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Mineral Wool Decorating and Acoustic Ceilings

矿物棉装饰吸声板

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Foreword

This standard is drafted in accordance with the regulations of GB/T 1.1- 2009.

This standard is not equivalent to JIS A 6301-2007 "Sound-absorbing Materials" on the contents of rock wool decorating and acoustic ceilings.

Please note that some contents of this standard may involve patents; the issuing organization of this standard shall not undertake the responsibility of identifying these patents.

This standard was proposed by the China Building Materials Federation.

This standard shall be under the jurisdiction of the National Technical Committee on Insulation Materials of Standardization Administration of China (SAC/TC 191).

Responsible drafting organizations of this standard: Nanjing Fiberglass R&D Institute, Beijing New Building Materials Public Limited Company, Beiyang Building Materials Co., Ltd., Star-USG Building Materials Company, Ltd., Shanghai A'musizhuang Building Products Co., Ltd.

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Mineral Wool Decorating and Acoustic Ceilings

1 Scope

This standard specifies the classification and marking, requirements, test methods, inspection rules, marks and labels, packaging, transportation and storage of mineral wool decorating and acoustic ceilings (hereinafter referred to as "acoustic ceilings").

This standard is applicable to the mineral wool decorating and acoustic ceilings produced by the wet-process method or dry-process method.

2 Normative References

The following documents are indispensable for the application of this standard. For dated references, only the dated edition is applicable to this document. For undated references, the latest editions of the normative documents (including all the amendments) are applicable to this document.

GB/T 191 Packaging - Pictorial Marking for Handling of Goods

GB/T 3947 Acoustical Terminology

GB/T 4132 Definitions of Terms Relating to Thermal Insulating Materials

GB/T 5480 Test Methods for Mineral Wool and its Products

GB 6566 Limit of Radionuclides in Building Materials

GB 8624-1997 Classification for Burning Behavior of Building Materials and Products

GB/T 10294 Thermal Insulation - Determination of Steady-state Thermal Resistance and Related Properties - Guarded Hot Plate Apparatus

GB/T 10295 Thermal Insulation-Determination of Steady-state Thermal Resistance and Related Properties - Heat Flow Meter Apparatus

GB/T 17657-1999 Test Methods of Evaluating the Properties of Wood-based Panels and Surface Decorated Wood-based Panels

GB 18580 Indoor Decorating and Refurbishing Materials - Limit of Formaldehyde Emission of Woodbased Panels and Finishing Products

GB/T 18696.1 Acoustics - Determination of sound absorption coefficient and impedance in impedance tubes - Part 1: Method using standing wave ratio

GB/T 18696.2 Acoustics - Determination of sound absorption coefficient and impedance in impedance tubes - Part 2: Transfer function method

GB/T 20247 Acoustics - Measurement of sound absorption in a reverberation room

GB/T 20313 Hygrothermal performance of building materials and products - Determination of moisture content by drying at elevated temperature

HJ/T 206 Technical requirement for environmental labeling products - Asbestos free building materials

3 Terms and Definitions

For the purposes of this document, the terms and definitions in GB/T 3947 and GB/T 4132 AND the following ones apply.

3.1

Mineral wool decorating and acoustic ceilings

The decorating and acoustic ceilings materials that use mineral wool, rock wool and glass wool as the major raw materials through wet-process or dry-process method.

3.2

Wet-process ceilings

The mineral wool decorating and acoustic ceilings that are made by the wet-process method such as slurring, forming, drying and post-processing.

3.3

Dry-process ceilings

The mineral wool decorating and acoustic ceilings that are made of mineral (rock) wool ceilings or glass wool ceilings as the base materials.

3.4

Nominal size

It is a general term of the size of product specification.

3.5

Actual size

Table 5

Type		Noise reduction coefficient (NRC)	
		Reverberant room method (rigid wall)	Impedance pipe method (rear-cavity: 50mm)
Wet-process ceilings	Knurling	≥0.50	≥0.25
	Others	≥0.30	≥0.15
Dry-process ceilings		≥0.60	≥0.30

5.8 Damping deflection

The damping deflection of wet-process ceilings shall not be greater than 3.5mm while the damping deflection of dry-process ceilings shall not be greater than 1.0mm.

5.9 Radionuclide limit

It shall reach the requirements of Category A finishing materials specified in GB 6566, namely the internal exposure index I_{Ra} shall not be greater than 1.0 and the external exposure index I_r shall not be greater than 1.3.

5.10 Formaldehyde emission

It shall reach the requirements of Grade E₁ specified in GB 18580, namely the formaldehyde emission shall not be greater than 1.5 mg/L.

5.11 Asbestos phase

There shall be no asbestos fiber in acoustic ceilings.

6 Test Methods

6.1 Appearance, size and volume density

In accordance with Appendix A.

6.2 Right angle deviation

In accordance with Appendix B.

