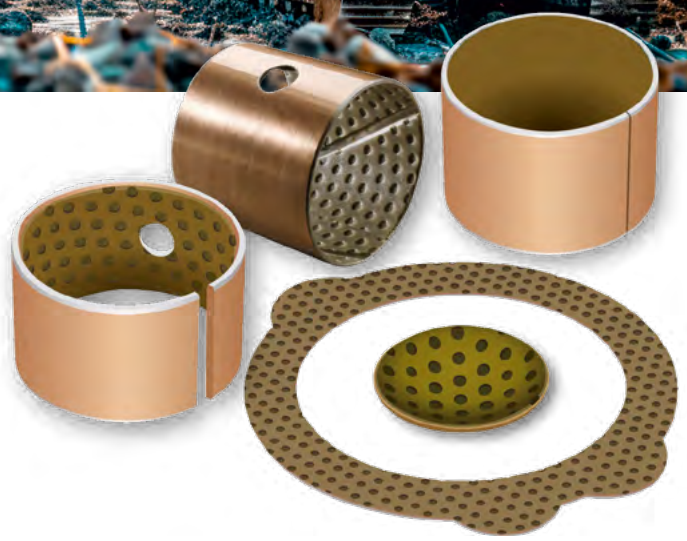
GGB
BY TIMKEN

GGB DX®10

compliant RoHS

MAINTENANCE-FREE, TRIBOLOGICAL BEARING SOLUTIONS FOR HIGH-DEMAND ENVIRONMENTS



Who we are

GGB helps create a world of motion with minimal frictional loss through plain bearing and surface engineering technologies. With global R&D, testing, and production facilities, GGB partners with customers worldwide on customized tribological design solutions that are efficient and environmentally sustainable. GGB's engineers bring their expertise and passion for tribology to a wide range of industries, including automotive, aerospace and industrial manufacturing. To learn more about tribology for surface engineering from GGB, visit **ggbearings.com**.

Our products are used in tens of thousands of critical applications every day on our planet. It is always our goal to provide superior, high-quality solutions for our customers' needs, no matter where those demands take our products. From space vehicles to golf carts and virtually everything in between, we offer the industry's most extensive range of high-performance, maintenance-free bearing solutions for a multitude of applications:

Aerospace

Agriculture

Automotive

Construction

E-Mobility

Energy

Exoskeletons

Fluid Power

Industrial

Medical

Mining

Oil & Gas

Primary Metals

Railway

Recreation

Robotics & Automation

The GGB Advantage

MAINTENANCE-FREE

GGB bearings are self-lubricating, making them ideal for applications requiring long bearing life without continuous lubrication.

LOW FRICTION, HIGH WEAR RESISTANCE

Low coefficients of friction eliminate the need for lubrication, while providing smooth operation, reducing wear and extending service life.

NVH (NOISE, VIBRATION, HARSHNESS)

Plain bearings provide a smooth sliding motion between surfaces and their material properties and simple design reduce noise, vibration and harshness.

LOWER SYSTEM COST

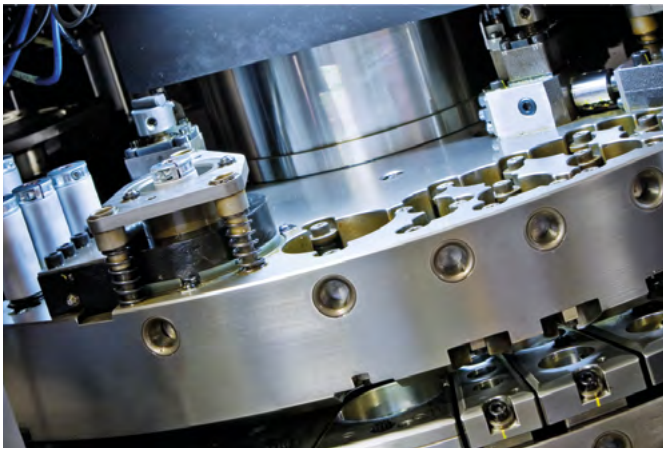
A one-piece design offers space and weight reductions and thanks to the material compositions and self-lubricating properties, less maintenance is needed.

