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**Fasteners—Methods of verification
for size and geometry**

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Foreword

This translation has been made based on the original Japanese Industrial Standard 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 The Japan Research Institute for Screw Threads and Fasteners (JFRI)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS B 1071:1985** is replaced with this Standard.

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Fasteners—Methods of verification for size and geometry

1 Scope

This Japanese Industrial Standard specifies the measuring methods of characteristics on the dimensional tolerance and the geometrical tolerance of fasteners based on **JIS B 1021**.

The measuring method shall be a method by actual measurement, a method by a gauge or a method by comparison.

NOTE : An example of the jig used to hold and rotate the shank of the part being inspected is shown in Annex A.

2 Normative references

The following standards contain provisions which, 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 0251 *Limit gauges for metric screw threads*
- JIS B 1012 *Cross recesses for screws*
- JIS B 1013 *Countersunk head screws—Head configuration and gauging*
- JIS B 1015 *Hexalobular internal driving feature for bolts and screws*
- JIS B 1016 *Gauging of hexagon sockets*
- JIS B 1021 *Tolerances for fasteners—Part 1: Bolts, screws, studs and nuts—Product grades A, B and C*
- JIS B 1194 *Hexagon socket countersunk head screws*
- JIS B 7153 *Measuring microscopes*
- JIS B 7184 *Profile projectors*
- JIS B 7502 *Micrometer callipers*
- JIS B 7503 *Dial gauges*
- JIS B 7507 *Vernier, dial and digital callipers*
- JIS B 7515 *Cylinder gauges*
- JIS B 7516 *Metal rules*
- JIS B 7520 *Indicating micrometers*
- JIS B 7524 *Feeler gauges*
- JIS B 7533 *Dial test indicators (Lever type)*
- JIS B 7540 *Vee blocks*
- JIS B 7544 *Depth micrometers*

3 Measuring items

The items intended to measure the characteristic values of fasteners (hereafter referred to as “measuring items”) shall be as given in table 1.

Table 1 Measuring items

Measuring item			Clause of JIS B 1021	Measuring method
1 Screw thread	1.1 Internal thread	a) Pitch diameter	4.1.2	As specified in 4.1.1 a)
		b) Minor diameter		As specified in 4.1.1 b)
	1.2 External thread	a) Pitch diameter	3.1.2	As specified in 4.1.2 a)
		b) Major diameter		As specified in 4.1.2 b)
	1.3 Tapping screw	a) Major diameter	5.1.1	As specified in 4.1.3 a)
		b) Minor diameter		As specified in 4.1.3 b)
		c) Width of flat at crest		As specified in 4.1.3 c)
		d) Shape of thread point		As specified in 4.1.3 d)
2 Feature with dimensional tolerance	2.1 External dimensions	a) Length of threaded portion	3.1.4.5	As specified in 4.2.1 a)
		b) Length	3.1.4.4, 5.1.3.3	As specified in 4.2.1 b)
		c) Width across flats	3.1.3.1.1, 4.1.3.1, 5.1.2.1.1	As specified in 4.2.1 c)
		d) Width across corners	3.1.3.1.2, 4.1.3.2, 5.1.2.1.2	As specified in 4.2.1 d)
		e) Height of head	3.1.3.1.3, 3.1.4.2, 5.1.2.1.3, 5.1.3.2	As specified in 4.2.1 e)
		f) Height of nut	4.1.4.1, 4.1.5.1	As specified in 4.2.1 f)
		g) Effective heights of head and nut	3.1.3.1.4, 4.1.4.2, 4.1.5.1, 5.1.2.1.4	As specified in 4.2.1 g)
		h) Diameter of head	3.1.4.1, 5.1.3.1	As specified in 4.2.1 h)
		i) Diameter of body	3.1.4.6	As specified in 4.2.1 i)
		j) Diameter of bearing area	3.1.4.3, 4.1.4.3	As specified in 4.2.1 j)
		k) Height of bearing section	3.1.4.3, 4.1.4.3	As specified in 4.2.1 k)
		l) Fillet transition diameter	3.1.4.3	As specified in 4.2.1 l)
		m) Diameter of castle part of slotted nut	4.1.5.1	As specified in 4.2.1 m)
		n) Distance from slot bottom to bearing surface of slotted nut		As specified in 4.2.1 n)

