



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 1217 : 2018

(JSME/JSA)

Bolting for use with pipe flanges

ICS 21.060.10; 21.060.20; 23.040.60

Reference number : JIS B 1217 : 2018 (E)

PROTECTED BY COPYRIGHT

B 1217 : 2018

Date of Establishment: 2009-03-20

Date of Revision: 2018-02-20

Date of Public Notice in Official Gazette: 2018-02-20

Investigated by: Japanese Industrial Standards Committee
Standards Board for ISO area

JIS B 1217 : 2018, First English edition published in 2018-07

Translated and published by: Japanese Standards Association
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2018

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

HT/HN
 **Documents**
Document Sharing Hub

Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Materials, steel grades and property classes of bolts	3
4.1 Carbon steel bolt and low alloy steel bolt	3
4.2 Stainless steel bolt	5
4.3 Aluminium alloy bolt	6
5 Materials, steel grades and property classes of nuts	6
6 Combination of bolts and nuts	7
7 Shapes and dimensions of bolts and nuts	8
7.1 Threads of bolts and nuts	8
7.2 Shapes and dimensions of bolts	9
7.3 Shapes and dimensions of nuts	10
8 Surface defects of bolts and nuts	10
9 Inspection of bolts and nuts	10
10 Designation of bolts and nuts	11
10.1 Bolts	11
10.2 Nuts	12
11 Marking of bolts and nuts	13
12 Washers	14
Annex A (informative) Nominal length, overall length and thread length of bolts for flanges	15
Annex B (informative) Bibliography	32

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 The Japan Society of Mechanical Engineers (JSME)/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 1217:2012** is replaced with this Standard.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or utility model rights.

Bolting for use with pipe flanges

Introduction

This Japanese Industrial Standard was established in 2009 and has been revised twice since then. The previous edition was made in 2012, and this revision is to update the contents of this document based on changes in production and use of bolts and nuts that have been made after the introduction of the previous edition.

No corresponding International Standard has been established at this point.

1 Scope

This Standard specifies requirements for bolts, nuts and associated parts used for joining the pipe flanges specified in JIS B 2220, JIS B 2239, JIS B 2240 and JIS B 2241 (hereafter referred to as flanges).

For those bolts, nuts, and associated parts that are intended for services at temperatures below the ordinary temperature, the requirements for material, steel grade and property class are to be subject to the agreement between the manufacturer and the purchaser.

NOTE Requirements of this Standard assume the use of right-handed threads.

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 0101 *Screw threads and fasteners — Vocabulary*

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

JIS B 0209-1 *ISO general purpose metric screw threads — Tolerances — Part 1 : Principles and basic data*

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*

JIS B 1003 *Fasteners — Ends of parts with external ISO metric thread*

JIS B 1021 *Tolerances for fasteners — Part 1 : Bolts, screws, studs and nuts — Product grades A, B and C*

JIS B 1041 *Fasteners — Surface discontinuities — Part 1 : Bolts, screws and studs for general requirements*

JIS B 1042 *Fasteners — Surface discontinuities — Part 2 : Nuts*

- JIS B 1051 *Mechanical properties of fasteners made of carbon steel and alloy steel — Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*
- JIS B 1052-2 *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 2 : Nuts with specified property classes — Coarse thread and fine pitch thread*
- JIS B 1054-1 *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 1 : Bolts, screws and studs*
- JIS B 1054-2 *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 2 : Nuts*
- JIS B 1071 *Fasteners — Methods of verification for size and geometry*
- JIS B 1091 *Fasteners — Acceptance inspection*
- JIS B 1180 *Hexagon head bolts and hexagon head screws*
- JIS B 1181 *Hexagon nuts and hexagon thin nuts*
- JIS B 1256 *Plain washers*
- JIS B 2220 *Steel pipe flanges*
- JIS B 2239 *Cast iron pipe flanges*
- JIS B 2240 *Copper alloy pipe flanges*
- JIS B 2241 *Aluminium alloy pipe flanges*
- JIS G 0404 *Steel and steel products — General technical delivery requirements*
- JIS G 3101 *Rolled steels for general structure*
- JIS G 4051 *Carbon steels for machine structural use*
- JIS G 4107 *Alloy steel bolting materials for high temperature service*
- JIS G 4303 *Stainless steel bars*
- JIS H 4040 *Aluminium and aluminium alloy bars and wires*
- ASTM A 194/A 194M *Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in JIS B 0101, and the following apply.

