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 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 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.*
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 2020 (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 115 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.
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

**Applications**

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

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- 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

Plain
A

Plain with spiral oil groove
R

Plain with inside ring oil groove
H

Plain with inside ring and spiral oil groove
I

Ring grooves, holes and spiral oil groove
B

D

E

SPECIAL BEARINGS
Available with various grease grooves, holes, and in flanged configuration.
Bearing Properties

### BEARING PROPERTIES

<table>
<thead>
<tr>
<th></th>
<th>IMPERIAL UNITS</th>
<th>IMPERIAL VALUE</th>
<th>METRIC UNITS</th>
<th>METRIC VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load, p</td>
<td>psi</td>
<td>43 500</td>
<td>N/mm²</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>psi</td>
<td>21 500</td>
<td>N/mm²</td>
<td>150</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>psi</td>
<td>79 750</td>
<td>N/mm²</td>
<td>550</td>
</tr>
<tr>
<td>Maximum operating temperature</td>
<td>°F</td>
<td>302</td>
<td>°C</td>
<td>150</td>
</tr>
<tr>
<td>Density</td>
<td></td>
<td>0.282</td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td>Coefficient of linear thermal expansion</td>
<td>$10^6$/F</td>
<td>6.67</td>
<td>$10^6$/K</td>
<td>12</td>
</tr>
<tr>
<td><strong>GREASE LUBRICATED</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum sliding speed, U</td>
<td>fpm</td>
<td>19.7</td>
<td>m/s</td>
<td>0.1</td>
</tr>
<tr>
<td>Maximum pU factor</td>
<td>psi x fpm</td>
<td>42 000</td>
<td>N/mm² x m/s</td>
<td>1.5</td>
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<tr>
<td>Coefficient of friction, f</td>
<td></td>
<td>0.2</td>
<td></td>
<td>0.2</td>
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<tr>
<td><strong>MATING MATERIAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bearing surface roughness, Ra</td>
<td>μin</td>
<td>≤ 31.5</td>
<td>μm</td>
<td>≤ 0.8</td>
</tr>
<tr>
<td>Bearing surface hardness</td>
<td>HRC</td>
<td>58 - 62</td>
<td>HRC</td>
<td>58 - 62</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>IMPERIAL UNITS</th>
<th>IMPERIAL VALUE</th>
<th>METRIC UNITS</th>
<th>METRIC VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPERATING PERFORMANCE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>Poor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil lubricated</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grease lubricated</td>
<td>Very good</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water lubricated</td>
<td>Not recommended</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process fluid lubricated</td>
<td>Depending on fluid</td>
<td></td>
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</table>

### MICROSECTION

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

THE TRIBOLOGICAL SOLUTION PROVIDER FOR INDUSTRIAL PROGRESS, REGARDLESS OF SHAPE OR MATERIAL
# Dimensions

## STANDARD GGB-SHB® BEARINGS

![Diagram of cylindrical bearing](image)

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

<table>
<thead>
<tr>
<th>Nominal Diameter</th>
<th>Wall Thickness S</th>
<th>Width B</th>
</tr>
</thead>
<tbody>
<tr>
<td>D&lt;sub&gt;i&lt;/sub&gt;</td>
<td>D&lt;sub&gt;o&lt;/sub&gt;</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
<td>5.0</td>
</tr>
<tr>
<td>25</td>
<td>35</td>
<td>5.0</td>
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<tr>
<td>30</td>
<td>38</td>
<td>4.0</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>55</td>
<td></td>
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<tr>
<td>50</td>
<td>60</td>
<td></td>
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<tr>
<td>55</td>
<td>65</td>
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<td>60</td>
<td>70</td>
<td>5.0</td>
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<tr>
<td>75</td>
<td>85</td>
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</tr>
<tr>
<td>80</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

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 identible marking for full tracability.

