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GB/T 32981-2026

Replacing GB/T 32981-2016

Test method for the effective thermal conductivity of wall materials

墙体材料当量导热系数测定方法

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document supersedes GB/T 32981-2016 "Method for Determination of Equivalent Thermal Conductivity of Wall Materials" and is consistent with GB/T 32981-2016. Compared to previous versions, aside from structural adjustments and editorial changes, the main technical changes are as follows:

a) The scope has been changed (see Chapter 1, Chapter 1 of the.2016 edition);

b) Added terms and definitions for homogeneous wall materials (see 3.2);

c) The terminology and definitions for non-homogeneous wall materials have been changed (see 3.3,

2.2 of the.2016 edition);

d) The requirements for the cold box, control, and data acquisition and processing system in the instrumentation have been changed; the environmental space requirements have been removed; and performance requirements have been added. Requirements that can be checked (see 5.2, 5.6, 5.7; 4.2, 4.6,

4.7 in the.2016 edition);

e) The requirements for filler preparation, sample preparation, measurement methods, and calculation methods in the test procedures have been changed, and environmental conditions have been added. See Chapter 6 (Chapter 5 in the.2016 edition);

f) Increased requirements for test reports (see Chapter 7). Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the China Building Materials Federation. This document is under the jurisdiction of the National Technical Committee on Standardization of Building Materials for Walls, Roofs and Roads (SAC/TC285). This document was drafted by: China National Testing & Inspection Holding Group Xi'an Co., Ltd., and the Fourth Engineering Co., Ltd. of China Railway 25th Bureau Group. China Railway 23rd Bureau Group Fourth Engineering Co., Ltd., Quanzhou Construction Engineering Group Co., Ltd., China National Testing & Inspection Holding Group Shaanxi Co., Ltd. Fujian Lijian Inspection and Testing Group Co., Ltd., Heze Urban Construction Engineering Development Group Co., Ltd., Zhejiang Jinzhou Technology Co., Ltd., Anhui Lange Litong New Materials Application Co., Ltd., Guilin University of Technology, China Nuclear Huachen Construction Engineering Co., Ltd., Anhui Provincial Construction Engineering Quality Supervision and Inspection Center The survey station company, China Railway 24th Bureau Group Shanghai Railway Construction Engineering Co., Ltd., and China Construction Third Bureau Group Co., Ltd. The main drafters of this document are. Gao Weijie, Ruan Zhiyong, Chen Jingyuan, Li Guiqiang, Liu Changshun, Bai Hubin, Zhang Haiyan, Zhang Yujiao, and Qin Qian. Chen Wenbin, Weng Xiangyang, Yu Dejun, Zeng Yonglin, Xie Xiaojun, Jiao Chengcai, Dang Bo, Liu Shuai, Wu Bing, Guan Lin, Guo Shasha, Zheng Tingting, Zhu Tiansheng Jin Kangming, Wang Pan, Liang Haibo, Hu Xin, Zhang Jian, Wang Shenxue, Bian Aihong, Wang Wengai, Zhao Feng, Jiang Bin, Xu Jingan, Yuan Zhiqiang. This document was first published in.2016 as GB/T 32981-2016, and this is the first revision. Method for determining the equivalent thermal conductivity of wall materials

1.Scope This document specifies the principle, measuring device, test procedure, and test report content for determining the equivalent thermal conductivity of wall materials. This standard applies to the determination of the equivalent thermal conductivity of wall materials.

4.Principles This method is based on the principle of steady-state heat transfer. A filler with a known thermal conductivity, a specimen placed within the filler, and a measuring instrument are installed in a cold chamber. Between the measuring chambers, the temperatures of the cold chamber and the measuring chamber are controlled to maintain thermal conductivity balance. Under the same operating conditions, the heat passing through the filler and the specimen is measured separately. The equivalent thermal conductivity lambdae of the specimen was calculated based on the flow rate and the changes in temperature and power.

