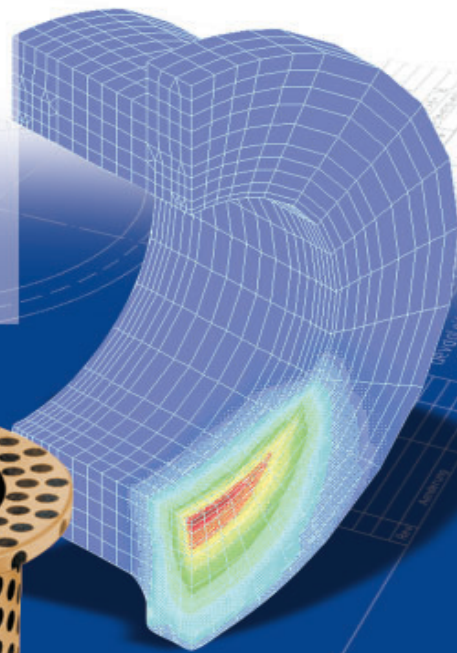




DEVA®
Product range

DEVA® – more than just bearings

- ✓ Benefit from more than 60 years of experience with self-lubricating bearings
- ✓ Use our extensive material and application knowledge in all industrial areas
- ✓ Let the DEVA® application engineering team assist you with:
 - Material selection
 - Design, standard or according to your individual needs
 - Assembly
 - Calculation of estimated life time
- ✓ Make use of the latest material developments supported by modern test facilities
- ✓ Ask for the simulation of your bearing application on our test rigs
- ✓ Let us analyse your bearing problem by FEM
- ✓ Expect the highest quality standards, certified by DIN ISO 9001 : 2000, ISO/TS 16949 : 2002 and DIN EN ISO 14001



World class bearings from DEVA® save time and money!

Where to use

deva.metal® is a self-lubricating bearing material manufactured by advanced powder metallurgy. It is fully compacted, unlike oil-impregnated porous bronze materials that are weak by comparison. **deva.metal®** is provided with an evenly distributed solid lubricant throughout its metallic matrix.

deva.metal®

- is suitable for dry running at slow sliding speeds and high loads,
- is stick-slip free,
- has high resistance to temperature and corrosion,
- is insensitive to contamination and edge pressures,

- can be easily machined if required.

Reference applications

Iron and steel works, furnace construction, fans, foundry machinery, waste water cleaning plants, water-, steam- and gas-turbines, pumps and compressors, food and beverage industry machinery, packing machinery, apparatus engineering, mechanical handling equipment, etc.



deva.metal®

Material properties

Material property <small>(depending on alloy and operating conditions)</small>	Unit	Value
Max. permitted static load (\bar{p})	MPa	260
Max. permitted dynamic load (\bar{p})	MPa	130
Max. sliding speed (U)	m/s	0.4
Max. $\bar{p}U$ -value	MPa × m/s	1.5
Friction coefficient	μ	0.09 to 0.49
Temperature range	°C	-200 to +800

Tolerances	
Housing bore	H7
Bearing outer Ø	r6/s6
Bearing inner Ø	C7 for D8 after inst.
Shaft Ø	h7
Counter material	hardness > 180 HB
Shaft surface finish	R _a 0.2 to 0.8 µm

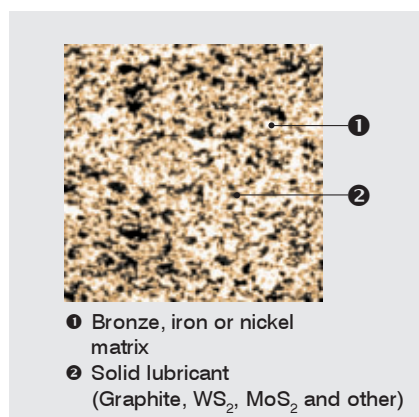
Tolerances

Other installation tolerances are possible, provided that a safe fit in the housing and the necessary running clearance are maintained.

Installation

The recommended method for installing bushes is supercooling (bronze alloys only) or press-fit.

