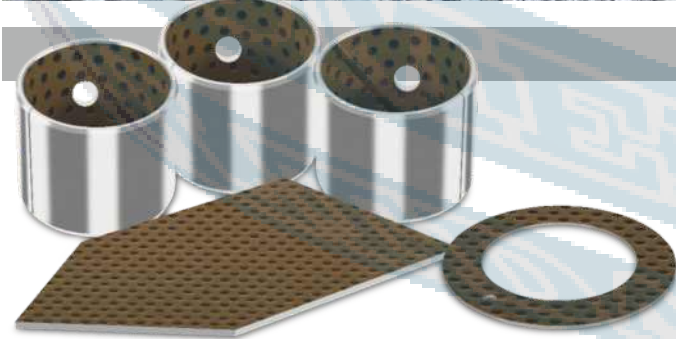




GGB DX[®]10

Metal-Polymer High Performance Maintenance-Free Bearing Solutions



The Global Leader
in High Performance Bearing Solutions



an EnPro Industries company

GGB Bearing Technology

GGB's history as the global leader in plain bearing technologies dates back more than 115 years, beginning with the founding of Glacier Antifriction Metal Company in 1899. GGB introduced the industry-leading DU® bearing in 1965. Since that time, GGB has continued to create innovative technologies and solutions that improve safety, performance and profitability in a wide range of markets. Today, our products can be found everywhere – from scientific vessels at the bottom of the ocean to racecars

- **Safety:** GGB's deep-rooted culture of safety places a relentless focus on creating a secure, healthy work environment for all. A core value of GGB, safety is critically essential at all levels of business in order to achieve our goal of having the safest employees in the industry.
- **Excellence:** A world-class organization is built by fostering excellence throughout the company in all positions and functional areas. Our world-class manufacturing plants are certified in quality and excellence in the industry according

speeding down the tarmac to jumbo jets slicing through the sky to the Curiosity rover exploring the surface of Mars.

Throughout our history, safety, excellence and respect have formed the foundational values for the entire GGB family. They are of paramount importance as we seek to maximize personal possibility, achieve excellence and establish open, creative work environments with the highest safety standards in the industry.

to ISO 9001, TS 16949, ISO 14001, ISO 50001 and OHSAS 18001, allowing us to access the industry's best practices while aligning our quality management system with global standards.

- **Respect:** We believe that respect is consistent with the growth of individuals and groups. Our teams work together with mutual respect regardless of background, nationality or function, embracing the diversity of people and learning from one another.

The GGB Advantage

With manufacturing facilities around the world, including cutting edge R&D facilities, flexible production platforms and extensive customer support networks, GGB offers unmatched technical expertise combined with razor sharp responsiveness and customized solutions. Our global presence and local logistics networks ensure our customers receive only the highest quality bearing solutions, in a timely manner and with extensive engineering support. **We don't just make products, we build partnerships. That's the GGB Advantage.**

Quality/Certification

Our world-class manufacturing plants in the United States, Brazil, China, Germany, France and Slovakia are **CERTIFIED IN QUALITY AND EXCELLENCE IN THE INDUSTRY** according to ISO 9001, TS 16949, ISO 14001, ISO 50001 and OHSAS 18001. This allows us to access the industry's best practices while aligning our quality management system with global standards.

For a complete listing of our certifications, please visit our website:

www.ggbearings.com/en/company/certificates



Introduction

DX[®]10 is a value engineered steel backed bearing product designed with a tough abrasion resistant polymer surface for heavy duty applications and harsh environments where high loads, shock, heat and abrasive contamination are present.

DX[®]10 leads the way to longer bearing life, less maintenance and lower operational costs.

For current designs, you can replace troublesome bronze, bi-metallic and roller bearings with DX[®]10 for longer, trouble-free bearing life.

