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**Set of anchor bolt with rolled threads for
structures**

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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 Standards Committee according to the proposal of establishing a Japanese Industrial Standard submitted by Japanese Society of Steel Construction (JSSC)/Japanese Standards Association (JSA) with a draft prepared from the Japanese Society of Steel Construction Standard (JSS II 13:2004) being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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Set of anchor bolt with rolled threads for structures

1 Scope

This Japanese Industrial Standard specifies the characteristics of sets of anchor bolts threaded at both ends intended for structures, which are used in such as column base of a structure, and which consist of an anchor bolt with rolled threads, nuts, and a washer (hereafter referred to as the "sets").

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 0205-2 *ISO general purpose metric screw threads—Part 2: General plan*
- JIS B 0205-4 *ISO general purpose metric screw threads—Part 4: Basic dimensions*
- JIS B 0209-3 *ISO general purpose metric screw threads—Tolerances—Part 3: Deviations for constructional screw threads*
- JIS B 0251 *Limit gauges for metric screw threads*
- JIS B 0601 *Geometrical Product Specifications (GPS)—Surface texture: Profile method—Terms, definitions and surface texture parameters*
- JIS B 0651 *Geometrical Product Specifications (GPS)—Surface texture: Profile method—Nominal characteristics of contact (stylus) instruments*
- JIS B 1052-2 *Mechanical properties of fasteners—Part 2: Nuts with specified proof load values—Coarse thread*
- JIS B 1052-6 *Mechanical properties of fasteners—Part 6: Nuts with specified proof load values—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 7502 *Micrometer callipers*
- JIS B 7507 *Vernier, dial and digital callipers*
- JIS B 7512 *Steel tape measures*
- JIS B 7516 *Metal rules*
- JIS B 7721 *Tension/compression testing machines—Verification and calibration of the force-measuring system*

- JIS G 0320 *Standard test method for heat analysis of steel products*
 JIS G 3138 *Rolled steel bars for building structure*
 JIS G 4321 *Stainless steel for building structure*
 JIS H 8641 *Hot dip galvanized coatings*
 JIS Z 2244 *Vickers hardness test—Test method*
 JIS Z 2245 *Rockwell hardness test—Test method*

3 Terms and definitions

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

4 Types of set

The sets are classified according to the material of a bolt and the tensile strength of the bolt, into the types as given in table 1.

Table 1 Types of set

Symbol indicating the type of set	Material of bolt ^{a)}		Tensile strength (min.) N/mm ²	Strength division of nuts	Hardness division of washers
ABR400	Carbon steel	SNR400B	400	5J	200J
ABR490		SNR490B	490		
ABR520SUS	Stainless steel	SUS304A	520	50	
Note ^{a)} SNR400B and SNR490B indicate the rolled steel bars for building structure specified in JIS G 3138. Furthermore, SUS304A indicates the stainless steel for building structure specified in JIS G 4321.					

5 Composition of set

The composition of a set shall be as follows:

- The set shall consist of one anchor bolt with rolled threads for structures (hereafter referred to as "bolts"), four hexagon nuts for structures (hereafter referred to as "nuts") and one plain washer for structures (hereafter referred to as "washers").
- The bolt shall be linear-shaped and provided with specified threads in both ends as shown in figure 1, and the set shall have a pulling resistance by being fixed to the anchor plate in the concrete foundation.
- The bolt, nuts and washer shall be in accordance with Annex A, Annex B and Annex C, respectively.
- A carbon steel bolt shall be combined with carbon steel nuts and a carbon steel washer and a stainless steel bolt shall be combined with stainless steel nuts and a stainless steel washer.

