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Cold-drawn or Cold-rolled Precision Inside Diameter Seamless Steel Tube for Hydraulic and Pneumatic System Service

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Foreword

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

This Standard was proposed by China Iron and Steel Association.

This Standard shall be under the jurisdiction of the National Standardization Technical Committee on Steel (SAC/TC 183).

The drafting organizations of this Standard: XCMG Hydraulics Co., Pangang Group Chengdu Iron & Steel Co., Ltd., Hengyang Valin Steel Tube Co., Ltd., Yichang Zhongnan Precision Steel Tube Co., Ltd., Wuxi Jiangnan High-precision Cold-drawn Tube Co., Ltd., Jiangsu Huacheng Industry Pipe Making Corporation, Jiangyin Hongteng Machinery Co., Ltd., Wuxi Dajin High-precision Cold-drawn Steel Tube Co., Ltd., Zhangjiagang Huicheng Pipe-making Co., Ltd. and Zhejiang Lunbao Metal Tube Industry Co., Ltd.

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Cold-drawn or Cold-rolled Precision Inside Diameter Seamless Steel Tube for Hydraulic and Pneumatic System Service

1 Scope

This Standard specifies the classification and codes, order content, dimensions, shape, weight and tolerances, technical requirements, test method, inspection rules, packaging, marking and quality certification for cold-drawn or cold-rolled precision inside diameter seamless steel tube for hydraulic and pneumatic system service.

This Standard applies to cold-drawn or cold-rolled precision inside diameter seamless steel tube for hydraulic and pneumatic system service of an inside diameter 25 mm to 500 mm.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced document (including any amendments) applies to this Standard.

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

GB/T 223.5 Steel and Iron – Determination of Acid-Soluble Silicon and Total Silicon Content – Reduced Molybdosilicate Spectrophotometric Method

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 223.23 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 223.53 Methods for Chemical Analysis of Iron, Steel and Alloy – the Flame Atomic Absorption Spectrophotometric Method for the Determination of Copper Content

GB/T 223.59 Iron, Steel and Alloy – Determination of Phosphorus Content – Bismuth Phosphomolybdate Blue Spectrophotometric Method and Antimony

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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 223.68 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 Content – Gas-volumetric Method after Combustion in the Pipe Furnace

GB/T 228.1 Metallic Materials – Tensile Testing – Part 1: Method of Test at Room Temperature

GB/T 229 Metallic Materials – Charpy Pendulum Impact Test Method

GB/T 242 Metal Materials – Tube – Drift-expanding Test

GB/T 246 Metal Materials – Tube - Flattening Test

GB/T 699 Quality Carbon Structural Steels

GB/T 1031 Geometrical Product Specifications (GPS) – Surface Texture: Profile Method – Surface Roughness Parameters and Their Values

GB/T 1591-2008 High Strength Low Alloy Structural Steels

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

GB/T 2975 Steel and Steel Products – Location and Preparation of Test Pieces for Mechanical Testing

GB/T 3077-2015 Alloy Structure Steels

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 7735-2004 Steel Tubes - The Inspection Method on Eddy Current Test

GB/T 12606-2016 Automated Full Peripheral Flux Leakage Testing of Seamless and Welded (Except Submerged Arc-welded) Ferromagnetic Steel Tubes for the Detection of Longitudinal and / or Transverse Imperfections

GB/T 17395 Dimensions, Shapes, Masses and Tolerances of Seamless Steel Tubes

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5.1.1 Steel tube is usually delivered in inside diameter and wall thickness. When the purchaser requires the supplier to deliver in outside diameter and inside diameter or outside diameter and wall thickness, it shall be specified in the contract.

5.1.2 The inner diameter and wall thickness of steel tube shall be preferentially selected from the dimensions listed in Table 1. Steel tubes of other dimensions than those listed in Table 1 may be supplied after consultation between the supplier and the purchaser.

5.1.3 For the cold worked (+C and +LC) steel tube, the tolerances of inside diameter and outside diameter shall meet the specifications of Table 1 and Table 2. For the heat treated (+SR, +A and +N) steel tube, the tolerances of inside diameter and outside diameter shall meet the specifications of Table 3.

5.1.4 In accordance with the requirements of the purchaser, steel tubes of other tolerances than those specified in Table 1, Table 2 and Table 3 can be supplied after consultation between the supplier and the purchaser; it shall be specified in the contract.

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mm and wall thickness is not more than 10 mm; it shall be specified in the contract. The taper of the expanding top core is 60°. The expanding rate of outside diameter of the test pieces after expanding shall meet the specifications of Table 9. No crack or gap shall be allowed on the test pieces after expanding.

Table 9 Expanding Rates of Steel Tube Drift-expanding Test

Designation	Expanding rate / %	
	Wall thickness $S \leq 4$ mm	Wall thickness $S > 4$ mm
20	18	12
Q345	15	10
25Mn	13	8

6.6 Nondestructive test

In accordance with the requirements of the purchaser, nondestructive test can be done for steel tube after consultation between the supplier and the purchaser; it shall be specified in the contract. In the nondestructive test, eddy current inspection is conducted in accordance with the specifications of acceptance level B in GB/T 7735-2004; or magnetic flux leakage inspection is conducted in accordance with the specifications of acceptance level F3 in GB/T 12606-2016.

6.7 Surface roughness

When the purchaser has any requirements on the surface roughness of steel tube, it shall be specified in the contract. The parameters of surface roughness shall be determined in accordance with the arithmetical mean deviation of the profile R_a specified in GB/T 1031; its surface roughness value and sampling length value during determination shall be subjected to the consultation between the supplier and the purchaser.

6.8 Surface quality

The inner and outer surfaces of steel tube shall be smooth and free from cracks, folds, creases, separations and scars. These defects shall be removed completely. The actual wall thickness of steel tube after removing these defects shall not be less than the minimum value of the tolerances of wall thickness.

The existence of phosphate and lubricating agent adhesion layer from the manufacturing process is allowed on the inner and outer surfaces of steel tube; an oxide film is allowed on the inner surface of steel tube delivered in the heat treatment state, which does not affect the surface inspection.

6.9 Grain size

The actual grain size of steel tube shall not be lower than grade 5.

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