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Hot Rolled Steel Plate, Sheet and Strip for Tower Structural Purpose

铁塔结构用热轧钢板和钢带

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Hot Rolled Steel Plate, Sheet and Strip for Tower Structural Purpose

1 Scope

This Standard specifies the classification, method of nameplate expression, content of ordering, dimension, appearance, weight, technical requirement, test method, inspection rule, packaging, marking and certification of hot rolled steel plate, sheet and strip for tower structural purpose.

This Standard is applicable to hot rolled steel plate, sheet and strip (hereinafter referred to as steel plate and strip) for tower structural purpose (thickness ≤ 25.4 mm). Steel plate and strip are mainly applied to manufacture tower structure for electricity and communication; tower structure for decorative power, watchtower, lighting tower, television tower and special purposes.

2 Normative References

The following documents are indispensable to the application of this Standard. In terms of references with a specified date, only versions with a specified date are applicable to this Standard. The latest version (including all the modifications) of references without a specified date is also applicable to this Standard.

GB/T 222 Permissible Tolerances for Chemical Composition of Steel Products

GB/T 223.5 Steel and Iron - Determination of Acid-soluble Silicon and Total Silicon Content - Reduced Molybdosilicate Spectrophotometric Method

GB/T 223.9 Iron Steel and Alloy - Determination of Aluminum Content - Chrom Azurol S Photometric Method

GB/T 223.14 Methods for Chemical Analysis of Iron, Steel and Alloy - The N-Benzoy-N-Phenylhydroxylamine Extraction Photometric Method for the Determination of Vanadium Content

GB/T 223.16 Methods for Chemical Analysis of Iron, Steel and Alloy - The Chromotropic Acid Photometric Method for the Determination of Titanium Content

GB/T 223.19 Methods for Chemical Analysis of Iron, Steel and Alloy - The Neocuproine-chloroform Extraction Photometric Method for the Determination of Copper Content

GB/T 223.37 Methods for Chemical Analysis of Iron, Steel and Alloy - The

Indophenol Blue Photometric Method for the Determination of Nitrogen Content after Distillation Separation

GB/T 223.40 Iron, Steel and Alloy - Determination of Niobium Content by the Sulphochlorophenol S Spectrophotometric Method

GB/T 223.59 Iron, Steel and Alloy - Determination of Phosphorus Content - Bismuth Phosphomolybdate Blue Spectrophotometric Method and Antimony Phosphomolybdate Blue Spectrophotometric Method

GB/T 223.63 Methods for Chemical Analysis of Iron, Steel and Alloy - The Sodium (potassium) Periodate Photometric Method for the Determination of Manganese Content

GB/T 223.67 Iron, Steel and Alloy - Determination of Sulfur Content - Methylene Blue Spectrophotometric Method

GB/T 223.68 Methods for Chemical Analysis of Iron, Steel and Alloy - The Potassium Iodate Titration Method after Combustion in the Pipe Furnace for the Determination of Sulfur Content

GB/T 223.69 Iron, Steel and Alloy - Determination of Carbon Contents - Gas-volumetric Method after Combustion in the Pipe Furnace

GB/T 228.1 Metallic Materials - Tensile Testing - Part 1: Method of Test at Room Temperature

GB/T 229 Metallic Materials - Charpy Pendulum Impact Test Method

GB/T 232 Metallic Materials - Bend Test

GB/T 247 General Rule of Package Mark and Certification for Steel Plates (sheets) and Strips

GB/T 709 Dimensions, Shape, Weight and Tolerances for Hot Rolled Steel Sheets and Strips

GB/T 1591-2008 High Strength Low Alloy Structural Steels

GB/T 2975 Steel and Steel Products - Location and Preparation of Test Pieces for Mechanical Testing

GB/T 4336 Carbon and Low-alloy Steel - Determination of Multi-element Contents - Spark Discharge Atomic Emission Spectrometric Method (routine method)

GB/T 8170 Rules of Rounding off for Numerical Values & Expression and Judgment of Limiting Values

the initial of Chinese phonetic alphabet “TA” that represents tower steel; quality level (A, B, C, D, E).

In terms of steel for high-tensile strength and high-elongation tower, tower for hot-dip galvanized tower and steel for weather resistant tower, respectively add the initial of Chinese phonetic alphabet “L”, “X” and “NH” that represent “tensile”, “zinc” and “weather resistant” after “T”.

For example, Q355TC

Q---initial of Chinese phonetic alphabet “QU” that represents yield strength;

355---the minimum stipulated yield strength of steels, expressed in MPa;

T---initial of Chinese phonetic alphabet “TA” that represents tower;

C---quality level.

