

JIS

JAPANESE INDUSTRIAL STANDARD

Specification for Corrosion-
resistant Stainless
Steel Fasteners

JIS B 1054—1985

Translated and Published

by

Japanese Standards Association

Printed in Japan

Translation without guarantee
In the event of any doubt arising, the original
standard in Japanese is to be evidence

JAPANESE INDUSTRIAL STANDARD

J I S

Specification for Corrosion-resistant
Stainless Steel Fasteners

B 1054-1985

1. Scope

This Japanese Industrial Standard specifies the property division, mechanical properties and their tests, inspection and marking of the corrosion resistant threaded fasteners such as bolts (including stud), machine screw, nut, etc., which have been manufactured by use of stainless steels of austenitic system, ferritic system and martensitic system and correspond to the application conditions of Table 1 (¹).

Note (¹) "Stainless threaded fastener" is a general term for the corrosion resistant threaded fasteners such as stainless steel bolts, machine screws, nuts, etc. which are intended for application in this standard.

Applicable Standards:

JIS B 0205-Metric Coarse Screw Threads

JIS B 0207-Metric Fine Screw Threads

JIS B 1001-Diameter of Bolt Hole and Counterbore

JIS B 1052-Mechanical Properties of Nuts

JIS G 0573-Method of 65 per cent Nitric Acid Test for Stainless Steels

JIS G 0575-Method of Copper Sulfate-Sulfuric Acid Test for
Stainless Steels

JIS Z 2241-Method of Tensile Test for Metallic Materials

JIS Z 2243-Method of Brinell Hardness Test

JIS Z 2244-Method of Vickers Hardness Test

JIS Z 2245-Method of Rockwell and Rockwell Superficial
Hardness Test

Corresponding International Standard:

ISO 3506-1979 Corrosion-resistant stainless steel fasteners-Specifications

Table 1. Conditions to Be Applied for
Stainless Threaded Fasteners

Item to be applied	Condition to be applied	
	In the cases of bolts and machine screws	In the case of nuts
Class of threaded fastener	Mechanical properties to be required shall have no relation with shape.	
Type of screw thread	To be in accordance with Table 3 of JIS B 0205 and JIS B 0207.	
Range of nominal diameter of screw thread	To be of 1.6 mm to 39 mm in nominal diameter of screw thread	
Width across flats or outside diameter	—	Width across flats or outside diameter shall be not less than 1.45 times the nominal diameter of screw thread.
Effective length of engagement of threaded portion	—	Effective length of engagement of threaded portion shall be not less than 0.6 time the nominal diameter of screw thread.
Material	To be stainless steel of austenitic system, ferritic system and martensitic system.	

Remarks 1. This standard is based on ISO 3506-1979.

2. This standard specifies the mechanical properties of stainless threaded fasteners which have been divided into some grades and does not specify corrosion resistance, oxidation resistance, etc. under each environment.
Therefore, the corrosion resistance and oxidation resistance and mechanical properties at high and low temperatures of stainless threaded fasteners shall be subjected to agreement between the parties concerned.
3. The units and numerical values given in { } in this standard are in accordance with conventional units and are the standard value. Further, $1 \text{ N/mm}^2 = 1 \text{ MPa}$.

