SLOVENSKI STANDARD
SIST EN ISO 18233:2006

01-julij-2006

Akustika – Uporaba novih merilnih metod na področju gradbene in prostorske akustike (ISO 18233:2006)

Acoustics - Application of new measurement methods in building and room acoustics (ISO 18233:2006)

Akustik - Anwendung neuer Messverfahren in der Bau- und Raumakustik (ISO 18233:2006)

Acoustique - Application de nouvelles méthodes de mesure dans l'acoustique des bâtiments et des salles (ISO 18233:2006)

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English Version

Acoustics - Application of new measurement methods in building and room acoustics (ISO 18233:2006)

Acoustique - Application de nouvelles méthodes de mesure dans l'acoustique des bâtiments et des salles (ISO 18233:2006)

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Foreword

This document (EN ISO 18233:2006) has been prepared by Technical Committee ISO/TC 43 "Acoustics" in collaboration with Technical Committee CEN/TC 126 "Acoustic properties of building elements and of buildings", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 18233:2006 has been approved by CEN as EN ISO 18233:2006 without any modifications.

INTERNATIONAL STANDARD

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Acoustics — Application of new measurement methods in building and room acoustics

Acoustique — Application de nouvelles méthodes de mesurage dans l'acoustique des bâtiments et des salles

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Contents

Page

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 18233 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

Introduction

Stochastic signal analysis methods for the measurement of sound transmission phenomena started to be developed around 1960, but lack of available computing power excluded the use of these methods outside the best equipped research laboratories.

The development of digitizing circuitry, powerful personal computers and the use of digital signal processing components in sound measuring equipment for field use, have made the application of measuring equipment based on extended digital signal analysis readily available. Dedicated instruments, as well as specialized software used on general computers, currently apply such methods and are already widely used.

The new methods bring a number of advantages compared to the well-established classical methods, such as suppression of background noise and extended measurement range. However, there is also risk of unreliable results if certain guidelines are not followed. The new methods may demonstrate larger sensitivity to time-variations and change in the environmental conditions than the classical methods.

This International Standard is developed to give requirements and guidelines for the use of new measurement methods in building and room acoustic measurements, but can also be used in the construction of measuring equipment for the implementation of the methods.

As even an experienced user of equipment based on classical methods may be unaware of the difficulties and limitations for some applications of the new methods, the user is encouraged to develop a deeper understanding of the theoretical bases for the new methods. Instrument manufacturers are also encouraged to give further guidelines for applications and to make it an objective to design instruments that give warnings when results are not reliable.

This International Standard gives guidelines and requirements for the application of new methods for the measurement of sound insulation in buildings and building elements and for the measurement of reverberation time and related quantities. Reference is made to the standards for the classical methods regarding what to measure, the number and the selection of measurement points, and the conditions for measurements.

Acoustics — Application of new measurement methods in building and room acoustics

1 Scope

This International Standard gives guidelines and specifies requirements for the application of new methods for the measurement of the acoustic properties of buildings and building elements. Guidelines and requirements for selection of the excitation signal, signal processing and environmental control are given, together with requirements for linearity and time-invariance for the systems to be tested.

This International Standard is applicable to such measurements as airborne sound insulation between rooms and of façades, measurement of reverberation time and other acoustic parameters of rooms, measurement of sound absorption in a reverberation room, and measurement of vibration level differences and loss factor.

This International Standard specifies methods to be used as substitutes for measurement methods specified in standards covering classical methods, such as ISO 140 (all parts), ISO 3382 (all parts) and ISO 17497-1.

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.

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

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms definitions and abbreviated terms

3.1 Terms and definitions

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

3.1.1
classical method
conventional method of measurement where the resulting sound pressure levels or decay rates are determined directly from the recorded responses to random noise or impulse signals

3.1.2
new method
measurement method in which various deterministic signals can be used to first obtain the impulse response of the system under test and from which the required sound pressure levels and decay rates can be obtained

NOTE The new methods may have additional, intentional features such as giving results under situations where no result is obtained by the classical method. The new methods may, for instance, be more immune to noise from other sources.

3.1.3
effective signal-to-noise ratio
signal-to-noise ratio
ten times the logarithm to the base 10 of the ratio of the mean-square value of the signal part caused by the excitation and obtained by the new method, to the mean-square value of the unwanted part of the signal obtained by the same method and caused by sources other than the excitation

NOTE 1 The effective signal-to-noise ratio is expressed in decibels.

NOTE 2 The effective signal-to-noise ratio is used as a substitute for the normal signal-to-noise ratio when establishing procedures for the new method based on a classical method.

3.1.4
peak-to-noise ratio
ten times the logarithm to the base 10 of the ratio of the squared peak value of the signal part caused by the excitation and obtained by the new method, to the mean-square value of the unwanted part of the signal obtained by the same method and caused by other sources than the excitation

NOTE The effective peak-to-noise ratio is expressed in decibels.

3.1.5
fractional-octave band
frequency range, in hertz, from lower to higher band edge frequency for a fractional-octave-band filter as specified in IEC 61260

NOTE Both full-octave- and fractional-octave-band filters are designated fractional-octave-band filters.

3.2 Abbreviated terms

MLS Maximum length sequence method

SS Swept-sine method

4 Designations

4.1 Maximum length sequence method (MLS)

An MLS method in accordance with this International Standard shall be designated as “ISO 18233–MLS”.

4.2 Swept-sine method (SS)

An SS method in accordance with this International Standard shall be designated as “ISO 18233–SS”.

5 Theory

5.1 General

The transmission of sound within a room as well as the transmission of sound between rooms may normally be considered as a close approximation to a linear and time-invariant system. The general theory applicable to such systems may therefore be used to establish the relationship between excitation and response for the sound transmission.

The impulse response is the basis of all measurements. The methods are applicable to the velocities measured on structures as well as to sound pressures measured in rooms.