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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 10476-2024

Specifications for urea high pressure condenser

尿素高压冷凝器技术条件

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10.1 Accompanying Documents

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting is required. This document replaces GB/T 10476-2004 "Technical Specifications for Urea High-Pressure Condensers". Compared with GB/T 10476-2004, except for the structure In addition to adjustments and editorial changes, the main technical changes are as follows:

- a) The scope has been changed (see Chapter 1, Chapter 1 of the.2004 edition);
- b) Deleted the terms and their definitions (see 3.5 of the.2004 edition);
- c) Added symbols (see Chapter 4);
- d) The basic structure of the condenser is added (see 5.2);
- e) Added technical requirements for main components (see 5.3); changed the requirements for the maximum deviation of heat exchange tube dimensions (see 5.3.1.2., 2004

1 Scope

GB/T 10476-2024 is the Chinese specification for the high pressure carbamate condenser of a urea plant, one of the most demanding pressure vessels built anywhere. The service combines high pressure and temperature with ammonium carbamate, which attacks steel so aggressively that the vessel is lined or clad in urea-grade stainless or in duplex or titanium alloys and the corrosion allowance concept does not apply: the liner either holds or the vessel fails. The standard sets the design, the general principles, the basic construction of the condenser and its main components; the materials in detail, the low alloy steel shell, the urea-grade stainless steels and the other corrosion resistant materials with their supplementary requirements; and then the fabrication, the lining and cladding, the welding and the welding procedure qualification, the heat treatment, the non-destructive testing, the pressure and leak testing including the ammonia leak detection behind the liner, the inspection and acceptance, and the marking and documentation. China builds a large share of the world's urea capacity. It takes effect on 1 April 2025.

This document specifies the design, materials, manufacturing, inspection and testing, factory inspection, accompanying documents, Labeling, transportation, packaging and storage. This document is applicable to shell side design pressure not exceeding

1.26 MPa, tube side design pressure not exceeding

16.2 MPa, and design temperature not exceeding 200°C Urea-grade corrosion-resistant ultra-low carbon chromium-nickel-molybdenum (CrNiMo) austenitic stainless steel (hereinafter referred to as "urea-grade stainless steel") lining, Urea high-pressure condenser with cladding structure (hereinafter referred to as "condenser").

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 150 (all parts) Pressure vessels

GB/T 151-2014 Heat exchanger

GB/T 223.5 Determination of acid-soluble silicon and total silicon content of iron and steel - Reduced molybdenum silico-silicic acid spectrophotometric method

GB/T 223.11 Determination of chromium content in steel and alloys Visual titration or potentiometric titration method

GB/T 223.12 Methods for chemical analysis of iron, steel and alloys - Sodium carbonate separation - Diphenylcarbazide photometric method for determination of chromium content

GB/T 223.23 Determination of nickel content in steel and alloys - Dimethylglyoxime spectrophotometric method

GB/T 223.25 Methods for chemical analysis of iron, steel and alloys - Dimethylglyoxime gravimetric method for the determination of nickel content

GB/T 223.26 Determination of molybdenum content in steel and alloys - Thiocyanate spectrophotometric method

GB/T 223.28 Chemical analysis methods for iron, steel and alloys - alpha-benzoin oxime gravimetric method for determination of molybdenum content

GB/T 223.36 Chemical analysis methods for iron, steel and alloys - Separation by distillation - Neutralization titration method for determination of nitrogen content

GB/T 223.37 Determination of nitrogen content in iron, steel and alloys -

Spectrophotometric method using indophenol blue distillation separation

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

GB/T 223.60 Determination of silicon content in steel and alloys by gravimetric method

4.2.2.7

c) of the.2004 edition];

f) The requirements for surface quality, dimensions and dimensional limit deviations of urea grade stainless steel plates have been modified (see 5.3.2.1,.2004 edition). 4.2.2.8.1);
Changed the requirements for ultrasonic testing of tubes and bars (see 5.3.2.2, 4.2.2.8.2 of the.2004 edition);

g) The requirements for head manufacturing have been changed (see 5.3.3, 4.3.2 of the.2004 edition);

h) Added requirements for the surface quality of tube sheet cladding (see 5.3.4.1);

i) Added requirements for corrugated expansion joints (see 5.3.5.3);

j) Added requirements for gas-liquid distributors (see 5.3.6);

k) Added the requirements for buffers for the inlet of ammonium methyllate (see 5.3.7);
Added the requirements for vortex breakers for the outlet of ammonium methyllate (see 5.3.8);

l) Added requirements for supporting grilles (see 5.3.9);

m) Added support requirements (see 5.3.10);

n) Added requirements for nozzle flanges (see 5.3.11);

o) Added requirements for manholes (see 5.3.12);

p) Changed the requirements for the qualified quality grade of the head steel plate ultrasonic testing and the requirements for the grain size grade of the head plate (see 6.2.1,.2004

4.2.1.1 of the.2016 edition); added the requirements for the Charpy pendulum impact test temperature and the impact absorption energy KV2 of the head steel plate Requirements for sampling of head steel plate specimens (see 6.2.1);