

Corrosion Resistant Bearings



JTEKT has a series of “EXSEV* bearings for use in special environments” that responds to various special environments such as vacuum or high temperature conditions where normal lubricants and grease cannot be used, and we have been providing such bearings broadly for customers such as in the semi-conductor manufacturing field. The environment which especially requires corrosion resistance is not only the semi-conductor manufacturing field, but also many other fields such as FPD, film manufacturing equipment, and chemical applications manufacturing processes, and various corrosion resistant bearings are being used. This article introduces its features.

* Extreme Special Environment

1. Main Materials and Corrosion Resistant Test Results

The bearings used in corrosive environments are splashed with or immersed in strong acid, strong alkali, and other highly corrosive chemical liquids, therefore selection of materials suitable for applications is required. This is why corrosion resistant bearings are composed of ceramics and stainless steels. **Table 1** shows the characteristics of the materials, **Fig. 1** shows the scope of application of corrosion resistant materials (bearing ring), and **Table 2** and **Fig. 2** show the corrosion resistant test examples.

Table 1 Characteristics of Ceramics and Stainless Steels

Material	Ceramics				Stainless steel		
	Silicon Nitride (Si ₃ N ₄)	Corrosion Resistant Silicon Nitride (Si ₃ N ₄)	Zirconia (ZrO ₂)	Silicon Carbide (SiC)	Martensitic stainless steel (SUS440C)	Precipitation hardening stainless steel (SUS630)	High-hardness and corrosion-resistant stainless steel
Bearing component							
Density, g/cm ³	3.2	3.2	6.0	3.1	7.65	7.70	7.68
Hardness	1 500 HV	1 500 HV	1 200 HV	2 200 HV	60 HRC	40 HRC	60 HRC
Modules of longitudinal elasticity, GPa	320	320	220	380	208	196	208

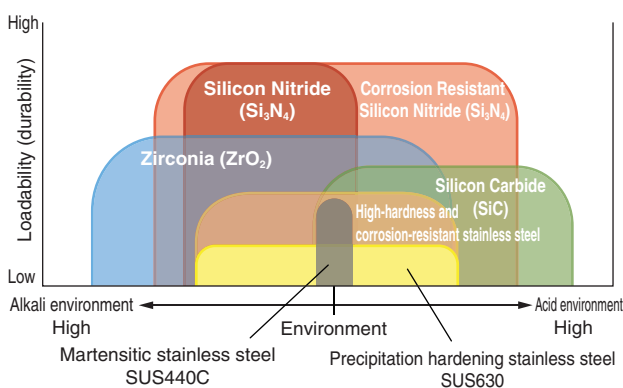


Fig. 1 Scope of application of corrosion resistant materials (bearing ring)

Table 2 Test conditions of corrosion resistance (CASS)

Liquid used	Sodium chloride: 50 ± 5 g/l Copper chloride (II): 0.26 ± 0.02 g/l
pH	3.0 to 3.2
Temperature	50 ± 2°C
Test time	4 h

* CASS test is a spraying test method to check the corrosion resistance. CASS complies with JIS Z 2371. CASS: Copper-Accelerated Acetic Acid Salt Spray

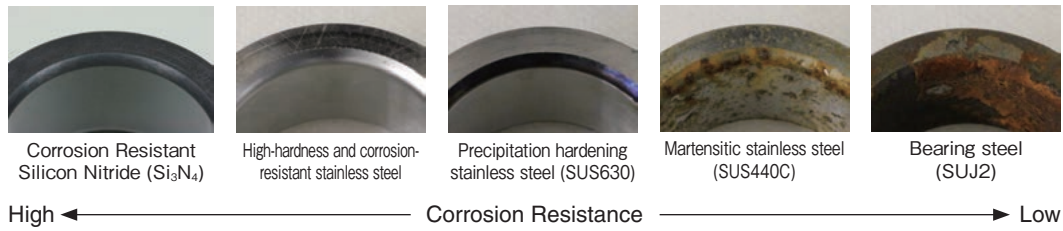


Fig. 2 Corrosion resistant test examples (CASS test results)

2. Product Line-up

The line-up of our main corrosion resistant bearings is shown below.

■ Ceramic bearing ring

Product name	Ceramic Bearings	Corrosion Resistant Ceramic Bearings	High Corrosion Resistant Ceramic Bearings
Product specifications	<p>Silicon Nitride (Si_3N_4) Outer ring Inner ring Ball Fluorocarbon resin Cage</p>	<p>Corrosion Resistant Silicon Nitride (Si_3N_4) Outer ring Inner ring Ball Fluorocarbon resin Cage</p>	<p>Silicon Carbide (SiC) Outer ring Inner ring Ball Fluorocarbon resin Cage</p>
Environment	Acidity: Weak Alkalinity: Middle Load: High	Acidity: Middle Alkalinity: Middle Load: High	Acidity: Strong Load: Low

■ Stainless steel bearing ring

Product name	Corrosion Resistant Hybrid Ceramic Bearings	Corrosion Guard Pro Bearings
Product specifications	<p>Precipitation hardening stainless steel (SUS630) Outer ring Inner ring Silicon Nitride (Si_3N_4) Ball Fluorocarbon resin Cage Austenitic stainless steel Shield</p>	<p>High-hardness and corrosion-resistant stainless steel Outer ring Inner ring Corrosion Resistant Silicon Nitride (Si_3N_4) Ball PEEK resin Cage</p>
Environment	Acidity: Weak Alkalinity: Weak Load: Low	Acidity: Weak Alkalinity: Weak Load: Middle

3. Application Examples

Such as film manufacturing equipment, wafer cleaning equipment, aluminum foil capacitor manufacturing equipment, food machinery, and chemical liquid stirring equipment.

*1 EXSEV is a registered trademark of JTEKT Corporation.

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