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(JFRI/JSA)

**ISO general purpose metric screw
threads—Tolerances—
Part 1: Principles and basic data**

ICS 21.040.10

Reference number : JIS B 0209-1 : 2001 (E)

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standard Committee according to the proposal of establishing a Japanese Industrial Standard from The Japan Research Institute for Screw Threads and Fasteners (JFRI)/the Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

By this Standard, **JIS B 0209:1997**, **JIS B 0211:1997** and **JIS B 0215:1982** were withdrawn and replaced with **JIS B 0209 Part 1 to Part 3**.

This Standard has been made based on **ISO 965-1:1998** *ISO general purpose metric screw threads—Tolerances—Part 1: Principles and basic data* for the purposes of making easy to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of International Standard which is based on Japanese Industrial Standard.

JIS B 0209 series consist of 5 parts with the title of *ISO general purpose metric screw threads — Tolerances*.

- JIS B 0209-1 *Part 1: Principles and basic data*
- JIS B 0209-2 *Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*
- JIS B 0209-3 *Part 3: Deviations for constructional screw threads*
- JIS B 0209-4 *Part 4: Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing*
- JIS B 0209-5 *Part 5: Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing*

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ISO general purpose metric screw threads – Tolerances – Part 1: Principles and basic data

Introduction This Japanese Industrial Standard has been prepared based on the third edition of **ISO 965-1** *ISO general purpose metric screw threads — Tolerances — Part 1: principles and basic data* published in 1998 without modifying the technical contents.

1 Scope This Standard specifies the tolerance system for ISO general purpose metric screw threads (M) conforming to **JIS B 0205-2**.

The tolerance system refers to the basic profile in accordance with **JIS B 0205-1**.

Remarks: The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

ISO 965-1: 1998 *ISO general purpose metric screw threads – Tolerances – Part 1: Principles and basic data* (IDT)

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) shall be applied.

JIS B 0101 *Screw threads and fasteners — Vocabulary*

Remarks: The items cited from **ISO 5408:1983** *Cylindrical screw threads – Vocabulary* are equivalent to the corresponding matters of the said standard.

JIS B 0205-1 *ISO general purpose metric screw threads — Part 1: Basic profile*

Remarks: **ISO 68-1:1998** *ISO general purpose screw threads — Basic profile — Part 1: Metric screw threads* is identical with the said standard.

JIS B 0205-2 *ISO general purpose metric screw threads — Part 2: General plan*

Remarks: **ISO 261:1998** *ISO general purpose metric screw threads — General plan* is identical with the said standard.

JIS B 0205-3 *ISO general purpose metric screw threads — Part 3: Selected sizes for screws, bolts and nuts*

Remarks: **ISO 262:1998** *ISO general purpose screw threads — Selected sizes for screws, bolts and nuts* is identical with the said standard.

JIS B 0205-4 *ISO general purpose metric screw threads — Part 4: Basic dimensions*

Remarks: **ISO 724:1993** *ISO general purpose metric screw threads — Basic dimensions* is identical with the said standard.

JIS B 0209-2 *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads – Medium quality*

Remarks: **ISO 965-2:1998** *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads – Medium quality* is identical with the said standard.

JIS B 0209-3 *ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads*

Remarks: **ISO 965-3:1998** *ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads* is identical with the said standard.

JIS B 0251 *Limit gauges for metric screw threads*

Remarks: The items cited from **ISO 1502:1996** *ISO general purpose metric screw threads – Gauges and gauging* are equivalent to the corresponding matters of the said standard.

JIS B 1051 *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

Remarks: **ISO 898-1:1999**, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs* is identical with the said standard.

3 Definitions and symbols

3.1 Definitions For the purpose of this Standard the definitions given in **JIS B 0101** apply.

3.2 Symbols The following symbols are used:

Symbol	Explanation
D	basic major diameter of internal thread
D_1	basic minor diameter of internal thread
D_2	basic pitch diameter of internal thread
d	basic major diameter of external thread
d_1	basic minor diameter of external thread
d_2	basic pitch diameter of external thread
d_3	minor diameter of external thread
P	pitch
Ph	lead
H	height of fundamental triangle
S	designation for thread engagement group "short"
N	designation for thread engagement group "normal"
L	designation for thread engagement group "long"
T	tolerance
T_{D1}, T_{D2} T_d, T_{d2}	tolerances for D_1, D_2, d, d_2
ei, EI es, ES	lower deviations (see Fig. 1) upper deviations (see Fig. 1)
R	root radius of external thread
C	root truncation of external thread

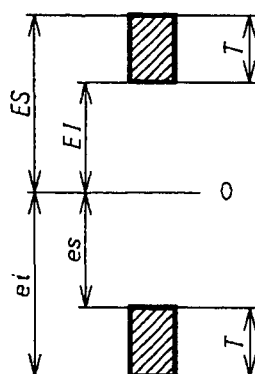


Fig. 1 Position of tolerances with respect to zero line (basic size)

4 Structure of the tolerance system The system gives tolerances defined by tolerance grades and tolerance positions and a selection of grades and positions.

