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**Cylindrical gears — System of tolerance
classification — Part 3: Definitions and
allowable values of deviations relevant to
corresponding gear-tooth flanks and
radial-composite deviations of injection-
molded plastic gears**

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Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Gear Manufacturers Association (JGMA)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS B 1702-3:2008**), which has been technically revised.

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JIS B 1702 series consists of the following 3 parts:

JIS B 1702-1 *Cylindrical gears — ISO system of flank tolerance classification — Part 1 : Definitions and allowable values of deviations relevant to flanks of gear teeth*

JIS B 1702-2 *Cylindrical gears — ISO system of accuracy — Part 2 : Definitions and allowable values of deviations relevant to radial composite deviations and runout information*

JIS B 1702-3 *Cylindrical gears — System of tolerance classification — Part 3: Definitions and allowable values of deviations relevant to corresponding gear-tooth flanks and radial-composite deviations of injection-molded plastic gears*

Cylindrical gears — System of tolerance classification — Part 3 : Definitions and allowable values of deviations relevant to corresponding gear-tooth flanks and radial- composite deviations of injection-molded plastic gears

1 Scope

This Japanese Industrial Standard specifies the tolerance classification of injection-molded plastic cylindrical involute gears (hereafter referred to as gears), the terms and definitions relevant to flank deviations and radial composite deviations of gears, and the flank tolerance classification system and radial composite tolerance classification system of gears.

These tolerances are applicable to the following ranges :

- a) normal module (m_n) 0.1 mm or over up to and including 2.0 mm;
- b) reference diameter (d) 1 mm or over up to and including 280 mm;
- c) number of teeth (z) 3 or more;
- d) helix angle (β) 45° or less;
- e) facewidth (b) 0.2 mm or over up to and including 40 mm.

2 Normative references

Part or all of the provisions of the following standards, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0102-1 *Vocabulary of gear terms — Part 1 : Definitions related to geometry*

JIS B 0121 *International gear notation — Symbols for geometrical data*

ISO 21771 *Gears — Cylindrical involute gears and gear pairs — Concepts and geometry*

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions, and those given in **JIS B 0102-1** and **ISO 21771** apply.

NOTE Some of the symbols and terminology contained in this Standard may differ from those used in other standards and documents.

3.1

General

3.1.1

measurement diameter, d_M

diameter of the cylinder concentric with the datum axis (3.1.5) where the probe is in contact with the tooth flanks during the measurement of a helix form or pitch

Note 1 to entry The measurement circle (cylinder) is normally taken as a cylinder which passes through the centre of the tooth depth of a usable flank.

3.1.2

active root diameter, d_{Nr}

diameter corresponding to the root side boundary of the flank range with which a mating gear meshes

Note 1 to entry It is determined by the undercut starting position or the tip form diameter (3.3.5) of a mating gear (see Figure 1).

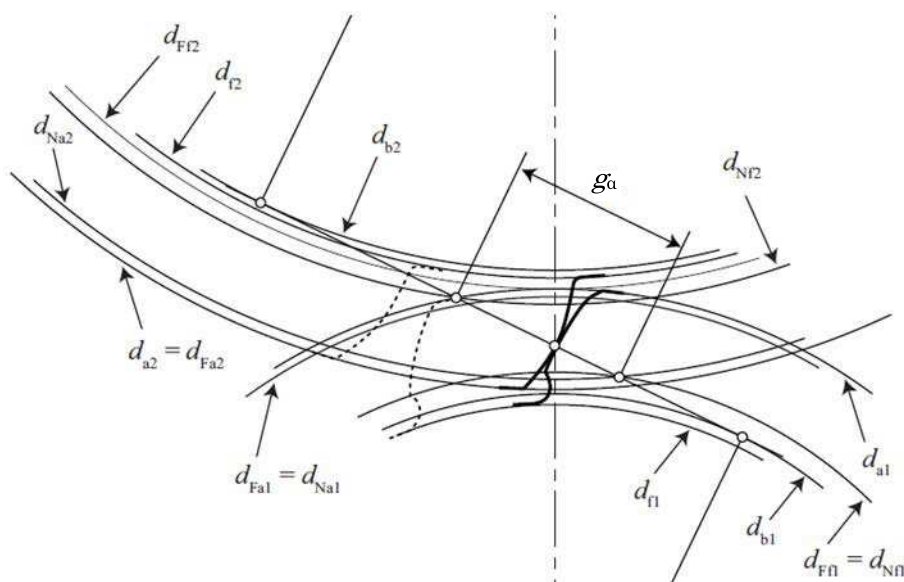


Figure 1 Active root diameter, length of path of contact and tip form diameter

3.1.3

roll path length

linear distance along a base tangent line from its contact with the base circle to the given point on the involute profile in the transverse plane

Note 1 to entry Roll path length is an alternative to roll angle for specification of selected diameter positions on an involute profile.

