

ICS 21.100.20

CCS J 11



**NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**GB/T 39271.2-2020**

---

**Rolling bearings. Load ratings for hybrid bearings with rolling  
elements made of ceramic - Part 2: Static load ratings**

**Issued on: November 19, 2020**

**Implemented on: June 1, 2021**

---

**Issued by: State Administration for Market Regulation, China National  
Standardization Administration**

## Table of Contents

Foreword

Introduction

1 Scope

2 Normative references

3 Terms and definitions

### Foreword

GB/T 39271 "Rating load of hybrid bearings with ceramic rolling elements for rolling bearings" is divided into two parts.

---Part 1. Rated dynamic load;

---Part 2. Rated static load.

This part is Part 2 of GB/T 39271.

This section was drafted in accordance with the rules given in GB/T 1.1-2009.

The translation method used in this part is equivalent to the ISO.20056-2.2017 "Rated Load of Ceramic Rolling Element Hybrid Bearing for Rolling Bearings"

Part 2. Static Load Rating.

The Chinese documents that have a consistent correspondence with the international documents cited in this section are as follows.

---GB/T 4662-2012 Rolling bearing static load rating (ISO 76.2006, IDT)

---GB/T 6930-2002 rolling bearing vocabulary (ISO 5593.1997, IDT)

This part was proposed by China Machinery Industry Federation.

This part is under the jurisdiction of the National Rolling Bearing Standardization Technical Committee (SAC/TC98).

Drafting organizations of this section. Luoyang Bearing Research Institute Co., Ltd., Zhejiang Wuzhou Xinchun Group Co., Ltd., Cixing Group Co., Ltd.,

Chongqing Changjiang Bearing Co., Ltd., Shanghai Tianan Bearing Co., Ltd.

### Introduction

Hybrid bearings are rolling bearings with rolling elements made of silicon nitride and rings

made of common bearing steel (see ISO 5593 for definition). due to

Ceramic rolling elements have a higher modulus of elasticity. Under the same load conditions, hybrid bearings have more advantages than steel rolling element bearings.

Small contact ellipse, which will lead to increased contact stress under the same load.

Since the second edition of ISO 76 was released in 1987, the static load capacity of rolling bearings is allowed by the maximum rolling element load contact.

The Hertz contact stress is determined. In steel rolling bearings, this contact stress causes about 1/10000 times of rolling at the contact between the raceway and the rolling element.

The permanent plastic deformation of the diameter of the moving body; in the hybrid bearing, no obvious plastic deformation occurs on the rolling elements, so the total rolling contact is caused.

Plastic deformation is small. Therefore, according to industrial practice, a slightly higher allowable Hertzian stress is specified for hybrid bearings, which also improves Jing'an

The reference value of the full coefficient  $S_0$  to maintain the same overall safety as the raceway.

Ceramic rolling element hybrid bearings for rolling bearings

Rated Load Part 2.Static Load Rated

## 1 Scope

This part of GB/T 39271 stipulates that the bearing ring is made of contemporary high-quality hardened bearing steel and is made according to good processing methods.

The dynamic body is a calculation method for the static load rating of a hybrid bearing made of high-quality silicon nitride ( $\text{Si}_3\text{N}_4$ ). ISO 3290-2[1] and

ISO 26602[4] applies to ceramic balls; ISO 12297-2[2] and ISO 26602[4] apply to ceramic rollers.

When using hybrid bearings, see Table 1 and Table 2 for the reference value of static safety factor  $S_0$ .

## 2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article

Pieces. For undated references, the latest version (including all amendments) applies to this document.

ISO 76.2006 Static load rating of rolling bearings

ISO 5593 rolling bearing vocabulary

### 3 Terms and definitions

The following terms and definitions defined by ISO 5593 and ISO 76 apply to this document.

The website of the terminology database used in the standardization work maintained by ISO and IEC is as follows.

#### 3.1

Radial basic static load rating

The radial static load corresponding to the following calculated contact stress is generated at the contact center of the maximum load rolling element and the raceway.

---4600MPa radial ball bearings, including self-aligning ball bearings;

---4200MPa radial roller bearings.

Note 1. For single row angular contact ball bearings, the radial static load rating refers to the radial component of the load that causes a pure radial displacement between the bearing rings.

Note 2. The contact stress limit given in this definition is only valid for rolling elements made of silicon nitride with an elastic modulus of 300,000 MPa or higher.

For rolling elements made of ceramics with low elastic modulus, the contact stress limit in ISO 76 applies.

#### 3.2

Axial basic static load rating

The center axial static load corresponding to the following calculated contact stress is generated at the contact center of the maximum load rolling element and the raceway.

---4600MPa thrust ball bearing;

---4200MPa thrust roller bearing.

Note 1. For tapered rollers, the applicable roller diameter is equal to the average of the imaginary theoretical sharp corner diameters at the large and small ends of the roller.

Note 2. For asymmetric spherical rollers, the applicable roller diameter is the approximate value of the diameter at the contact point of the roller and the raceway without ribs under zero load.