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GB/T 16270-2009

Replacing GB/T 16270-1996

High strength structural steel plates in the quenched and tempered condition

高强度结构用调质钢板

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Foreword

This Standard is formulated by reference to EN 10025-6:2004 (E) "Hot rolled products of structural steels, Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition"; ISO 4950.3-2003 "High yield strength flat products, Part 3: quenched and tempered steel"; and on the basis of production technology of domestic steel enterprise and through revising GB/T 16270-1996 "High-strength structural steel plates and strips: products supplied in the heat-treated or controlled rolled condition".

This Standard replaces GB/T 16270-1996 "High-strength structural steel plates and strips: products supplied in the heat-treated or controlled rolled condition".

Compared with GB/T 16270-1996, the main changes in this Standard are as follows:

- Standard name is changed to "High strength structural steel plates in quenched and tempered condition";
- Applicable thickness is extended from 100mm to 150mm, steel strip is deleted;
- Q420 is deleted; 3 grades of steel Q800, Q890 and Q960 and the corresponding technical indexes' specifications are added;
- Quality grade C, F (except grade of steel Q460) are added; compositions and performances' specifications of every designation are adjusted;
- Specifications of flexural property are deleted;
- Requirements of CEV are added; and "taking CET as the terms of consultation by both buyer and seller" is supplemented;
- Delivery states such as normalizing, normalizing + tempering, controlled rolling are deleted.

Appendix A of this Standard is informative.

This Standard was proposed by China Iron & Steel Association.

This Standard shall be under jurisdiction of China Steel Standardization Technical Committee.

Main drafting organizations of this Standard: Bao Steel Co., Ltd, China Metallurgical Information Standardization Research Institute, and Hunan Hualin Linyuan Steel Co., Ltd.

Main drafters of this Standard: Wang Xiangru, Zhou Shenyu, Wang Xiaohu, Wen Dezhi, and Zhoujian.

High strength structural steel plates in the quenched and tempered condition

1 Scope

This Standard specifies designations, dimension, shape, weight, and allowable deviation, technical requirements, test method, inspection rules, packaging, marks and quality certificate of high strength structural steel plates in quenched and tempered condition.

This Standard is applicable to high strength structural steel plate whose thickness shall not exceed 150mm and delivery state is slack quenching (quench plus tempering).

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this national standard. For dated reference, subsequent amendments (excluding corrigendum) or revisions of these publications do not apply. However, the parties who enter into agreement according to these specifications are encouraged to study whether the latest editions of these references are applicable. For undated references, the latest edition of the normative document is applicable to this Standard.

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

GB/T 223.5 Methods for chemical analysis of steel and alloy - The reduced molybdosilicate spectro-photometric method for the determination of acid-soluble silicon content

GB/T 223.9 Iron steel and alloy - Determination of aluminium content - Chromazurol S photometric method

GB/T 223.11 Methods for chemical analysis of iron, steel and alloy - The ammonium persulfate oxidation volumetric method for the determination of chromium content

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 223.68 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 Methods for chemical analysis of iron, steel and alloy - The gas-volumetric method after combustion in the pipe furnace for the determination of carbon content

GB/T 223.76 Methods for chemical analysis of iron, steel and alloy - The flame atomic absorption spectrometric method for the determination of vanadium content

GB/T 223.78 Methods for chemical analysis of iron, steel and alloy - Curcumin spectrophotometric method for the determination of boron content

GB/T 228 Metallic materials - Tensile testing at ambient temperature (GB/T 228-2002, eqv ISO 6892:1998)

GB/T 229 Metallic materials - Charpy pendulum impact test method (GB/T 229-2007, ISO 148-1:2006, MOD)

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

GB/T 709 Dimension, Shape, Weight and Tolerances for Hot Rolled Sheets and Plates

GB/T 2970 Thicker Steel Plates - Method for Ultrasonic Inspection

GB/T 2975 Steel and steel products - Location and preparation of test pieces for mechanical testing (GB/T 2975-1998, eqv ISO 377:1997)

GB/T 4336 Standard test method for spark discharge atomic emission spectrometry Spectrometric analysis of carbon and low-Alloy steel (Routine Method)

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 20123 Steel and iron - Determination of total carbon and sulfur content Infrared absorption method after combustion in an induction furnace (routine method)(GB/T 20123-2006, ISO 15350:2000, IDT)

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

GB/T 20126 Unalloyed steel - Determination of low carbon content - Part 2: Infrared absorption method after combustion in an induction furnace (with preheating) (GB/T 20126-2006, ISO 15349-2:1999, IDT)

6 Technical Requirements

6.1 Designation and chemical composition

6.1.1 Steel designation, chemical composition (smelting analysis) and carbon-equivalent value CEV shall comply with the specifications of Table 1.

