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Seamless Steel Tubes for Liquid Service

输送流体用无缝钢管

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Standardization Administration of the People's Republic of China.

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Seamless Steel Tubes for Liquid Service

1 Scope

This Standard specifies order content, dimension, shape, weight, technical requirements, test methods, test rules, packaging, marking and quality certificate of seamless steel tubes for liquid service.

This Standard is applicable to the general seamless steel tubes for liquid service.

2 Normative References

The following standards contain provisions which, through reference in this text, constitute the provisions of this Standard. For dated reference, the subsequent amendments (excluding corrigendum) or revisions of these publications do not apply. However, the parties who enter into agreement according to these specifications are encouraged to study whether the latest editions of these references are applicable. For undated references, the latest edition of the normative document is applicable to this Standard.

GB/T 222 Permissible tolerances for chemical composition of steel products

GB/T 223.3 Chemical analysis method for steel and alloy - The diantipyryl methane phosphomolybdate gravimetric method for the determination of phosphorus content

GB/T 223.5 Methods for chemical analysis of iron, steel and alloy - The reduced molybdosilicate spectro-photometric method for the determination of acid-soluble silicon content

GB/T 223.9 Methods for chemical analysis of iron, steel and alloy - The chrome azurol S photometric method for the determination of aluminium content

GB/T 223.11 Chemical analysis method for steel and alloy - The ammonium persulfate oxidation volumetric method for the determination of chromium content

GB/T 223.12 Chemical analysis method for 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 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 Methods for chemical analysis of iron, steel and alloy - The dimethylglyoxime spectrophotometric method for the determination of nickel content

GB/T 223.26 Methods for chemical analysis of iron, steel and alloy - The thiocyanate direct photometric method for the determination of molybdenum content

GB/T 223.37 Methods for chemical analysis of iron, steel and alloy - The thiocyanate-butyl acetate extraction spectrophotometric method for the determination of molybdenum content

GB/T 223.40 Iron, steel and alloy-Determination of niobium content - The sulphochlorophenol S spectrophotometric method

GB/T 223.49 Methods for chemical analysis of iron, steel and alloy-Extraction separation-chlorophosphonazo mA spectro-photometric 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 extraction-absorption catalytic polarographic method for the determination of

manganese content

GB/T 223.59 Methods for chemical analysis of iron, steel and alloy - The sodium arsenite-sodium nitrite titrimetric method for the determination of phosphorus content

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 Methods for chemical analysis of iron, steel and alloy - The flame atomic absorption spectrometric method for the determination of manganese content

GB/T 223.67 Methods for chemical analysis of iron, steel and alloy - The 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 - The potassium iodate titration method after combustion in the pipe furnace for the determination of sulfur content

GB/T 223.69 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 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 Methods for chemical analysis of iron, steel and alloy - The alumina chromatographic separation - Barium sulfate gravimetric method for the determination of sulphur content

GB/T 228 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 241 Metal tubes - Hydrostatic pressure testing

GB/T 242 Metallic materials – Tube - Drift expanding test (GB/T 242-2007, ISO 8493:1998, IDT)

GB/T 244 Metallic materials – Tube - Bend test (GB/T 244-2008, ISO 8491:1986, IDT)

GB/T 246 Metallic materials – Tube - Flattening test (GB/T 246-2007, ISO 8492:1998, IDT)

GB/T 699 Carbon constructional quality steel

GB/T 1591 Low-alloy high-tensile structural steel

GB/T 2102 Acceptance inspection, packaging, mark and quality certificate of steel tube

GB/T 2975 Mechanical test sampling location and sample preparation for steel and steel products (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 5777 Seamless steel pipe and tubing-Methods for ultrasonic testing (GB/T 5777-2008, ISO 9303:1989, MOD)

GB/T 7735 Steel tubes - The inspection method on eddy current test (GB/T 7735-2004, ISO 9304:1989, MOD)

GB/T 12606 Steel tubes - The testing method of magnetic flux leakage (GB/T 12606-1999, eqv ISO 9402:1989, ISO 9598:1989)

GB/T 17395 Dimensions, shapes, masses and tolerances of seamless steel tubes (GB/T 17395-2008, ISO 1127:1992, ISO 4200:1991, ISO 5252:1991, 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)

GB/T 20124 Steel and iron-Determination of nitrogen content - Thermal

conductimetric method after fusion in a current of inert gas (Routine method) (GB/T 20124-2006, ISO 15351:1999, IDT)

3 Order content

The following content shall be included in the contract of purchase or order sheet of steel tube based on this Standard:

a) Standard number;

b) Product name;

c) Designation of steel; quality classification shall be indicated in case there is such quality classification;

d) Dimensions;

e) Lot size (total weight or total length);

f) Delivery state;

g) Special requirement.

