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Alloy Tool and Mould Steel Sheets and Plates

合金工模具钢板

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard was proposed by China Iron and Steel Association.

This Standard shall be under the jurisdiction of the National Standardization Technical Committee on Steels (SAC/TC 183).

The drafting organizations of this Standard: Northeast Special Steel Shares Co., Ltd., China Metallurgical Information and Standardization Institute.

The main drafters of this Standard: Wang Lin, Mou Feng, Ji Xiao, Liu Yufen, Dai Qiang.

Alloy Tool and Mould Steel Sheets and Plates

1 Application Scope

This Standard specifies the ordering content, dimensions, shape, weight, specifications, test methods, inspection rules, and packaging, marking and quality certification of alloy tool and mould steel sheets and plates (hereinafter referred to as “steel sheets and plates”).

This Standard applies to cold-rolled steel sheets and plates of thickness not greater than 4 mm and hot-rolled steel sheets and plates of thickness not greater than 10 mm.

2 Normative References

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

GB/T 223.11, *Iron, Steel and Alloy – Determination of Chromium Content – Visual Titration or Potentiometric Titration Method*

GB/T 223.13, *Methods for Chemical Analysis of Iron, Steel and Alloy- the Ammonium Ferrous Sulfate Titration Method for the Determination of Vanadium Content*

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 223.22, *Methods for Chemical Analysis of Iron, Steel and Alloy – The Nitroso-R-Salt Spectrophotometric Method for the Determination of Cobalt 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 223.28, *Methods for Chemical Analysis of Iron Steel and Alloy – The α - Benzoin Oxime Gravimetric Method for the Determination of Molybdenum Content*

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

GB/T 223.43, *Iron Steel and Alloy – Determination of Tungsten Content – Gravimetric Method and Spectrophotometric Method*

GB/T 223.58, *Methods for Chemical Analysis of Iron, Steel and Alloy – The Sodium Arsenite-Sodium Nitrite Titrimetric Method for the Determination of Manganese Content*

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 223.62, *Methods for Chemical Analysis of Iron, Steel and Alloy – The Butyl Acetate Extraction Photometric Method for the Determination of Phosphorus Content*

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 223.71, *Methods for Chemical Analysis of Iron, Steel and Alloy – The Gravimetric Method after Combustion in the Pipe Furnace for the Determination of Carbon Content*

GB/T 224, *Determination of Depth of Decarburization of Steels*

GB/T 225, *Steel - Hardenability Test by End Quenching (Jominy Test)*

GB/T 226, *Test Method for Macrostructure and Defect of Steel by Etching*

GB/T 231.1, *Metallic Materials – Brinell Hardness Test – Part 1: Test Method*

GB/T 247, *Methods for Chemical Analysis of Iron, Steel and Alloy – The Gravimetric Method after Combustion in the Pipe Furnace for the Determination of Carbon Content*

GB/T 708, *Dimensions, Shape, Weight and Tolerances for Cold-Rolled Plates and Sheets*

GB/T 709-2006, *Dimension, Shape, Weight and Tolerances for Hot-Rolled Steel Plates and Sheets*

GB/T 1299-2014, *Tool and Mould Steels*

GB/T 4336, *Carbon and Low-alloy Steel – Determination of Multi-element Contents – Spark Discharge Atomic Emission Spectrometric Method (Routine Method)*

GB/T 6394, *Metal – Methods for Estimating the Average Grain Size*

GB/T 8651, *Flaw Detection Method by the Ultrasonic Plate Wave for Metal Plates*

4.4.1 Steel plates and sheets of other dimensions may be supplied, which shall be as agreed on by the supplier and the purchaser and stated in the contract.

4.4.2 Steel plates and sheets of higher rolling precision may be supplied, which shall be as agreed on by the supplier and the purchaser and stated in the contract.

5 Technical Requirements

5.1 Designation and chemical composition

The designation and chemical composition (product analysis composition) of steels shall be as specified in Table 3. Steels of other designations in GB/T 1299-2014 may also be supplied as required by the purchaser, which shall be stated in the contract.

5.2 Smelting method

Steels shall be smelted with the method of electric furnace + vacuum refining or electroslag remelting. When the electroslag remelting smelting is required, it shall be stated in the contract.

5.3 Delivery condition

5.3.1 Steel plates and sheets shall be delivered in the state of annealing.

5.3.2 Steel plates and sheets may be delivered in the state of acid pickling as required by the purchaser, which shall be stated in the contract.

