GB

NATIONAL STANDARD OF

THE PEOPLE'S REPUBLIC OF CHINA

ICS 77.140.45

H 40

GB/T 699-2015

Replacing GB/T 699-1999

Quality carbon structure steels

Issued on: December 10, 2015 **Implemented on: November 1, 2016**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine;

Standardization Administration Committee.

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Foreword

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

This Standard replaces GB/T 699-1999 *Quality Carbon Structural Steels.*

Compared with GB/T 699-1999, the main technical changes are as follows:

- Deleted steel bar classification according to metallurgical quality; added classification according to surface type (see Clause 3 of this Standard; Clause 4, Table 2 & Table 4 in GB/T 699-1999);
- Deleted rimmed steel and semi-killed steel (see Table 1 of this Standard; Sub-clause 6.1.1.6 and 6.1.1.8 in GB/T 699-1999);
- Modified chemical composition of the Steel 08Al (see footnote c in Table 1 of this Standard; Sub-clause 6.1.1.5 in GB/T 699-1999);
- Specified “yield point” as “lower yield strength R_{el} or specific plastic extension strength $R_{p0.2}$” (see Table 2 of this Standard; Table 3 in GB/T 699-1999);
- Increased allowable adjustment range of heat treatment temperature (see footnote c in Table 2 of this Standard);
- Modified sampling provisions on steel bar mechanical properties change wrought (rolled) (see setting in Table 2 of this Standard; Sub-clause 6.4.2 in GB/T 699-1999);
- Specified requirements for forging steel (see Sub-clause 6.5.1 of this Standard; Sub-clause 6.5.1 in GB/T 699-1999);
- Increased macrostructure requirements for continuously cast steel (see Table 3 of this Standard);
- Subdivided surface imperfection into imperfection and defect (see Sub-clause 6.6.1 and 6.8 of this Standard; Sub-clause 6.6.1 and 6.9 in GB/T 699-1999);
- Added that surface quality shall comply with provisions of GB/T 28300 (see Sub-clause 6.8.4 of this Standard).
- Modified sampling number of impact test, microstructure inspection, etc. (see Table 7 of this Standard);
- Added requirements that steel bar test results use numerical rounding rules (see Sub-clause 8.4.3 of this Standard).

Quality Carbon Structural Steels

1 Scope

This Standard specifies classification and code, order information, size, appearance and weight, technical requirements, test methods, inspection rules, packaging, marks and quality certificate of quality carbon structural steel bars.

This Standard is applicable to hot-rolled or forged quality carbon structural steel bars of which nominal diameter or thickness is not greater than 250 mm. Hot-rolled or forged quality carbon structural steel bars of which nominal diameter or thickness is greater than 250 mm shall also be supplied, as agreed between the buyer and the supplier (hereinafter referred to as steel bars)

The designations and chemical composition specified in this Standard are also applicable to steel ingots, steel billets, steels and its products of other cross-sections.

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 *Method of sampling steel for determination of chemical composition and permissible variations for product analysis*

GB/T 223.5 *Steel and iron - Determination of acid-soluble silicon and total silicon content - Reduced molybdosilicate spectrophotometric method*

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

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 223.59 *Iron, steel and alloy - Determination of phosphorus content - Bismuth phosphomolybdate blue spectrophotometric method and antimony*

phosphomolybdate blue spectrophotometric method

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 223.79 *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 223.85 *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 steel*

GB/T 225 *Steel - Hardenability test by end quenching (Jominy test)*

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 229 *Metallic materials - Charpy notch impact test*

GB/T 231.1 *Metallic materials - Brinell hardness test - Part 1: Test method*

GB/T 702 *Hot-rolled steel bars - Dimensions, shape, weight and tolerances*

GB/T 908 *Forged round and square steels dimension, shape, weight and tolerance*

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

GB/T 2101 *General requirement of acceptance packaging marking and certification for section steel*

GB/T 2975 *Steel and steel products - Location and preparation of test pieces for mechanical testing*

GB/T 4162 *Forged and Rolled Steel Bars - Method for Ultrasonic Examination*

14	Surface quality	Piece by piece	On whole steel bar	Visual inspection or GB/T 28300
15	Size, appearance	Piece by piece	On whole steel bar	Calipers, micrometer, etc.
[a] Group I: For U-type notch, take 2 specimens; for V-type notch, take 3 specimens.				

