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Replacing GB/T 1221-1992

Heat-Resistant Steel Bars

耐热钢棒

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Heat-Resistant Steel Bars

1 Scope

This Standard specifies the size, shape, technical requirements, test methods, acceptance rules, packing marks, certificate of quality and other contents of heat-resistant steel rods (the general name of round steel, square steel, flat steel and hexagonal steel, hereinafter referred to as steel rods).

This Standard is applicable to hot-rolled, forged steel rods with size (diameter, side length, thickness or opposite side distance, hereinafter referred to as size) of not more than 250mm; or cold-processing rods with size of not more than 120mm. After negotiation between the supplier and the purchaser, the hot-rolled, forged steel rods with size more than 250mm, and the cold-processing steel rods with size of more than 120 mm can also be supplied.

2 Normative References

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 222 Allowable Deviation for Chemical Components of Finished Steel Products

GB/T 223.3 Methods for Chemical Analysis of Iron, Steel and Alloy - Diantipyrylmethane Phosphomolybdate Acid Gravimetric Method for the Determination of Phosphorus Content

GB/T 223.4 Methods for Chemical Analysis of Iron, Steel and Alloy - Ammonium Nitrate Oxidation Volumetric Method for the Determination of Manganese Content

GB/T 223.5 Methods for Chemical Analysis of Iron, Steel and Alloy - Reduction Type Molybdosilicate Spectrophotometry for the Determination of Acid-Soluble Silicon Content

GB/T 223.8 Methods for Chemical Analysis of Iron, Steel and Alloy - Sodium Fluoride Separation - EDTA Titrimetric Method for the Determination of Aluminum

Content

GB/T 223.43 Methods for Chemical Analysis of Iron, Steel and Alloy - Determination of Tungsten Content

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

GB/T 223.59 Methods for Chemical Analysis of Iron, Steel and Alloy - Antimony, Phosphorus Molybdenum Photometric Method for the Determination of Phosphorus Content

GB/T 223.60 Methods for Chemical Analysis of Iron, Steel and Alloy - Perchloric Acid Dehydration Gravimetric Method for the Determination of Silicon Content

GB/T 223.61 Methods for Chemical Analysis of Iron, Steel and Alloy - Ammonium Phosphomolybdate Volumetric Method for the Determination of Phosphorus Content

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

GB/T 223.63 Methods for Chemical Analysis of Iron, Steel and Alloy - Sodium (Potassium) Periodate Photometric Method for the Determination of Manganese Content (GB/T 223.63-1998, neq ISO R 629)

GB/T 223.64 Methods for Chemical Analysis of Iron, Steel and Alloy - Flame Atomic Absorption Spectrometric Method for the Determination of Manganese Content

GB/T 223.67 Methods for Chemical Analysis of Iron, Steel and Alloy - Reducing Distillation - Methylene Blue Photometric Method for the Determination of Sulfur Content

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

GB/T 223.69 Methods for Chemical Analysis of Iron, Steel and Alloy - Gas Volumetric Method after Combustion in Tube Furnace for the Determination of Carbon Content

GB/T 223.71 Methods for Chemical Analysis of Iron, Steel and Alloy - Gravimetric Method After Combustion in Tube Furnace for the Determination of Carbon Content.

GB/T 223.72 Methods for Chemical Analysis of Iron, Steel and Alloy - Aluminum Oxide Chromatographic Separation - Barium Sulfate Gravimetric Method for the Determination of Sulfur Content

GB/T 223.75 Methods for Chemical Analysis of Iron, Steel and Alloy - Methanol Distillation - Curcumin Photometric Method for the Determination of Boron Content

GB/T 226 Acid Etch Test for Macrostructure and Defect of Steel (GB/T 226-1991, neq ISO 4969:1980, Steel-Macroscopic examination by etching with strong mineral acids)

GB/T 228 Tensile Test Method for Metal Material under Room Temperature (GB/T 228-2002, eqv ISO 6892:1998)

GB/T 229 Charpy Notch Impact Test Method of Metal (GB/T 229-1994, eqv ISO 83:1976, Steel-Charpy impact test (U-notch), eqv ISO 148:1983, Steel-Charpy impact test (V-notch))