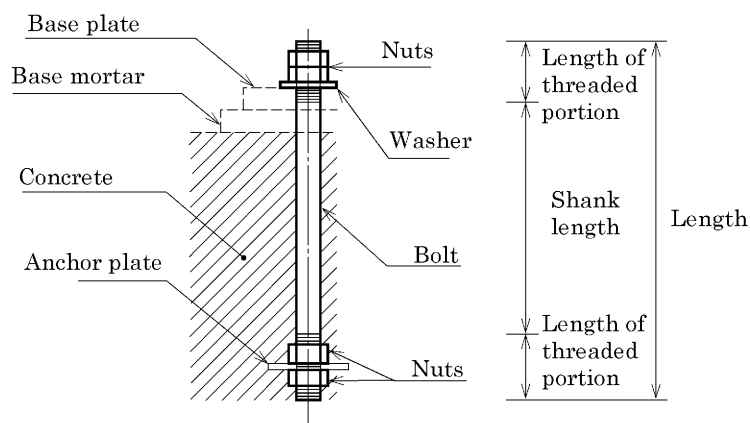


Figure 1 Composition of set

6 Tensile yield strength of set

6.1 Set with tensile strength of 400 N/mm² and 520 N/mm²

The tensile yield strength (minimum) of a carbon steel set with the tensile strength of 400 N/mm² and a stainless steel set with the tensile strength of 520 N/mm² shall be as given in table 2.

Table 2 Tensile yield strength of sets with tensile strength of 400 N/mm² and 520 N/mm²

Designation of screw thread <i>d</i>	Reference shaft diameter mm	Cross-sectional area of shank mm ²	Effective cross-sectional area of thread mm ²	Tensile yield strength of set (min.) ^{b)} kN	
				Threaded portion	Shank (informative)
M16	14.54	166	157	36.9	39.0
M20	18.20	260	245	57.6	61.1
M22	20.20	320	303	71.2	75.2
M24	21.85	375	353	83.0	88.1
M27	24.85	485	459	108	114
M30	27.51	594	561	132	140
M33	30.51	731	694	163	172
M36	33.17	864	817	192	203
M39	36.17	1 030	976	229	242
M42	38.83	1 180	1 120	263	277
M45	41.83	1 370	1 310	282 (308) ^{a)}	295 (322) ^{a)}
M48	44.48	1 550	1 470	316 (345) ^{a)}	333 (364) ^{a)}
Notes ^{a)} The parenthesized values of tensile yield strength of set are to be applied in the case of ABR520SUS.					
^{b)} The tensile yield strength of set is equivalent to proof load stress.					

6.2 Set with tensile strength of 490 N/mm²

The tensile yield strength (minimum) of a set with the tensile strength of 490 N/mm² shall be as given in table 3.

Table 3 Tensile yield strength of set with tensile strength of 490 N/ mm²

Designation of screw thread <i>d</i>	Reference shaft diameter mm	Cross-sectional area of shank mm ²	Effective cross-sectional area of thread mm ²	Tensile yield strength of set (minimum) ^{a)} kN	
				Threaded portion	Shank (informative)
M16	14.54	166	157	51.0	54.0
M20	18.20	260	245	79.6	84.5
M22	20.20	320	303	98.5	104
M24	21.85	375	353	115	122
M27	24.85	485	459	149	158
M30	27.51	594	561	182	193
M33	30.51	731	694	226	238
M36	33.17	864	817	266	281
M39	36.17	1 030	976	317	335
M42	38.83	1 180	1 120	364	384
M45	41.83	1 370	1 310	386	404
M48	44.48	1 550	1 470	434	457
Note ^{a)} The tensile yield strength of set is equivalent to proof load stress.					

7 Confirmatory test of tensile yield strength

7.1 Apparatus

The apparatus used for the test shall be as follows:

- The testing machine shall be a tensile testing machine calibrated in accordance with **JIS B 7721**, and shall have sufficient capability of applying the threaded portion tensile yield strength (minimum) given in tables 2 and 3 to the test specimen specified in 7.2.
- The test specimen mounting bracket (hereafter referred to as "brackets") shall have such a cross-sectional area that it does not deflect more than 1 mm when the threaded portion tensile yield strength (minimum) is applied to the test specimen specified in 7.2. An example of the shape of the bracket is shown in figure 2. Furthermore, the hole diameter (d_1) of the bracket shall be larger than the designation of screw thread of the bolt and smaller than the dimension obtained by adding 5 mm to the designation of screw thread.

In addition, the outside shape of the bracket shall be determined so that it is in agreement with the shape of the pedestal of the testing machine, and the plate thickness of the bracket (t) should be determined so that the required cross-sectional area is obtained.

- The length measuring instrument shall be a steel tape measure of which the scale interval is 1 mm specified in **JIS B 7512** or a metal rule of which the scale interval is 1 mm specified in **JIS B 7516**.