



GGB-SHB Case Hardened Steel Bearings

FOR LUBRICATED APPLICATIONS

GGB Company History

FOR MORE THAN 120 YEARS, GGB HAS IMPROVED SURFACE ENGINEERING TO MOVE THE WORLD FORWARD.

GGB began in 1899 as Glacier Antifriction Metal Company, producing plain bearings and introducing many successful new products to the market, including internationally recognized polymer materials. Over the past 120 years, our company has continued forming strategic partnerships, continuously expanding into a global network of manufacturing facilities, increasing production capabilities and resources to become who we are today: world leaders in tribological innovation.

Today, our products can be found everywhere – from scientific vessels at the bottom of the ocean to race cars 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.

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 critical 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, across all roles. Our world-class manufacturing plants are certified in quality and excellence in the industry according to ISO 9001, IATF 16949, ISO 14001 and ISO 45001, 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 8 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.**

The Highest Standards in Quality

Our world-class manufacturing plants in the United States, Brazil, China, Germany, France and Slovakia 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:

www.ggbearings.com/en/company/certificates

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Product Information

GGB gives an assurance that the products described in this document have no manufacturing errors or material deficiencies.

The details set out in this document are registered to assist in assessing the material's suitability for the intended use. They have been developed from our own investigations as well as from generally accessible publications. They do not represent any assurance for the properties themselves.

Unless expressly declared in writing, GGB gives no warranty that the products described are suited to any particular purpose or specific operating circumstances. GGB accepts no liability for any losses, damages or costs however they may arise through direct or indirect use of these products.

GGB's sales and delivery terms and conditions, included as an integral part of quotations, stock and price lists, apply absolutely to all business conducted by GGB. Copies can be made available on request.

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

Edition 2023 (This edition replaces earlier editions which hereby lose their validity).





Introduction

The continuous improvements made in today's machinery and equipment are heavily dependent on the performance of the bearings.

The bearings are expected to perform under increasingly difficult operating conditions and still offer greater reliability, a longer service life with reduced maintenance and a lower cost of ownership.

GGB brings more than 120 years of experience and accumulated expertise in self-lubricating bearings, offering an extensive portfolio of bearing products and technical application knowledge across a wide range of industries. Our application engineering team can provide assistance in:

- Selection of the optimal type of bearing for your application
- Design with either standard or custom products
- Calculation of estimated life expectancy
- Assembly and installation

GGB offers the most advanced bearing products in the industry, supported by laboratory testing in state-of-the-art facilities, produced according to the highest quality standards.

This brochure gives information about GGB-SHB case hardened steel bearings that ideally suited to applications with harsh working conditions. Thanks to their characteristics, they are usually employed as a protection against wear on all coupling systems having a low rotation speed combined with a high specific pressure, where bearings, shafts, pins and coupling bolts can be easily replaced.

Applications

GGB-SHB case hardened steel bearings are perfectly suited to a wide range of applications, including:

- Earth moving machinery, excavators and loaders
- Farming machinery, power harrows, ploughs and harvesters
- Grabs, buckets and grippers
- Hydraulic cylinders for the protection against wear of bottoms and eyelets
- Industrial washing machines
- Sliding guides for industrial presses
- Suction pumps, sliding seats
- Machine tools

Characteristics

STANDARD PRODUCTS

- Steel 20MnV6, ASTM A381, DIN 1.5217
- Outer diameters from Ø 30 mm to Ø 100 mm
- Tolerances: Outer diameter u6 / Inner diameter C8
- Case hardening and tempering treatment
- Case hardening depth 0.8 - 1.0 mm
- Surface hardness HRC 58 - 62
- Over 60 000 bearings available in stock

SPECIAL PRODUCTS

- Other materials are available to order
- Outer diameters up to 250 mm are feasible

Advantages

The advantages gained from mounting GGB-SHB bearings are as follows:

- Special steel alloy containing manganese and vanadium for higher bearing strength, toughness and wear resistance
- Carburized case-hardened and tempered bearing surface for improved resistance to wear, to seizure and to fatigue damage under dynamic/shock loads
- Uniform heat treatment process and continuous quality checks to ensure the preset carburizing depth
- Tracability of the chemical and mechanical properties of each production batch for high product quality

