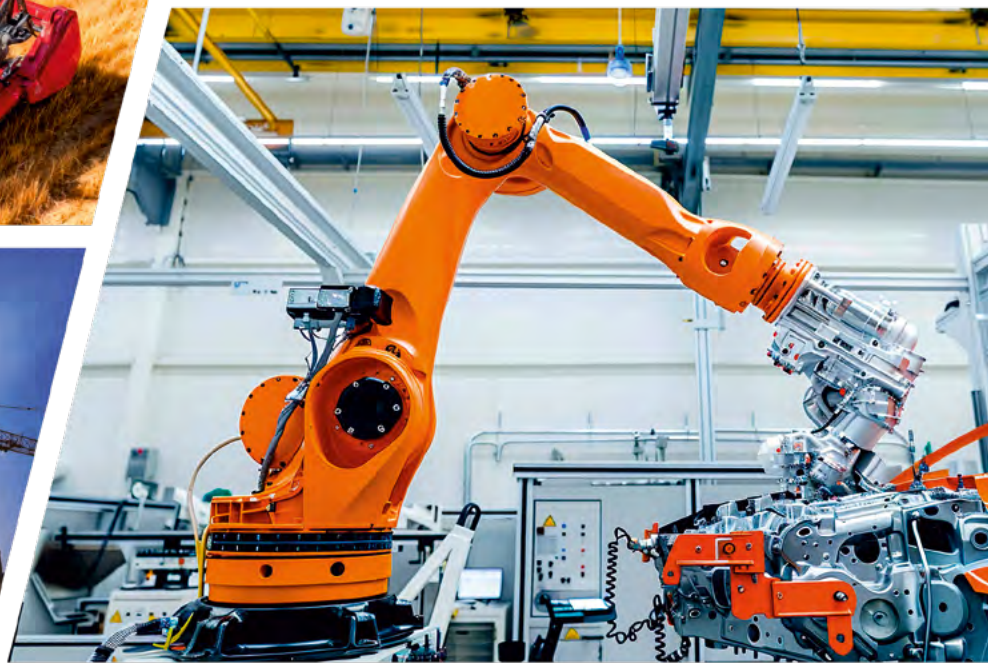
GGB
BY TIMKEN



compliant RoHS

GGB-SHB®
Case Hardened Steel Bearings

FOR LUBRICATED APPLICATIONS

Who we are

GGB helps create a world of motion with minimal frictional loss through plain bearing and surface engineering technologies. With R&D, testing and production facilities in the United States, Germany, France, Brazil, Slovakia and China, 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 **www.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

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

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

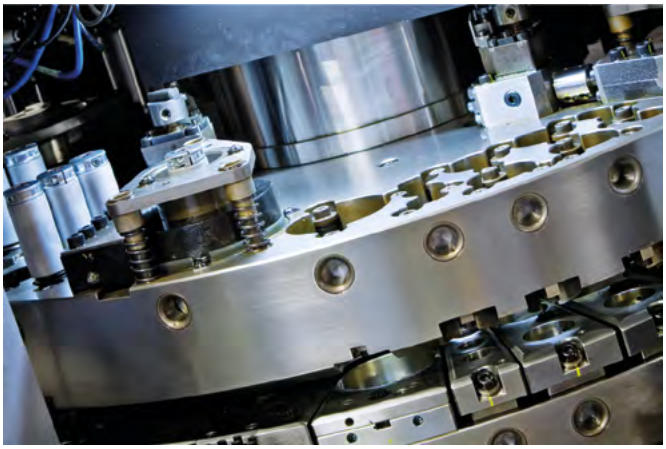
A one-piece design offers space and weight reductions and thanks to the material compositions and self-lubricating properties, less maintenance is needed.

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:

www.ggbearings.com/en/certificates

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1 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 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.

