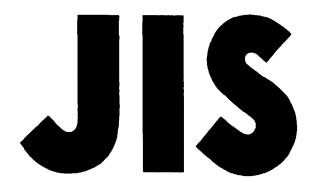UDC 669.15-194:669.14.018.29

JIS

JAPANESE INDUSTRIAL STANDARD

Carbon steel tubes for building structure

JIS G 3475-1996

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JAPANESE INDUSTRIAL STANDARD J I S

Carbon steel tubes for building structure G 3475-1996

1. Scope   This Japanese Industrial Standard specifies the carbon steel tubes (hereafter referred to as "steel tube") mainly used for structural members for buildings.

> Remarks: The cited standards to this Standard are given in Attached Table 2.

> Informative reference   The piles for foundation of buildings are covered by JIS A 5525 (Steel pipe piles).

2. Grade and symbol   The steel tube shall be classified into three categories, and their symbols shall be as given in Table 1.

3. Method of manufacture   The method of manufacture shall be as follows :

(1)   The steel tube shall be manufactured by either the seamless, electric resistance welding, butt welding, or arc welding (straight seam welding) process.

(2)   The steel tube shall be as manufactured conditions (hot formed, blue heat formed, or cold formed), otherwise appropriate heat treatment shall additionally be applied thereto.

4. Chemical composition   The steel tube shall be tested in accordance with 9.1, and the cast analysis values thereof shall be as given in Table 1.

Table 1. Chemical composition

Unit : %

Symbol of grade	C	Si	Mn	P	S	N
STKN400W	0.25 max.	—	—	0.030 max.	0.030 max.	0.006 max.
STKN400B	0.25 max.	0.35 max.	1.40 max.	0.030 max.	0.015 max.	0.006 max.
STKN490B	0.22 max.	0.55 max.	1.60 max.	0.030 max.	0.015 max.	0.006 max.

Remarks 1.   An alloying element(s) other than those given in Table 1 may be added, as necessary.

2.   The specification of N is only applicable to the steel tube as cold formed conditions.

Further, when such element as Al which is able to immobilize N is added, the content of total N may be contained up to and including 0.009 %, provided that the nitrogen of solid solution type is less than 0.006 %.

3.   The product analysis value may be used in lieu of the cast analysis value upon agreement between the purchaser and supplier. In this case, the permissible range of the values given in Table 1 excluding the values of N shall be in accordance with Table 1 in JIS G 0321.

4.   The chemical composition other than those given in Table 1 which are involved in the formula in 5. for calculation of the carbon equivalent or the chemical composition on sensitivity of welding crack shall be determined in accordance with 9.1.

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5. Carbon equivalent or chemical composition on sensitivity of welding crack

The carbon equivalent or chemical composition on sensitivity of welding crack for the steel tube shall be as follows :

(1) The carbon equivalent shall be as given in Table 2. The carbon equivalent shall be calculated from the following formula using cast analysis values obtained by 9.1. When Remarks 3 of Table 1 is applied, however, the product analysis value may be used.

Further, all elements designated in the formula shall be used for calculation disregarding that those elements are added or not.

$$\text{Carbon equivalent (\%)} = C + \frac{Mn}{6} + \frac{Si}{24} + \frac{Ni}{40} + \frac{Cr}{5} + \frac{Mo}{4} + \frac{V}{14}$$

Table 2. Carbon equivalent

Grade of symbol	Carbon equivalent %
STKN400W	0.36 max.
STKN400B	
STKN490B	0.44 max.

(2) The chemical composition on sensitivity of welding crack may be applied in lieu of the carbon equivalent according to the agreement between the purchaser and supplier. In this case, the chemical composition on sensitivity of welding crack shall be as given in Table 3. The chemical composition on sensitivity of welding crack shall be calculated from the following formula using cast analysis values obtained by 9.1. When Remarks 3 of Table 1 is applied, however, the product analysis value may be used.

Further, all elements designated in the formula shall be used for calculation disregarding that those elements are added or not.

Chemical composition on sensitivity of welding crack (%)

$$= C + \frac{Si}{30} + \frac{Mn}{20} + \frac{Cu}{20} + \frac{Ni}{60} + \frac{Cr}{20} + \frac{Mo}{15} + \frac{V}{10} + 5B$$

Table 3. Chemical composition on sensitivity of welding crack

Grade of symbol	Chemical composition on sensitivity of welding crack %
STKN400W	0.26 max.
STKN400B	
STKN490B	0.29 max.

6. Mechanical properties
The steel tube shall be tested in accordance with 9.3, 9.4 and 9.5, and the yield point or proof stress, tensile strength, yield ratio, elongation, flattening resistance, absorbed energy obtained by Charpy impact test and tensile strength of weld zone thereof shall be in accordance with Table 4. In the case of flattening test, the steel tube shall be free from flaws and cracks on its wall surface.

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