ACOUSTIC RESEARCH LAB.

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BLX ACOUSTIC RESEARCH LABORATORY

BLX Acoustic Research Laboratory is the first and only R&D laboratory in Turkey with special status where acoustic performance of materials is tested in accordance with ASTM and ISO standards.

Reverberation room to test the sound absorption performance of materials in the laboratory where the activities are carried out accredited; Sound transmission loss rooms are available for acoustic tests in structures and building elements.

The technical specifications of the laboratory rooms serving in accordance with the relevant international standards are as follows.

ISO 10140-2 & ASTM E90 SOURCE AND RECEIVER ROOM

BLX ARL can perform measuring the airborne sound insulation of building products, such as walls, floors, doors, windows, shutters, façade elements, façades, glazing, small technical elements, for instance transfer air devices, airing panels (ventilation panels), outdoor air intakes, electrical raceways, transit sealing systems and combinations, for example walls or floors with linings, suspended ceilings, or floating floors.

The test results can be used to compare the sound insulation properties of building elements, classify elements according to their sound insulation capabilities, help design building products which require certain acoustic properties and estimate the in situ performance in complete buildings.

The features of the Source and Receiver Room are as follows:

@ The measurement mechanism of ISO 10140-2 contains 2 room and 1 frame.

@ Frame is using for opening.

@ Source room, receiving room and frame are isolated from airborne sound and structure borne sound.

@ Source room, receiving room and frame are not rigidly connected to each other.

@ The receiving room is designed in accordance with minimum volume requirement in ISO 10140-2 relevant clause

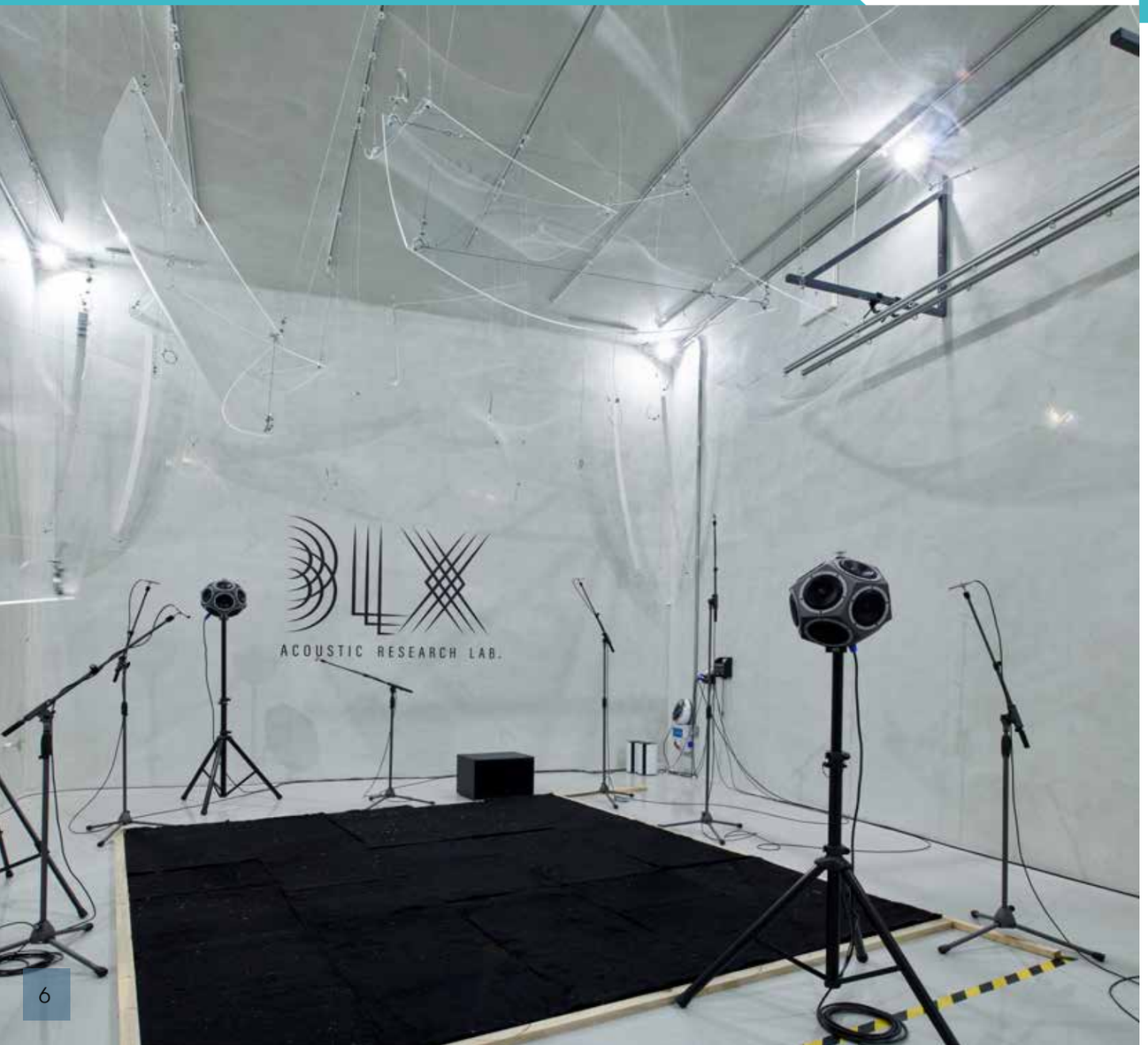
@ The Source room is designed to be %10 percent different from Receiving room volume.The volume of source room is 63 cubic meter.

