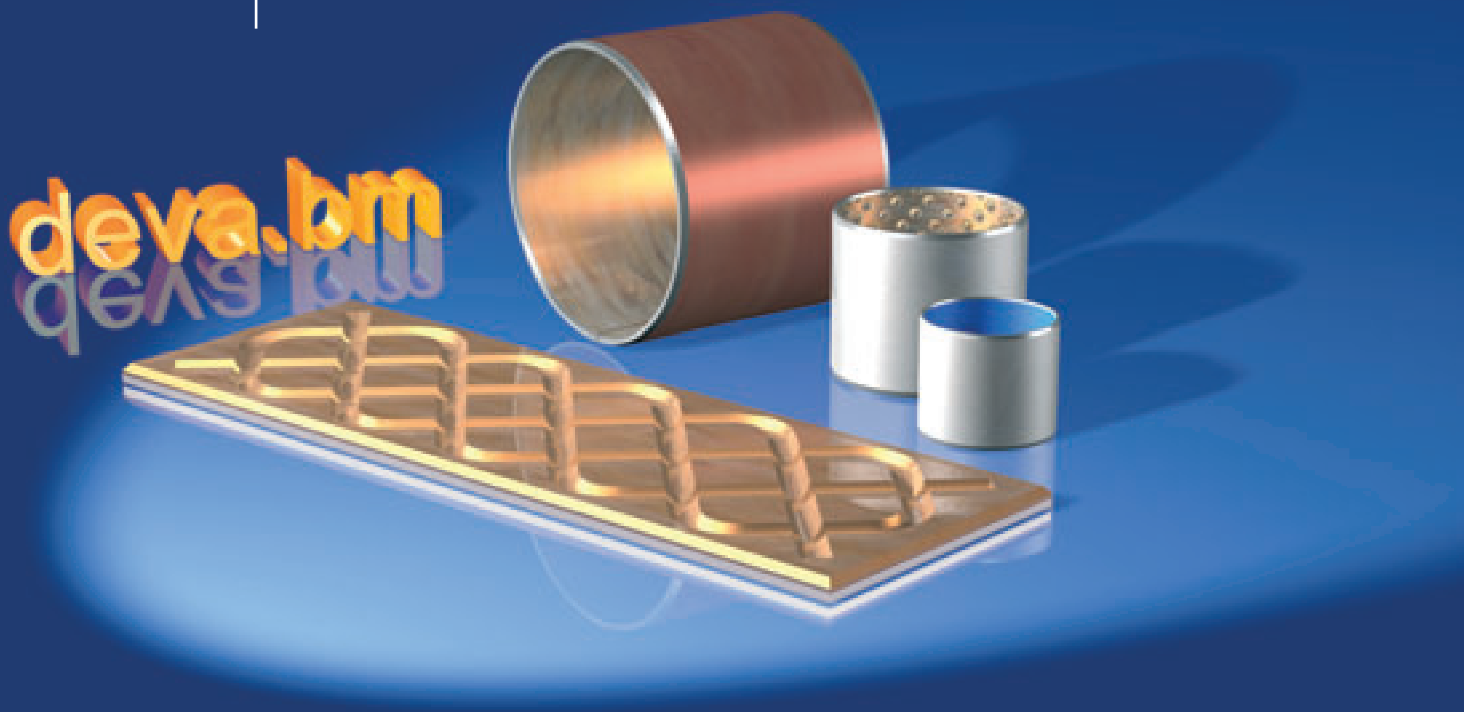
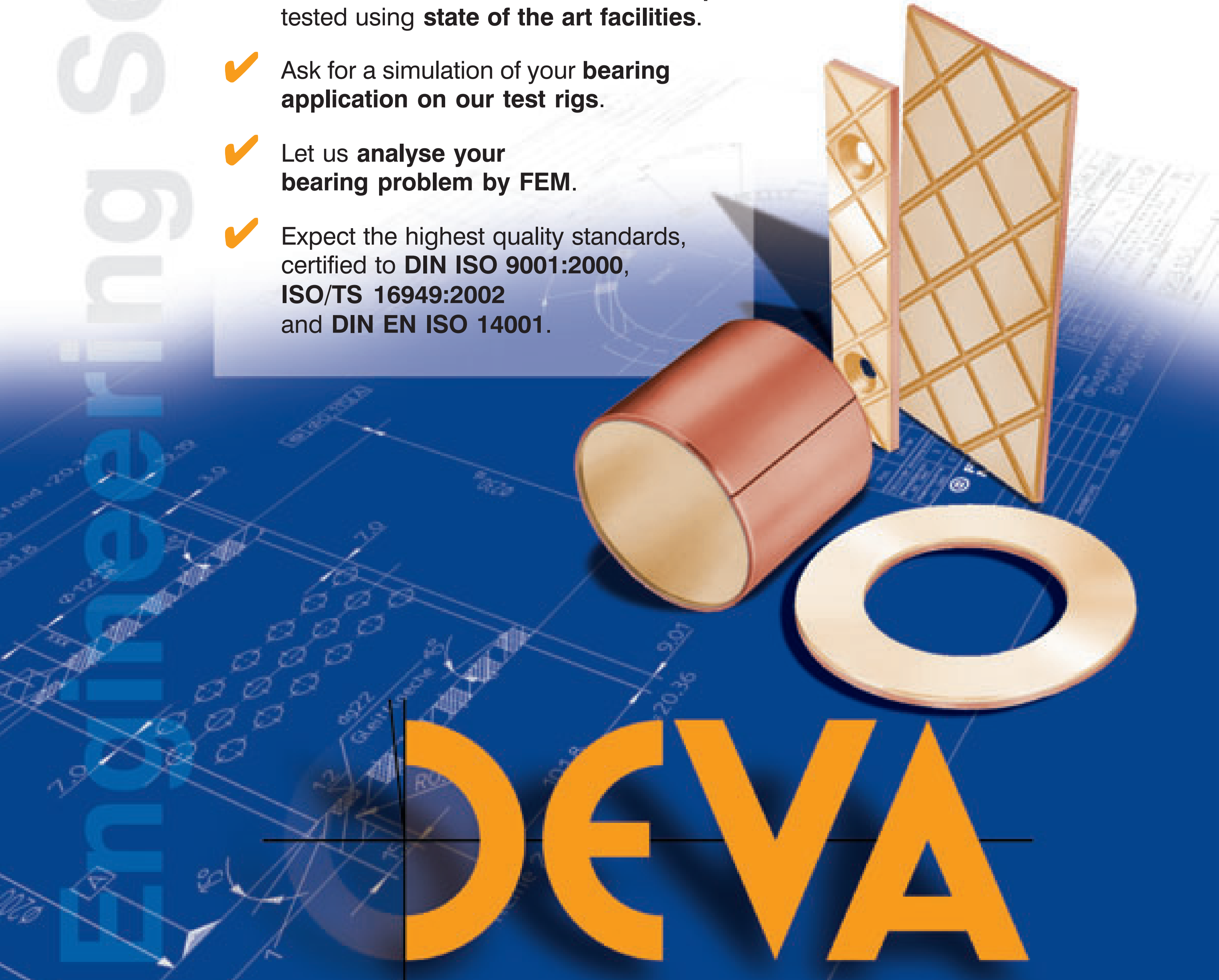


deva.bm®

Maintenance-free, self-lubricating bearings

Our bearing service

- Profit from more than **60 years of experience in self-lubricating sliding bearings**.
- Make use of our extensive **material and application** expertise spanning a **very wide range of industries**.
- Let **our application engineering team assist you in the:**
  - selection of the bearing materials,
  - design, purpose-built to your requirements,
  - assembly and installation,
  - calculation of estimated life time.
- Benefit from the latest **material developments**, tested using **state of the art facilities**.
- Ask for a simulation of your **bearing application on our test rigs**.
- Let us **analyse your bearing problem by FEM**.
- Expect the highest quality standards, certified to **DIN ISO 9001:2000**, **ISO/TS 16949:2002** and **DIN EN ISO 14001**.