REDUCED CO_2 FOOTPRINT

GGB's flexible and local production platforms assure timely deliveries and reduced CO_2 footprint.

PARTNER SUPPORT

GGB offers tribological, application and design support, and partners with our customers to provide the most efficient solutions.



The Highest Standards in Fabrication

Our world-class manufacturing plants are certified in quality and excellence according to ISO 9001, IATF 16949, ISO 14001 and ISO 45001. This allows us to access the industry's best practices while aligning our management system with global standards.

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

ggbearings.com/en/certificates

Introduction

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

DX®10 leads the way to lower maintenance and lower operational costs. In existing designs, DX®10 can replace troublesome bronze, bimetallic and roller bearings for a longer service life wherever possible.

CHARACTERISTICS

- High load capacity
- High PV capability
- Excellent abrasion resistance
- Good temperature resistance
- Very good performance with grease and oil lubrication
- Available with pin-indented surfaces for better lubricant retention, or unindented for oil-lubricated applications
- Available in bushings, washers and special shaped parts
- Machinability: DX®10 is a machinable product (consult our Applications Engineering Department for guidelines)

DX®10 IS AVAILABLE IN PLAIN BORE, UNINDENTED FORM.

DX®10 is available in plain bore, unindented form, which performs well in highly loaded, oil-lubricated applications that require:

HIGH-TEMPERATURE CAPABILITY

GOOD WEAR RESISTANCE

HIGH FATIGUE STRENGTH

EXCELLENT CHEMICAL RESISTANCE

EROSION RESISTANCE

LEAD FREE

RECOMMENDED MARKET APPLICATIONS*

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

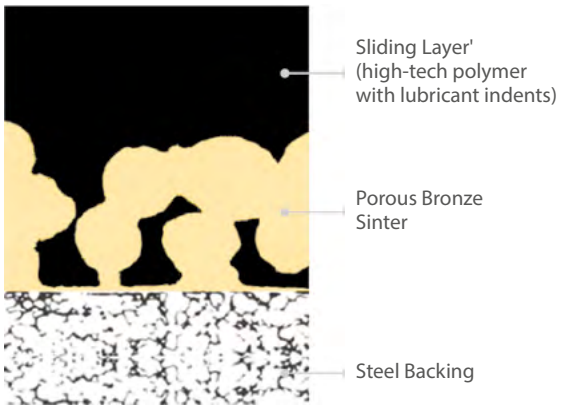
- Kingpins for trucks and off-highway equipment
- Truck and automotive suspensions
- Construction equipment
- Lift equipment
- Cranes
- Automotive oil pumps
- Small reciprocating bushings
- Mechanical handling and lifting equipment
- Recreational equipment
- Industrial machinery

* Inquire with our Applications Engineering Team for other possible applications.

BEARING PROPERTIES

BEARING PROPERTIES	IMPERIAL VALUE	METRIC VALUE
GENERAL		
Maximum load P, static	36,000 psi	250 N/mm²
Maximum load P, dynamic	20,000 psi	140 N/mm²
Operating temperature min.	- 40 °F	- 40 °C
Operating temperature max.	350 °F	175 °C
GREASE LUBRICATED		
Maximum sliding speed, V	500 fpm	2.5 m/s
Maximum PV factor	80,000 psi x fpm	2.8 N/mm² x m/s
Coefficient of friction, f	0.01 - 0.10	0.01 - 0.10
OIL LUBRICATED		
Maximum sliding speed, V	2,000 fpm	10.0 m/s
Maximum PV factor	80,000 psi x fpm	2.8 N/mm² x m/s
Coefficient of friction, f	0.01 - 0.06	0.01 - 0.06
RECOMMENDATIONS		
Shaft surface roughness, R_a	≤ 16 µin	≤ 0.4 µm
Shaft surface hardness - normal	HB > 200	
Shaft surface hardness - for longer service life	HB > 350	