@ The opening area is 12 square meter.

@ For lightweight wall system, BLX Acoustic Research Laboratory's R'max value is determined as 78.1 dB.

@ Reverberation time of 500 Hz in receiving room is 4.4 second.

@ Background noise level of receiving room is 37.9 dB.



ISO 354 & ISO 3741 REBERATION ROOM

The features of the Reverberation Room are as follows:

@ The reverberation room has a volume of 222 cubic meters with a floor area of 44.5 square meters and a height of 5 m. At least 200 cubic meters are provided for 100 Hz in the relevant section of the standard.
@ No surfaces other than the floor and ceiling are positioned parallel to each other.
@ Surfaces are designated as reflective.
@ In accordance with ISO 3741 Standard the reverberation time of the reverberation room is greater than the ratio of volume to the total surface area.
@ The environmental conditions of the reverberation room are between humidity and temperature tolerance values.
@ As specified in ISO 3741, source is placed 7 different positions. Standard deviation control is applied for measure 6 microphone position. All of standard deviation are appropriate for broad-band sound measurement.

BLX ARL can perform determining the sound power level or sound energy level of a noise source from sound pressure levels measured in a reverberation test room. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source, in frequency bands of width one-third octave, is calculated using required measurements, including corrections to allow for any differences between the meteorological conditions at the time and place of the test and those corresponding to a reference characteristic impedance.

In general, the frequency range of interest includes the one-third-octave bands with mid-band frequencies from 100 Hz to 10 000 Hz.

The noise source under test can be a device, machine, component or sub-assembly. ISO 3741:2010 is applicable to noise sources with a volume not greater than 2 % of the volume of the reverberation test room. BLX ARL can measure samples with a maximum volume of 4.4 cubic meters.

ISO/IEC 17025 enables laboratories to demonstrate that they operate competently and generate valid results, thereby promoting confidence in their work both nationally and around the world.

It also helps facilitate cooperation between laboratories and other bodies by generating wider acceptance of results between countries. Test repoWWrts and certificates can be accepted from one country to another without the need for further testing, which, in turn, improves international trade.

ISO/IEC 17025 is useful for any organization that performs testing, sampling or calibration and wants reliable results. This includes all types of laboratories, whether they be owned and operated by government, industry or, in fact, any other organization. The standard is also useful to universities, research centres, governments, regulators, inspection bodies, product certification organizations and other conformity assessment bodies with the need to do testing, sampling or calibration.

ISO 16283-1

Acoustics — Field measurement of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation

ISO 16283 (all parts) describes procedures for field measurements of sound insulation in buildings. Airborne, impact and façade sound insulation are described in ISO 16283-1, ISO 16283-23and ISO 16283-34, respectively.

Field sound insulation measurements that were described previously in ISO 140-4, –5, and –7 were (a) primarily intended for measurements where the sound field could be considered to be diffuse, and (b) not explicit as to whether operators could be present in the rooms during the measurement. ISO 16283 differs from ISO 140-4, –5, and –7 in that (a) it applies to rooms in which the sound field may or may not approximate to a diffuse field, (b) it clarifies how operators can measure the sound field using a hand-held microphone or sound level meter and (c) it includes additional guidance that was previously contained in ISO 140-14.

ISO 16283-2

Acoustics — Field measurement of sound insulation in buildings and of building elements — Part 2: Impact sound insulation

This document specifies procedures to determine the impact sound insulation using sound pressure measurements with an impact source operating on a floor or stairs in a building. These procedures are intended for room volumes in the range from 10 m3 to 250 m3 in the frequency range from 50 Hz to 5 000 Hz. The test results can be used to quantify, assess and compare the impact sound insulation in unfurnished or furnished rooms where the sound field can approximate to a diffuse field.

ISO 16283-3

Acoustics — Field measurement of sound insulation in buildings and of building elements — Part 3: Façade sound insulation

ISO 16283-3:2016 specifies procedures to determine the airborne sound insulation of façade elements (element methods) and whole façades (global methods) using sound pressure measurements. These procedures are intended for room volumes in the range from 10 m3 to 250 m3 in the frequency range from 50 Hz to 5 000 Hz.