Structure



- 1 Bronze, iron or nickel matrix
- 2 Solid lubricant (Graphite, WS₂, MoS₂ and other)

Photomicrograph deva.metal®

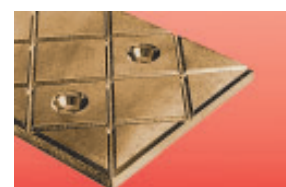
Basic forms



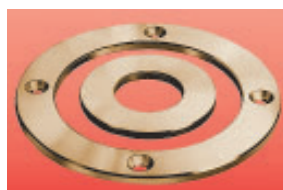
Flanged bearings



Cylindrical bearings



Sliding plates



Thrust washers



Machinable blanks



Spherical bearings

Where to use

deva.bm[®] is a thin-walled self-lubricating composite sliding material. It consists of a backing made of standard steel, stainless steel or bronze with a **deva.metal[®]** layer applied in a combined rolling/sintering process. **deva.bm[®]** offers basically the same bearing characteristics as **deva.metal[®]** but is capable of handling even **higher loads** and offers an **economic solution** to many bearing problems.

Reference applications

Water turbines, injection molding machinery, food and beverage industry machinery, packing machinery, printing machinery, apparatus engineering, shut-off valves, tire molds, etc.



Material properties

Material property <small>(depending on used material and operating cond.)</small>	Unit	Value
Max. permitted static load (\bar{p})	MPa	320
Max. permitted dynamic load (\bar{p})	MPa	150
Max. sliding speed (U)	m/s	1.0
Max. $\bar{p}U$ -value	MPa × m/s	1.5
Friction coefficient	μ	0.05 to 0.18
Temperature range	°C	-150 to +280

Tolerances	
Housing bore	H7
Bearing inner Ø	H8/H9 after inst.
Shaft Ø	d7/ e7
Counter material	hardness > 180 HB
Shaft surface finish	R _a 0.2 to 0.8 µm

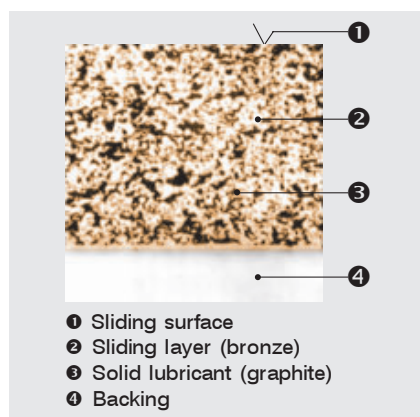
Tolerances

Other installation tolerances are possible, provided that a safe fit in the housing and the necessary running clearance are maintained.

Installation

Press-fit installation or supercooling.

Structure



Photomicrograph deva.bm[®]

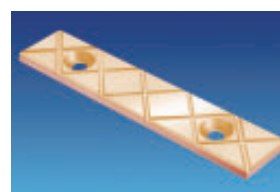
Basic forms



Cylindrical bearings



Cyl. bearings with grooves



Sliding strips



Custom parts



Sliding plates



Thrust washers

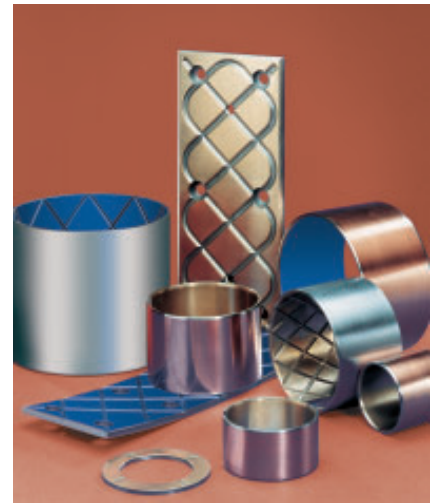
Where to use

deva.bm®/9P is a thin-walled, self-lubricating composite sliding material. The sliding layer is applied to a stainless steel backing in a combined rolling/sintering process.

PTFE serves as lubricant and offers very low friction and wear rates. An optional running-in film can extend the bearing lifetime under certain operating conditions.

Reference applications

Water turbines, injection molding machinery, packing machinery, food and beverage industry machinery, printing machinery, shut-off valves, hydro-mechanical engineering, tire molds, apparatus engineering, etc.



