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ICS 77.140.75

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NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

# GB/T 17396-2009

Replacing GB/T 17396-1998

# Hot-rolled Seamless Steel Tubes for Hydraulic Pillar Service

液压支柱用热轧无缝钢管



**Issued on: October 30, 2009** **Implemented on: May 01, 2010**

**Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;**

**Standardization Administration of the People's Republic of China.**

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# Foreword

This Standard replaces GB/T 17396-1998 "Hot-rolled Seamless Steel Tubes for Hydraulic Pillar Service". Compared with GB/T 17396-1998, this Standard has the main changes as follows:

- ADD order contents;

- Cancel dimensions table;

- MODIFY permissible wall thickness deviation;

- ADD the requirements for full length bending;

- CANCEL the designation examples;

- ADD requirements for residual element Mo content of alloy steel designation;

- MODIFY requirements for nonmetallic inclusion.

This Standard is proposed by China Iron and Steel Association.

This Standard is under the jurisdiction of the National Technical Committee on Iron and Steel of Standardization Administration of China.

Drafting organizations of this Standard: Pangang Group Chengdu Steel & Iron Co., Ltd., Xining Special Steel Co., Ltd., Hunan Hengyang Steel Pipe (Group) Co., Ltd.

Main drafters of this Standard: Yan Ru, Chen Lie, Li Zhi, Li Qi, Zhao Bin.

The previous edition of the standard replaced by this Standard is as:

- GB/T 17396-1998.

# Hot-rolled Seamless Steel Tubes for Hydraulic Pillar Service

## 1 Scope

This Standard specifies the dimension, appearance, weight, technical requirements, test methods, inspection rules, packing, marking and quality certificate of the hot-rolled seamless steel tubes for hydraulic pillar service.

This Standard is applicable to hot-rolled seamless steel tubes for cylinder and pillar service for manufacturing coal mine hydraulic support and pillar. Other hot-rolled seamless steel tubes for hydraulic cylinder and pillar service may refer to this Standard.

## 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 Permissible Tolerances 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 223.5 Steel and Iron - Determination of Acid-soluble Silicon and Total Silicon Content-Reduced Molybdosilicate Spectrophotometric Method (GB/T 223.5-2008, ISO 4829-1:1986, ISO 4829-2:1988, 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 223.19 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 223.40 Iron Steel and Alloy - Determination of Niobium Content by the Sulphochlorophenol S Spectrophotometric Method

GB/T 223.49 Methods for Chemical Analysis of Iron, Steel and Alloy - Extraction Separation - Chlorophosphonazo mA Spectrophotometric Method for the Determination of the Total Rare Earth Content

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 223.62 "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 223.69 Iron Steel and Alloy-Determination of Carbon Contents - Gas-volumetric Method after Combustion in the Pipe Furnace

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

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

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

GB/T 2102 Acceptance, Packing, Marking and Certification of Pipe

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

GB/T 17395 Dimensions, Shapes, Masses and Tolerances of Seamless Steel Tubes (GB/T 17395-2008, ISO 4200:1991, ISO 5252:1991, ISO 1127:1992, NEQ)

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)

## 3 Order Contents

The order contract or order of steel tube according to this standard shall include the following contents:

a) Standard number;

b) Product name;

c) Designation;

**4.5.2** The full length bending of steel tube shall not be greater than 0.15% of the full length of steel tube.

### 4.6 Ends

Both end faces of steel tube shall be vertical to steel tube axes; cut and burrs thereon shall be cleared away.

### 4.7 Weight

The steel tube shall be delivered according to their actual weight or may be delivered according to the theoretical weight; the calculation of the theoretical weight each meter of steel tube shall be in accordance with those specified in GB/T 17395 and the steel density shall be 7.85kg/dm$^3$.

## 5 Technical Requirements

### 5.1 Designations and chemical compositions of steel

**5.1.1** Designation and chemical composition of steel (melting analysis) shall be in accordance with those specified in Table 2. As required by the purchaser, noted in the contract and based on the agreement of both the supplier and the purchaser, the steel tubes of other designations may be supplied.

**5.1.2** Chemical composition of steel tube is accepted according to smelting composition. When the product analysis is required by the purchaser, it shall be indicated in the contract; the permissible deviation of chemical composition of steel tube shall meet the requirements of GB/T 222.

