



FEDERAL MOGUL



Maintenance Free Sliding Materials in the Hydro Power and Hydro Mechanical Industry

DIN-No.	3	6	30	120	Material	48
					Loctite 306	3
					brass Ms58	1
					BM11 CuSn8713/9P E	
					stainless steel	

DEVA

Material

DEVA and the Hydro Industry

Federal-Mogul DEVA GmbH

- has been manufacturing selflubricating sliding materials for more than 100 years
- has been focusing on hydro industry for more than 50 years – the hydro industry is a major application field
- has optimised materials for the toughest conditions in the hydro power and -mechanical industry like pump turbines and ball valves
- is used in more than 4,000 projects within this sector throughout the world by major OEM's and end-users

Quality

A quality brand – We fulfil the requirements for the:

- ISO 9001:2000
- ISO 14001:1996
- ISO/TS 16949:2002
- EMAS II

Materials

Federal-Mogul DEVA manufactures a wide range of selflubricating bearing materials where the dry lubricant is uniformly dispersed within the material. For sliding elements in the hydro industry four major material groups are used:

deva.bm[®] and deva.bm[®]/9P

deva.bm[®] and deva.bm[®]/9P are selflubricating composite materials consisting of a steel backing and a deva.metal[®] sliding layer. While deva.bm[®] has graphite as incorporated lubricant, deva.bm[®]/9P has PTFE as lubricant. A special technology guarantees perfect bonding of the sintered deva.metal[®] layer to the steel backing material. The micro distributed lubricant copes with micro movements like a grease film.

- Thin walled, fits into almost any space.
- Selflubricating properties even at minute movements.
- The steel backing allows highest loads.
- Stick-slip free, corrosion resistant.
- Intelligent material behaviour

Materials (continued)

deva.metal[®]

deva.metal[®] selflubricating material is a sintered product. The advantage of this monolithic material is the possibility to machine complex geometrical shapes and still maintain the selflubricating properties of the materials throughout the entire machined part.

- Selflubricating properties even at minute movements.
- Applicable for high loads, corrosion resistant, stick-slip free.
- Preloaded lubricant in the pockets of the bronze matrix lubricates its surrounding area widely.

deva.glide[®]

deva.glide[®] selflubricating material consists of highly wear resistant copper cast alloys with evenly distributed solid (macro distributed) lubricant plugs specially designed for the required application.

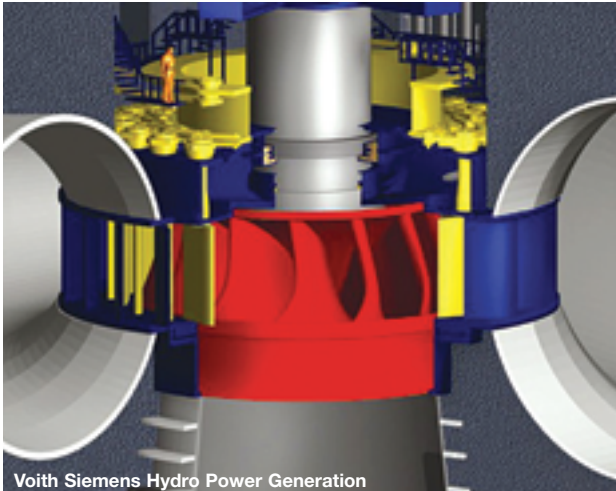
- Allows maintenance free operation instead of lubricated bronze.
- Thick walled; high wear resistance.
- Applicable for large diameters.

deva.tex[®]

deva.tex[®] is a selflubricating, glass fibre reinforced composite material which is produced using a special winding technology. The base material guarantees high strength, while the bearing lining contains special non-abrasive fibres and solid lubricants which ensure excellent tribological properties even in damp environments or in the event of edge loads.

- Adjustable wall thickness – full machinable.
- Optimised for replacement of existing bronze bushes.
- No swelling (DNV and GL Certification available).
- Lowest friction coefficient.
- High edge load capability – Intelligent material behaviour.
- Successfully tested by Power Tech Labs (USACE).

Turbine Equipment



Voith Siemens Hydro Power Generation

Wicket gates & regulating mechanisms, Kaplan runner hubs, waterlubricated main bearings

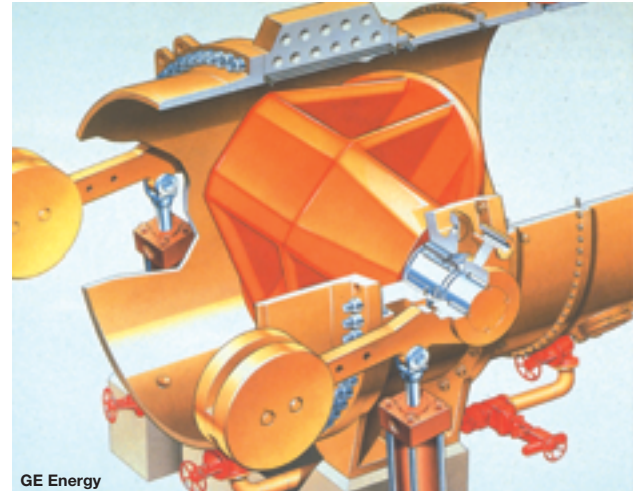
Environment

- Lead-free possible by using deva.bm[®]/9P
- Oil-free operation possible – water as lubrication possible
- Maintenance free – selflubricating
- Corrosion resistant
- Insensitive to dirt – also cleaning grooves possible (deva.bm[®])

Load

- High load & high edge load capability
- Low clearance
- Excellent emergency running properties
- Vibration insensitive
- High strength due to steel or glassfibre backing
- Intelligent material behaviour

Mechanical Equipment



GE Energy

Gates, sluices, chains, cylinders, valves (butterfly or spherical)

Design

- Large sizes – small sizes
- Nearly each shape possible
- Easy installation
- Sliding and backing layer with different friction coefficient
- Cost optimised solution

For further detailed material data as well as design and installation proposals please refer to the individual material handbooks and ask for assistance.

Trademarks

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DEVA[®] – Advantages at a glimpse:

- Application - specific design and problem solving
- Certified
- R & D support facilities
- Wide range of materials to ideally suit your application
- Full range of test facilities
- Specialized application manager assisting with expert knowledge world wide
- World wide sales network
- Assembly assistance
- Bearing inspection service

Sales Organisation



Almost all major OEM's and hydro producers are using more and more DEVA[®] products successfully in their plants.

References:

- Three Gorges
- Itaipu
- Guri

are three out of more than 4,000 hydro power projects successfully equipped with DEVA[®] bearings.

Federal-Mogul Deva GmbH

Schulstrasse 20

35260 Stadtallendorf

Germany

Phone: +49 (0) 64 28 / 701 - 0

Facsimile: +49 (0) 64 28 / 701 - 108

E-Mail: info@deva.de

Internet: www.deva.de

DEVA