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Akustik – Mätning utan luftflöde av insättningsdämpning hos kanalljuddämpare – Översiktsmetod för laboratorier (ISO 11691:1995)

Acoustics – Measurement of insertion loss of ducted silencers without flow – Laboratory survey method (ISO 11691:1995)

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Europastandarden EN ISO 11691:2009 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 11691:2009.

Denna standard ersätter SS-EN ISO 11691, utgåva 1.

The European Standard EN ISO 11691:2009 has the status of a Swedish Standard. This document contains the official English version of EN ISO 11691:2009.

This standard supersedes the Swedish Standard SS-EN ISO 11691, edition 1.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11691

August 2009

ICS 91.120.20

Supersedes EN ISO 11691:1995

English Version

Acoustics - Measurement of insertion loss of ducted silencers without flow - Laboratory survey method (ISO 11691:1995)

Acoustique - Détermination de la perte d'insertion de silencieux en conduit sans écoulement - Méthode de mesurage en laboratoire (ISO 11691:1995)

Akustik - Messung des Einfügungsdämpfungsmaßes von Schalldämpfern in Kanälen ohne Strömung - Laborverfahren der Genauigkeitsklasse 3 (ISO 11691:1995)

This European Standard was approved by CEN on 3 August 2009.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Ref. No. EN ISO 11691:2009: E

Foreword

The text of ISO 11691:1995 has been prepared by Technical Committee ISO/TC 43 “Acoustics” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 11691:2009 by Technical Committee CEN/TC 211 “Acoustics” the secretariat of which is held by DS.

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of an identical text or by endorsement, at the latest by January 2010, and conflicting national standards shall be withdrawn at the latest by January 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 11691:1995.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directives.

For relationship with EC Directives, see informative Annexes ZA and ZB, which are integral parts of this document.

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Endorsement notice

The text of ISO 11691:1995 has been approved by CEN as a EN ISO 11691:2009 without any modification.

Introduction

The insertion loss of absorbent silencers is generally not affected by the air flow, provided that the flow velocity does not exceed approximately 20 m/s in the narrowest cross-section of the silencer. In practice, non-uniform flow distributions must be considered, therefore the limit velocity of 20 m/s corresponds to a design velocity of 10 m/s to 15 m/s.

Acoustics — Measurement of insertion loss of ducted silencers without flow — Laboratory survey method

1 Scope

1.1 General

This International Standard specifies a laboratory substitution method to determine the insertion loss without flow of ducted, mainly absorbent, circular and rectangular silencers, as well as other duct elements for use in ventilating and air-conditioning systems.

NOTE 1 Laboratory measurement procedures for ducted silencers with superimposed flow are described in ISO 7235.

This International Standard is applicable to silencers where the design velocity does not exceed 15 m/s. As the method does not include self-generated flow noise, this International Standard is not suitable for tests on silencers where this type of noise is of great importance for the evaluation of the silencer performance.

The insertion loss determined according to this International Standard in a laboratory will not necessarily be the same as the insertion loss that will be obtained in an installation in the field. Different sound and flow fields in the duct will yield different results. As this International Standard requires regular test ducts, the results may include some flanking transmission via structural vibrations in the duct walls, that sets an upper limit to the insertion loss that can be determined.

NOTE 2 ISO 7235 gives methods for determining this limit.

This International Standard is intended to be used for circular silencers with diameters of 80 mm to 2 000 mm or rectangular silencers with cross-sectional areas within the same range.

1.2 Measurement uncertainty

Exact information on the precision of the method cannot be given at this time. Therefore this International Standard is denoted a survey standard.

Interlaboratory tests are necessary for the determination of the standard deviation of reproducibility, σ_R, of the method (relevant terms and methods are given in ISO 5725-1). It is, however, estimated that this method will have a σ_R which is comparable to that of ISO 7235. See table 1.

