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PEOPLE'S REPUBLIC OF CHINA**

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Welded stainless steel pipes for liquefied natural gas

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009. This standard is proposed by China Iron and Steel Industry Association. This standard is under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC183). The drafting of this standard. Jiangsu Wujin Stainless Co., Ltd., Zhejiang Jiuli Special Technology Co., Ltd., Shanxi TISCO Stainless Steel Steel Pipe Co., Ltd., Zhejiang Geluo Si Seamless Steel Tube Co., Ltd., Metallurgical Industry Information Standards Institute. The main drafters of this standard. Song Jianxin, Chen Liang, Liu Mingzhou, Yue Weiheng, Ji Hai, Lu Fenghui, Yang Yuxian, Dong Li. Stainless steel welded steel for liquefied natural gas

1 Scope

China's national standard for austenitic stainless steel welded pipe used in liquefied natural gas service. It specifies the classification, the ordering information, the dimensions, shape and weight, the technical requirements, the test methods, the inspection rules, and the packaging, marking and quality certificate, and it applies to austenitic stainless steel welded pipe of nominal diameter 219.1 mm to 1219 mm for LNG use. LNG is natural gas cooled to about minus 162 degrees Celsius, at which temperature it is a liquid occupying a six-hundredth of its gaseous volume, and that is what makes shipping it across an ocean possible. It is also what makes the pipework difficult. At cryogenic temperature ordinary carbon steel is brittle: it has passed below the temperature at which its fracture mode changes from tearing to cleaving, and a pipe that would bend at ambient temperature shatters. Austenitic stainless steel does not have that transition. Its face-centred cubic structure stays tough all the way down, which is why it and a small number of nickel steels are the only materials used for LNG piping, and why a pipe standard for this service is a

metallurgical document as much as a dimensional one. The requirements accordingly emphasise the composition, the delivery condition and the weld, since it is the weld and its heat-affected zone that carry the risk: a weld that has picked up ferrite or precipitated carbides in service can behave quite differently from the parent pipe at cryogenic temperature. Issued on 29 August 2016 and in force since 1 July 2017.

This standard specifies the classification, ordering, size, shape and weight of stainless steel welded steel for liquefied natural gas, technical requirements, test Methods, inspection rules, packaging, signs and quality certificates. This standard applies to the nominal diameter of 219.1mm ~ 1219mm liquefied natural gas with austenitic stainless steel welded steel pipe (hereinafter Called steel pipe).

2 Normative reference documents

The following documents are indispensable for the application of this document. For dated references, only the dated edition applies to this article Pieces. For undated references, the latest edition (including all modifications) applies to this document.

GB/T 222 Determination of chemical composition of finished steel Steel and alloys - Determination of chromium content - Visual titration or potentiometric titration Methods for chemical analysis of iron, steel and alloy - The chromotropic acid photometric method for the determination of titanium content GB/T

GB/T 223.25 Methods for chemical analysis of iron, steel and alloy - The dibutyl ketoxime gravimetric method for the determination of nickel content

GB/T 223.28 Methods for chemical analysis of iron, steel and alloy The alpha-benzooxime gravimetric method for the determination of molybdenum content Iron and steel - Determination of niobium content - Chlorosulfonol S spectrophotometric method GB/T 223.40

GB/T 223.58 Methods for chemical analysis of iron, steel and alloy The sodium arsenite - sodium nitrite titration method for the determination of manganese content

GB/T 223.59 Determination of phosphorus content of iron, steel and alloy - Bismuth phosphorus molybdenum blue spectrophotometric method and antimony phosphomolybdenum blue spectrophotometric method

GB/T 223.60 Methods for chemical analysis of iron, steel and alloy - Perchloric acid dehydration gravimetric method for the determination of silicon content Iron and steel - Determination of sulfur content - Dimethyl blue spectrophotometric method GB/T Iron and steel - Determination of total carbon content - Infrared absorption method after induction furnace combustion Metallic materials - Tensile testing - Part 1. Test methods for room temperature GB/T

GB/T 229 Metallic materials Chibi pendulum impact test method Metallic materials -

Rockwell hardness test - Part 1. Test methods Metallic materials - Brinell hardness test - Part 1. Test methods

GB/T 232 bending test method for metallic materials Hydraulic test method for metal pipe

GB/T 241 Method for determination of ferrite content in welds of chrome - nickel austenitic stainless steels GB/T

GB/T 2102 steel pipe acceptance, packaging, signs and quality certificate Test Method for Impact Test of GB/T 2650 Welded Joints

GB/T 2975 steel and steel products mechanical properties test sampling location and sample preparation Metallic melt welding joint radiography Corrosion of metals and alloys - Test method for intergranular corrosion of stainless steels GB/T 4334-2008

GB/T 11170 Determination of multi-element content of stainless steel Spark discharge atomic emission spectrometry (conventional method) Sampling and sample preparation methods for the determination of chemical constituents of steels and iron GB/T

GB/T 20123 Determination of total carbon and sulfur content of steel - High frequency induction furnace after combustion infrared absorption method (conventional method)