NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB/T 40802-2021

Carbon and low alloy cast steels for general applications

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1 Scope

This document specifies the technical requirements, inspection methods, inspection rules, identification, certificate, packaging, storage and transportation for carbon and low alloy cast steels for general applications.

This document applies to carbon and low alloy cast steels for general applications (hereinafter referred to as "the casting").

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 223.5, Methods for chemical analysis of iron, steel and alloy - The reduced molybdosilicate spectrophotometric method for the determination of acid-soluble silicon content (GB/T 223.5-2008, ISO 4829-1:1986, MOD)

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

potentiometric titration method (GB/T 223.11-2008, ISO 4937:1986, MOD)

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 223.19, Methods for chemical analysis of iron, steel and alloy - The neocuproine-chloroform extraction photometric method for the determination of copper content

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

GB/T 223.25, Methods for chemical analysis of iron, steel and alloy - The dimethylglyoxime gravimetric method for the determination of nickel content

GB/T 223.26, Iron, steel and alloy - Determination of molybdenum content - The thiocyanate 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, 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 228.1, Metallic materials - Tensile testing - Part 1: Method of test at room temperature (GB/T 228.1-2010, ISO 6892-1:2009, MOD)

GB/T 229, Metallic materials - Charpy pendulum impact test method (GB/T 229-2020, ISO 148-1:2016, MOD)

GB/T 4336, Carbon and low-alloy steel - Determination of multi-element contents -Spark discharge atomic emission spectrometric method (routine method)

GB/T 5677, Castings - Radiographic testing (GB/T 5677-2018, ISO 4993:205, MOD)

GB/T 6414, Castings - Dimensional tolerances and geometrical tolerances and machining allowances (GB/T 6414-2017, ISO 8062-3:2007, MOD)

GB/T 7233.1, Steel castings - Ultrasonic examination - Part 1: Steel castings for general purposes (GB/T 7233.1-2009, ISO4992-1:2006, MOD)

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

limiting values

GB/T 9443, Steel and iron castings - Liquid penetrant inspection (GB/T 9443-2019,

ISO 4987:2010, MOD)

GB/T 9444, Steel and iron castings - Magnetic particle inspection (GB/T 9444-2019,

ISO 4986:2010, MOD)

GB/T 11351, Mass tolerances of casting

GB/T 15056, Casting surface roughness - Appraising method

GB/T 16923, Casting surface roughness - Appraising method

GB/T 16924, Quenching and tempering of steel parts is determined by the supplier. The heat treatment temperatures in Table 2 are for reference only.

4.5 Surface quality

4.5.1 The surface roughness of the casting shall conform to the drawing or contract.

4.5.2 The casting shall be trimmed with flashes, burrs, and risers removed. There shall be no surface casting defects that affect the quality of the product.

4.6 Internal quality

4.6.1 The type, scope and quantity of defects allowed in the casting shall conform to the drawings and technical requirements of the purchaser or shall be agreed upon by the supplier and the purchaser.

4.6.2 Non-destructive testing method can be used to detect the internal quality of the casting.

4.7 Geometry, size The geometry and size of the casting shall conform to the drawings or contract specifications. Geometric tolerance and dimensional tolerance grade are selected according to GB/T 6414.

4.8 Weight tolerance The weight tolerance of the casting shall comply with the provisions of GB/T 11351.

4.9 Welding repair

4.9.1 Casting defects can be repaired by welding. Welding repair conditions are determined by the supplier. If the purchaser has other provisions on the defect location, size and welding repair times, it shall be negotiated between the supplier and the purchaser.

4.9.2 Welders who repair the casting shall have corresponding qualifications. Before welding repairs, the defective parts of the casting shall be cleaned up. The transitions in edge areas are smooth. Welding repair shall choose suitable welding consumables.

Welding shall be carried out after welding procedure qualification. See Annex C for preheating temperature and maximum interlayer temperature before welding.

4.9.3 This part shall be re-inspected after the casting is repaired by welding.

4.9.4 If the depth of the pit prepared for welding repair exceeds 40% of the wall thickness or 25mm (whichever is the smaller), or the area exceeds 65cm2, it is regarded as a major welding repair.

4.9.5 For major welding repairs, the location and extent of welding repairs shall be recorded.

4.9.6 The casting with major welding repairs shall be subjected to post-weld heat treatment. See Annex C for the post-weld heat treatment temperature.

4.10 Correction The deformation of the casting can be eliminated by correcting. The casting is usually corrected after heat treatment and at room temperature. Thermal correction can be used in special cases. If necessary, the stress relief treatment can be carried out after correction.

5 Test methods

5.1 Chemical composition analysis

5.1.1 Chemical composition analysis adopts conventional chemical analysis or spectroscopic analysis.

5.1.2 Routine chemical analysis is carried out according to GB/T 223.5, GB/T 223.11,

GB/T 223.14, GB/T 223.19, GB/T 223.23, GB/T 223.25, GB/T 223.26, GB/T 223.59,

GB/ T 223.63, GB/T 223.68 and GB/T 223.69.

5.1.3 Spectral analysis method is carried out according to the provisions of GB/T 4336.

5.1.4 The casting is sampled for chemical composition analysis according to the melting furnace.

5.1.5 The test block for melting analysis shall be prepared during the pouring process.

The analysis of the finished product adopts the additional casting or single casting test block.

5.1.6 The sampling and preparation methods of the specimens for analysis shall be carried out in accordance with the provisions of GB/T 20066.

5.1.7 If a single casting is to be smelted with multiple ladles in one heat, chemical composition analysis and records shall be carried out on samples from each ladle.

5.1.8 For castings smelted in multiple furnaces and multi-cladding, samples shall be taken from the casting test block attached to the casting. The chemical composition report is