World class bearings from DEVA® save time and money.

deva.bm® Technical Manual – Contents

Introduction

Contemporary designs represent an enormous challenge to modern-day bearing materials because, frequently, zero maintenance is expected under severe to extreme conditions as well as under maximum loads.
The constant pressure on costs additionally calls for increasing uptime of machinery and equipment and uncompromising standards of operational reliability.

The maintenance-free, permanently self-lubricating heavy-duty bearing materials from the DEVA® product range offer bearing solutions guaranteed to operate reliably and safely over a long term.

1 Material properties

deva.bm® is a self-lubricating composite bearing material, comprising a steel backing with a sliding layer of **deva.metal®**.
deva.bm® is produced using a special sintering process to get the following advantages:
deva.bm®

- normally requires no lubrication.
- allows maintenance-free operation.
- possesses a high static and dynamic load-bearing capacity.
- has a low coefficient of friction.
- is stick-slip-free.
- offers a high margin of safety against mating material damage.
- is utilisable in dusty environments.
- is utilisable at temperatures ranging from -260 °C to +280 °C.
- is utilisable in corrosive environments.
- does not absorb water and guarantees maximum dimensional accuracy.
- is utilisable in seawater.
- is utilisable in radioactive environments.
- is electrically conductive. No electrostatic charging effects occur.
- is suitable for rotational, oscillating and linear movements.
- is suitable for micro movements.
- is suitable even for applications involving high edge pressures.

2 Material structure

Layer structure and microstructure of deva.bm®

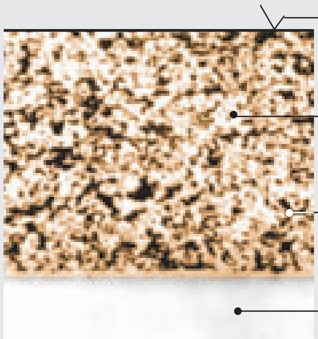


Figure 2.1 – Micrograph of deva.bm®

The distinguishing features of **deva.bm®** are its highly durable steel backing and the bronze matrix with homogeneous solid lubricant indentations that ensure low friction coefficients. The latter is either graphite of varying particle form and size, or PTFE.

Solid lubricants used

Properties	Graphite	PTFE
Crystalline structure	hexagonal	none
Specific weight (in g/cm³)	2.25	2.16
Coefficient of friction in air	0.1 to 0.18	0.07 to 0.12
Chemical resistance	very good	very good
Corrosion resistance	good	very good
Use in radioactive radiation	very good	poor
Use in air	very good	very good
Use in water	very good	very good
Use in vacuum	poor	very good

Table 2.1 – Solid lubricants

It is additionally possible to apply an initial surface film to support running-in phases in which the running conditions are purely dry. Where used with conventional lubricants, the graphite-containing **deva.bm®** sliding layer can be impregnated with oil.

3 Materials

3.1 Properties

deva.bm®	Steel backing properties [4]			Sliding layer properties [4]			
Materials	Material			Physical properties			Mech. properties
		0.2 % Yield strength	Tensile strength	Density	Hardn. (min.)	Linear thermal expansion coefficient	Compressive strength
Symbol		δ_y	δ_T	ρ		α_1	δ_c
Unit		MPa	MPa	g/cm³	HB	10^{-6}/K	MPa
deva.bm® 302	stainless	320	500 – 700	6.5	40	17.5	320
deva.bm® 312	stainless	320	500 – 700	6.3	40	17.5	320
deva.bm® 322	unalloyed	280	270 – 350	6.6	40	13	300
deva.bm® 332[1]	unalloyed [3]	280	270 – 350	7.6	40	13	300
deva.bm® 342	stainless	320	500 – 700	6.4	40	17.5	300
deva.bm® 362/9P	stainless [2]	320	500 – 700	6.5	35	17.5	320

[1] deva.bm® 332 has lubrication indentations in the sliding layer.
[2] 1.4301 or 1.4571
[3] 1.0338
[4] Current properties and values can be inferred from the DEVA® material data sheets, which are available on request.

Table 3.1.1 – Steel backing and sliding layer properties of deva.bm®

deva.bm®	Bearing properties								
Materials	Max. permissible load		Max. sliding speed	Max. $\bar{p}$U-value	Temperature range		Friction coefficient[2]	Min. shaft hardn.	Shaft surface quality
	stat. [1]	dyn. [1]	dry	dry	max.	min.	depending on operating cond.		optimal
Symbol	$\bar{p}_{stat./max}$	$\bar{p}_{dyn./max}$	U_{max}	$\bar{p}U_{max}$	T_{max}	T_{min}	f	HB	R_a
Unit	MPa	MPa	m/s	MPa × m/s	°C	°C			µm
deva.bm® 302	320	150	0.1	0.4	280	-150	0.13 – 0.18	180	0.2 – 0.8
deva.bm® 312	280	80	0.25	0.8	280	-150	0.11 – 0.18	180	0.2 – 0.8
deva.bm® 322	250	80	0.5	1.0	280	-150	0.10 – 0.17	180	0.2 – 0.8
deva.bm® 332	250	120	1.0	1.5	120	-150	0.10 – 0.13	180	0.2 – 0.8
deva.bm® 342	280	100	0.5	1.0	280	-150	0.10 – 0.17	180	0.2 – 0.8
deva.bm® 362/9P	320	150	1.0	2	260	-260	0.05 – 0.15	180	0.2 – 0.8

[1] Under optimum operating conditions.
[2] The stated sliding friction coefficients are not guaranteed properties. They have been determined on our test rigs using field-proven parameters that do not necessarily reflect the actual application of our products and their service environment. We offer customer-specific friction and wear tests on request.

Table 3.1.2 – deva.bm® bearing properties

3.2 Chemical resistance

Table 3.2.1 shows the chemical resistance of the **deva.bm®** alloys. Information on actual performance, however, is obtainable only by testing under realistic operating conditions.

