2} \cdot \frac{1}{1000}$$

M Nm
 Bearing frictional torque
 F N
 Concentric radial or axial load
 μ –
 Coefficient of friction, see table
 d_x mm
 Specific diameter, see table.



For reasons of safety, the maximum coefficient of friction must always be used when calculating the drive power, see table, page 34. If the coefficient of friction is above the maximum value, this may lead to increased wear, a rise in bearing temperature and impaired functioning of the plain bearing.

Specific diameter

Plain bearings	Specific diameter d_x
Bush	D_i
Flanged bush (radial sliding surface)	D_i
Flanged bush (axial sliding surface)	D_{fl}
Thrust washer	D_o

Comparison of coefficients of friction

Sliding layer, sliding contact surface	Mating surface	Friction coefficient μ	
		min.	max.
E40 ¹⁾	Steel	0,03	0,25
E50	Steel	0,02	0,2

¹⁾ For E40, detailed coefficients of friction must be observed, see table, page 64.

Heat dissipation

Friction is converted into heat. Adequate heat dissipation is essential for the function of a plain bearing. This occurs through convection via the housings and shafts to the environment. In some cases, heat is carried away by means of the lubricant.

In plain bearings where high frictional energy $p \cdot v$ is converted, increased heat dissipation is required.



Design of bearing arrangements

Bushes Shafts should be chamfered and all sharp edges rounded, see page 38. For easier pressing in, the chamfer should be produced to $f_G \times 20^\circ \pm 5^\circ$, see table and *Figure 1*.

The recommended mounting tolerances for the shaft and housing bore must be observed, see table, page 49.

For the housing bore, a roughness depth Rz 10 is recommended. The optimum operating life in dry running of the sliding layer E40 is achieved with a roughness depth of the shaft of Rz 2 to Rz 3.



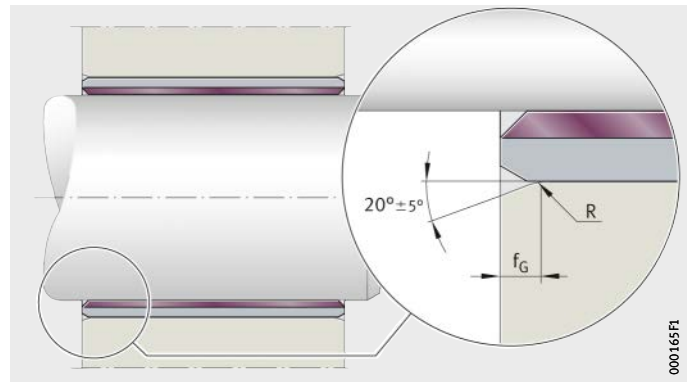
Very small roughness depths will not increase the operating life, but larger roughness depths will lead to a significant reduction.

Chamfer width

Bore diameter d_G mm	Chamfer width f_G mm
$d_G \leq 30$	$0,8 \pm 0,3$
$30 < d_G \leq 80$	$1,2 \pm 0,4$
$80 < d_G \leq 180$	$1,8 \pm 0,8$
$180 < d_G$	$2,5 \pm 1$

f_G = chamfer width
R = rounded edge

Figure 1
Chamfer on housing bore



Design of bearing arrangements

Flanged bushes

In flanged bushes, the radius at the transition from the radial to the axial component must be taken into consideration.

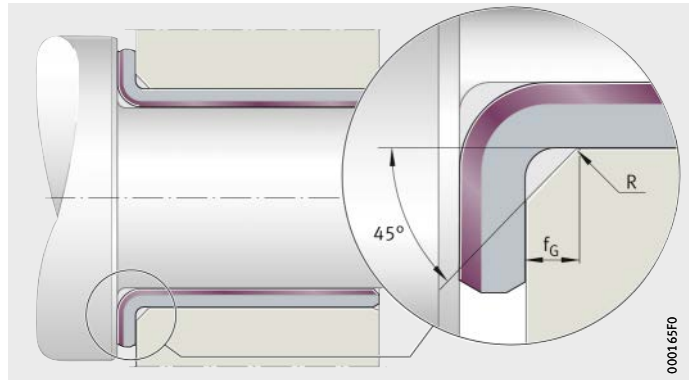
The flanged bush must not be in contact in the area of the radius and, where axial loads are present, an adequate level of additional support must be provided for the flange. Chamfer width for the housing bore, see table and *Figure 2*.

Chamfer width

Bore diameter d_G mm	Chamfer width f_G mm
$d_G \leq 20$	$1,2 \pm 0,2$
$20 < d_G \leq 28$	$1,7 \pm 0,2$
$28 < d_G \leq 45$	$2,2 \pm 0,2$
$45 < d_G$	$2,7 \pm 0,2$

f_G = chamfer width
R = rounded edge

Figure 2
Chamfer on housing bore





Thrust washers and strips

Concentric seating of thrust washers is ensured by means of recesses in the housing, *Figure 3*. Diameters and depths of recesses, see dimension tables.

Undesirable rotation of the thrust washers must be prevented by means of a dowel pin or countersunk head screw. The screw head or dowel pin must be recessed relative to the running surface by at least 0,25 mm, *Figure 3* and *Figure 4*. Size and arrangement of the holes, see dimension tables.

If it is not possible to make a recess in the housing, the plain bearings must be secured by means of several dowel pins or screws. It is also possible to use other cost-effective joining techniques such as laser welding, soft soldering or adhesive bonding, see page 57.

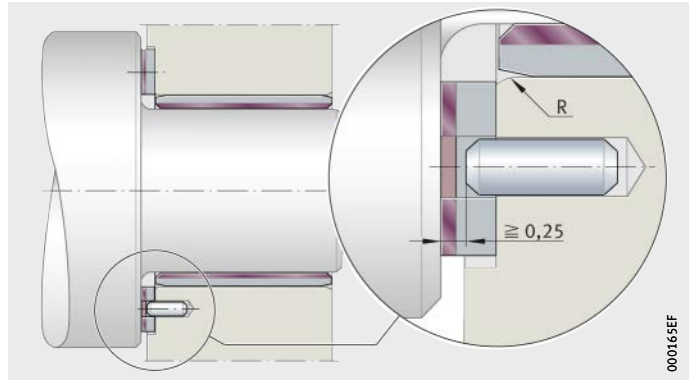
It is not always necessary to provide security against rotation. In some cases, the adhesive friction between the backing of the plain bearing and the housing will be sufficient.

Strips can be located in the same way as thrust washers.



R = rounded edge

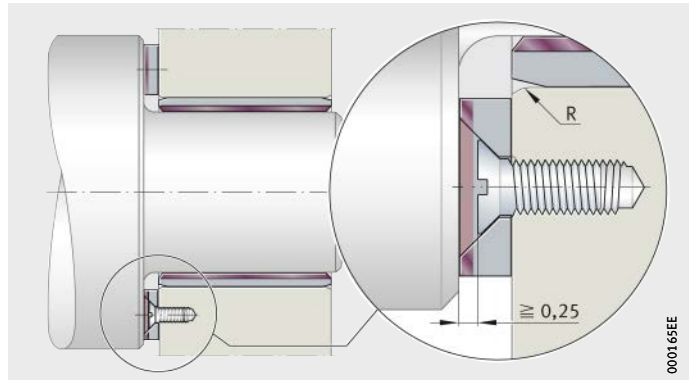
Figure 3
Prevention of rotation
by dowel pin



R = rounded edge

Note the guidelines relating to machining
of plain bearings, see page 57.

Figure 4
Prevention of rotation
by countersunk head screw



Design of bearing arrangements

Design of mating surfaces

The shaft and mating surface of the bearing arrangement must be produced in accordance with the following specifications.

The shafts or parts of the mating surfaces should be chamfered and all sharp edges should be rounded. This allows easier mounting and prevents damage to the sliding layer.

Measures

The mating surface should always be wider than the bearing to prevent the formation of steps in the sliding layer.

The optimum operating life will be achieved with a roughness depth of the mating surface of Rz 2 to Rz 3:

■ with dry running of the sliding layer E40

■ with lubrication of the sliding layer E50



Very small roughness values do not have a beneficial effect on the operating life, but larger roughness values reduce it considerably.

Surface quality

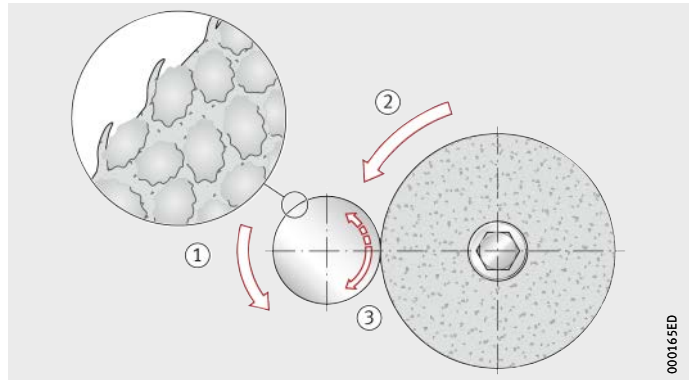
Ground or drawn surfaces are preferable as a mating surface. Surfaces that have been precision turned or rolled by precision turning, even with Rz 2 to Rz 3, can cause greater wear since helical manufacturing grooves are created by precision turning.

Spheroidal graphite cast iron GGG has an open surface structure and should therefore be ground to Rz 2 or better, *Figure 5*, page 38.

The direction of rotation of cast shafts in the application should be the same as that of the grinding wheel during machining, since increased wear should be anticipated if rotation is in the opposing direction, *Figure 5*.

- ① Direction of shaft rotation in the application
- ② Direction of grinding wheel rotation
- ③ Direction of shaft rotation during grinding

Figure 5
Grinding of a cast shaft



**Protection against corrosion**

Corrosion of the mating surface is prevented by sealing or the use of corrosion-resistant steel. Alternatively, suitable surface treatments may be carried out.

In the case of the sliding layer E50, the lubricant gives additional protection against corrosion.

Fretting corrosion

Due to the tin coating applied as standard, fretting corrosion between the steel backing of the plain bearing material and the housing occurs only rarely. In such cases, electroplated protective coatings can be used to achieve a delaying effect.

Electrochemical contact corrosion

In unfavourable conditions, electrical cells (local elements) can be formed that reduce the operating life through corrosion of the steel. This should be checked at the design stage and clarified by means of tests. In case of doubt, please consult the Schaeffler engineering service.

Design of bearing arrangements

Misalignment of plain bushes

Precise alignment is important for plain bushes. This is particularly valid for maintenance-free plain bushes, in which load cannot be distributed by means of a lubricant film.

The misalignment across the entire bush width should be $\leq 0,02$ mm, *Figure 6*. This also applies across the entire width of bushes arranged in pairs as well as to thrust washers.



Plain bushes should not be used for movement involving spatial motion. Any skewing of the shaft will reduce the operating life.

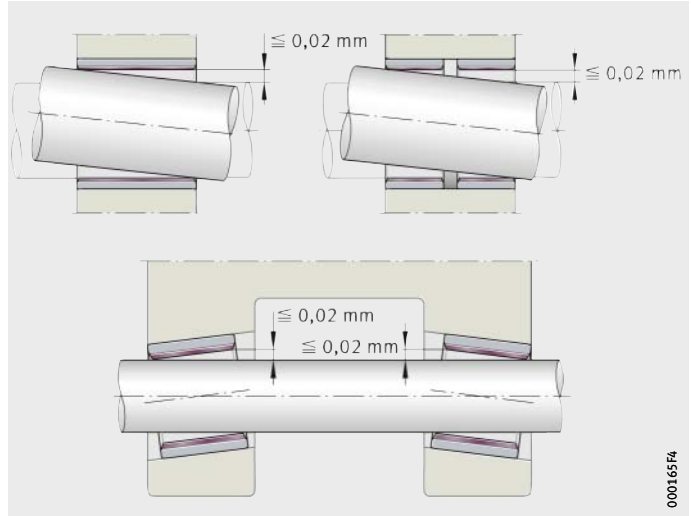


Figure 6
Permissible misalignment of bushes

Edge loading of metal/polymer composite plain bushes

In the case of metal/polymer composite plain bushes, the high edge loads should be reduced by means of chamfers, larger bore diameters in the vicinity of the edge or wide bushes that protrude beyond the edge of the bore, *Figure 7*.

Where bushes are arranged in series, they should be of the same width and the butt joints should be in alignment.

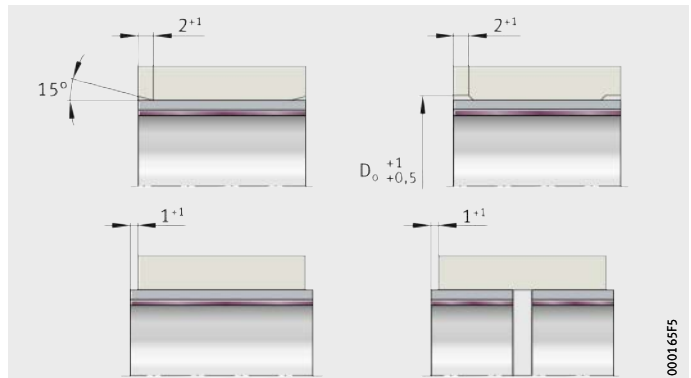


Figure 7
Reduction of peak stresses at edges



Sealing

Seals for plain bushes

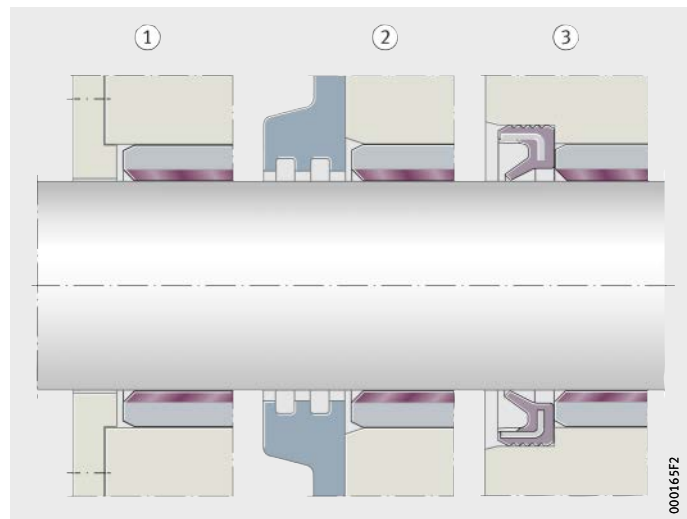
Possibilities for sealing the bearing position in the adjacent construction are as follows, *Figure 1*:

- a modified adjacent construction
- gap seals
- rotary shaft seals.

The suitability of the sealing arrangement must be agreed in consultation with the seal manufacturer.



If the seal is designed with additional outer seals, it must be borne in mind that the bearing clearance will increase due to the wear of the sliding layer. Plain bushes with ELGOGLIDE, ELGOTEX or E40 are not lubricated. Grease must be prevented from leaving a seal and coming into contact with these sliding layers.



- ① Protection by adjacent construction
- ② Gap seal
- ③ Shaft seal

Figure 1
Seals for protection
of the bearing position

Bearing clearance and mounting tolerances

Theoretical bearing clearance of metal/polymer composite plain bushes



Bushes with the sliding layer E40 and E50 are pressed into the housing. This provides axial and radial location. No additional means of location are required.

If the recommended mounting tolerances are used with rigid housings and shafts, this gives an interference fit or bearing clearance, see table, page 49.

Expansion of the housing bore is not taken into account in calculation of the bearing clearance.

Calculation of the interference U is carried out using the tolerances of the housing bore and the deviations for the bush outside diameter D_o , see table, page 49, and table, page 50, or table, page 50.

Calculation of bearing clearance

The theoretical bearing clearance is calculated as follows:

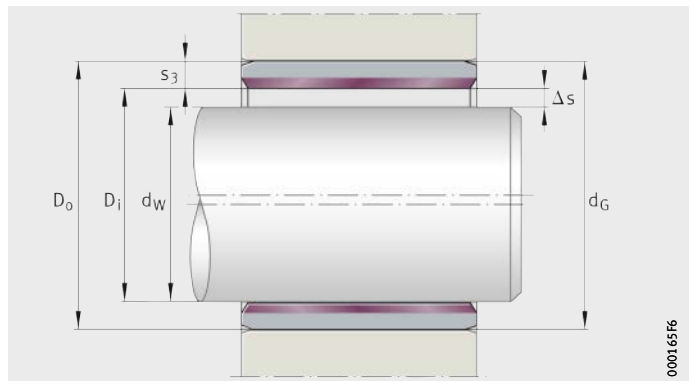
$$\Delta s_{\max} = d_{G\max} - 2 \cdot s_{3\min} - d_{W\min}$$

$$\Delta s_{\min} = d_{G\min} - 2 \cdot s_{3\max} - d_{W\max}$$

Δs_{\max}	mm
Maximum bearing clearance, <i>Figure 1</i>	
Δs_{\min}	mm
Minimum bearing clearance, <i>Figure 1</i>	
$d_{G\max}$	mm
Maximum diameter of housing bore	
$d_{G\min}$	mm
Minimum diameter of housing bore	
$d_{W\max}$	mm
Maximum shaft diameter	
$d_{W\min}$	mm
Minimum shaft diameter	
$s_{3\max}$	mm
Maximum wall thickness, see page 51 or page 51	
$s_{3\min}$	mm
Minimum wall thickness, see page 51 or page 51.	

- D_o = outside diameter of bush
- D_i = inside diameter of bush
- d_W = shaft diameter
- d_G = diameter of housing bore
- s_3 = wall thickness of bush
- Δs = bearing clearance

Figure 1
Theoretical bearing clearance





Theoretical bearing clearance after pressing in

The theoretical bearing clearance after pressing in of bushes or flanged bushes of metric sizes or inch sizes is calculated without considering any possible expansion of the bore, see tables.

The theoretical bearing clearance is calculated taking account of the recommended mounting tolerances, see page 49.