Material properties

Material property	Unit	Value
Max. permitted static load (\bar{p})	MPa	320
Max. permitted dynamic load (\bar{p})	MPa	150
Max. sliding speed (U)	m/s	1.0
Max. $\bar{p}U$ -value	MPa × m/s	2
Friction coefficient (dep. on operating cond.)	μ	0.05 to 0.15
Temperature range	°C	-260 to +250

Tolerances	
Housing bore	H7
Bearing inner Ø	H8/H9 after inst.
Shaft Ø	d7/e7
Counter material	hardness > 180 HB
Shaft surface finish	R_a 0.2 to 0.8 μm

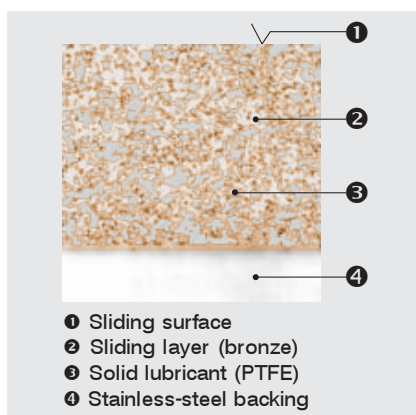
Tolerances

Other installation tolerances are possible, provided that a safe fit in the housing and the necessary running clearance are maintained.

Installation

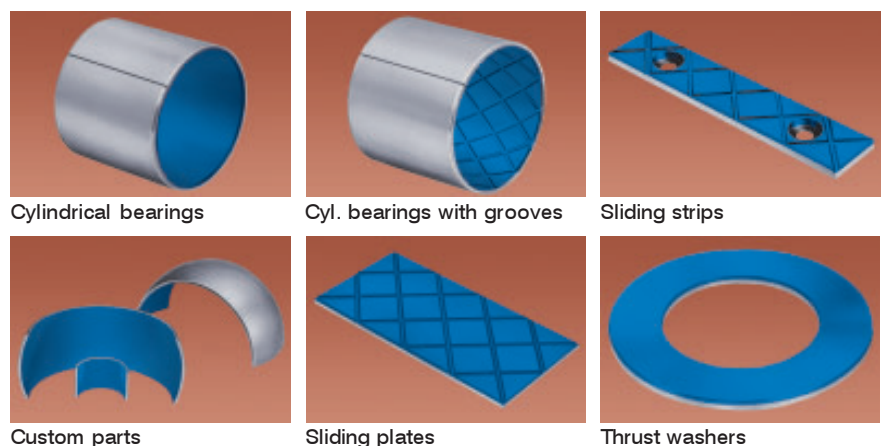
Press-fit installation or supercooling.

Structure



Photomicrograph deva.bm®/9P

Basic forms



Where to use

deva.glide® is a self-lubricating bearing material that consists of a high-quality bearing bronze with solid lubricant pockets. A thin film of solid lubricant aids the running-in process if required.

deva.glide® allows to replace lubricated bronze bearings with a maintenance-free alternative and

- is suitable for large dimensions,
- has a low friction coefficient,
- has a high wear resistance,
- allows a high durability.

Reference applications

Hydromechanical engineering, offshore industry, iron foundries and steel works, heavy machinery, cranes and conveyors, deep and open cast mining machinery, construction and earth-moving machinery, etc.



Material properties

Material property	Unit	Value
Max. permitted static load (\bar{p})	MPa	150
Max. permitted dynamic load (\bar{p})	MPa	90
Max. silding speed (U)	m/s	0.4
Max. $\bar{p}U$ -value	MPa × m/s	1.5
Friction coefficient (dep. on operating cond.)	μ	0.10 to 0.15
Temperature range	°C	-100 to +250

Tolerances	
Housing bore	H7
Bearing outer Ø	s6
Bearing inner Ø	E8 for H10 after install.
Shaft Ø	c8/ d8
Counter material	hardness > 180 HB
Shaft surface finish	R_a 0.2 to 0.8 μm

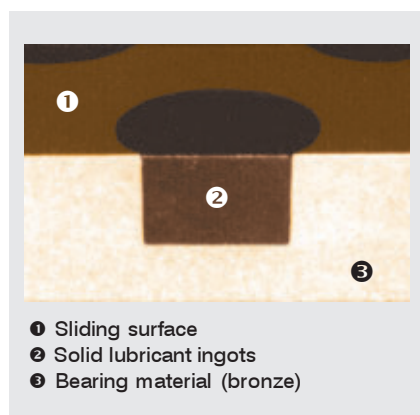
Tolerances

Other installation tolerances are possible, provided that a safe fit in the housing and the necessary running clearance are maintained.

Installation

Press-fit installation or supercooling.

