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GB/T 6478-2015

Replacing GB/T 6478-2001

Steels for Cold Heading and Cold Extruding

(ISO 4954:1993, MOD)

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard replaced GB/T 6478-2001 *Steels for Cold Heading and Cold Extruding*.

Compared with GB/T 6478-2001, this Standard has the major technical changes as follows:

--- Expand the upper limit of applicable wire rod diameter from 40mm to 60mm;

--- Add non-quenched/tempered steel for cold heading and cold extruding in the "classification";

--- Confirm the allowable deviation of hot-rolled wire rod dimension conforms to the provisions of Grade-B accuracy stipulated in GB/T 14981-2009;

--- Add 14 grades and relevant technical requirements, such as ML06Al, ML10, ML12Al, ML12, ML15Cr, ML30Cr, ML45Cr, ML20CrMo, ML25CrMo, ML45CrMo, ML25B, ML25MnB, ML30MnB, ML40Mnb;

--- Add MFT8, MFT9 and MFT10 non-quenched/tempered steel for cold heading and cold extruding, and relevant requirements;

--- Increase the manganese content in Grade ML30~ML45 from 0.30%~0.60% to 0.60%~0.90%; delete the relevant requirements of two Grades ML30Mn and ML35Mn;

--- Adjust ML22Mn into ML20Mn; ML37Cr into ML35Cr; ML42CrMo into ML40CrMo; ML28B into ML30B;

--- Straighten the phosphorus content and sulfur content in the quenched/tempered steel for cold heading and cold extruding from "≤0.035%" to "≤0.025%";

--- Add the refining requirements outside of the furnace;

--- Modify the decarburization requirements;

--- Modify the macrostructure requirements;

--- Modify the surface quality requirements;

--- Add the relevant provisions of digit rounding off;

--- Modify the re-inspection and judgment rules;

--- Add Appendix B "Grade Comparison List between this Standard and ISO

Steels for Cold Heading and Cold Extruding

1 Scope

This Standard specifies the classification, grade, ordering contents, dimension, appearance, weight and allowable deviation, technical requirements, test methods, inspection rules, package, mark, and quality certificate, etc. for the non-alloyed steels and alloyed structural steels for cold heading and cold extruding.

This Standard is applicable to the hot-rolled wire rod with nominal diameter 5.0mm~60mm, and hot-rolled round steel (hereinafter referred to as steel) with nominal diameter 12mm~100mm.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 222 Permissible Tolerance for Chemical Composition of Steel Products

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

GB/T 223.4 Alloyed Steel – Determination of Manganese Content – Potentiometric or Visual Titration Method

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 4829-1:1996, ISO 4829-2:1998, MOD)

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

GB/T 223.9 Methods for Chemical Analysis of Iron, Steel and Alloy - the Chrom Azurol S Photometric Method for the Determination of Aluminium Content

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 223.12 Methods for Chemical Analysis of Iron, Steel and Alloy - the Sodium Carbonate Separation-Diphenyl Carbazide Photometric Method for the Determination of Chromium Content

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-Benzoy-N-Phenylhydroxylamine Extraction Photometric Method for the Determination of Vanadium Content

GB/T 223.16 Methods for Chemical Analysis of Iron, Steel and Alloy - The Chromotropic Acid Photometric Method for the Determination of Titaninm 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 Iodimetric Method for the Determination of Copper 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 223.26 Iron, Steel and Alloy - Determination of Molybdenum Content - The Thiocyanate Spectrophotometric Method

GB/T 223.37 Methods for Chemical Analysis of Iron, Steel and Alloy - the Indophenol Blue Photometric Method for the Determination of Nitrogen Content after Distillation Separation

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

GB/T 223.53 Methods for Chemical Analysis of Iron, Steel and Alloy - The Flame Atomic Absorption Spectrophotometric Method for the Determination of Copper Content

GB/T 223.54 Methods for Chemical Analysis of Iron, Steel and Alloy - The Flame Atomic Absorption Spectrophotometric Method for the Determination of Nickel

Content

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 223.59 Iron, Steel and Alloy - Determination of Phosphorus Content - Bismuth Phosphomolybdate Blue Spectrophotometric Method and Antimony Phosphomolybdate Blue 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 223.61 Methods for Chemical Analysis of Iron, Steel and Alloy - The Ammonium Phosphomolybdate Volumetric Method for the Determination of Phosphorus 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 223.63 Methods for chemical analysis of iron, steel and alloy--The sodium(potassium)periodate photometric method for the determination of manganese content