The test results can be used to quantify, assess, and compare the airborne sound insulation in unfurnished or furnished rooms where the sound field can or cannot approximate to a diffuse field. The measured airborne sound insulation is frequency-dependent and can be converted into a single number quantity to characterize the acoustic performance using the rating procedures in ISO 717-1.

ISO 16251-1

Acoustics — Loboratory measurement of the reduction of transmitted impact noise by floor coverings on a small floor mock-up -Part 1: Heavyweight compact floor

ISO 16251-1:2014 specifies a laboratory measurement method to determine the improvement of impact sound insulation by a floor covering when laid on a standard concrete floor mock-up and excited by a standard tapping machine. The method is restricted to soft, flexible floor coverings, which transmit impact sound mainly "locally" into the floor, i.e. through the area close to the points of excitation, so that the size of the flooring specimen does not have an influence on the results. Examples of such floor coverings are carpets, PVC, and linoleum. These floor coverings correspond to ISO 10140-1:2010, Annex H, category I.

The results only provide information about the noise radiated. A subjective classification of the quality of the floor coverings is not intended.

ISO 16251-1:2014 provides the measurement method. Product test codes can contain further requirements concerning the specimens, such as temperature range, the number of test specimens or special mounting conditions.

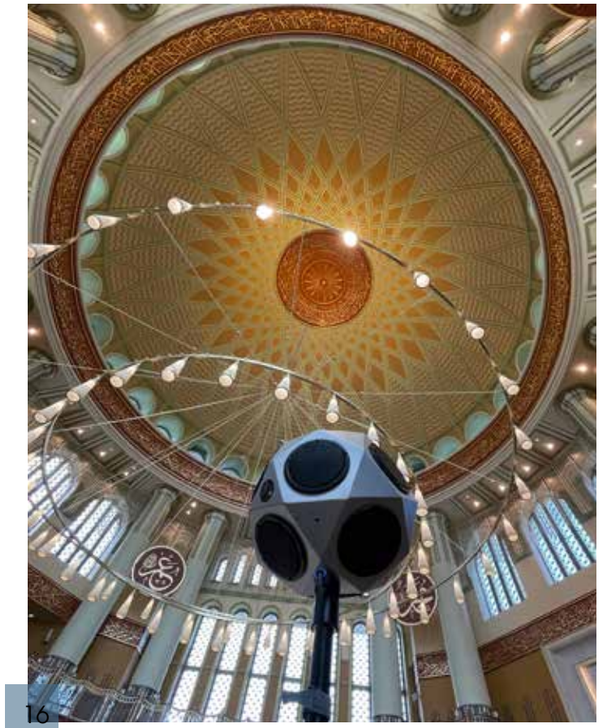
ISO 3382-1

Acoustics — Measurement of room acoustic parameters — Part 1: Performance spaces

ISO 3382-1:2009 specifies methods for the measurement of reverberation time and other room acoustical parameters in performance spaces. It describes the measurement procedure, the apparatus needed, the coverage required, and the method of evaluating the data and presenting the test report. It is intended for the application of modern digital measuring techniques and for the evaluation of room acoustical parameters derived from impulse responses.

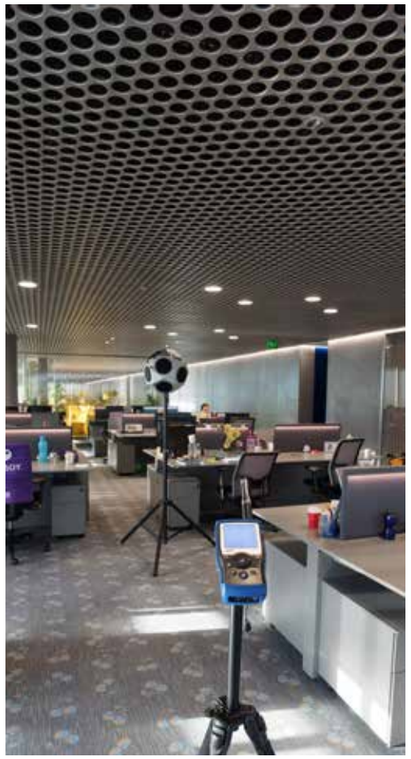
ISO 3382-2

Acoustics — Measurement of room acoustic parameters — Part 2: Reverberation time in ordinary rooms



This part of ISO 3382 specifies methods for the measurement of reverberation time in ordinary rooms. It describes the measurement procedure, the apparatus needed, the required number of measurement positions, and the method for evaluating the data and presenting the test report.

The measurement results can be used for correction of other acoustic measurements, e.g. sound pressure level from sound sources or measurements of sound insulation, and for comparison with requirements for reverberation time in rooms.