8 Inspection Rules

8.1 Inspections and Acceptance

8.1.1 Factory inspection and acceptance shall be carried out by the quality technical supervision department of the supplier.

8.1.2 The supplier must ensure that the steel bar delivered complies with the provisions of this Standard or of the contract. The buyer is entitled to make inspection or acceptance to any of the test items defined in this Standard or the contract if necessary.

8.2 Batch-group Rules

Steel bar shall be inspected and accepted according to batch. Each batch consists of steel material with the same designation, the same furnace number, the same working method, the same size, the same delivery state, the same heat treatment system (or furnace lot).

8.3 Quantity and Location for Sampling

The quantity and location for sampling of each batch of steel bar shall comply with the provisions in Table 7.

8.4 Re-inspection and Judging Rules

8.4.1 The re-inspection and judging rules shall be in compliance with provisions in standard GB/T 17505.

8.4.2 If the supplier can guarantee the conformance of the steel material, it is allowed to use billet to substitute material, or to use large pieces to substitute small pieces - for the same furnace (tank) steel-material or steel-billet's macro-test, mechanical properties and non-metallic inclusion's inspection result.

8.4.3 The test results of steel bar shall be rounded with rounding value comparison method to have the same digital number with specified value; the rounding regulation shall comply with the provisions in chapter 3 of GB/T 8170-2008.

9 Packaging, Marks and Quality Certificate

Packaging, marks and quality certificates of the steel bar shall comply with the provisions of GB/T 2101.

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ICS 77.140.20
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NATIONAL STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 699-1999

Quality Carbon Structural Steels

优质碳素结构钢

Issued on: Nov 01, 1999 Implemented on: Aug 01, 2000
Issued by: State Bureau of Quality Technical Supervision

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Foreword

This standard is a revision to GB/T 699-1988 *Specifications for Quality Carbon Structural Steels*.

This revision of this standard has made modifications to the following items:

— The name of standard is changed to "*Quality carbon structural steels*";

— The applicable scope is extended to that quality carbon structural steels with diameter or thickness greater than 250mm may be supplied;

— The Chapter "Order Information" is added;

— The size, dimensions and allowance shall be in accordance with the stipulations in standard GB/T 702-1986 or GB/T 908-1987;

— Marking symbols of steel products and unified numerical representation for various designations are added;

— The range of carbon content for designations below 40 (with exception of 08F) is narrowed by 0.01%;

— The phosphorus and sulfur contents and macroscopic structure of steels are classified into three grades, based on the metallurgical quality;

— For steels delivered in the hot-rolled or hot forged state, the mechanical properties may be exempted from inspection if the supplier can guarantee the conformance;

— In note 2 of Table 3, the quench cooling medium for designation 75, 80 and 85 steels is changed from "water cooling" to "oil cooling";

— The "fracture" test is deleted;

— The acceptable grading of non-metallic inclusions is deleted.

This standard shall replace GB/T 699-1988 *Specifications for Quality Carbon Structural Steels* since its implementation.

This standard was proposed by the State Bureau of Metallurgical Industry.

This standard shall be under the jurisdiction of the National Technical Committee of Steel Standardization.

The main drafting organizations of this standard: Information Standard Institute of the Ministry of Metallurgical Industry, Chongqing Special Steel Co., Shanghai Pugang Group Corporation, Daye Special Steel Co., Ltd., and Handan Iron and Steel Corporation.