Evaluation:
✚ Resistant
⋆ Limited resistance, depending on concentration, oxygen content, temperature, etc.
○ Not recommended

Chemical substance	Concentration in %	Temperature in °C	Alloy 302, 312, 342, 362/9P	Alloy 322, 332
Strong acids				
Hydrochloric acid	5	20	○	○
Hydrofluoric acid	5	20	⋆	○
Nitric acid	5	20	○	○
Sulphuric acid	5	20	✚	○
Phosphoric acid	5	20	✚	○
Weak acids				
Ethanoic acid	5	20	✚	○
Formic acid	5	20	✚	○
Boric acid	5	20	✚	○
Citric acid	5	20	✚	○
Bases				
Ammonia	10	20	○	○
Sodium hydroxide	5	20	✚	○
Potassium hydroxide	5	20	✚	○
Solvents				
Acetone		20	✚	○
Carbon tetrachloride		20	✚	○
Ethyl alcohol		20	✚	○
Ethyl acetate		20	✚	○
Ethyl chloride		20	✚	○
Glycerine		20	✚	⋆
Salts				
Ammonium nitrate			○	○
Calcium chloride			✚	○
Magnesium chloride			✚	○
Magnesium sulphate			✚	○
Sodium chloride			✚	○
Sodium nitrate			✚	○
Zinc chloride			○	○
Zinc sulphate			✚	○
Gases				
Ammonia gas			⋆	○
Chlorine gas			○	○
Carbon dioxide			✚	○
Fluorine			○	○
Sulphur dioxide			✚	○
Hydrogen sulphide			⋆	○
Nitrogen			✚	○
Hydrogen			✚	○
Lubricants and fuels				
Paraffin		20	✚	✚
Petroleum		20	✚	✚
Fuel oil		20	✚	✚
Diesel		20	✚	✚
Mineral oil		70	✚	✚
HFA - ISO46 oil-water emulsion		70	✚	✚
HFC - water ethylene		70	✚	✚
HFD - phosphate ester		70	✚	✚
Miscellaneous				
Water		20	✚	○
Seawater		20	✚	○
Resin			✚	✚
Hydrocarbons			✚	○

Table 3.2.1 – Chemical properties of deva.bm® alloys

Materials

4 Mating materials

The **deva.bm**® bearing materials can be used only with mating materials demonstrating a hardness of at least 180 HB. Where lubricant is additionally introduced into the sliding contact, hardness values of >130HB are also permissible. In abrasive environments, a surface hardened to 35 HRC / 45 HRC should be used. The ideal mating surface roughness for **deva.bm**® is R_a = 0.2 to 0.8 μm, produced by grinding. Rougher surfaces are also acceptable, depending on the operating conditions. To obtain the right surface roughness, it is equally possible to use bushings of a suitable hardness. Hard-faced or galvanised protective layers (normally coated, hard-chrome, nickel-plated) can also be used to a limited extent.

The corrosion criteria for the mating materials have to be determined on the basis of the operating conditions in each case. The adjacent table provides an overview of several possible mating materials.

Mating materials for normal applications

Material number	Material designation	Comparable standards		
		USA AISI	GB B.S. 9 70	F AFNOR
1.0543	ZSt 60-2	Grade 65	55C	A60-2
1.0503	C45	1045	080M46	CC45
1.7225	42CrMo4	4140	708M40	42CD4

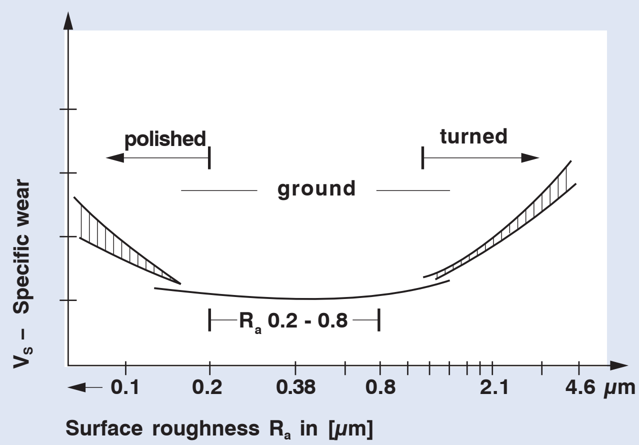
Mating materials for corrosive applications

Material number	Material designation	Comparable standards		
		USA AISI	GB B.S. 9 70	F AFNOR
1.4021	X 20Cr13	420	420S37	Z20C13
1.4057	X 17CrNi16-2	431	432S29	Z15CN16.02
1.4112	X 90CrMoV18	440B		(Z70CV17)
1.4122	X 39CrMo17-1			

Mating materials for use in seawater

Material number	Material designation	Comparable standards		
		USA AISI	GB B.S. 9 70	F AFNOR
1.4460	X 4CrNiMoN27-5-2			
1.4462	X2CrNiMoN22-5-3	UNS531803	318513	Z3CND24-08
2.4856	Inconel 625			

Table 4.1 – Main possible mating materials



Model representation
(based on various tests and studies)

Figure 4.1 – Influence of mating material surface roughness on the microwear of composite

5 Fits

Permissible fit and tolerance ranges

D_1 (in mm)	D_1-Tolerance excl. running-in film	Shaft	
	In installed state	Normal applications	Precision applications
< 20	H9	d7	e7
> 20	H8	d7	e7
> 45	H8 / H9 (Standard)	d7	e7
> 180	H8 / H9	d7	e7

Table 5.1 – Fits and tolerances

- **deva.bm**® is pressed into the housing with an interference fit (using a screw press, hydraulic press or press-fit mandrel). Tapping or driving into place is not permissible.
- The standard housing bore is H7.
- Mean roughness of housing: $R_a = 3.2\ \mu m$
- The housing has a chamfer of 20 - 40° for easier mounting.
- To achieve minimum clearances after mounting (IT7 or higher), finishing should take place in the mounted state. For this purpose, **deva.bm**® can be provided with a machining allowance, in which case the running-in film has to be applied after finishing.

6 Design

6.1 Sliding surface design

For applications without any special dry running criteria, **deva.bm**® can be used with a plain sliding surface and a running-in film (Figure 6.1.1).
For difficult, non-lubricated applications in abrasive and vibrating environments, etc., **deva.bm**® can also be provided with cleaning grooves in the sliding layer as a means of prolonging the service life (Figure 6.1.2).

For grease-lubricated applications, the **deva.bm**® sliding layer can be provided with regularly spaced lubrication indentations, which act as a lubricant 'reservoir' to prolong the service life (Figure 6.1.3).