The system provides for:

- a) a series of tolerance grades for each of the four screw thread diameters, as follows:

	Tolerance grades
D_1	4, 5, 6, 7, 8
d	4, 6, 8
D_2	4, 5, 6, 7, 8
d_2	3, 4, 5, 6, 7, 8, 9

Details of tolerance grades and combinations of tolerance grades for pitch and crest diameters according to tolerance quality and length of engagement group required, with order of preference, are shown in clause 12.

- b) Series of tolerance positions:
- G and H for internal threads;
 - e, f, g and h for external threads.

The established tolerance positions comply with the need of current coating thickness and with the demands of easy assembly.

- c) Selection of recommended combinations of grades and positions (tolerance classes) giving the commonly used tolerance qualities fine, medium and coarse for the three groups of length of thread engagement short S, normal N and long L. Moreover a further selection of tolerance classes is given for commercial bolt and nut threads. Tolerance classes other than those shown in clause 12 are not recommended and shall only be used for special cases.

5 Designation

5.1 General The complete designation for a screw thread comprises a designation for the thread system and size, a designation for the thread tolerance class followed by further individual items if necessary.

5.2 Designation of single-start screw threads A screw thread complying with the requirements of the Standards for ISO general purpose metric screw threads according to **JIS B 0205-1**, **JIS B 0205-2**, **JIS B 0205-3**, **JIS B 0205-4**, **JIS B 0209-2** and **JIS B 0209-3** shall be designated by the letter M followed by the value of the nominal diameter and of the pitch, expressed in millimetres and separated by the sign "×".

Example: M8 × 1.25

For coarse pitch threads listed in **JIS B 0205-2**, the pitch may be omitted.

Example: M8

The tolerance class designation comprises a class designation for the pitch diameter tolerance followed by a class designation for the crest diameter tolerance.

Each class designation consists of

- a figure indicating the tolerance grade;
- a letter indicating the tolerance position, capital for internal threads, small for external threads.

If the two class designations for the pitch diameter and crest diameter (major or minor diameter for internal and external threads respectively) are the same it is not necessary to repeat the symbols.

Examples: **External thread**

M10×1-5g 6g

Thread of 10 mm nominal diameter having a pitch of 1 mm —————

Tolerance class for pitch diameter —————

Tolerance class for major diameter —————

M10-6g

Thread of 10 mm nominal diameter in the coarse pitch series —————

Tolerance class for pitch and major diameters —————

Internal thread

M10×1-5H 6H

Thread of 10 mm nominal diameter having a pitch of 1 mm —————

Tolerance class for pitch diameter —————

Tolerance class for minor diameter —————

M10-6H

Thread of 10 mm nominal diameter in the coarse pitch series —————

Tolerance class for pitch and minor diameters —————

A fit between threaded parts is indicated by the internal thread tolerance class followed by the external thread tolerance class separated by a stroke.

Example: M6–6H/6g

M20 × 2–6H/5g6g

The absence of tolerance class designation means that tolerance quality “medium” with the following tolerance classes are specified:

Internal threads

– 5H for threads up to and including M1,4;

– 6H for threads M1,6 and larger.

Remarks: Except for threads with pitch $P = 0.2$ mm for which the tolerance grade 4 is defined only (see tables 3 and 5).

External threads

– 6h for threads up to and including M1,4;

– 6g for threads M1,6 and larger.

The designation for the group of length of thread engagement “short” S and “long” L should be added to the tolerance class designation separated by a dash.

Example: M20 × 2–5H–S

M6 – 7H/7g6g–L

The absence of the designation for the group of length of thread engagement means the group “normal” N is specified.

5.3 Designation of multiple-start screw threads Multiple-start metric screw threads shall be designated by the letter M followed by the value of the nominal diameter, the sign ×, the letters Ph and the value of the lead, the letter P and the value of the pitch (axial distance between two neighbouring flanks in the same direction) a dash, and the tolerance class. Nominal diameter, lead and pitch are expressed in millimetres.

Example: M16 × Ph3P1.5–6H

For extra clarity the number of starts i.e. the value of $\frac{Ph}{P}$ may be added in verbal form and in parenthesis.

Example: M16 × Ph3P1.5 (two starts) – 6H

5.4 Designation of the left hand threads When left hand threads are specified the letters LH shall be added to the thread designation, separated by a dash.

Example: M8 × 1–LH

M6 × 0.75 – 5h6h–S–LH

M14 × Ph6P2–7H–L–LH

M14 × Ph6P2 (three starts)–7H–L–LH