FBS BEARINGS

The ZEN Bearings **Food and Beverage-Safe Line**

Hygienic Food-Grade Bearings

FDA

TÜVRheinland CERT

DIN

A line Specifically Designed to Meet the Needs of the Food and Beverage Industry

Food-safe and Hygienic Products that Help You Comply With FDA Regulations:

- Easy to clean.
- Protection against contamination and lubricant leakage.
- Able to withstand continuous washdowns.
- Non-toxic.
- Excellent corrosion protection.

Excellent Performance in Extreme Cold and Hot Temperatures:

From extreme heat in baking applications to freezer environments, FBS stainless steel bearings, housings, hybrid and ceramic bearings adapt to the diverse temperature requirements within the industry.

Minimum Downtime and Operating Costs:

Thanks to the durability and reliability of the FBS line, your operations will experience enhanced efficiency. These bearings guarantee optimal equipment performance and longevity.

Why choose ZEN Bearings?

Quality and Consistency Assured:

- Our manufacturing process follows German DIN design, materials, dimensions, and performance standards.
- We meticulously ensure that bearings meet DIN standards during and after manufacturing at our ISO 9001:2015 certified inspection centre.
- Our German-style management guarantees top-quality products and consistent quality control across our global locations.

The Support of a Brand that is Close and Accessible to its Customers:

We provide not only high-quality bearings but also high-quality customer service. Thanks to our dedicated staff, 80% of our customers choose us again.

Products Backed by a Global Group:

The ZEN Group is a global bearing manufacturer with a strong distribution network and offices worldwide, allowing us to offer you the guarantees of a consolidated company in the market.

Experience ZEN Bearing's proven durability and reliability. Contact us today for a free quote!

Our FBS Line at a Glance

All the bearings, housings and inserts within our FBS line are made with materials and provided with lubricants that comply with the industry standards and regulations.

They are designed to prevent the entry of contaminants such as dust, moisture, or cleaning agents into the bearing and to withstand frequent washdowns.

FDA DIN

Stainless Steel FBS Bearings

Hygiene / Cleanability

Corrosion Resistance

Temperature Resistance

AISI 420 AC+ FBS Bearings

Hygiene / Cleanability

Corrosion Resistance

Temperature Resistance

Solid Oil FBS Bearings

Hygiene / Cleanability

Corrosion Resistance

Temperature Resistance

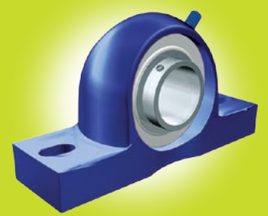
Ceramic & Hybrid FBS Bearings

Hygiene / Cleanability

Corrosion Resistance

Temperature Resistance

Thermoplastic FBS Housings



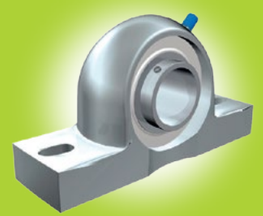
Hygiene / Cleanability

Corrosion Resistance

Temperature Resistance

VS

Stainless Steel FBS Housings

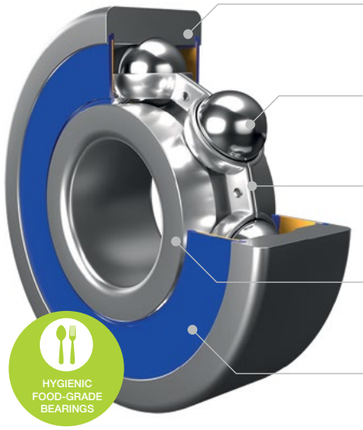


Hygiene / Cleanability

Corrosion Resistance

Temperature Resistance

ZEN Stainless Steel FBS bearings



Outer Ring
AISI 420 grade stainless steel

Balls
AISI 420 grade stainless steel

Cage
AISI 304 grade stainless steel

Inner Ring
AISI 420 grade stainless steel

Seal & Shields
FDA-approved synthetic rubber (NBR) and metal shields

Seals and Shields:

These food and beverage safe bearings come with FDA-approved NBR seals and metal shields to protect against dirt and other particles. They help keep the lubricant inside, prevent corrosion, and make cleaning the bearing easier. Additionally, the NBR seals provide several benefits:

- Resistant to vegetable oil and animal fats.
- Resistant to mould and water.
- Non-toxic and odourless.
- Preserve the properties of the food they come in contact with.