GB/T 230.1 Metal Rockwell Hardness Test - Part 1: Test Method (A, B, C, D, E, F, G, H, K, N, T scale) (GB/T 230.1-2004, ISO 6508:1999, MOD)

GB/T 231.1 Metallic Brinell Hardness Test - Part 1: Test Method (GB/T 231.1-2002, eqv ISO 6506-1:1999)

GB/T 702-2004 Forged Round And Square Steels - Size, Shape, Weight and Allowable Derivation of Hot-Rolled Round Steel and Square Steel (GB/T 702-2004, ISO 1035-1:1980, Hot-Rolled Steel Bar - Part 1: Dimension of Round Bars; ISO 1035-2: 1980 Hot-Rolled Steel Bar - Part 1: Dimension of Square Bars; ISO 1035-4: 1982, Hot-Rolled Steel Bar - Part 4-Tolerances, MOD)

GB/T 704-1988 Size, Shape, Weight and Allowable Derivation of Hot-Rolled Flat Steel

GB/T 705-985 Size, Shape, Weight and Allowable Derivation of Hot-Rolled Hexagonal Steel and Octagonal Steel

GB/T 908-1987 Size, Shape, Weight and Allowable Derivation of Forged Round Steel and Square Steel

GB/T 1979 Structural Steel Macrostructure Defect Rating Chart

GB/T 2101 General Provisions for Acceptance, Packing, Marking and Certificate of Quality of Structural Steel

GB/T 2975 Steel and steel products - Location and preparation of test pieces for mechanical testing (GB/T 2975-98, eqv ISO 377: 1997)

GB/T 6394 Metal Average Grain Size Determination Method

GB/T 7736 Ultrasonic Inspection Method for Macro-Structure and Defect of Steel

GB/T 9971-2004 Pure Iron for Raw Material

GB/T 10121 Steel Tower-Shaped Hairline Magnetic Particle Inspection Method

GB/T 10561 Determination Standard Rating Chart of Content of Nonmetallic Inclusion – Microscopic Inspection Method (GB/T 10561-2005, ISO 4967:1998, IDT)

GB/T 11170 Photoelectric Emission Spectroscopic Analysis Method of Stainless Steel

GB/T 15574 Classification of Steel Products (GB/T 15574-1995, eqv ISO 6929:1987)

GB/T 15711 Steel Tower-Shaped Hairline Acid Pickling Inspection Method

GB/T 16761-1997 Size, Shape, Weight and Allowable Derivation of Forged Flat Steel

GB/T 17505 General Technical Requirements for Delivery of Steel and Steel Products (GB/T 17505-1998, eqv ISO 404:1992)

GB/T 20066 Sampling and Preparation of Samples for the Determination of Chemical Components of Steel and Iron (GB/T 20066-006, ISO 14284: 1996, IDT)

GB/T 20878 Stainless and Heat-Resistant Steel Brand and Chemical Components

YB/T 5293 Metal Material Top Forging Test Method

3 Terms and Definitions

The terms and definitions established in GB/T 20878 and GB/T 15574 standard are applicable to this Standard.

4 Order Content

According to the order contract of this Standard or order form, it shall include the following contents:

a) Standard No.;

6.2 Size, shape and allowable deviation of hot-rolled flat steel

The size, shape and allowable deviation of hot-rolled flat steel shall be in accordance with the provisions of GB/T 704-1988, and the specific requirements shall be specified in the contract. Those that are not specified shall be executed according to ordinal level specified in GB/T 704-1988 standard.

6.3 Size, shape and allowable deviation of hot-rolled hexagonal steel

The size, shape and allowable deviation of hot-rolled hexagonal steel shall be in accordance with the provisions of GB/T 705-1985, and the specific requirements shall be specified in the contract. Those that are not specified shall be executed according to Group 2 of GB/T 705-1985 standard.

6.4 Size, shape and allowable deviation of forged round steel and square steel

The size, shape and allowable deviation of forged round steel and square steel shall be in accordance with the provisions of GB/T 908-1987, and the specific requirements shall be specified in the contract. Those that are not specified shall be executed according to Group 2 of GB/T 908-1987 standard.

6.5 Size, shape and allowable deviation of forged flat steel

The size, shape and allowable deviation of forged flat steel shall be in accordance with the provisions of GB/T 16761-1997, and the specific requirements shall be specified in the contract. Those that are not specified shall be executed according to Group 2 of GB/T 16761-1997 standard.