4 Dimension, Shape and Weight

4.1 Outside Diameter and Wall Thickness

The outside diameter (D) and wall thickness (S) of steel tube shall meet the requirements of GB/T 17395.

According to the requirements of the buyer and through the negotiation of both buyer and seller, steel tubes of other outside diameter and wall thickness may also be adopted, which shall be indicated in the contract.

4.2 Allowable Deviation of Outside Diameter and Wall Thickness

4.2.1 The allowable deviation of steel tube's outside diameter shall meet the requirements of Table 1.

Table 1 Allowable Deviation of Steel Tube's Outside Diameter In: mm

Steel tube type	Allowable deviation
Hot rolling (hot extruding, hot expanding) steel tube	±1% *D* or ±0.50, take the bigger value
Cold drawing (cold rolling) steel tube	±1% *D* or ±0.30, take the bigger value

4.2.2 The allowable deviation of wall thickness for hot rolling (hot extruding, hot expanding) steel tube shall meet the requirements of Table 2.

than 0.030%.

5.1.5 In case product analysis is required by the buyer, it shall be indicated in the contract; the allowable deviation of chemical composition for finished steel tube shall meet the requirements of GB/T 222.

5.2 Manufacturing Method

5.2.1 Smelting Process of Steel

Electric arc furnace and out-of-furnace refining method as well as oxygen converter and out-of-furnace refining method shall be adopted for smelting steel.

Through the negotiation of both buyer and seller, other smelting methods with higher requirements may also be adopted. If the buyer specifies certain smelting process, it shall be clearly indicated in the contract.

5.2.2 Manufacturing Method of Tube Blank

Continuous casting or hot rolling (forging) method may be adopted for tube blank manufacturing; steel ingot may also be made into tube blank directly.

5.2.3 Manufacturing Method of Steel Tube

Hot rolling (hot extruding, hot expanding) or cold drawing (rolling) seamless method shall be adopted for steel tube manufacturing. If the buyer specifies certain method for steel tube manufacturing, it shall be clearly indicated in the contract.

5.3 Delivery State

5.3.1 Hot rolling (hot extruding, hot expanding) steel tube shall be delivered at hot rolling state or heat treatment condition. If it is required to be delivered at heat treatment condition, the requirements shall be clearly indicated in the contract.

5.3.2 Cold drawing (cold rolling) steel tube shall be delivered at heat treatment condition. According to the requirements of the buyer and through the negotiation of both buyer and seller, they can also be delivered at cold drawing (rolling) state, which shall be indicated in the contract.

5.4 Mechanical Properties

5.4.1 Tensile Property

The longitudinal stretching property of steel tube at delivery state shall meet the requirements of Table 5.

is adopted, L4 in GB/T 5777 (C12) shall be referred to as artificial defect dimension.

5.6 Surface Quality

The inside and outside of steel tube shall be free from any visible crack, folding, scar, rolling crease and delamination. These defects shall be totally removed, and the removal depth shall not exceed the minus deviation of the nominal wall thickness. In the removal parts, the actual wall thickness shall not be less than the minimum allowable value of the wall thickness.

Other partial defects exceeding the minus deviation of wall thickness are not allowed.

6 Test Method

6.1 The dimension and shape of steel tube shall be measured with measuring device which can meet the accuracy requirement.

6.2 The internal and external surface of steel tube shall be tested visually under sufficient lighting condition.

6.3 The sampling methods and test methods of other inspection items of steel tube shall meet the requirements of Table 8.

b) For steel tubes of which the outside diameter is greater than 351mm: 50 pieces;

c) For steel tubes with other dimensions: 200 pieces.

7.2.4 If the buyer has no special requirement, designation 10 and designation 20 steel-made steel tubes with the same designation, same specification and different furnace number may be formed into a batch.

7.2.5 If the quantity of surplus steel tubes is not less than 50% of the number specified above, these steel tubes can be listed as one batch; otherwise, they may be incorporated into the adjacent batches with the same designation, same furnace number and same specification.

7.3 Sampling Quantity

The sampling quantity of all inspection items of per steel-tube batch shall meet the requirements of Table 8.

7.4 Re-inspection and Decision Rules

The re-inspection and decision rules of steel tube shall meet the requirements of GB/T 2102.

8 Packaging, Mark and Quality Certificate

8.1 The packaging, mark and quality certificate of steel tube shall meet the requirements of GB/T 2102.

8.2 According to the requirements of the buyer and through the negotiation of both buyer and seller, both the internal and external surface of steel tube may be applied with protective layer, which shall be indicated in the contract.

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