Advantages

GGB DX[®]10 offers the following advantages:

- Good wear resistance
- High load capacity
- High pU capability
- Excellent abrasion resistance
- Good temperature resistance
- Excellent chemical resistance
- Very good performance with grease and oil lubrication
- Available with pin indented surfaces for better lubricant retention
- Machinable: broaching, reaming
- Available in bushings, washers and special shaped parts
- Lead-free

Applications

GGB DX[®]10 is intended for greased or oil lubricated heavy duty applications with high load, elevated temperature and potential for abrasive contamination:

- King pins for trucks and off-highway equipment
- Truck and automotive suspension joints
- Agricultural equipment
- Construction equipment
- Lift equipment
- Cranes
- Automotive oil pumps
- Small reciprocating bushings
- Piston pumps



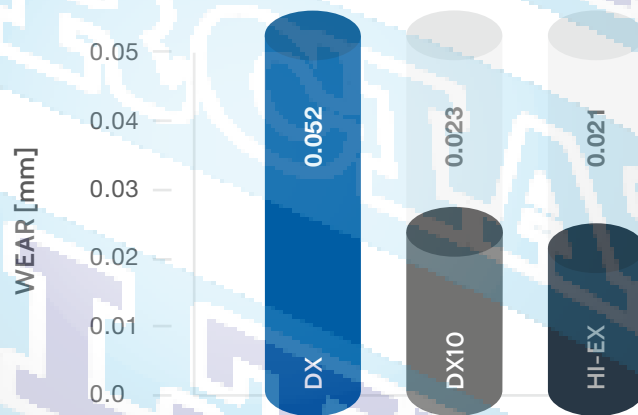
Bearing Performance

Abrasion Resistance

To confirm DX[®]10's superb abrasion wear resistance, DX[®]10 was compared against DX[®] and HI-EX[®]. Each thrust washer was pin indented. The grease was contaminated with 50% by weight Arizona road dust. Testing indicated that DX[®]10 abrasive wear resistance was better than GGB standard product DX[®] and on par with GGB premium product HI-EX[®].

Thrust Washer Test

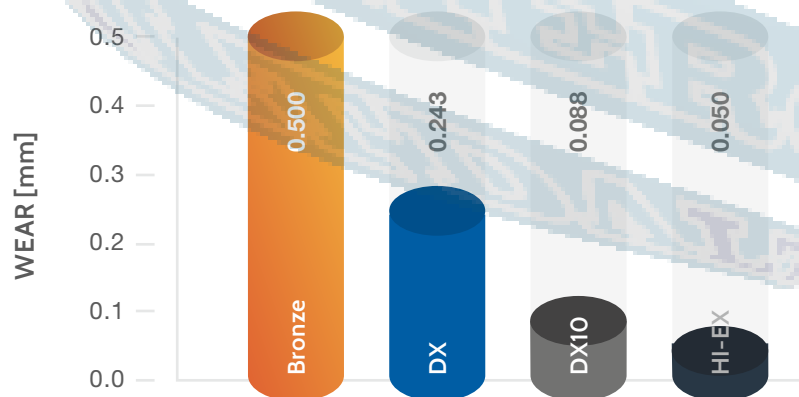
Applied Load 13.8 MPa [2000 psi]
 Speed 0.15 m/s [30 fpm]
 Temperature 105°C [221° F]
 Grease Mixture 50% Lithium grease
 + 50% Arizona road dust; % by weight
 Test Duration 12 hours



Oscillation with Grease

To prove the durability of DX[®]10 in oscillation, DX[®]10 was compared with DX[®], HI-EX[®] and bronze alloy (90% Cu, 10% Sn) in greased oscillation tests. Each bearing was pin indented. The graph below shows the superior performance of DX[®]10.

Testing indicated that DX[®]10 greased oscillation wear resistance was substantially better than bronze; better than GGB standard product DX[®]. GGB premium product HI-EX[®] was better than DX[®]10.