3.1.4

length of path of contact, g_a

roll path length (3.1.3) from the start of active root diameter (3.1.2) to the tip form di-

ameter (3.3.5), or to the point where contact stops due to undercut on the mating gear (see Figure 1)

3.1.5

datum axis

axis straight line which serves as a geometric basis in order to specify the tolerance zone corresponding to the allowable values of pitch, tooth profile and helix

3.2

Pitch deviations

3.2.1

individual single pitch deviation, f_{pi}

algebraic difference between the actual pitch and the corresponding theoretical pitch in the transverse plane on the measurement circle of the gear

Note 1 to entry When the length of arc between measured flanks is longer than the theoretical value, it is taken as positive, and when it is shorter, it is taken as negative.

Note 2 to entry For the individual single pitch deviation, the same number as the number of teeth is required for each of left and right flanks.

3.2.2

single pitch deviation, f_p

maximum absolute value of all the individual single pitch deviations (3.2.1) observed

3.2.3

individual cumulative pitch deviation, F_{pi}

algebraic difference, over a sector of n adjacent pitches in the transverse plane on the measurement circle of the gear, between the actual length and the theoretical length of the relevant arc

Note 1 to entry n varies from 1 to z (number of teeth).

Note 2 to entry When the length of arc from the reference flank to the measured flank is longer than the theoretical value, it is taken as positive, and when it is shorter, it is taken as negative.

Note 3 to entry For the value of individual cumulative pitch deviation, since one reference flank is determined, only the same number as z exists for each of left and right flanks.

3.2.4

total cumulative pitch deviation, F_p

difference between the maximum and the minimum of individual cumulative pitch deviation

Note 1 to entry One total cumulative pitch deviation exists for each of left and

right flanks.

Note 2 to entry The value of total cumulative pitch deviation becomes the same value even if any tooth flank is taken as a reference flank.

3.3

Profile deviations

3.3.1

measured profile

flank form of the range along which the probe is in contact during the profile measurement

Note 1 to entry The measured profile shall include the profile evaluation range (3.3.2).

3.3.2

profile evaluation range

range where the deviation of the measured profile (3.3.1) is evaluated starting at the profile control diameter (3.3.4) (see Figure 2)

Note 1 to entry Unless otherwise specified, it shall be a range of 95 % of the roll path length (3.1.3) up to the tip form diameter (3.3.5).

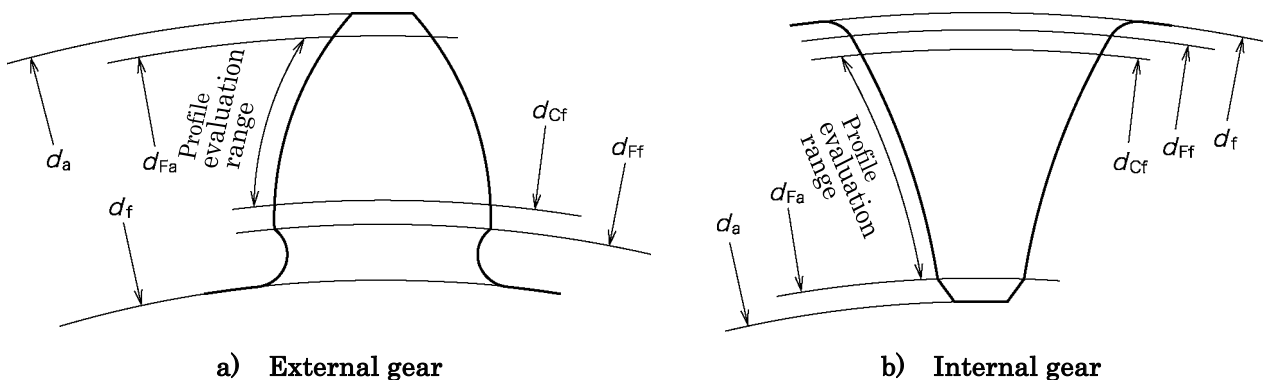


Figure 2 profile evaluation range and profile control diameter

3.3.3

profile evaluation length, L_a

roll path length (3.1.3) corresponding to the profile evaluation range (3.3.2)

3.3.4

profile control diameter, d_{Cf}

diameter of the circle corresponding to the root side boundary of the profile evaluation range (3.3.2) (see Figure 2)

Note 1 to entry When profile control diameter is not specified, it shall be active

root diameter (3.1.2). In the case of meshing with two or more gears, it is desirable to take all the mating gears into consideration.