ISO 3382-3

Acoustics — Measurement of room acoustic parameters — Part 3: Open plan offices

This part of ISO 3382 specifies methods for the measurement of room acoustic properties in open plan offices with furnishing. It specifies measurement procedures, the apparatus needed, the coverage required, the method for evaluating the data, and the presentation of the test report.

The measurement results can be used to evaluate room acoustic properties in open plan offices. This part of ISO 3382 is intended for medium and large size open plan offices.

ISO 1996-1

Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures

This part of ISO 1996 defines the basic quantities to be used for the description of noise in community environments and describes basic assessment procedures. It also specifies methods to assess environmental noise and gives guidance on predicting the potential annoyance response of a community to long-term exposure from various types of environmental noises. The sound sources can be separate or in various combinations. Application of the method to predict annoyance response is limited to areas where people reside and to related long-term land uses.

Community response to noise can vary differently among sound sources that are observed to have the same acoustic levels. This part of ISO 1996 describes adjustments for sounds that have different characteristics. The term "rating level" is used to describe physical sound predictions or measurements to which one or more adjustments have been added. On the basis of these rating levels, the long-term community response can be estimated.

The sounds are assessed either singly or in combination, allowing for consideration, when deemed necessary by responsible authorities, of the special characteristics of their impulsiveness, tonality, and low-frequency content, and for the different characteristics of road-traffic noise, other forms of transportation noise (such as aircraft noise), and industrial noise.

This part of ISO 1996 does not specify limits for environmental noise.

NOTE 1 In acoustics, several different physical measures describing sound can have their level expressed in decibels (e.g. sound pressure, maximum sound pressure, and equivalent continuous sound pressure). The levels corresponding to these physical measures normally will differ for the same sound. This often leads to confusion. Therefore, it is necessary to specify the underlying physical quantity (e.g. sound pressure level, maximum sound pressure level, and equivalent continuous sound pressure level).

ISO 1996-2

Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of sound pressure levels

This document describes how sound pressure levels intended as a basis for assessing environmental noise limits or comparison of scenarios in spatial studies can be determined. Determination can be done by direct measurement and by extrapolation of measurement results by means of calculation. This document is primarily intended to be used outdoors but some guidance is given for indoor measurements as well. It is flexible and to a large extent, the user determines the measurement effort and, accordingly, the measurement uncertainty, which is determined and reported in each case. Thus, no limits for allowable maximum uncertainty are set up. Often, the measurement results are combined with calculations to correct for reference operating or propagation conditions different from those during the actual measurement. This document can be applied on all kinds of environmental noise sources, such as road and rail traffic noise, aircraft noise and industrial noise.

ISO 10140-2

Acoustics — Laboratory measurement of sound insulation of building elements Part 2: Measurement of airborne sound insulation

ISO 10140-2:2010 specifies a laboratory method for measuring the airborne sound insulation of building products, such as walls, floors, doors, windows, shutters, façade elements, façades, glazing, small technical elements, for instance transfer air devices, airing panels (ventilation panels), outdoor air intakes, electrical raceways, transit sealing systems and combinations, for example walls or floors with linings, suspended ceilings or floating floors.

ASTM E90

Standard test method for laboratory measurement of airborne sound transmission loss of building partitions and elemnts

This test method covers the laboratory measurement of airborne sound transmission loss of building partitions such as walls of all kinds, operable partitions, floor-ceiling assemblies, doors, windows, roofs, panels, and other space-dividing elements.