Oscillation Test

Applied Load 70 MPa [10,000 psi]
 Oscillation ±30° at 15cpm
 Temperature 22°C [72°F]
 Shaft Diameter 25 mm [0.984 inch]
 Shaft hardness 60 Rc
 Grease Mixture Lithium grease
 greased once at startup
 Test Duration 250,000 cycles [278 hours]

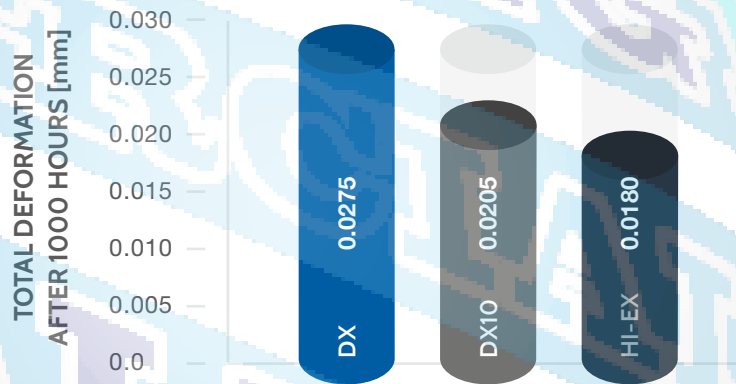
Thermal Dimensional Stability

To demonstrate the long term thermal dimensional stability GGB tape products creep resistance tests were performed at 100°C comparing DX® and HI-EX® and DX®10.

The test data indicated that DX®10 was significantly better than DX® and on par with GGB premium product HI-EX®.

Thermal Dimensional Stability

Load 36 MPa [5220 psi]
 Material Thickness 1.5 mm [0.059 inch]
 Temperature 100°C [212° F]
 Test Duration 1000 hours



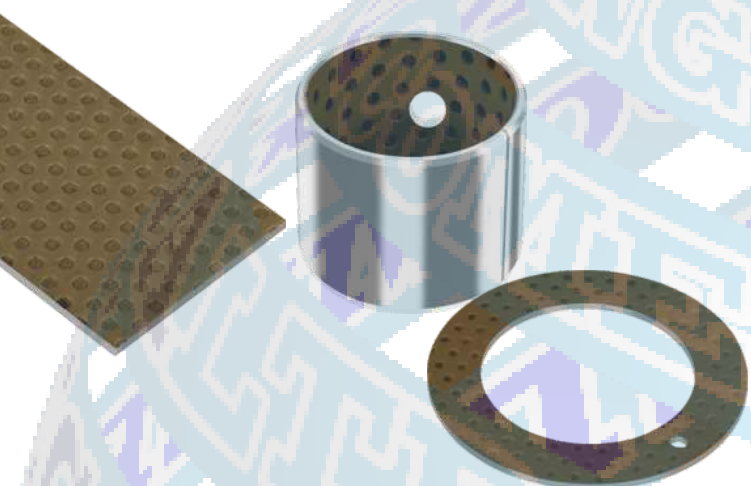
Bearing Properties

Bearing Properties	Imperial Units	Imperial Value	Metric Units	Metric Value	
General					
Maximum load, p	Static	psi	36 000	N/mm ²	250
	Dynamic	psi	20 000	N/mm ²	140
Operating temperature	Min	°F	- 40	°C	- 40
	Max	°F	350	°C	175
Grease Lubricated					
Maximum sliding speed, U	fpm	500	m/s	2.5	
Maximum pU factor	psi x fpm	80 000	N/mm ² x m/s	2.8	
Coefficient of friction f		0.01 - 0.10		0.01 - 0.10	
Oil Lubricated					
Maximum sliding speed, U	fpm	2 000	m/s	10.0	
Maximum pU factor	psi x fpm	80 000	N/mm ² x m/s	2.8	
Coefficient of friction f		0.01 - 0.06		0.01 - 0.06	
Recommendations					
Shaft surface roughness, Ra	µin	≤ 16	µm	≤ 0.4	
Shaft surface hardness	Normal For longer service life		HB > 200 HB > 350		

Microsection



- Sliding Layer High-Tech Polymer With Lubricant Indents
- Porous Bronze Sinter
- Steel Backing



Availability

Bearing forms made to order: Cylindrical bushes, thrust washers, sliding plates, half-bearings, special shapes obtained by stamping, bearings with locating notches, lubricant holes and machined grooves, customized bearing designs

DX[®]10 is a member of the GGB thermoplastic-based metal-polymer family of bearing products which are excellent for marginally lubricated applications and machinable for tight tolerance control:

- DX[®] - intended for lubricated applications; temperatures up to 130°C [265°F]
- DS[™] - intended for dry and lubricated applications; temperatures up to 130°C [265°F]
- HI-EX[®] - intended for highly loaded and/or high temperature lubricated applications; temperatures up to 250°C [480°F].