Structure



Photomicrograph deva.glide®

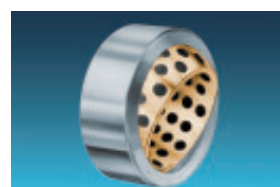
Basic forms



Flanged bearings



Thrust washers



Spherical bearings, floating



Cylindrical bearings



Sliding plates



Spherical bearings, fixed

Where to use

deva.tex® is a high performance self-lubricating sliding material with a glass-fibre reinforced carrying layer. The **machinable sliding layer** consists of fibres which are embedded in epoxy resin. The resin carries PTFE as lubricant for excellent tribological performance.

deva.tex® bearings are available in standard dimensions up to 200 mm according to DIN 1850 and are characterized by a very high corrosion and wear resistance. They are insensitive to contamination as well as to vibrations and shock loads. Custom dimensions are also

available due to the machinable inner and outer layer.

Reference applications

Water turbines, hydromechanical engineering, agricultural machines, earth moving equipment, railroad vehicles, shut-off valves, chemical industry, apparatus engineering, wind turbines, etc.



Material properties

Material property	Unit	Value
Max. permitted static load (\bar{p})	MPa	220
Max. permitted dynamic load (\bar{p})	MPa	120
Max. sliding speed (U)	m/s	0.3
Max. $\bar{p}U$ -value	MPa × m/s	1.8
Friction coefficient (dep. on operating cond.)	μ	0.03 to 0.12
Temperature range	°C	-100 to +160

Tolerances	
Housing bore	H7
Bearing inner Ø	see techn. manual
Shaft Ø	see techn. manual
Counter material	hardness > 180 HB
Shaft surface	R_a 0.2 to 0.8 μm

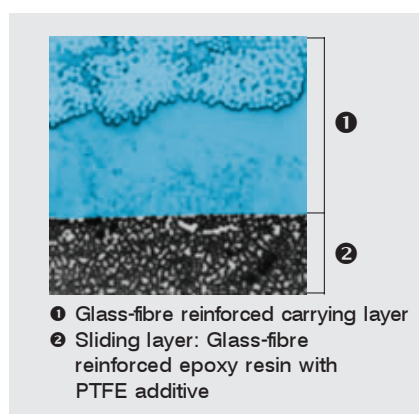
Tolerances

As the outer and inner diameters are machinable, other tolerances are possible.

Installation

Press-fit installation. Supercooling in liquid nitrogen possible for inner diameters above 150 mm.

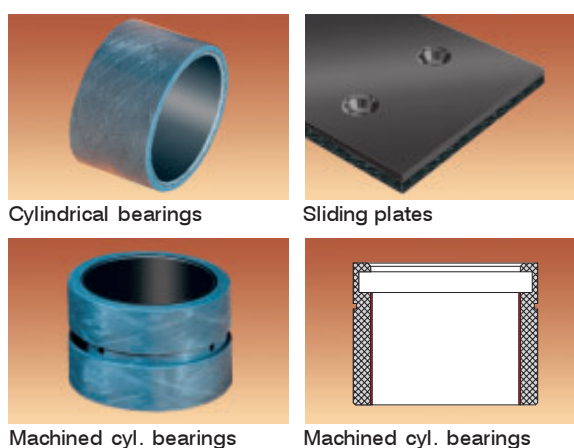
Structure



- ① Glass-fibre reinforced carrying layer
- ② Sliding layer: Glass-fibre reinforced epoxy resin with PTFE additive

Photomicrograph deva.tex®

Basic forms



Cylindrical bearings

Sliding plates

Machined cyl. bearings

Machined cyl. bearings

Where to use

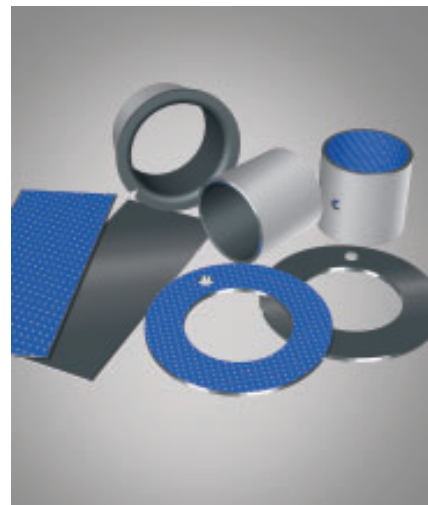
GLYCODUR® F sliding bearings consist of a 0.2 to 0.4 mm porous tin bronze layer sintered onto a copper plated steel base. The pores of this layer are filled during a rolling process with PTFE and other friction and wear reducing additives. A 5 to 30 μm top layer made of the same material forms the running-in layer.