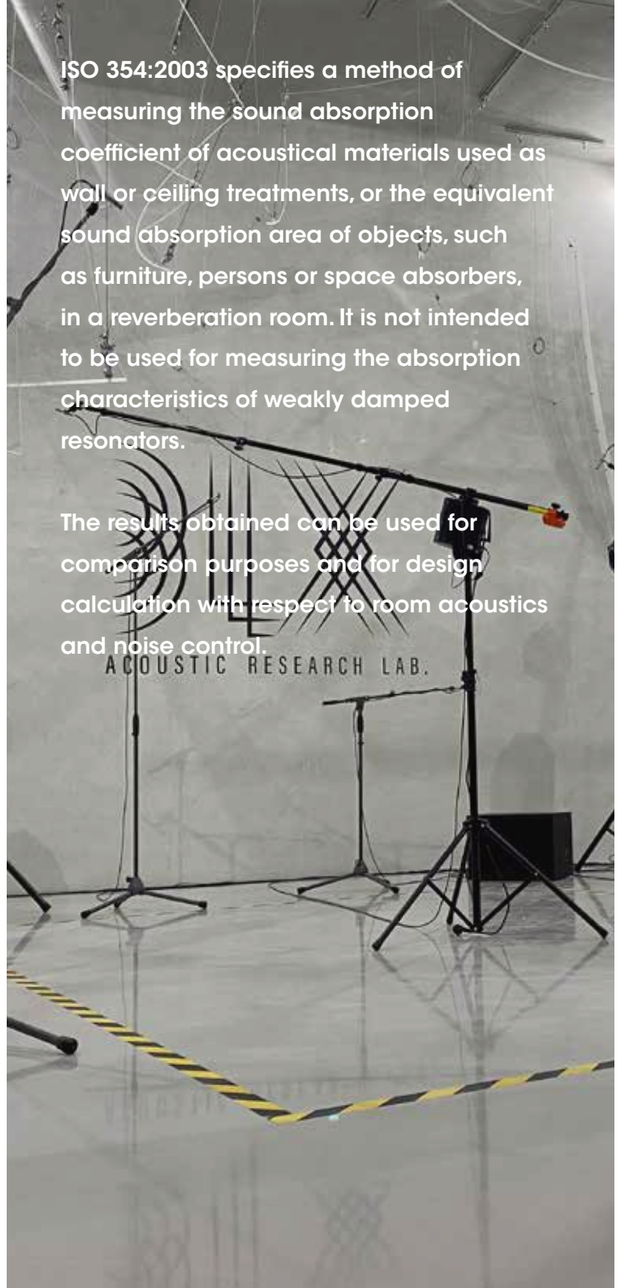
Laboratories are designed so the test specimen constitutes the primary sound transmission path between the two test rooms and so approximately diffuse sound fields exist in the rooms.

Laboratory Accreditation—The requirements for accrediting a laboratory for performing this test method are given in Annex A4.

This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

ISO 354

Acoustics — Measurement of sound absorption in a reverberation room



ISO 354:2003 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 to be used 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.

ISO 3741

Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for reverberation test room

ISO 3741:2010 specifies methods for determining the sound power level or sound energy level of a noise source from sound pressure levels measured in a reverberation test room. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source, in frequency bands of width one-third-octave, is calculated using those measurements, including corrections to allow for any differences between the meteorological conditions at the time and place of the test and those corresponding to a reference characteristic impedance. Measurement and calculation procedures are given for both a direct method and a comparison method of determining the sound power level and the sound energy level.

In general, the frequency range of interest includes the one-third-octave bands with mid-band frequencies from 100 Hz to 10 000 Hz. Guidelines for the application of the specified methods over an extended frequency range in respect to lower frequencies are given in an annex. ISO 3741:2010 is not applicable to frequency ranges above the 10 000 Hz one-third-octave band.

The methods specified in ISO 3741:2010 are suitable for all types of noise (steady, non-steady, fluctuating, isolated bursts of sound energy, etc.) defined in ISO 12001.

The noise source under test can be a device, machine, component or sub-assembly. ISO 3741:2010 is applicable to noise sources with a volume not greater than 2 % of the volume of the reverberation test room. For a source with a volume greater than 2 % of the volume of the test room, it is possible that the achievement of results as defined in ISO 12001:1996, accuracy grade 1 (precision grade) is not feasible.

The test rooms that are applicable for measurements made in accordance with ISO 3741:2010 are reverberation test rooms meeting specified requirements.

ISO 3743-2

Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 2: Methods for special reverberation test rooms

This document specifies a relatively simple engineering method for determining the sound power levels of small, movable noise sources. The methods specified in this document are suitable for measurements of all types of noise within a specified frequency range, except impulsive noise consisting of isolated bursts of sound energy which are covered by ISO 3744 and ISO 3745.

ISO 3744

Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane

This International Standard specifies methods for determining the sound power level or sound energy level of a noise source from sound pressure levels measured on a surface enveloping the noise source (machinery or equipment) in an environment that approximates to an acoustic free field near one or more reflecting planes. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source, in frequency bands or with A-weighting applied, is calculated using those measurements.

NOTE Differently shaped measurement surfaces can yield differing estimates of the sound power level of a given noise source and an appropriately drafted noise test code (see ISO 12001) gives detailed information on the selection of the surface.

ISO 3746

Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane

This International Standard specifies methods for determining the sound power level or sound energy level of a noise source from sound pressure levels measured on a surface enveloping a noise source (machinery or equipment) in a test environment for which requirements are given. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source with frequency A-weighting applied is calculated using those measurements.
NOTE Differently shaped measurement surfaces can yield differing estimates of the sound power level of a given noise source and an appropriately drafted test code (see ISO 12001) gives detailed information on the selection of the surface.