3.3.5

tip form diameter, d_{Fa}

diameter of the circle corresponding to the tip side boundary of the usable flank (see Figure 1)

Note 1 to entry Unless otherwise specified, it shall be diameter of the circle in which twice the tip corner radius or chamfer is removed from tip diameter toward the root side.

3.3.6

profile deviation

amount by which a measured profile (3.3.1) deviates from the design profile (3.3.8)

3.3.7

profile deviation diagram

diagram which expresses a profile form, taking one axis as the deviation from an involute and the other axis as the roll path length (3.1.3), by giving an appropriate magnification, respectively (see Figure 3)

Note 1 to entry The direction in which the tooth thickness increases more than the theoretical profile is taken as positive, and the direction in which it decreases is taken as negative.

Note 2 to entry In the case of the correct involute, the profile deviation diagram becomes a straight line parallel to the axis of roll path length (3.1.3).

3.3.8

design profile

profile specified by the designer

Note 1 to entry Normally, the relieving amount from an involute is expressed as profile deviation diagram (3.3.7) (see Figure 3).

Note 2 to entry Unless otherwise specified, it shall be a correct involute.

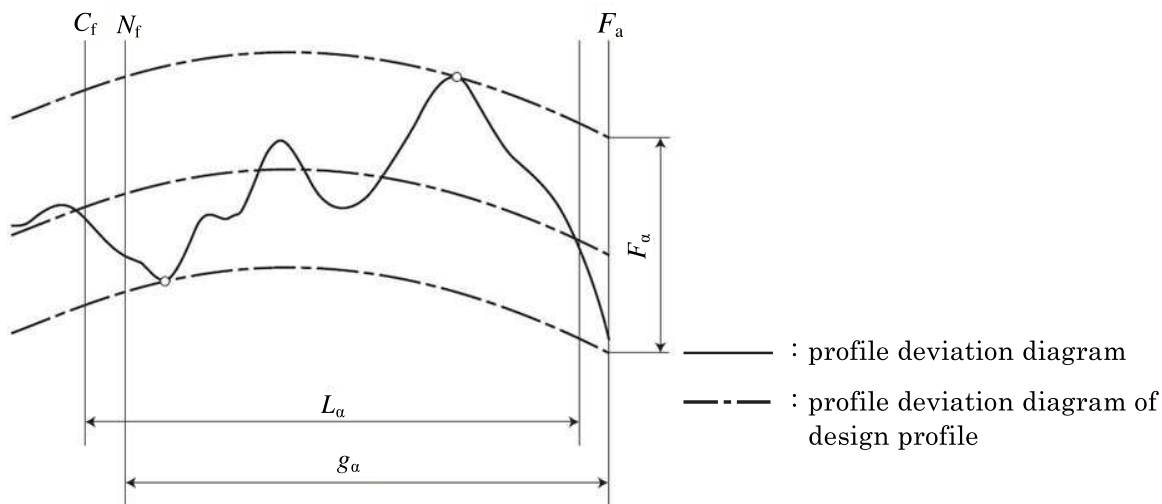


Figure 3 Profile deviation diagram, design profile and total profile deviation

3.3.9

measured profile slope

straight line slope obtained by performing the least square approximation of the line which expresses a profile form within the profile evaluation range (3.3.2), taking one axis as the deviation from a design profile (3.3.8) and the other axis as the roll path length (3.1.3), by giving an appropriate magnification, respectively (see Figure 4)

3.3.10

mean profile line

line or curve obtained by adding the measured profile slope (3.3.9) to the design profile (3.3.8) on the profile deviation diagram (3.3.7)

3.3.11

total profile deviation, F_a

travel distance in the deviation direction when performing the parallel translation of the design profile (3.3.8) so as to enclose the measured profile (3.3.1) over the profile evaluation range (3.3.2) on the profile deviation diagram (3.3.7) (see Figure 3)

Note 1 to entry A positive value is always taken.

Note 2 to entry When the measured profile (3.3.1) deviated from the profile evaluation range (3.3.2) in the tip side has a point which exceeds the design profile (3.3.8) enclosed in the tooth thickness increasing side, it shall be enclosed including the point.