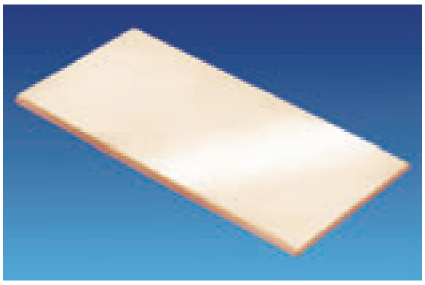


Figure 6.1.1 – Plain sliding surface

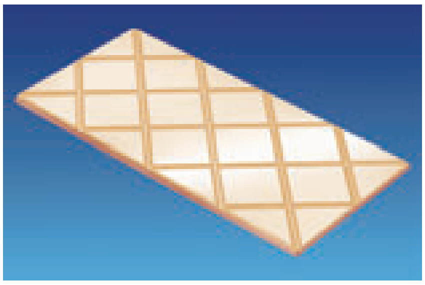


Figure 6.1.2 – Sliding layer with cleaning grooves

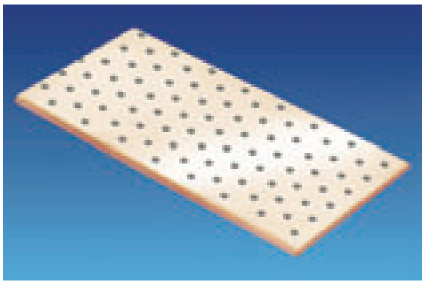


Figure 6.1.3 – Sliding layer with lubrication indentations

6.2 Examples of design

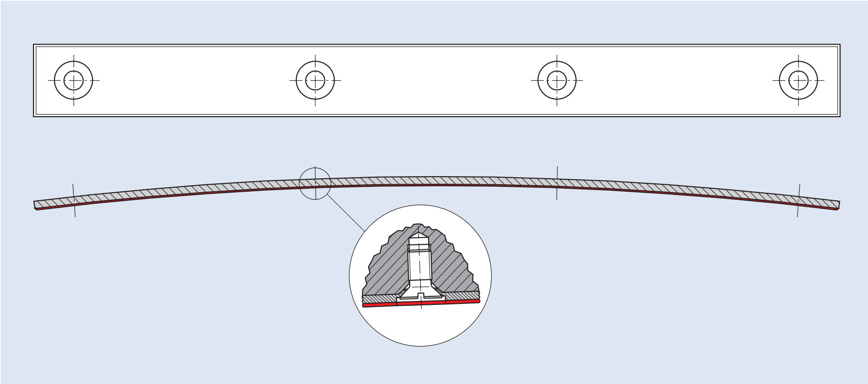


Figure 6.2.1 – deva.bm® radial segment including mounting and screw joint

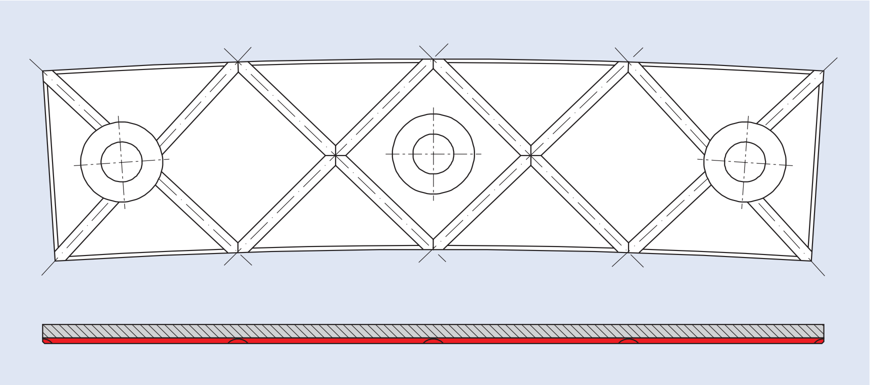


Figure 6.2.2 – deva.bm® axial segment with cleaning grooves

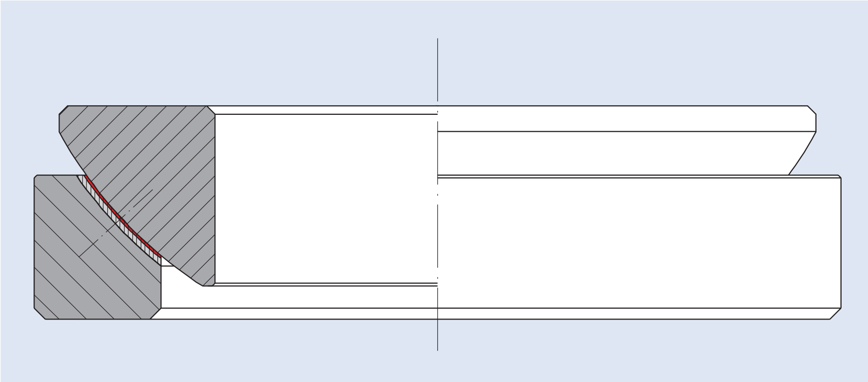


Figure 6.2.3 – Spherical sliding bearing

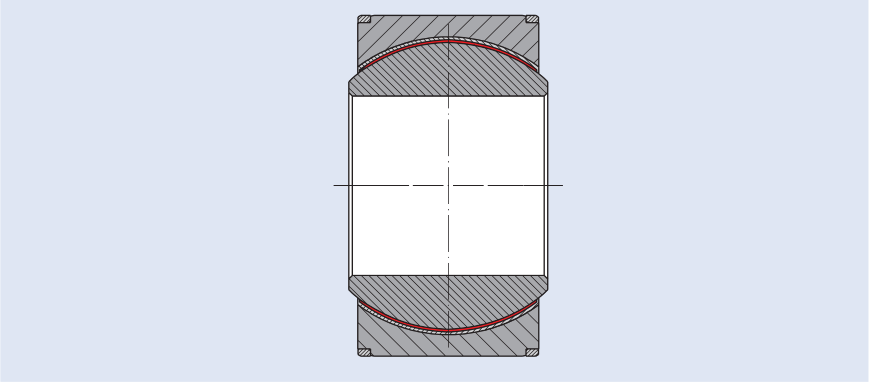


Figure 6.2.4 – Spherical sliding bearing

7 Installation

7.1 Mounting of deva.bm® sliding bearings with $D_1 \leq 550$ mm

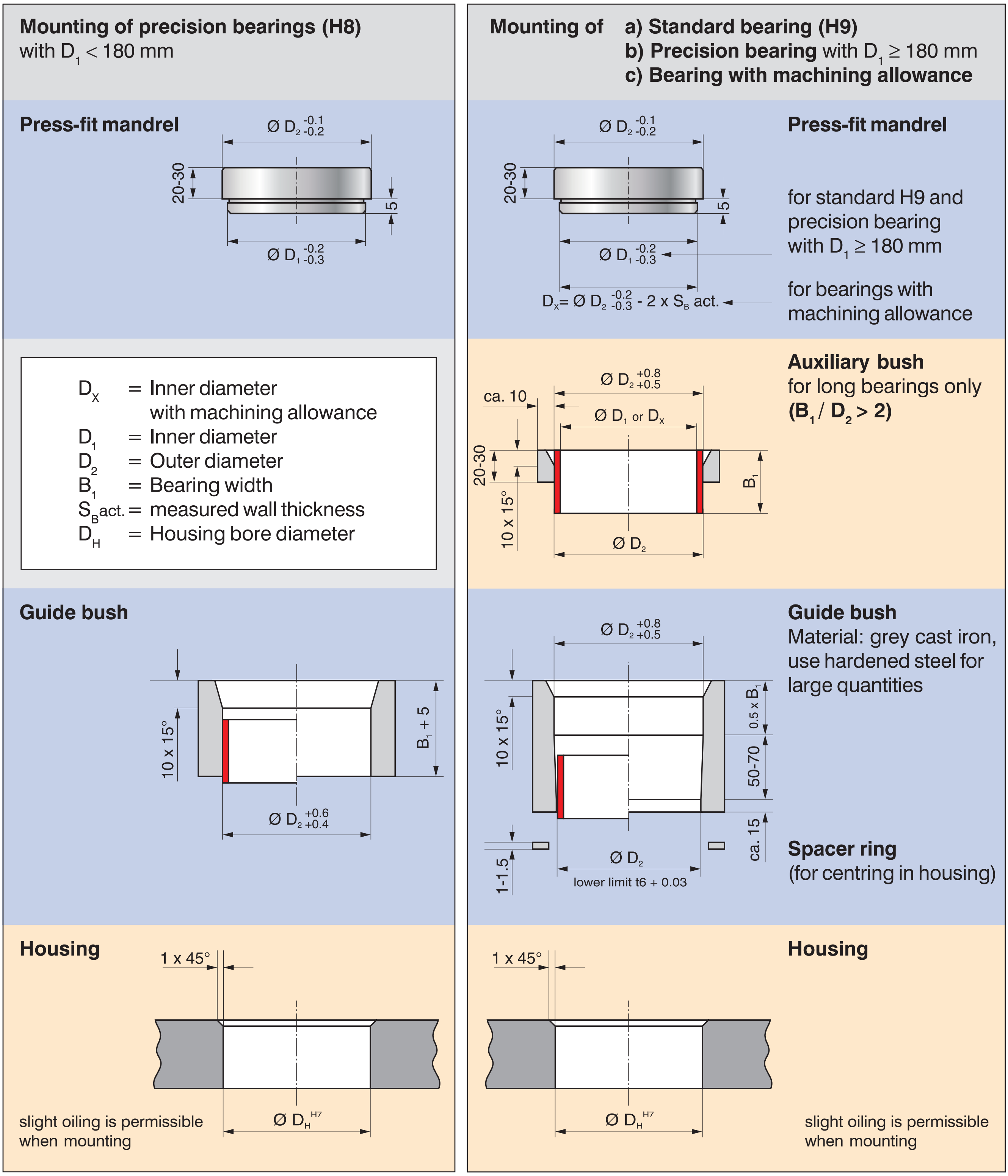
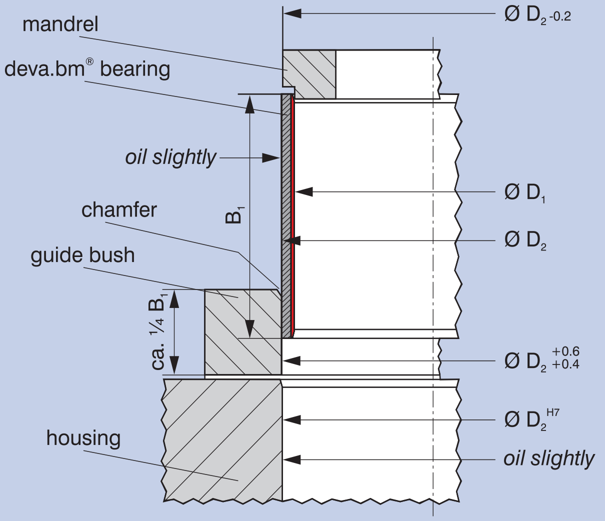