Main drafters of this standard: Luan Yan, Tang Yifan, Tang Zhibai, Chen Changxi, Sun Ping, Teng Changling, and Zhao Gaunxin.

This standard was first-time issued in January 1965 and revised for the first time in February 1988.

Quality Carbon Structural Steels

1 Scope

This standard specifies the size, dimensions, weight and allowance, technical requirements, test methods, inspection rules, packaging, marking and quality certificates of hot rolled or forged quality carbon structural steels.

This standard is applicable to quality carbon structural steel bars with diameter or thickness not greater than 250mm. Those with diameter or thickness greater than 250mm may also be supplied, per agreement by both parties the buyer and the supplier.

The designations and chemical composition as specified in this standard are also applicable to steel ingots, steel billets and their manufactures.

2 Normative References

Provisions from the following standards shall form part of this standard by being cited herein. At the time of publication of this standard, the revisions of these standards as shown are valid. All standards are subject to amendment and revision. All users of this standard shall study into the possibility of applying the updated revisions of the following standards.

GB/T 222-1984 Method for sampling of specimens for chemical analysis of steels and allowance for chemical composition of finished products

GB/T 224-1987 Method for decarburized layer depth test of steels

GB/T 226-1991 Method for acid attack test of macroscopic structure and imperfection of steels

GB/T 228-1987 Method for tensile test of metals

GB/T 229-1994 Metallic Material - Charpy notch impact test

GB/T 231-1984 Method for Brinnel hardness test of metals

GB/T 233-1982 Method for upsetting test of metals

GB/T 702-1986 Size, dimensions, weight and allowance of hot rolled round and square steels

GB/T 908-1987 Size, dimensions, weight and allowance of forged round and square steels
GB/T 1979-1980 Grading diagrams for evaluation of macroscopic structural imperfections of structural steels

GB/T 2101-1989 General stipulations on acceptance, packaging, markings and quality

certificates of profile steels

GB/T 2975-1998 Steel and steel products - Location and preparation of test specimens for mechanical testing

GB/T 4336-1984 Method for photoelectric emission spectroscopic analysis of carbon steel, medium and low alloy steel

GB/T 6397-1986 Specimens for tensile test of metals

GB/T 7736-1987 Ultrasonic inspecting method for macro-structure and imperfection of steel

GB/T 10561-1989 Steel - Determination of content of non-metallic inclusion - Micrographic method using standard diagrams

GB/T 17616-1998 Unified numbering system for designations of iron, steel and alloy

GB/T 13299-1991 Steel - Determination of microstructure

GB/T 15711-1995 Steel products - Methods for acid etch test of tower sample

GB/T 17505-1998 Steel and steel products - General technical delivery requirements

YB/T 5148-1993 Method for the test of mean grain fineness of metals

See Annex A (Annex to the Standard) for normative references for chemical analysis methods of various elements in steel.

3 Order Information

The contracts or purchase orders ordered according to this standard shall contain the following contents:

a) Standard code number;

b) Description of product;

c) Designations or unified numerical code;

d) Weight (quantity) of delivery;

e) Specification and dimension precision grading;

f) The processing method to be used;

g) State of delivery;

h) Impact test (where required, as per 6.4.1);

i) Upsetting test (where required, as per 6.5);

j) Non-metallic inclusion (where required, as per 6.7);

k) Decarburized layer (where required, as per 6.8);

l) Special requirements (where required, as per 6.10).

4 Classifications and Code

4.1 Steel material is classified, according to its metallurgical quality, as follows:

Quality Steel	
Premium-grade Quality Steel	A
Special-grade Quality Steel	E

4.2 Steel material is classified into two categories according to the processing method used:

a) Steel for pressed work	UP
Steel for hot pressed work	UHP
Steel for upsetting work	UF
Steel for cold drawn billet	UCD
b) Steel for cutting work	UC

5 Size, Dimensions, Weight and Allowance

5.1 The size, dimensions and allowance of hot rolled round steels and square steels shall comply with relevant stipulations in GB/T 702. Specific requirements shall be clearly stated in the contract.