Table 1 (continued)

	Measuring item	Clause of JIS B 1021	Measuring method
2 Feature with dimensional tolerance (concluded)	2.2 Internal dimensions	a) Width across flats of hexagon socket	As specified in 4.2.2 a)
		b) Width across corners of hexagon socket	As specified in 4.2.2 b)
		c) Width of slot	As specified in 4.2.2 c)
		d) Inclination of side face of slot	As specified in 4.2.2 d)
		e) Cross recess	As specified in 4.2.2 e)
		f) Hexalobular hole	As specified in 4.2.2 f)
		g) Depth of hexagon socket	As specified in 4.2.2 g)
		h) Depth of slot	As specified in 4.2.2 h)
		i) Chamfer of threaded portion of nut	As specified in 4.2.2 i)
		j) Width of slot of castle nut	As specified in 4.2.2 j)
3 Feature with geometrical tolerance	3.1 External thread parts	a) External feature (feature of fastening section)	As specified in 4.3.1 a)
		b) Internal feature (feature of fastening section)	As specified in 4.3.1 b)
		c) Position of external feature to shank	As specified in 4.3.1 c)
		d) Position of slot to shank	As specified in 4.3.1 d)
		e) Position of cross recess to shank	As specified in 4.3.1 e)
		f) Position of internal feature to shank	As specified in 4.3.1 f)
		g) Position of circular head to shank	As specified in 4.3.1 g)
		h) Position of split pin hole to threaded portion	As specified in 4.3.1 h)
		i) Position of (short) dog point to threaded portion	As specified in 4.3.1 i)
		j) Position of body to threaded portion	As specified in 4.3.1 j)
		k) Straightness of shank	As specified in 4.3.1 k)
		l) Total run-out in axial direction of bearing surface to shank	As specified in 4.3.1 l)
		m) Total run-out in axial direction of end face of point to shank	As specified in 4.3.1 m)

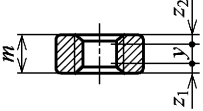
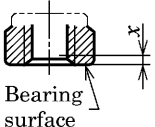
Table 1 (concluded)

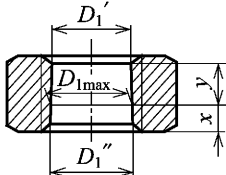
Measuring item		Clause of JIS B 1021	Measuring method
3 Feature with geometrical tolerance (concluded)	3.1 External thread parts (concluded)	n) Circular run-out of conical face of point to threaded portion	As specified in 4.3.1 n)
		o) Deviation from shape of bearing surface	As specified in 4.3.1 o)
	3.2 Internal thread parts	a) External feature (feature of fastening section)	As specified in 4.3.2 a)
		b) Position of side face of hexagon to threaded portion	As specified in 4.3.2 b)
		c) Position of side face of square to threaded portion	As specified in 4.3.2 c)
		d) Position of circular periphery to threaded portion	As specified in 4.3.2 d)
		e) Position of split pin groove to threaded portion	As specified in 4.3.2 e)
		f) Total run-out in axial direction of bearing surface to thread	As specified in 4.3.2 f)
		g) Deviation from shape of bearing surface	As specified in 4.3.2 g)