GLYCODUR® F sliding bearings combine the mechanical properties of the sintered bronze with the sliding and lubrication properties of a PTFE mixture.

The structure of this composite material results in good dimensional stability and good thermal conductivity.

Reference applications

General dry running applications, shock absorbers, hydraulics, pneumatic cylinders, medical equipment, textile machines, agricultural machinery, office applications, etc.



Material properties

Material property	Unit	Value
Max. permitted static load (\bar{p})	MPa	250
Max. permitted dynamic load (\bar{p})	MPa	80
Max. silding speed (U)	m/s	2
Max. $\bar{p}U$ -value	MPa \times m/s	on request
Friction coefficient (dep. on operating cond.)	μ	0.03 to 0.25
Temperature range	$^{\circ}\text{C}$	-200 to +260

Tolerances	
Housing bore	H7
Bearing outer \varnothing	see catalogue
Bearing inner \varnothing	see catalogue
Shaft \varnothing	$f7 \leq 75$; $h8 > 75$
Counter material	hardness > 50 HRC
Shaft surface finish	$R_a \leq 0.3 \mu\text{m}$

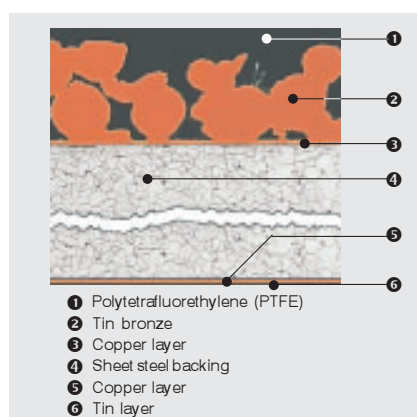
Tolerances

For tolerances please refer to the GLYCODUR® catalogue.

Installation

Installation by press-fitting or glueing. For details see GLYCODUR® catalogue.

Structure



Photomicrograph GLYCODUR® F

Basic forms



Cylindrical bearings



Flanged bearings



Thrust washers



Sliding plates

Where to use

GLYCODUR® A dry sliding bearings have a copper-plated steel base and a 0.2 to 0.4 mm sintered tin bronze layer. The major characteristic of these bearings is the POM top layer on the sintered bronze.

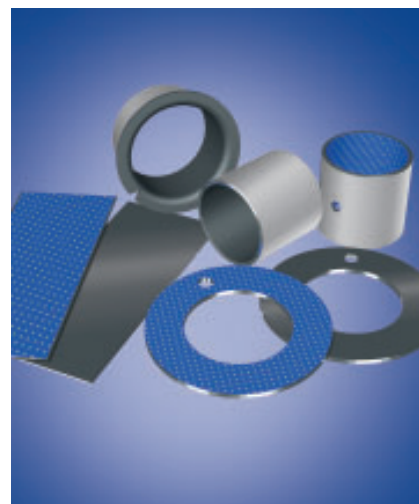
This surface layer has a thickness of 0.3 mm and features pockets for lubricant. **GLYCODUR® A** bearings are insensitive to misalignment and subsequent edge load.

GLYCODUR® AB sliding bearings have a similar composition to **GLYCODUR® A** sliding bearings, but they have a 0.35 mm top layer

made of POM. This allows final machining of the sliding surface on installed bushings by boring or turning, or in exceptional cases by rubbing, in order to eliminate possible misalignments, or to achieve small operating clearance.

Reference applications

With oil or grease lubrication such as slowly rotating gears or aligning movements.