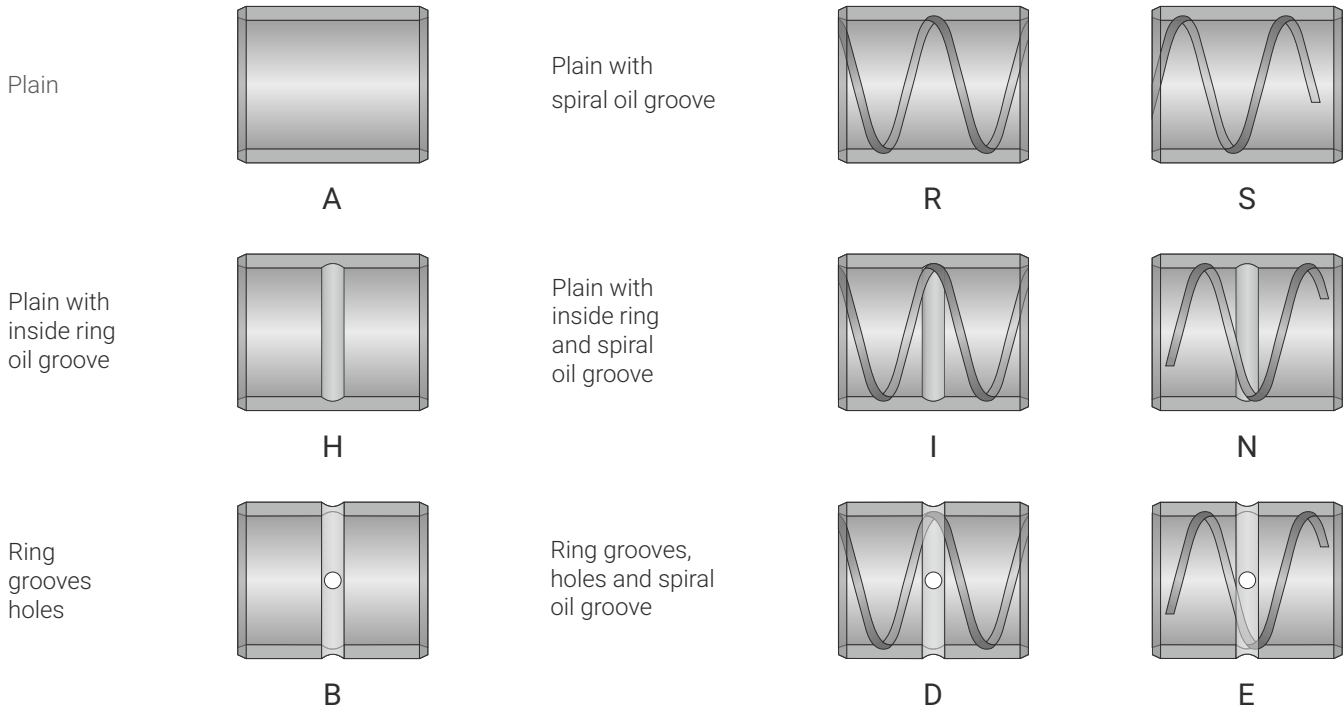
Available Forms

STANDARD CYLINDRICAL BEARINGS

Available with various grease grooves and holes, with hardening and tempering treatment.



STANDARD FORMS



SPECIAL BEARINGS

Available with various grease grooves, holes, and in flanged configuration.



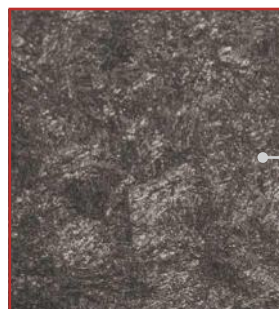
Bearing Properties



BEARING PROPERTIES		IMPERIAL UNITS	IMPERIAL VALUE	METRIC UNITS	METRIC VALUE
GENERAL					
Maximum load, p	Static	psi	43 500	N/mm ²	300
	Dynamic	psi	21 500	N/mm ²	150
Tensile strength		psi	79 750	N/mm ²	550
Maximum operating temperature		°F	302	°C	150
Density			0.282		7.8
Coefficient of linear thermal expansion		10 ⁻⁶ /F	6.67	10 ⁻⁶ /K	12
GREASE LUBRICATED					
Maximum sliding speed, U		fpm	19.7	m/s	0.1
Maximum pU factor		psi x fpm	42 000	N/mm ² x m/s	1.5
Coefficient of friction, f			0.2		0.2
MATING MATERIAL					
Bearing surface roughness, Ra		µin	≤ 31.5	µm	≤ 0.8
Bearing surface hardness		HRC	58 - 62	HRC	58 - 62