6.6 Size, shape and allowable deviation of cold processing steel rods

6.6.1 Size and allowable deviation

6.6.1.1 The allowable deviation of the size of the cold processing steel rods shall comply with the provisions of Table 1. Its allowable deviation level shall be specified in the contract. If it is not specified, it shall be executed according to h11 level. The applicable scope of allowable deviation level for cold processing steel rods can be selected according to Table 2.

6.6.1.2 The allowable deviation of heat treatment and acid pickling steel rods after cold processing shall be 2 times as many as the relatively loose ones listed in Table 2.

according to the non-heat treatment. The heat treatment system of all kinds of steel rods is shown in Tables A.1~A.4 in Annex A.

7.3.1 Solution treatment or annealing treatment is conducted to austenitic steel rods for cutting processing. It is allowed not to conduct treatment upon negotiation between the supplier and the purchaser. Solution treatment or annealing treatment is not conducted for the steel rods used for hot pressure processing.

7.3.2 Annealing treatment is conducted for ferritic steel rods, and it is allowed not to conduct treatment upon negotiation between the supplier and the purchaser.

7.3.3 Annealing treatment is conducted for martensitic steel rods.

7.3.4 Solution treatment or annealing treatment is selected for the precipitation hardening type steel rods according to the structure of the steel. The annealing system is determined through negotiation between the supplier and the purchaser; and the annealing temperature is generally 650°C to 680°C without agreement. After negotiation between the supplier and the purchaser, it is allowed not to conduct treatment of precipitation hardening type steel rods (except 05Cr17Ni4Cu4Nb).

7.3.5 Cold processing steel rods after being cold drawn, polished or cut or made in the combination of these methods are delivered after the hot treatment and acid pickling according to the requirements of the purchaser.

7.4 Mechanical property

7.4.1 The heat treatment system of all kinds of steel rods or samples is shown in Tables A.1 ~ A.4 in Annex A. The size of the sample blank for heat treatment is generally 25 mm. When the size of steel rods is less than 25 mm, heat treatment is conducted with the steel rods in original size. The mechanical property of steel rods after cold drawing without heat treatment are determined through negotiation between the supplier and the purchaser.

7.4.2 The steel rods after heat treatment (except martensitic steel annealing), the samples are no longer conducted with heat treatment; and their mechanical property shall comply with the provisions of Tables 8~11, respectively.

7.4.3 The mechanical property of steel rods without heat treatment and sample blank after heat treatment shall comply with the provisions of Tables 8 ~11.

7.4.4 The mechanical property of the precipitation hardening type steel rods shall be specified with heat treatment group in the contract. When it is not specified, it shall be executed according to Group 1.

7.4.5 If the supplier can ensure that the mechanical property is qualified, some or all mechanical property tests can be omitted.

7.7.3 The surface of cold processing steel rods shall be clean and smooth, and no cracks, scars, folds, inclusions, cracking and oxide scales are allowed. The steel rods delivered in heat treatment state is allowed to be oxidized. In the absence of special requirements, the surface of the steel rods allows individual defects, such as minor scratches, drawing stamps, black spots, and pits with depth not exceeding the nominal size tolerances from the actual size.

7.7.4 No defect affecting the use is allowed to exist on the surface of steel rods after turning or peeling, polishing and buffing.

7.7.5 After negotiation between the supplier and the purchaser, and if it is specified in the contract, the black skin produced by heat treatment can be removed by the method of acid pickling, turning and others.

7.8 Special requirements

According to the requirements of the purchaser, and after the agreement between the supplier and the purchaser, we can supply the steel rods meeting the following special requirements.

a) Reduce the scope of chemical components in Tables 4~7;

b) Restrict the upper limit of tensile strength in Tables 8~11;

c) Inspect the content of non-metallic inclusions in steel;

d) Inspect the grain size of steel;

e) Increase the tower-shaped test;

f) Measure the mechanical property of steel at high temperature

g) Other special requirements.

8 Test Method

The inspection items and test methods for each batch of steel rods shall comply with the provisions of Table 15.

9 Inspection Rules

9.1 Inspection and acceptance

The inspection and acceptance of steel rods shall be conducted by Technical Quality Supervision Department of the supplier.

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