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

GB/T 39271.1-2020

**Rolling bearings. Load ratings for hybrid bearings with rolling
elements made of ceramic - Part 1: Dynamic load ratings**

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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 1 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.20056-1.2017 "Rating Loads of Ceramic Rolling Element Hybrid Bearings for Rolling Bearings"

Part 1. Dynamic Load Rating.

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

---GB/T 6391-2010 Rolling bearing rated dynamic load and rated life (ISO 281.2007, 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).

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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. This will theoretically lead to a reduction in the dynamic load carrying capacity.

In fact, hybrid bearings have been used in many industrial fields and have shown at least as long service life as conventional steel rolling element bearings.

Therefore, for the conventional application range of hybrid bearings, the theoretical dynamic load rating has not been reduced in practical applications. Smaller connection

The material combination of contact ellipse and ceramic and steel leads to a significant reduction in surface shear stress at the rolling contact point, which improves the bearing capacity.

This can be reflected by specifying a higher b_m coefficient relative to steel rolling element bearings, which compensates for the higher contact stress of hybrid bearings under the same load.

Therefore, the formula specified in this section gives the same dynamic load rating of steel rolling element bearings with the same geometric parameters specified in ISO 281.

Ceramic rolling element hybrid bearings for rolling bearings

Rated load part 1.dynamic load rating

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 the calculation method of the rated dynamic load of the hybrid bearing made of high-quality silicon nitride (Si_3N_4). ISO 3290-2[2] and

ISO 26602[6] applies to ceramic balls; ISO 12297-2[3] and ISO 26602[6] apply to ceramic rollers.

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 281 rolling bearing rating dynamic load and rating life

ISO 5593 rolling bearing vocabulary

3 Terms and definitions

The terms and definitions defined by ISO 281 and ISO 5593 apply to this document.

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

4 symbols

The following symbols apply to this document.

bm. The rating factor of high-quality hardened bearing steel and good processing methods commonly used in contemporary times, this value varies with bearing type and design

Ca. Basic axial dynamic load rating, N

Cr. Radial basic dynamic load rating, N

Cu. Fatigue load limit, N (see Appendix A)

Dpw. pitch circle diameter of ball or roller set, mm

Dw. Nominal diameter of ball, mm

Dwe. Roller diameter used for rated load calculation, mm

ECe. ceramic elastic modulus, MPa ($ECe=300000MPa$)

ESt. elastic modulus of bearing steel, MPa (according to ISO 281, $ESt=207000MPa$)

E(chi). Complete elliptic integral of the second kind

fc. coefficient related to the geometry, manufacturing accuracy and material of the bearing parts

i. the number of columns of the rolling element

Lwe. Effective roller length used for rated load calculation, mm