Features:

- ZEN stainless steel FBS bearings are made of AISI 420 and AISI 304, which are recognised as food-grade materials and comply with FDA regulations.
- They offer excellent corrosion resistance and can withstand frequent washing with high-pressure water or chemicals, remaining undamaged by extreme temperatures.
- They are also non-toxic, non-porous, and easy to clean, making them suitable for food and beverage applications where hygiene is crucial.
- With high hardness and wear resistance, they can handle high loads and vibrations, resulting in longer service life.

Lubrication:

The ZEN FBS Line is supplied with FDA-compliant MobilgreaseTM FM, which has the following properties:

Lubrication Features & Benefits — Hygienic Food-Grade Bearings

Meets global performance & cultural requirements:
- NSF H1 Registered.
- Kosher/Parve.
- Halal.

Non-Toxic formulation
- Allows use in food packaging and processing applications.

Very good anti-wear properties
- Reduces wear and extends equipment life.

Excellent oxidation stability
- Provides long oil and equipment life and extends filter life.

High level corrosion protection
- Prevents internal hydraulic system corrosion.
- Reduces negative effects of moisture in systems.
- Provide corrosion protection of multi-metallurgy component designs.

Meets a wide range of equipment requirements
- Reduced potential for product misapplication.

Excellent air separation characteristics
- Reduces foaming and its negative effects.

Very good water separation properties
- Protects systems where small quantities of moisture are present.
- Readily separates larger quantities of water.

ZEN AISI 420 AC+ FBS bearings

One step further to prevent corrosion.

Features:

- ZEN AISI 420 AC+ bearings are enhanced with a special surface treatment developed by ZEN, which allows them to outperform the rust protection of standard AISI 420 and AISI 440 stainless steel.
- They comply with FDA and RoHS standards and last twice as long as standard stainless steel bearings, reducing replacement costs and downtime due to corrosion.

Seals and Shields:

Our AISI 420 AC+ bearings are offered with NBR seals and metal shields to ensure cleanliness, safety, and reliable performance. They are also available in an open version.

Lubrication:

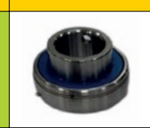
They are provided with FDA-compliant Mobilgrease™ FM (see advantages on page 5).

Comparing AISI 440 and AISI 420 Stainless Steel With ZEN AISI 420 AC+

- We conducted a 120-hour salt spray test to demonstrate the corrosion resistance of ZEN AISI 420 AC+ bearings. Along with the sample of AISI 420 AC+, samples of AISI 440 and 420 were included in the test.
- After 120 hours of testing, AISI 420 stainless steel AC+ remained virtually untouched by corrosion. There was no rust mark on the inner and outer rings of the bearing, only some rust spots on the oil groove.

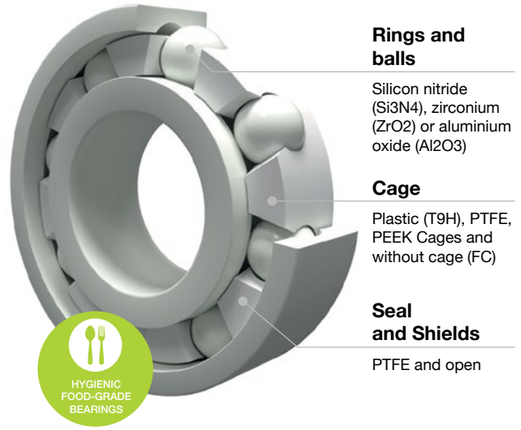
Salt Spray Test Report

Criteria GB/T	10125-1997	Salt Spray Test	Sample	Ref	Result
Sample solution	50g / l±5g / l NaCl			AISI 420 stainless steel AC+	No rust mark on the inner and outer ring, only some rust spots on the oil groove
Application temperature	(35±2) °C		Bearing	AISI 420	Traces of rust on the inner and outer rings
Ph	6.5~7.2			AISI 440	The inner and outer rings have serious rust marks
Spray volume	1~2ml/80cm² /h				
Test Duration	120 hours				