3.1

stud bolt, threaded at both ends (hereafter referred to as double-ended bolt)

bolt comprising a cylindrical rod which is threaded at both ends and of which the diameter is equal to the nominal or pitch diameter of the thread

NOTE See Figure 1 a) and b).

3.2

stud bolt, threaded full length (hereafter referred to as full-threaded bolt)

bolt comprising a cylindrical rod which is threaded through its entire length

NOTE See Figure 1 c).

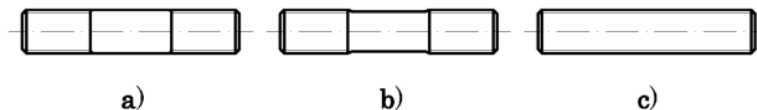


Figure 1 Double-ended bolt and full-threaded bolt

3.3

heavy hex nut

hexagon nut of which the height is equal to the nominal diameter of thread

4 Materials, steel grades and property classes of bolts

4.1 Carbon steel bolt and low alloy steel bolt

The selection numbers for materials of carbon steel bolts and low alloy steel bolts shall be as shown in Table 1.

Table 1 Selection numbers of carbon steel bolts and low alloy steel bolts

Material ^{a)}	Selection number	Material ^{a)}	Selection number
SS400 of JIS G 3101	1	S35C (H) of JIS G 4051	5
SS490 of JIS G 3101	2	S45C (H) of JIS G 4051	6
SS540 of JIS G 3101	3	SNB7 of JIS G 4107	7
S25C (N) of JIS G 4051	4	SNB16 of JIS G 4107	8
Note ^{a)} S25C (N), S35C (H) and S45C (H) of JIS G 4051 shall be inspected according to JIS G 0404. S25C (N) shall have a minimum tensile strength of 440 MPa, S35C (H), a minimum tensile strength of 570 MPa, and S45C (H), a minimum tensile strength of 690 MPa.			

Table 2 shows the correspondence of selection numbers of carbon steel bolts and low alloy steel bolts to flange standard, nominal pressure, gasket shape and service temperature.

Table 2 Correspondence of selection numbers of carbon steel bolts and low alloy steel bolts to flanges

Flange standard	Nominal pressure of flange	Gasket shape	Selection number							
			Service temperature °C							
			65 or under	Over 65 up to and incl. 220	Over 220 up to and incl. 300	Over 300 up to and incl. 350	Over 350 up to and incl. 425	Over 425 up to and incl. 450	Over 450 up to and incl. 490	Over 490 up to and incl. 510
JIS B 2220	5K, 10K, 10K thin	Whole surface	1 to 4 ^{a)} , 5 ^{b)} , 6 ^{b)} , 7, 8			—	—	—	—	—
		Ring	1 to 8		4 to 8	—	—	—	—	—
	16K	Whole surface	5 ^{b)} , 6 ^{b)} , 7, 8					—	—	—
		Ring	1 to 8		4 to 8		7, 8	—	—	—
	20K	Ring	1 to 8		4 to 8		7, 8	—	—	—
	30K	Ring	1 to 8		4 to 8		7, 8		—	
	40K, 63K	Ring	1 to 8		4 to 8		7, 8		8	
JIS B 2239	5K, 10K, 10K thin	Ring	1 to 8		4 to 8	—	—	—	—	—
	16K, 20K	Ring	1 to 8		4 to 8		—	—	—	—
JIS B 2240	5K, 10K, 16K	Whole surface	1 ^{c)} , 2 to 6 ^{b)} , 7, 8		—	—	—	—	—	—
		Ring	1 to 8		—	—	—	—	—	—
JIS B 2241	5K, 10K, 16K	Ring	1 to 8	—	—	—	—	—	—	—
Notes ^{a)} Restricted to the flanges of nominal pressure 5K and nominal diameter 1 000A or under, flanges of nominal pressure 10K and nominal diameter 600A or under, and flanges of nominal pressure 10K thin, sealed with rubber sheet gasket or cotton-inserted rubber sheet gasket and used at a temperature of 120 °C or under. ^{b)} Not applicable if a joint sheet with a thickness smaller than 3 mm is used for gasket. ^{c)} Restricted to the flanges of nominal pressures 5K and 10K, sealed with rubber sheet gasket or cotton-inserted rubber sheet gasket and used at a temperature of 120 °C or under.										

