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NB

ENERGY INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

NB/T 47007-2018

Replacing NB/T 47007-2010

Air-cooled heat exchangers

空冷式热交换器

Issued on: December 25, 2018 **Implemented on: May 1, 2019**

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Foreword

This document was issued on 25 December 2018 by the National Energy Administration of the PRC and takes effect on 1 May 2019.

It is a NB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

It is classified under ICS 71.120.30, Chinese classification J 75.

It replaces NB/T 47007-2010, which is superseded.

This standard was drafted in accordance with the rules given in GB/T 1.1-2009 Directives for standardization - Part 1: Structure and drafting of standards.

During the revision of this standard, reference was made to ISO 13706:2011 Petroleum, petrochemical and natural gas industries - Air-cooled heat exchangers and to API 661-2013 Petroleum, petrochemical and natural gas industries - Air-cooled heat exchangers.

This standard replaces NB/T 47007-2010 Air-cooled heat exchangers. Compared with NB/T 47007-2010, the main technical changes are as follows.

Part of the terms have been modified and new terms have been added.

Requirements for the heat transfer performance test of a single finned tube have been specified.

Technical requirements for the embedded (inlaid) finned tube have been added.

A method for evaluating the energy efficiency of air-cooled heat exchangers has been added.

This standard was proposed by and is under the jurisdiction of the National Technical Committee on Boilers and Pressure Vessels of Standardization Administration of China (SAC/TC 262).

The chief drafting organizations of this standard are: Shanghai Lanbin Petrochemical Equipment Co., Ltd.; SINOPEC Engineering Incorporation; SINOPEC Guangzhou Engineering Co., Ltd.; Xi'an Jiaotong University; Harbin Air Conditioning Co., Ltd.; Hubei Changjiang Petrochemical Equipment Co., Ltd.; Baoding Hangji Fan Manufacturing Co., Ltd.; Kelvion Thermal Technology (Jiangsu) Co., Ltd.; Shanghai Institute of Special Equipment Inspection and Technical Research; China Special Equipment Inspection and Research Institute; Weihai Klaite Feier Fan Co., Ltd.; Shanghai Hetu Petrochemical Engineering Co., Ltd.

The chief drafters of this standard are: Ma Jun, Han Zhuo, Zhang Yanfeng, Zhang Yingkai, Li Qunsheng, Bai Bofeng, Zhao Liang, Yin Jiying, Zhao Tianbo, Zhou Feng, Han Ruichao, Beng Zhenhai, Wang Chunhui, Chen Zhanyang, Chen Zhiwei, Zhou Wenxue, Zhong Xiaoping, Lu Hongliang and Wang Xin.

The previous editions of the standard replaced by this standard are as follows: NB/T 47007-2010.

1 Scope

NB/T 47007-2018 covers air-cooled heat exchangers, replacing the 2010 edition. An air cooler rejects process heat to the atmosphere across finned tubes instead of to cooling water, which is why refineries, gas plants and petrochemical units in dry regions are built around them. The standard fixes the types and the general arrangement - forced and induced draught, horizontal, inclined and vertical bundles - and names every component of the machine, from the tube bundle and its headers to the plenum, fan ring, drive, structure and louvres. It sets the general provisions on design conditions, design pressure and temperature, and the codes the pressure-retaining parts must satisfy. Design rules follow for the tube bundle: tube and finned tube types and their materials, tube-to-tubesheet joints, plug and cover plate headers and their bolting, tube supports and the allowance for

differential expansion, together with the nozzles and their loads. The air side is treated in its own right - fans and their blades, hubs and drives, motors, belt and gear transmissions, vibration switches, the plenum and the louvres and their control, and the recirculation arrangements used in cold climates. Fabrication, welding and heat treatment, inspection and testing including pressure and leak testing of the bundle, surface preparation and painting, marking, and the requirements for transport and site assembly complete the standard. It applies to air-cooled heat exchangers built in China.

This standard specifies the design, material, fabrication, inspection and acceptance requirements for forced-draught and induced-draught air-cooled heat exchangers (hereinafter referred to as air coolers), as well as the method for evaluating their energy efficiency.

1.1 This standard is applicable to air coolers with a design pressure not higher than 35 MPa.

1.2 The range of design temperature to which this standard applies is determined by the service temperature permitted for the material.

1.3 The following categories of air cooler do not fall within the scope of this standard:

1.3 a) air coolers whose headers are made of aluminium or of other non-ferrous metals;

1.3 b) air coolers for which a dedicated industry standard already exists (such as in the refrigeration and air conditioning industries).

1.4 Boundary of the air cooler.

1.4.1 Tube bundle.

1.4.1 a) the face of the first flange gasket in the connection between the header and the external piping;

1.4.1 b) the first threaded joint in the connection between the header and the external piping.

1.4.2 Structure (supporting frame): the steel structure above the base plate of the structure columns.

1.4.3 Fan: the terminal box of the electric motor and the first connection of the pneumatic control air supply of the fan.

1.4.4 Louver: the first connection of the pneumatic control air supply of the louver.

1.5 For pressure-containing parts of an air cooler whose structural dimensions cannot be determined by this standard, design by one of the following methods is permitted, but it shall be assessed and approved by the National Technical Committee on Boilers and Pressure Vessels:

1.5 a) design by analysis (except for organizations that have already obtained the qualification for design by analysis);

1.5 b) proof hydrostatic test;

1.5 c) comparative empirical design based on a comparable structure that has already been put into service.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 150.1-2011 Pressure vessels - Part 1: General requirements

GB/T 150.2-2011 Pressure vessels - Part 2: Materials

GB/T 150.3-2011 Pressure vessels - Part 3: Design

GB/T 150.4-2011 Pressure vessels - Part 4: Fabrication, inspection and testing, and acceptance

GB/T 151-2014 Heat exchangers

GB/T 28712.6-2012 Types and basic parameters of heat exchangers - Part 6: Air-cooled heat exchangers

GB/T 27698.6-2011 Test methods of performance for heat exchangers and heat transfer elements - Part 6: Finned tubes for air coolers

GB/T 16507.4-2013 Water-tube boilers - Part 4: Strength calculation of pressure parts

GB/T 196 General purpose metric screw threads - Basic dimensions (GB/T 196-2003, ISO 724:1993, MOD)

GB/T 197 General purpose metric screw threads - Tolerances (GB/T 197-2018, ISO 965-1:2013, MOD)

GB/T 230.1 Metallic materials - Rockwell hardness test - Part 1: Test method

GB/T 231.1 Metallic materials - Brinell hardness test - Part 1: Test method (GB/T 231.1-2018, ISO 6506-1:2014, MOD)

GB/T 699 Quality carbon structural steels

GB/T 700 Carbon structural steels (GB/T 700-2006, ISO 630:1995, NEQ)

GB/T 985.1 Recommended joint preparation for gas welding, manual metal arc welding, gas-shielded arc welding and high energy beam welding