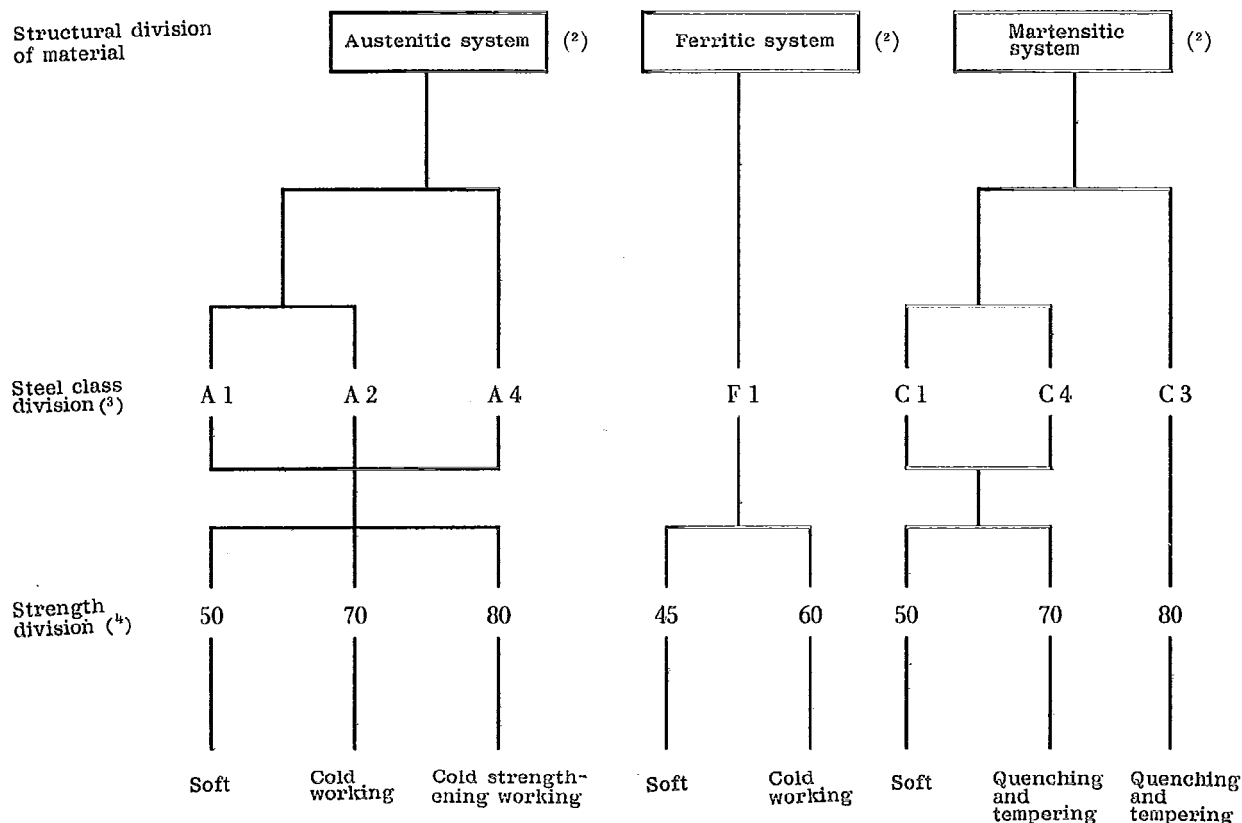
2. Property Division and Its Indication Method

The property division of stainless steel threaded fasteners shall consist of structure division, steel class division and strength division, as shown in Table 2, and the indication method shall be shown like the following examples by combining symbol of steel class division by a letter and a number of one figure and symbol of strength division by a number of two figures in this order.

Example: A2-70 Threaded fastener of 700 N/mm² {71.4 kgf/mm²} or more in tensile strength of which the cold working has been completed by using stainless steel (A2) of austenitic system.

C4-70 Threaded fastener of 700 N/mm² {71.4 kgf/mm²} or more in tensile strength of which the quenching and tempering have been completed by using stainless steel (C4) of martensitic system.

Table 2. Property Division



Notes ⁽²⁾ The chemical components of stainless steel of austenitic system, ferritic system and martensitic system are shown in Table 7.

⁽³⁾ The meanings of letters and figures indicating the steel class division are as follows:

A : indicates austenitic system.

F : indicates ferritic system.

C : indicates martensitic system.

Figure : indicates the division by elements included in stainless steels of A, F and C.

⁽⁴⁾ The number of two figures expressing the strength division indicates 1/10 of the minimum tensile-strength of bolt and machine screw or the proof load stress of nut given by unit of N/mm².

3. Mechanical Properties

3.1 Mechanical Properties of Bolts and Machine Screws The mechanical properties of bolts and machine screws of stainless steels of austenitic system, ferritic system and martensitic system shall be as specified in Table 3.