Theoretical bearing clearance for metric sizes

Diameter of bush		Bearing clearance Δs			
		E40, E40-B		E50	
D_i mm	D_o mm	Δs_{\min} mm	Δs_{\max} mm	Δs_{\min} mm	Δs_{\max} mm
3	4,5	0,000	0,054	–	–
4	5,5	0,000	0,056	–	–
5	7	0,000	0,077	–	–
6	8	0,000	0,077	–	–
7	9	0,003	0,083	–	–
8	10	0,003	0,083	0,040	0,127
10	12	0,003	0,086	0,040	0,130
12	14	0,006	0,092	0,040	0,135
13	15	0,006	0,092	0,040	0,135
14	16	0,006	0,092	0,040	0,135
15	17	0,006	0,092	0,040	0,135
16	18	0,006	0,092	0,040	0,135
18	20	0,006	0,095	0,040	0,138
20	23	0,010	0,112	0,050	0,164
22	25	0,010	0,112	0,050	0,164
24	27	0,010	0,112	0,050	0,164
25	28	0,010	0,112	0,050	0,164
28	32	0,010	0,126	0,060	0,188
30	34	0,010	0,126	0,060	0,188
32	36	0,015	0,135	0,060	0,194
35	39	0,015	0,135	0,060	0,194
40	44	0,015	0,135	0,060	0,194
45	50	0,015	0,155	0,080	0,234
50	55	0,015	0,160	0,080	0,239

Bearing clearance and mounting tolerances

Theoretical bearing clearance for metric sizes (continued)

Diameter of bush		Bearing clearance Δs			
D_i mm	D_o mm	E40, E40-B		E50	
		Δs_{min} mm	Δs_{max} mm	Δs_{min} mm	Δs_{max} mm
55	60	0,020	0,170	0,080	0,246
60	65	0,020	0,170	0,080	0,246
65	70	0,020	0,170	0,080	0,246
70	75	0,020	0,170	0,080	0,246
75	80	0,020	0,170	0,080	0,246
80	85	0,020	0,201	0,080	0,251
85	90	0,020	0,209	0,080	0,251
90	95	0,020	0,209	0,080	0,259
95	100	0,020	0,209	0,080	0,259
100	105	0,020	0,209	0,080	0,259
105	110	0,020	0,209	–	–
110	115	0,020	0,209	–	–
115	120	0,020	0,209	–	–
120	125	0,070	0,264	–	–
125	130	0,070	0,273	–	–
130	135	0,070	0,273	–	–
135	140	0,070	0,273	–	–
140	145	0,070	0,273	–	–
150	155	0,070	0,273	–	–
160	165	0,070	0,273	–	–
180	185	0,070	0,279	–	–
200	205	0,070	0,288	–	–
220	225	0,070	0,288	–	–
250	255	0,070	0,294	–	–
300	305	0,070	0,303	–	–



Bearing clearance and mounting tolerances

Theoretical bearing clearance for inch sizes

Designation	Nominal diameter <i>inch</i>	Recommended diameter of			
		Shaft <i>inch/mm</i>		Housing bore <i>inch/mm</i>	
		d_W min	d_W max	d_G min	d_G max
EGBZ03	$\frac{3}{16}$	0,1858	0,1865	0,2497	0,2503
		4,719	4,737	6,342	6,358
EGBZ04	$\frac{1}{4}$	0,2481	0,2490	0,3122	0,3128
		6,302	6,325	7,930	7,945
EGBZ05	$\frac{5}{16}$	0,3106	0,3115	0,3747	0,3753
		7,889	7,912	9,517	9,533
EGBZ06	$\frac{3}{8}$	0,3731	0,3740	0,4684	0,4691
		9,477	9,500	11,897	11,915
EGBZ07	$\frac{7}{16}$	0,4355	0,4365	0,5309	0,5316
		11,062	11,087	13,485	13,503
EGBZ08	$\frac{1}{2}$	0,4980	0,4990	0,5934	0,5941
		12,649	12,675	15,072	15,090
EGBZ09	$\frac{9}{16}$	0,5605	0,5615	0,6559	0,6566
		14,237	14,262	16,660	16,678
EGBZ10	$\frac{5}{8}$	0,6230	0,6240	0,7184	0,7192
		15,824	15,850	18,247	18,268
EGBZ11	$\frac{11}{16}$	0,6855	0,6865	0,7809	0,7817
		17,412	17,437	19,835	19,855
EGBZ12	$\frac{3}{4}$	0,7479	0,7491	0,8747	0,8755
		18,997	19,027	22,217	22,238
EGBZ14	$\frac{7}{8}$	0,8729	0,8741	0,9997	1,0005
		22,172	22,202	25,392	25,413
EGBZ16	1	0,9979	0,9991	1,1246	1,1256
		25,347	25,377	28,565	28,590
EGBZ18	$1\frac{1}{8}$	1,1226	1,1238	1,2808	1,2818
		28,514	28,545	32,532	32,558
EGBZ20	$1\frac{1}{4}$	1,2472	1,2488	1,4058	1,4068
		31,679	31,720	35,707	35,733
EGBZ22	$1\frac{3}{8}$	1,3722	1,3738	1,5308	1,5318
		34,854	34,895	38,882	38,908
EGBZ24	$1\frac{1}{2}$	1,4972	1,4988	1,6558	1,6568
		38,029	38,070	42,057	42,083
EGBZ26	$1\frac{5}{8}$	1,6222	1,6238	1,7808	1,7818
		41,204	41,245	45,232	45,258
EGBZ28	$1\frac{3}{4}$	1,7471	1,7487	1,9371	1,9381
		44,376	44,417	49,202	49,228
EGBZ32	2	1,9969	1,9987	2,1871	2,1883
		50,721	50,767	55,552	55,583



**Theoretical bearing clearance
for inch sizes
(continued)**

Designation	Nominal diameter <i>inch/mm</i>		Inside diameter after pressing in		Bearing clearance <i>inch/mm</i>	
	D_i	D_o	min.	max.	Δs_{\min}	Δs_{\max}
EGBZ03	0,1875	0,2500	0,1867	0,1893	0,0002	0,0035
	4,763	6,350	4,742	4,808	0,005	0,089
EGBZ04	0,2500	0,3125	0,2492	0,2518	0,0002	0,0037
	6,350	7,938	6,330	6,396	0,005	0,094
EGBZ05	0,3125	0,3750	0,3117	0,3143	0,0002	0,0037
	7,938	9,525	7,917	7,983	0,005	0,094
EGBZ06	0,3750	0,4688	0,3742	0,3769	0,0002	0,0038
	9,525	11,906	9,505	9,573	0,005	0,096
EGBZ07	0,4375	0,5313	0,4367	0,4394	0,0002	0,0039
	11,113	13,494	11,092	11,161	0,005	0,099
EGBZ08	0,5000	0,5938	0,4992	0,5019	0,0002	0,0039
	12,700	15,082	12,680	12,748	0,005	0,099
EGBZ09	0,5625	0,6563	0,5617	0,5644	0,0002	0,0039
	14,288	16,669	14,267	14,336	0,005	0,099
EGBZ10	0,6250	0,7188	0,6242	0,6270	0,0002	0,0040
	15,875	18,258	15,855	15,926	0,005	0,102
EGBZ11	0,6875	0,7813	0,6867	0,6895	0,0002	0,0040
	17,463	19,844	17,442	17,513	0,005	0,101
EGBZ12	0,7500	0,8750	0,7493	0,7525	0,0002	0,0046
	19,050	22,225	19,032	19,114	0,005	0,116
EGBZ14	0,8750	1,0000	0,8743	0,8775	0,0002	0,0046
	22,225	25,400	22,207	22,289	0,005	0,116
EGBZ16	1,0000	1,1250	0,9992	1,0026	0,0001	0,0047
	25,400	28,575	25,380	25,466	0,003	0,119
EGBZ18	1,1250	1,2813	1,1240	1,1278	0,0002	0,0052
	28,575	32,544	28,550	28,646	0,005	0,132
EGBZ20	1,2500	1,4063	1,2490	1,2528	0,0002	0,0056
	31,750	35,719	31,725	31,821	0,005	0,142
EGBZ22	1,3750	1,5313	1,3740	1,3778	0,0002	0,0056
	34,925	38,894	34,900	34,996	0,005	0,142
EGBZ24	1,5000	1,6563	1,4990	1,5028	0,0002	0,0056
	38,100	42,069	38,075	38,171	0,005	0,142
EGBZ26	1,6250	1,7813	1,6240	1,6278	0,0002	0,0056
	41,275	45,244	41,250	41,346	0,005	0,142
EGBZ28	1,7500	1,9375	1,7489	1,7535	0,0002	0,0064
	44,450	49,213	44,422	44,539	0,005	0,163
EGBZ32	2,0000	2,1875	1,9989	2,0037	0,0002	0,0068
	50,800	55,563	50,772	50,894	0,005	0,173

Bearing clearance and mounting tolerances

Interference fit and bearing clearance of metal/polymer composite plain bushes

The table shows measures that can be taken to influence the bearing clearance and interference fit:

- at high ambient temperatures
- depending on housing material
- depending on housing wall thickness.

Reduced clearance tolerances require tighter tolerances for the shaft and the bore.

Consequences and measures due to environmental influences

Consequences and measures for interference fit and bearing clearance in the case of high ambient temperatures, special housing materials or special wall thicknesses, see table.

Environmental influence

Design and environmental influences	Consequences			Measures		
	Bearing clearance		Poor interference fit	Change in diameter		
	Too large	Too small		d_G	d_W	Notes
Light metal or thin-walled housings	■	-	-	●	-	The housing is more highly stressed; the permissible stress on the housing must not be exceeded.
Steel or cast iron housings ¹⁾	-	■	-	-	▼	-
Bronze or copper alloy housings ¹⁾	-	-	■	▲	▲	Reduce d_G and d_W by the same value so that the bearing clearance is maintained.
Aluminium alloy housings ¹⁾	-	-	■	○	○	Reduce d_G and d_W by the same value so that the bearing clearance is maintained. At temperatures below 0 °C, the housing is more highly stressed; the permissible stress on the housing must not be exceeded.
Bushes with thicker anti-corrosion layer	-	■	-	□	-	The bush and housing will be more highly stressed if appropriate measures are not taken.

- Applicable
- Reduce
- Reduce by 0,1% per 100 °C above room temperature
- ▲ Reduce by 0,05% per 100 °C above room temperature
- Increase by 0,03 mm if, for example, the layer thickness = 0,015 mm
- ▼ Reduce by 0,008 mm per 100 °C above room temperature.

¹⁾ At high ambient temperatures.



Recommended mounting tolerances for plain bushes

The plain bearing bushes are pressed into the housing. This provides axial and radial location. No additional means of location are required.

Recommended mounting tolerances, see tables.



If shafts with the tolerance class h Ⓢ are used, the bearing clearance must be checked in accordance with the equations for Δs_{max} and Δs_{min} , see page 42.

For aluminium housings, mounting tolerances to M7 Ⓢ are recommended.

Mounting tolerances for metal/polymer composite plain bushes

Diameter range mm	Sliding layer ¹⁾		
	E40	E40-B	E50
Shaft			
$d_W < 5$	h6	f7	–
$5 \leq d_W < 80$	f7	f7	h8
$80 \leq d_W$	h8	h8	h8
Housing bore			
$d_G \leq 5,5$	H6	–	–
$5,5 < d_G$	H7	H7	H7

¹⁾ The envelope condition Ⓢ applies here.

ISO tolerances

The ISO tolerances for shafts and housings to ISO 286 give, in conjunction with the tolerances for the bore and outside diameter of bearings to ISO 3547, the fit, see tables.

ISO tolerances for shafts

Nominal shaft diameter in mm											
over incl.	– 3	3 6	6 10	10 18	18 30	30 50	50 80	80 120	120 180	180 250	250 315
Shaft deviation in μm											
f7	–6 –16	–10 –22	–13 –28	–16 –34	–20 –41	–25 –50	–30 –60	–36 –71	–43 –83	–50 –96	–56 –108
h6	0 –6	0 –8	0 –9	0 –11	0 –13	0 –16	0 –19	0 –22	0 –25	0 –29	0 –32
h7	0 –10	0 –12	0 –15	0 –18	0 –21	0 –25	0 –30	0 –35	0 –40	0 –46	0 –52
h8	0 –14	0 –18	0 –22	0 –27	0 –33	0 –39	0 –46	0 –54	0 –63	0 –72	0 –81

ISO tolerances for bores

Nominal bore diameter in mm											
over incl.	– 3	3 6	6 10	10 18	18 30	30 50	50 80	80 120	120 180	180 250	250 315
Bore deviation in μm											
G7	+12 +2	+16 +4	+20 +5	+24 +6	+28 +7	+34 +9	+40 +10	+47 +12	+54 +14	+61 +15	+69 +17
H6	+6 0	+8 0	+9 0	+11 0	+13 0	+16 0	+19 0	+22 0	+25 0	+29 0	+32 0
H7	+10 0	+12 0	+15 0	+18 0	+21 0	+25 0	+30 0	+35 0	+40 0	+46 0	+52 0
H8	+14 0	+18 0	+22 0	+27 0	+33 0	+39 0	+46 0	+54 0	+63 0	+72 0	+81 0
J7	+4 –6	+6 –6	+8 –7	+10 –8	+12 –9	+14 –11	+18 –12	+22 –13	+26 –14	+30 –16	+36 –16
M7	–2 –12	0 –12	0 –15	0 –18	0 –21	0 –25	0 –30	0 –35	0 –40	0 –46	0 –52

Bearing clearance and mounting tolerances

Tables of deviations and wall thicknesses

The deviations for the bushes are defined in ISO 3547.

Deviations of outside diameter

The deviations for the outside diameter D_o conform to ISO 3547-1, Table 7, see table.

Deviations Tolerances in mm

D_o mm	E40		E40-B	
	Deviation			
	upper	lower	upper	lower
$D_o \leq 10$	+0,055	+0,025	+0,075	+0,045
$10 < D_o \leq 18$	+0,065	+0,030	+0,080	+0,050
$18 < D_o \leq 30$	+0,075	+0,035	+0,095	+0,055
$30 < D_o \leq 50$	+0,085	+0,045	+0,110	+0,065
$50 < D_o \leq 80$	+0,100	+0,055	+0,125	+0,075
$80 < D_o \leq 120$	+0,120	+0,070	+0,140	+0,090
$120 < D_o \leq 180$	+0,170	+0,100	+0,190	+0,120
$180 < D_o \leq 305$	+0,255	+0,125	+0,245	+0,145

Deviations Tolerances in mm

D_o mm	E50	
	Deviation	
	upper	lower
$D_o \leq 10$	+0,055	+0,025
$10 < D_o \leq 18$	+0,065	+0,030
$18 < D_o \leq 30$	+0,075	+0,035
$30 < D_o \leq 50$	+0,085	+0,045
$50 < D_o \leq 80$	+0,100	+0,055
$80 < D_o \leq 120$	+0,120	+0,070
$120 < D_o \leq 180$	+0,170	+0,100
$180 < D_o \leq 305$	+0,255	+0,125



Wall thickness for sliding layer E40

The nominal dimensions and limiting deviations for the wall thickness s_3 of bushes and flanged bushes with the sliding layer E40 conform to ISO 3547-1, Table 5, Series B, see table.

Wall thickness Tolerances in mm

D _i mm	s ₃ mm	E40		E40-B	
		Deviation			
		upper	lower	upper	lower
D _i < 5	0,75	0,000	-0,020	-	-
	1	-	-	+0,005	-0,020
5 ≦ D _i < 20	1	+0,005	-0,020	+0,005	-0,020
20 ≦ D _i < 28	1,5	+0,005	-0,025	+0,005	-0,025
28 ≦ D _i < 45	2	+0,005	-0,030	+0,005	-0,030
45 ≦ D _i < 80	2,5	+0,005	-0,040	+0,005	-0,040
80 ≦ D _i < 120	2,5	-0,010	-0,060	-0,010	-0,060
120 ≦ D _i	2,5	-0,035	-0,085	-0,035	-0,085

Wall thickness for sliding layer E50

The nominal dimensions and limit deviations for the wall thickness s_3 of bushes with the sliding layer E50 for inside diameter D_i conform to ISO 3547-1, Table 5, Series D, see table.

Wall thickness Tolerances in mm

D _i mm	s ₃ mm	E50	
		Deviation	
		upper	lower
8 ≦ D _i < 20	1	-0,020	-0,045
20 ≦ D _i < 28	1,5	-0,025	-0,055
28 ≦ D _i < 45	2	-0,030	-0,065
45 ≦ D _i	2,5	-0,040	-0,085

Bearing clearance and mounting tolerances

Chamfers and chamfer tolerances

The tolerances and dimensions of the outer chamfer f and the inner edge break F_i for bushes of metric sizes conform to ISO 3547-1, *Figure 2* and dimension tables. For plain bushes of inch sizes, corresponding values apply, see dimension tables.

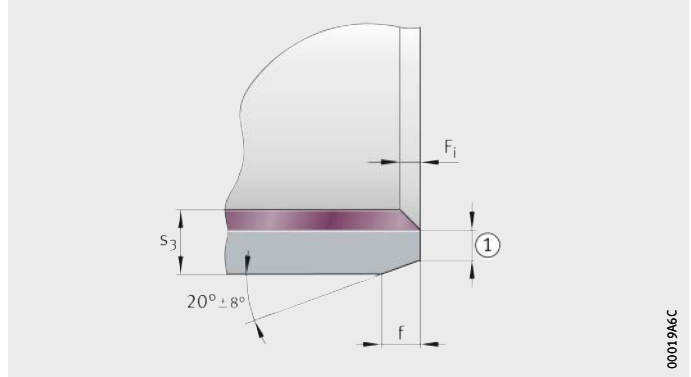
Chamfer deformation due to round bending is permissible.

① $\cong 0,3 \text{ mm}$ (0,012 inch)

F_i = inner edge break
 f = outer chamfer
 s_3 = wall thickness

Figure 2

Outer chamfer and inner edge break

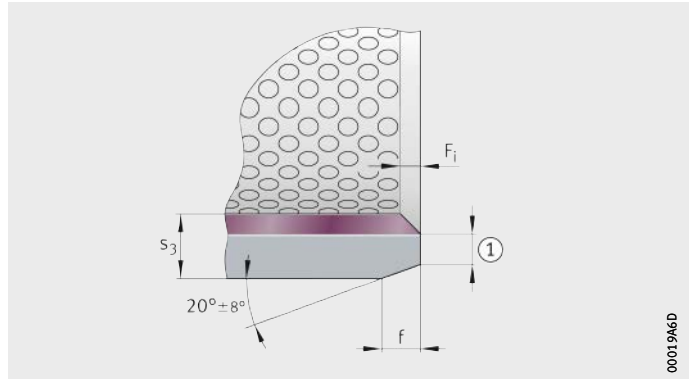


① $\cong 0,3 \text{ mm}$

F_i = inner edge break
 f = outer chamfer
 s_3 = wall thickness

Figure 3

Outer chamfer and inner edge break





Mounting and dismounting

General guidelines

In the interests of the user, the applicable legal regulations and other directives relating to environmental protection and occupational safety must be observed.



Plain bearings must be handled with care before and during mounting. Problem-free functioning of the sliding surfaces is substantially dependent on the care taken in mounting. The sliding surfaces must not be damaged. It must be ensured that mounting is carried out in clean conditions.

The bearings will only achieve their maximum operating life and functional capability if they are mounted correctly. Where a mounting position is specified, this must be observed in all cases.

Plain bearings with maintenance-free sliding layers must not be lubricated. The use of lubricant will lead to a considerable reduction in the operating life.

Delivered condition

The plain bearings are supplied with preservative in a box or in a bag held in a box.



Any change, irrespective of the bearing type, will reduce their operating life.

Bearings must not be treated or cleaned using trichloroethylene, perchloroethylene, petroleum spirit or other solvents.

Substances containing oil will change the characteristics of the bearings.

Storage of bearings

Plain bearings should be stored:

- in the original packaging
- in clean, dry areas
- at as constant a temperature as possible
- at a relative humidity of max. 65%.

Unpacking of bearings

Plain bearings should only be removed from their packaging immediately before mounting:

- Hands should be kept clean and dry and protective gloves worn if necessary (perspiration leads to corrosion).
- If the original packaging is damaged, the products must be checked.
- If the products are contaminated, they must be wiped with a clean cloth only.

Mounting and dismounting

Checking the adjacent construction

Before plain bushes are mounted, the adjacent construction must be checked for the following:

- the quality of the bearing seating surface on the shaft and housing bore
- the dimensional and geometrical accuracy of seating and locating faces
- the shaft and housing seats
- any chamfers, radii and edge breaks required on the shaft and housing bore, see section Design of bearing arrangements, page 35.

Any burrs present must be removed.

If tight fits are present or mounting conditions present difficulties, the surface of the shaft and housing bore should be lightly oiled.



If welding work is carried out on the adjacent construction, welding currents must not be allowed to pass through the spherical plain bearing, since this will immediately damage the sliding surfaces.



Pressing in of bushes

The bushes can be easily pressed into the housing bore. The bushes can be pressed in more easily if the bush backing or housing bore is lightly oiled.

Bushes can be pressed in flush or into a counterbore using a press-in mandrel, *Figure 1* and *Figure 2*. In the case of metal/polymer composite plain bushes, an auxiliary ring should additionally be used due to the butt joint for a diameter equal to or greater than $\cong 55$ mm, *Figure 3*, page 56.

The chamfer on the mandrel must have rounded transitions or rounding of the end.



Sharp transitions on the entry side of the shaft and mandrel will damage the sliding layer during mounting and reduce the operating life of the plain bearings.