Material properties

Material property	Unit	Value
Max. permitted static load (\bar{p})	MPa	250
Max. permitted dynamic load (\bar{p})	MPa	120
Max. silding speed (U)	m/s	2.5
Max. $\bar{p}U$ -value	MPa × m/s	on request
Friction coefficient (dep. on operating cond.)	μ	0.02 to 0.2
Temperature range	°C	-40 to +110

Tolerances	
Housing bore	H7
Bearing outer \varnothing	see catalogue
Bearing inner \varnothing	see catalogue
Shaft \varnothing	h8
Counter material	hardness > 50HRC
Shaft surface finish	$R_a \leq 0.3 \mu\text{m}$

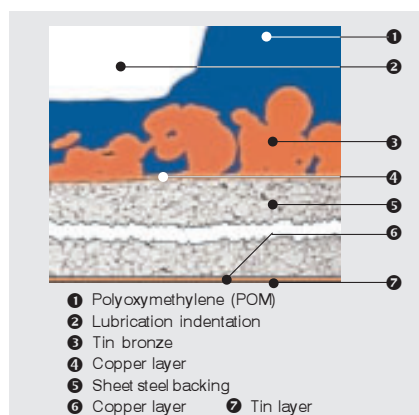
Tolerances

For tolerances please refer to the GLYCODUR® catalogue.

Installation

Installation by press-fitting or gluing. For details see GLYCODUR®-Catalogue.

Structure



Photomicrograph GLYCODUR® A/AB

Basic forms



Cylindrical bearings

Thrust washers

Sliding plates

Where to use

deva.eco® sliding bearings are thin-walled, rolled CuSn8 parts with lubrication deposits. They can take high loads and enable compact economic bearing design solutions. There are three basic designs:

deva.eco® 9 with rhombic shaped rolled lubrication pockets. This design is mostly used in applications where nearby construction elements, such as gears, are oil-lubricated. Likewise these bearings can be used with standard pumpable greases or lubrication pastes.

deva.eco® 8 has lubrication pockets like **deva.eco® 9**. These pockets are

filled with solid lubricant to allow operation without additional lubrication.

If higher lubrication performance is required **deva.eco® 7** is better suited. This type includes punched holes as lubrication deposits and is used for applications which are frequently relubricated. Due to the shape of the lubrication deposits this type is less suitable for oil lubrication.

Reference applications

Farming equipment, hydraulic equipment, applications with heavy shock-loads such as construction machinery and handling equipment.



Material properties

Material property	Unit	Value
Max. permitted static load (\bar{p})	MPa	120
Max. permitted dynamic load (\bar{p})	MPa	eco 7/9 = 40; eco 8 = 80
Max. silding speed (U) (lubricated)	m/s	≈ 2.5
Max. $\bar{p}U$ -value	MPa × m/s	2.8
Friction coefficient (dep. on operating cond.)	μ	0.015 to 0.15
Temperature range	°C	-40 to +150

Tolerances	
Housing bore	H7
Bearing outer \varnothing	-
Bearing inner \varnothing	H9 after installation
Shaft \varnothing	e7/f7
Counter material	hardness > 200 HB
Shaft surface finish	R_a 0.8 μ m

Tolerances

Other installation tolerances are possible, provided that a safe fit in

the housing and the necessary running clearance are maintained.

Installation

Press-fit installation or supercooling.

Basic forms



Cyl. bearings (deva.eco® 9)



Flanged bearings (deva.eco® 9)



Thrust bearings (deva.eco® 9)



Cyl. bearings (deva.eco® 7)



Flanged bearings (deva.eco® 7)



Cyl. bearings (deva.eco® 8)

Notes

**For more information about DEVA[®] and its products,
please visit our website www.deva.de**

This technical documentation was checked carefully. However we can not take any liability for mistakes or incomplete information. The data given in the document 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 coefficients of friction and wear rates mentioned and also indicated in our catalogues or other technical literatures are no assured properties. These values resulted from tests carried out on our test rigs under conditions not matching exactly the operating and environmental conditions of the application of our products involved. Hence the real occurring operating conditions cannot be extensively simulated. Guarantees can only be given upon written agreement on all decisive product features, test procedures and parameter required.

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Further information about our products:



Technical manual
deva.metal®



Technical manual
deva.bm®



Technical manual
deva.glide®



Technical manual
deva.tex®



DEVA®-Materials
in the tire industry



GLYCODUR®
Dry bearings catalogue



Technical manual
deva.eco®



New bearing
perspective with DEVA®



DEVA®-Materials
in the steel industry



DEVA®-Materials
in the hydro industry



Federal-Mogul Deva GmbH

Postfach 1160 · D-35251 Stadtallendorf · Schulstrasse 20 · D-35260 Stadtallendorf

Phone +49 (0)6428 701-0 · Telefax +49 (0)6428 701-108

info@deva.de · www.deva.de