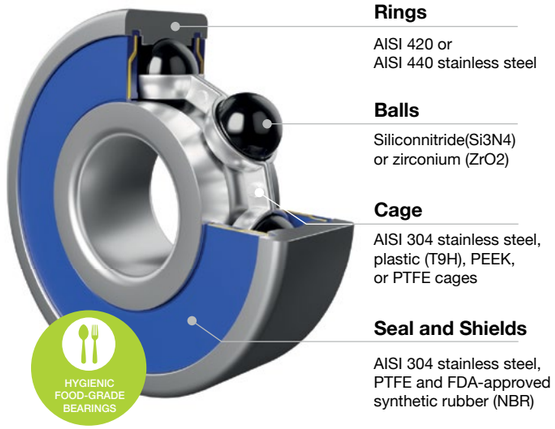
	12hrs	24hrs	48hrs	72hrs	96hrs	120hrs
AISI 420 Stainless steel AC+						
AISI 420						
AISI 440						

ZEN Full Ceramic and Hybrid FBS Bearings

ZEN Full Ceramic FBS Bearings:



ZEN Hybrid FBS Bearings:



Features:

- ZEN Full Ceramic and Hybrid FBS Bearings are ideal for demanding food and beverage applications requiring superior corrosion resistance and higher temperature capabilities than stainless steel bearings.
- The rings and balls in full ceramic bearings, and the balls in hybrid bearings, are made from Silicon Nitride (Si3N4) or Zirconium (ZrO2), enabling exceptional performance beyond the limits of conventional materials.
- These bearings offer excellent durability against continuous exposure to water, harsh chemicals, acids, and alkalis, minimising maintenance requirements.
- They are designed to withstand extreme heat from cooking, baking, and cold from refrigeration or freezer applications. Silicon Nitride (Si3N4) can handle temperatures from -210°C to 1100°C, while Zirconium (ZrO2) can handle temperatures from -190°C up to 400°C. For even higher temperature needs, our solid ceramic bearings made of Aluminium Oxide (Al2O3) can withstand working temperatures of up to 1750°C.
- In the case of hybrid bearings, the rings possess the corrosion resistance and temperature properties of AISI 420 or AISI 440 grade stainless steel.
- The low friction coefficient of ZEN FBS Ceramic and Hybrid bearings contributes to cost savings through the extended lifespan, reduced lubrication needs, and lower energy consumption.

Seals and Shields:

To comply with the strict hygiene and safety requirements in the food and beverage industry, ceramic and hybrid FBS bearings come with FDA-compliant PTFE seals.

Key Features of our FDA-compliant PTFE Seals Include:

- Excellent thermal stability (-40 oC to 250ºC).
- Optimal resistance to aggressive cleaners and disinfectants used in the industry.
- Effective protection against contamination by keeping debris and liquid away from the surface.

Furthermore, our hybrid bearings come with FDA- approved synthetic rubber (NBR) and AISI 304 stainless steel shields, offering enhanced temperature resistance.

Lubrication:

ZEN Full Ceramic FBS Bearings can run lubrication-free, thus reducing contamination risk and maintenance and cutting costs.

ZEN Hybrid FBS Bearings can function with less lubrication than stainless steel bearings due to their reduced coefficient of friction and lightweight balls. These bearings are available with FDA-compliant Mobilgrease™ FM (see advantages on page 5).

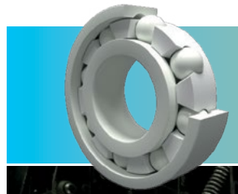
Cages:

The cage could limit the temperature that full ceramic bearings can reach. For this reason, and to better adapt to the needs of the industry, our Full Ceramic FBS Bearings are offered with plastic (T9H), PTFE, PEEK cages and without cage (FC).

ZEN Hybrid FBS bearings can be supplied with AISI 304 stainless steel, plastic (T9H) or FDA- complaint PTFE cages.