For applications at temperatures 150 °C or lower, bolts of property classes specified in **JIS B 1051** indicated in Table 3 may be used regardless of the specification in Table 2. However, mechanical properties of bolts with thread sizes M30 × 3, M42, and M42 × 3 shall be subject to the provisions in **JIS B 1051**, and minimum ultimate tensile strength and proof load shall be as agreed between the purchaser and the manufacturer.

For applications at temperatures above 150 °C, strength of the bolt at the service temperature shall be confirmed.

Table 3 Correspondence of property classes of carbon steel bolts and low alloy steel bolts to flanges

Flange standard	Nominal pressure of flange	Gasket shape	Property class
JIS B 2220	5K, 10K, 10K thin, 16K	Whole surface	4.6 ^{a)} , 4.8 ^{a)} , 5.6 ^{b)} , 5.8 ^{b)} , 6.8 ^{b)} , 8.8 or higher ^{c)}
		Ring	4.6 or higher ^{c)}
	20K, 30K, 40K, 63K	Ring	4.6 or higher ^{c)}
JIS B 2239	5K, 10K, 10K thin, 16K, 20K	Ring	4.6 or higher ^{c)}
JIS B 2240	5K, 10K, 16K	Whole surface	4.6 ^{d)} , 4.8 ^{d)} , 5.6 ^{b)} , 5.8 ^{b)} , 6.8 ^{b)} , 8.8 or higher ^{c)}
		Ring	4.6 or higher ^{c)}
JIS B 2241	5K, 10K, 16K	Ring	4.6 or higher ^{c)}
Notes ^{a)} Restricted to the flanges of nominal pressure 5K and nominal diameter 1 000A or under, flanges of nominal pressure 10K and nominal diameter 600A or under, and flanges of nominal pressure 10K thin, sealed with rubber sheet gasket or cotton-inserted rubber sheet gasket and used at a temperature of 120 °C or under. ^{b)} Not applicable if a joint sheet with a thickness smaller than 3 mm is used for gasket. ^{c)} "Or higher" means classes equal to or higher than the class indicated. ^{d)} Restricted to the flanges of nominal pressures 5K and 10K, sealed with rubber sheet gasket or cotton-inserted rubber sheet gasket and used at a temperature of 120 °C or under.			

4.2 Stainless steel bolt

Table 4 shows the correspondence of materials of stainless steel bolts to flange standard, nominal pressure and gasket shape.

Table 4 Correspondence of materials of stainless steel bolts to flanges

Flange standard	Nominal pressure of flange	Gasket shape	Material
JIS B 2220	5K, 10K, 10K thin, 16K	Whole surface	—
		Ring	SUS304 of JIS G 4303
	20K, 30K, 40K, 63K	Ring	SUS316 of JIS G 4303
JIS B 2241	5K, 10K, 16K	Ring	

For applications at temperatures 400 °C or lower, bolts of steel grades and property classes specified in JIS B 1054-1 indicated in Table 5 may be used regardless of the specification in Table 4. However, mechanical properties of bolts with thread sizes M30 × 3, M42, and M42 × 3 shall be subject to the provisions in JIS B 1054-1.

For applications at temperatures above 400 °C, strength of the bolt at the service temperature shall be confirmed.

For bolts of property classes 70 and 80, possibility of stress corrosion cracking should be paid attention to.

Table 5 Correspondence of steel grades and property classes of stainless steel bolts to flanges

Flange standard	Nominal pressure of flange	Gasket shape	Steel grade	Property class
JIS B 2220	5K, 10K, 10K thin, 16K	Whole surface	A2, A4	70 ^{a)} , 80
		Ring		50, 70, 80
	20K, 30K, 40K, 63K	Ring		
JIS B 2241	5K, 10K, 16K	Ring		
Note ^{a)} Not applicable if a joint sheet with a thickness smaller than 3 mm is used for gasket.				

4.3 Aluminium alloy bolt

Table 6 shows the correspondence of materials of aluminium alloy bolts to flange standards.