OPERATING PERFORMANCE	
Dry	Poor
Oil lubricated	Good
Grease lubricated	Very good
Water lubricated	Not recommended
Process fluid lubricated	Depending on fluid

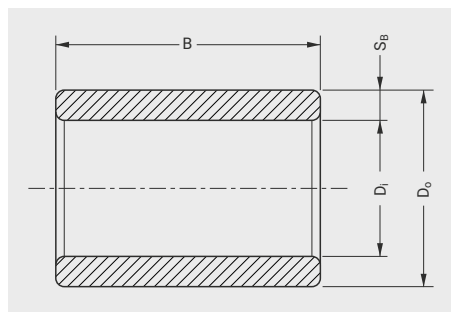
MICROSECTION



Steel E410, E470
(20MnV6, AISI A381)
acc. to EN 10305

Dimensions

STANDARD GGB-SHB BEARINGS



DIMENSIONS OF STANDARD CYLINDRICAL GGB-SHB CASE HARDENED STEEL BEARINGS [MM]

Nominal Diameter		Wall Thickness S_3	Width B																
D_i	D_o		20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
20	30	5.0	●	●	●	●	●	●	●	●	●	●							
25	35	4.0			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
30	38	4.0			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
30	40	5.0			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
35	45				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
40	50				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
45	55				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
50	60				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
55	65				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
60	70				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
65	75				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
70	80				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
75	85				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
80	90				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
85	95				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
90	100				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Table: Dimensions of standard cylindrical GGB-SHB case hardened steel bearings

STANDARD TOLERANCES

The standard range of GGB-SHB bearings are supplied with:

- outer and inner diameter tolerances of u6 and C8 respectively
- a casehardened depth of 0.8 - 1.0 mm
- a surface hardness of HRC 58 - 62

The case hardening and tempering treatment enhances the bearing's strength and resistance to wear enabling operation in the most arduous applications. The low surface roughness of the bearing reduces friction for improved efficiency. After initial greasing, relubrication intervals of up to 550 hours are possible (interval that can vary depending on the working conditions).

GGB-SHB bearings are available in standard sizes (see table on page 11) and, in most cases, are available from stock. Customized bearings designed by GGB or according to customer drawings can be produced and are made to order.

The bushes are marked with an identifiable marking for full traceability.

TOLERANCES OF STANDARD CYLINDRICAL GGB-SHB CASE HARDENED STEEL BEARINGS [MM]

Outside $\varnothing D_o$ [mm]	Tolerance u6 [μm]	Inside $\varnothing D_i$ [mm]	Tolerance C8 [μm]	Outside $\varnothing D_o$ [mm]	Tolerance u6 [μm]	Inside $\varnothing D_i$ [mm]	Tolerance C8 [μm]
> 24 ≤ 30	+ 61 + 48	> 18 ≤ 30	+ 143 + 110	> 100 ≤ 120	+ 166 + 144	> 100 ≤ 120	+ 234 + 180
> 30 ≤ 40	+ 76 + 60	> 30 ≤ 40	+ 159 + 120	> 120 ≤ 140	+ 195 + 170	> 120 ≤ 140	+ 263 + 200
> 40 ≤ 50	+ 86 + 70	> 40 ≤ 50	+ 169 + 130	> 140 ≤ 160	+ 215 + 190	> 140 ≤ 160	+ 273 + 210
> 50 ≤ 65	+ 106 + 87	> 50 ≤ 65	+ 186 + 140	> 160 ≤ 180	+ 235 + 210	> 160 ≤ 180	+ 293 + 230
> 65 ≤ 80	+ 121 + 102	> 65 ≤ 80	+ 196 + 150	> 180 ≤ 200	+ 265 + 236	> 180 ≤ 200	+ 312 + 240
> 80 ≤ 100	+ 146 + 124	> 80 ≤ 100	+ 224 + 170	> 200 ≤ 225	+ 287 + 258	> 200 ≤ 225	+ 332 + 206

Table: Tolerances of standard cylindrical GGB-SHB case hardened steel bearings

Assembly

Under normal conditions, it is recommended that the bearing is mounted with an interference fit into the housing to avoid movement of the bearing during operation.

