
International Standard



354

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Acoustics — Measurement of sound absorption in a reverberation room

Acoustique — Mesurage de l'absorption acoustique en salle réverbérante

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 354 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

It cancels and replaces ISO Recommendation R 354-1963, of which it constitutes a technical revision.

Acoustics — Measurement of sound absorption in a reverberation room

0 Introduction

When a sound source operates in an enclosed space, the level to which reverberant sound builds up, and the subsequent decay of reverberant sound when the source is stopped, are governed by the sound-absorbing characteristics of the boundary surfaces and objects within the space. In general, the fraction of the incident sound power absorbed at a surface depends upon the angle of incidence. In order to relate the reverberation time of an auditorium, office, workshop, etc. to the noise reduction that would be effected by an absorbing treatment, a knowledge of the sound-absorbing characteristics of the surfaces, usually in the form of a suitable average over all angles of incidence, is required. Since the distribution of sound waves in typical enclosures includes a wide and largely unpredictable range of angles, it is convenient, for the purposes of standardization, to take a uniform distribution as the basic condition. If, furthermore, the sound intensity is independent of location within the room, such a distribution is called a diffuse sound field, and the sounds reaching a room surface are said to be at random incidence.

Measurements under reverberant conditions are necessary because, in this way, the effects of practical mounting conditions can be included. Furthermore, it is the only way to determine the sound absorption of discrete objects such as chairs, office landscaping screens, etc.

The purpose of this International Standard is to promote uniformity in the methods and conditions of measurement of sound absorption in reverberation rooms, so that values determined by different laboratories agree as closely as is possible at present. In order to improve precision, it may become necessary to limit further the variability of test conditions. The sound absorption data determined by the method described may be used for design calculations. In certain cases, however, deviations between predicted and measured values of reverberation time may occur.

It should be emphasized that, in order to attain the above objectives, a more diffuse sound field than the one which ordinarily exists in most rooms, auditoria, etc. is required, and certain other constraints, for example on the dimensions of the reverberation room, are necessary.

1 Scope and field of application

This International Standard specifies a method of measuring the sound absorption coefficient of acoustical materials used as

wall or ceiling treatments, or the equivalent sound absorption area of objects, such as furniture, persons or space absorbers, in a reverberation room. It is not intended for measuring the absorption characteristics of weakly damped resonators.

The results obtained can be used for comparison purposes and for design calculation with respect to room acoustics and noise control.

2 References

ISO 5725, *Precision of test methods — Determination of repeatability and reproducibility by inter-laboratory tests.*

IEC Publication 225, *Octave, half-octave and third-octave band filters intended for the analysis of sounds and vibrations.*

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1 reverberation time: The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.

The quantity is denoted by T and is expressed in seconds.

NOTE — This definition is based on the assumption that, in the ideal case, there is a linear relationship between the sound pressure level and time and that the background noise level is sufficiently low.

3.2 equivalent sound absorption area of a room: The hypothetical area of a totally absorbing surface without diffraction effects which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration.

For the empty reverberation room, this quantity is denoted by A_1 ; for the reverberation room containing a test specimen, it is denoted by A_2 . The quantity is expressed in square metres.

3.3 equivalent sound absorption area of a test specimen: The difference between the equivalent sound ab-