Inner & Outer Rings Balls / Cage	Long-time working temp
ZrO2 / ZrO2 / PTFE	
ZrO2 / ZrO2 / PEEK	
ZrO2 / ZrO2 / FC	
Si3N4 / Si3N4 / PTFE	
Si3N4 / Si3N4 / PEEK	
Si3N4 / Si3N4 / FC	
Al2O3 / Al2O3 / PTFE	
Al2O3 / Al2O3 / PEEK	
Al2O3 / Al2O3 / FC	

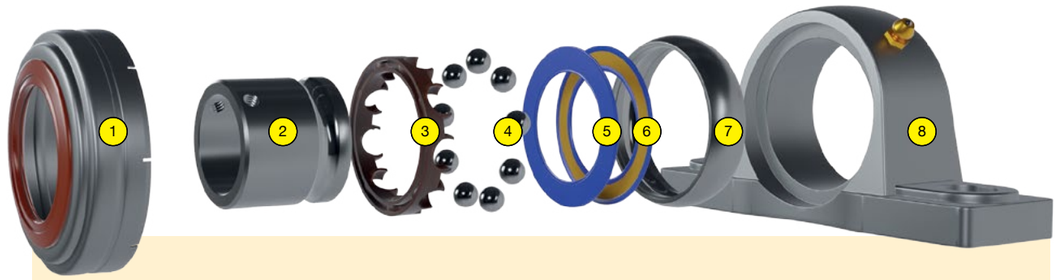
180ºC 260ºC 400ºC 1100ºC 1750ºC



ZEN Full Ceramic and Hybrid FBS Bearings are ideal for food and beverage applications with extreme temperature requirements.

ZEN FBS Housings and Inserts

FBS Stainless Steel Housings with Stainless Steel inserts



1

The AISI 420 stainless steel end cap provides additional protection against contamination that increases hygiene properties.

2 7

The AISI 420 stainless steel insert reinforces the corrosion and temperature resistance of the overall bearing assembly and provides hardness and toughness.

8

The smooth surface of the stainless steel AISI 304 housing is resistant to bacterial growth with exceptional corrosion and temperature resistance.

5 6

The non-toxic NBR seals protect the insert from foreign debris and keep the lubricant contained in compliance with the FDA.

3

The PA66 food-grade cage provides additional protection against corrosion and makes it easier to remove any potential buildup during cleaning procedures.In addition, this lightweight material reduces noise and vibration for quieter operation.

ZEN FBS stainless steel housings are designed to meet food safety and hygiene requirements while ensuring equipment performance and longevity.

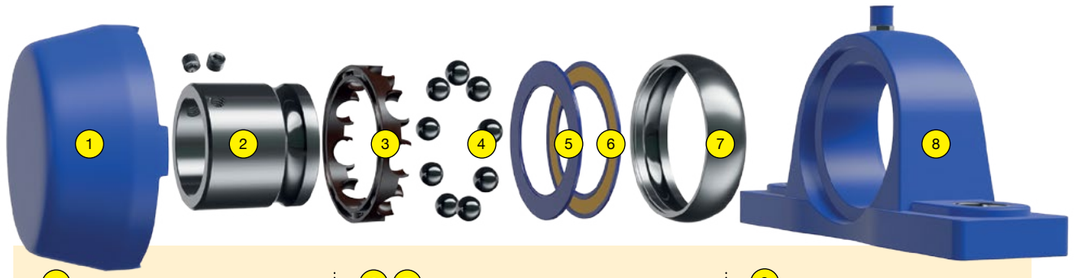
They are made from AISI 304 stainless steel, which provides excellent corrosion and temperature resistance, preventing rust and damage from moisture, liquids, and cleaning agents commonly used in the food and beverage industry.

These housings have a smooth surface that is easy to clean, promoting hygiene and reducing the risk of contamination. They are strong, durable, and can withstand heavy loads, impacts, and frequent use, minimising downtime and maintenance costs.

The housings are equipped with AISI 430 stainless steel end caps, offering additional protection against contamination, corrosion, and lubricant leakage, ensuring compliance with industry hygiene standards.

They are also provided with AISI 420 stainless steel inserts, reinforcing the corrosion and temperature resistance and the overall bearing assembly's strength, durability, and hygiene properties. In addition, to comply with the strict food safety regulations, they are lubricated with FDA-compliant Mobilgrease™ FM (see advantages on page 5).

FBS Thermoplastic Housings With Stainless Steel Inserts



1

Improved sealing that reduces bacterial growth prevents moisture and contaminants and protect against damage.

2-7

The AISI 420 stainless steel insert enhances the properties of the PBT housing, adding extra corrosion and temperature resistance, as well as improving its cleanability.

8

Light PBT housing with a smooth, non-porous surface that is easy to clean and maintain.

