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Textiles - Testing and evaluation of sound absorption property

纺织品 吸音性能的检测和评价

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Standardization Administration Committee.

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard was proposed by China Textile Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee on Textiles of Standardization Administration of China (SAC/TC 209).

The drafting organization of this Standard: Guangzhou Fiber Products Testing and Research Institute.

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Textiles - Testing and evaluation of sound absorption property

1 Scope

This Standard specifies the testing method and evaluation for sound absorption property of textiles.

This Standard applies to textiles and their products, irrespective of material.

2 Normative references

The following referenced 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 6529, *Textiles - Standard atmospheres for conditioning and testing*

GB/T 8170, *Rules of rounding off for numerical values & expression and judgement of limiting values*

JJG 176, *Verification Regulation of Sound Calibrators*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 sound absorption property

a performance of sound energy decay when sound waves go through a certain medium or incident surface of some medium, generally characterized by sound absorption coefficient

3.2 random noise

sound oscillation of which the instantaneous values can not be pre-determined; the distribution of the instantaneous value of random noise to time is only subject to a certain statistical distribution

[GB/T 3947-1996, Definition 2.12]

3.3 sound pressure; p

the difference between medium pressure and static pressure when there is sound wave

NOTE: The unit is Pascal (Pa).

[GB/T 3947-1996, Definition 2.21]

3.4 plane wave

vertical plane wave of which the wave front is parallel to the spread direction

[GB/T 3947-1996, Definition 4.5]

3.5 sound absorption coefficient at normal incidence; α

the ratio of normal incidence plane wave into specimen power to incident sound power

[GB/T 18696.2-2002, Definition 3.1]

4 Principle

Mount the specimen on one end of the impedance tube and the other end is a random noise source. The resulting plane wave is incident perpendicularly to the surface of the specimen. Measure the sound pressure by using two microphones on a fixed position. Calculate the sound absorption coefficient at normal incidence of the specimen based on the sound transfer function. The sound absorption performance of the sample shall be characterized by sound absorption coefficient.

NOTE: See Annex A for calculation principle of sound absorption coefficient.

5 Equipment

5.1 Equipment composition

The testing equipment for sound absorption property consists of signal generator, power amplifier, speaker, impedance tube, specimen tube, microphone, frequency analyzer, sound calibrator. The schematic diagram of testing device is shown in Figure 1.

Connect the test device as shown in Figure 1. Select the diameter of the test impedance tube according to the test frequency range. Boot up for at least 10 min. The total sound pressure level of the microphone position shall be between 90dB ~ 110dB.

8.2 Microphone calibration

Turn on the sound calibrator power switch. Select Channel 1. Insert the corresponding No. 1 microphone into the sound calibrator for calibration. When the number of inputs in the input signal prompt is the same as the set calibration signal, the calibration of No. 1 microphone shall be completed. Follow the steps above to complete the calibrations for other microphones.

8.3 Specimen installation

Install the specimen in the test tube. Slowly push the metal rod of the sleeve to make the surface of the sound of the specimen flush with the contact face. It shall ensure that the specimen is fully filled into the cavity of the test tube. In order to prevent the sound leakage, the gap around the specimen shall be blocked with Vaseline and other grease. If necessary, double-sided tape can be used to firmly adhere the specimen to the back plate of the resistance tube to prevent vibration or excess air. For test specimens that require an air layer thickness, the metal rods of the sleeve shall be drawn to the desired air layer thickness.

8.4 Correction of microphone mismatch

Using the exchange channel to repeat the measurement to complete the microphone mismatch correction. Insert the microphone connected to Channel 1 into the slot near the speaker. Insert the microphone connected to Channel 2 into the slot near the specimen. Click the button to start the measurement. After the commissioning is passed, switch the position of the two microphones, that is, the microphone connected to the Channel 1 is inserted in the slot near the specimen, and the microphone connected to the Channel 2 is inserted in the slot near the speaker. Click the button to start the measurement, then the microphone mismatch correction shall be completed.

8.5 Sound absorption coefficient test

After the mismatch correction of the microphone is completed, the two microphones shall be returned to the initial position, and the sound absorption coefficient test shall be carried out. The sound absorption coefficient shall be recorded according to the different frequencies. Similarly, according to steps 8.3 ~ 8.5 to complete the remaining two groups of specimens of the sound absorption coefficient test.

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