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

GB/T 10294-2008

Replacing GB/T 10294-1988

**Thermal insulation -- Determination of steady-state thermal
resistance and related properties -- Guarded hot plate
apparatus**

绝热材料稳态热阻及有关特性的测定 防护热板法

(English Translation)

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Foreword

This standard is identical with ISO 8302:1991 "Thermal insulation --- steady and related properties - Guarded hot plate ---" (in English).

This standard replaces GB/T 10294-1988 "steady-state thermal insulation materials and related properties - Guarded hot plate." this standard 10294-1988 major changes compared to GB/T as follows.

- Increased introduction;
- Increases the thermal homogeneous material, an isotropic coefficient of thermal heat transfer body, the average thermal conductivity of the test piece, the test piece, the apparent thermal conductivity of the material Coefficient, steady-state heat transfer properties, room temperature, operators, data users, designers and other means defined;
- Adding a more detailed summary of symbols and units (see 1.4);
- Increase the factors that affect heat transfer properties (see 1.5.1);
- Sums up the device, configuration, and test parameters (see 1.6) are in principle;
- Sums up the limit due to the generating means (see 1.7);
- Induction due to limitations resulting specimens (see 1.8);
- Increased thermocouple for measuring the temperature of 21K ~ 170K, the standard error limits (see 2.1.4.1.4);
- Increasing the measurement error of the thermocouple and its connection forms generated (see 2.1.4.1.2);
- Detailed methods to increase the thickness measurements (see 2.1.4.2);

- Increased the thermocouple connection description (see 2.1.4.1.2);
- Increase in the fluid-cooled metal plate design should pay attention to the problem (see 2.1.2);
- Description flatness measurement of a minimum value of 25 μ m (see 2.4.1);
- The relationship between the measured temperature difference increases (see 3.4.3);
- Measurement report has been refined, such as "to insert a sheet material or the use of water vapor in the sealed bag between the specimen and the panel means test Test, measurement report should be marked in the parameter (see 3.6.14)";
- Inclusion of this standard describes the limit values and device performance test conditions (see Appendix A);
- Based on experience gives the E-type and T-type thermocouples recommendations (special grade) Error limit (see Table B.1);
- Increase the recommended upper temperature limit protection type thermocouple (see Table B.2);
- Conditions lab environment changes, 7.2.2 second paragraph "293 $\pm$ 1K" to "296K $\pm$ 1K";
- Added Appendix NA.

Appendix A of this standard is a normative appendix, Appendix B, Appendix C, Appendix D and Appendix NA informative appendices.

Please note that some of the content of this standard may involve patents, the issuing authority of this standard should not bear the responsibility to identify these patents.

The standard proposed by China Building Materials Industry Association.

This standard by the National Standardization Technical Committee heat insulating material (SAC/TC191) centralized.

0.1 Standard Architecture

This standard is divided into three chapters, describes the use and design of all the information guarded hot plate apparatus need.

1 Overview;

2 devices and error analysis;

3 during the test.

In terms of the test operator for the purpose of Chapter 3 may notice only, but in order to get accurate results, the operator also needs to be familiar with the other two chapters, He

must outline a more profound understanding. Chapter 2 direct means for the designer, but in order to create a good means he wants to focus on its His two chapters. Thus, the standard method will better achieve their goals.

0.2 Properties of Heat Transfer and Measurement

Most of the heat transfer properties of the test is for the low density of the porous material. In this case, the material inside pass real passion to obtain accurate results, this standard only for design and operation of guarded hot plate apparatus made necessary mandatory.

Appendix A lists the limit values of the standard set forth in the performance of the device and test conditions.

The specimen size standard also contains the recommended procedures and practical knowledge, as well as recommendations, which will raise the general level of measurement help to improve inter-laboratory comparison measurement procedures and cooperation.

GB/T 10294-2008/ISO 8302:1991 Determination of steady-state thermal insulation materials and related properties Guarded hot plate

1.1 Scope

This standard specifies the calculation using the guarded hot plate apparatus measures the plate-like specimen steady heat transfer properties and methods of heat transfer properties.

The present method is to measure the heat transfer properties of the absolute law or arbitration law, only need to measure the size, temperature, and electrical power.

The standard test methods in line with the report of the test piece the thermal resistance not less than $0.1 \text{ m}^2 \cdot \text{K/W}$, and a thickness of no more than the requirements of 1.7.4.

Specimen thermal resistance limit can be as low $0.02 \text{ m}^2 \cdot \text{K/W}$, but not necessarily to achieve accuracy 1.5.3 according to the full extent.

If the specimen only to meet the requirements of 1.8.1, the test results indicate the thermal conductivity and thermal transfer coefficients or specimen.

If the specimen meet the requirements of 1.8.2, the test results can be expressed by the average of the test piece can be measured thermal conductivity.

If the specimen meet the requirements of 1.8.3, the test results may indicate an apparent thermal conductivity or thermal conductivity of the material being tested.

1.2 Normative references

The following documents contain provisions which, through reference in this standard and become the standard terms. For dated references, subsequent Amendments (not including errata content) or revisions do not apply to this standard, however, encourage the parties to

the agreement are based on research Whether the latest versions of these documents. For undated reference documents, the latest versions apply to this standard.

ISO 7345. 1987 Adiabatic --- Physical quantities and definitions ISO 9229:1991 --- insulation materials, products and systems --- Vocabulary ISO 9251. 1987 adiabatic heat transfer conditions and material properties --- --- Vocabulary ISO 9288. 1989 radiation heat transfer insulation --- --- Physical quantities and definitions ISO 9346. 1987 MASS insulation --- --- Physical quantities and definitions

1.3 Terms, definitions, symbols and units

ISO 7345 or ISO 9251, and established the following terms and definitions apply to this standard.

Physical symbol Unit Heat flow Φ W Heat flux q W/m² Thermal Resistance 1) R m² · K/W Thermal conductivity Λ W/(m² · K) Thermal conductivity 2) λ W/(m · K) Thermal coefficient γ m · K/W Porosity ξ Local porosity ξ_p

1) In some cases, you may want to consider is the temperature difference between the heat flow in addition, no special symbols to represent the physical, sometimes also called resistance.

2) In most cases, the direction and $q \rightarrow \text{grad}T$ different (λ not determined by a single constant λ , but by the constant matrix). In addition, the specimen inside Position changes, temperature changes and time changes will lead to changes in the thermal conductivity.

Porous body porousmedium Homogeneous body homogeneousmedium Homogeneous porous body homogeneousporousmedium GB/T 10294-2008/ISO 8302:1991