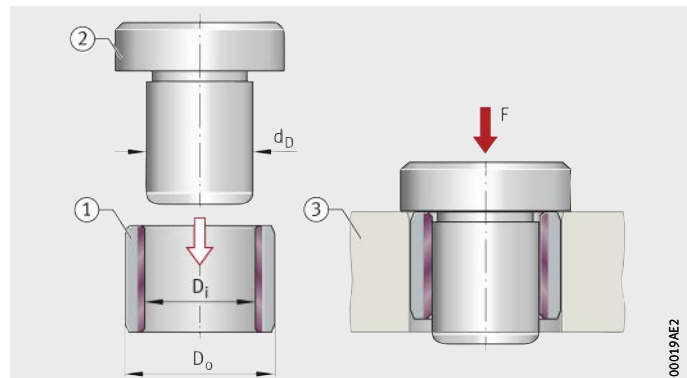
Diameter of press-in mandrel

Series	Diameter of press-in mandrel d_D
Metal/polymer composite plain bushes	$D_i \begin{matrix} -0,1 \\ -0,2 \end{matrix}$
ELGOTEX filament wound bushes	$D_i \begin{matrix} -0,3 \\ -0,5 \end{matrix}$
ELGOLIDE plain bushes	

D_i, D_o = inside or outside diameter
 d_D = outside diameter of press-in mandrel
 F = pressing in force

- ① Bush
- ② Press-in mandrel
- ③ Housing

Figure 1
Pressing bush in flush

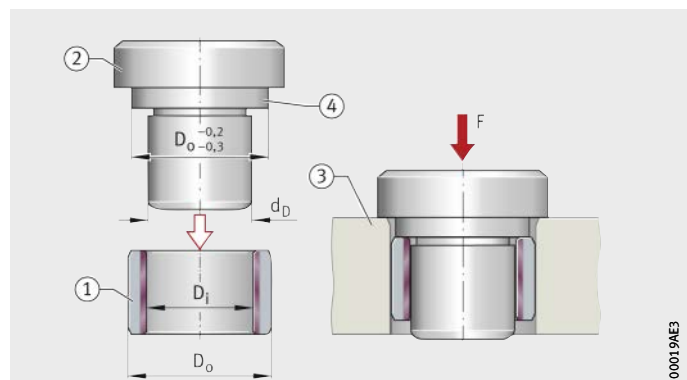


00019AE3

D_i, D_o = inside or outside diameter
 d_D = outside diameter of press-in mandrel
 F = pressing in force

- ① Bush
- ② Press-in mandrel
- ③ Housing
- ④ Shoulder diameter

Figure 2
Pressing bush into a counterbore



00019AE3

Mounting and dismounting

Auxiliary ring for metal/polymer composite plain bushes with $D_o \geq 55$ mm

Outside diameter of bush D_o mm	Inside diameter of auxiliary ring d_H mm
$55 \leq D_o \leq 100$	$D_o^{+0,28}_{+0,25}$
$100 < D_o \leq 200$	$D_o^{+0,4}_{+0,36}$
$200 < D_o \leq 305$	$D_o^{+0,5}_{+0,46}$

$D_o \geq 55$ mm
 D_o = outside diameter of bush
 D_i = inside diameter of bush
 d_H = inside diameter of auxiliary ring

- ① Bush
- ② Auxiliary ring
- ③ Press-in mandrel
- ④ Housing
- ⑤ Shoulder diameter
- ⑥ O-ring

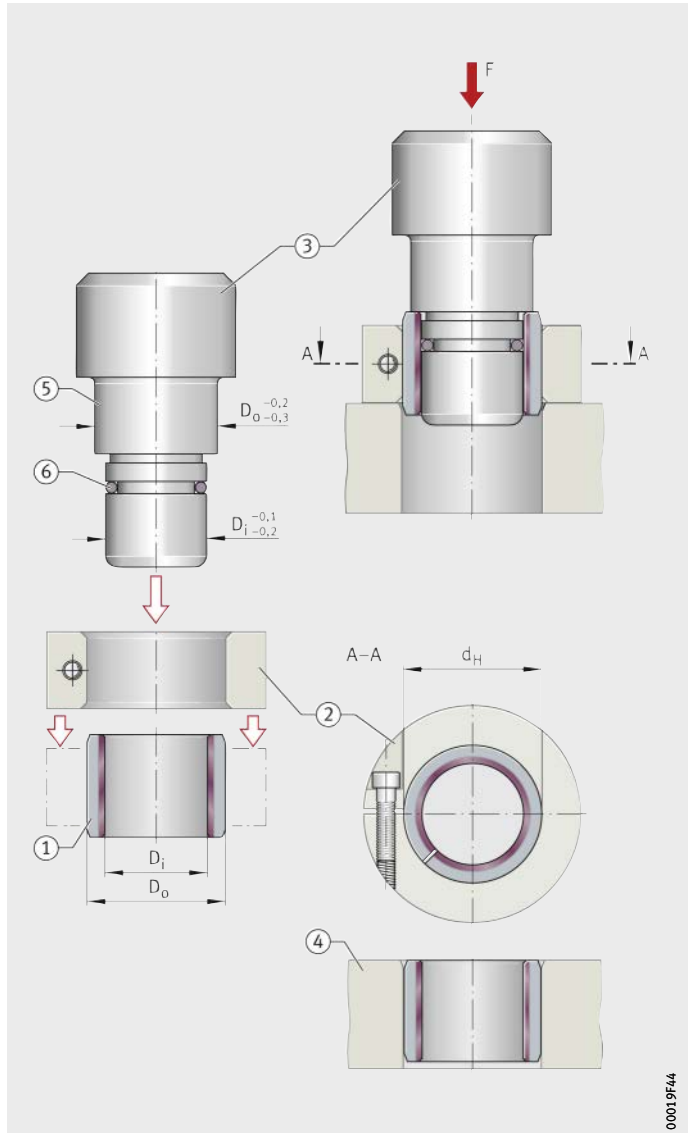


Figure 3 Pressing bush in using auxiliary ring



Machining of plain bearings

Metal/polymer composite plain bearings can be machined by either cutting or non-cutting methods, such as shortening, drilling or bending.

The procedure is as follows:

- Separate the plain bearings starting from the sliding layer side, since the burr formed in cutting will impair the running surface
- Clean the bearing elements thoroughly.
- Protect any bright steel surfaces such as cut edges against corrosion by means of oil or electroplated protective coatings.



In electroplating with high current densities or long coating times, the sliding layers should be masked to prevent deposits.

The machining temperature must not exceed +280 °C in the case of the sliding layer E40, otherwise there may be a health risk.

The machining temperature must not exceed +110 °C in the case of the sliding layer E50.

Alternative joining methods

If it is uneconomical to use dowel pins or screws, there are economical alternative methods for location:

- laser welding
- soft soldering
- adhesive bonding.

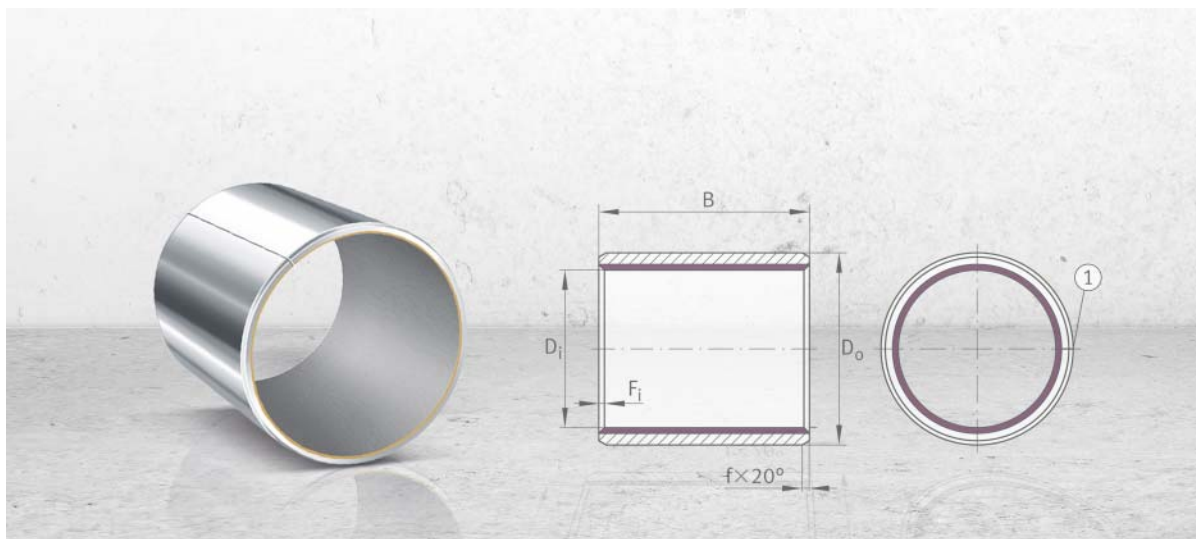


The machining temperature must not exceed +280 °C in the case of the sliding layer E40, otherwise there may be a health risk.

The machining temperature must not exceed +110 °C in the case of the sliding layer E50.

The running-in or sliding surface must always be kept free of adhesive.

If adhesive is used, the adhesive manufacturer must always be consulted, particularly on the selection of adhesives, preparation of the surface, hardening, strength, temperature range and elongation behaviour.



Metal/polymer composite plain bearings, maintenance-free

Bushes
Flanged bushes
Thrust washers
Strips

Metal/polymer composite plain bearings, maintenance-free

		Page
Product overview	Metal/polymer composite plain bearings, maintenance-free	60
Features	Resistance of the plain bearing material.....	61
	Technical data for E40	62
	Sealing.....	62
	Lubrication	63
	Operating temperature	63
	Suffixes.....	63
Design and safety guidelines	Friction.....	64
	Running-in process.....	65
	Hydrodynamic operation.....	66
	Heat dissipation	67
	Electrical conductivity.....	67
	Setting the bearing clearance	67
Dimension tables	Bushes, maintenance-free, ISO 3547, with steel backing	69
	Bushes, maintenance-free, with steel backing, inch sizes	74
	Bushes, maintenance-free, ISO 3547, with bronze backing	79
	Flanged bushes, maintenance-free, ISO 3547, with steel backing	81
	Flanged bushes, maintenance-free, ISO 3547, with bronze backing	83
	Thrust washers, maintenance-free, material in accordance with ISO 3547-4, with steel backing	84
	Thrust washers, maintenance-free, material in accordance with ISO 3547-4, with bronze backing	85
	Strips, maintenance-free, material in accordance with ISO 3547-4, with steel backing	86



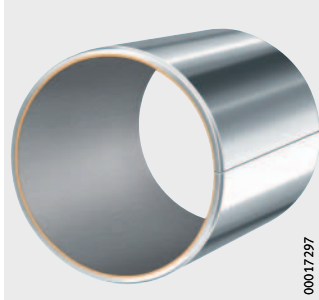
Product overview

Metal/polymer composite plain bearings, maintenance-free

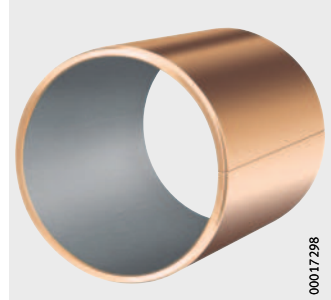
Bushes

With steel backing or
with bronze backing
Metric or inch sizes

EGB..-E40, EGBZ..-E40



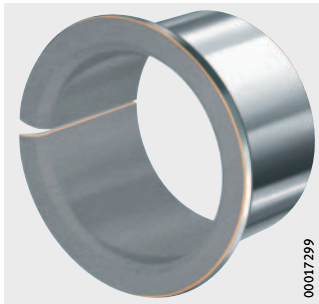
EGB..-E40-B



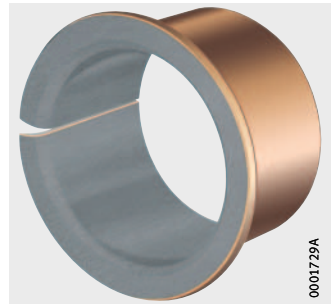
Flanged bushes

With steel backing or
with bronze backing

EGF..-E40



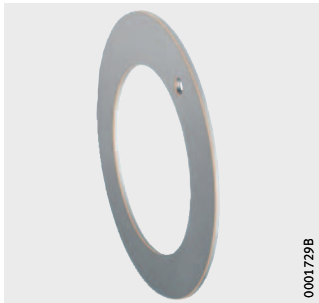
EGF..-E40-B



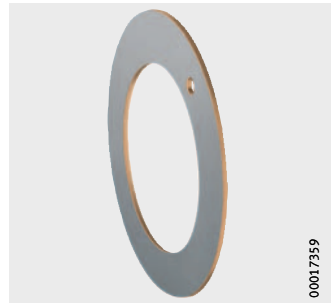
Thrust washers

With steel backing or
with bronze backing

EGW..-E40



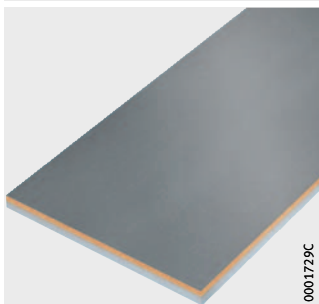
EGW..-E40-B



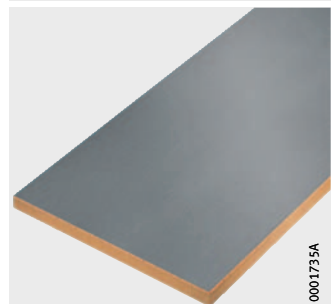
Strips

With steel backing or
with bronze backing
(by agreement)

EGS..-E40



EGS..-E40-B



Metal/polymer composite plain bearings, maintenance-free

Features

These plain bearings are bearings for very small radial or axial design envelopes. These products are available as bushes, flanged bushes, thrust washers and strips. The bushes are available in metric sizes and in inch sizes.

The plain bearings are supplied with either steel backing or bronze backing. Bearings with a bronze backing have high corrosion resistance and thermal conductivity and are antimagnetic.



If the plain bearings are to be used in the medical or aerospace sectors or in the food or pharmaceuticals industry, please contact the Schaeffler engineering service.



Resistance of the plain bearing material

The resistance of the material E40 depends on the chemical characteristics of the individual layers:

- The material E40 is resistant to water, alcohols, glycols and numerous mineral and synthetic oils.
- The tin-plated steel surface gives adequate protection against corrosion in most cases.
- In the case of the material E40-B, the bronze backing is additionally resistant to water vapour and seawater.



The material E40 is not resistant to acidic media ($\text{pH} < 5$) and alkaline media ($\text{pH} > 9$). The bronze backing of E40-B is not resistant to oxidising acids and gases such as free halides, ammonia or hydrogen sulphide, especially if these gases have a high moisture content.

Metal/polymer composite plain bearings, maintenance-free

Technical data for E40

The sliding layer E40 is maintenance-free. It can be used for rotary and oscillating motion as well as for short stroke linear motion.

The low-wear material has good sliding characteristics (no stick-slip), a low coefficient of friction and high resistance to chemicals. It does not absorb water (it is highly resistant to swelling), does not tend to weld to metal and is also suitable for hydrodynamic operation.

The maintenance-free plain bearing materials E40 and E40-B have the following mechanical and physical characteristics, see table.

Characteristics of E40 and E40-B

Characteristic	Loading		
Maximum pv value for dry running	Continuous operation	pv	1,8 N/mm ² · m/s
	For short periods		3,6 N/mm ² · m/s
Permissible specific bearing load	Static	p _{max}	250 N/mm ²
	Rotary, oscillating		140 N/mm ²
Permissible sliding velocity	Dry running	v _{max}	2,5 m/s
	Hydrodynamic operation		>2,5 m/s
Permissible operating temperature		ϑ	-200 °C to +280 °C
Coefficient of thermal expansion	Steel backing	α _{St}	11 · 10 ⁻⁶ K ⁻¹
	Bronze backing	α _{Bz}	17 · 10 ⁻⁶ K ⁻¹
Coefficient of thermal conductivity	Steel backing	λ _{St}	>42 Wm ⁻¹ K ⁻¹
	Bronze backing	λ _{Bz}	>70 Wm ⁻¹ K ⁻¹
Relative electrical resistance after running-in		R _{rel.min}	>1 Ω · cm ²

Sealing

The plain bearings are not sealed, but can be protected against the ingress of contamination and moisture by the use of external seals, see page 41.

Lubrication

Plain bearings with the sliding layer E40 contain dry lubricants and do not therefore require lubrication.

Lubrication can be used to protect the mating surface against corrosion or simply to provide sealing against contamination. It should be checked in advance, however, whether it is more advantageous in such cases to use a corrosion-resistant material for the mating surface or a different means of sealing the bearing position.

In certain applications, the sliding layer E40 can be used in fluid media. In this case, the improved heat dissipation may considerably increase the operating life.



The compatibility of the media with the sliding layer E40 must be checked. Further advice should therefore be sought from the Schaeffler engineering service.

Lubricants

Oil and grease lubrication, even in very small quantities, impairs the transfer of material during the running-in phase.

Over time, grease and small quantities of oil mix with wear debris to form a paste that promotes wear. Solid lubricants such as zinc sulphide, molybdenum disulphide or similar grease additives are not permitted, since they promote this paste formation to an increased extent.

Relubrication

If it is not possible in exceptional cases to avoid the use of grease lubrication, the bearings must be relubricated periodically. During relubrication, old grease is replaced by fresh grease. At the same time, the grease flushes wear debris and contaminants out of the bearing.



If periodic relubrication is carried out, the formation of paste comprising debris and contaminants must be avoided.

Operating temperature

The permissible operating temperature for maintenance-free metal/polymer composite plain bearings is between -200 °C and $+280\text{ °C}$.



The running-in layer and sliding layer may undergo swelling in the presence of some mineral oils at temperatures above $+100\text{ °C}$. This could lead to jamming of the bearing.

This can be remedied by increasing the bearing clearance, since other characteristics of the sliding layer E40 are unaffected.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
E40	Maintenance-free sliding layer, with steel backing	Standard
E40-B	Maintenance-free sliding layer, with bronze backing	



Metal/polymer composite plain bearings, maintenance-free

Design and safety guidelines



Plain bushes should not be used for movement involving spatial motion. Any skewing of the shaft will reduce the operating life.

Friction

Sliding motion is free from stick-slip.

The friction in a plain bearing is influenced by:

- the roughness depth of the mating surface
- the mating surface material
- the specific bearing load
- the sliding velocity
- the operating temperature
 - Up to approx. +100 °C, the coefficient of friction is slightly lower than the value at room temperature.
 - Above +100 °C, the coefficient of friction may be up to 50% above the value at room temperature.

Friction behaviour

The coefficient of friction is lower under high specific bearing load and low sliding velocity. The coefficients of friction stated are valid for the condition after running-in, see table.

Coefficient of friction for sliding layer E40

Specific bearing load p N/mm ²	Sliding velocity v m/s	Coefficient of friction μ
250 to 140	$\leq 0,001$	0,03
140 to 60	0,001 to 0,005	0,04 to 0,07
60 to 10	0,005 to 0,05	0,07 to 0,1
10 to 1	0,05 to 0,5	0,1 to 0,15
≤ 1	0,5 to 2	0,15 to 0,25

Bearing frictional torque

Calculation of the bearing frictional torque and the typical wear characteristics are given in the chapter Technical principles, see section Friction and increases in temperature, page 32.

Running-in process

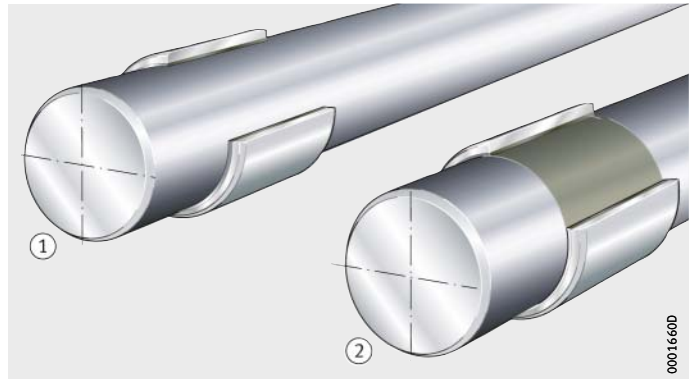
During the running-in process, part of the running-in layer is transferred to the mating surface, *Figure 1*:

- This compensates uneven areas.
- A mating surface with a low coefficient of friction is formed, which acts favourably on the operating behaviour.
- After running in, some of the porous bronze layer is visible on the sliding layer as individual areas of differing sizes, *Figure 2*. This shows that the bearing is running correctly.