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 24 ≤ 30</td>
<td>+ 61</td>
<td>&gt; 18 ≤ 30</td>
<td>+ 143</td>
<td>&gt; 100 ≤ 120</td>
<td>+ 166</td>
<td>&gt; 100 ≤ 120</td>
<td>+ 234</td>
</tr>
<tr>
<td></td>
<td>+ 48</td>
<td></td>
<td></td>
<td></td>
<td>+ 144</td>
<td></td>
<td>+ 180</td>
</tr>
<tr>
<td>&gt; 30 ≤ 40</td>
<td>+ 76</td>
<td>&gt; 30 ≤ 40</td>
<td>+ 159</td>
<td>&gt; 120 ≤ 140</td>
<td>+ 195</td>
<td>&gt; 120 ≤ 140</td>
<td>+ 263</td>
</tr>
<tr>
<td></td>
<td>+ 60</td>
<td></td>
<td></td>
<td></td>
<td>+ 170</td>
<td></td>
<td>+ 200</td>
</tr>
<tr>
<td>&gt; 40 ≤ 50</td>
<td>+ 86</td>
<td>&gt; 40 ≤ 50</td>
<td>+ 169</td>
<td>&gt; 140 ≤ 160</td>
<td>+ 215</td>
<td>&gt; 140 ≤ 160</td>
<td>+ 273</td>
</tr>
<tr>
<td></td>
<td>+ 70</td>
<td></td>
<td></td>
<td></td>
<td>+ 190</td>
<td></td>
<td>+ 210</td>
</tr>
<tr>
<td>&gt; 50 ≤ 65</td>
<td>+ 106</td>
<td>&gt; 50 ≤ 65</td>
<td>+ 186</td>
<td>&gt; 160 ≤ 180</td>
<td>+ 235</td>
<td>&gt; 160 ≤ 180</td>
<td>+ 293</td>
</tr>
<tr>
<td></td>
<td>+ 87</td>
<td></td>
<td></td>
<td></td>
<td>+ 210</td>
<td></td>
<td>+ 230</td>
</tr>
<tr>
<td>&gt; 65 ≤ 80</td>
<td>+ 121</td>
<td>&gt; 65 ≤ 80</td>
<td>+ 196</td>
<td>&gt; 180 ≤ 200</td>
<td>+ 265</td>
<td>&gt; 180 ≤ 200</td>
<td>+ 312</td>
</tr>
<tr>
<td></td>
<td>+ 102</td>
<td></td>
<td></td>
<td></td>
<td>+ 236</td>
<td></td>
<td>+ 240</td>
</tr>
<tr>
<td>&gt; 80 ≤ 100</td>
<td>+ 146</td>
<td>&gt; 80 ≤ 100</td>
<td>+ 224</td>
<td>&gt; 200 ≤ 225</td>
<td>+ 287</td>
<td>&gt; 200 ≤ 225</td>
<td>+ 332</td>
</tr>
<tr>
<td></td>
<td>+ 124</td>
<td></td>
<td></td>
<td></td>
<td>+ 258</td>
<td></td>
<td>+ 206</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Tolerance</th>
<th>H7 [μm]</th>
<th>H8 [μm]</th>
<th>Ø Dpin [mm]</th>
<th>Ø Dhousing [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 18 ≤ 30</td>
<td>+ 21</td>
<td>+ 33</td>
<td>&gt; 18 ≤ 30</td>
<td>+ 33</td>
</tr>
<tr>
<td>&gt; 30 ≤ 50</td>
<td>+ 25</td>
<td>+ 29</td>
<td>&gt; 30 ≤ 50</td>
<td>+ 29</td>
</tr>
<tr>
<td>&gt; 50 ≤ 80</td>
<td>+ 30</td>
<td>+ 46</td>
<td>&gt; 50 ≤ 80</td>
<td>+ 46</td>
</tr>
<tr>
<td>&gt; 80 ≤ 120</td>
<td>+ 35</td>
<td>+ 54</td>
<td>&gt; 80 ≤ 120</td>
<td>+ 54</td>
</tr>
<tr>
<td>&gt; 120 ≤ 180</td>
<td>+ 40</td>
<td>+ 63</td>
<td>&gt; 120 ≤ 180</td>
<td>+ 63</td>
</tr>
<tr>
<td>&gt; 180 ≤ 250</td>
<td>+ 46</td>
<td>+ 72</td>
<td>&gt; 180 ≤ 250</td>
<td>+ 72</td>
</tr>
</tbody>
</table>

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 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.
Bearing Application Data Sheet

Please complete the form below and share it with your GGB sales engineer or send it to: usa@ggbearings.com

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]

<table>
<thead>
<tr>
<th>Inside diameter</th>
<th>Outside diameter</th>
<th>Length</th>
<th>Flange Diameter</th>
<th>Flange thickness</th>
<th>Wall thickness</th>
<th>Length of slideplate</th>
<th>Width of slideplate</th>
<th>Thickness of slideplate</th>
</tr>
</thead>
<tbody>
<tr>
<td>D₁</td>
<td>D₉</td>
<td>B</td>
<td>D₁囫</td>
<td>B₈</td>
<td>S₁</td>
<td>L</td>
<td>W</td>
<td>S₅</td>
</tr>
</tbody>
</table>

FITS & TOLERANCES

<table>
<thead>
<tr>
<th>Shaft</th>
<th>Bearing housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dⱼ</td>
<td>D₉</td>
</tr>
</tbody>
</table>

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 $\eta$ [mPas]

SERVICE HOURS PER DAY

Continuous operation
Interruption operation
Operating time
Days per year

SERVICE LIFE

Required service life $L_s$ [h]

CUSTOMER INFORMATION

Company __________________________________________

Street _____________________________________________

City / State / Province / Post Code __________________________

Telephone ___________________________ Fax ___________________________

Name ___________________________________________ Date ___________________________

BEARING TYPE

☐ Cylindrical bush

☐ Flanged bush

☐ Thrust washer

☐ Slideplate

☐ Special parts (sketch)