6.1.2 According to the requirements of the buyer, through the negotiation of both buyer and seller, and indicated in the contract, carbon-equivalent value CET can be provided at $CET = C + (Mn+Mo)/10 + (Cr+Cu)/20 + Ni/40$.

6.1.3 The allowable deviation of chemical composition of finished steel plate shall comply with the provisions of GB/T 222.

6.2 Smelting process

By oxygen converter or electro-smelting.

6.3 Delivery state

Delivery of steel plate shall follow the state of slack quenching (quench + tempering).

6.4 Mechanical Properties and Processing Properties

6.4.1 The mechanical properties of steel plate and processing property shall meet the requirements of Table 2.

6.4.2 Charpy pendulum impact energy shall be calculated by arithmetic mean value of three specimens from one group. It is allowed that a single-value of 1 of the samples is below the specified value of Table 2, however, it shall not be lower than 70% of the specified value.

6.4.3 If the steel plate's thickness is less than 12mm, auxiliary specimen shall be adopted for Charpy pendulum impact test of steel plate. If the thickness $>8\text{mm} \sim <12\text{mm}$, auxiliary specimen size of steel plate shall be $10\text{mm} * 7.5\text{mm} * 55\text{mm}$; the test result shall not be less than 75% of the specified value. If the thickness is between $6\text{mm} \sim 8\text{mm}$, auxiliary specimen size of steel plate shall be $10\text{mm} * 5\text{mm} * 55\text{mm}$; the test result shall not be less than 75% of the specified value. Impact test shall not be carried out for the steel plate whose thickness is less than 6mm.

6.5 Surface Quality

6.5.1 Flaw, bubble, scab, fold and inclusion etc. shall not be allowed for the steel plate surface. Lamination shall not be allowed for steel plate. If there are aforesaid defects, clearing is allowed. The clearing depth shall be calculated from the trim size of steel plate, and shall not exceed thickness tolerance of steel plate. The minimum thickness of steel plate shall be ensured. Defect clearing position shall be smooth and no edges and corners.

6.5.2 Other defects are allowed, but clearing depth shall be calculated from the trim size of steel plate and shall not exceed half of thickness allowable tolerance of steel plate. The defect position thickness shall be ensured not to exceed the minimum thickness of steel plate.

6.5.3 Through negotiation by both buyer and seller, and indicated in the contract, repair welding is allowed for steel plate. If repair welding is carried out after quenching and tempering, quenching and tempering shall be carried out again.

6.5.4 Through negotiation by both buyer and seller, and indicating in the contract, surface quality shall conform to specification of GB/T 14977.

6.6 Special Requirements

6.6.1 Through negotiation between buyer and seller, and indicating in the contract, ultrasonic testing can be carried out for steel plate sheet-by-sheet; test method shall conform to specification of GB/T 2970; testing standard and acceptance grade shall be indicated in the contract.

6.6.2 Through negotiation between both buyer, and seller and indicating in the contract, other special requirements can be put forward to the steel plate.

7 Test Methods

7.1 The inspection items, sample quantity, sampling methods and test methods of steel plates from every batch shall conform to the provisions of Table 3.

10 Rounding off of numerical values

Rounding off of numerical values shall meet the specification of YB/T 081.

11 Approximate contrast of domestic-foreign designations

Approximate contrast among designations of this Standard, previous standard, foreign or international standards is shown in Appendix A.

Appendix A

(Informative Appendix)

Approximate contrast of domestic-foreign designations

Approximate contrast among designations of this Standard, previous standard, foreign or international standards is shown in Table A.1.

Table A.1

This Standard	GB/T 16270-1996	EN10025-6:2004(E)	ISO 4950.3-2003
Q460QC	Q460C	—	—
Q460QD	Q460D	S460Q	E460DD
Q460QE	Q460E	S460QL	E460E
Q460QF	—	S460QL1	—
Q500QC	—	—	—
Q500QD	Q500D	S500Q	—
Q500QE	Q500E	S500QL	—
Q500QF	—	S500QL1	—
Q550QC	—	—	—
Q550QD	Q550D	S550Q	E550DD
Q550QE	Q550E	S550QL	E550E
Q550QF	—	S550QL1	—
Q620QC	—	—	—
Q620QD	Q620D	S620Q	—
Q620QE	Q620E	S620QL	—
Q620QF	—	S620QL1	—
Q690QC	—	—	—
Q690QD	Q690D	S690Q	E690DD
Q690QE	Q690E	S690QL	E690E
Q690F	—	S690QL1	—
Q800QC	—	—	—
Q800QD	—	—	—
Q800QE	—	—	—
Q800QF	—	—	—
Q890QC	—	—	—
Q890QD	—	S890Q	—
Q890QE	—	S890QL	—
Q890QF	—	S890QL1	—
Q960QC	—	—	—
Q960QD	—	S960Q	—
Q960QE	—	S960QL	—
Q960QF	—	—	—

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