5.2 The size, dimensions and allowance of forged round and square steels shall comply with relevant stipulations in GB/T 908. Specific requirements shall be clearly stated in the contract.

5.3 The size, dimensions and allowance of steels with other cross-sections shall comply with relevant stipulations in corresponding standards.

8 Test Rules

8.1 Inspections and Acceptance

8.1.1 The quality of steel material shall be inspected and accepted by the quality technical supervision department of the supplier.

8.1.2 The supplier must ensure that the steel material delivered complies with the stipulations of this standard or of the contract. The buyer is entitled to make inspection or acceptance to any of the test items defined in this standard or the contract if necessary.

8.2 Batch-group Rules

Steel material shall be inspected and accepted according to batch. Each batch consists of steel material with the same heat (furnace) number, the same working method, the same size, the same delivery state (or the same heat treatment system/furnace lot) and the same surface state.

8.3 Quantity and Location for Sampling

The quantity and location for sampling of steel material shall comply with the stipulations in Table 8.

8.4 Re-inspection and Judging Rules

~~**8.4.1** The re-inspection and judging rules shall be in compliance with relevant stipulations in 8.3.4.3 of standard GB/T 17505-1998. For non-metallic inclusion's inspection result, it is allowed to use billet to substitute material, or to use large pieces to substitute small pieces.~~ [Corrigendum: September 26, 2000].

8.4.1 The re-inspection and judging rules shall be in compliance with relevant stipulations in 8.3.4.3 of standard GB/T 17505-1998. [Corrigendum: September 26, 2000].

8.4.2 If the supplier can guarantee the conformance of the steel material, it is allowed to use billet to substitute material, or to use large pieces to substitute small pieces - for the same furnace (tank) steel-material or steel-billet's macro-test, mechanical properties and non-metallic inclusion's inspection result. [Corrigendum: September 26, 2000].

9 Packaging, Marking and Quality Certificate

Packaging, marking and quality certificates of the steel material shall comply with the stipulations of GB/T 2101.

	— The determination of nickel content by flame atomic absorption spectrophotometry
GB/T 223.58 - 1987	Methods for chemical analysis of iron, steel and alloy — The determination of manganese content by sodium arsenite – sodium nitrite titration method
GB/T 223.59 - 1987	Methods for chemical analysis of iron, steel and alloy — The determination of phospgorus content by antimonium-Phosphorus-Molybdium-blue photometric method
GB/T 223.60 - 1997	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 - 1988	Methods for chemical analysis of iron, steel and alloy — The determination of phosphorus content by ammonium molybdo-phosphate volumetric method
GB/T 223.62 - 1988	Methods for chemical analysis of iron, steel and alloy — The determination of phosphorus content by butyl acetate extraction photometric method
GB/T 223.63 - 1988	Methods for chemical analysis of iron, steel and alloy — The determination of manganese content by sodium (potassium) permanganate photometric method
GB/T 223.64 - 1988	Methods for chemical analysis of iron, steel and alloy — The determination of manganese content by flame atomic absorption spectrometric method
GB/T 223.67 - 1989	Methods for chemical analysis of iron, steel and alloy — The determination of sulfur content methyl dyne blue photometric method after reduced distillation
GB/T 223.68 - 1997	Methods for chemical analysis of iron, steel and alloy — The potassium iodated titration method after combustion in the pipe furnace for the determination of sulfur content
GB/T 223.69 - 1997	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 223.71 - 1997	Methods for chemical analysis of iron, steel and alloy — The volumetric method after combustion in the pipe furnace for the determination of carbon content
GB/T 223.72 - 1991	Methods for chemical analysis of iron, steel and alloy — Aluminum oxide stratography - barium sulfate gravimetric method for the determination of sulfur content

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