- ① Before running-in
- ② After running-in

Figure 1

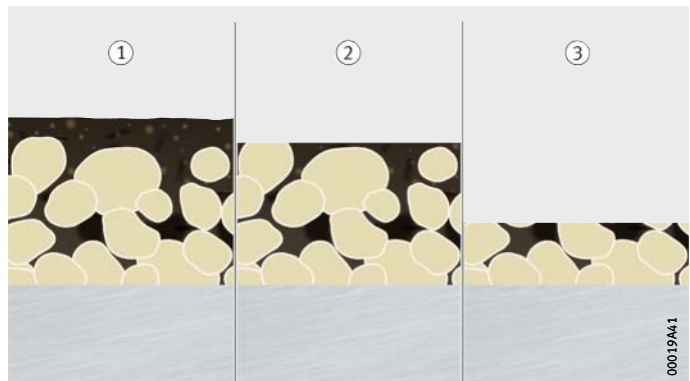
Material transfer during running-in



- ① Before running-in
- ② After running-in
- ③ After long operating life

Figure 2

Typical wear pattern of sliding layer E40



Metal/polymer composite plain bearings, maintenance-free

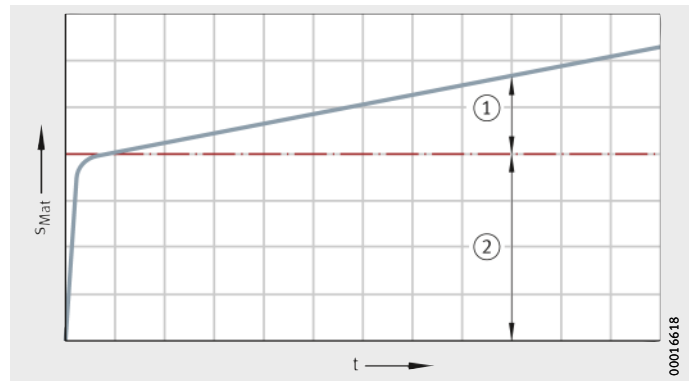
Operating behaviour

After running-in, the wear of maintenance-free plain bearings proceeds in a linear manner, *Figure 3*.

s_{Mat} = material removal
t = time

- ① Wear during operation
- ② Material transfer during running-in

Figure 3
Typical operating behaviour during operating life



Hydrodynamic operation

Metal/polymer composite plain bearings with the sliding layer E40 can be operated under hydrodynamic conditions. Higher circumferential speeds are permissible than with dry running.

Once the transition speed is reached, pure fluid friction is present. This allows wear-free operation.

At speeds below the transition speed, mixed friction is present and the self-lubricating effect of the sliding layer is utilised.



For hydrodynamic operation with the sliding layer E40, the roughness R_z of the mating surface should be less than the smallest lubricant film thickness in fluid friction.

Schaeffler offers the calculation of hydrodynamic conditions for plain bearings as a service.

Calculation

For the calculation of hydrodynamic conditions, the following data are necessary:

- load
- speed
- diameter of the housing bore d_G with tolerance
- diameter of the shaft d_W with tolerance
- bush width B
- viscosity of the fluid at operating temperature.

Heat dissipation

Correct and sufficient heat dissipation must be ensured:

- If hydrodynamic operation is present, the heat is dissipated predominantly via the fluid lubricant.
- In the case of maintenance-free plain bearings, the heat is dissipated via the housing and shaft.

Electrical conductivity

The electrical conductivity of new bearings may be lower because the running-in layer is still present. The bronze layer is partially exposed after the running-in process, thus improving the electrical conductivity, *Figure 2*, page 65.

The electrical resistance is dependent on the size of the contact surface.



Setting the bearing clearance

Metal/polymer composite plain bearings are supplied ready for mounting. In order to set the tolerance of the bearing clearance, measures should be selected at the predimensioning stage that will not shorten the life of the bearings, such as closer tolerances of the housing bore or the shaft.

In a further possibility for setting the bearing clearance, the bushes are sized, *Figure 4* and table. This should only be carried out if there is no other way to achieve a reduced tolerance of the bearing clearance.



Sizing leads to a significant reduction in the rating life L_h of metal/polymer composite plain bearings with the sliding layer E40, see table. Precise values for the reduction in rating life can only be determined by means of tests.

Guide values for diameter of the sizing arbor and reduction in the rating life

Required inside diameter of bush after pressing in	Diameter of sizing arbor ¹⁾ d_K	Rating life ²⁾ L_h %
D_{IE}	–	100
$D_{IE}+0,02$	$D_{IE}+0,06$	80
$D_{IE}+0,03$	$D_{IE}+0,08$	60
$D_{IE}+0,04$	$D_{IE}+0,10$	30

¹⁾ Guide value, related to steel housing.

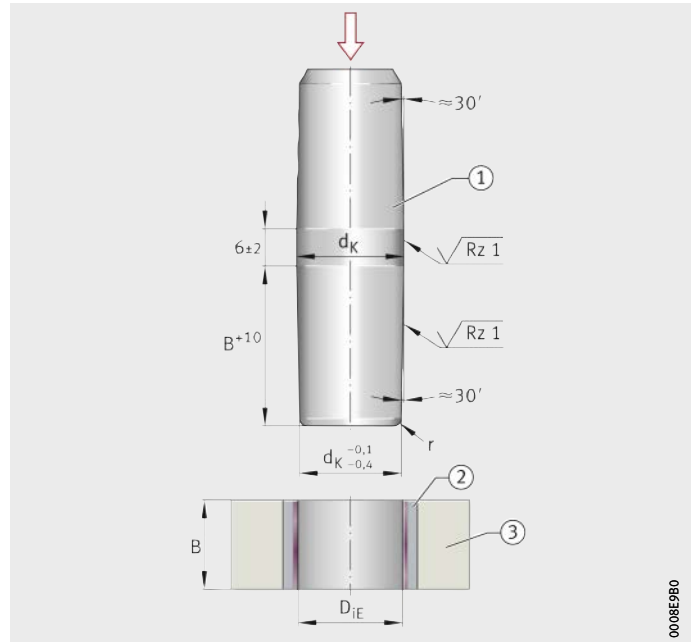
²⁾ Guide value for dry running.

Metal/polymer composite plain bearings, maintenance-free

- ① Sizing arbor, case hardening depth CHD > 0,6, HRC 56 to 64
- ② Plain bearing bush EGB..-E40
- ③ Housing

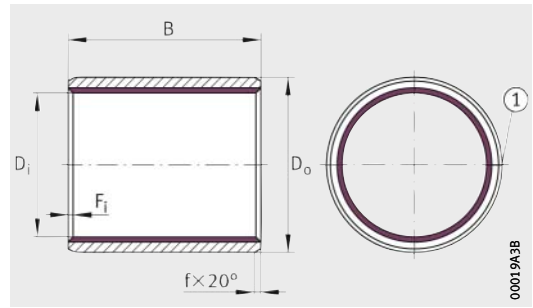
B = bush width
 D_{iE} = inside diameter of bush after pressing in
 d_K = diameter of sizing arbor
 r = rounded edge

Figure 4
 Sizing of plain bearing bush



Bushes

Maintenance-free
ISO 3547
With steel backing



EGB
① Butt joint

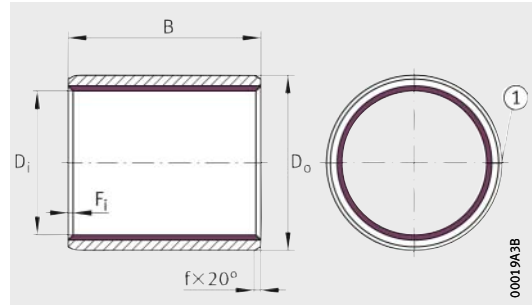
Dimension table · Dimensions in mm

Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B ±0,25	f	F _i		dyn. C _r N	stat. C _{0r} N
						min.	max.		
EGB0303-E40	0,1	3	4,5	3	0,5±0,3	0,1	0,4	1 260	2 250
EGB0304-E40	0,2	3	4,5	4	0,5±0,3	0,1	0,4	1 680	3 000
EGB0305-E40	0,3	3	4,5	5	0,5±0,3	0,1	0,4	2 100	3 750
EGB0306-E40	0,3	3	4,5	6	0,5±0,3	0,1	0,4	2 520	4 500
EGB0403-E40	0,2	4	5,5	3	0,5±0,3	0,1	0,4	1 680	3 000
EGB0404-E40	0,3	4	5,5	4	0,5±0,3	0,1	0,4	2 240	4 000
EGB0406-E40	0,4	4	5,5	6	0,5±0,3	0,1	0,4	3 360	6 000
EGB0410-E40	0,7	4	5,5	10	0,5±0,3	0,1	0,4	5 600	10 000
EGB0505-E40	0,6	5	7	5	0,6±0,4	0,1	0,6	3 500	6 250
EGB0508-E40	1,0	5	7	8	0,6±0,4	0,1	0,6	5 600	10 000
EGB0510-E40	1,3	5	7	10	0,6±0,4	0,1	0,6	7 000	12 500
EGB0606-E40	0,9	6	8	6	0,6±0,4	0,1	0,6	5 040	9 000
EGB0608-E40	1,2	6	8	8	0,6±0,4	0,1	0,6	6 720	12 000
EGB0610-E40	1,5	6	8	10	0,6±0,4	0,1	0,6	8 400	15 000
EGB0710-E40	1,7	7	9	10	0,6±0,4	0,1	0,6	9 800	17 500
EGB0806-E40	1,1	8	10	6	0,6±0,4	0,1	0,6	6 720	12 000
EGB0808-E40	1,5	8	10	8	0,6±0,4	0,1	0,6	8 960	16 000
EGB0810-E40	2,0	8	10	10	0,6±0,4	0,1	0,6	11 200	20 000
EGB0812-E40	2,4	8	10	12	0,6±0,4	0,1	0,6	13 400	24 000
EGB1008-E40	1,9	10	12	8	0,6±0,4	0,1	0,6	11 200	20 000
EGB1010-E40	2,4	10	12	10	0,6±0,4	0,1	0,6	14 000	25 000
EGB1012-E40	2,9	10	12	12	0,6±0,4	0,1	0,6	16 800	30 000
EGB1015-E40	3,6	10	12	15	0,6±0,4	0,1	0,6	21 000	37 500
EGB1020-E40	4,9	10	12	20	0,6±0,4	0,1	0,6	28 000	50 000
EGB1208-E40	2,3	12	14	8	0,6±0,4	0,1	0,6	13 400	24 000
EGB1210-E40	2,8	12	14	10	0,6±0,4	0,1	0,6	16 800	30 000
EGB1212-E40	3,4	12	14	12	0,6±0,4	0,1	0,6	20 200	36 000
EGB1215-E40	4,3	12	14	15	0,6±0,4	0,1	0,6	25 200	45 000
EGB1220-E40	5,8	12	14	20	0,6±0,4	0,1	0,6	33 600	60 000
EGB1225-E40	7,3	12	14	25	0,6±0,4	0,1	0,6	42 000	75 000
EGB1310-E40	3,1	13	15	10	0,6±0,4	0,1	0,6	18 200	32 500

Recommended mounting tolerances, see page 49.

Bushes

Maintenance-free
ISO 3547
With steel backing



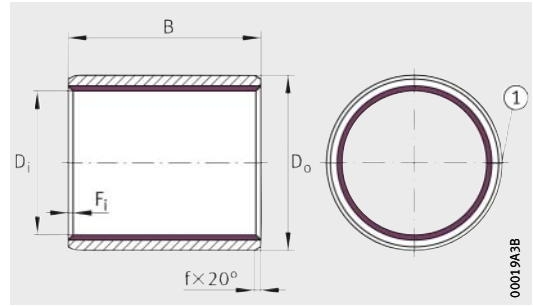
EGB
① Butt joint

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B	f	F _i		dyn. C _r N	stat. C _{or} N
						min.	max.		
EGB1410-E40	3,3	14	16	10	0,6±0,4	0,1	0,6	19 600	35 000
EGB1412-E40	4	14	16	12	0,6±0,4	0,1	0,6	23 500	42 000
EGB1415-E40	5	14	16	15	0,6±0,4	0,1	0,6	29 400	52 500
EGB1420-E40	6,7	14	16	20	0,6±0,4	0,1	0,6	39 200	70 000
EGB1425-E40	8,4	14	16	25	0,6±0,4	0,1	0,6	49 000	87 500
EGB1510-E40	3,5	15	17	10	0,6±0,4	0,1	0,6	21 000	37 500
EGB1512-E40	4,2	15	17	12	0,6±0,4	0,1	0,6	25 200	45 000
EGB1515-E40	5,3	15	17	15	0,6±0,4	0,1	0,6	31 500	56 300
EGB1520-E40	7,1	15	17	20	0,6±0,4	0,1	0,6	42 000	75 000
EGB1525-E40	8,9	15	17	25	0,6±0,4	0,1	0,6	52 500	93 800
EGB1610-E40	3,7	16	18	10	0,6±0,4	0,1	0,6	22 400	40 000
EGB1612-E40	4,5	16	18	12	0,6±0,4	0,1	0,6	26 900	48 000
EGB1615-E40	5,7	16	18	15	0,6±0,4	0,1	0,6	33 600	60 000
EGB1620-E40	7,6	16	18	20	0,6±0,4	0,1	0,6	44 800	80 000
EGB1625-E40	9,5	16	18	25	0,6±0,4	0,1	0,6	56 000	100 000
EGB1810-E40	4,2	18	20	10	0,6±0,4	0,1	0,6	25 200	45 000
EGB1815-E40	6,3	18	20	15	0,6±0,4	0,1	0,6	37 800	67 500
EGB1820-E40	8,5	18	20	20	0,6±0,4	0,1	0,6	50 400	90 000
EGB1825-E40	10,6	18	20	25	0,6±0,4	0,1	0,6	63 000	113 000
EGB2010-E40	7,4	20	23	10	0,6±0,4	0,1	0,7	28 000	50 000
EGB2015-E40	11,1	20	23	15	0,6±0,4	0,1	0,7	42 000	75 000
EGB2020-E40	14,9	20	23	20	0,6±0,4	0,1	0,7	56 000	100 000
EGB2025-E40	18,6	20	23	25	0,6±0,4	0,1	0,7	70 000	125 000
EGB2030-E40	22,4	20	23	30	0,6±0,4	0,1	0,7	84 000	150 000
EGB2215-E40	12,2	22	25	15	0,6±0,4	0,1	0,7	46 200	82 500
EGB2220-E40	16,3	22	25	20	0,6±0,4	0,1	0,7	61 600	110 000
EGB2225-E40	20,4	22	25	25	0,6±0,4	0,1	0,7	77 000	138 000
EGB2230-E40	24,5	22	25	30	0,6±0,4	0,1	0,7	92 400	165 000
EGB2415-E40	13,2	24	27	15	0,6±0,4	0,1	0,7	50 400	90 000
EGB2420-E40	17,7	24	27	20	0,6±0,4	0,1	0,7	67 200	120 000
EGB2425-E40	22,1	24	27	25	0,6±0,4	0,1	0,7	84 000	150 000
EGB2430-E40	26,5	24	27	30	0,6±0,4	0,1	0,7	101 000	180 000

Recommended mounting tolerances, see page 49.

Bushes

Maintenance-free
ISO 3547
With steel backing



EGB
① Butt joint

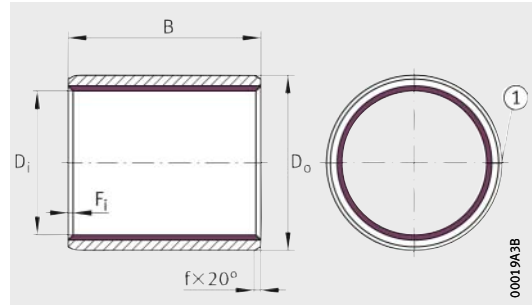
Dimension table (continued) - Dimensions in mm

Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B ±0,25	f	F _t		dyn. C _r N	stat. C _{0r} N
						min.	max.		
EGB2510-E40	9,1	25	28	10	0,6±0,4	0,1	0,7	35 000	62 500
EGB2515-E40	13,7	25	28	15	0,6±0,4	0,1	0,7	52 500	93 800
EGB2520-E40	18,3	25	28	20	0,6±0,4	0,1	0,7	70 000	125 000
EGB2525-E40	23	25	28	25	0,6±0,4	0,1	0,7	87 500	156 000
EGB2530-E40	27,6	25	28	30	0,6±0,4	0,1	0,7	105 000	188 000
EGB2540-E40	36,8	25	28	40	0,6±0,4	0,1	0,7	140 000	250 000
EGB2550-E40	46,1	25	28	50	0,6±0,4	0,1	0,7	175 000	313 000
EGB2820-E40	27,8	28	32	20	1,2±0,4	0,1	0,7	78 400	140 000
EGB2830-E40	42	28	32	30	1,2±0,4	0,1	0,7	118 000	210 000
EGB3015-E40	22,2	30	34	15	1,2±0,4	0,1	0,7	63 000	113 000
EGB3020-E40	29,7	30	34	20	1,2±0,4	0,1	0,7	84 000	150 000
EGB3025-E40	37,4	30	34	25	1,2±0,4	0,1	0,7	105 000	188 000
EGB3030-E40	44,8	30	34	30	1,2±0,4	0,1	0,7	126 000	225 000
EGB3040-E40	59,9	30	34	40	1,2±0,4	0,1	0,7	168 000	300 000
EGB3230-E40	47,6	32	36	30	1,2±0,4	0,1	0,7	134 000	240 000
EGB3240-E40	63,6	32	36	40	1,2±0,4	0,1	0,7	179 000	320 000
EGB3520-E40	34,4	35	39	20	1,2±0,4	0,1	0,7	98 000	175 000
EGB3530-E40	51,8	35	39	30	1,2±0,4	0,1	0,7	147 000	263 000
EGB3540-E40	69,2	35	39	40	1,2±0,4	0,1	0,7	196 000	350 000
EGB3550-E40	86,7	35	39	50	1,2±0,4	0,1	0,7	245 000	438 000
EGB4020-E40	39	40	44	20	1,2±0,4	0,1	0,7	112 000	200 000
EGB4030-E40	58,8	40	44	30	1,2±0,4	0,1	0,7	168 000	300 000
EGB4040-E40	78,6	40	44	40	1,2±0,4	0,1	0,7	224 000	400 000
EGB4050-E40	98,4	40	44	50	1,2±0,4	0,1	0,7	280 000	500 000
EGB4530-E40	83,2	45	50	30	1,8±0,6	0,2	1	189 000	338 000
EGB4540-E40	111	45	50	40	1,8±0,6	0,2	1	252 000	450 000
EGB4550-E40	140	45	50	50	1,8±0,6	0,2	1	315 000	563 000
EGB5020-E40	60,8	50	55	20	1,8±0,6	0,2	1	140 000	250 000
EGB5030-E40	92	50	55	30	1,8±0,6	0,2	1	210 000	375 000
EGB5040-E40	123	50	55	40	1,8±0,6	0,2	1	280 000	500 000
EGB5060-E40	186	50	55	60	1,8±0,6	0,2	1	420 000	750 000

Recommended mounting tolerances, see page 49.