Figure 7.1.1 – Press-fitting of deva.bm® radial bearings

7.2 Mounting of large deva.bm® sliding bearings with D_1 > 550 mm



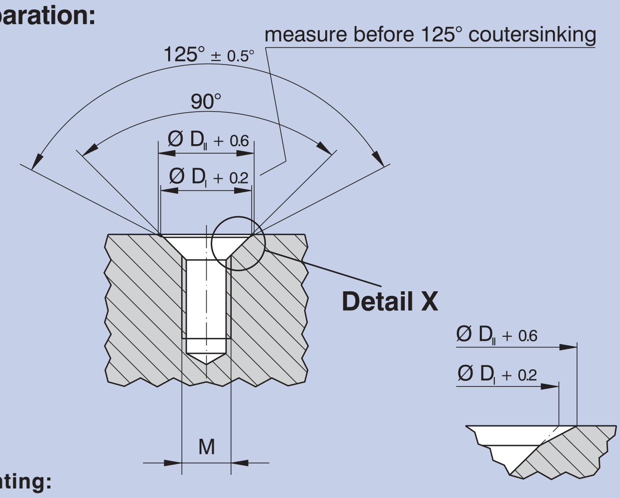
Note:
- Guide bush ensures correct circularity Ø = $D_{2\,+0.4}^{+0.6}$
- Oil *slightly* during press-fitting

Figure 7.2.1 - Press-fitting of large deva.bm® bearings

7.3 Fastening of deva.bm® with countersunk flat head screws

Mounting 2, 2.5, 3 and 5 mm thick deva.bm® sliding strips
with countersunk flat head screws to **DIN EN ISO 7046-1** or **DIN EN ISO 2009**

Preparation:



Mounting:
The screws should be secured with adhesive, e.g. 'Loctite 306'. Observe manufacturer's instructions on temperature limits and use.

Thread to DIN 13	d	D	D_I	D_{II}	S_S	S		Hole spacing tolerance supporting element and deva.bm®
						unall.	stainl.	
M5	5.3	11	9.5	10.5	2	0.8	0.8	± 0.1
M6	6.4	13	11.5	12.5	2/2.5	0.8	0.8	± 0.1
M8	8.4	17	15	16	2.5/3	1.0	0.8	± 0.1
M10	10.5	21	18.5	19.5	3/5	1.0	0.8	± 0.5
M12	13	25	22.5	23.5	5	1.0	0.8	± 0.5

Mounting:

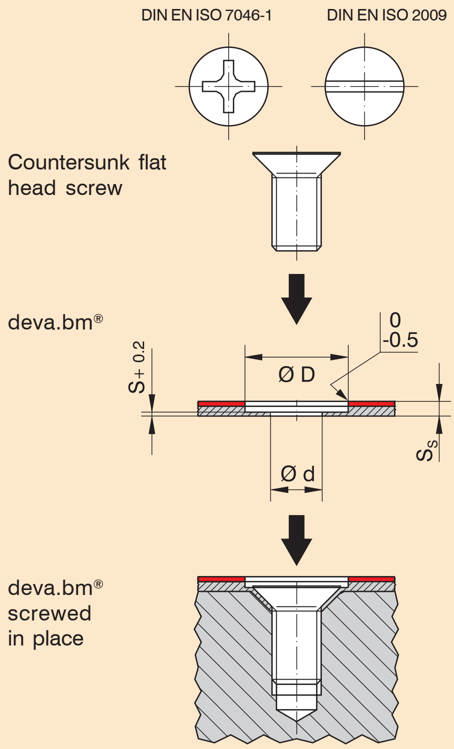
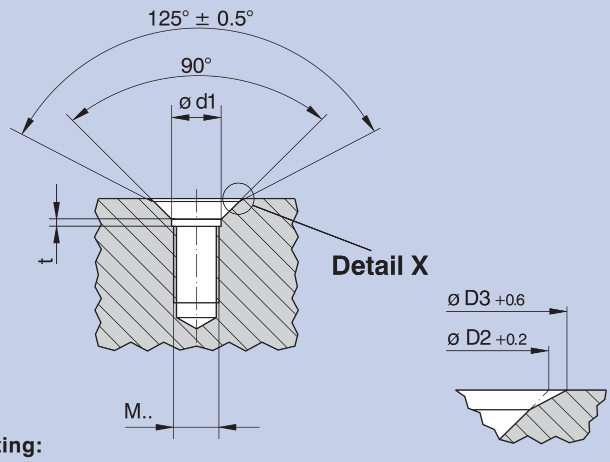


Figure 7.3.1 – Fastening of deva.bm® sliding strips with countersunk flat head screws

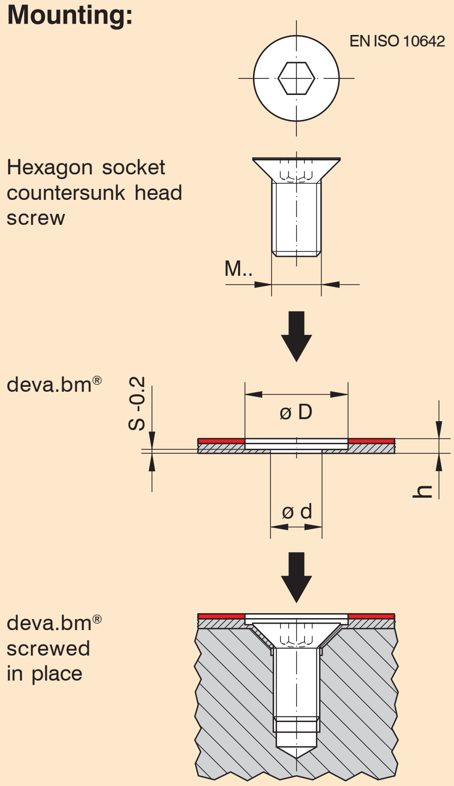
Mounting 2, 2.5, 3 and 5 mm thick deva.bm® sliding strips
with hexagon socket countersunk head screws to **EN ISO 10642** [1)]

Preparation:



Mounting:
The screws should be secured with adhesive, e.g. 'Loctite 306'. Observe manufacturer's instructions on temperature limits and use.