ISO 23351-1

Acoustics — Measurement of speech level reduction of furniture ensembles and enclosures - Part 1: laboratory method

This document specifies a laboratory method to facilitate the comparison of furniture ensembles and enclosures with respect to their ability to reduce the speech level of the occupant speaking inside the product.
In this method, the sound power level is measured in two scenarios: 1) without the product, and 2) with the product. During scenario 1), the test signal is produced by the sound source in an empty room while the product is absent. During scenario 2), the test signal is produced by the sound source inside the product in the occupant's position. Level reduction is the difference of the sound power levels measured in the two scenarios in 1/1-octave frequency bands from 125 Hz to 8 000 Hz. Speech level reduction is a single-number quantity that expresses the corresponding reduction in A-weighted sound power level of standard speech within the entire frequency range from 125 Hz to 8 000 Hz.
The method is applicable for entire furniture ensembles or enclosures, which form a unity that serves one or several occupants, and which are also used to provide improved speech privacy.
This method is not intended for single components used in workstations, such as a screen, a storage unit, a table, a luminaire, a cupboard, a bookshelf, a standard chair, a wall absorber or a ceiling absorber.

This International Standard specifies measurements on silencers in situ. It is applicable to measurements on silencers in practical applications for acoustic analysis, acceptance tests and similar evaluations. Results obtained in accordance with this International Standard cannot be compared to performance data obtained from laboratory measurements on ducted silencers in accordance with ISO 7235, partly because of different test conditions (such as sound field distribution, flow, temperature and mounting conditions) and partly because of different definitions.
Depending on the method used, the measurement is either of
— insertion loss Dis, or
— transmission loss Dts.
The measurement method depends upon the type of silencer and the installation conditions (e.g. insertion loss measurements must be carried out for blowdown silencers).
NOTE 1 The subscripts denote the practical application of the silencer and the particular installation and operating conditions: "s" stands for "in situ", "t" for transmission, and "i" for insertion.

ISO 11820

Acoustics — Measurements on silencers in situ

ISO 7235

Acoustics — Laboratory measurement procedures for ducted silencers and air-terminal units - Insertion loss, flow noise and total pressure loss

This International Standard specifies methods for determining
— the insertion loss, in frequency bands, of ducted silencers with and without airflow,
— the sound power level, in frequency bands, of the flow noise (or regenerated sound) generated by ducted silencers,
— the total pressure loss of silencers with airflow, and
— the transmission loss, in frequency bands, of air-terminal units.
The measurement procedures are intended for laboratory measurements at ambient temperature. Measurements on silencers in situ are specified in ISO 11820.
It is to be noted that the results determined in a laboratory according to this International Standard will not necessarily be the same as those obtained in situ (installation), as different sound and flow fields will yield different results. For example, the pressure loss will be lower under laboratory conditions than in situ, but will be comparable between different laboratories.
This International Standard is applicable to all types of silencer including silencers for ventilating and air-conditioning systems, air intake and exhaust of flue gases, and similar applications. Other passive air-handling devices, such as bends, air-terminal units or T-connectors, can also be tested using this International Standard.
This International Standard is not applicable to reactive silencers used for motor vehicles.

ISO 10848-2

Acoustics — Laboratory and field measurement of flanking transmission for airborne, impact and building service equipment sound between adjoining rooms - Part 2: Application to Type B elements when the junction has a small influence

ISO 10848 (all parts) specifies measurement methods to characterize the flanking transmission of one or several building components. This document considers only laboratory measurements.

The measured quantities can be used to compare different products, or to express a requirement, or as input data for prediction methods, such as ISO 12354-1 and ISO 12354-2. However, the measured quantities Dn,f, Ln,f and Lne0,f only represent the performance with the dimensions for the test specimens described in this document.

This document is referred to in ISO 10848-1:2017, 4.5 as being a supporting part of the frame document. It applies to Type B elements as defined in ISO 10848-1, such as suspended ceilings, access floors, light uninterrupted façades or floating floors. The transmission from one room to another can occur simultaneously through the test element and via the plenum (if any). For measurements made according to this document, the total sound transmission is determined and it is not possible to separate the two kinds of transmission.

ISO 10848-3

Acoustics — Laboratory and field measurement of flanking transmission for airborne, impact and building service equipment sound between adjoining rooms — Part 3: Application to Type B elements when the junction has a substantial influence

ISO 10848 (all parts) specifies measurement methods to characterize the flanking transmission of one or several building components.

This document specifies laboratory and field measurements of buildings for Type B elements (defined in ISO 10848-1) when the junction has a substantial influence.

Laboratory measurements are used to quantify the performance of the junction with suppressed flanking transmission from the laboratory structure. Field measurements are used to characterize the in situ performance and it is not usually possible to suppress unwanted flanking transmission sufficiently; hence, the results can only be considered representative of the performance of that junction when installed in that particular building structure.

This document is referred to in ISO 10848-1:2017, 4.5 as being a supporting part to the frame document and applies to Type B elements that are structurally connected as defined in ISO 10848-1.

The measured quantities can be used to compare different products, or to express a requirement, or as input data for prediction methods, such as ISO 12354-1 and ISO 12354-2.

