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Bolts of turnbuckle for building

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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 Japanese Society of Steel Construction (JSSC)/the 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 A 5542 : 1993** is replaced with this Standard.

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Bolts of turnbuckle for building

1 Scope This Japanese Industrial Standard specifies the bolts of turnbuckle used for building made of carbon steel products, hot-dip zinc coated carbon steel products and stainless steel products (hereafter referred to as “bolts”).

For the bolts of turnbuckle for building of carbon steel products (except M6 to M10) with material of SS400 of **JIS G 3101** are specified in Annex (normative).

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) indicated below shall be applied.

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

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

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 1180 *Hexagon head bolts and hexagon head screws*

JIS B 1181 *Hexagon nuts and hexagon thin nuts*

JIS B 1186 *Sets of high strength hexagon bolt, hexagon nut and plain washers for friction grip joints*

JIS B 7507 *Vernier, dial and digital callipers*

JIS G 3101 *Rolled steels for general structure*

JIS G 3136 *Rolled steels for building structure*

JIS G 3138 *Rolled bars for building structure*

JIS G 4303 *Stainless steel bars*

JIS G 4321 *Stainless steel for building structure*

JIS H 8641 *Zinc hot dip galvanizings*

3 Classification and symbol Bolts shall be classified by the shape and classification of product as shown in Table 1.

Table 1 Symbol of classification

Classification	Symbol	Product
Strap bolt	S	Carbon steel products
Hot-dip zinc coated strap bolt	S-HDZ	Hot-dip zinc coated carbon steel products
Stainless steel strap bolt	S-SUS	Stainless steel products
Eyebolt	E	Carbon steel products
Hot-dip zinc coated eyebolt	E-HDZ	Hot-dip zinc coated carbon steel products
Double-ended stud	D	Carbon steel products
Hot-dip zinc coated double-ended stud	D-HDZ	Hot-dip zinc coated carbon steel products

Remarks : Mass of hot-dip zinc deposit per unit area shall be not less than HDZ35 specified in **JIS H 8641**.

4 Performance

4.1 Tensile load Tensile load of bolts shall be not less than the minimum value shown in Table 2.

4.2 Permanent deformation Permanent deformation of bolts which may be detrimental to practical use shall not be generated on the bolt under the proof load shown in Table 2.

Table 2 Performance

Unit: kN

Nominal designation of screw threads	Product			
	Carbon steel products and hot-dip zinc coated carbon steel products ⁽¹⁾		Stainless steel products	
	Tensile load (min.)	Proof load ⁽²⁾	Tensile load (min.)	Proof load ⁽²⁾
M6	8.5	5.0	—	—
M8	15.5	9.1	—	—
M10	24.5	14.3	31.8	14.3
M12	35.8	21.0	46.2	21.0
M14	49.0	28.7	—	—
M16	66.0	38.6	85.3	38.6
M18	81.9	48.0	—	—
M20	104	60.6	134	60.6
M22	128	74.7	165	74.7
M24	150	87.7	193	87.7
M27	194	114	—	—
M30	238	139	—	—
M33	292	172	—	—

Notes ⁽¹⁾ Hot-dip zinc coated carbon steel products shall be not less than M10.

⁽²⁾ Proof load corresponds to the allowable unit stress depending upon the short period force.

5 Shape, dimensions and their allowances

5.1 Shape, dimensions of bolts and their allowances The shape and dimensions of bolts and their allowances shall be in accordance with Attached Tables 1 to 4.

5.2 Screw thread of bolt The screw thread of bolt shall be coarse pitch thread specified in **JIS B 0205-2**, and the precision of screw after thread rolling shall be the tolerance class 8g specified in **JIS B 0209-3**.

5.3 Fixing bolt and fixing nut The fixing bolt and fixing nut shall be as specified in Attached Tables 1 to 4.

6 Appearance The appearance of bolt shall be as follows.

- a) There shall be no defects detrimental to use such as flaw, crack, scar and so on.
- b) The centre line of shaft shall be straight, and there shall be no eccentricity nor bending detrimental to use.

7 Materials The materials for bolt shall be in accordance with Table 3.

Table 3 Material

Classification	Material	
Strap bolt	Round bar	M6 to M10 shall be SS400 of JIS G 3101 M12 to M33 shall be SNR400B of JIS G 3138
	Flat bar and plate	M6 to M10 shall be SS400 of JIS G 3101 M12 to M33 shall be SN400B of JIS G 3136
Hot-dip zinc coated strap bolt	Round bar	M10 shall be SS400 of JIS G 3101 M12 to M33 shall be SNR400B of JIS G 3138
	Flat bar and plate	M10 shall be SS400 of JIS G 3101 M12 to M33 shall be SN400B of JIS G 3136
Eyebolt Double-ended stud	M6 to M10 shall be SS400 of JIS G 3101 M12 to M33 shall be SNR400B of JIS G 3138	
Hot-dip zinc coated eyebolt Hot-dip zinc coated double-ended stud	M10 shall be SS400 of JIS G 3101 M12 to M33 shall be SNR400B of JIS G 3138	
Stainless steel strap bolt	Round bar and flat bar shall be SUS304A of JIS G 4321	

8 Manufacture method

8.1 Shank of bolt The shank of bolt shall be manufactured from one solid rod and shall have no joint.

8.2 Screw thread of bolt The screw thread part of a bolt shall be manufactured by thread rolling.

8.3 Eyebolt The eyebolt shall be manufactured from one solid rod, and shall have no joint.

8.4 Treatment of welded part of stainless steel bolt The connecting part of strap bolt and steel bar shall be finished with acid cleaning or the equivalent method after welding.

9 Test method

9.1 Shape and dimensions The shape and dimensions shall be measured for the shank diameter (d_1), the length of screw thread (S), and other dimensions shown in Attached Tables 1 to 3, using the vernier caliper specified in **JIS B 7507** or a limit gauge.

9.2 Precision of threads The precision of the threads after thread rolling shall be measured using the limit gauge specified in **JIS B 0251** or substituting apparatus which measures the thread precision.

9.3 Tensile load Using a suitable jig capable of setting the condition close to the practical use of the bolt, fit the jig or nut on the thread of the bolt so as to let at least three complete threads remain inside the cylinder side of the bolt, in the case of a strap bolt and eyebolt, insert the fixing bolt through the bolt hole at the bolt head, and in the case of a stud bolt, screw the fixing nut in the bolt heads, and apply the load in the axial direction to examine the maximum tensile load. The number of test specimens shall be three for one lot. The fixing bolt and the fixing nut in the bolt head shall be used as specified in Attached Tables 1 to 4.

When the bolt is too long to be set in a tester, it is permissible to cut it so as to make the test for adjusting screw part and head part separately.

9.4 Permanent deformation As the test similar to **9.3**, the proof load shown in Table 2 shall be loaded for 15 s, and shall be unloaded. The length of body shall be examined to see whether any deformation detrimental to use exists or not. The number of test specimens shall be three for one lot.

10 Inspection

10.1 Shape and dimensions The shape and dimensions shall be measured by the method of **9.1**, and the results shall satisfy the specification of **5.1**.

10.2 Precision of threads The precision of the threads shall be measured by the method of **9.2**, and the results shall satisfy the specification of **5.2**.

10.3 Appearance The appearance of bolt shall be inspected visually and the results shall satisfy the specification of clause **6**.

10.4 Tensile load The tensile load shall be measured by the method of **9.3**, and the results shall satisfy the specification of **4.1** for all three specimens.

10.5 Permanent deformation The permanent deformation shall be measured by the method of **9.4**, and the results shall satisfy the specification of **4.2** for all three specimens.