6.3 Mass moisture percentage

It shall be in accordance with GB/T 20313. The specimen shall be cut according to the requirements of GB 5480; the size shall be 150 mm×150, the thickness shall be the product thickness, specimen quantity is 3, and the drying temperature is (105±5)°C.

6.4 Bending failure load

In accordance with Appendix C.

6.5 Thermal resistance

The thermal resistance shall be tested according to the requirements of GB/T 10294 or GB/T 10295; the arbitration test method is specified in GB/T 10294. Test thickness of thermal resistance shall be the measured thickness of the specimen.

6.6 Combustion performance

In accordance with the requirements of GB 8624-1997.

6.7 Noise reduction coefficient

In accordance with GB/T 18696.1, GB/T 18696.2 or GB/T 20247.

6.8 Damping deflection

In accordance with Appendix D. The test temperature is $(40\pm 2)^{\circ}\text{C}$, the relative test humidity is the marked RH value of the product and shall not be less than RH 70, and the precision is $\pm 3\%$; as for the products for which the RH values are not marked, the test temperature is $(40\pm 2)^{\circ}\text{C}$ and relative humidity is $(70\pm 3)\%$.

6.9 Radionuclide limit

In accordance with GB 6566.

6.10 Formaldehyde emission

It shall be carried out in accordance with the 9 ~ 11L dryer method specified in 4.12 of GB/T 17657-1999.

6.11 Asbestos phase

In accordance with HJ/T 206.

7 Inspection Rules

7.1 Exit-factory inspection

Exit-factory inspection refers to each test that must be carried out when the product is delivered. The inspection items include: appearance, size, volume density, right angle deviation, mass moisture percentage and bending failure load.

7.2 Type inspection

The type inspection refers to all inspection on the technical requirements specified in the standard to assess the product quality.

7.2.1 The type inspection shall be carried out under one of the following conditions:

- a) The trial manufacture and type identification of new products or old products produced by new plant;
- b) After formal production, there is major change on the raw materials and production process which may affect the product performance;
- c) Type inspection is carried out at least once every year on regular production;
- d) When the production resumes after the production halts for 6 months;
- e) Significant difference exists between exit-factory inspection results and the last type inspection results;
- f) When the state quality supervision agency requires carrying out type inspection.

7.2.2 The inspection items of type inspection are all the items specified in Chapter 5.

7.3 Group-batching

The products with the same raw materials, same production process, same variety and stable continuous production shall be deemed as one inspection batch.

An inspection batch is composed of one or more uniform delivery batches. The inspection batch shall not be greater than the productive capacity over one week.

7.4 Sampling

7.4.1 Sampling

Unit-product shall be randomly taken from the inspection batch; the sample may be composed of one or more unit products. All unit-products are deemed as the same in mass; the essential specimen may be taken from the unit-products.

7.4.2 Sampling scheme

Secondary sampling scheme for batch size and sample size of type inspection and routine inspection is detailed in Table 6.

defect number in the first sample is greater than or equal to the first rejection number Re (Column IV in Table 7), this batch will be judged as unqualified.

If the defect number of relevant performance in the first sample is between the acceptance number Ac and the rejection number Re of the first sample, the sample number shall be increased to the gross sample number and the gross sample inspection results shall be adopted to judge.

If the defect number of relevant performance in the gross sample is less than or equal to the acceptance number Ac (Column V in Table 7) of the gross sample, the counting inspection of this batch may be received. If the defect number in the gross sample is greater than or equal to the rejection number Re of the gross sample (Column VI in Table 7), this batch will be judged as unqualified.

7.5.3 Combustion performance, radionuclide limit, formaldehyde emission, asbestos phase and other performances shall be judged according to the determination values; if the determination values of the first sample are qualified, this batch of products will be judged qualified in terms of the single item for the above-mentioned performance; otherwise, unqualified.

7.5.4 Mass moisture percentage, bending failure load, thermal resistance, noise reduction coefficient, damping deflection and other performances shall be judged according to the average determination values; if the determination values of the first sample are qualified, this batch of products will be judged qualified in terms of the single item for the above-mentioned performance. If the determination values of the first sample are not qualified, the second sample shall be measured and the average determination value of both the samples shall be regarded as the judgment for whether the single item for each batch is qualified or not.

7.5.5 Integrative judgment rule for batch quality is: all the quality index for qualified batch shall simultaneously meet the acceptance qualification requirements as specified in 7.5.2, 7.5.3 and 7.5.4, otherwise this batch of products is not qualified.

8 Marks and Labels

8.1 Marks

The packing box shall be clearly indicated with the manufacturer's name, trademark, product marks, production date, quantity or area on the prominent positions. According to the requirements of GB/T 191, it shall also be marked with such words or icons as "Do not roll" and "Rainproof".

8.2 Labels

The labels shall be indicated with the manufacturer's name, trademark, product marks, production date as well as the inspector' signature and seal.