Statement Regarding Lead Content in GGB Products & EU Directive Compliance

GGB is committed to adhering to all U.S., European and international standards and regulations with regard to lead content. We have established internal processes that monitor any changes to existing standards and regulations, and we work collaboratively with customers and distributors to ensure that all requirements are strictly followed. This includes RoHS and REACH guidelines.

GGB makes it a top priority to operate in an environmentally conscious and safe manner. We follow numerous industry best practices, and are committed to meeting or exceeding a variety of internationally recognized standards for emissions control and workplace safety.

Each of our global locations has management systems in place that adhere to ISO TS 16949, ISO 9001, ISO 14001, ISO 50001 and OHSAS 18001 quality regulations.

All of our certificates can be found here: <http://www.ggbearings.com/en/company/certificates>. A detailed explanation of our commitment to REACH and RoHS directives can be found at www.ggbearings.com/en/company/quality-and-environment.

Bearing Application Data Sheet

Not sure which GGB part fits your application requirements? Go to ggbpartfinder.com to complete a Bearing Application Data Sheet online, and one of our GGB bearing specialists will reach out to you with recommended options that meet your application requirements. You can also complete the form below and share it with your GGB sales person or distributor representative.

DATA FOR BEARING DESIGN CALCULATION

Application: _____

Project / No.: _____ Quantity: _____ New Design Existing Design

DIMENSIONS (mm)

Inside diameter D_i
 Outside diameter D_o
 Length B
 Flange diameter D_{fi}
 Flange thickness B_{fi}
 Wall thickness S_T
 Length of slideplate L
 Width of slideplate W
 Thickness of slideplate S_s

LOAD

Radial load F static [N]
 dynamic [N]
 Axial load F static [N]
 dynamic [N]
 Specific load p radial [MPa]
 axial [MPa]

MOVEMENT

Rotational speed N [1/min]
 Speed U [m/s]
 Length of stroke L_s [mm]
 Frequency of stroke [1/min]
 Oscillating cycle ϕ [°]
 Osc. frequency N_{osz} [1/min]

MATING SURFACE

Material _____
 Hardness HB/HRC _____
 Surface finish R_a [μm] _____

CUSTOMER INFORMATION

Company _____
 Street _____
 City / State / Province / Post Code _____
 Telephone _____ Fax _____
 Name _____
 Email Address _____ Date _____

FITS & TOLERANCES

Shaft D_j
 Bearing housing D_H

OPERATING ENVIRONMENT

Ambient temperature T_{amb} [°]
 Housing with good heating transfer properties
 Light pressing or insulated housing with poor heat transfer properties
 Non metal housing with poor heat transfer properties
 Alternate operation in water and dry

LUBRICATION

Dry
 Continuous lubrication
 Process fluid lubrication
 Initial lubrication only
 Hydrodynamic conditions

Process fluid _____
 Lubricant _____
 Dynamic viscosity η _____

SERVICE HOURS PER DAY

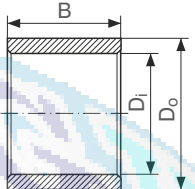
Continuous operation
 Intermittent operation
 Operating time _____
 Days per year _____

SERVICE LIFE

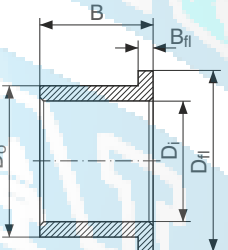
Required service life L_H [h] _____

BEARING TYPE:

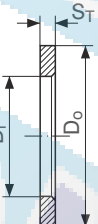
Cylindrical bush



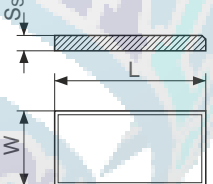
Flanged bush



Thrust washer



Slideplate



Special parts (sketch)
 Rotational movement
 Steady load
 Rotating load
 Oscillating movement
 Linear movement



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Um nome carregado de soluções

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