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

GB/T 21228.2-2023

**Acoustics - Sound-scattering properties of surfaces - Part 2:
Measurement of the directional diffusion coefficient in a free
field**

声学 表面声散射特性 第2部分：自由场方向性扩散系数测量

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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 2 of GB/T 21228 "Sound Scattering Characteristics of Acoustic Surfaces": GB/T 21228 has issued the following parts:

--- Part 1: Measurement of scattering coefficient of random incident sound in reverberation chamber;

--- Part 2: Free field directional diffusion coefficient measurement: This document is equivalent to ISO 17497-2:2012 "Acoustic Surface Sound Scattering Properties Part 2: Free Field Directional Diffusion Coefficient Measurement": The following minimal editorial changes have been made to this document:

---Changed the index number description 5 in Figure 1, and changed the "receiver" in ISO 17497-2:2012 to "receiving point trajectory (arc or sphere)", to make the explanation clearer: Please note that some contents of this document may refer to patents: The issuing agency of this document assumes no responsibility for identifying patents: This document was proposed by the Chinese Academy of Sciences: This document is under the jurisdiction of the National Acoustic Standardization Technical Committee (SAC/TC17): This document was drafted by: Institute of Acoustics, Chinese Academy of Sciences, Tongji University, Hangzhou Aihua Intelligent Technology Co., Ltd., Chongqing University, Zhengzhou Hongsen Energy Saving Technology Co., Ltd., Southeast University, China Academy of Building Research Co., Ltd., Nanjing University, Qingdao University of Technology: The main drafters of this document: Lu Yadong, Li Xiaodong, Cheng Xiaobin, Mo Fangshuo, Xiong Wenbo, Jiang Guorong, Yu Wuzhou, Xie Hui, Zhang Jianxun, Fu Xiuzhang, Tan Hua, Tao Jiancheng, Xu Xin, Yin Cho, Liu Bilong:

The degree of surface sound scattering is very important in various occasions of room acoustics (such as: concert halls, recording studios, workshops and reverberation rooms, etc.): indoor The degree of scattering and absorption is an important factor affecting the sound quality of the room: This document deals with the measurement and characterization of scattering surfaces: GB/T 21228 is proposed to be divided into the following parts:

--- Part 1: Reverberation chamber random incident sound scattering coefficient measurement: The purpose is to describe the force from the surface caused by the surface roughness The degree to which the acoustic reflection deviates from the specular reflection:

--- Part 2: Free field directional diffusion coefficient measurement: The aim is to describe the space of surface acoustic scattering that characterizes the quality of diffuse surfaces: distribution characteristics: The random incident sound scattering coefficient introduced in Part 1 of GB/T 21228 is different from the directional diffusion coefficient described in this document The former describes the degree of sound scattering, and the latter describes the directional uniformity of sound scattering: The two are related, and they have different applications: use the occasion: Acoustic Surface Sound Scattering Properties Part 2: Free-field directional diffusion coefficient measurement

1 Scope

GB/T 21228.2-2023 is Part 2 of the Chinese series on the sound scattering properties of surfaces, and measures the directional diffusion coefficient in a free field. Diffusers are the acoustic treatment that scatters sound rather than absorbing it, which is what a concert hall, a studio or a recording room needs when it must stay live but must not have flutter echo; the property that describes how uniformly a surface scatters is not the same as the scattering coefficient of Part 1, and it is measured differently - by mapping the polar response of the reflection in an anechoic environment. The standard sets the measurement principle, the frequency range, the measurement arrangement covering the environment, the measurement area and the specimen, the test method with the test signal, the source and receiving equipment, the measurement and the processing of the polar responses, and the expression of the directional diffusion coefficient and its normalised form. It took effect on 1 December 2023.

This document describes a method for measuring the directional diffusion coefficient of a surface: The diffusion coefficient describes the uniformity of the directional distribution of the surface reflected sound, and is an index to measure the scattering characteristics of the surface sound: The user accounts for the sound diffusing properties of surfaces and also provides information for developers and users of predictive room acoustics models: However, the diffusion coefficient is not Suitable directly as an input to the current diffusion algorithm in the geometric-acoustic model of the room: This document also details methods for characterizing the sound diffusion properties of surfaces in a free field:

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:

Note: Commonly used frequencies in

GB/T 3240-1982 acoustic measurement (neq ISO 266:1975)

IEC 61260 Electroacoustic octave and fractional octave filters
(Electroacoustics-Octave-bandandfractional-

GB/T 3241-2010 Electroacoustic octave and fractional octave filters (IEC 61260:1995, MOD)

3 Terms and Definitions

The following terms and definitions apply to this document: 3:1 sound ray soundray A line originating from the point of sound source that traces a possible direction of sound propagation: 3:

2 Specular reflection specular reflection Reflection that obeys Snel's law (that is, the angle of reflection equals the angle of incidence): NOTE: Specular reflection can be approximated by a rigid plane much larger than the wavelength of the incident sound: 3:

3 Specular reflection area specularzone The area enclosed by the sound rays from the virtual sound source (i:e: the specific reference plane and the sound rays around the edge of the reference plane and the receiving point arc or the area formed by the sphere):

Note 1: The reference plane is a rigid plane with the same projected shape or footprint as the surface of the test piece:

Note 2: The position where the sound rays from the virtual sound source to the receiving point pass through the diffuser is the specular reflection point (see Figure 1):