GGB-SHB bearings can be assembled into the housing by using the following methods.

1. Assembly with a press

The GGB-SHB bearing can be inserted into the housing by using an appropriate tool and press.

2. Assembly with liquid nitrogen

Submerging the GGB-SHB bearing into liquid nitrogen sufficiently reduces the bearing outer diameter to enable an easy insertion of the bearing into the housing.

RECOMMENDED TOLERANCES FOR THE HOUSING AND THE SHAFT

Housing $\varnothing D_{\text{housing}}$ [mm]	Tolerance H7 [μm]	Tolerance H8 [μm]	Pin $\varnothing D_{\text{pin}}$ [mm]	Tolerance H7 [μm]
$> 18 \leq 30$	+ 21 + 0	+ 33 + 0	$> 18 \leq 30$	0 - 21
$> 30 \leq 50$	+ 25 + 0	+ 29 + 0	$> 30 \leq 50$	0 - 25
$> 50 \leq 80$	+ 30 + 0	+ 46 + 0	$> 50 \leq 80$	0 - 30
$> 80 \leq 120$	+ 35 + 0	+ 54 + 0	$> 80 \leq 120$	0 - 35
$> 120 \leq 180$	+ 40 + 0	+ 63 + 0	$> 120 \leq 180$	0 - 40
$> 180 \leq 250$	+ 46 + 0	+ 72 + 0	$> 180 \leq 250$	0 - 46

Table: Recommended tolerances for the housing and the shaft

By following the recommended tolerances indicated in the above table:

- Inner diameter tolerance H7 or H8 of the housing obtained by reaming
- Bearing outer diameter and inner diameter tolerances of u6 and C8 respectively

a clearance of approximately 80 μm will be obtained between the bearing and the shaft.

This clearance is sufficient to allow a correct distribution of the lubricant in the bearing whilst ensuring a precise guidance of the shaft.

Bearing Application Data Sheet

Not sure which GGB part fits your application requirements?

Please 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

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

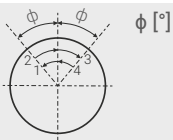
LOAD

Static load
 Dynamic load

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

MOVEMENT

Rotational speed	N [1/min]
Speed	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	Ra [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} [°]
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

LUBRICATION

Dry
 Continuous lubrication
 Process fluid lubrication
 Initial lubrication only
 Hydrodynamic conditions

Process fluid	
Lubricant	
Dynamic viscosity	η [mPas]

SERVICE HOURS PER DAY

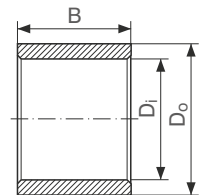
Continuous operation	
Intermittent operation	
Operating time	
Days per year	

SERVICE LIFE

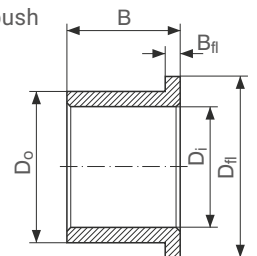
Required service life	L_H [h]
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BEARING TYPE

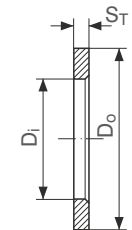
Cylindrical bush



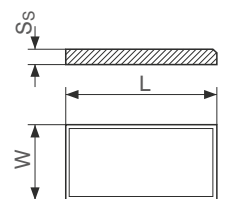
Flanged bush



Thrust washer



Slideplate



Special parts (sketch)

PUSHING BOUNDARIES TO CO-CREATE A HIGHER QUALITY OF LIFE



GGB NORTH AMERICA

P.O. Box 189 | 700 Mid Atlantic Parkway

USA | Thorofare, New Jersey, 08086

Tel: +1 856 848 3200

www.ggbearings.com



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