The relevant quantity to be measured is selected according to ISO 10848-1:2017, 4.5. The performance of the building components is expressed either as an overall quantity for the combination of elements and junction (such as Dn,f,ij and/or Ln,f,ij and/or Lne0,f,ij) or as the normalized direction-average velocity level difference mml_m1 of a junction. Dn,f,ij, Ln,f,ij, Lne0,f,ij and mml_m2 depend on the actual dimensions of the elements.

IEC 60268-16

Sound system equipment - Part 16: Objective rating of speech intelligibility by speech transmission index

IEC 60268-16:2011 specifies objective methods for rating the transmission quality of speech with respect to intelligibility. It provides a comprehensive manual for all types of users of the STI method in the fields of audio, communications and acoustics. Three methods are presented, which are closely related and are referred to as STI, STIPA, and STITEL. The first two methods are intended for rating speech transmission performance with or without sound systems. The STITEL method has more restricted uses. This fourth edition cancels and replaces the third edition, published in 2003, and constitutes a technical revision. It includes the following significant technical changes with respect to the previous edition:

- development of more comprehensive, complete and unambiguous standardization of the STI methodology;
- the term STIr is discontinued. A new function for the prediction of auditory masking effects is introduced;
- the concept of 'speech level' and the setting of the level of the test signal have been introduced;
- additional information has been included on prediction and measurement procedures. The French version of this standard has not been voted upon.

ISO 7240-19

Fire detection and alarm systems — Part 19: Design, installation, commissioning and service of sound systems for emergency purposes

This part of ISO 7240 specifies the design, installation, commissioning and service requirements for a sound system for emergency purposes (s.s.e.p.; see ISO 7240-1:2005, Figure 1, item C), which is primarily intended to broadcast information for the protection of lives within one or more specified indoor or outdoor areas during an emergency. The s.s.e.p. is intended to initiate a rapid and orderly mobilization of occupants in an emergency by including systems using loudspeakers to broadcast voice announcements for emergency purposes, alert signals complying with ISO 7731 (where applicable) and evacuation signals complying with ISO 8201. In some cases, sound systems are used in preference to sounders or bells in order to broadcast a range of coded warnings that is difficult to communicate with sounders or bells.

The use of the s.s.e.p. for normal sound reinforcement and distribution systems purposes under non-hazardous circumstances is not excluded. When used for non-emergency purposes, the zoning of the loudspeakers can differ from the zones used for emergency purposes.

This part of ISO 7240 does not apply to sound systems that use bells or sounders.

1.1 This test method covers the measurement of sound absorption in a reverberation room by measuring decay rate. Procedures for measuring the absorption of a room, the absorption of an object, such as an office screen, and the sound absorption coefficients of a specimen of sound absorptive material, such as acoustical ceiling tile, are described.

1.2 Field Measurements—Although this test method covers laboratory measurements, the test method described in 4.1 can be used for making field measurements of the absorption of rooms (see also 5.5). A method to measure the absorption of rooms in the field is described in Test Method E2235.

1.3 This test method includes information on laboratory accreditation (see Annex A1), asymmetrical screens (see Annex A2), and reverberation room qualification (see Annex A3).

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

ASTM C423

Standard test method for sound absorption ans absorption coefficients by the reverberation room method

ASTM E2179

Standard test method for laboratory measurement of the effectiveness of floor coverings in reducing impact sound transmission through concrete floors

1.1 This test method describes a method for the laboratory measurement of the effectiveness of floor coverings in reducing impact noise from a standard tapping machine through concrete floors. The test results are not necessarily directly related to the subjective evaluations of the floor coverings.

1.2 This test method applies to all floor coverings, whether single or multi-layered, as installed on a standard concrete floor. Multi-layered coverings may be factory-assembled or assembled at the test laboratory.

1.3 The test method applies only to laboratory measurements. It does not apply to the measurement of the effectiveness of a floor covering in a field situation.

1.4 Laboratory Accreditation—A procedure for accrediting a laboratory for performing this test method is given in Method E492.

1.5 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

IEC 60704-1:2021 is available as IEC 60704-1:2021 RLV which contains the International Standard and its Redline version, showing all changes of the technical content compared to the previous edition.
IEC 60704-1:2021 applies to electric appliances (including their accessories or components) for household and similar use, supplied from mains or from batteries.
By "similar use" is understood the use in conditions similar to those found in households, for example in inns, coffee houses, tea rooms, hotels, barber or hairdresser shops, launderettes, etc., if not otherwise specified in the IEC 60704-2 series.
This document does not apply to:
– appliances, equipment, or machines designed exclusively for industrial or professional purposes;
– appliances that are integrated parts of a building or its installations, such as equipment for air conditioning, heating and ventilating (except household fans, cooker hoods, free-standing heating appliances, dehumidifiers, air cleaners, and stand-alone water heaters), oil burners for central heating, pumps for water supply and for sewage systems;
– separate motors or generators and
– appliances exclusively for outdoor use.
For determining and verifying noise emission values declared in product specifications, see IEC 60704-3:2019.
This fourth edition cancels and replaces the third edition published in 2010. This edition constitutes a technical revision.
It includes the following significant changes with respect to the previous edition:
a) update of references (especially to ISO standards);
b) revision of requirements on climatic conditions;
c) revision of requirements on background noise level.