4 Measuring methods

4.1 Screw thread

4.1.1 Internal thread

Measuring item	Measuring method	Example of measuring instrument
a) Pitch diameter	The pitch diameter of internal thread (D_2) shall be examined by using GO and NOT GO screw plug gauges corresponding to the tolerance zone class thereof according to the method specified in JIS B 0251 .	Screw plug gauges specified in JIS B 0251
b) Minor diameter  a) Effective minor diameter part  b) Incomplete minor diameter part Figure 1	Method 1: Method by gauge The minor diameter of internal thread (D_1) shall be examined by using GO and NOT GO plain plug gauges corresponding to the tolerance zone class thereof according to the method specified in JIS B 0251. The length of effective minor diameter part ¹⁾ of a nut (y) shall be given by the value obtained by subtracting the sum of lengths ($z_1 + z_2$) when plain NOT GO plug gauge is admitted from two sides of the nut from the actually measured height of the nut (m). The length of incomplete minor diameter part ²⁾ of a prevailing torque type nut (x) shall be given by the length when the plain NOT GO plug gauge is admitted from the bearing surface side of the nut. Notes ¹⁾ The part in which the minor diameter of internal thread is within the specified tolerance zone [see figure 1 a)]. ²⁾ The part in which the minor diameter of internal thread is over the specified maximum allowable dimension [see figure 1 b)]. Method 2: Method by actual measurement The minor diameter of internal thread (D_1) shall be measured by using a measuring instrument (e.g. vernier callipers) suitable for the allowable limit of minor diameter corresponding to the tolerance zone class thereof with respect to two perpendicularly crossing directions. The length of effective minor diameter part (y) and length of incomplete minor diameter part (x) shall be obtained from the condition diagram of the change in minor diameter obtained by actual measurement (see figure 2).	- Plain plug gauges specified in JIS B 0251 - Vernier callipers specified in JIS B 7507

Measuring item	Measuring method	Example of measuring instrument
b) Minor diameter (concluded)	 NOTE : D_1' and D_1'' are respectively the minimum and the maximum values of the actually measured minor diameter. $D_{1\max}$ is the maximum allowable dimension of the minor diameter specified for each tolerance zone class of internal thread. Figure 2 Condition diagram of change in minor diameter	

4.1.2 External thread

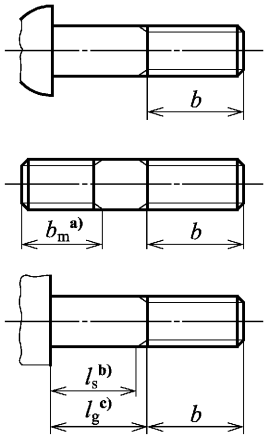
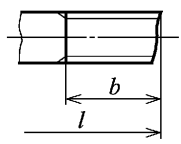
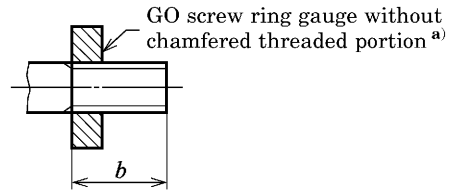
Measuring item	Measuring method	Example of measuring instrument
a) Pitch diameter	The pitch diameter of external thread (d_2) shall be examined by using GO and NOT GO screw ring gauges corresponding to the tolerance zone class thereof or the equivalent limit gauge for screw thread according to the method specified in JIS B 0251 .	Screw ring gauges specified in JIS B 0251
b) Major diameter	Method 1: Method by gauge The major diameter of external thread (d) shall be examined by using GO and NOT GO plain ring gauges or GO and NOT GO plain calliper gauges corresponding to the tolerance zone class according to the method specified in JIS B 0251. Method 2: Method by actual measurement The major diameter of external thread (d) shall be examined by using micrometer callipers for external measurement or indicating micrometer, or measuring instrument equivalent to these with respect to two perpendicularly crossing directions. The measuring position for major diameter of external thread shall be taken at around the centre of the threaded portion. When the threaded portion is long, it is preferable to measure at two positions of the end and the root of threaded portion, provided that the part within two pitches from the thread point and the incomplete threaded portion shall be excluded.	- Plain ring gauges or plain calliper gauges specified in JIS B 0251 - Micrometer callipers for external measurement specified in JIS B 7502 - Indicating micrometers specified in JIS B 7520