Bushes

Maintenance-free
ISO 3547
With steel backing



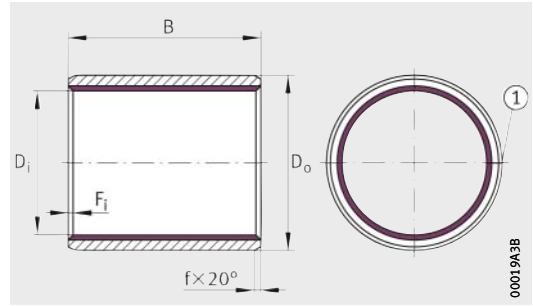
EGB
① Butt joint

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B	f	F _i		dyn. C _r N	stat. C _{or} N
						min.	max.		
EGB5540-E40	135	55	60	40	1,8±0,6	0,2	1	308 000	550 000
EGB5560-E40	203	55	60	60	1,8±0,6	0,2	1	462 000	825 000
EGB6030-E40	110	60	65	30	1,8±0,6	0,2	1	252 000	450 000
EGB6040-E40	147	60	65	40	1,8±0,6	0,2	1	336 000	600 000
EGB6060-E40	221	60	65	60	1,8±0,6	0,2	1	504 000	900 000
EGB6070-E40	259	60	65	70	1,8±0,6	0,2	1	588 000	1 050 000
EGB6530-E40	119	65	70	30	1,8±0,6	0,2	1	273 000	488 000
EGB6540-E40	158	65	70	40	1,8±0,6	0,2	1	364 000	650 000
EGB6550-E40	200	65	70	50	1,8±0,6	0,2	1	455 000	813 000
EGB6560-E40	240	65	70	60	1,8±0,6	0,2	1	546 000	975 000
EGB6570-E40	279	65	70	70	1,8±0,6	0,2	1	637 000	1 140 000
EGB7040-E40	170	70	75	40	1,8±0,6	0,2	1	392 000	700 000
EGB7050-E40	214	70	75	50	1,8±0,6	0,2	1	490 000	875 000
EGB7070-E40	301	70	75	70	1,8±0,6	0,2	1	686 000	1 230 000
EGB7540-E40	182	75	80	40	1,8±0,6	0,2	1	420 000	750 000
EGB7550-E40	229	75	80	50	1,8±0,6	0,2	1	525 000	938 000
EGB7560-E40	278	75	80	60	1,8±0,6	0,2	1	630 000	1 130 000
EGB7580-E40	367	75	80	80	1,8±0,6	0,2	1	840 000	1 500 000
EGB8040-E40	194	80	85	40	1,8±0,6	0,2	1	448 000	800 000
EGB8060-E40	292	80	85	60	1,8±0,6	0,2	1	672 000	1 200 000
EGB8080-E40	390	80	85	80	1,8±0,6	0,2	1	896 000	1 600 000
EGB80100-E40	488	80	85	100	1,8±0,6	0,2	1	1 120 000	2 000 000
EGB8560-E40	311	85	90	60	1,8±0,6	0,2	1	714 000	1 280 000
EGB85100-E40	519	85	90	100	1,8±0,6	0,2	1	1 190 000	2 130 000
EGB9050-E40	272	90	95	50	1,8±0,6	0,2	1	630 000	1 130 000
EGB9060-E40	327	90	95	60	1,8±0,6	0,2	1	756 000	1 350 000
EGB90100-E40	547	90	95	100	1,8±0,6	0,2	1	1 260 000	2 250 000
EGB9560-E40	345	95	100	60	1,8±0,6	0,2	1	798 000	1 430 000
EGB95100-E40	578	95	100	100	1,8±0,6	0,2	1	1 330 000	2 380 000
EGB10050-E40	301	100	105	50	1,8±0,6	0,2	1	700 000	1 250 000
EGB10060-E40	362	100	105	60	1,8±0,6	0,2	1	840 000	1 500 000
EGB100115-E40	697	100	105	115	1,8±0,6	0,2	1	1 610 000	2 880 000

Recommended mounting tolerances, see page 49.

Bushes

Maintenance-free
ISO 3547
With steel backing



EGB
① Butt joint

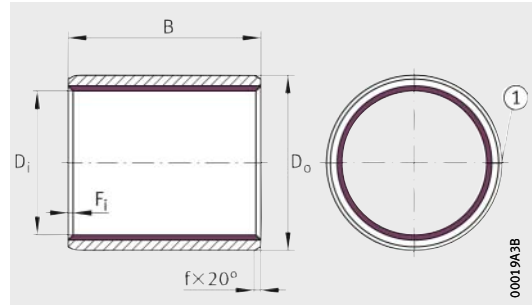
Dimension table (continued) - Dimensions in mm

Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B ±0,25	f	F _t		dyn. C _r N	stat. C _{0r} N
						min.	max.		
EGB10560-E40	382	105	110	60	1,8±0,6	0,2	1	882 000	1 580 000
EGB105115-E40	733	105	110	115	1,8±0,6	0,2	1	1 690 000	3 020 000
EGB11060-E40	398	110	115	60	1,8±0,6	0,2	1	924 000	1 650 000
EGB110115-E40	767	110	115	115	1,8±0,6	0,2	1	1 770 000	3 160 000
EGB11550-E40	347	115	120	50	1,8±0,6	0,2	1	805 000	1 440 000
EGB11560-E40	417	115	120	60	1,8±0,6	0,2	1	966 000	1 730 000
EGB11570-E40	487	115	120	70	1,8±0,6	0,2	1	1 130 000	2 010 000
EGB12060-E40	433	120	125	60	1,8±0,6	0,2	1	1 010 000	1 800 000
EGB120100-E40	724	120	125	100	1,8±0,6	0,2	1	1 680 000	3 000 000
EGB125100-E40	754	125	130	100	1,8±0,6	0,2	1	1 750 000	3 130 000
EGB13060-E40	468	130	135	60	1,8±0,6	0,2	1	1 090 000	1 950 000
EGB130100-E40	785	130	135	100	1,8±0,6	0,2	1	1 820 000	3 250 000
EGB13560-E40	486	135	140	60	1,8±0,6	0,2	1	1 130 000	2 030 000
EGB13580-E40	649	135	140	80	1,8±0,6	0,2	1	1 510 000	2 700 000
EGB14060-E40	504	140	145	60	1,8±0,6	0,2	1	1 180 000	2 100 000
EGB140100-E40	842	140	145	100	1,8±0,6	0,2	1	1 960 000	3 500 000
EGB15060-E40	539	150	155	60	1,8±0,6	0,2	1	1 260 000	2 250 000
EGB15080-E40	720	150	155	80	1,8±0,6	0,2	1	1 680 000	3 000 000
EGB150100-E40	901	150	155	100	1,8±0,6	0,2	1	2 100 000	3 750 000
EGB16080-E40	768	160	165	80	1,8±0,6	0,2	1	1 790 000	3 200 000
EGB160100-E40	961	160	165	100	1,8±0,6	0,2	1	2 240 000	4 000 000
EGB180100-E40	1 078	180	185	100	1,8±0,6	0,2	1	2 520 000	4 500 000
EGB200100-E40	1 197	200	205	100	1,8±0,6	0,2	1	2 800 000	5 000 000
EGB220100-E40	1 315	220	225	100	1,8±0,6	0,2	1	3 080 000	5 500 000
EGB250100-E40	1 492	250	255	100	1,8±0,6	0,2	1	3 500 000	6 250 000
EGB300100-E40	1 790	300	305	100	1,8±0,6	0,2	1	4 200 000	7 500 000

Recommended mounting tolerances, see page 49.

Bushes

Maintenance-free
With steel backing
Inch sizes



EGBZ
① Butt joint

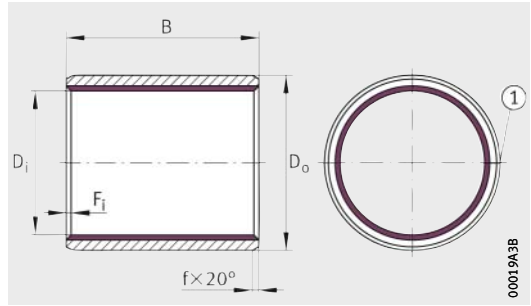
Dimension table - Dimensions in mm and inch

Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B	f	F _i		dyn. C _r N	stat. C _{0r} N
						min.	max.		
EGBZ0303-E40	0,5	3/16	1/4	3/16	0,5±0,3	0,1	0,4	3 170	5 670
		4,763	6,35	4,76±0,25					
EGBZ0304-E40	0,7	3/16	1/4	1/4	0,5±0,3	0,1	0,4	4 230	7 560
		4,763	6,35	6,35±0,25					
EGBZ0306-E40	1	3/16	1/4	3/8	0,5±0,3	0,1	0,4	6 350	11 300
		4,763	6,35	9,53±0,25					
EGBZ0404-E40	0,9	1/4	5/16	1/4	0,5±0,3	0,1	0,4	5 650	10 100
		6,35	7,938	6,35±0,25					
EGBZ0406-E40	1,3	1/4	5/16	3/8	0,5±0,3	0,1	0,4	8 470	15 100
		6,35	7,938	9,53±0,25					
EGBZ0408-E40	1,7	1/4	5/16	1/2	0,5±0,3	0,1	0,4	11 300	20 200
		6,35	7,938	12,70±0,25					
EGBZ0504-E40	1,1	5/16	3/8	1/4	0,5±0,3	0,1	0,4	7 060	12 600
		7,938	9,525	6,35±0,25					
EGBZ0506-E40	1,6	5/16	3/8	3/8	0,5±0,3	0,1	0,4	10 600	18 900
		7,938	9,525	9,53±0,25					
EGBZ0603-E40	1,5	3/8	15/32	3/16	0,6±0,4	0,1	0,6	6 350	11 300
		9,525	11,906	4,76±0,25					
EGBZ0604-E40	2	3/8	15/32	1/4	0,6±0,4	0,1	0,6	8 470	15 100
		9,525	11,906	6,35±0,25					
EGBZ0606-E40	3	3/8	15/32	3/8	0,6±0,4	0,1	0,6	12 700	22 700
		9,525	11,906	9,53±0,25					
EGBZ0608-E40	3,9	3/8	15/32	1/2	0,6±0,4	0,1	0,6	16 900	30 200
		9,525	11,906	12,7±0,25					
EGBZ0610-E40	4,9	3/8	15/32	5/8	0,6±0,4	0,1	0,6	21 200	37 800
		9,525	11,906	15,88±0,25					
EGBZ0612-E40	6	3/8	15/32	3/4	0,6±0,4	0,1	0,6	25 400	45 400
		9,525	11,906	19,05±0,25					
EGBZ0706-E40	3,4	7/16	17/32	3/8	0,6±0,4	0,1	0,6	14 800	26 500
		11,113	13,494	9,53±0,25					
EGBZ0708-E40	4,5	7/16	17/32	1/2	0,6±0,4	0,1	0,6	19 800	35 300
		11,113	13,494	12,70±0,25					

Recommended mounting tolerances, see page 46.

Bushes

Maintenance-free
With steel backing
Inch sizes



EGBZ
① Butt joint

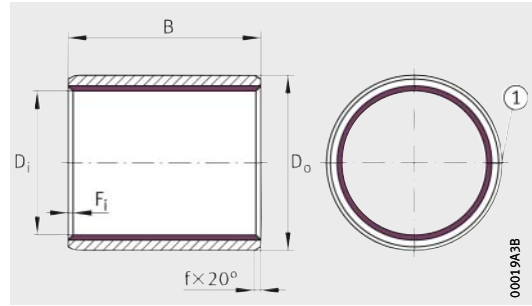


Dimension table (continued) - Dimensions in mm and inch									
Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B	f	F _i		dyn. C _r N	stat. C _{0r} N
						min.	max.		
EGBZ0712-E40	7	7/16	17/32	3/4	0,6±0,4	0,1	0,6	29 600	52 900
		11,113	13,494	19,05±0,25					
EGBZ0804-E40	2,6	1/2	19/32	1/4	0,6±0,4	0,1	0,6	11 300	20 200
		12,7	15,082	6,35±0,25					
EGBZ0806-E40	3,8	1/2	19/32	3/8	0,6±0,4	0,1	0,6	16 900	30 300
		12,7	15,082	9,53±0,25					
EGBZ0808-E40	6	1/2	19/32	1/2	0,6±0,4	0,1	0,6	22 600	40 300
		12,7	15,082	12,70±0,25					
EGBZ0810-E40	7	1/2	19/32	5/8	0,6±0,4	0,1	0,6	28 200	50 400
		12,7	15,082	15,88±0,25					
EGBZ0812-E40	8	1/2	19/32	3/4	0,6±0,4	0,1	0,6	33 900	60 500
		12,7	15,082	19,05±0,25					
EGBZ0814-E40	9	1/2	19/32	7/8	0,6±0,4	0,1	0,6	39 500	70 600
		12,7	15,082	22,23±0,25					
EGBZ0906-E40	4,3	9/16	21/32	3/8	0,6±0,4	0,1	0,6	19 100	34 000
		14,288	16,669	9,53±0,25					
EGBZ0908-E40	6	9/16	21/32	1/2	0,6±0,4	0,1	0,6	25 400	45 400
		14,288	16,669	12,70±0,25					
EGBZ0912-E40	9	9/16	21/32	3/4	0,6±0,4	0,1	0,6	38 100	68 000
		14,288	16,669	19,05±0,25					
EGBZ1004-E40	3,1	5/8	23/32	1/4	0,6±0,4	0,1	0,6	14 100	25 200
		15,875	18,258	6,35±0,25					
EGBZ1008-E40	7	5/8	23/32	1/2	0,6±0,4	0,1	0,6	28 200	50 400
		15,875	18,258	12,70±0,25					
EGBZ1010-E40	8	5/8	23/32	5/8	0,6±0,4	0,1	0,6	35 300	63 000
		15,875	18,258	15,88±0,25					
EGBZ1012-E40	10	5/8	23/32	3/4	0,6±0,4	0,1	0,6	42 300	75 600
		15,875	18,258	19,05±0,25					
EGBZ1014-E40	11	5/8	23/32	7/8	0,6±0,4	0,1	0,6	49 400	88 200
		15,875	18,258	22,23±0,25					
EGBZ1112-E40	11	11/16	25/32	3/4	0,6±0,4	0,1	0,6	46 600	83 200
		17,463	19,844	19,05±0,25					

Recommended mounting tolerances, see page 46.

Bushes

Maintenance-free
With steel backing
Inch sizes



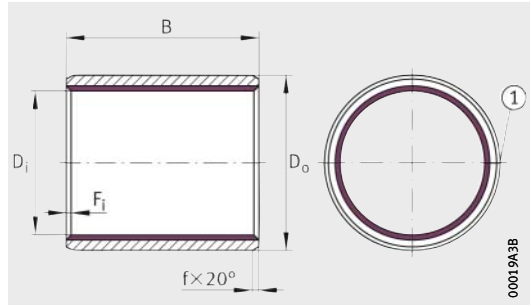
EGBZ
① Butt joint

Dimension table (continued) · Dimensions in mm and inch									
Designation	Mass m ≈g	Dimensions					Basic load ratings		
		D _i	D _o	B	f	F _i		dyn. C _r N	stat. C _{or} N
						min.	max.		
EGBZ1204-E40	6	3/4	7/8	1/4	0,6±0,4	0,1	0,7	16 900	30 200
		19,05	22,225	6,35±0,25					
EGBZ1206-E40	8	3/4	7/8	3/8	0,6±0,4	0,1	0,7	25 400	45 400
		19,05	22,225	9,53±0,25					
EGBZ1208-E40	11	3/4	7/8	1/2	0,6±0,4	0,1	0,7	33 900	60 500
		19,05	22,225	12,70±0,25					
EGBZ1210-E40	13	3/4	7/8	5/8	0,6±0,4	0,1	0,7	42 400	75 600
		19,05	22,225	15,88±0,25					
EGBZ1212-E40	16	3/4	7/8	3/4	0,6±0,4	0,1	0,7	50 800	90 700
		19,05	22,225	19,05±0,25					
EGBZ1216-E40	21	3/4	7/8	1	0,6±0,4	0,1	0,7	67 700	121 000
		19,05	22,225	25,40±0,25					
EGBZ1412-E40	18	7/8	1	3/4	0,6±0,4	0,1	0,7	59 300	106 000
		22,225	25,4	19,05±0,25					
EGBZ1416-E40	24	7/8	1	1	0,6±0,4	0,1	0,7	79 000	141 000
		22,225	25,4	25,40±0,25					
EGBZ1606-E40	10	1	1 1/8	3/8	0,6±0,4	0,1	0,7	33 900	60 500
		25,4	28,575	9,53±0,25					
EGBZ1608-E40	14	1	1 1/8	1/2	0,6±0,4	0,1	0,7	45 200	80 600
		25,4	28,575	12,70±0,25					
EGBZ1610-E40	17	1	1 1/8	5/8	0,6±0,4	0,1	0,7	56 500	101 000
		25,4	28,575	15,88±0,25					
EGBZ1612-E40	20	1	1 1/8	3/4	0,6±0,4	0,1	0,7	67 700	121 000
		25,4	28,575	19,05±0,25					
EGBZ1614-E40	23	1	1 1/8	7/8	0,6±0,4	0,1	0,7	79 000	141 000
		25,4	28,575	22,23±0,25					
EGBZ1616-E40	27	1	1 1/8	1	0,6±0,4	0,1	0,7	90 300	161 000
		25,4	28,575	25,40±0,25					
EGBZ1620-E40	33	1	1 1/8	1 1/4	0,6±0,4	0,1	0,7	113 000	202 000
		25,4	28,575	31,75±0,25					
EGBZ1624-E40	40	1	1 1/8	1 1/2	0,6±0,4	0,1	0,7	135 000	242 000
		25,4	28,575	38,10±0,25					

Recommended mounting tolerances, see page 46.

Bushes

Maintenance-free
With steel backing
Inch sizes



EGBZ
① Butt joint



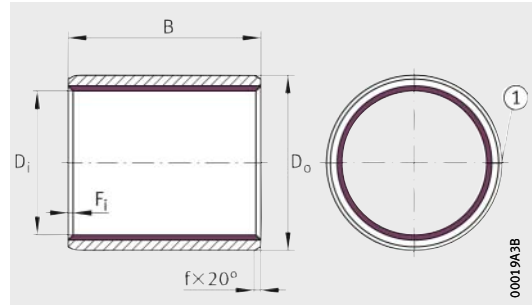
Dimension table (continued) - Dimensions in mm and inch

Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B	f	F _i		dyn. C _r N	stat. C _{0r} N
						min.	max.		
EGBZ1808-E40	19	<i>1¹/₈</i>	<i>1⁹/₃₂</i>	<i>1/2</i>	1,2±0,4	0,1	0,7	50 800	90 700
		28,575	32,544	12,70±0,25					
EGBZ1812-E40	28	<i>1¹/₈</i>	<i>1⁹/₃₂</i>	<i>3/4</i>	1,2±0,4	0,1	0,7	76 200	136 000
		28,575	32,544	19,05±0,25					
EGBZ1816-E40	38	<i>1¹/₈</i>	<i>1⁹/₃₂</i>	<i>1</i>	1,2±0,4	0,1	0,7	102 000	181 000
		28,575	32,544	25,40±0,25					
EGBZ2006-E40	16	<i>1¹/₄</i>	<i>1¹³/₃₂</i>	<i>3/8</i>	1,2±0,4	0,1	0,7	42 400	75 600
		31,75	35,719	9,53±0,25					
EGBZ2012-E40	31	<i>1¹/₄</i>	<i>1¹³/₃₂</i>	<i>3/4</i>	1,2±0,4	0,1	0,7	84 700	151 000
		31,75	35,719	19,05±0,25					
EGBZ2016-E40	42	<i>1¹/₄</i>	<i>1¹³/₃₂</i>	<i>1</i>	1,2±0,4	0,1	0,7	113 000	202 000
		31,75	35,719	25,40±0,25					
EGBZ2020-E40	52	<i>1¹/₄</i>	<i>1¹³/₃₂</i>	<i>1¹/₄</i>	1,2±0,4	0,1	0,7	141 000	252 000
		31,75	35,719	31,75±0,25					
EGBZ2206-E40	17	<i>1³/₈</i>	<i>1¹⁷/₃₂</i>	<i>3/8</i>	1,2±0,4	0,1	0,7	46 600	83 200
		34,925	38,894	9,53±0,25					
EGBZ2208-E40	23	<i>1³/₈</i>	<i>1¹⁷/₃₂</i>	<i>1/2</i>	1,2±0,4	0,1	0,7	62 100	111 000
		34,925	38,894	12,70±0,25					
EGBZ2210-E40	29	<i>1³/₈</i>	<i>1¹⁷/₃₂</i>	<i>5/8</i>	1,2±0,4	0,1	0,7	77 600	139 000
		34,925	38,894	15,88±0,25					
EGBZ2212-E40	34	<i>1³/₈</i>	<i>1¹⁷/₃₂</i>	<i>3/4</i>	1,2±0,4	0,1	0,7	93 100	166 000
		34,925	38,894	19,05±0,25					
EGBZ2216-E40	46	<i>1³/₈</i>	<i>1¹⁷/₃₂</i>	<i>1</i>	1,2±0,4	0,1	0,7	124 000	222 000
		34,925	38,894	25,40±0,25					
EGBZ2224-E40	68	<i>1³/₈</i>	<i>1¹⁷/₃₂</i>	<i>1¹/₂</i>	1,2±0,4	0,1	0,7	186 000	333 000
		34,925	38,894	38,10±0,25					
EGBZ2228-E40	79	<i>1³/₈</i>	<i>1¹⁷/₃₂</i>	<i>1³/₄</i>	1,2±0,4	0,1	0,7	217 000	388 000
		34,925	38,894	44,45±0,25					

Recommended mounting tolerances, see page 46.

