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

GB/T 27698.1-2023

Replacing GB/T 27698.1-2011

**Test methods for the performance of heat exchangers and heat
exchange elements - Part 1: General requirements**

热交换器及传热元件性能测试方法 第1部分：通用要求

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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: This document is part 1 of GB/T 27698 "Test Methods for Performance of Heat Exchangers and Heat Transfer Elements": GB/T 27698 has been issued the following sections:

- Part 1: General requirements;
- Part 2: Heat exchangers;
- Part 3: Heat transfer elements;
- Part 4: Determination of air cooler noise: This document replaces GB/T 27698:1-2011 "Test methods for performance of heat exchangers and heat transfer elements - Part 1: General requirements" and GB/T 27698:8-2011 "Performance Test Methods for Heat Exchangers and Heat Transfer Elements Part 8: Industrial Calibration of Heat Exchangers": This document ends with GB/T 27698:1-2011 is the main content, integrating the contents of GB/T 27698:8-2011: Compared with GB/T 27698:1-2011, except knot In addition to structural adjustments and editorial changes, the main technical changes are as follows:
 - a) Added the terms and definitions of "heat exchanger", "heat transfer element", "performance" and "industrial calibration" (see Chapter 3);
 - b) Added pool boiling heat transfer performance test system (see 5:1:4);
 - c) The accuracy requirements for measuring instruments have been changed (see 5:2:1, 4:2:1 and 4:2:2 of GB/T 27698:1-2011);
 - d) Added the regulations on the measurement parameters and original data of the pool boiling heat transfer performance test (see 5:4:4);
 - e) Change the regulations on the calculation of performance test data (see 6:1, Chapter 7

of GB/T 27698:1-2011);

f) Added provisions for data processing of pool boiling heat transfer performance test (see 6:1:4);

g) Changed the provisions for determining the performance of the vapor-liquid condensation performance test (see 6:2:2, 5:3:2 of GB/T 27698:1-2011);

h) Changed the provisions for determining the performance of the vapor-liquid flow boiling and evaporation performance test (see 6:2:3, GB/T 27698:1-2011 5:3:3);

i) Added the provisions for determining the performance of the pool boiling heat transfer performance test (see 6:2:4);

1 Scope

China's national standard for the general requirements governing performance tests on heat exchangers and heat exchange elements. It is Part 1 of GB/T 27698 and establishes the common basis on which every test in the series is carried out: the terms, the quantities measured, the test rig, the instrumentation and its accuracy, the steady-state criteria, the data processing, the treatment of error and uncertainty and the content of the test report. A heat exchanger has no single performance figure. What it transfers depends on the flow rates, the inlet temperatures, the fluids, the fouling of its surfaces and the way it is connected, and any of those can be chosen to flatter the result. Two manufacturers testing the same unit under conditions of their own choosing can both report honestly and differ by a wide margin - which is why a series of test standards begins with a part that fixes what is common to all of them rather than with the tests themselves. The general requirements settle the questions that would otherwise be answered differently in every laboratory: what counts as steady state and how long it must be held, where the temperatures and pressures are measured and to what accuracy, how the flow rates are determined, how the heat balance between the two sides is checked and what discrepancy is acceptable, how the overall heat transfer coefficient and the pressure drop are derived from the measurements, and how the uncertainty of the final figure is estimated and stated. The 2023 edition consolidates the earlier Part 1 and Part 8 into one document. Issued and in force since 23 May 2023, it replaces GB/T 27698.1-2011 and GB/T 27698.8-2011.

This document describes a general method for performance testing of heat exchangers and heat transfer elements, including test systems, measuring instruments, measurement methods, data Processing methods and test report requirements: This document is applicable to test fluids which are liquid-liquid, steam-liquid, steam-air liquid-liquid without phase change, vapor-liquid condensation with phase change, Performance test of phase transition between vapor-liquid boiling and evaporation, and phase transition between vapor-gas condensation:

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to this document: GB/T 151 heat exchanger

GB/T 7724 Electronic Weighing Instrument

GB/T 27418 Evaluation and Expression of Measurement Uncertainty NB/T 47004:

1 Plate heat exchangers Part 1: Removable plate heat exchangers NB/T 47004:

2 Plate heat exchangers Part 2: Welded plate heat exchangers NB/T 47007 Air-cooled heat exchanger NB/T 47045 Braze plate heat exchanger NB/T 47048 spiral plate heat exchanger

3 Terms and Definitions

GB/T 151, GB/T 27418, NB/T 47004:1, NB/T 47004:2, NB/T 47007, NB/T 47045, NB/T 47048 defined and the following terms and definitions apply to this document: 3:1 heat exchanger heatexchanger Equipment that transfers heat from a hot fluid to a cold fluid to meet specified process requirements: 3:2 heat transfer element heatexchangeelement Parts in the heat exchanger that directly participate in heat transfer: 3:3 performance performance The properties and functions of machinery, equipment, objects, etc:

Note: The performance in this document refers to the heat transfer and flow functional characteristics of heat exchangers and heat transfer elements, as well as the noise characteristics of air-cooled heat exchangers: