GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 77.140.50

CCS H 46

GB/T 28415-2023

Replacing GB/T 28415-2012

Fire-resistant structural steel plate, sheet and strip

耐火结构用钢板和钢带

Issued on: August 06, 2023 **Implemented on: March 01, 2024**

Issued by: State Administration for Market Regulation;
Standardization Administration of the People's Republic of China.

Table of Contents

Fire-resistant structural steel plate, sheet and strip

1 Scope

This document specifies designation expression method, ordering content, size, shape, weight, technical requirements, test methods, inspection rules, packaging, marking and quality certificates of fire-resistant structural steel plates, sheets and strips.

This document applies to steel plates with a thickness of no more than 150 mm and steel sheets and strips with a thickness of no more than 25.4 mm and sheared steel plates (hereinafter referred to as steel plates, sheets and strips) that are mainly used to manufacture general structures and engineering structures with fire resistance.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 222, *Permissible tolerances for chemical composition of steel products*

GB/T 223.3, *Methods for chemical analysis of iron, steel and alloy. The diantipyryl methane phosphomolybdate gravimetric method for the determination of phosphorus content*

GB/T 223.9, *Iron, steel and alloy -- Determination of aluminium content -- Chrome azurol S photometric method*

GB/T 223.11, *Iron, steel and alloy -- Determination of chromium content -- Visual titration or potentiometric titration method*

GB/T 223.14, *Methods for chemical analysis of iron, steel and alloy. The N-benzoyl-N-phenylhydroxylamine extraction photometric method for the determination of vanadium content*

GB/T 223.17, *Methods for chemical analysis of iron, steel and alloy -- The diantipyrylmethane photometric method for the determination of titanium content*

GB/T 223.18, *Methods for chemical analysis of iron steel and alloy -- The sodium thiosulfate separation iodometric method for the determination of copper content*

GB/T 223.23, *Iron, steel and alloy -- Determination of nickel content -- The dimethylglyoxime spectrophotometric method*

GB/T 223.26, *Iron, steel and alloy -- Determination of molybdenum content -- The thiocyanate spectrophotometric method*

GB/T 223.40, *Iron, steel and alloy -- Determination of niobium content by the sulphochlorophenol S spectrophotometric method*

GB/T 223.60, *Methods for chemical analysis of iron, steel and alloy -- The perchloric acid dehydration gravimetric method for the determination of silicon content*

GB/T 223.63, *Iron, steel and alloy -- Determination of manganese content -- Sodium (potassium) periodate 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 223.79, *Iron and steel -- Determination of multi-element contents -- X-ray fluorescence spectrometry (Routine method)*

GB/T 228.1, *Metallic materials -- Tensile testing -- Part 1: Method of test at room temperature*

GB/T 228.2, *Metallic materials -- Tensile testing -- Part 2: Method of test at elevated 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, *Dimension, shape, weight and tolerance for hot-rolled steel strip, plate and sheet*

GB/T 2970, *Method for ultrasonic testing of thicker steel plates*

GB/T 2975, *Steel and steel products -- Location and preparation of samples and 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 5313, *Steel plate with through-thickness properties*

GB/T 8170, *Rules of rounding off for numerical values and expression and judgement of limiting values*

GB/T 14977, *General requirement for surface condition of hot-rolled steel plates*

GB/T 17505, *Steel and steel products -- General technical delivery requirements*

GB/T 20066, *Steel and iron -- Sampling and preparation of samples for the determination of chemical composition*

GB/T 20123, *Steel and iron -- Determination of total carbon and sulfur content Infrared absorption method after combustion in an induction furnace (routine method)*

GB/T 20125, *Low-alloy steel -- Determination of multi-element contents -- Inductively coupled plasma atomic emission spectrometric method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 fire-resistant structural steel

The steel that a certain content of alloying elements such as Mo, Cr, etc. is added to the steel to improve the fire resistance.

4 Designation expression method

4.1 The designation of fire-resistant structural steel consists of the initial letter "Q" in Chinese pinyin of the word "Qu" representing yield strength, the specified lower limit value of the upper yield strength, the initial letter "FR" of English representing "fire resistance" and the quality grade (codenamed B, C, D or E).

NOTE: Q+ specifies the lower limit value of upper yield strength + FR, referred to as "steel grade".

Example: Q420FRD, where:

Q - the initial letter "Q" in Chinese pinyin of the word "Qu" representing yield strength;

420 - the specified lower limit value of the upper yield strength, in megapascals (MPa);

FR - the initials of "fire resistant" in English;

D - the quality grade is D.

4.2 When steel plates, sheets and strips are required to have thickness-direction properties, a symbol representing the thickness-direction (Z-direction) performance

of the steel plate thickness. The minimum allowable thickness of the steel plate shall be ensured.

7.5.1.3 Surface defects of steel plates are allowed to be removed by grinding and other methods. The cleaning area shall be smooth and without edges. The cleaning depth shall not be greater than the negative deviation of the steel plate thickness. The minimum allowable thickness of the steel plate shall be ensured.

7.5.1.4 If there are defects on the surface of the steel plate that cannot be cleaned according to the provisions of 7.5.1.3, welding repair can be carried out after negotiation between the supplier and the purchaser. The following requirements shall be met:

a) Use appropriate welding methods;

b) Before welding repairs, use appropriate methods such as leveling or grinding to completely remove harmful defects on the steel plate. The depth of the removed portion is within 20% of the nominal thickness of the steel plate. The total grinding area on one side shall be within 2% of the steel plate area;

c) There shall be no undercut or overlap on the edges of the welded parts of the steel plates. The pile height shall be more than 1.5 mm higher than the rolling surface. Then remove the pile height by leveling or grinding;

d) Heat treated steel plates shall be heat treated again after welding and repair.

7.5.1.5 After negotiation between the supplier and the purchaser, and stated in the contract, the surface quality of the steel plate can be in accordance with the provisions of GB/T 14977.

7.5.2 Steel sheets and strips, sheared steel plates

7.5.2.1 The surfaces of the steel sheets and strips shall not have scars, cracks, folds, inclusions, air bubbles, and intrusion of iron oxide scale that would affect the use and other harmful defects. The steel sheets and strips shall have no visible delamination.

7.5.2.2 The surfaces of the steel sheets and strips are allowed to have local defects such as a thin layer of iron oxide scale, rust, slight pitting, scratches, etc. that do not affect the use. However, its depth or height shall not exceed half of the steel sheet and strip thickness tolerance. The allowable minimum thickness of the steel sheet and strip shall be ensured.

7.5.2.3 The steel sheets and strips are allowed to be delivered with local defects, but the defective part shall not exceed 6% of the total length of each coil of steel sheets and strips.

7.5.2.4 After negotiation between the supplier and the purchaser, and stated in the contract, the surface quality of the steel sheet and strip can be in accordance with the

				corresponding accuracy

9 Inspection rules

9.1 Inspection and acceptance

The inspection and acceptance of steel plates, sheets and strips are carried out by the supplier's quality inspection department.

9.2 Batching rules

9.2.1 Steel plates, sheets and strips shall be accepted in batches. Each batch shall be composed of steel plates or steel sheets and strips of the same designation, the same heat number, the same thickness, the same rolling system, and the same delivery status. The weight of each batch shall not exceed 60 t. Steel sheets and strips and continuous rolled plates with rolled coils larger than 30 t can be batched into two rolled coils.

9.2.2 For steel plates, sheets and strips requiring thickness direction properties, the batch assembly rules shall comply with the provisions of GB/T 5313.

9.3 Sampling quantity

The sampling quantity of each batch of steel plates, sheets and strips shall comply with the requirements in Table 10.

9.4 Reinspection and judgement rules

9.4.1 The reinspection and judgment of steel plates, sheets and strips shall comply with the provisions of GB/T 17505.

9.4.2 Suppliers are allowed to heat-treat or re-heat-treat steel plates that fail the thickness direction performance reinspection and then submit them for acceptance as a new batch.

9.4.3 The supplier is allowed to re-heat-treat the steel plates that fail the heat treatment delivery reinspection and submit them for acceptance as a new batch.

9.5 Numerical rounding

The inspection results of steel plates, sheets and strips shall be rounded using the rounding value comparison method. Carbon equivalent (CEV) and welding crack susceptibility index (P_{cm}) shall be calculated according to formula (1) and formula (2) first and then rounded. The rounding off rules shall comply with the provisions of GB/T 8170.

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------