Table 3. Mechanical Properties of Bolts and Machine Screws

Structural division of material	Steel class division	Strength division	Division of nominal diameter of screw thread mm	Mechanical properties of bolt and machine screw									
				Tensile strength ⁽⁵⁾ N/mm ² {kgf/mm ² }	Twisting strength N · m {kgf · cm}	Proof stress ⁽⁶⁾ N/mm ² {kgf/mm ² }	Elongation ⁽⁷⁾ mm	Hardness ⁽⁸⁾					
				Minimum	Minimum	Minimum	Minimum	Vickers HV		Brinell HB		Rockwell HRC	
								Mini- mum	Maxi- mum	Mini- mum	Maxi- mum	Mini- mum	Maxi- mum
Austenitic system	A1, A2	50	1.6 to 5 incl. ⁽¹⁰⁾	500 {51.0}	See Table 4	210 {21.4}	0.6 <i>d</i>	—	—	—	—	—	—
			Over 5 to 39 incl.	—	—	—	—	—	—	—	—	—	—
	and 70 ⁽⁹⁾	70 ⁽⁹⁾	1.6 to 5 incl. ⁽¹⁰⁾	700 {71.4}	See Table 4	450 {45.9}	0.4 <i>d</i>	—	—	—	—	—	—
			Over 5 to 20 incl. ⁽¹¹⁾	—	—	—	—	—	—	—	—	—	—
	A4	80 ⁽⁹⁾	1.6 to 5 incl. ⁽¹⁰⁾	800 {81.6}	See Table 4	600 {61.2}	0.3 <i>d</i>	—	—	—	—	—	—
			Over 5 to 20 incl. ⁽¹¹⁾	—	—	—	—	—	—	—	—	—	—
Ferritic system	F1	45	1.6 to 5 incl.	450 {45.9}	⁽¹²⁾	250 {25.5}	0.2 <i>d</i>	—	—	—	—	—	—
			Over 5 to 24 incl. ⁽¹¹⁾	—	—	—	—	—	—	—	—	—	—
		60 ⁽⁹⁾	1.6 to 5 incl.	600 {61.2}	⁽¹²⁾	410 {41.8}	0.2 <i>d</i>	—	—	—	—	—	—
			Over 5 to 24 incl. ⁽¹¹⁾	—	—	—	—	—	—	—	—	—	—
Martensitic system	C1	50	1.6 to 5 incl.	500 {51.0}	⁽¹²⁾	250 {25.5}	0.2 <i>d</i>	—	—	—	—	—	—
			Over 5 to 39 incl.	—	—	—	—	—	—	—	—	—	—
		70	1.6 to 5 incl.	700 {71.4}	⁽¹²⁾	410 {41.8}	0.2 <i>d</i>	220	330	209	314	20	34
			Over 5 to 39 incl.	—	—	—	—	—	—	—	—	—	—
	C3	80	1.6 to 5 incl.	800 {81.6}	⁽¹²⁾	640 {65.3}	0.2 <i>d</i>	240	340	228	323	21	35
			Over 5 to 39 incl.	—	—	—	—	—	—	—	—	—	—
	C4	50	1.6 to 5 incl.	500 {51.0}	⁽¹²⁾	250 {25.5}	0.2 <i>d</i>	—	—	—	—	—	—
			Over 5 to 39 incl.	—	—	—	—	—	—	—	—	—	—
		70	1.6 to 5 incl.	700 {71.4}	⁽¹²⁾	410 {41.8}	0.2 <i>d</i>	220	330	209	314	20	34
			Over 5 to 39 incl.	—	—	—	—	—	—	—	—	—	—

Notes ⁽⁵⁾ The tensile strength shall be obtained by dividing a tensile load by the stress area of screw thread [see Note ⁽²³⁾].

⁽⁶⁾ The proof stress shall be the value when the permanent set is 0.2 %.

⁽⁷⁾ The elongation shall be obtained from the product itself in accordance with 6.2.1 (3).

Further, Table 5 shows the values of 0.6 *d*, 0.4 *d*, 0.3 *d*, and 0.2 *d* to the nominal diameter of screw thread (*d*) = 6 mm to 39 mm.

⁽⁸⁾ The hardness applies only to the bolts and machine screws of martensitic system which have been applied with quenching and tempering.

- (⁹) The values of mechanical properties of this Table to the strength divisions 70 and 80 of austenitic system (A 1, A 2 and A 4) and to the strength division 60 of ferritic system (F 1) apply to the bolts and machine screws of not more than 8 d (d is nominal diameter of screw thread) in nominal length and doesn't apply to the bolts and machine screws of more than 8 d in nominal length. Provided that the values of mechanical properties of the bolts and machine screws of more than 8 d in nominal length shall be as agreed upon between the parties concerned.

Further, the values of mechanical properties of this table to other strength division apply to all of nominal length.

- (¹⁰) The tensile strength to nominal designation of screw thread M 1.6 to M 5 of bolts and machine screws of austenitic system (A 1, A 2 and A 4) may be in accordance with the twisting strength of Table 4.
- (¹¹) The values of mechanical properties to the bolts and machine screws belonging in strength division 70 and 80 of austenitic system (A 1, A 2 and A 4) and having nominal diameter of screw thread of more than 20 mm and to the bolts and machine screws belonging in strength division 45 and 60 of ferritic system and having nominal diameter of screw thread of more than 24 mm shall be subjected to the agreement between the parties concerned.
- (¹²) Where the twisting strength to nominal designation of screw thread M 1.6 to M 5 of bolts and machine screws of ferritic system (F 1) and martensitic system (C 1, C 3 and C 4) is required, it shall be subjected to the agreement between the parties concerned.