ISO 60704-1

Household And Similar Electrical Appliances - Test Code For The Determination Of Airborne Acoustical Noise - Part 1: General Requirements

ISO 60704-2-1

Household and similar electrical appliances - Test code for the determination of airborne acoustical noise - Part 2-1: Particular requirements for vacuum cleaners

IEC 60704-2-1:2014 applies to electrical vacuum cleaners (including their accessories and their component parts) for household use in or under conditions similar to those in households. This part of IEC 60704 applies as it is to electrical vacuum cleaners operating in dry conditions. Some additions and modifications for vacuum cleaners operating in wet conditions are under consideration. How to test robotic vacuum cleaners is under consideration for a future edition. This part of IEC 60704 does not apply to vacuum cleaners for industrial or professional purposes. This third edition cancels and replaces the second edition published in 2000. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition: a) introduction of a measuring method on hard floors; b) inclusion of values for measurement uncertainty; c) inclusion of values for standard deviation for declaration and verification; d) update of the definition of the standard

ISO 60704-2-3

Household and similar electrical appliances - Test code for the determination of airborne acoustical noise - Part 2-3: Particular requirements for dishwashers

These particular requirements apply to single unit electric dishwashers for household and similar use, with or without automatic programme control, for cold and/or warm water supply, for detachable or permanent connection to water supply or sewage systems, intended for placing on the floor against a wall, for building-in or placing under a counter, a kitchen worktop or under a sink, for wall-mounting or on a counter.

The methods specified in ISO 3743-1, ISO 3743-2 and ISO 3744 can be used for measuring noise emitted by electric dishwashers.

The method specified in ISO 3744 is applicable to noise sources of any size. When applying ISO 3743-1 and ISO 3743-2, care should be taken that the maximum size of the appliance under test fulfils the requirements specified in 1.2 of ISO 3743-1:2010 and 1.3 of ISO 3743-2:1994.
Addition: Requirements for the declaration of noise emission values are not within the scope of this document.

NOTE 101 For determining and verifying noise emission values declared in product specifications, see IEC 60704-3.

ISO 60704-2-6

Household And Similar Electrical Appliances - Test Code For The Determination Of Airborne Acoustical Noise - Part 2-6: Particular Requirements For Tumble Dryers

Applies to the methods of determination of airborne acoustical noise emitted by tumble dryers for household and similar use. This standard applies to single unit electic tumble dryers intended for placing on the floor against a wall, for building in or placing under a counter, a kitchen work-top or under a sink, for wall-mounting or for mounting on a counter. For the purpose of this standard, washer-dryer combinations, when operated as a dryer, are considered as a tumble dryer

ISO 60704-2-9

Household and similar electrical appliances - Test code for the determination of airborne acoustical noise - Part 2-9: Particular requirements for electric hair care appliances

Applies to electric hand-held hairdryers for household and similar use supplied from mains, which operate with a flow of air. Can also be applied to analogous electrically operated devices such as hairstyling appliances, which produce the airflow by a fan. Does not apply to hair care appliances with radiant heating and helmet-type hairdryers.

IEC 60704-2-10:2011 applies to electric cooking ranges, ovens, grills, microwave ovens and any combination of these for household and similar use. This standard does not apply to appliances or parts of appliances that use gas energy. This second edition cancels and replaces the first edition published in 2004 and constitutes a technical revision. Compared to the first edition (2004) of this Part 2-10, this second edition doesn't contain the description of an appropriate test enclosure which has now been incorporated in Part 1.

"Specifies methods for measuring airborne acoustical noise emitted by electric refrigerators, frozen-food storage cabinets, food freezers and their combinations for household and similar uses, supplied from the mains or from batteries. This standard does not apply to appliances, equipment or machines designed exclusively for industrial or commercial purposes."

ISO 60704-2-10

Household and similar electrical appliances - Test code for the determination of airborne acoustical noise - Part 2-10: Particular requirements for electric cooking ranges, ovens, grills, microwave ovens and any combination of these

ISO 60704-2-14

"Household And Similar Electrical Appliances - Test Code For The Determination Of Airborne Acoustical Noise - Part 2-14: Particular Requirements For Refrigerators, Frozen-Food Storage Cabinets And Food Freezers"

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