Bushes

Maintenance-free
With steel backing
Inch sizes



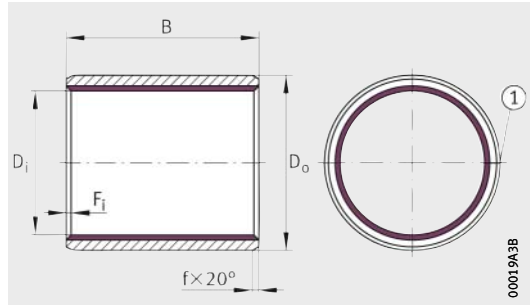
EGBZ
① Butt joint

Dimension table (continued) · Dimensions in mm and inch									
Designation	Mass m ≈g	Dimensions					Basic load ratings		
		D _i	D _o	B	f	F _i		dyn. C _r N	stat. C _{0r} N
						min.	max.		
EGBZ2408-E40	25	1 ^{1/2}	1 ^{21/32}	1 ^{1/2}	1,2±0,4	0,1	0,7	67 700	121 000
		38,1	42,069	12,70±0,25					
EGBZ2416-E40	49	1 ^{1/2}	1 ^{21/32}	1	1,2±0,4	0,1	0,7	135 000	242 000
		38,1	42,069	25,40±0,25					
EGBZ2420-E40	62	1 ^{1/2}	1 ^{21/32}	1 ^{1/4}	1,2±0,4	0,1	0,7	169 000	302 000
		38,1	42,069	31,75±0,25					
EGBZ2424-E40	74	1 ^{1/2}	1 ^{21/32}	1 ^{1/2}	1,2±0,4	0,1	0,7	203 000	363 000
		38,1	42,069	38,10±0,25					
EGBZ2432-E40	98	1 ^{1/2}	1 ^{21/32}	2	1,2±0,4	0,1	0,7	271 000	484 000
		38,1	42,069	50,80±0,25					
EGBZ2616-E40	53	1 ^{5/8}	1 ^{25/32}	1	1,2±0,4	0,1	0,7	147 000	262 000
		41,275	45,244	25,40±0,25					
EGBZ2624-E40	80	1 ^{5/8}	1 ^{25/32}	1 ^{1/2}	1,2±0,4	0,1	0,7	220 000	393 000
		41,275	45,244	38,10±0,25					
EGBZ2816-E40	69	1 ^{3/4}	1 ^{15/16}	1	1,8±0,6	0,2	1	158 000	282 000
		44,45	49,213	25,40±0,25					
EGBZ2824-E40	104	1 ^{3/4}	1 ^{15/16}	1 ^{1/2}	1,8±0,6	0,2	1	237 000	423 000
		44,45	49,213	38,10±0,25					
EGBZ2832-E40	138	1 ^{3/4}	1 ^{15/16}	2	1,8±0,6	0,2	1	316 000	565 000
		44,45	49,213	50,80±0,25					
EGBZ3216-E40	79	2	2 ^{3/16}	1	1,8±0,6	0,2	1	181 000	323 000
		50,8	55,563	25,4±0,25					
EGBZ3224-E40	118	2	2 ^{3/16}	1 ^{1/2}	1,8±0,6	0,2	1	271 000	484 000
		50,8	55,563	38,1±0,25					
EGBZ3232-E40	157	2	2 ^{3/16}	2	1,8±0,6	0,2	1	361 000	645 000
		50,8	55,563	50,8±0,25					
EGBZ3240-E40	196	2	2 ^{3/16}	2 ^{1/2}	1,8±0,6	0,2	1	452 000	806 000
		50,8	55,563	63,5±0,25					

Recommended mounting tolerances, see page 46.

Bushes

Maintenance-free
ISO 3547
With bronze backing



EGB
① Butt joint



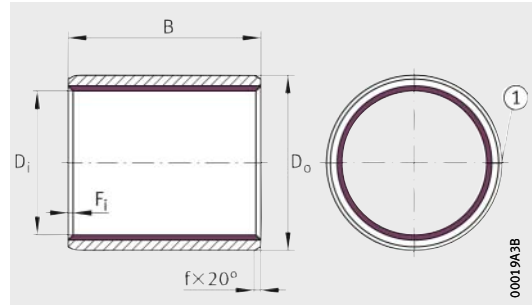
Dimension table · Dimensions in mm

Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B ±0,25	f	F _i		dyn. C _r N	stat. C _{0r} N
						min.	max.		
EGB0406-E40-B-6	0,7	4	6	6	0,6±0,4	0,1	0,6	3 360	6 000
EGB0505-E40-B	0,7	5	7	5	0,6±0,4	0,1	0,6	3 500	6 250
EGB0606-E40-B	1	6	8	6	0,6±0,4	0,1	0,6	5 040	9 000
EGB0610-E40-B	1,6	6	8	10	0,6±0,4	0,1	0,6	8 400	15 000
EGB0808-E40-B	1,7	8	10	8	0,6±0,4	0,1	0,6	8 960	16 000
EGB0810-E40-B	2,1	8	10	10	0,6±0,4	0,1	0,6	11 200	20 000
EGB0812-E40-B	2,6	8	10	12	0,6±0,4	0,1	0,6	13 400	24 000
EGB1005-E40-B	1,3	10	12	5	0,6±0,4	0,1	0,6	7 000	12 500
EGB1010-E40-B	2,6	10	12	10	0,6±0,4	0,1	0,6	14 000	25 000
EGB1015-E40-B	4	10	12	15	0,6±0,4	0,1	0,6	21 000	37 500
EGB1020-E40-B	5,3	10	12	20	0,6±0,4	0,1	0,6	28 000	50 000
EGB1210-E40-B	3,1	12	14	10	0,6±0,4	0,1	0,6	16 800	30 000
EGB1212-E40-B	3,7	12	14	12	0,6±0,4	0,1	0,6	20 200	36 000
EGB1215-E40-B	4,7	12	14	15	0,6±0,4	0,1	0,6	25 200	45 000
EGB1220-E40-B	6,3	12	14	20	0,6±0,4	0,1	0,6	33 600	60 000
EGB1225-E40-B	7,9	12	14	25	0,6±0,4	0,1	0,6	42 000	75 000
EGB1415-E40-B	5,4	14	16	15	0,6±0,4	0,1	0,6	29 400	52 500
EGB1515-E40-B	5,8	15	17	15	0,6±0,4	0,1	0,6	31 500	56 300
EGB1525-E40-B	9,7	15	17	25	0,6±0,4	0,1	0,6	52 500	93 800
EGB1615-E40-B	6,2	16	18	15	0,6±0,4	0,1	0,6	33 600	60 000
EGB1625-E40-B	10,3	16	18	25	0,6±0,4	0,1	0,6	56 000	100 000
EGB1815-E40-B	6,9	18	20	15	0,6±0,4	0,1	0,6	37 800	67 500
EGB1825-E40-B	11,6	18	20	25	0,6±0,4	0,1	0,6	63 000	113 000
EGB2015-E40-B	12,2	20	23	15	0,6±0,4	0,1	0,7	42 000	75 000
EGB2020-E40-B	16,3	20	23	20	0,6±0,4	0,1	0,7	56 000	100 000
EGB2025-E40-B	20,4	20	23	25	0,6±0,4	0,1	0,7	70 000	125 000
EGB2030-E40-B	24,5	20	23	30	0,6±0,4	0,1	0,7	84 000	150 000
EGB2215-E40-B	13,3	22	25	15	0,6±0,4	0,1	0,7	46 200	82 500
EGB2220-E40-B	17,8	22	25	20	0,6±0,4	0,1	0,7	61 600	110 000
EGB2225-E40-B	22,3	22	25	25	0,6±0,4	0,1	0,7	77 000	138 000

Recommended mounting tolerances, see page 49.

Bushes

Maintenance-free
ISO 3547
With bronze backing



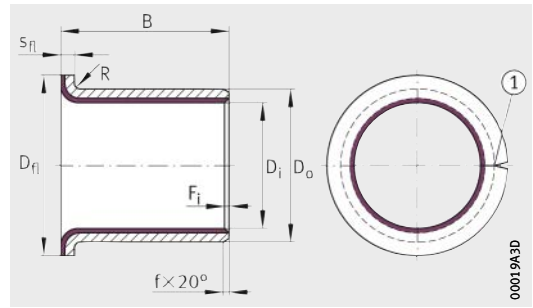
EGB
① Butt joint

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions						Basic load ratings	
		D _i	D _o	B	f	F _i		dyn. C _r N	stat. C _{or} N
				±0,25		min.	max.		
EGB2430-E40-B	29,1	24	27	30	0,6±0,4	0,1	0,7	101 000	180 000
EGB2525-E40-B	25,2	25	28	25	0,6±0,4	0,1	0,7	87 500	156 000
EGB2530-E40-B	30,2	25	28	30	0,6±0,4	0,1	0,7	105 000	188 000
EGB2830-E40-B	46,1	28	32	30	1,2±0,4	0,1	0,7	118 000	210 000
EGB3020-E40-B	32,6	30	34	20	1,2±0,4	0,1	0,7	84 000	150 000
EGB3030-E40-B	49,2	30	34	30	1,2±0,4	0,1	0,7	126 000	225 000
EGB3040-E40-B	65,8	30	34	40	1,2±0,4	0,1	0,7	168 000	300 000
EGB3520-E40-B	37,7	35	39	20	1,2±0,4	0,1	0,7	98 000	175 000
EGB3530-E40-B	56,9	35	39	30	1,2±0,4	0,1	0,7	147 000	263 000
EGB4050-E40-B	108	40	44	50	1,2±0,4	0,1	0,7	280 000	500 000
EGB4550-E40-B	154	45	50	50	1,8±0,6	0,2	1	315 000	563 000
EGB5030-E40-B	101	50	55	30	1,8±0,6	0,2	1	210 000	375 000
EGB5040-E40-B	136	50	55	40	1,8±0,6	0,2	1	280 000	500 000
EGB5060-E40-B	204	50	55	60	1,8±0,6	0,2	1	420 000	750 000
EGB5540-E40-B	149	55	60	40	1,8±0,6	0,2	1	308 000	550 000
EGB6040-E40-B	161	60	65	40	1,8±0,6	0,2	1	336 000	600 000
EGB6050-E40-B	202	60	65	50	1,8±0,6	0,2	1	420 000	750 000
EGB6060-E40-B	243	60	65	60	1,8±0,6	0,2	1	504 000	900 000
EGB6070-E40-B	284	60	65	70	1,8±0,6	0,2	1	588 000	1 050 000
EGB7050-E40-B	235	70	75	50	1,8±0,6	0,2	1	490 000	875 000
EGB7070-E40-B	329	70	75	70	1,8±0,6	0,2	1	686 000	1 230 000
EGB8060-E40-B	321	80	85	60	1,8±0,6	0,2	1	672 000	1 200 000
EGB80100-E40-B	537	80	85	100	1,8±0,6	0,2	1	1 120 000	2 000 000
EGB9060-E40-B	360	90	95	60	1,8±0,6	0,2	1	756 000	1 350 000
EGB90100-E40-B	602	90	95	100	1,8±0,6	0,2	1	1 260 000	2 250 000
EGB9560-E40-B	379	95	100	60	1,8±0,6	0,2	1	798 000	1 430 000
EGB10060-E40-B	399	100	105	60	1,8±0,6	0,2	1	840 000	1 500 000
EGB100115-E40-B	767	100	105	115	1,8±0,6	0,2	1	1 610 000	2 880 000

Recommended mounting tolerances, see page 49.

Flanged bushes

Maintenance-free
ISO 3547
With steel backing



EGF
① Butt joint

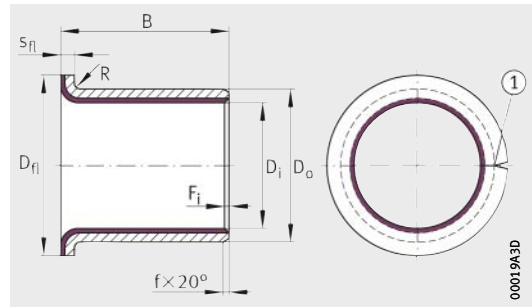
Dimension table · Dimensions in mm

Designation	Mass m ≈g	Dimensions									Basic load ratings			
		Di	Do	Dfl	B	Sfl	R	f	Fi		radial		axial	
									min.	max.	dyn. Cr	stat. COr	dyn. Ca	stat. C0a
EGF06040-E40	0,9	6	8	12	4	1	1	0,6±0,4	0,1	0,6	1 680	3 000	4 840	8 640
EGF06070-E40	1,4	6	8	12	7	1	1	0,6±0,4	0,1	0,6	4 200	7 500	4 840	8 640
EGF06080-E40	1,6	6	8	12	8	1	1	0,6±0,4	0,1	0,6	5 040	9 000	4 840	8 640
EGF08055-E40	1,6	8	10	15	5,5	1	1	0,6±0,4	0,1	0,6	3 920	7 000	8 910	15 900
EGF08075-E40	2	8	10	15	7,5	1	1	0,6±0,4	0,1	0,6	6 160	11 000	8 910	15 900
EGF08095-E40	2,4	8	10	15	9,5	1	1	0,6±0,4	0,1	0,6	8 400	15 000	8 910	15 900
EGF10070-E40	2,5	10	12	18	7	1	1	0,6±0,4	0,1	0,6	7 000	12 500	14 100	25 100
EGF10090-E40	3	10	12	18	9	1	1	0,6±0,4	0,1	0,6	9 800	17 500	14 100	25 100
EGF10120-E40	3,8	10	12	18	12	1	1	0,6±0,4	0,1	0,6	14 000	25 000	14 100	25 100
EGF10170-E40	5	10	12	18	17	1	1	0,6±0,4	0,1	0,6	21 000	37 500	14 100	25 100
EGF12070-E40	2,9	12	14	20	7	1	1	0,6±0,4	0,1	0,6	8 400	15 000	15 800	28 300
EGF12090-E40	3,5	12	14	20	9	1	1	0,6±0,4	0,1	0,6	11 800	21 000	15 800	28 300
EGF12120-E40	4,4	12	14	20	12	1	1	0,6±0,4	0,1	0,6	16 800	30 000	15 800	28 300
EGF12170-E40	5,9	12	14	20	17	1	1	0,6±0,4	0,1	0,6	25 200	45 000	15 800	28 300
EGF14120-E40	5,1	14	16	22	12	1	1	0,6±0,4	0,1	0,6	19 600	35 000	17 600	31 400
EGF14170-E40	6,8	14	16	22	17	1	1	0,6±0,4	0,1	0,6	29 400	52 500	17 600	31 400
EGF15090-E40	4,3	15	17	23	9	1	1	0,6±0,4	0,1	0,6	14 700	26 300	18 500	33 000
EGF15120-E40	5,4	15	17	23	12	1	1	0,6±0,4	0,1	0,6	21 000	37 500	18 500	33 000
EGF15170-E40	7,2	15	17	23	17	1	1	0,6±0,4	0,1	0,6	31 500	56 300	18 500	33 000
EGF16120-E40	5,7	16	18	24	12	1	1	0,6±0,4	0,1	0,6	22 400	40 000	19 400	34 600
EGF16170-E40	7,5	16	18	24	17	1	1	0,6±0,4	0,1	0,6	33 600	60 000	19 400	34 600
EGF18120-E40	6,4	18	20	26	12	1	1	0,6±0,4	0,1	0,6	25 200	45 000	21 100	37 700
EGF18170-E40	8,5	18	20	26	17	1	1	0,6±0,4	0,1	0,6	37 800	67 500	21 100	37 700
EGF18220-E40	10,7	18	20	26	22	1	1	0,6±0,4	0,1	0,6	50 400	90 000	21 100	37 700

Recommended mounting tolerances, see page 49.

Flanged bushes

Maintenance-free
 ISO 3547
 With steel backing



EGF
 ① Butt joint

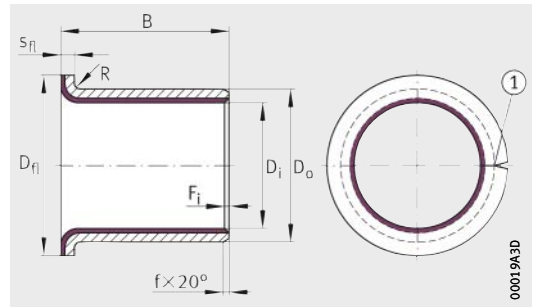
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈g	Dimensions									Basic load ratings			
		D _i	D _o	D _{fl}	B	s _{fl}	R	f	F _i		radial		axial	
									min.	max.	dyn. C _r	stat. C _{0r}	dyn. C _a	stat. C _{0a}
EGF20115-E40	11,1	20	23	30	11,5	1,5	1,5	0,6±0,4	0,1	0,7	23 800	42 500	24 600	44 000
EGF20165-E40	14,8	20	23	30	16,5	1,5	1,5	0,6±0,4	0,1	0,7	37 800	67 500	24 600	44 000
EGF20215-E40	18,6	20	23	30	21,5	1,5	1,5	0,6±0,4	0,1	0,7	51 800	92 500	24 600	44 000
EGF25115-E40	13,5	25	28	35	11,5	1,5	1,5	0,6±0,4	0,1	0,7	29 800	53 100	29 000	51 800
EGF25165-E40	18,1	25	28	35	16,5	1,5	1,5	0,6±0,4	0,1	0,7	47 300	84 300	29 000	51 800
EGF25215-E40	22,7	25	28	35	21,5	1,5	1,5	0,6±0,4	0,1	0,7	64 800	115 600	29 000	51 800
EGF30160-E40	29,2	30	34	42	16	2	2	1,2±0,4	0,1	0,7	50 400	90 000	35 200	62 800
EGF30260-E40	44,2	30	34	42	26	2	2	1,2±0,4	0,1	0,7	92 400	165 000	35 200	62 800
EGF35160-E40	33,5	35	39	47	16	2	2	1,2±0,4	0,1	0,7	58 800	105 000	39 600	70 700
EGF35260-E40	51	35	39	47	26	2	2	1,2±0,4	0,1	0,7	108 000	193 000	39 600	70 700
EGF40260-E40	58,9	40	44	53	26	2	2	1,2±0,4	0,1	0,7	123 000	220 000	55 500	99 200

Recommended mounting tolerances, see page 49.