Table 4. Twisting Strength of
M 1.6 to M 5

Unit: N · m {kgf · cm}

Nominal designation (Meter coarse screw thread)	Twisting strength (Minimum)		
	In the case of strength division 50	In the case of strength division 70	In the case of strength division 80
M 1.6	0.15 { 1.53 }	0.2 { 2.04 }	0.27 { 2.75 }
M 2	0.3 { 3.06 }	0.4 { 4.08 }	0.56 { 5.71 }
M 2.5	0.6 { 6.12 }	0.9 { 9.18 }	1.2 { 12.2 }
M 3	1.1 { 11.2 }	1.6 { 16.3 }	2.1 { 21.4 }
M 4	2.7 { 27.5 }	3.8 { 38.7 }	4.9 { 50.0 }
M 5	5.5 { 56.1 }	7.8 { 79.5 }	10.0 { 102 }

Remark: This Table applies to only the bolts and machine screws of austenitic system.

Table 5. Elongation after Break
to Nominal Diameter of
Screw Thread

Unit: mm

Nominal diameter of screw thread d	Elongation			
	0.6 d	0.4 d	0.3 d	0.2 d
6	3.6	2.4	1.8	1.2
8	4.8	3.2	2.4	1.6
10	6.0	4.0	3.0	2.0
12	7.2	4.8	3.6	2.4
14	8.4	5.6	4.2	2.8
16	9.6	6.4	4.8	3.2
18	10.8	7.2	5.4	3.6
20	12.0	8.0	6.0	4.0
22	13.2	8.8	6.6	4.4
24	14.4	9.6	7.2	4.8
27	16.2	10.8	8.1	5.4
30	18.0	12.0	9.0	6.0
33	19.8	13.2	9.9	6.6
36	21.6	14.4	10.8	7.2
39	23.4	15.6	11.7	7.8

3.2 Mechanical Properties of Nuts The mechanical properties of stainless steel nuts of austenitic system, ferritic system and martensitic system shall be as shown in Table 6.

Table 6. Mechanical Properties of Nuts

Structural division of material	Steel class division	Strength division	Division of nominal diameter of screw thread mm	Mechanical properties of nut							
				Proof load stress ⁽¹³⁾ N/mm ² {kgf/mm ² }	Hardness ⁽¹⁴⁾						
					Vickers		Brinell		Rockwell		
					HV		HB		HRC		
Mini- mum	Maxi- mum	Mini- mum	Maxi- mum	Mini- mum	Maxi- mum						
Austenitic system	A1, A2 and A4	50	1.6 to 39 incl.	500{51.0}	—	—	—	—	—	—	
		70	(¹⁵) 1.6 to 20 incl.	700{71.4}	—	—	—	—	—	—	
		80		800{81.6}	—	—	—	—	—	—	
Ferritic system	F1	45	(¹⁵) 1.6 to 24 incl.	450{45.9}	—	—	—	—	—	—	
		60		600{61.2}	—	—	—	—	—	—	
Martensitic system	C1	50	1.6 to 39 incl.	500{51.0}	—	—	—	—	—	—	
		70		700{71.4}	220	330	209	314	20	34	
	C3	80		800{81.6}	240	340	228	323	21	35	
	C4	50		500{51.0}	—	—	—	—	—	—	—
		70		700{71.4}	220	330	209	314	20	34	

Notes ⁽¹³⁾ When tested in accordance with 6.2.3, the nut shall resist this load without causing cracks or breaks. Further, the nut shall be detached from mandrel by fingers after removal of load.

⁽¹⁴⁾ The hardness applies to only the nuts of martensitic system which have completed quenching and tempering.

⁽¹⁵⁾ The values of mechanical properties to nuts belonging in strength division 70 and 80 of austenitic system (A 1, A 2 and A 4) and having nominal diameter of screw thread of more than 20 mm and to nuts belonging in strength division 45 and 60 of ferritic system (F 1) and having nominal diameter of screw thread of more than 24 mm shall be subjected to the agreement between the parties concerned.

4. Surface Condition and Magnetism

The surface of stainless steel threaded fastener shall have metallic gloss and be free from surface defects likely to impair the mechanical properties.

The stainless steel threaded fasteners of austenitic system are non-magnetic generally, but they show magnetism a little after cold working in some cases. Where it becomes a problem especially, it shall be subjected to the agreement between the parties concerned.