Mounting:



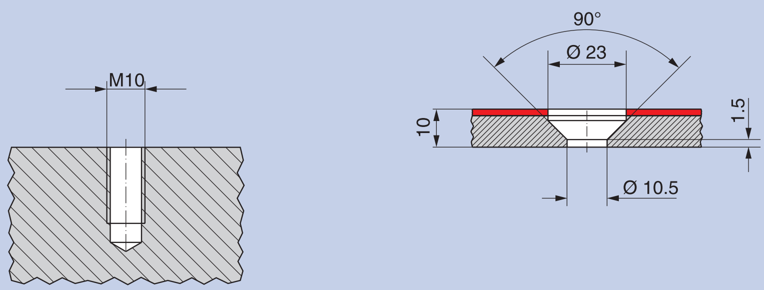
Thread to DIN 13	ød	øD	øD2	øD3	ød1	t	h	s		Hole spacing tolerance supporting element and deva.bm®
								unall.	stainl.	
M5	5.3	13.5	11.5	12.5	6	1	2	0.8	0.8	± 0.1
M6	6.4	16	14	15	7	1.5	2/2.5	0.8	0.8	± 0,1
M8	8.4	20	18	19	9	2	2.5/3	1.0	0.8	± 0.1
M10	10.5	25	22	23	11	2.5	3/5	1.0	0.8	± 0.15
M12	13	29	26.5	27.5	13	3	5	1.0	0.8	± 0.15

[1)] Countersinking is also suitable for screws to DIN EN ISO 7045-1 and DIN EN ISO 2009.

Figure 7.3.2 – Fastening deva.bm® sliding strips with hexagon socket countersunk head screws

Mounting 10 mm thick deva.bm® sliding strips
with M10 hexagon socket countersunk head screws to **EN ISO 10642**

Preparation:



Installation:

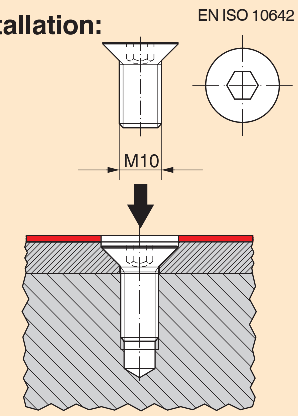
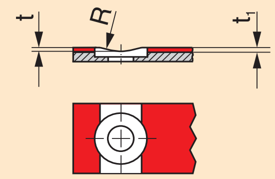


Figure 7.3.3 – Fastening deva.bm® sliding strips with hexagon socket countersunk head screws

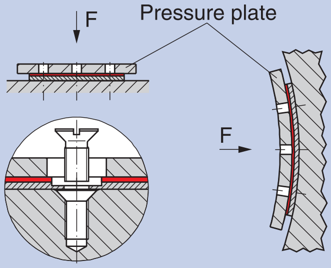
Hole spacing and mounting

Note:
The number and size of the screws depends on the occurring stresses and the shearing forces to be withstood as a result.
We recommend as guide values:
b_1 = 10 - 30 mm – if $b_1 < 4$ mm, should nicks be made as shown in the drawing below (left), in order to avoid chipped sliding layer edges.
l_1 = 60 - 150 mm
b ≈ (1 - 1.5) D



Maximum machining depth for **deva.bm**®:

$$t_1 = t^{-0.1}_{-0.2}$$



When screwing into place, secure **deva.bm**® with a pressure plate. Tighten alternately on the left and right sides, in relation to the centre.

Configuration examples:

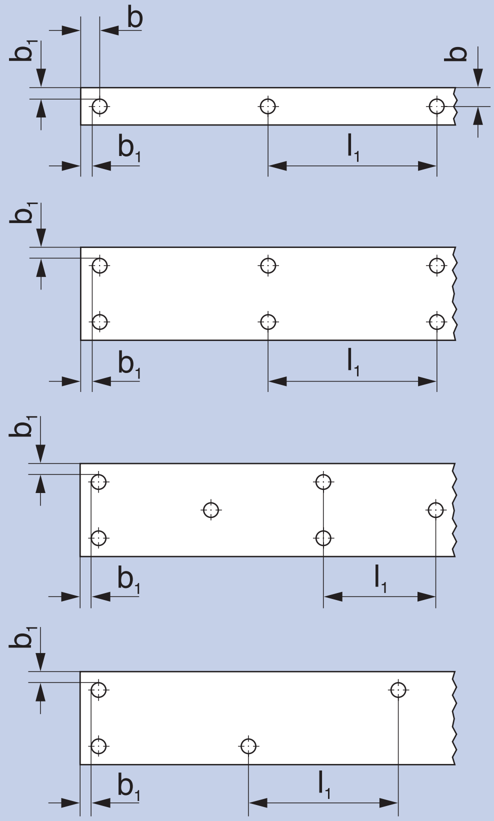
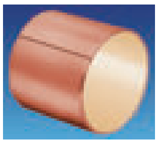


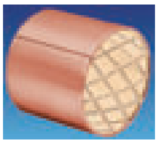
Figure 7.3.4 – Fastening of deva.bm® - hole spacing and mounting

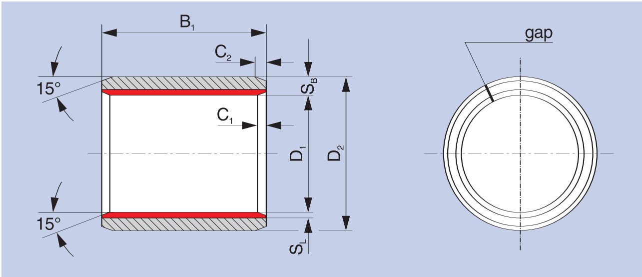
8 Available dimensions

8.1 Measurement table for deva.bm® plain bearings

deva.bm® bearings are made to DIN ISO 3547 standard. Other sizes and tolerances for special applications are also possible, however.
The sizes given in the following table can be manufactured as standard in all the alloys listed in this manual.







