DRAFT AMENDMENT ISO 10140-5:2010/DAM 1

ISO/TC **43**/SC **2** Secretariat: **DIN**

Voting begins on **2012-11-07** Voting terminates on **2013-04-07**

Acoustics — Laboratory measurement of sound insulation of building elements —

Part 5: Requirements for test facilities and equipment

AMENDMENT 1: Rainfall noise

Acoustique — Mesurage en laboratoire de l'isolation acoustique des éléments de construction —

Partie 5: Exigences relatives aux installations et appareillage d'essai

AMENDEMENT 1: Bruit produit par la pluie

ICS 91.120.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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.

Amendment 1 to ISO 10140-5:2010 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

Acoustics — Laboratory measurement of sound insulation of building elements —

Part 5:
Requirements for test facilities and equipment

AMENDMENT 1: Rainfall noise

page v, Introduction

delete the last sentence before Table 1.

page 8, 4.1 General

Add the following paragraph as last paragraph.

> For these and other measurements also reference objects could be defined to calibrate the test facility; see Annex I for the measurement of rainfall sound as an example.

page 9, 5.2, Impact sound source

Add the following paragraph as last paragraph.

> Annex H gives information on an artificial rain source to be used to characterise the generation of rainfall sound by building elements, as explained in the ISO 10140-1, Annex K.

page 35

Insert Annex H and Annex I, which start on page 2, before the Bibliography.

Annex H
(normative)

Specification of heavy and intense rain with example of a tank with perforated base

H.1 Specification of artificial rain production

Two different tanks with different perforated bases are required for artificial raindrop production; one for heavy type rain (mandatory) and the second for the intense type rain (only recommended if lower rainfall rates are needed). Based on the classification of rain fall, see ISO 10140-1:2010, Annex K, the specifications for these two types of rain are given in Table H.1. Upper limits have been chosen since larger drops produce most of the noise generated.

Table H. 1 — Characteristic parameters for artificial raindrops generation

Rainfall type	Rainfall rate mm/h	Volume median drop diameter mm	Fall velocity m/s
Intense	15	2,0	4,0
Heavy	40	5,0	7,0

The rainfall rate is the depth of water layer created by spreading the rainfall on a horizontal surface in a 1 h time interval. The volume median drop diameter is the value when 50% of the total volume of water sprayed is made up of drops with diameter larger than the median value and 50% with smaller diameter,

The appropriate specifications for the perforated bases are given in Table H.2. The tanks are made from polycarbonate plates of thickness 1 cm; the base is reinforced by metal strips.

Table H.2 — Specifications

Parameters of tank with perforated base		Intense	Heavy
1	Diameter of holes	0,3 mm to 0,5 mm	1 mm
2	Number of holes per unit area	Approx. 25 m^{-2}	Approx. 60 m^{-2}
3	Fall height	Approx. 1 m	Approx. 3,5 m
4	Volume median drop diameter	2 mm	5,0 mm
5	Distribution of drop size	Max. uniformity	Max. uniformity
6	Fall velocity at fall height	4 m/s	7 m/s
7	Rainfall rate	15 mm/h	40 mm/h
8	Water supply	To allow a constant height of water in the tank (50 mm to overflow limit)	

If the tank with perforated base does not correspond to the geometrical characteristics given above, then the drop size, impact velocity and rainfall rate shall be measured as mentioned in ISO 10140-1:2010, Annex K and correspond to the values given in Table H.1. Tolerances on the three characteristic parameters for artificial raindrops generation given in Table H.1 are as follows:

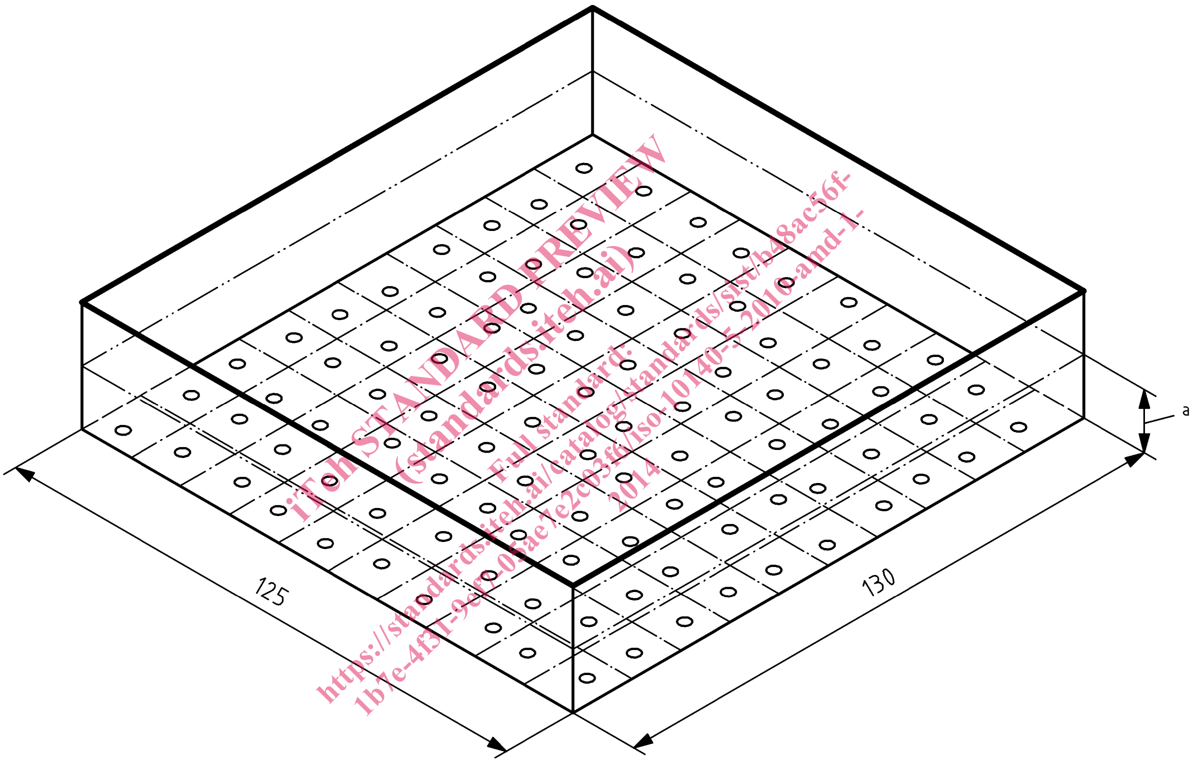
— the rainfall rate shall be within ±2 mm/h of the rainfall rate given in Table H.1;