MICROSECTION



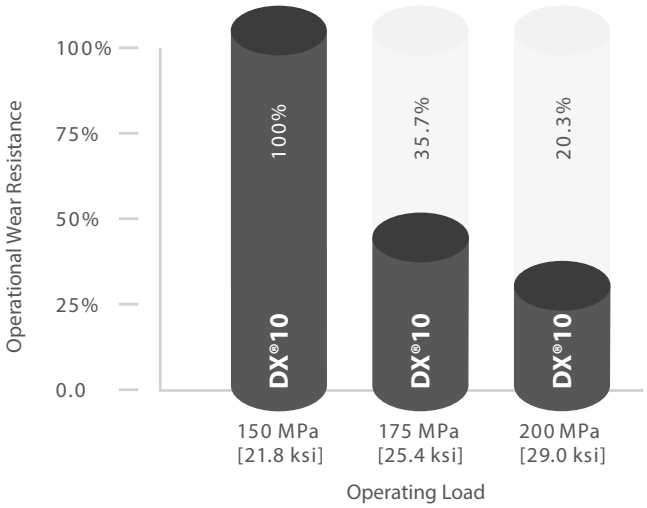
Baring Performance

WEAR RESISTANCE – EXTREME LOADS

DX®10 produces maximum wear resistance under a greased oscillation from low loads to the extreme load of 150 MPa. The DuraStrong™ technology works by developing a solid lubricant between the polymer liner system and the metallic interface, which prevents excess wear of the liner and significantly decreases the frictional response. The self-lubricating system is proven to be effective at maintaining an operational wear resistance at loads as high as 200 MPa.

OPERATIONAL WEAR TEST

Oscillation	±30° at 15 cpm
Temperature	22 °C [72 °F]
Shaft diameter	25.4 mm [0.9998 inch]
Shaft hardness	55 HRC
Grease mixture	Zinc based grease, greased once upon installation
Test duration	50 hours

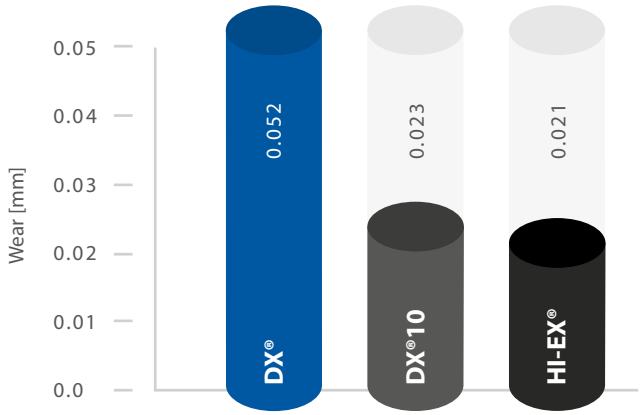


ABRASION RESISTANCE

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

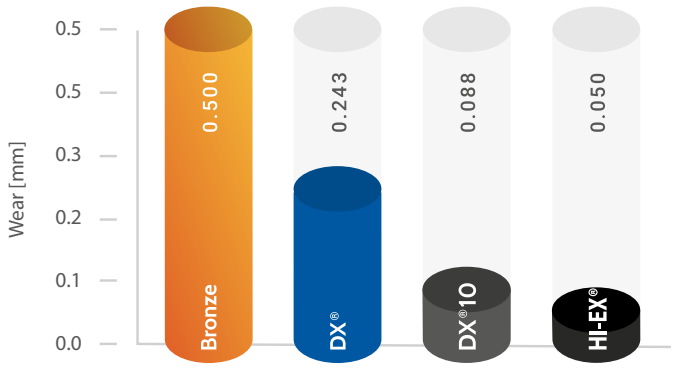


OSCILLATION WITH GREASE

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 15 cpm
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]