Bore tolerance (after mounting)	Nominal dimensions						Bearing width B_1 ± 0.25 mm																
	D_1	D_2	S_B	S_L	C_1	C_2	10	15	20	25	30	40	50	60	70	80	100	120	140	150	160	180	200
H9	10	12	1.0	≥ 0.40	0.7	0.5	○	○															
	12	14					○	○															
	14	16					○	○	○														
	15	17					○	○	○														
	16	18					○	○	○														
	18	20					○	○	○	○													
H8	20	23	1.5	≥ 0.50	1.0	0.6	○	○	○	○	○												
	22	25						○	○	○	○												
	24	27						○	○	○	○												
	25	28						○	○	○	○												
	28	32	2.0	≥ 0.75	1.5	0.8		○	○	○	○	○											
	30	34						○	○	○	○	○											
	32	36							○	○	○	○											
	35	39							○	○	○	○	○										
	36	40							○	○	○	○	○										
	38	42							○	○	○	○	○										
	40	44							○	○	○	○	○	○									
	42	46								○	○	○	○	○									
H8 (Precision) / H9 (Standard)	45	50	2.5	≥ 0.70	1.8	1.0				○	○	○	○	○									
	50	55								○	○	○	○	○	○								
	55	60									○	○	○	○	○	○							
	60	65									○	○	○	○	○	○							
	65	70										○	○	○	○	○							
	70	75										○	○	○	○	○	○						
	75	81	3.0	≥ 1.00	2.5	1.5						○	○	○	○	○	○						
	80	86										○	○	○	○	○	○	○					
	85	91											○	○	○	○	○	○					
	90	96											○	○	○	○	○	○					
	95	101											○	○	○	○	○	○	○				
	100	106											○	○	○	○	○	○	○	○			
	105	111												○	○	○	○	○	○	○			
	110	116												○	○	○	○	○	○	○	○		
	115	121												○	○	○	○	○	○	○	○		
	120	126												○	○	○	○	○	○	○	○	○	
	125	131													○	○	○	○	○	○	○	○	
	130	136													○	○	○	○	○	○	○	○	
	135	141													○	○	○	○	○	○	○	○	○
	140	146													○	○	○	○	○	○	○	○	○
	145	151														○	○	○	○	○	○	○	○
	150	156														○	○	○	○	○	○	○	○
	160	166														○	○	○	○	○	○	○	○
	180	186															○	○	○	○	○	○	○
	200	206															○	○	○	○	○	○	○
	220	226															○	○	○	○	○	○	○
	240	246															○	○	○	○	○	○	○
	250	260	5.0	≥ 1.5	3.0	2.0														○	○	○	○
	all dimensions	$D_1 + 2 \times S_B$																		○	○	○	○
																				○	○	○	○
																					○	○	○
																						○	○
																						○	○
																						○	○
	800	810																					○

deva.bm® bearings, D_1 > 550 mm, laser-welded, additionally locking recommended.

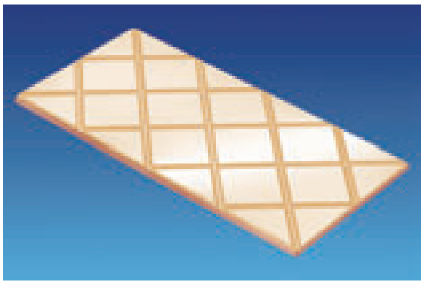
Very large **deva.bm®** bearings are manufactured in segments.

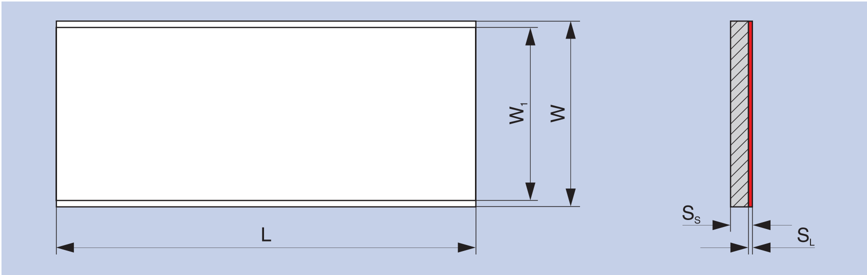
deva.bm® 332 and **deva.bm® 362/9P** are available in diameters from D_1 > 28 mm.

Further sizes available on request.

Table 8.1.1 - Measurement table for deva.bm® plain bearings (all sizes in mm)

8.2 Measurement table for deva.bm® sliding plates





Wall thickness S_S	Wall thickness tolerance	min. sliding layer thickn. S_L	Useful width W_1 tol.: + 1 mm [2]	Length L tol.: + 3 mm
2.5	± 0.05 [1]	0.75	200	1750
3.0	± 0.05 [1]	1.05	200	1750
5.0	± 0.05 [1]	1.55	200	1750

[1] Different tolerances possible [2] For **deva.bm® 362/9P** W_1 = 190 mm

Table 8.2.1 – Measurement table for deva.bm® sliding plates (all sizes in mm)

Available materials
deva.bm® 302
deva.bm® 312
deva.bm® 342
deva.bm® 362/9P

8.3 Dimension table for deva.bm® contour elements

Segment thickness [1]	Minimum bending diameter for deva.bm® strips with sliding layer at the ...	
	Inner diameter	Outer diameter
1.2	10	– [2]
1.7	20	– [2]
2.2	28	– [2]
2.7	45	– [2]
3.2	75	600
5.2	250	800

[1] Other thicknesses on request [2] On request

Table 8.3.1 – Manufacturing restrictions for deva.bm® radial segments (all sizes in mm)

The minimum bending radius for **deva.bm®** depends on the total thickness of the steel backing and sliding layer (see Table 8.3.1).

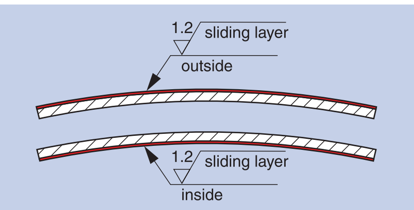


Figure 8.3.1 – Radial segments

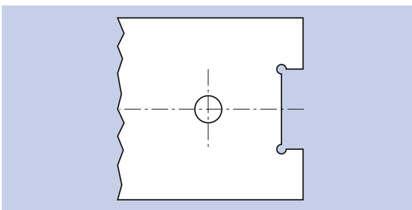


Figure 8.2.3 – Sliding plate

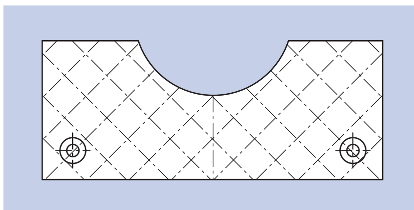


Figure 8.3.3 – Sliding plate

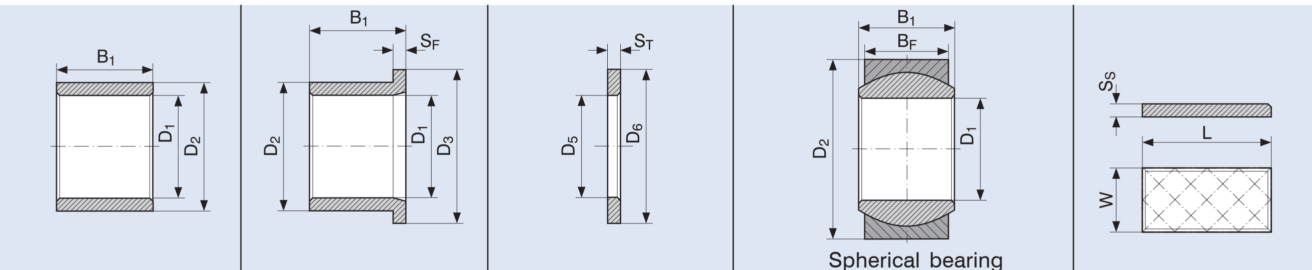
9 Data relevant to the design of DEVA® bearings

Description of application: ______________________

____

____

Project / No. ______________________ ☐ **New design** ☐ **Existing design**



☐ Plain bearing ☐ Flanged bearing ☐ Thrust washer

Spherical bearing ☐ Floating bearing ☐ Fixed bearing

☐ Sliding plate

☐ Shaft rotates ☐ Bearing rotates ☐ Angular motion ☐ Axial motion

	Item 1	Item 2	Item 3
Quantity			

Dimensions (in mm)	Item 1	Item 2	Item 3
Inner diameter D_1 (D_5)			
Outer diameter D_2 (D_6)			
Bearing width B_1			
Outer ring width B_F			
Flange outer dia. D_3			
Flange thickness S_F			
Wall thickness S_T			
Plate length L			
Plate width W			
Plate thickness S_S			