Table 6 Correspondence of materials of aluminium alloy bolts to flanges

Flange standard	Material
JIS B 2241	A2014BD-T6 of JIS H 4040
	A2024BD-T4 of JIS H 4040
	A6061BD-T6 of JIS H 4040

5 Materials, steel grades and property classes of nuts

Table 7 lists the materials, steel grades and property classes of nuts. However, mechanical properties of bolts with thread sizes M30 × 3, M42, and M42 × 3 specified in **JIS B 1052-2** or **JIS B 1054-2** shall be subject to the provisions in **JIS B 1052-2** or **JIS B 1054-2**, and proof load shall be as agreed between the purchaser and the manufacturer.

For stainless steel bolts of property classes 70 and 80, possibility of stress corrosion cracking should be paid attention to.

Table 7 Materials, steel grades and property classes of nuts

Classification	Material ^{a)}	Steel grade	Property class
Carbon steel and low alloy steel	SS400 of JIS G 3101	—	—
	S25C(N) of JIS G 4051	—	—
	S35C(H) of JIS G 4051	—	—
	S45C(H) of JIS G 4051	—	—
	Gr.4 of ASTM A 194/A 194M	—	—
	Gr.7 of ASTM A 194/A 194M	—	—
	—	—	Class 5 or higher ^{b)} of JIS B 1052-2
Stainless steel	SUS304 of JIS G 4303	—	—
	SUS316 of JIS G 4303	—	—
	—	A2 of JIS B 1054-2	50, 70, 80 of JIS B 1054-2
	—	A4 of JIS B 1054-2	50, 70, 80 of JIS B 1054-2
Aluminium alloy	A2014BD-T6 of JIS H 4040	—	—
	A2024BD-T4 of JIS H 4040	—	—
	A6061BD-T6 of JIS H 4040	—	—
Notes ^{a)} S25C (N) and S45C (H) of JIS G 4051 shall be inspected according to JIS G 0404 . S25C (N) shall have a hardness of 123HBW to 183HBW, S35C (H), a hardness of 167HBW to 235HBW, and S45C (H), a hardness of 201HBW to 269HBW. ^{b)} “Or higher” means classes equal to or higher than the class indicated.			

6 Combination of bolts and nuts

Table 8 shows appropriate combination of bolts and nuts.

Table 8 Combination of bolts and nuts

Classification	Bolt			Nut		
	Material	Steel grade	Property class	Material	Steel grade	Property class
Carbon steel and low alloy steel	SS400	—	—	SS400 ^{a)}	—	—
	SS490	—	—	SS400 ^{a)}	—	—
	SS540	—	—	SS400 ^{a)}	—	—
	S25C (N)	—	—	S25C (N) ^{a)}	—	—
	S35C (H)	—	—	S25C (N) ^{a)}	—	—
	S45C (H)	—	—	S35C (H) ^{a)}	—	—
	SNB7	—	—	S45C (H) ^{a)}	—	—
	SNB16	—	—	Gr.4 or Gr.7	—	—
	—	—	4.6, 4.8, 5.6, 5.8	—	—	5 or higher ^{b)}
	—	—	6.8	—	—	6 or higher ^{b)}
	—	—	8.8	—	—	8 or higher ^{b)}
	—	—	9.8	—	—	9 or higher ^{b)}
	—	—	10.9	—	—	10 or higher ^{b)}
	—	—	12.9/12.9	—	—	12
Stainless steel	SUS304	—	—	SUS304	—	—
	SUS316	—	—	SUS316	—	—
	—	A2	50	—	A2	50 or higher ^{b)}
	—	A2	70	—	A2	70 or higher ^{b)}
	—	A2	80	—	A2	80
	—	A4	50	—	A4	50 or higher ^{b)}
	—	A4	70	—	A4	70 or higher ^{b)}
	—	A4	80	—	A4	80
Aluminium alloy	A2014BD-T6	—	—	A2014BD-T6	—	—
	A2024BD-T4	—	—	A2024BD-T4 ^{a)}	—	—
	A6061BD-T6	—	—	A6061BD-T6 ^{a)}	—	—
Notes ^{a)} Materials having a higher strength at the service temperature than that indicated may be used.						
^{b)} “Or higher” means classes equal to or higher than the class indicated.						

7 Shapes and dimensions of bolts and nuts

7.1 Threads of bolts and nuts

The standard dimensions for threads of bolts and nuts are provided in **JIS B 0205-4**. Table 9 shows proper combinations of thread nominal diameters and pitches.