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**Nickel Alloy Steel Plates for  
Low Temperature Pressure Vessels**

低温压力容器用镍合金钢板

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# Nickel Alloy Steel Plates for Low Temperature Pressure Vessels

## 1 Scope

This Standard specifies the ordering contents, size, shape, weight and permissible deviation, technical requirements, test methods, inspection rules, package, mark, quality certificate and transportation of nickel alloy steel plates for low temperature pressure vessels.

This Standard is applicable to the nickel alloy steel plates (hereinafter referred to as steel plate) with thickness no greater than 150mm for the liquefied gas storage and transportation device.

## 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 document.

GB/T 222 Method for Determination of Permissible Tolerance of the Chemical Composition of Steel Finished Product

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 223.14 Methods for Chemical Analysis of Iron, Steel and Alloy - The N-Benzoyl-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 232 Metallic Materials - Bend Test

GB/T 247 General rule of package mark and certification for steel plates (sheets) and strips

GB/T 709-2006 Dimension, Shape, Weight and Tolerances for Hot Rolled Sheets and Strip

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

GB/T 4336 Carbon and Low-Alloy Steel - Determination of Multi-Element Contents -Spark Discharge Atomic Emission Spectrometric Method (Routine Method)

GB/T 5313 Steel Plates with through-Thickness Characteristics

GB/T 6803 Test Method for Drop-Weight Test to Determine Nil-Ductility Transition Temperature of Ferritic Steels

GB/T 8170 Rules of Rounding off for Numerical Values & Expression and Judgement of Limiting Values

GB/T 13239 Metallic Materials - Tensile Testing At Low Temperatures

GB/T 17505 Steel and Steel Products General Technical Delivery Requirements

GB/T 20066 Steel and Iron-Sampling and Preparation of Samples for the Determination of Chemical Composition

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 20124 Steel and Iron - Determination of Nitrogen Content - Thermal Conductimetric Method after Fusion in a Current of Inert Gas

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

NB/T 47013.3-2015 Nondestructive Testing of Pressure Equipment Part 3: Ultrasonic Testing

### 3 Ordering Contents

The contract or ordering list purchasing products as per this Standard include the following contents:

no greater than half thickness tolerance of the steel plate; ensure the minimum thickness of the steel plate.

**5.5.3** When the surface of the steel plate has defects, it is allowed to be removed by the grinding method; the grinding position shall be smooth; ensure the minimum thickness of the steel plate.

### 5.6 Ultrasonic test

The steel plate shall be ultrasonically tested one by one; the test method and qualification level shall be determined through the negotiation between the supplier and the purchaser. If they are not clear, they shall conform to the provisions of Level-I in NB/T 47013.3-2015.

### 5.7 Particular requirements

**5.7.1** According to the negotiation between supplier and purchaser, the steel plate can be tested for dropping hammer, low temperature drawing, residual magnetism, thickness direction performance. When taking the dropping hammer and low temperature drawing tests, take two samples per group (totally two groups) from the steel plate with the maximum thickness in each ordering batch.

**5.7.2** According to the negotiation between supplier and purchaser, the steel plate can also be inspected for other items.

## 6 Test Methods

**6.1** The test methods for chemical compositions of steel shall conform to the provisions of GB/T 223.5, GB/T 223.12, GB/T 223.14, GB/T 223.19, GB/T 223.23, GB/T 223.25, GB/T 223.26, GB/T 223.62, GB/T 223.63, GB/T 223.64, GB/T 223.72, GB/T 223.78, GB/T 223.79, GB/T 223.81, GB/T 223.84, GB/T 223.85, GB/T 223.86, GB/T 4336, GB/T 20123, GB/T 20124, GB/T 2015.

**6.2** The inspection items, sampling quantity, sampling method and test methods for each batch of steel plates shall conform to the provisions of Table 3.

**Table 3**

SN	Inspection items	Sampling quantity / piece	Sampling method	Test method
1	Chemical composition (smelting analysis)	1 / furnace	GB/T 20066	See 6.1
2	Tensile test	1 / batch	GB/T 2975	GB/T 228.1
3	Bending test	1 / batch	GB/T 2975	GB/T 232
4	Impact test	3 / batch	GB/T 2975	GB/T 229

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