Loading	Item 1	Item 2	Item 3
Static	☐	☐	☐
Dynamic	☐	☐	☐
Alternating	☐	☐	☐
Impact	☐	☐	☐
Radial load in kN			
Axial load in kN			
Surface pressure			
Radial in MPa			
Axial in MPa			

Mating material	Item 1	Item 2	Item 3
Material No./type			
Hardness in HB/HRC			
Roughness R_a in μm			

Lubrication	Item 1	Item 2	Item 3
Dry running	☐	☐	☐
Permanent lubrication	☐	☐	☐
Medium lubrication	☐	☐	☐
Medium			
Lubricant			
Assembly lubrication	☐	☐	☐
Hydrodyn. lubrication	☐	☐	☐
Dynamic viscosity			

Motion	Item 1	Item 2	Item 3
Speed in rpm			
Sliding speed in m/s			
Stroke length in mm			
Double strokes/ min			
Angle $\alpha°$			
Frequency in n/ min			

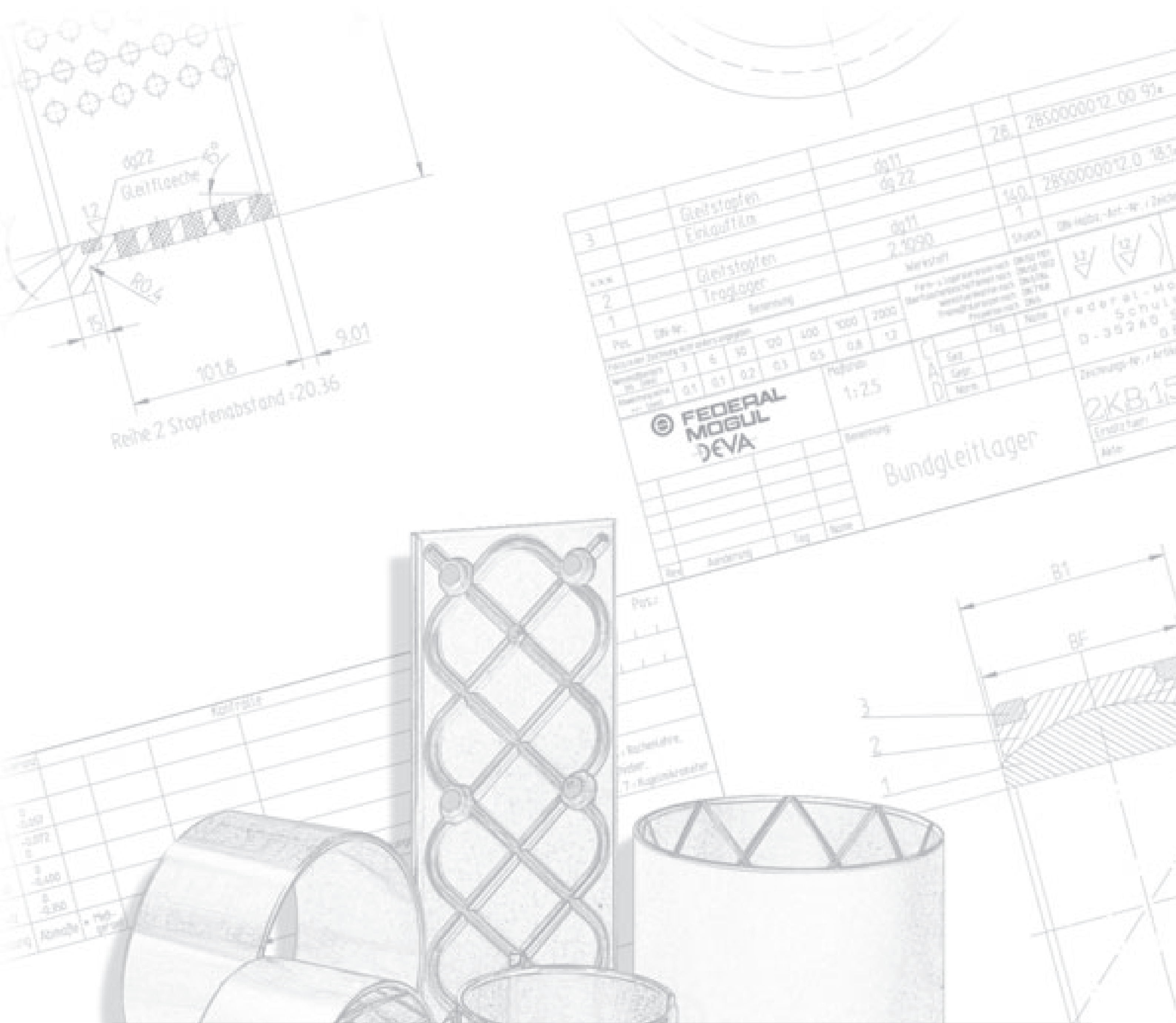
Operating time	Item 1	Item 2	Item 3
Continuous operation			
Intermittent operation			
Duty cycle	%/h	%/h	%/h
Days/years			
Frictional distance in km			

Fits and tolerances	Item 1	Item 2	Item 3
Shaft			
Bearing holder			

Environm. conditions	Item 1	Item 2	Item 3
Temperature at bearing	°C	°C	°C
Contact medium			
Other influences			

Lifetime	Item 1	Item 2	Item 3
Desired operating time	h	h	h
Permissible wear	mm	mm	mm

Company address / contact



The present technical documentation has been prepared with care and all the information verified for its correctness. No liability, however, can be accepted for any incorrect or incomplete information. The data given in the documentation are intended as an aid for assessing the suitability of the material. They are derived from our own research as well as generally accessible publications.

The sliding friction and wear values stated by us or appearing in catalogues and other technical documentation do not constitute a guarantee of the specified properties. They have been determined in our test facilities under conditions that do not necessarily reflect the actual application of our products and their service environment or permit comprehensive simulation in relation to them. We provide guarantees only after written agreement of the test procedures and parameters and of all the relevant characteristics which the product is required to have.

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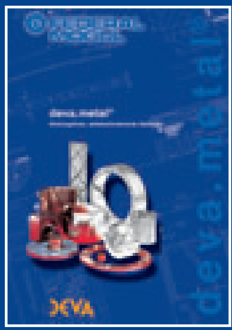
Further infomation about our products:

DEVA®
Product range



Technical Manual
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deva.glide®

Technical Manual
deva.tex®

Technical Manual
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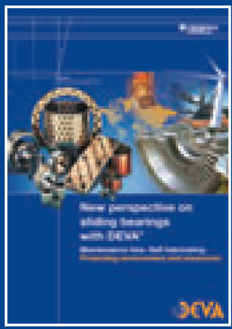
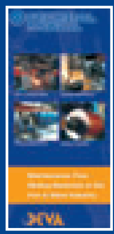
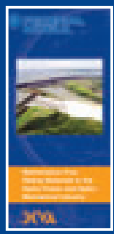


New perspective on
bearings with DEVA®

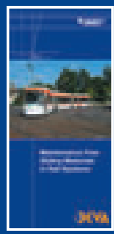


DEVA®-
Materials
in the
steel industry



DEVA®-
Materials
in the hydro
industry

DEVA®-
Materials
in the tire
industry



DEVA®-
Materials
in rail
systems

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