GB/T 223.64 Iron, Steel and Alloy - Determination of Manganese Content - Flame Atomic Absorption Spectrometric Method

GB/T 223.67 Iron, Steel and Alloy - Determination of Sulfur Content - Methylene Blue Spectrophotometric Method (GB/T 223.67-2008, ISO 10701:1994, IDT)

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 223.71 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 223.72 Iron, Steel and Alloy - Determination of Sulfur Content - Gravimetric Method

GB/T 223.75 Iron steel and alloy - Determination of boron content - Methanol

distillation-curcumin photometric method

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 223.79 Iron and Steel - Determination of Multi-Element Contents - X-Ray Fluorescence Spectrometry (Routine Method)

GB/T 223.81 Iron Steel and Alloy - Determination of Total Aluminum and Total Boron Contents - Microwave Digestion-Inductively Coupled Plasma Mass Spectrometric Method

GB/T 223.84 Steel and Iron - Determination of Titanium Content - Diantipyrylmethane Spectrophotometric Method

GB/T 223.85 Steel and Iron - Determination of Sulfur Content - Infrared Absorption Method After Combustion in an Induction Furnace

GB/T 223.86 Steel and Iron - Determination of Total Carbon Content - Infrared Absorption Method after Combustion in an Induction Furnace

GB/T 224 Determination of Depth of Decarburization of Steels (GB/T 224-2008, ISO 3887:2003, MOD)

GB/T 225 Steel – Hardenability Test by End Quenching (Jominy Test) (GB/T 225-2006, ISO 642:1999, IDT)

GB/T 226 Etch Test for Macrostructure and Defect of Steels

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 230.1 Metallic Materials - Rockwell Hardness Test - Part 1: Test Method (Scales A, B, C, D, E, F, G, H, K, N, T) (GB/T 230.1-2009, ISO 6508-1:2005, MOD)

GB/T 231.1 Metallic Materials - Brinell Hardness Test - Part 1: Test Method (GB/T 231.1-2009, ISO 6506-1:2005, MOD)

GB/T 702 Hot-rolled Steel Bars - Dimensions, Shape, Weight and Tolerances (GB/T 702-2008, ISO 1035-1-4:1980, MOD)

GB/T 1979 Standard Diagrams for Macrostructure and Defect of Structural Steels

GB/T 2101 General Provisions on Acceptance, Package, Marking and Quality

Certificate for Profile Steel

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 Spectrometric Analysis of Carbon and Low-Alloy Steel (Routine Method)

GB/T 6394 Metal - Methods for Estimating the Average Grain Size

GB/T 8170 Rules of Rounding off for Numerical Values & Expression and Judgement of Limiting Values

GB/T 10561 Steel - Determination of Content of Nonmetallic Inclusions - Micrographic Method Using Standards Diagrams (GB/T 10561-2005, ISO 4967:1998, IDT)

GB/T 14981-2009 Dimension Shape Mass and Tolerance for Hot-Rolled Round Wire Rod (GB/T 14981-2009, ISO 16124:2004, MOD)

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 20066-2006, ISO 14284:1996, IDT)

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 20125-2006, ISO 15351:1999, IDT)

GB/T 21834 Medium and Low Alloy Steel - Determination of The Distribution of Multi-Element Contents - Original Position Statistic Distribution Analysis Method

GB/T 22368 Low-Alloy Steel - Determination of Multi-Element Contents - Glow Discharge Optical Emission Spectrometry (Routine Method)

GB/T 28300 Surface Quality Classes for Hot-Rolled Bars and Rods Technical Delivery Conditions

YB/T 5293 Metallic Materials - Forging Test

3 Booking Contents

According to this Standard, the booking contract shall include the following contents:

"non-quenched and tempered" Chinese phonetic first two letters "FT", fastener's strength level number.

Example: MFT8

Thereof:

M - "riveting" Chinese phonetic alphabet;

FT - "non-quenched and tempered" Chinese phonetic first two letters;

8 - fastener's strength level number.

5 Dimension, Appearance, Weight and Allowable Deviation

5.1 The dimension, appearance, weight and allowable deviation of hot-rolled round steel shall conform to the provisions of GB/T 702.