— 50 % of the drops should be within ±0,5 mm of the volume median drop diameter, given in Table H.1;

— 50 % of the drops should be within ±1 m/s of the fall velocity given in Table H.1.

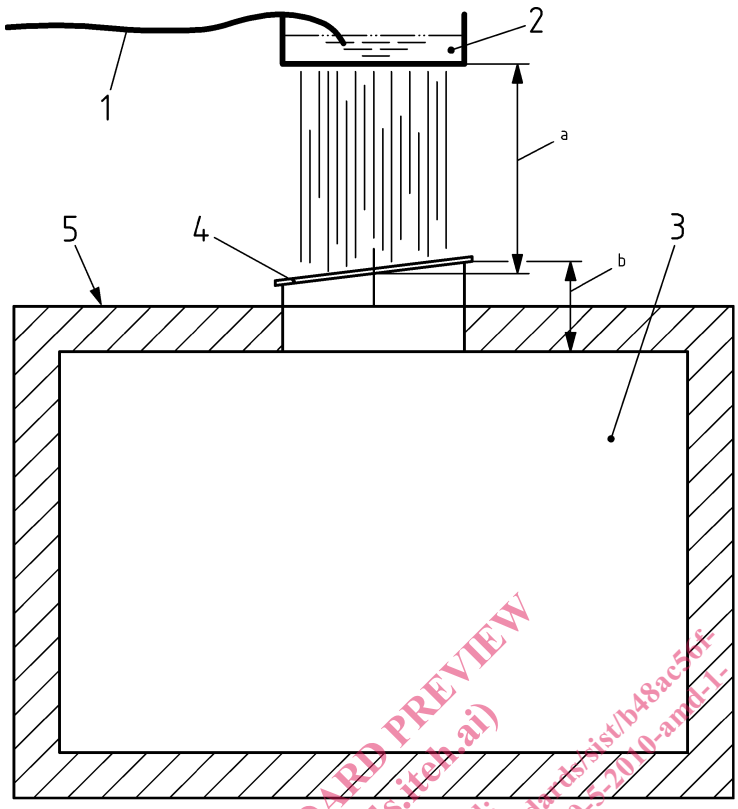
The fall height is evaluated from Figure 6 of Reference [20].

Dimensions in centimetres



[a] Typical water height.

Figure H.1 — Schematic of tank with perforated base



Key

1 water-supply system
2 tank with perforated base
3 test room
4 test specimen
5 water drainage (arranged by user)

a Fall height.
b Height of the niche.

Figure H.2 — Typical test arrangement

H.2 Generation of artificial raindrops rain production

H.2.1 General

The artificial raindrop generation system, when connected to a water supply, is capable of generating water drops of uniform diameter in a full water spray pattern. The water supply to generate artificial raindrops may be either a closed loop type or a continuous type that enables continuous generation of constant diameter water drops over a long period of time.

H.2.2 Artificial raindrop generation system

The artificial raindrop system shall be a tank with a perforated base capable of generating water drops with the specification given in Table H.2 in a full spray pattern. The perforations on the tank base should be distributed over a minimum area of 1,6 m^2, thus totally covering smaller test specimens in the standard configuration with a 30° slope; a random distribution is preferred rather than a uniform distribution (see Figure H.1).

The water supply pressure and the number of perforations shall be chosen so that the water height in the tank is constant and allows the rainfall rate given in Table H.2 to be generated by the perforated tank. The perforation characteristics (diameter) of the tank base shall be chosen so that water drops with the volume median drop diameter given in Table H.2 are produced by the perforated tank. The fall height of the artificial raindrops shall be adjusted such that either the measured or the theoretically calculated fall velocities based on perforation dimensions, water pressure and fall height are as given in Table H.2. For the determination of the fall height for inclined surfaces, see Figure H.2.

H.2.3 Calibration of the raindrop generation system

The artificial raindrop generation system shall be calibrated.

If a water tank system is used and therefore follows the geometrical characteristics given above, then only the rainfall rate shall be checked by collecting the water over a given area over a precisely measured time period; the measurement of the rainfall rate allows a quick and simple method for periodic verification of the artificial raindrop generation system.

If another system is selected in order to generate other types of rain fall, the rainfall type characteristics, i.e. the drop size, drop velocity and rainfall rate, shall be given by the manufacturer; if they are not available, they should be measured. Here again, the measurement of the rainfall rate allows a quick and simple method for periodic verification of the artificial raindrop generation system.

NOTE There are several non-intrusive methods to measure drop size and drop velocity as, for example, imaging analysers consisting of a light source (typically a strobe light), a video camera and a computer, or phase Doppler particle analysers consisting of a transmitter, a receiver, a signal processor and a computer.