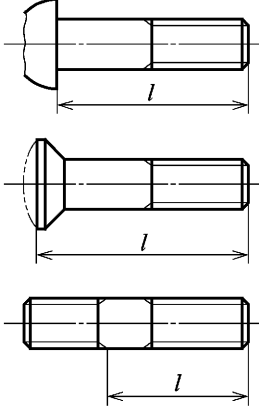
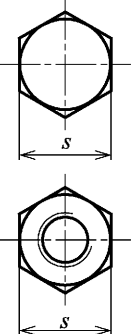
4.1.3 Tapping screw

Measuring item	Measuring method	Example of measuring instrument
a) Major diameter	The major diameter of tapping screw (d_1) shall be measured by using micrometer callipers for external measurement, indicating micrometer, measuring microscope, profile projector or measuring instrument equivalent to these.	• Micrometer callipers for external measurement specified in JIS B 7502 • Indicating micrometers specified in JIS B 7520 • Measuring microscopes specified in JIS B 7153 • Profile projectors specified in JIS B 7184
b) Minor diameter	The minor diameter of tapping screw (d_2) shall be measured by using measuring microscope, profile projector or measuring instrument equivalent to these.	
c) Width of flat at crest	The width of flat at crest of tapping screw (c) shall be measured by using measuring microscope, profile projector or measuring instrument equivalent to these.	
d) Shape of thread point	The shape of thread point of tapping screw (angle or d_3) shall be measured by using measuring microscope, profile projector or measuring instrument equivalent to these.	

4.2 Feature with dimensional tolerance

4.2.1 External dimensions

Measuring item	Measuring method	Example of measuring instrument
a) Length of threaded portion (b, b_m, l_s and l_g in figure 3)  Notes a) b_m is the length of the threaded portion on the stud end side of the stud. b) l_s is the length of the body without threads. c) l_g is the length of the body without threads (including the run-out of threaded portion). Figure 3	For the length of threaded portion (b), the distance from the thread point to the incomplete threaded portion shall be measured by using metal rule, vernier calipers or measuring instrument equivalent to these. In this case, if the end face of thread point is oblique, measurement shall be carried out by taking the start of thread point is assumed to be the longest point (see figure 4). The boundary between the complete threaded portion and the incomplete threaded portion shall be regarded as the point where GO screw ring gauge stops (see figure 5) or a point corresponding to it. For the length of threaded portion on the stud end side of a tap-end stud (b_m), the distance from the end face of thread to the end of the incomplete threaded portion shall be measured by using the measuring instrument used for the measurement of b. The length of body without threads (l_s and l_g) shall be measured from the bearing surface of a bolt by using the measuring instrument used for the measurement of b.  Figure 4 Start of thread point  Figure 5 Boundary between complete threaded portion and incomplete threaded portion Note a) When GO screw ring gauge with chamfered threaded portion is used, the dimension of chamfered part shall not be included in dimension b.	• Metal rules specified in JIS B 7516 • Vernier callipers specified in JIS B 7507

Measuring item	Measuring method	Example of measuring instrument
b) Length (l in figure 6)  Figure 6	The measurement of the length (l) shall be in accordance with that for the length of threaded portion (b) [see 4.2.1 a)]. If the end face of thread point is oblique, the start of thread point is assumed to be the longest point (see figure 4).	• Metal rules specified in JIS B 7516 • Vernier callipers specified in JIS B 7507
c) Width across flats (s in figure 7)  Figure 7	Method 1: Method by actual measurement The width across flats (s) shall be measured by using vernier callipers, micrometer callipers for external measurement, indication micrometer or measuring instrument equivalent thereto. Method 2: Method by gauge The width across flats (s) shall be examined by using GO and NOT GO calliper gauges corresponding to the allowable limit dimensions thereof. Instead of GO calliper gauge, the formed gauge based on figure C.1 or figure C.3 of JIS B 1021 may be used.	• Vernier callipers specified in JIS B 7507 • Micrometer callipers for external measurement specified in JIS B 7502 • Indicating micrometers specified in JIS B 7520 • Calliper gauges • Formed gauges