Appendix A

(Normative)

Appearance, Size and Volume Density's Test Method

A.1 Device

A.1.1 Measuring tools: precision shall not be less than 0.1 mm.

A.1.2 Bench scale: division value shall not be greater than 1% of the measured mass.

A.2 Procedures

A.2.1 Appearance quality inspection

Samples shall be visually inspected one by one with 1 m away from sample under the bright sunshine conditions and the observed defects shall be recorded.

A.2.2 Size determination

A.2.2.1 Length and width

The length and width shall be measured with three values, of which two are determined 20mm from the edge and one is determined at the center line. The measuring positions are shown by the dotted line in Figure A.1. Arithmetic average of the three measured values shall be adopted to represent the length and width of the specimen.

A.2.2.2 Thickness

Measuring points for thickness shall be kept clear from prominently convex areas. Four points shall be measured in total and the positions are shown by the dots in Figure A.1. Average value of the four measured values shall be adopted to represent the specimen thickness. Products with veneer shall be included with veneer thickness.

Note: the measuring basis for the length, width and thickness of different types of acoustic ceilings may be determined with reference to the marking method of product size in Appendix E.

dimension is: width 40 mm; thickness 10 mm; span $L = 150$ mm and the loading device shall ensure that the specimens suffer the uniform load along the whole width.

- b) Mechanism exerting pressure on the specimen.
- c) Device recording or indicating specimen load values. There shall be no inertia for the device at specified test speed and the load value error shall not be greater than 1%.

C.2.2 Suitable cutting tools, such as knife and saw.

C.3 Specimen

Six samples in the size of 150 mm×200 mm and allowable deviation ± 1 mm shall be tailored with cutting tools; take three specimens along the vertical and horizontal directions of sample.

C.4 Test conditions

Unless there are other special conditions, tests shall be carried out under the laboratory conditions where the temperature is $(23\pm 5)^{\circ}\text{C}$ and the relative humidity is $(50\pm 10)\%$.

C.5 Procedures

C.5.1 Place the well-tailored specimens in the drying oven with temperature of $(105\pm 5)^{\circ}\text{C}$ for (120 ± 5) min.

C.5.2 The specimen thickness shall be measured according to the requirements of Appendix A.

C.5.3 Adjust the positions of span and upper pressure head for loading to make sure the distance between two support centers is $150 \text{ mm} \pm 0.5 \text{ mm}$; the upper pressure head for loading shall be positioned in the middle of the supports and the upper pressure head shall be in parallel with the two supports.

C.5.4 Lay the brace table on the support, the specimen on the brace table; the finishing coats shall be symmetrically positioned downward and the specimen length direction shall be vertical to the support and the upper pressure head for loading.

C.5.5 Adjust rate of loading to be (50 ± 2) mm/min.

C.5.6 Exert load to the specimen till failure; record the load of failure; if the deflection is equal to 1.5 times of the specimen thickness and the specimen is still undestroyed, the load under such deflection shall be recorded and this value shall be regarded as the bending failure load.

C.5.7 Repeat the procedures in C.5.4~C.5.6 till six effective determination values

Appendix D

(Normative)

Damping Deflection Test Method

D.1 Device

D.1.1 Damping deflection determinator: the precision shall not be less than 0.1 mm.

D.1.2 Temperature and humidity regulator: the temperature fluctuation is $\pm 2^{\circ}\text{C}$ and the humidity fluctuation is $\pm 3\%$.

D.2 Specimen

Specimen size is 500 mm \times 250 mm and the thickness is the product thickness. Three specimens shall be taken. The product pattern trend is the sample length direction.

D.3 Procedures

Place the specimen on the plane, regulate the specimen for 4h under the laboratory environment where the temperature is $(20\pm 15)^{\circ}\text{C}$ and the relative humidity is less than or equal to 70%, turn the finishing coat of the specimen downward, suspend the specimen on the test stand support of the damping deflection determinator (the distance of support centers is 480mm), measure at the specimen center with special measuring head and record the initial value H_1 . The tests shall be carried out under corresponding test conditions according to different product types for 24h. Then regulate the specimen for 24h under the laboratory environment where the temperature is $(23\pm 5)^{\circ}\text{C}$ and the relative humidity is $(50\pm 10)\%$, measure at the damp specimen center with special measuring head, record the value and regard it as the post-test value H_2 . Damping deflection shall be calculated according to Formula (D.1).

$$\delta = H_1 - H_2 \dots\dots\dots (D.1)$$

Where,

δ — Damping deflection, in mm;

H_1 — The initial height at the center of specimen before the test, in mm;

H_2 — The height at the center of specimen after the test, in mm.

The average value of three specimens shall be taken as the result.

In the arbitration test, the temperature fluctuation in the test conditions shall not exceed $\pm 1^{\circ}\text{C}$ and the humidity fluctuation shall not exceed $\pm 2\%$.

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