Flanged bushes

Maintenance-free
ISO 3547
With bronze backing



EGF
① Butt joint

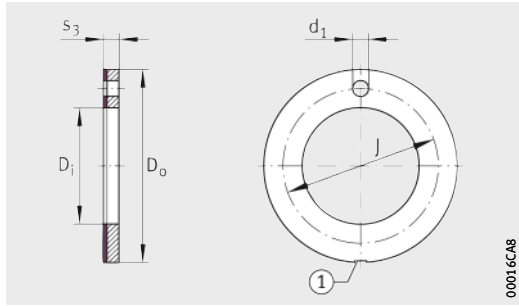
Dimension table · Dimensions in mm

Designation	Mass m ≈g	Dimensions										Basic load ratings			
		Di	Do	Dfl	B	Sfl	R	f	Fi		dyn. Cr	stat. C0r	axial		
									min.	max.			dyn. Ca	stat. C0a	
EGF06080-E40-B	1,7	6	8	12	8	1	1	0,6±0,4	0,1	0,6	5 040	9 000	4 840	8 640	
EGF08055-E40-B	1,8	8	10	15	5,5	1	1	0,6±0,4	0,1	0,6	3 920	7 000	8 910	15 900	
EGF08095-E40-B	2,7	8	10	15	9,5	1	1	0,6±0,4	0,1	0,6	8 400	15 000	8 910	15 900	
EGF10070-E40-B	2,8	10	12	18	7	1	1	0,6±0,4	0,1	0,6	7 000	12 500	14 100	25 100	
EGF10120-E40-B	4,1	10	12	18	12	1	1	0,6±0,4	0,1	0,6	14 000	25 000	14 100	25 100	
EGF10170-E40-B	5,5	10	12	18	17	1	1	0,6±0,4	0,1	0,6	21 000	37 500	14 100	25 100	
EGF12070-E40-B	3,2	12	14	20	7	1	1	0,6±0,4	0,1	0,6	8 400	15 000	15 800	28 300	
EGF12090-E40-B	3,9	12	14	20	9	1	1	0,6±0,4	0,1	0,6	11 800	21 000	15 800	28 300	
EGF12120-E40-B	4,8	12	14	20	12	1	1	0,6±0,4	0,1	0,6	16 800	30 000	15 800	28 300	
EGF15120-E40-B	5,9	15	17	23	12	1	1	0,6±0,4	0,1	0,6	21 000	37 500	18 500	33 000	
EGF15170-E40-B	7,8	15	17	23	17	1	1	0,6±0,4	0,1	0,6	31 500	56 300	18 500	33 000	
EGF16120-E40-B	6,2	16	18	24	12	1	1	0,6±0,4	0,1	0,6	22 400	40 000	19 400	34 600	
EGF18100-E40-B	6	18	20	26	10	1	1	0,6±0,4	0,1	0,6	20 200	36 000	21 100	37 700	
EGF18220-E40-B	11,6	18	20	26	22	1	1	0,6±0,4	0,1	0,6	50 400	90 000	21 100	37 700	
EGF20115-E40-B	12,1	20	23	30	11,5	1,5	1,5	0,6±0,4	0,1	0,7	23 800	42 500	24 600	44 000	
EGF20165-E40-B	16,2	20	23	30	16,5	1,5	1,5	0,6±0,4	0,1	0,7	37 800	67 500	24 600	44 000	
EGF25215-E40-B	24,9	25	28	35	21,5	1,5	1,5	0,6±0,4	0,1	0,7	64 800	115 600	29 000	51 800	
EGF30160-E40-B	32	30	34	42	16	2	2	1,2±0,4	0,1	0,7	50 400	90 000	35 200	62 800	
EGF30260-E40-B	48,6	30	34	42	26	2	2	1,2±0,4	0,1	0,7	92 400	165 000	35 200	62 800	
EGF35260-E40-B	56	35	39	47	26	2	2	1,2±0,4	0,1	0,7	108 000	193 000	39 600	70 700	
EGF40260-E40-B	64,8	40	44	53	26	2	2	1,2±0,4	0,1	0,7	123 000	220 000	55 500	99 200	

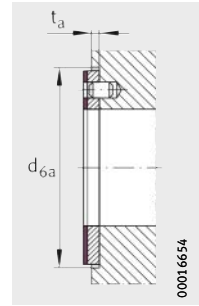
Recommended mounting tolerances, see page 49.

Thrust washers

Maintenance-free
 Material in accordance
 with ISO 3547-4
 With steel backing



EGW
 ① Cutout¹⁾



Mounting
 dimensions

Dimension table - Dimensions in mm

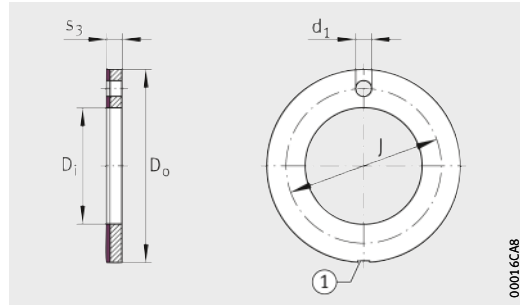
Designation	Mass m ≈g	Dimensions					Mounting dimensions			Basic load ratings	
		Di +0,25	Do -0,25	s3 -0,05	J ±0,12	d1 +0,4 +0,1	ta ±0,2	d6a +0,12	dyn. Ca N	stat. C0a N	
EGW10-E40 ²⁾	2,6	10	20	1,5	—	—	1	20	33 000	58 900	
EGW12-E40	3,7	12	24	1,5	18	1,5	1	24	47 500	84 800	
EGW14-E40	4,1	14	26	1,5	20	2	1	26	52 800	94 200	
EGW16-E40	5,6	16	30	1,5	22	2	1	30	70 800	126 000	
EGW18-E40	6,1	18	32	1,5	25	2	1	32	77 000	137 000	
EGW20-E40	7,7	20	36	1,5	28	3	1	36	98 500	176 000	
EGW22-E40	8,3	22	38	1,5	30	3	1	38	106 000	188 000	
EGW26-E40	10,9	26	44	1,5	35	3	1	44	139 000	247 000	
EGW28-E40	13,1	28	48	1,5	38	4	1	48	167 000	298 000	
EGW32-E40	16,4	32	54	1,5	43	4	1	54	208 000	371 000	
EGW38-E40	20,9	38	62	1,5	50	4	1	62	264 000	471 000	
EGW42-E40	22,5	42	66	1,5	54	4	1	66	285 000	509 000	
EGW48-E40	37,3	48	74	2	61	4	1,5	74	349 000	623 000	
EGW52-E40	39,8	52	78	2	65	4	1,5	78	372 000	664 000	
EGW62-E40	50,2	62	90	2	76	4	1,5	90	468 000	836 000	

Thrust washers in special sizes available by agreement.

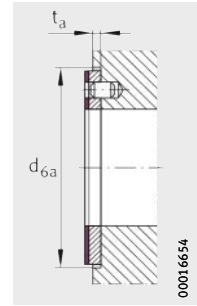
- 1) Cutouts permissible on the inside or outside diameter in any quantity and position.
- 2) No fixing hole.

Thrust washers

Maintenance-free
Material in accordance
with ISO 3547-4
With bronze backing



EGW
① Cutout¹⁾



Mounting
dimensions

Dimension table · Dimensions in mm

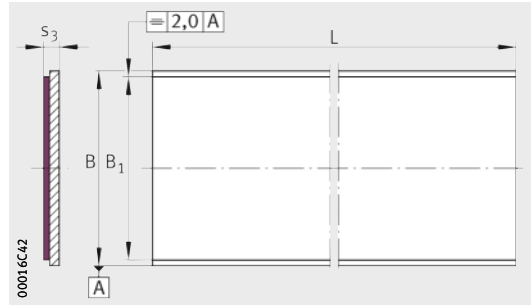
Designation	Mass m ≈ g	Dimensions						Mounting dimensions		Basic load ratings	
		Di +0,25	Do -0,25	s3 -0,05	J ±0,12	d1 +0,4 +0,1	ta ±0,2	d6a +0,12	dyn. Ca N	stat. C0a N	
EGW10-E40-B²⁾	2,8	10	20	1,5	–	–	1	20	33 000	58 900	
EGW12-E40-B	4,1	12	24	1,5	18	1,5	1	24	47 500	84 800	
EGW14-E40-B	4,5	14	26	1,5	20	2	1	26	52 800	94 200	
EGW16-E40-B	6,1	16	30	1,5	22	2	1	30	70 800	126 000	
EGW18-E40-B	6,6	18	32	1,5	25	2	1	32	77 000	137 000	
EGW20-E40-B	8,4	20	36	1,5	28	3	1	36	98 500	176 000	
EGW22-E40-B	9,1	22	38	1,5	30	3	1	38	106 000	188 000	
EGW26-E40-B	11,9	26	44	1,5	35	3	1	44	139 000	247 000	
EGW28-E40-B	14,4	28	48	1,5	38	4	1	48	167 000	298 000	
EGW32-E40-B	17,9	32	54	1,5	43	4	1	54	208 000	371 000	
EGW38-E40-B	22,8	38	62	1,5	50	4	1	62	264 000	471 000	
EGW42-E40-B	24,7	42	66	1,5	54	4	1	66	285 000	509 000	
EGW48-E40-B	41	48	74	2	61	4	1,5	74	349 000	623 000	
EGW52-E40-B	43,7	52	78	2	65	4	1,5	78	372 000	664 000	
EGW62-E40-B	55,1	62	90	2	76	4	1,5	90	468 000	836 000	

Thrust washers in special sizes available by agreement.

- 1) Cutouts permissible on the inside or outside diameter in any quantity and position.
- 2) No fixing hole.

Strips

Maintenance-free
 Material in accordance with ISO 3547-4
 With steel backing



EGS..-E40-S3E

Dimension table - Dimensions in mm

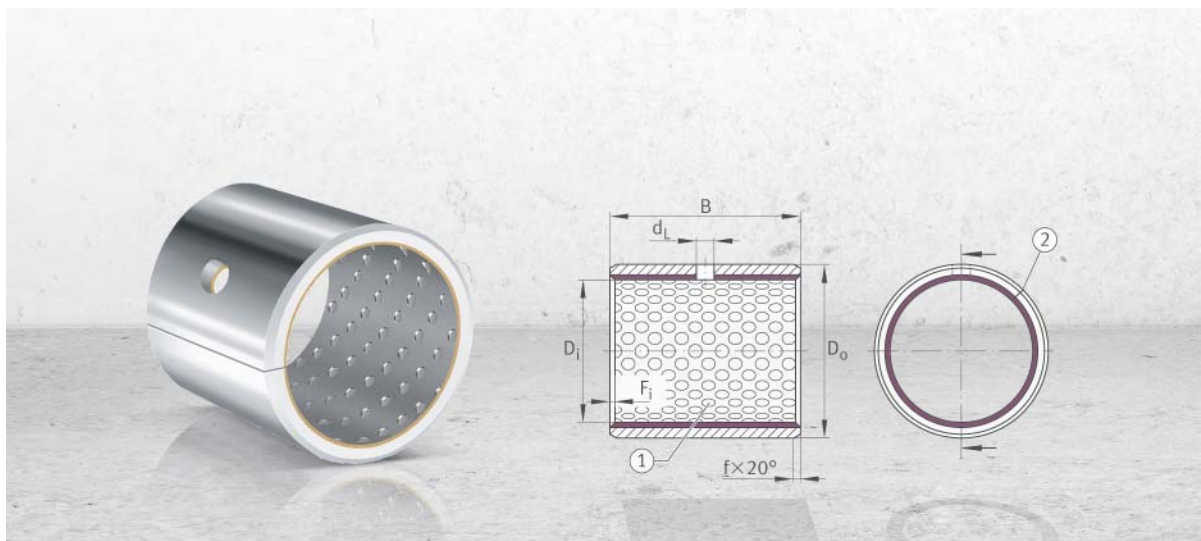
Designation	Mass m ≈g	Dimensions			
		s_3 -0,05	B ±2	B_1	L +3
EGS15260-E40-S3E	1 456	1,505	260	243	500
EGS20260-E40-S3E	1 966	2,005	260	243	500
EGS25260-E40-S3E	2 476	2,505	260	243	500
EGS30260-E40-S3E	3 048	3,065	260	243	500

B = total width

B_1 = minimum usable width

Strips with a smaller wall thickness s_3 and in special sizes are available by agreement.





Metal/polymer composite plain bearings, low-maintenance

Bushes
Thrust washers
Strips

Metal/polymer composite plain bearings, low-maintenance

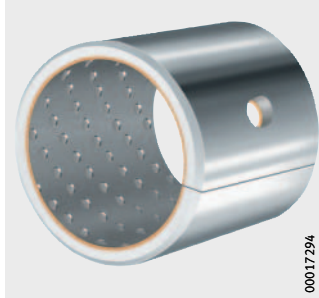
	Page
Product overview	
Metal/polymer composite plain bearings, low-maintenance.....	90
Features	
Resistance of the plain bearing material.....	91
Technical data for E50	91
Sealing.....	92
Lubrication	92
Operating temperature	92
Heat supply.....	92
Suffixes.....	92
Dimension tables	
Bushes, low-maintenance, ISO 3547, with steel backing	93
Thrust washers, low-maintenance, material in accordance with ISO 3547-4, with steel backing	95
Strips, low-maintenance, material in accordance with ISO 3547-4, with steel backing	96



Product overview **Metal/polymer composite plain bearings, low-maintenance**

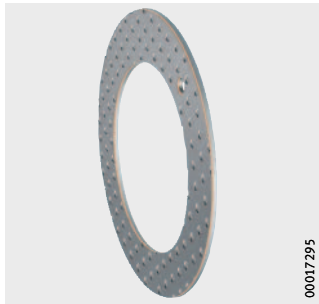
Bushes
With steel backing

EGB..-E50



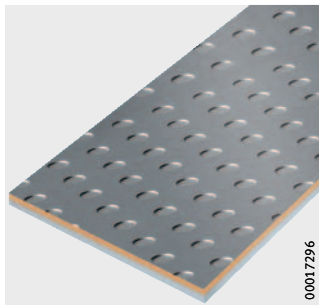
Thrust washers
With steel backing

EGW..-E50



Strips
With steel backing

EGS..-E50



Metal/polymer composite plain bearings, low-maintenance

Features

Low-maintenance plain bearings are available as bushes, thrust washers and strips.



If the plain bearings are to be used in the medical or aerospace sectors or in the food or pharmaceuticals industry, please contact the Schaeffler engineering service.

Resistance of the plain bearing material

Resistance

The resistance of the material E50 depends on the chemical characteristics of the individual layers:

- The material E50 is resistant to many greases.
- The tin-plated steel surface gives adequate protection against corrosion in most cases.
- On strips without a tin layer, a copper layer on the steel surfaces gives adequate corrosion protection in most cases.



The material E50 is not resistant to acidic media (pH < 5) and alkaline media (pH > 9).

Technical data for E50

The sliding layer E50 is a low-maintenance, low-wear material with good damping characteristics and long relubrication intervals. It can be used for rotary and oscillating motion and for long stroke linear motion, is only slightly sensitive to edge loads and is insensitive to shocks.

The low-maintenance plain bearing material E50 has the following mechanical and physical characteristics, see table.

Characteristics of E50

Characteristics	Load		
Maximum pv value		pv	3 N/mm ² · m/s
Permissible specific bearing load	Static	p _{max}	140 N/mm ²
	Rotary, oscillating		70 N/mm ²
Permissible sliding velocity		v _{max}	2,5 m/s
Permissible operating temperature		ϑ	-40 °C to +110 °C
Coefficient of thermal expansion	Steel backing	α _{St}	11 · 10 ⁻⁶ K ⁻¹
Coefficient of thermal conductivity	Steel backing	λ _{St}	<4 Wm ⁻¹ K ⁻¹
Coefficient of friction		μ	0,02 to 0,2



Metal/polymer composite plain bearings, low-maintenance

Sealing The plain bearings are not sealed, but can be protected against the ingress of contamination and moisture by the use of external seals, see page 41.

Lubrication The low-maintenance plan bearing material E50 has lubrication pockets. The lubrication pockets retain the lubricant, which means that an initial lubrication is sufficient in most cases.
The operating life increases if relubrication is carried out regularly. Plain bearing bushes made from E50 have a lubrication hole.

Greases Low-maintenance plain bearings made from E50 must be lubricated using suitable grease or oil.
Lithium soap greases with a mineral oil base are highly suitable. Grease additives such as molybdenum disulphide, zinc sulphide or other solid lubricants are unfavourable since they increase wear. Greases may contain max. 5% MoS₂.

Operating temperature The permissible operating temperature for low-maintenance plain bearings is between -40 °C and +110 °C.

Heat dissipation Correct and sufficient heat dissipation must be ensured:

- If media-lubricated operation is present, the heat is dissipated predominantly via the fluid lubricant.
- In the case of low-maintenance plain bearings, the heat is dissipated via the housing and shaft.

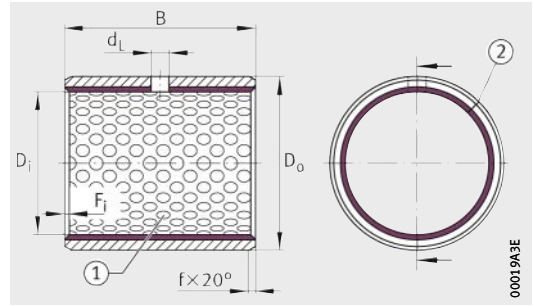
Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
E50	Low-maintenance sliding layer, with lubrication pockets, ready-to-fit	Standard

Bushes

Low-maintenance
ISO 3547
With steel backing



EGB

① Lubrication pockets, ② Butt joint

00019A3E

Dimension table - Dimensions in mm

Designation	Mass m ≈g	Dimensions							Basic load ratings	
		D _i	D _o	B	d _L	f	F _i		dyn. C _r N	stat. C _{0r} N
							min.	max.		
EGB0808-E50	1,2	8	10	8	1) ¹⁾	0,6±0,4	0,1	0,6	4 480	8 960
EGB0810-E50	1,5	8	10	10	1) ¹⁾	0,6±0,4	0,1	0,6	5 600	11 200
EGB0812-E50	1,8	8	10	12	1) ¹⁾	0,6±0,4	0,1	0,6	6 720	13 400
EGB1008-E50	1,6	10	12	8	1) ¹⁾	0,6±0,4	0,1	0,6	5 600	11 200
EGB1010-E50	1,9	10	12	10	3	0,6±0,4	0,1	0,6	7 000	14 000
EGB1015-E50	2,7	10	12	15	3	0,6±0,4	0,1	0,6	10 500	21 000
EGB1210-E50	2,1	12	14	10	3	0,6±0,4	0,1	0,6	8 400	16 800
EGB1212-E50	2,5	12	14	12	3	0,6±0,4	0,1	0,6	10 100	20 200
EGB1215-E50	3,3	12	14	15	3	0,6±0,4	0,1	0,6	12 600	25 200
EGB1220-E50	4,4	12	14	20	3	0,6±0,4	0,1	0,6	16 800	33 600
EGB1420-E50	4,9	14	16	20	3	0,6±0,4	0,1	0,6	19 600	39 200
EGB1510-E50	2,7	15	17	10	3	0,6±0,4	0,1	0,6	10 500	21 000
EGB1515-E50	4	15	17	15	3	0,6±0,4	0,1	0,6	15 800	31 500
EGB1525-E50	6,8	15	17	25	3	0,6±0,4	0,1	0,6	26 300	52 500
EGB1612-E50	3,3	16	18	12	3	0,6±0,4	0,1	0,6	13 400	26 900
EGB1615-E50	4,3	16	18	15	3	0,6±0,4	0,1	0,6	16 800	33 600
EGB1620-E50	5,8	16	18	20	3	0,6±0,4	0,1	0,6	22 400	44 800
EGB1815-E50	4,7	18	20	15	3	0,6±0,4	0,1	0,6	18 900	37 800
EGB1820-E50	6,4	18	20	20	3	0,6±0,4	0,1	0,6	25 200	50 400
EGB2015-E50	8,4	20	23	15	3	0,6±0,4	0,1	0,7	21 000	42 000
EGB2020-E50	11,2	20	23	20	3	0,6±0,4	0,1	0,7	28 000	56 000
EGB2025-E50	14	20	23	25	3	0,6±0,4	0,1	0,7	35 000	70 000
EGB2030-E50	16,9	20	23	30	3	0,6±0,4	0,1	0,7	42 000	84 000
EGB2220-E50	12,2	22	25	20	3	0,6±0,4	0,1	0,7	30 800	61 600
EGB2515-E50	10,3	25	28	15	4	0,6±0,4	0,1	0,7	26 300	52 500
EGB2520-E50	13,8	25	28	20	4	0,6±0,4	0,1	0,7	35 000	70 000
EGB2525-E50	17,3	25	28	25	4	0,6±0,4	0,1	0,7	43 800	87 500
EGB2530-E50	20,8	25	28	30	4	0,6±0,4	0,1	0,7	52 500	105 000
EGB2830-E50	34,3	28	32	30	4	1,2±0,4	0,1	0,7	58 800	118 000

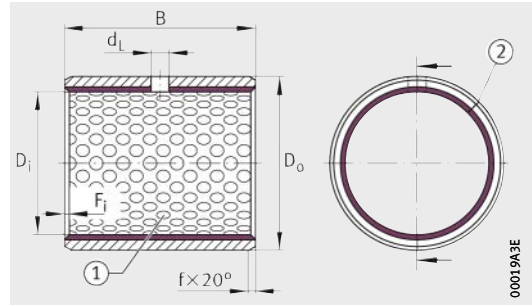
Recommended mounting tolerances, see page 49.