4 Content of Ordering

4.1 In accordance with this Standard, contract or order shall include the following content:

a) Serial number of this Standard;

b) Product type (steel plate, steel strip);

c) Nameplate;

d) Dimension, specification and thickness accuracy;

e) Borderline state (trimming EC; non-trimming EM);

f) Status of delivery;

g) Weight;

h) Packaging mode;

i) Special requirements.

4.2 When borderline state and thickness accuracy is not indicated in the contract, steels shall be delivered under common thickness and accuracy (steel strip: non-trimmed; steel plate: trimmed).

6.5.2 Partial defects that will not affect the usage and can be removed, such as thin layer of oxidized scale, rust, slight pocking mark and scratch, can be allowed to exist on the surface of steel plate and steel strip. Its convex-concave degree cannot exceed half of the tolerance of steel plate and steel strip. Furthermore, the minimum allowable thickness of steel plate and steel strip shall be guaranteed

6.5.3 In terms of steel plate and steel strip that are delivered while being non-trimmed, the depth in the width direction of its edge crack and other defects shall be ≤ half of the allowable deviation of width. Furthermore, the minimum width of steel strip shall be guaranteed.

6.5.4 The surface quality of steel plate can also comply with the stipulations in GB/T 14977 through the negotiation of the supply side and the demand side.

6.5.5 In terms of steel strip, since there is no opportunity to cut off the defects, it is allowed to be delivered with defects. However, the length of the part with defects shall not exceed 6% of the total length of steel strip.

6.6 Corrosion Resistance of Steel for Weather Resistant Tower

In terms of steel for weather resistant tower, please refer to Appendix B for the evaluation of weather corrosion resistance of low-alloy steel. Specific requirements of corrosion shall be negotiated and determined by the supply side and the demand side.

6.7 Special Requirements

Other special requirements can be put forward towards steel plate and steel strip through the negotiation of the supply side and the demand side; this content shall be indicated in the contract.

7 Test Methods

7.1 Method of testing chemical composition of steels shall comply with GB/T 223.5, GB/T 223.9, GB/T 223.14, GB/T 223.16, GB/T 223.19, GB/T 223.37, GB/T 223.40, GB/T 223.59, GB/T 223.63, GB/T 223.67, GB/T 223.68, GB/T 223.69, GB/T 4336, GB/T 20123, GB/T 20124, GB/T 20125 or stipulations of general methods. However, arbitration of this content shall comply with the stipulations in GB/T 223.5, GB/T 223.9, GB/T 223.14, GB/T 223.16, GB/T 223.19, GB/T 223.37, GB/T 223.40, GB/T 223.59, GB/T 223.63, GB/T 223.67, GB/T 223.68 and GB/T 223.69.

7.2 Test items and test methods of each batch of steel plate and steel strip shall comply with the stipulation in Table 5 below.

Appendix B

(informative appendix)

Guideline for the Evaluation of Weather Corrosion Resistance of Low-alloy Steel

B.1 Scope

This Appendix provides a method of evaluating low-alloy steel's weather corrosion resistance through chemical composition. In accordance with this Appendix, the relative corrosion resistance of various nameplates can be evaluated. Under general circumstances, when steels manifest relatively satisfying weather corrosion resistance, the corrosion resistance index that is calculated in accordance with this Appendix shall be 6.0 or above 6.0.

In this Method, a forecasting formula that is based on steel's chemical composition is adopted to calculate steel's corrosion resistance index.

Since multiple corrosion resistance indexes are being adopted in the world, when an index is selected, the consideration of different working environment and steel's chemical composition is indispensable. Based on the differences of the working environment and steel's chemical composition, any index might be inapplicable. Therefore, it is necessary for the supply side and the demand side to jointly determine which index shall be adopted and the size of such index in the forecasted working environment.

B.2 Terms

Low-alloy steel refers to carbon steel with the total content of alloy elements > 1% but < 5%.

NOTE: most "low-alloy weather resistant steel" contains the addictive Cr and Cu element; it also might contain the addictive Si, Ni, P or other allow elements that can reinforce the weather resistance properties.

B.3 Method

B.3.1 Legault and Leckie released the formula of forecasting the corrosion of low-alloy steel that is exposed under different atmospheric environment for 15.5 years based on the chemical composition of steels. This formula is based on a great deal of data released by Larrabee and Coburn.

B.3.2 For the accuracy of application, the Legault-Leckie formula under industrial environment (Kearny, N.J.) has been modified to calculate chemical composition-

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