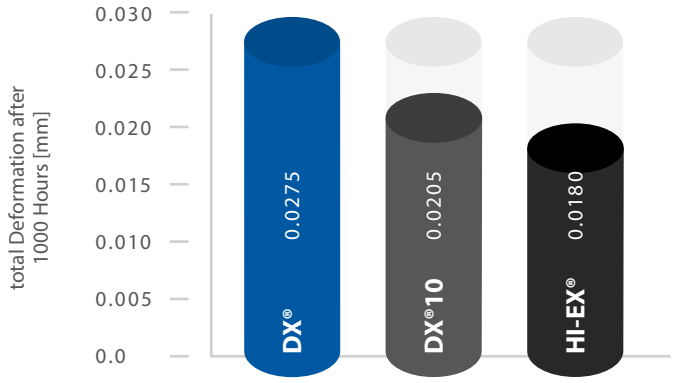


THERMAL DIMENSIONAL STABILITY

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

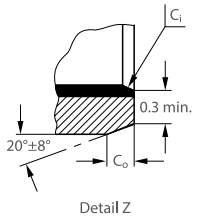
THRUST WASHER TEST

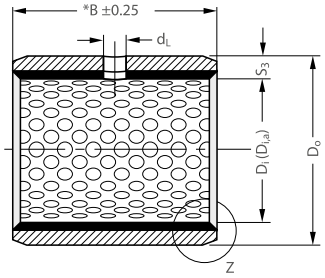
Load	36 MPa [5220 psi]
Material thickness	1.5 mm [0.059 inch]
Temperature	100 °C [212 °F]
Test duration	1000 hours

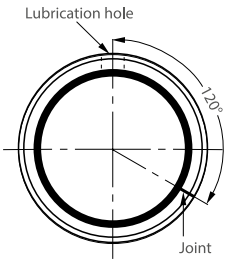


Standard Dimensions

PM DX®10 CYLINDRICAL BUSHES







*for $D_i \geq 80$ mm = B±0.5

Dimensions [mm], testing and material according to GGB specifications

PART NO.	TECHNICAL DATA					
DX®10	Dimensions				Installation	
	Inside Ø D_i	Outside Ø D_o	Width B	Lubrication hole Ød_L	Housing / Shaft	$D_{i,a}$
PM1010DX10	10	12	10	3	H7 / h8	+0.099 +0.049
PM1215DX10	12	14	15	4		
PM2015DX10	20	23	15	4		+0.121 +0.061
PM2020DX10	20	23	20	4		
PM2515DX10	25	28	15	6		
PM2520DX10	25	28	20	6		
PM2525DX10	25	28	25	6		
PM2830DX10	28	32	30	6		+0.023 +0.073
PM3530DX10	36	39	30	6		+0.143 +0.073
PM4050DX10	40	44	50	6		
PM5040DX10	50	55	40	8		+0.185 +0.095
PM5050DX10	50	55	50	8		
PM5060DX10	50	55	60	8		
PM6060DX10	60	65	60	8		
PM6570DX10	65	70	70	8		+0.247 +0.115
PM7560DX10	75	80	60	9.5		
PM8060DX10	80	85	60	9.5		+0.250 +0.118
PM8080DX10	80	85	80	9.5		
PM9060DX10	90	95	60	9.5		+0.260 +0.150
PM9090DX10	90	95	90	9.5		
PM11080DX10	110	115	80	9.5		
PM12060DX10	120	125	60	9.5		
PM200120DX10	200	205	120	-		+0.263 +0.153
PM22060DX10	220	225	60	-		
PM220120DX10	220	225	120	-		

Contact your local Timken representative for additional dimensions.
$D_{i,a}$ = Dimensions of the inner diameter of the bush after installation in the housing centre H7.

