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Carbon steel tubes for general structure

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Contents

	Page
1 Scope	1
2 Normative references	1
3 Symbol of grade	1
4 Manufacturing method	2
5 Chemical composition	2
6 Mechanical properties	3
6.1 Tensile strength and yield point or proof stress	3
6.2 Elongation	4
6.3 Flattening resistance	5
6.4 Bendability	5
7 Dimensions, unit mass and dimensional tolerances	6
7.1 Dimensions and unit mass	6
7.2 Dimensional tolerances	9
8 Appearance	11
9 Tests	12
9.1 Chemical analysis	12
9.2 Mechanical tests	12
10 Inspection and reinspection	16
10.1 Inspection	16
10.2 Reinspection	16
11 Marking	16
12 Report	17
Annex A (normative) Type of coating and coating mass for tubes manufactured from coated steel sheet or coated steel strip	18

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 Iron and Steel Federation (JISF) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS G 3444 : 2016**), which has been technically revised.

However, **JIS G 3444 : 2016** may be applied in the **JIS** mark certification based on the relevant provisions of Article 30, paragraph (1), etc. of the Industrial Standardization Act until 21 February 2022.

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Carbon steel tubes for general structure

1 Scope

This Japanese Industrial Standard specifies requirements for the carbon steel tubes (hereafter referred to as tubes), used for civil engineering and architecture such as steel towers, scaffoldings, footing piles, foundation piles, piles for landslide suppression.

NOTE The dimensional range covered by this Standard is generally outside diameter 21.7 mm to 1 016.0 mm. In application for foundation piles and piles for landslide suppression, however, this Standard is mainly applicable to tubes of outside diameter under 318.5 mm, and **JIS A 5525** applies mainly to welded steel tubes of outside diameter 318.5 mm or over.

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 G 0320 *Standard test method for heat analysis of steel products*
- JIS G 0321 *Product analysis and its tolerance for wrought steel*
- JIS G 0404 *Steel and steel products — General technical delivery requirements*
- JIS G 0415 *Steel and steel products — Inspection documents*
- JIS G 3302 *Hot-dip zinc-coated steel sheet and strip*
- JIS G 3313 *Electrolytic zinc-coated steel sheet and strip*
- JIS G 3314 *Hot-dip aluminium-coated steel sheet and strip*
- JIS G 3317 *Hot-dip zinc-5 % aluminium alloy-coated steel sheet and strip*
- JIS G 3321 *Hot-dip 55 % aluminium-zinc alloy-coated steel sheet and strip*
- JIS G 3323 *Hot-dip zinc-aluminium-magnesium alloy-coated steel sheet and strip*
- JIS Z 2241 *Metallic materials — Tensile testing — Method of test at room temperature*
- JIS Z 3121 *Methods of tensile test for butt welded joints*
- JIS Z 8401 *Rounding of numbers*

3 Symbol of grade

The tubes are classified into 5 grades, and the symbol of grade shall be as given in Table 1.

Table 1 Symbol of grade and symbol for manufacturing method

Symbol of grade	Symbol for manufacturing method		
	Tube manufacturing method	Finishing method	Marking
STK290	Seamless : S		As given in 11 b).
STK400	Electric resistance welded : E	Hot finished : H	
STK490	Butt welded : B	Cold finished : C	
STK500	Automatic arc welded : A	As electric resistance welded : G	

4 Manufacturing method

The manufacturing method shall be as follows.

- The tubes shall be manufactured by combination of the tube manufacturing method and the finishing method which are indicated in Table 1. The symbol for manufacturing method shall be as specified in Table 1. If required, tubes may be subjected to an appropriate heat treatment.
- The tubes may be manufactured using coated steel sheet or coated steel strip, if so requested by the purchaser. In this case, the type of coating and coating mass applied should be in accordance with Annex A.
- The tubes shall be finished with plain ends unless otherwise specified. If the purchaser specifies bevel end finishing, the shape of the bevel end shall be as agreed between the purchaser and the manufacturer. If not specified, the shape of the bevel end shall be in accordance with Figure 1.

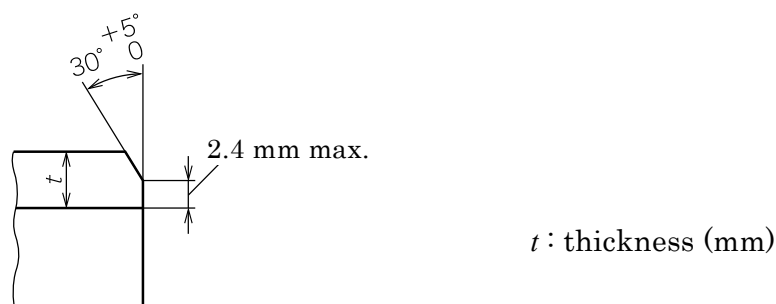


Figure 1 Shape of bevel end

5 Chemical composition

The tubes shall be subjected to the test of 9.1, and satisfy the heat analysis values given in Table 2. When the product analysis is requested by the purchaser, the test shall be performed according to 9.1, and the obtained product analysis values shall satisfy the requirements in Table 2 within tolerances given in Table 2 of JIS G 0321.

Table 2 Chemical composition ^{a)}

Unit: %

Symbol of grade	C	Si	Mn	P	S
STK290	—	—	—	0.050 max.	0.050 max.
STK400	0.25 max.	—	—	0.040 max.	0.040 max.
STK490	0.18 max.	0.55 max.	1.65 max.	0.035 max.	0.035 max.
STK500	0.24 max.	0.35 max.	0.30 to 1.30	0.040 max.	0.040 max.
STK540 ^{b)}	0.23 max.	0.55 max.	1.50 max.	0.040 max.	0.040 max.
Notes ^{a)} Alloy elements not included in this table and elements indicated with “—” may be added as necessary. ^{b)} For STK540, the chemical composition of tubes of wall thickness over 12.5 mm may be as agreed between the purchaser and the manufacturer.					

6 Mechanical properties

6.1 Tensile strength and yield point or proof stress

The tubes, steel sheets and steel strip used for manufacturing tubes shall be tested in accordance with 9.2, and the tensile strength and yield point or proof stress as well as the tensile strength at the weld shall satisfy the values specified in Table 3. The tensile strength in weld is applied to automatic arc welded steel tubes. The tensile test in weld may be omitted upon approval of the purchaser.

Table 3 Mechanical properties

Symbol of grade	Tensile strength N/mm ²	Yield point or proof stress N/mm ²	Tensile strength in weld N/mm ²	Flattening resistance	Bendability	
				Distance between flat plates (<i>H</i>)	Bending angle ^{a)}	Inside radius
STK290	290 min.	—	290 min.	$\frac{2}{3}D$	90°	6 <i>D</i>
STK400	400 min.	235 min.	400 min.	$\frac{2}{3}D$	90°	6 <i>D</i>
STK490	490 min.	315 min.	490 min.	$\frac{7}{8}D$	90°	6 <i>D</i>
STK500	500 min.	355 min.	500 min.	$\frac{7}{8}D$	90°	8 <i>D</i>
STK540	540 min.	390 min.	540 min.	$\frac{7}{8}D$	90°	6 <i>D</i>
NOTE 1 In this table, <i>D</i> stands for the outside diameter of tube.						
NOTE 2 1 N/mm ² = 1 MPa						
Note ¹⁾ The bending angle shall be measured from the starting point of the bend.						