5.2 The dimension, appearance, weight and allowable deviation of hot-rolled wire rod shall conform to the provisions of GB/T 14981-2009; thereof the dimension, appearance and allowable deviation shall conform to the provisions of Class-B accuracy.

5.3 According to the negotiation between the supplier and the purchaser, other specification and accuracy of round steel and wire rod can be supplied.

6 Technical Requirements

6.1 Grade number and chemical composition

6.1.1 The grade number and chemical composition (smelting analysis) of not heat-treated steel for cold heading and cold extruding shall conform to the provisions of Table 1.

Appendix D

(Informative)

Technical Differences and Causes between this Standard and Applied International Standard

Table D.1 gives the technical differences and causes between this Standard and ISO 4954:1993.

Table D.1 Technical Differences and Causes between this Standard and ISO 4954:1993

Clause No. of this Standard	Technical Differences	Causes
1	1) The structure and content are greatly modified; relevant “classification” is moved to Chapter 4; 2) The lower limit of nominal diameter of applicable steel is modified from 2mm to 5.0mm; 3) Excluding steel wire, cold-drawn steel, or stainless steel	1) Meet the preparation requirements of China standard; 2) Since this Standard excludes steel wire; 3) Conform to standard system: steel wire can refer to GB/T 5953.1~GB/T 5953.3; cold-drawn steel can refer to GB/T 3078; stainless steel can refer to GB/T 4356 and GB/T 4232.
2	Add China’s standard, and replace corresponding international standard	Increase the operability and meet the technical conditions of steel products
3	Modify the booking contents	So as to adapt to the current state of domestic standard
4	1) Add non-quenched and tempered type; 2) Cancel the boiling steel in not heat-treated steel; 3) Modify the grade naming rules	1) Product development and application are mature, which is conducive to save energy and reduce the manufacturing cost; 2) Since there is no domestic manufacturing or booking activity; 3) The grade naming shall conform to the provisions of GB/T 221
5	Dimension deviation shall implement corresponding national standard	Increase the operability and meet the technical conditions of steel products
6.1	Not heat-treated type: increase 4 grades including ML04Al; case-hardened type: increase ML15Cr, delete 5 grades including CE10; quenched and tempered (including boron-steel): increase 12 grades including ML30Cr, delete 9 grades including 42Mn6E; non-quenched and tempered type: increase 3	So as to adapt to China’s actual production and application situations

Bibliography

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[2] GB/T 3078-2008 Quality Structural Steel Cold Drawn Bars

[3] GB/T 3098.1-2010 Mechanical Properties of Fasteners - Bolts, Screws and Studs

[4] GB/T 3098.22-2009 Mechanical Properties of Fasteners Made of the Fine Grain Non-Heat Treatment Steel - Bolts, Screws and Studs

[5] GB/T 4232-2009 Stainless Steel Wire for Cold Heading and Cold Forging

[6] GB/T 4356-2002 Stainless Steel Wire Rods

[7] GB/T 5953.1-2009 Steel Wire for Cold Heading and Cold Forging - Part 1: Intended for Heat Treatment

[8] GB/T 5953.2-2009 Steel Wire for Cold Heading and Cold Forging - Part 2: Not Intended for Heat Treatment

[9] GB/T 5953.3-2012 Steel Wire for Cold Heading - Part 3: Non-Quenched and Tempered Steel Wire for Cold Heading

[10] ISO 4954:1993 Steels for Cold Heading and Cold Extruding

[11] EN 10263-2:2001 Wire Rods, Steel Bars and Steel Wires for Cold Heading and Cold Extruding – Part 2: Delivery Technical Conditions for Not Heat-Treated Steel

[12] EN 10263-4:2001 Wire Rods, Steel Bars and Steel Wires for Cold Heading and Cold Extruding – Part 4: Delivery Technical Conditions for Quenched and Tempered Steel

[13] JIS G3507-1:2010 Carbon Steel for Cold Heading – Part 1: Wire Rod

[14] JIS G3058-1:2010 Boron-Contained Steel for Cold Heading – Part 1: Linear Material

[15] JIS G4053:2008 Alloy Steel for Machinery Manufacturing

[16] ASTM A29/A29M-12 Hot-Forging and Cold-Processing Carbon Steel and Alloy Steel Bar

[17] ASTM A510/A510M-13 General Requirements for Wire Rods and Coarse Round Wire

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