5.4 Hardness

5.4.1 The Brinell hardness of steel plates and sheets under the delivery condition shall be as specified in Table 4.

5.4.2 For steel plates and sheets of thickness not greater than 1.5 mm, when the supplier is capable of ensuring the hardness under the delivery condition is as specified in Table 4, the testing for hardness under the delivery condition may be omitted.

5.5 Macrostructure

There shall be no visible shrinking hole remnants, cracks and inclusions on the acid pickling macrostructural test pieces of steel plates and sheets or steel billets.

5.6 Nonmetallic inclusions

The nonmetallic inclusions of steel plates and sheets shall be tested and assessed in accordance with Method A in GB/T 10561-2005; the results shall be as specified in Table 5. When delivery is made as required for Group 1, it shall be stated in the contract, or they shall be delivered as required for Group 2.

tested as required by the purchaser, which shall be stated in the contract; the specific indexes are as agreed on by the supplier and the purchaser.

5.9 Surface quality

5.9.1 Steel plates and sheets shall not be layered; the surfaces shall be free from bubbles, inclusions, scars and cracks.

5.9.2 The surface of cold-rolled steel plates and sheets shall be free from hard spots small scratches, indentations, local pits and roller marks. Their depth shall not be greater than half of the tolerances and they shall not make steel plates and sheets less than the minimum allowable thickness.

5.9.3 The surface of hot-rolled steel plates and sheets shall be free from hard spots, indentations, scratches and thin scales. Their depth shall be within the tolerance range and they shall not make steel plates and sheets less than the minimum allowable thickness.

5.9.4 The local defects of steel plates and sheets are allowed to be removed; the depth of removal shall not make steel plates and sheets less than the minimum allowable thickness.

5.10 Special requirements

The following test items may be added as required by the purchaser, which shall be as agreed on by the supplier and the purchaser and stated in the contract:

- a) special chemical composition;
- b) special hardness;
- c) grain size;
- d) ultrasonic testing;
- e) other requirements.

6 Test Methods

6.1 Test items and test methods for steel plates and sheets

The test items and test methods for each batch of steel plates and sheets shall be as specified in Table 7.

6.2 Analytical methods for the chemical composition of steels

The analysis of chemical composition shall be carried out as specified in GB/T223.11, GB/T223.13, GB/T223.14, GB/T223.22, GB/T223.23, GB/T223.26, GB/T223.28,

7.2 Rules for batches and lots

Steel plates and sheets shall be inspected and accepted by batch; each batch of steel plates and sheets consist of steel plates and sheets of the same designation, furnace number, thickness, delivery condition and heat treatment furnace number. For steels smelted by electroslag remelting, the delivery in batches in accordance with the consumable electrodes smelting furnace number is allowed, provided that the process is stable and all requirements can be met.

7.3 Sample quantity and sampling location

7.3.1 The sample quantity and sampling location for each batch of steel plates and sheets shall be as specified in Table 7.

7.3.2 When electroslag steel is delivered in batches in accordance with the smelting furnace number and the chemical composition of each electroslag furnace number is satisfactory, take the chemical composition of one electroslag ingot to report to represent the chemical composition of the whole furnace. The sample quantity and sampling location for other items are as specified in Table 7.

7.3.3 When electroslag steel is delivered in accordance with the electroslag furnace number, 1 sample is taken from each electroslag furnace number for chemical composition; it shall be delivered in batches in accordance with the furnace number for other items and the sample quantity and sampling location shall be as specified in Table 7.

7.3.4 For stacked steel plates and sheets for heat treatment, take one steel plate or sheet respectively from the upper part and lower part of each stack and take one sample separately from any end of them; when the quantity of steel plates and sheets of thickness not greater than 4 mm is not more than 20 plates (sheets) and the quantity of steel plates and sheets of thickness greater than 4 mm is not greater than 10 plates (sheets), take one steel plate (sheet) from each batch for testing and take one sample from both ends of it.

7.3.5 The distance from the sample for testing to the edge of steel plates and sheets shall not be less than 40 mm.

7.4 Rules for reinspection and evaluation

The rules for reinspection and evaluation of steel plates and sheets shall be as specified in GB/T 17505.

8 Packaging, Marking and Quality Certification

The packaging, marking and quality certification of steel plates and sheets shall be as specified in GB/T 247.

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Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

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