5-6

The NBR seals effectively prevent contaminants from entering, thus maintaining product purity and protecting the bearing assembly from water and moisture, ensuring its integrity.

3

The PA66 food-grade cage provides additional protection against corrosion and makes it easier to remove any potential buildup during cleaning procedures.In addition, this lightweight material reduces noise and vibration for quieter operation.

Our thermoplastic housings are made of PBT, a material known for its excellent chemical resistance.

They can withstand acidic or alkaline substances and sanitising solutions without damage or corrosion. The smooth and easy-to-clean surface of PBT reduces bacterial growth and promotes hygiene.

These durable housings can handle equipment movement, vibrations, and frequent handling. They provide insulation and protection for internal electronic components, ensuring safe operation in food and beverage applications.

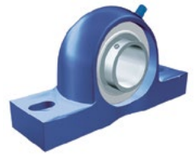
The housings are equipped with PP end caps that offer several benefits:

- Improved sealing to prevent moisture and contaminants.
- Enhanced chemical resistance for structural integrity.
- Increased impact resistance to protect against damage.
- Enhanced hygiene and cleanability, reducing bacterial growth.
- Compliance with food safety regulations for suitability.

These enhancements ensure reliable, durable, clean housing assemblies for safe food processing.

The AISI 420 stainless steel bearings are offered with AISI 420 stainless steel inserts and lubricated with FDA-compliant Mobilgrease™ FM to enhance the properties of the PBT housings further.

Comparative Between Thermoplastic Housings and Stainless Steel Housings



Thermoplastic Housings

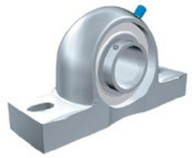
Material
PBT (Polybutylene Terephthalate) thermoplastic

Corrosion Resistance
Good resistance to certain chemicals and cleaning agents

Hygienic Properties
Smooth and non-porous surface, easy to clean and maintain

Impact Resistance
Good

Temperature Resistance
Moderate



Stainless Steel Housings

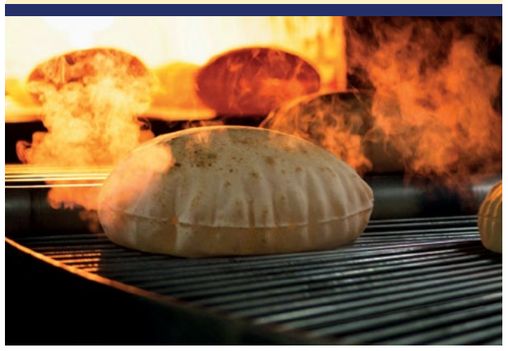
Material
AISI 304 stainless steel

Corrosion Resistance
Highly corrosion-resistant

Hygienic Properties
Resistant to bacterial growth

Impact Resistance
Excellent

Temperature Resistance
Superior



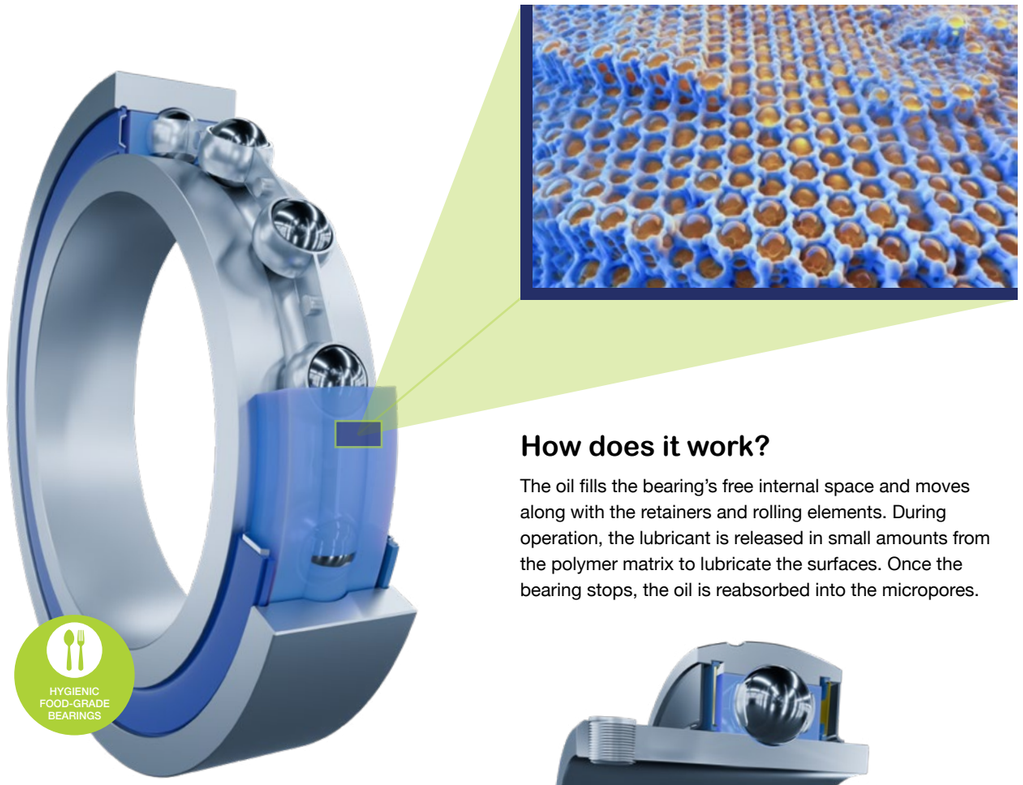
To find out more about our FBS Bearings and our whole range of bearings please visit www.zen.biz