Bearing Application Data Sheet

Please complete the form below and share it with your sales engineer.

DATA FOR BEARING DESIGN CALCULATION

Application: _____

_____

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

☐ Steady Load ☐ Rotating Load ☐ Rotational Movement ☐ Oscillating Movement ☐ Linear Movement

DIMENSIONS [MM]

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

LOAD

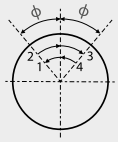
☐ Static load

☐ Dynamic load

Axial load F	[N]	
Radial load F	[N]	

MOVEMENT

Rotational speed	N [1/min]	
Speed	V [m/s]	
Length of stroke	L_S [mm]	
Frequence of stroke	[1/min]	
Oscillating cycle	ϕ[°]	
Osc. frequence	N_{osz} [1/min]	



MATING SURFACE

Material		
Hardness	HB/HRC	
Surface finish	R_a [µm]	

FITS & TOLERANCES

Shaft	D_J	
Bearing housing	D_H	

OPERATING ENVIRONMENT

Ambient temperature T_{amb} [°]	
Bearing housing material	

☐ 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

OPERATING ENVIRONMENT

☐ Dry

☐ Continuous lubrication

☐ Process fluid lubrication

☐ Initial lubrication only

☐ Hydrodynamic conditions

Process fluid	
Lubricant	
Dynamic viscosity η[mPas]	

SERVICE HOURS PER DAY

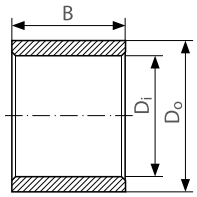
Continuous operation	
Intermittent operation	
Operating time	
Days per year	

SERVICE LIFE

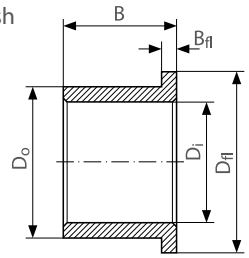
Required service life	L_H [h]	

BEARING TYPE

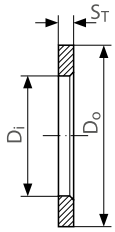
☐ Cylindrical bush



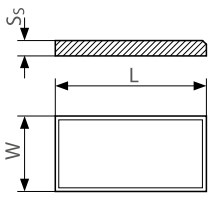
☐ Flanged bush



☐ Thrust washer



☐ Slide plate



☐ Special parts (sketch)

CUSTOMER INFORMATION

Company _____

Street _____

City / State / Province / Post Code _____

Telephone _____ Fax _____

Name _____

Email Address _____ Date _____

Product Information

This document is provided to give you the analysis tools or information to assist you in product selection. Product performance is affected by many factors beyond the control of GGB. Therefore, you must validate the suitability and feasibility of all product selections for your applications.

GGB products are sold subject to GGB's Terms of Sale and Delivery, which include our limited warranty and remedy.
You can find these here: **ggbearings.com/en/terms-and-conditions**, or ask your GGB representative for a copy.

Products are subject to continual development. GGB retains the right to make specification amendments or improvements to the technical data without prior announcement.

DOCUMENT INFORMATION

Edition 2026. This edition replaces earlier editions which hereby lose their validity.

Every reasonable effort has been made to ensure the accuracy of the information in this writing, but GGB assumes no liability for errors or omissions or for any other reason.

HEALTH AND SAFETY

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 followed. This includes RoHS and REACH guidelines. GGB is committed to operating 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 IATF 16949, ISO 9001, ISO 14001 and ISO 45001 quality regulations. Our certificates can be found here: **ggbearings.com/en/certificates**.

A detailed explanation of our commitment to REACH and RoHS directives can be found at **ggbearings.com/en/reach-rohs.**

TRADEMARKS

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Stronger.**Together.**

GGB BY TIMKEN

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IN136ENG05-26

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