
**Acoustics — Sound-scattering properties
of surfaces —**

**Part 2:
Measurement of the directional diffusion
coefficient in a free field**

Acoustique — Propriétés de dispersion du son par les surfaces —

Partie 2: Mesurage du coefficient de diffusion directionnel en champ libre



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17497-2 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

ISO 17497 consists of the following parts, under the general title *Acoustics — Sound-scattering properties of surfaces*:

- *Part 1: Measurement of the random-incidence scattering coefficient in a reverberation room*
- *Part 2: Measurement of the directional diffusion coefficient in a free field*

Introduction

The degree of acoustic scattering from surfaces is very important in all aspects of room acoustics, e.g. in concert halls, sound studios, industrial halls and reverberation chambers. The degree of scattering and absorption in a room are important factors related to the acoustic quality of the room. This part of ISO 17497 addresses the measurement and characterization of scattering surfaces.

The scattering coefficient is introduced in ISO 17487-1. In this part of ISO 17487, a measurement method for the directional diffusion coefficient is introduced. The diffusion coefficient is different from, but related to, the random incidence scattering coefficient. While the scattering coefficient is a rough measure that describes the degree of scattered sound, the diffusion coefficient describes the directional uniformity of the scattering, i.e. the quality of the diffusing surface. Consequently, there is a need for both concepts, and they have different applications.

The work has been coordinated with the working group of the Audio Engineering Society, AES SC-04-02 for the Characterization of Acoustical Materials.

Acoustics — Sound-scattering properties of surfaces —

Part 2:

Measurement of the directional diffusion coefficient in a free field

1 Scope

This part of ISO 17497 specifies a method of measuring the directional diffusion coefficient of surfaces.

The diffusion coefficient characterizes the sound reflected from a surface in terms of the uniformity of the reflected polar distribution. The diffusion coefficient is a measure of quality designed to inform producers and users of surfaces that, either deliberately or accidentally, diffuse sound. It can also inform developers and users of geometric room acoustic models. The diffusion coefficient is not suitable for direct use as an input to current diffusion algorithms in geometric room acoustic models.

This part of ISO 17497 details a free-field characterization method.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 266, *Acoustics — Preferred frequencies*

IEC 61260, *Electroacoustics — Octave-band and fractional-octave-band filters*

3 Terms and definitions

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

3.1

sound ray

line following one possible direction of sound propagation from a source point

3.2

specular reflection

reflection that obeys Snell's law, i.e. the angle of reflection is equal to the angle of incidence

Note 1 to entry Specular reflection can be obtained approximately from a plane, rigid surface with dimensions much larger than the wavelength of the incident sound.

3.3

specular zone

area contained by imaginary lines that are constructed from the image source, which is created about the plane of a specified reference flat surface via the edges of that surface to the receiver arc or hemisphere

Note 1 to entry The reference flat surface is a plane and rigid surface, with the same projected shape or footprint as the test surface.

Note 2 to entry The position at which an imaginary line from the image source to a receiver crosses the diffuser is the specular reflection point (see Figure 1).