### 5.2 Manufacturing methods

#### 5.2.1 Smelting process of steel

Steels may be smelted by adopting electric furnace with external refining or oxygen converter with external refining.

#### 5.2.2 Manufacturing method of steel tube

Steel tube shall be manufactured by adopting hot-rolled seamless method.

### 5.3 Delivery condition

The steel tube is delivered in hot-rolled condition. As required by the purchaser, noted in the contract and based on the agreement of both the supplier and the purchaser, the steel tube may be annealed or delivered in hardened and tempered condition.

### 5.4 Mechanical properties

**5.4.1** As for steel tubes of designations of 20, 35 and 45, made of quality carbon structural steels, the longitudinal mechanical properties shall be in accordance with those specified in Table 3 in the delivery condition. As for alloy steel tubes of designations of 27SiMn and 30MnNbRE, the measured longitudinal mechanical properties for the sample made into through annealing the blank shall be in accordance with those specified in Table 3.

**5.4.2** 27SiMn steel tubes shall be subject to Brinell hardness test when delivered in annealed condition and the Brinell hardness shall be in accordance with those specified in Table 3.

**5.4.3** Mechanical property of steel tube delivered in hardened and tempered condition shall be determined through negotiation between the supplier and the purchaser.

#### 5.4.4 Impact test

The alloy steel tube of wall thickness not less than 14 mm shall be subject to Charpy V-notch impact test at room temperature; the impact absorbed energy shall be in accordance with those specified in Table 3. The judgment rule of impact test shall

### 5.5 Macrostructure defect

The steel tube rolled directly with steel ingot shall be subjected to macrostructure defect detecting inspection; the acid leaching macrostructure test piece at steel tube cross section shall be free from visible white spots, inclusion, subsurface bubble, skull patch and delamination.

### 5.6 Nonmetallic inclusion

As required by the purchaser, noted in the contract and based on the agreement of both the supplier and the purchaser, the steel tube may be subjected to nonmetallic inclusion inspection; the nonmetallic inclusion of steel tube may be rated according to Method A in GB/T 10561; for class A, class B, class C, class D inclusions, both thin system level and coarse system level shall not be higher than Level 3; DS inclusion shall not be higher than Level 3; the total of the thin systems level and that for the coarse system level for class A, class B, class C, class D inclusions shall not be higher than Level 10 respectively.

### 5.7 Surface quality

The internal and external surfaces of steel tubes shall be free from cracks, folding, creasing, delamination and scars which shall be cleaned up completely and the cleaning depth shall not exceed negative deviation of the nominal wall thickness. The actual outer diameter and wall thickness at the defect cleaning position shall not be less than the permissible minimum value of the outer diameter and wall thickness.

The existence of other local defects not exceeding the permissible negative deviation of wall thickness is allowed.

## 6 Inspection and Test Method

**6.1** The dimension and appearance of steel tube shall be measured one by one with measuring instruments meeting the precision requirements.

**6.2** The internal and external surfaces of steel tubes shall be inspected visually one by one at sufficient lighting condition.

**6.3** Test methods and sampling methods of other inspection items of steel tubes shall meet those specified in Table 4.

all the pipe sections cut off from a tube blank rolled steel tube may be taken as one steel tube.

**7.2.3** Each batch shall be composed of such steel tubes with the same designation, same furnace number, same specification and same heat treating specification (furnace number). The steel tubes in each batch shall not exceed the following requirements:

a) If outer diameter ≤ 76 mm, 400;

b) If outer diameter > 351 mm, 50;

c) For other dimensions, 200.

**7.2.4** If the quantity of the residual steel tubes is not less than the 50% the aforementioned number, those steel tubes shall be grouped into a batch separately. Otherwise, those steel tubes may be grouped into the adjacent batch with the same designation, furnace number, specification and heat treating specification (furnace number).

### 7.3 Sampling quantity

The sampling quantity of each batch of steel tubes for each inspection item shall be in accordance with those specified in Table 4.

### 7.4 Re-inspection and judgment rule

The re-inspection and judgment rules of steel tubes shall comply with those specified in GB/T 2102.

## 8 Packing, Marking and Quality Certificate

The packing, marking and quality certificate of steel tubes shall meet those specified in GB/T 2102.

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