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YB/T 4146-2016

Replacing YB/T 4146-2006

High-carbon chromium bearing steel seamless steel tubes

高碳铬轴承钢无缝钢管

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High-carbon chromium bearing steel seamless steel tubes

1 Scope

This standard specifies the order content, size, shape, weight, technical requirements, test methods, inspection rules, packaging, marking and quality certificate of high carbon-chromium bearing steel seamless steel tube.

This standard applies to the hot-rolled and cold-drawn (rolling) high-carbon chromium bearing steel seamless steel tube (hereinafter referred to as steel tube) which is used to manufacture the rolling bearing parts and other mechanical parts.

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 standard.

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

GB/T 223.9 Iron steel and alloy - Determination of aluminum content - Chrome-azurol S photometric 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 223.26 Iron, steel and alloy - Determination of molybdenum content - The thiocyanate spectrophotometric method

GB/T 223.29 Iron, steel and alloy - Determination of lead content - Carrier

precipitation-xylenol orange spectrophotometric method

GB/T 223.31 Iron, steel and alloy - Determination of arsenic content - Distillation-molybdenum blue spectrophotometric method

GB/T 223.47 Methods for chemical analysis of iron, steel and alloy - The carrier precipitation-molybdenum blue photometric method for the determination of antimony content

GB/T 223.50 Methods for chemical analysis of iron, steel and alloy - The phenylfluorone-CTMAB direct photometric method for the determination of tin 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 223.71 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 224 Iron, steel and alloy - Determination of sulfur content. Gravimetric method

GB/T 226 Test method for macrostructure and defect of steel by etching

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

GB/T 1979 Standard diagrams for macrostructure and defect of 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 samples and test pieces for mechanical testing

GB/T 4336-2002 Standard test method for spark discharge atomic emission spectrometric analysis of carbon and low-alloy steel (routine method)

GB/T 5777-2008 Seamless steel pipe and tubing methods for ultrasonic testing

steel tubes of the fixed-length. The fixed-length is generally within the range of the normal length. The allowable deviation of length is $^{+10}_{0}$ mm.

4.4 Curvature

The curvature of the steel tube shall not exceed the following provisions:

a) When the wall thickness is S ≤ 15 mm, 1.0 mm/m;

b) When the wall thickness is S > 15 mm, 1.5 mm/m.

4.5 Out-of-roundness and nonuniformity of wall thickness

The out-of-roundness of the steel tube shall not exceed 60% of the tolerance of outer diameter as specified in Table 1. The nonuniformity of wall thickness of the steel tube shall not exceed 80% of the tolerance of wall thickness as specified in Table 1.

4.6 Shape of tip

4.6.1 The end faces of the steel tube shall be perpendicular to the axis of the steel tube. The burrs at the incision shall be removed.

4.6.2 According to the requirements of the purchaser, through negotiation between the supplier and the purchaser, one or both ends of the steel tube may be chamfered. The specific requirements for chamfering are indicated in the contract.

4.7 Delivery weight

Steel tubes are delivered in actual weight.

5 Technical requirements

5.1 Designation and chemical composition of steel

5.1.1 The designation and chemical composition (melting composition) of the steel, the content of residual elements in the steel, the allowable deviation of the finished product's composition shall comply with the requirements for G8Cr15, GCr15, GCr15SiMn, GCr15SiMo, GCr18Mo in Tables 4 ~ 6 of GB/T 18254-2016, respectively.

5.1.2 According to the requirements of the purchaser, the supplier may provide the content of restricted substances such as lead, cadmium, hexavalent chromium, mercury, polybrominated biphenyls, polybrominated diphenyl ethers.

5.5 Macrostructure

The steel tube shall be subjected to acid-leached macrostructure inspection. On the acid-leached test piece of its cross-section, it does not allow white spots, inclusions, underlaying bubbles, cracks, stratification.

5.6 Microstructure

The steel tube shall be subjected to a microstructure inspection. After the spheroidized annealing, the microstructure of the steel tube shall be fine-grained pearlite. The microstructure shall be graded according to the grade 5 chart in Appendix A of GB/T 18254-2016, the qualification grade shall be grade 2 ~ grade 4.

5.7 Carbide inhomogeneity

Steel tubes shall be subjected to carbide inhomogeneity inspection. After the spheroidized annealing of steel tubes, it does not allow severe carbide segregation. Carbide segregation shall be graded according to the grades 6, 8, 9 rating chart in Appendix A of GB/T 18254-2016. The specific grades shall meet the following requirements:

a) For steel tubes which have a wall thickness of not more than 15 mm, the carbide mesh shall be not more than grade 2.5. For steel tubes which have a wall thickness greater than 15 mm, the carbide mesh shall be determined by both parties through negotiation;

b) The carbide ribbon shall be not more than grade 2;

c) The carbide liquefaction shall be not more than grade 0.5.

5.8 Non-metallic inclusions

The steel tube shall be subjected to the inspection of non-metallic inclusions. The qualification grade shall comply with the provisions of 6.8 of GB/T 18254-2016.

5.9 Decarburization layer

5.9.1 The depth of the total decarburization layer on the inner and outer surfaces of the hot-rolled steel tube shall not exceed 0.50 mm.

5.9.2 The depth of the total decarburization layer on the inner and outer surfaces of the cold-drawn (rolled) steel tube shall not exceed 0.20 mm.

5.9.3 For the steel tubes which are delivered in peeled or polished states, it does not allow the outer surface to have a decarburized layer; the decarburized layer on the inner surface shall comply with the provisions of 5.9.1.

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