¹⁾ No lubrication hole.



Bushes

Low-maintenance
ISO 3547
With steel backing



EGB

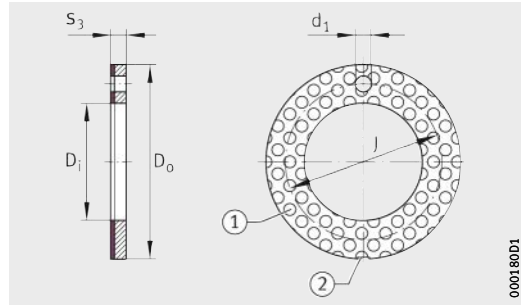
① Lubrication pockets, ② Butt joint

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈g	Dimensions							Basic load ratings	
		Di	Do	B	dL	f	Fi		dyn. Cr N	stat. Cor N
							min.	max.		
EGB3020-E50	24,2	30	34	20	4	1,2±0,4	0,1	0,7	42 000	84 000
EGB3025-E50	30,4	30	34	25	4	1,2±0,4	0,1	0,7	52 500	105 000
EGB3030-E50	36,6	30	34	30	4	1,2±0,4	0,1	0,7	63 000	126 000
EGB3040-E50	48,9	30	34	40	4	1,2±0,4	0,1	0,7	84 000	168 000
EGB3230-E50	38,9	32	36	30	4	1,2±0,4	0,1	0,7	67 200	134 000
EGB3520-E50	28	35	39	20	4	1,2±0,4	0,1	0,7	49 000	98 000
EGB3530-E50	42,3	35	39	30	4	1,2±0,4	0,1	0,7	73 500	147 000
EGB3550-E50	70,9	35	39	50	4	1,2±0,4	0,1	0,7	123 000	245 000
EGB4020-E50	31,8	40	44	20	4	1,2±0,4	0,1	0,7	56 000	112 000
EGB4030-E50	48,1	40	44	30	4	1,2±0,4	0,1	0,7	84 000	168 000
EGB4040-E50	64,3	40	44	40	4	1,2±0,4	0,1	0,7	112 000	224 000
EGB4050-E50	80,5	40	44	50	4	1,2±0,4	0,1	0,7	140 000	280 000
EGB4540-E50	95,2	45	50	40	5	1,8±0,6	0,2	1	126 000	252 000
EGB4550-E50	119	45	50	50	5	1,8±0,6	0,2	1	158 000	315 000
EGB5025-E50	65,2	50	55	25	5	1,8±0,6	0,2	1	87 500	175 000
EGB5040-E50	105	50	55	40	5	1,8±0,6	0,2	1	140 000	280 000
EGB5060-E50	159	50	55	60	5	1,8±0,6	0,2	1	210 000	420 000
EGB5540-E50	115	55	60	40	6	1,8±0,6	0,2	1	154 000	308 000
EGB6030-E50	93,4	60	65	30	6	1,8±0,6	0,2	1	126 000	252 000
EGB6040-E50	125	60	65	40	6	1,8±0,6	0,2	1	168 000	336 000
EGB6060-E50	189	60	65	60	6	1,8±0,6	0,2	1	252 000	504 000
EGB7040-E50	145	70	75	40	6	1,8±0,6	0,2	1	196 000	392 000
EGB7050-E50	182	70	75	50	6	1,8±0,6	0,2	1	245 000	490 000
EGB7070-E50	256	70	75	70	6	1,8±0,6	0,2	1	343 000	686 000
EGB7540-E50	155	75	80	40	6	1,8±0,6	0,2	1	210 000	420 000
EGB7580-E50	313	75	80	80	6	1,8±0,6	0,2	1	420 000	840 000
EGB8040-E50	166	80	85	40	6	1,8±0,6	0,2	1	224 000	448 000
EGB8055-E50	229	80	85	55	6	1,8±0,6	0,2	1	308 000	616 000
EGB8060-E50	250	80	85	60	6	1,8±0,6	0,2	1	336 000	672 000
EGB8080-E50	334	80	85	80	6	1,8±0,6	0,2	1	448 000	896 000
EGB9060-E50	280	90	95	60	6	1,8±0,6	0,2	1	378 000	756 000
EGB10050-E50	258	100	105	50	6	1,8±0,6	0,2	1	350 000	700 000
EGB10060-E50	310	100	105	60	6	1,8±0,6	0,2	1	420 000	840 000

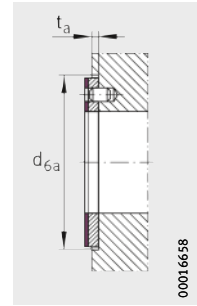
Recommended mounting tolerances, see page 49.

Thrust washers

Low-maintenance
 Material in accordance
 with ISO 3547-4
 With steel backing



EGW
 ① Lubrication pockets, ② Cutout¹⁾



Mounting
 dimensions

Dimension table · Dimensions in mm

Designation	Mass m ≈ g	Dimensions					Mounting dimensions			Basic load ratings	
		Di	Do	s ₃	J	d ₁	t _a	d _{6a}	dyn. C _a	stat. C _{0a}	
		+0,25	-0,25	-0,05	±0,12	+0,4 +0,1	±0,2	+0,12	N	N	
EGW12-E50	2,8	12	24	1,5	18	1,5	1	24	23 800	47 500	
EGW14-E50	3,1	14	26	1,5	20	2	1	26	26 400	52 800	
EGW18-E50	4,6	18	32	1,5	25	2	1	32	38 500	77 000	
EGW20-E50	5,8	20	36	1,5	28	3	1	36	49 300	98 500	
EGW22-E50	6,3	22	38	1,5	30	3	1	38	52 800	106 000	
EGW26-E50	8,3	26	44	1,5	35	3	1	44	69 300	139 000	
EGW28-E50	9,9	28	48	1,5	38	4	1	48	83 600	167 000	
EGW32-E50	12,4	32	54	1,5	43	4	1	54	104 000	208 000	
EGW38-E50	15,8	38	62	1,5	50	4	1	62	132 000	264 000	
EGW42-E50	17	42	66	1,5	54	4	1	66	143 000	285 000	
EGW48-E50	30,6	48	74	2	61	4	1,5	74	174 000	349 000	
EGW52-E50	32,6	52	78	2	65	4	1,5	78	186 000	372 000	

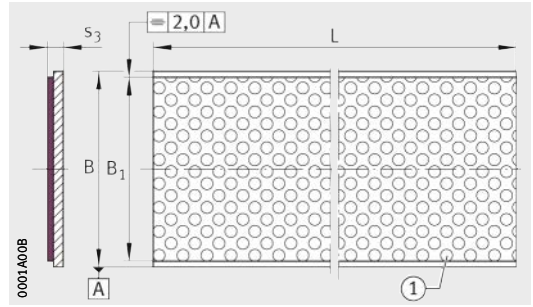
Thrust washers in special sizes available by agreement.

¹⁾ Cutouts permissible on the inside or outside diameter in any quantity and position.



Strips

Low-maintenance
 Material in accordance with ISO 3547-4
 With steel backing



EGS..-E50
 ① Lubrication pockets

Dimension table - Dimensions in mm

Designation	Mass m ≈g	Dimensions			
		s ₃ -0,04	B ±2	B ₁	L +3
EGS10080-E50	238	0,99	80	70	500
EGS15200-E50	829	1,48	200	190	500
EGS20200-E50	1 213	1,97	200	190	500
EGS25200-E50	1 598	2,46	200	190	500

B = total width

B₁ = minimum usable width

Strips in special sizes are available by agreement.





**Special designs,
special materials**

Special designs, special materials

Features

By agreement, Schaeffler manufactures plain bearings as special designs in accordance with customer requirements.

For such special designs, please consult the Schaeffler engineering service.



The feasibility of special designs should be checked as early as possible. This applies to the geometry and also to the costs.

Plain bushes

In addition to the catalogue range of metal/polymer composite plain bearings, there are numerous special designs which are run in either a predominantly rotary direction or a predominantly linear direction. A small selection of special designs already produced is shown below, *Figure 1*, page 100 to *Figure 5*, page 101.

The following special designs are possible:

- made from any plain bearing material
- with different dimensions from the catalogue products
- as combined components
 - pressed into rings
 - with plastic moulded parts
- in different shapes
 - bushes with windows and holes
 - bushes with stamped oil grooves
 - blanked components
 - ball cups
 - bearing shells
- with the sliding layer on the outside
- with different butt joint geometries.



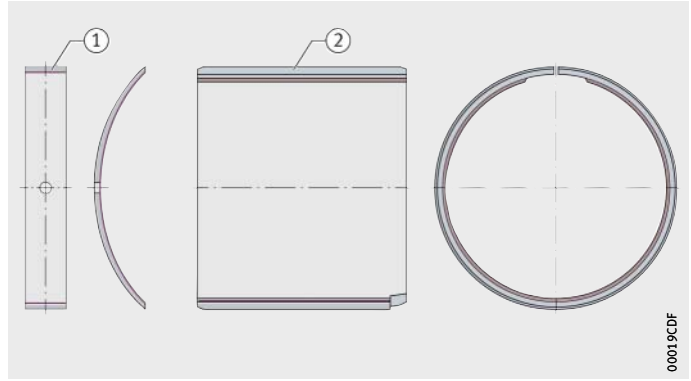
Special designs, special materials

Swivel motion and rotation

Special designs for rotary or oscillating swivel motion are developed in accordance with customer requirements, *Figure 1* and *Figure 2*.

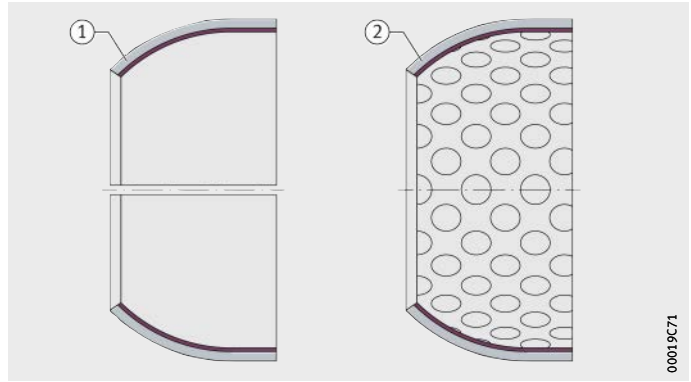
- ① Pivoting cradle bearing
- ② Plain bush with lubrication groove and recess

Figure 1
Plain bearings
for swivel motion or rotation



- ① Maintenance-free
- ② Low-maintenance

Figure 2
Ball cups



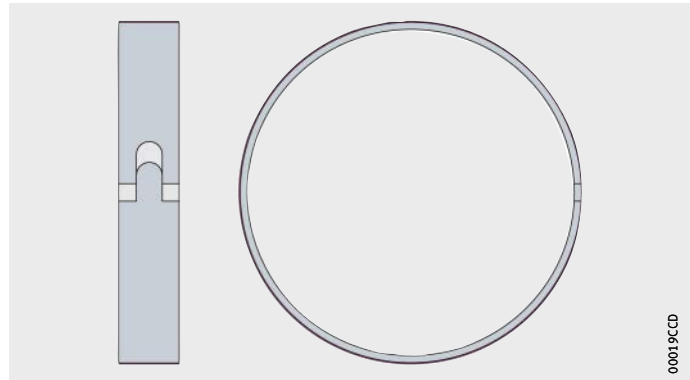
Linear motion

For linear motion, there are special designs in accordance with customer requirements, *Figure 3*, and the catalogue range of linear plain bearing units, see Catalogue WF1, Shaft Guidance Systems, *Figure 4* and *Figure 5*.

Linear plain bearings

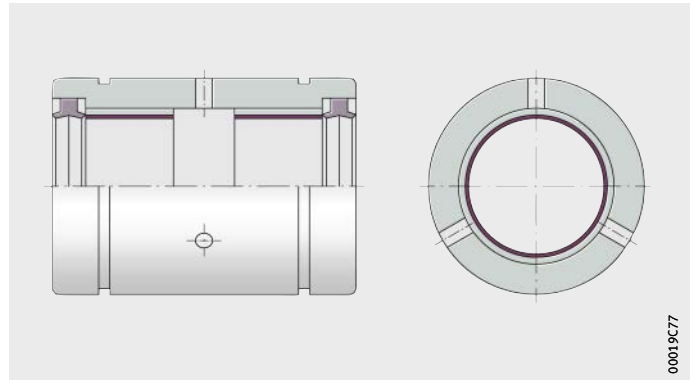
- Linear plain bearings PAB comprise an outer ring with pressed-in plain bearing bushes EGB..-E50. The design PABO has a segment cut out for supported shafts.
- Linear plain bearing units PAGH and PAGBA comprise a housing and a pressed-in linear plain bearing PAB or PABO.

Figure 3
Plain bearing with external coating for linear motion



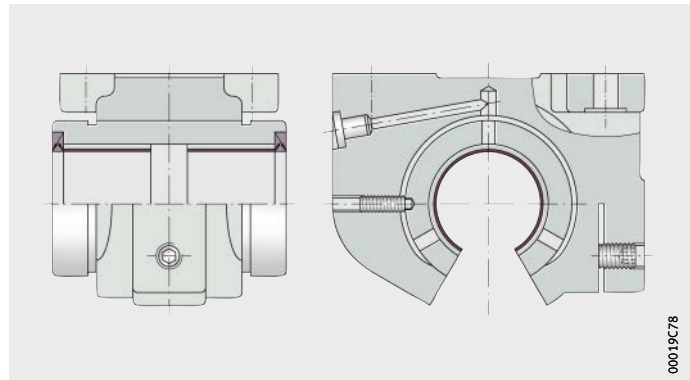
PAB..-PP-AS

Figure 4
Linear plain bearing



PAGBAO..-PP-AS

Figure 5
Linear plain bearing unit



Special designs, special materials

Features

By agreement, Schaeffler can supply plain bearings in materials other than those stated in the product descriptions. These have differing characteristics and areas of application.

In the case of spherical plain bearings, Schaeffler offers a glass fibre reinforced plastic as a sliding material, in the case of metal/polymer composite plain bearings the maintenance-free special material E421 or the plain bearing material E60 for film bearings.

These maintenance-free special materials conform to the regulations for lead-free plain bearings as stated in the Technical Principles.

Maintenance-free material E421

E421 is a two-layered metal/polymer composite comprising a steel supporting body with a plastic composite layer made from PTFE. The particularly thin-walled material facilitates very small design envelopes. Possible products include bushes, flanged bushes, thrust washers, strips and special designs in accordance with customer requirements.

Structure

The material comprises a steel backing and a sliding layer, *Figure 6*. As standard, the steel backing is protected against corrosion by a zinc coating.

- ① Sliding layer
- ② Steel backing
- ③ Zinc coating as surface protection

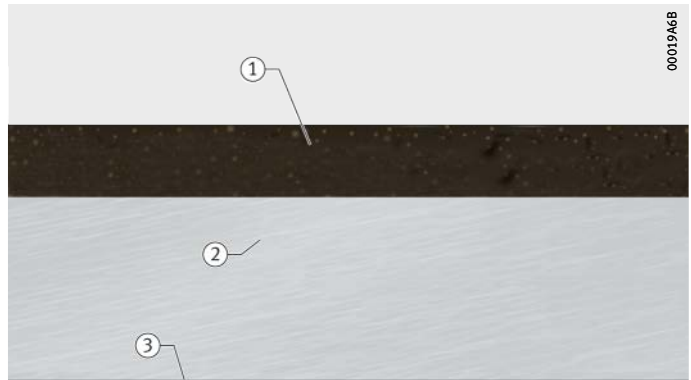


Figure 6
Maintenance-free plain bearing material E421

Layer thickness

The sliding material is available with a layer thickness of 0,5 mm.

Technical data for E421

For the important mechanical and physical characteristics of the maintenance-free plain bearing material E421, see table.

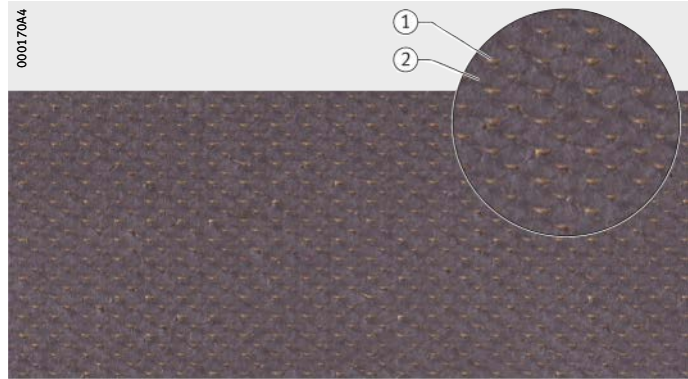
Data

Characteristics	Loads		
Maximum pv value for dry running		pv	1,8 N/mm ² · m/s
Permissible specific bearing load	Static	p _{max}	200 N/mm ²
	Dynamic		150 N/mm ²
Permissible sliding velocity		v _{max}	1,5 m/s
Permissible operating temperature		∅	-200 °C to +180 °C

Plain bearing material E60 for film bearings

E60 is the new plain bearing material from Schaeffler for maintenance-free film bearings. The metal/polymer composite comprises a bronze rib mesh that is filled with a dry lubricant made from polytetrafluoroethylene PTFE. This dry lubricant contains embedded chemically non-reactive additives.

Structure The material comprises a rib mesh and a sliding layer, *Figure 7*. A sliding layer made from PTFE is rolled and sintered into the rib mesh. The mesh thus functions as both a carrier and a sliding layer.



- ① Rib mesh
- ② Sliding layer

Figure 7
Maintenance-free plain bearing material E60

Rib mesh and sliding layer

Chemical element	Proportion of mass w %	
	Rib mesh	Sliding layer
Tin Sn	6	–
Copper Cu	94	–
Polytetrafluoroethylene PTFE	–	86
Fillers	–	14

Film thickness The plain bearing material is available in a film thickness of 0,5 mm.

Technical data for E60 For the important mechanical and physical characteristics of the maintenance-free plain bearing material E60, see table.

Data

Characteristics	Loads		
	Permissible specific bearing load	Static	p
Dynamic		p	80 N/mm ²
Permissible sliding velocity	v _{max}	1 m/s	
Permissible operating temperature	ϑ	–200 °C to +260 °C	



**Schaeffler Technologies
AG & Co. KG**

Industriestraße 1 – 3
91074 Herzogenaurach
Germany
www.ina.com
info.de@schaeffler.com

In Germany:

Phone 0180 5003872
Fax 0180 5003873

From other countries:

Phone +49 9132 82-0
Fax +49 9132 82-4950

**Schaeffler Technologies
AG & Co. KG**

Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
www.fag.com
faginfo@schaeffler.com

In Germany:

Phone 0180 5003872
Fax 0180 5003873

From other countries:

Phone +49 9721 91-0
Fax +49 9721 91-3435



Every care has been taken to ensure the correctness of the information contained in this publication but no liability can be accepted for any errors or omissions. We reserve the right to make technical changes.

© Schaeffler Technologies AG & Co. KG
Issued: 2017, October

This publication or parts thereof may not be reproduced without our permission.
TPI 211 GB-D