5 Measuring apparatus

5.1 Device Structure The measuring device consists of five parts. a cold box, a protective hot box, a metrology chamber, a specimen frame, and a control and data acquisition and processing system. The overall structure is shown in [reference needed]. Figure

1.The specimen is installed between the metrology chamber and the cold chamber, and the specimen frame is connected to the metrology chamber. A heating device and a refrigeration unit are installed in the cold chamber to simulate... Simulate constant cold chamber experimental conditions. Place a protective heat chamber outside the metrology chamber to reduce temperature loss from the metrology chamber (the temperature setpoint of the protective chamber should be similar to that of the metrology chamber). (The temperature setting of the measuring chamber is the same). A temperature sensor is placed inside the chamber to monitor the measurement process.

5.2 Cold Box

5.2.1 The internal space of the cold box should be large enough to accommodate refrigeration, heating and airflow organization equipment.

5.2.2 Adjust the air velocity parallel to the specimen surface using a deflector. The airflow direction should be the same as the natural convection direction, and the airflow velocity should be adjustable. The wind speed should be between

0.1 m/s and 10 m/s.

5.3 Protective Heat Box

5.3.1 The protective heat box shall be composed of homogeneous materials and shall have good sealing performance, with a thermal resistance of not less than

5.3.2 The protective heat box is placed outside the metering box, completely enclosing it. The distance between the inner surface of the protective heat box and the outer surface of the metering box is not less than [amount missing]. 150mm.

5.3.3 The temperature control system in the protective heat chamber is used to balance the temperature changes between the metering chamber and the protective heat chamber, thereby reducing heat loss in the metering chamber. Loss, in order to achieve a stable experimental state.

5.4 Metering box The metering box is made of thermal insulation material and is required to be structurally free of cold bridges and have good sealing performance, with a thermal resistance of not less than

3.5 m2·K/W. The space should be able to accommodate the heating device and the flow guiding device.

5.5 Specimen Frame The specimen frame is a device for mounting specimens. The opening size of the specimen frame is 500mm x 500mm, and the maximum thickness of the specimen mounted in the specimen frame is [not specified]. It is 400mm.

5.6 Control and Data Acquisition and Processing System

5.6.1 Cold Box Temperature Control System It consists of a cold box refrigeration compressor, a cold box temperature balancing electric heater, temperature control instruments, and temperature sensors. The temperature sensors measure... The uncertainty should not exceed 0.25K, and the quantity should be at least 5 pieces. At least two measurement points should be located in the gap between the flow guide and the specimen, and they should be horizontal. Setup. The cold box temperature setting range is -20°C to -10°C.

5.6.2 Temperature control system for the protective thermal chamber It consists of a protective heat chamber refrigeration compressor, a protective heat chamber temperature balancing electric heater, temperature control instruments, and temperature sensors. The measurement uncertainty of the instrument is no greater than 0.25K. Measurement points are located on the outer surface of the measuring chamber, with at least one measurement point on each surface. Heat protection is provided. The chamber temperature setting range is 20°C~30°C.

5.6.3 Metering Box Temperature Control System It consists of an electric heater, a temperature control instrument, and a temperature sensor. The heating power meter has an accuracy class of no less than 0.5.The temperature sensor... The measurement uncertainty is no greater than

0.25 K. Measurement points are located on the inner wall surface of the metrology chamber, with at least one measurement point on each wall surface. Metering chamber temperature. The set value is consistent with the temperature set value of the protective heat box.

5.6.4 Data Acquisition and Processing System It consists of a computer and data acquisition instruments. The data acquisition instruments can be used in conjunction with temperature control instruments or independently. It is used for data... The temperature sensors used for data acquisition should not be digital temperature sensors; thermocouples or platinum resistance thermometers should be selected according to different temperature measurement scenarios. Control software. The temperature changes at various measuring points can be displayed in real time by observing the temperature changes within the reaction chamber.

5.7 Performance Check Before the measuring device is put into use, at least two items with different thermal conductivity and stable thermal properties should be tested and calibrated in a nationally accredited laboratory. Materials must be tested, and only those with consistent results can be used. In subsequent use, the testing device should be checked periodically using the same method.