
Akustika - Merjenje zvočne izolirnosti v stavbah in zvočne izolirnosti gradbenih elementov - 18. del: Laboratorijsko merjenje zvoka, ki ga padavine povzročajo na gradbenih elementih (ISO 140-18:2006)

Acoustics - Measurement of sound insulation in buildings and of building elements - Part 18: Laboratory measurement of sound generated by rainfall on building elements (ISO 140-18:2006)

Akustik - Messung der Schalldämmung in Gebäuden und von Bauteilen - Teil 18: Messung des durch Regenfall auf Bauteile verursachten Schalls im Prüfstand (ISO 140-18:2006)

Acoustique - Mesurage de l'isolation acoustique des immeubles et des éléments de construction - Partie 18: Mesurage en laboratoire du bruit produit par la pluie sur les éléments de construction (ISO 140-18:2006)

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Acoustics - Measurement of sound insulation in buildings and of building elements - Part 18: Laboratory measurement of sound generated by rainfall on building elements (ISO 140-18:2006)

Acoustique - Mesurage de l'isolation acoustique des
immeubles et des éléments de construction - Partie 18:
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von Bauteilen - Teil 18: Messung des durch Regenfall auf
Bauteile verursachten Schalls im Prüfstand (ISO 140-
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This European Standard was approved by CEN on 14 November 2006.

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EN ISO 140-18:2006 (E)**Foreword**

This document (EN ISO 140-18:2006) 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of an identical text or by endorsement, at the latest by May 2007, and conflicting national standards shall be withdrawn at the latest by May 2007.

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 140-18:2006 has been approved by CEN as EN ISO 140-18:2006 without any modifications.

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**Acoustics — Measurement of sound
insulation in buildings and of building
elements —****Part 18:
Laboratory measurement of sound
generated by rainfall on building
elements**

*Acoustique — Mesurage de l'isolement acoustique des immeubles et
des éléments de construction —
Partie 18: Mesurage en laboratoire des bruits produit par la pluie sur les
éléments de construction*

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Foreword

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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 140-18 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Buildings acoustics*.

ISO 140 consists of the following parts, under the general title *Acoustics — Measurement of sound insulation in buildings and of building elements*:

- *Part 1: Requirements for laboratory test facilities with suppressed flanking transmission*
- *Part 2: Determination, verification and application of precision data*
- *Part 3: Laboratory measurements of airborne sound insulation of building elements*
- *Part 4: Field measurements of airborne sound insulation between rooms*
- *Part 5: Field measurements of airborne sound insulation of façade elements and façades*
- *Part 6: Laboratory measurements of impact sound insulation of floors*
- *Part 7: Field measurements of impact sound insulation of floors*
- *Part 8: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor*
- *Part 9: Laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it*
- *Part 10: Laboratory measurement of airborne sound insulation of small building elements*
- *Part 11: Laboratory measurements of the reduction of transmitted impact sound by floor coverings on lightweight reference floors*
- *Part 13: Guidelines (Technical Report)*
- *Part 14: Guidelines for special situations in the field*
- *Part 16: Laboratory measurement of the sound reduction index improvement by additional lining*
- *Part 18: Laboratory measurement of sound generated by rainfall on building elements*

Introduction

This part of ISO 140 prescribes a laboratory method for the measurement of sound generated by rainfall on building elements using artificial raindrops produced by a water tank.

Ideally, one should expose the test specimen to real rain for such measurements. But real rain is neither steady nor continuous with respect to time. Furthermore, raindrops can vary in diameter due to several factors, including geographic location, which will introduce variability in measured values. One can, however, use real raindrops as a means of validation of measured results obtained with artificial raindrops by building a test room in an unobstructed location. For such research, it is important that the rain sensor or rain gauge is capable of measuring constant short interval rainfall rates. In the absence of drop size information, repeatability and fluctuations of the measured sound levels with real rain can be investigated by undertaking measurements separated by a time interval of at least 24 h.

Artificial raindrop generation systems, other than the water tank used in this part of ISO 140, exist, such as hydraulic spray nozzles; however, so far, nozzles corresponding to the specifications given in this part of ISO 140 are not commercially available: indeed, their flow rate is too high when the drop diameter is correct or the drop diameter is too small when the flow rate is correct. As a result, only the water tank solution is proposed in this part of ISO 140.

An alternative to real rain or artificial raindrops is the dry mechanical excitation of the test specimen. Researchers have used different methods, such as excitation by an impact hammer and other mechanical impacting simulators, with an aim to simulate the noise of real rain. Such methods invariably suffer from the drawback that the noise source does not generate both the sound levels and the sound spectra that compare well with corresponding values generated by the real rain on various types of test specimens. Further research work is encouraged to develop mechanical methods of rain noise generation that can match both the sound levels and spectra of real rain.

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Acoustics — Measurement of sound insulation in buildings and of building elements —

Part 18:

Laboratory measurement of sound generated by rainfall on building elements

1 Scope

This part of ISO 140 specifies a laboratory method of measurement of the impact sound insulation of roofs, roof/ceiling systems and skylights excited by artificial rainfall. The results obtained can be used for assessing the noise to be produced by rainfall on a given building element in the room or space below. The results can also be used to compare rainfall sound insulation capabilities of building elements and to design building elements with appropriate rainfall sound insulation properties.

This part of ISO 140 is based on measurements with artificial raindrops under controlled conditions using a water tank in a laboratory test facility in which flanking sound transmission is suppressed. Measurements using real rain, although a useful means for validation purposes, are not included because of the variable, unpredictable and intermittent nature of real rain. Other mechanical simulation methods under investigation by researchers are not sufficiently well developed at present to adequately simulate real rain both in terms of sound levels and spectra generated.

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.

ISO 140-1:1997, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 1: Requirements for laboratory test facilities with suppressed flanking transmission*

ISO 140-3, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 3: Laboratory measurements of airborne sound insulation of building elements*

ISO 3382-2, *Acoustics — Measurement of room acoustic parameters — Part 2: Reverberation time in ordinary rooms*

ISO 10848-1:2006, *Acoustics — Laboratory measurement of the flanking transmission of airborne and impact sound between adjoining rooms — Part 1: Frame document*

ISO 15186-1:2000, *Acoustics — Measurement of sound insulation in buildings and of building elements using sound intensity — Part 1: Laboratory measurements*

IEC 60721-2-2, *Classification of environmental conditions — Part 2: Environmental conditions appearing in nature — Precipitation and wind*

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