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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 43105-2023

Seamless steel tubes for hydroformed parts

液压成形件用无缝钢管

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Standardization Administration of the PRC

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1 Scope

China's national standard for the seamless steel tube used in hydroforming. Hydroforming expands a tube inside a closed die using internal water pressure, and it makes structural parts that would otherwise be several stampings welded together - the engine cradle, the roof rail, the instrument panel beam of a car body. The advantages are a closed section, which is far stiffer per unit weight than an open one, and the elimination of flanges and welds. What it demands of the tube is unusual. The material must expand substantially without splitting, so its formability and its uniformity around the circumference matter more than its strength; the wall thickness must be even, because the thinnest point is where it will burst; and the weld, if there is one, is the weak line - which is why seamless tube is specified for the more severe expansions despite costing more.

This document specifies the order content, dimensions, shapes, weight and allowable deviations, technical requirements, test methods, inspection rules, packaging, marking and quality certificate of seamless steel tubes for hydroformed part. This document is applicable to seamless steel tubes (hereinafter referred to as steel tubes) used when manufacturing parts using the hydroforming method. Welded steel tubes for hydroformed part may take this document as a reference in implementation.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document

through the normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

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 223.9 Iron, Steel and Alloy - Determination of Aluminum Content - Chrome Azurol S Photometric 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 223.14 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 223.19 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

GB/T 20125 Low-alloy Steel - Determination of Multi-element Contents - Inductively Coupled Plasma Atomic Emission Spectrometric Method

GB/T 30062 Terminology of Steel Pipes and Tubes

GB/T 38719 Metallic Materials - Tube - Determination of Biaxial Stress-strain Curve of Tube by Hydro-bulging Test YB/T 4149 Continuously Cast Round Billet for Seamless Steel Tube Rolling YB/T 5221 Alloy Structure Steel Round Tube Blank Hot Rolled and Forged for Making Seamless Tube YB/T 5222 Quality Carbon Structural Steel Round Tube Blank

3 Terms and Definitions

The terms and definitions defined in GB/T 30062 are applicable to this document.

4 Designation Expression Method

The designation of steel consists of the abbreviation "HF" for "hydroforming" in English and the specified minimum lower yield strength (the specified plastic extension strength value, expressed in MPa). EXAMPLE: HF340, in which, HF

---the abbreviation for "hydroforming" in English; 340

---the specified minimum lower yield strength (the specified plastic extension strength) value, expressed in (MPa).

5 Order Content

The contract or order of purchasing steel tubes in accordance with this document shall include the following content:

a) Serial No. of this document;

b) Product name;

c) Designation of steel;

d) Dimensions and specifications;

e) Order quantity (total weight or total length); side and the supply-side, and statement in the contract, steel tubes can be delivered by fixed length or multiple lengths. The allowable deviation of the fixed length is 150 mm; the allowable deviation of the full length of multiple lengths is 150 mm, and a margin of 5 mm ~ 10 mm shall be left for each incision of the multiple lengths.

6.3 Curvature The curvature of the steel tubes per meter shall be not greater than

1.0 mm/m; the curvature of the full length shall be not greater than 0.075% of the length of the steel tubes.

6.4 Out-of-roundness and Uneven Wall Thickness

6.4.1 When the steel tubes are delivered by outer diameter and wall thickness, the outer diameter out-of-roundness and wall thickness unevenness shall respectively not exceed 80% of the outer diameter tolerance and wall thickness tolerance.

6.4.2 When the steel tubes are delivered by inner diameter and wall thickness, the inner diameter out-of-roundness and wall thickness unevenness shall respectively not exceed 80% of the inner diameter tolerance and wall thickness tolerance.

6.5 End Shape The end surfaces of both ends of the steel tubes shall be cut flat, and the burrs on the cuts shall be removed.

6.6 Weight

6.6.1 The steel tubes are delivered in accordance with the actual weight or theoretical

weight. The theoretical weight of the steel tubes per meter shall comply with the stipulations of GB/T 17395, and the density of steel is

6.6.2 When the steel tubes are delivered by nominal inner diameter and nominal wall thickness, the calculated outer diameter is used when calculating the theoretical weight; when the steel tubes are delivered by nominal outer diameter and nominal inner diameter, the calculated wall thickness is used when calculating the theoretical weight.