FBS Bearings with Solid Oil

Advanced Lubrication for Maximum Food Safety

What is Solid Oil?

Solid Oil is a special lubricant made up of a polymer material with millions of micro-pores that hold the oil by molecular tension.



How does it work?

The oil fills the bearing's free internal space and moves along with the retainers and rolling elements. During operation, the lubricant is released in small amounts from the polymer matrix to lubricate the surfaces. Once the bearing stops, the oil is reabsorbed into the micropores.

Is Solid Oil Safe for the Food & Beverage Industry?

ZEN FBS Solid Oil complies with FDA regulations and is H1 registered, making it suitable for use in food and beverage applications.

FDA DIN

ZEN Solid Oil bearings come in both insert and ball bearing versions.

Advantages of FBS Bearings with Solid Oil

Effective Contamination Prevention

- The Solid Oil fills the internal space of the bearing, eliminating air gaps where bacteria or contaminants could settle.
- The dustproof properties of this lubricant and the additional seals prevent external solid, powdery, or liquid contaminants from entering the bearing.
- Since the oil is trapped inside a solid polymer, it doesn't leak or drip, even when the bearing is washed or exposed to steam, water, or cleaning agents.

Low Maintenance

- Solid oil bearings can contain up to four times as much oil as grease-lubricated bearings, allowing them to be lubricated for life.

Superior Low-Temperature Resistance

- Thanks to the polymer in the lubricant, bearings can resist lower temperatures than those that use standard lubricants. This is especially important for cold storage, refrigerated environments, or frozen food processing lines where standard greases may harden and fail.

Higher Chemical Resistance

- The Solid Oil increases the bearings' chemical inertness, making them more resistant to cleaning agents and harsh sanitisation, ensuring a longer lifespan.

Minimised Condensation and Corrosion Risk

- This lubrication system eliminates air gaps that cause condensation, reducing internal rust risk and making these bearings ideal for humid, washdown, or refrigerated environments.

Excellent Performance Under Harsh Operating Conditions

Suitable for equipment that experiences:

- Frequent washdowns
- Start/stop operations (e.g., packaging lines)
- High vibration or reciprocating motion (e.g., slicers or mixers)

Materials:

FBS Bearings with solid oil are made from AISI 420 stainless steel which provides them with high hardness, excellent wear resistance, and good corrosion resistance.

Seals and Shields:

- AISI 430 Metal Shields

The metal shields made of AISI 430 offer good corrosion and oxidation resistance, as well as excellent protection against food particles, moisture, and frequent washdowns

- Rubber Seals (BRT)

These seals offer excellent resistance to oils, fats, and moisture. Perfect for standard food processing environments with routine cleaning.

- Viton™ Seals

Viton™ is a premium fluoroelastomer offering exceptional resistance to chemicals, steam, and high temperatures. It is ideal for demanding food and beverage applications involving aggressive washdowns, strong sanitising agents, and thermal cycling.

Bearings Lubricated for Life with Total Protection Against Corrosion, Bacteria, and Contaminants.

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Hygienic Food-Grade
Bearings