2 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

3 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

4 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

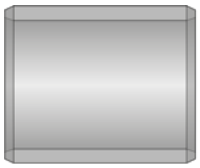
5 Available Forms

STANDARD CYLINDRICAL BEARINGS

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

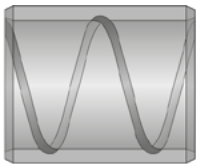
STANDARD FORMS

Plain

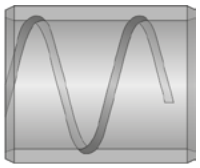


A

Plain with spiral oil groove

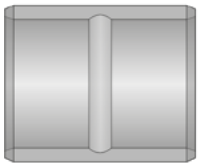


R



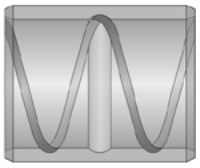
S

Plain with inside ring oil groove

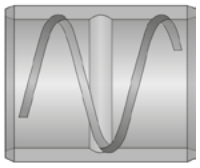


H

Plain with inside ring and spiral oil groove

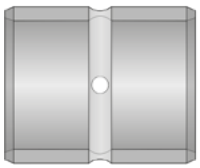


I



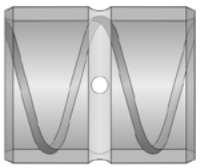
N

Ring grooves holes

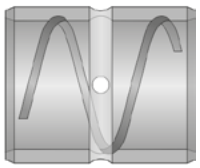


B

Ring grooves, holes and spiral oil groove



D



E

SPECIAL BEARINGS

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

6 Bearing Properties

BEARING PROPERTIES		IMPERIAL UNITS	IMPERIAL VALUE	METRIC UNITS	METRIC VALUE
GENERAL					
Maximum load, p	Static	psi	43 500	N/mm²	300
	Dynamic	psi	21 500	N/mm²	150
Tensile strength		psi	79 750	N/mm²	550
Operating temperature	min.	°F	-4	°C	-20
	max.	°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/mm² x m/s	1.5
Coefficient of friction, f			0.2		0.2
MATING MATERIAL					
Bearing surface roughness, R_a		µin	≤ 31.5	µm	≤ 0.8
Bearing surface hardness		HRC	58 - 62	HRC	58 - 62

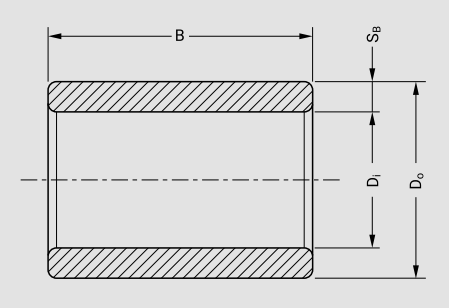
OPERATING PERFORMANCE	
Dry	Poor
Oil lubricated	Good
Grease lubricated	Very good
Water lubricated	Not recommended
Process fluid lubricated	Depending on fluid

MICROSECTION

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

7 Dimensions

7.1 STANDARD GGB-SHB® BEARINGS



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

Nominal Diameter		Wall Thickness	Width B																
D_i	D_o	S_3	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
20	30	5.0	●	●	●	●	●	●	●	●	●	●							
25	35				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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 1: Dimensions of standard cylindrical GGB-SHB® case hardened steel bearings

7.2 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 identilble marking for full tracability.

TOLERANCES OF STANDARD CYLINDRICAL GGB-SHB® CASE HARDENED STEEL BEARINGS [mm]							
Outside Ø D_o [mm]	Tolerance u6 [µm]	Inside Ø D_i [mm]	Tolerance C8 [µm]	Outside Ø D_o [mm]	Tolerance u6 [µm]	Inside Ø 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 2: Tolerances of standard cylindrical GGB-SHB® case hardened steel bearings

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

Table 3: 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 80µm 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.

9 Bearing Application Data Sheet

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

DATA FOR BEARING DESIGN CALCULATION

Application: _____

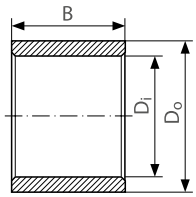
_____

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

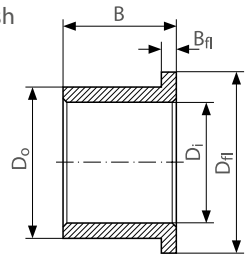
☐ Steady Load ☐ Rotating Load ☐ Rotational Movement ☐ Oscillating Movement ☐ Linear Movement

BEARING TYPE

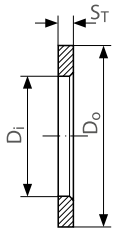
☐ Cylindrical bush



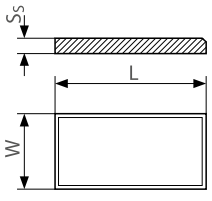
☐ Flanged bush



☐ Thrust washer



☐ Slide plate



☐ Special parts (sketch)

DIMENSIONS [MM]

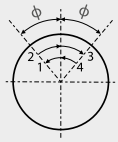
Inside diameter	D_i	
Outside diameter	D_o	
Length	B	
Flange diameter	D_{fl}	
Flange thickness	B_{fl}	
Wall thickness	S_T	
Length of slideplate	L	
Width of slideplate	W	
Thickness of slideplate	S_S	

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]	
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]	

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: **https://www.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 2025. 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:

https://www.ggbearings.com/en/company/certificates.

A detailed explanation of our commitment to REACH and RoHS directives can be found at

https://www.ggbearings.com/en/company/reach-rohs.

TRADEMARKS

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Stronger.**Together.**

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