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

GB/T 3480.1-2019

Replacing GB/T 3480-1997

**Calculation of load capacity of spur and helical gears -- Part 1:
Basic principles, introduction and general influence factors**

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Foreword

GB/T 3480 `` Calculation of Bearing Capacity of Spur and Helical Gears " is intended to include the following 5 parts.

- Part 1. Basic principles, overview, and general impact coefficient;
- Part 2. Calculation of tooth surface contact strength (pitting corrosion);
- Part 3. Calculation of tooth root bending strength;
- Part 5. Strength and quality of materials;
- Part 6. Calculation of service life under variable load conditions.

This part is the first part of GB/T 3480.

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

This section replaces part of GB/T 3480-1997 "Calculation method of bearing capacity of involute cylindrical gear".

Compared with GB/T 3480-1997, the main technical changes in this section are as follows.

- This section completely adopts ISO 6336-1..2006, only the basic principles and common impact coefficients, and does not involve ISO 6336-2 and

Calculation of contact and bending strength in ISO 6336-3;

- More than 100 new codes in this section, including many important coefficients, component coefficients, material codes, geometric quantities, deviations, etc .;

- The appendix content has been greatly adjusted and added;

- Amended some terms, such as "tooth direction" changed to "spiral", "tooth shape" changed to "tooth profile", "longitudinal" changed to "axial" and so on.

This section uses the translation method equivalent to ISO 6336-1..2006 "Calculation of spur and helical gear carrying capacity. Part 1. Basic principles

Management, Overview and General Impact Coefficients.

This section incorporates the technical errata content of ISO 6336-1..2006/Cor.1..2008, and the clauses related to these contents have been passed.

Vertical double lines () in the margins of the side margins are marked.

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

--- GB/T 3480.5-2008 Calculation of load capacity of spur gears and helical gears Part 5. Strength and quality of materials

(ISO 6336-5..2003, IDT)

--- GB/T 3480.6-2018 Calculation of load capacity of spur and helical gears Part 6. Service life under variable load

Calculation (ISO 6336-6..2006, IDT)

The following editorial changes have also been made in this section.

--- Change the "rhored" in the combination code of Table 1 of ISO 6336-1..2006 to "rhorel";

--- In ISO 6336-1..2006 formula (32), $q_2 =$

d_{i1}

d_{m2}

"To" $q_2 =$

d_{i2}

d_{m2}

,";

--- Change the "T" at the beginning of the third paragraph of the note in Figure 12 of ISO 6336-1..2006 to "T *";

--- Change a solid line in ISO 13336-1..2006 Figure 13 a), b), d), e) to a dotted line;

--- Change the "shaft" (shaft) in the title of 7.5.5 of ISO 6336-1..2006 to "bearing";

--- Change "a" to "~" in ISO 6336-1..2006 formula (B.9);

--- D.2 of ISO 6336-1..2006 "defined in 7.3.1" was changed to "defined in 7.2.1";

--- Change the "Y" to "y" in the symbol interpretation of the ISO 6336-1..2006 formula (E.4);

--- Change "SLi 1" to "SLi 1" in ISO 6336-1..2006 formula (E.12);

--- Change "xi 1" to "xi 1" in ISO 6336-1..2006 formula (E.14);

--- Change the "cgammam" to "Cgammam" in the interpretation of the ISO 6336-1..2006

formula (E.22);

--- Change " δ_{tai} " to " δ_{t1} " in ISO 6336-1..2006 formula (E.31);

--- Change "KH" to "KH β " in E.5.4 of ISO 6336-1..2006.

This part is proposed and managed by the National Gear Standardization Technical Committee (SAC/TC52).

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1 Scope

This part of GB/T 3480 introduces the basic principle, overview and general influence factor of spur gear and helical gear calculation. it

Together with ISO 6336-2, ISO 6336-3, ISO 6336-5 and ISO 6336-6 provides a way to compare different gear designs

Comparative method. It is not used to guarantee the performance of the assembled gear device, nor is it intended for general engineering personnel, but for experienced gear devices.

It can be used by designers, who can reasonably value the coefficients in the formula according to the knowledge of similar design, and understand what each value has to the calculation result.

influences.

The formula in GB/T 3480 is to calculate the tooth surface contact strength and tooth root bending strength of involute cylindrical spur gears or helical gears.

It is proposed to provide a widely accepted method.

GB/T 3480 contains the results based on experimental and theoretical researches such as Hirt [1], Strasser [2], and Brossmann [3]. Use this

The results of the normal calculation method are quite consistent with the results of the previously accepted calculation methods (for normal working pressure angles not exceeding 25 ° and indexing snails)

For cases where the rotation angle does not exceed 25° , see references [4] ~ [8].

For larger pressure angles and helix angles, the trend of the product of $Y_F Y_{\beta}$ and the product of $Z_H Z_{\beta}$ is different from some previously applied methods

of. Users should note that when GB/T 3480 is applied to this situation, its calculation results need to be confirmed based on experience.

The formula in GB/T 3480 does not apply to any of the following situations.

- The coincidence of the end faces of the spur gear or helical gear pair is less than 1.0;
- The coincidence of the end faces of the spur gear or helical gear pair is greater than 2.5;
- interference of tooth tip and tooth root;
- pointed teeth;
- The backlash is 0.

The formula in GB/T 3480 is not applicable to other forms of gear tooth damage, such as plastic yield, surface lamination, gluing and abrasion.

Used for unpredictable tooth damage caused by vibration. The bending strength calculation formula is only applicable when the tooth is broken at the fillet of the tooth root.

However, it does not apply to broken teeth on the working surface, failure of the wheel flange or failure of the wheel body caused by spokes and hubs. GB/T 3480 is not applicable to

Gear teeth that are forged or sintered as the final processing step are not suitable for gear pairs with poor contact areas.

GB/T 3480 provides a calculation method for the bearing capacity of tooth surface pitting and tooth root fracture. When the pitch circle linear velocity is less than 1m/s, the tooth

Wheel load capacity is usually limited by abrasive wear (for calculations in this regard, see other literature).

2 Normative references

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

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

GB/T 1356-2001 Standard basic rack profile for cylindrical gears for general machinery and heavy machinery (idt ISO 53..1998)

GB/T 3374.1-2010 Gear terms and definitions Part 1. Geometric definition (ISO