Table 1 — Estimated values of the standard deviation of reproducibility

Midband frequencies of one-third-octave band Hz	Standard deviation of reproducibility, σ_R dB
50 to 1 250	2
1 600 to 10 000	3

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3741:1988, *Acoustics — Determination of sound power levels of noise sources — Precision methods for broad-band sources in reverberation rooms.*

ISO 3743-1:1994, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for small, movable sources in reverberant fields — Part 1: Comparison method for hard-walled test rooms.*

ISO 3744:1994, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane.*

ISO 7235:1991, *Acoustics — Measurement procedures for ducted silencers — Insertion loss, flow noise and total pressure loss.*

ISO 9614-1:1993, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points.*

IEC 651:1979, *Sound level meters,* and Amendment 1:1993.

IEC 804:1985, *Integrating-averaging sound level meters,* Amendment 1:1989 and Amendment 2:1993.

IEC 942:1988, *Sound calibrators.*

IEC 1260:—[1], *Electroacoustics — Octave-band and fractional-octave-band filters.*

3 Definitions

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

3.1 insertion loss, D: Reduction in level of sound power propagating through a duct due to the insertion of a silencer into the duct system in place of a substitution duct. It is expressed in decibels.

3.2 test duct: Straight standard duct of constant cross-section in front of and behind the silencer under test. The purpose of the test ducts is to separate the test object from the sound source and the reverberation room.

3.3 substitution duct: Standard duct element having, if possible, the same length and same connecting cross-sections as the test object. It is conical if the cross-sectional areas of the entrance and exit of the silencer are different from each other. If the planes of the connections of the silencer are not parallel to each other, the connections shall be made with smooth curved ducts with a bend radius of the walls as large as possible.

3.4 transition element: Element which fits and connects the duct of the sound source to the test duct and, in some cases, the test duct to the silencer.

3.5 standard duct: Sheet metal duct commercially available directly from stock and normally used in practical applications together with the silencer under test.

NOTE 3 Normal wall thicknesses for standard ducts lie in the range 0,4 mm for small circular ducts to 1,25 mm for large circular ducts. A common thickness for rectangular ducts is 0,9 mm.

4 Test facility

4.1 General

The test facility shall consist of the equipment shown in figure 1. It contains the following:

— the sound measuring equipment (see 4.2);

— the sound source equipment (see 4.3);

— the transition element(s) (see 4.4);

— the test ducts (see 4.5);

— the substitution duct (see 4.5);

— the measurement environment appropriate to the standard used to determine the sound power level.

NOTE 4 If ISO 3741 is used to determine the sound power level, a reverberation room is used (see 4.6). This is the preferred method.

4.2 Sound measuring equipment

The instrumentation system, including the microphone and cable, shall meet the requirements for a type 1 instrument specified in IEC 651 or, in the case of integrating-averaging sound level meters, the requirements of IEC 804. Filters shall meet the requirements of IEC 1260.

Before and after each series of measurements, a class 1 sound calibrator complying with IEC 942 with a tolerance of ± 0,3 dB shall be applied to the microphone for verifying the calibration of the entire measuring system at one or more frequencies over the frequency range of interest.

1) To be published. (Revision of IEC 225:1966.)

The compliance of the calibrator with the requirements of IEC 942 shall be verified once a year and the compliance of the instrumentation system with the requirements of IEC 651 (and IEC 804 in the case of integrating systems) shall be verified at least every 2 years in a laboratory making calibrations traceable to appropriate standards.

The date of the verification of the compliance with relevant IEC standards shall be recorded.

4.3 Sound source equipment

The sound source equipment shall be connected to the test duct in front of the test silencer. It shall consist of a noise generator, an amplifier and a loudspeaker unit.

As shown in figure 2, the loudspeaker unit shall consist of a 0,3 m (12 in) loudspeaker element mounted at the end of a 1,0 m long circular duct with a diameter of 0,4 m. The back of the loudspeaker shall be enclosed in a sealed cabinet filled with mineral wool. The loudspeaker unit is coupled to the test duct with a transition element.

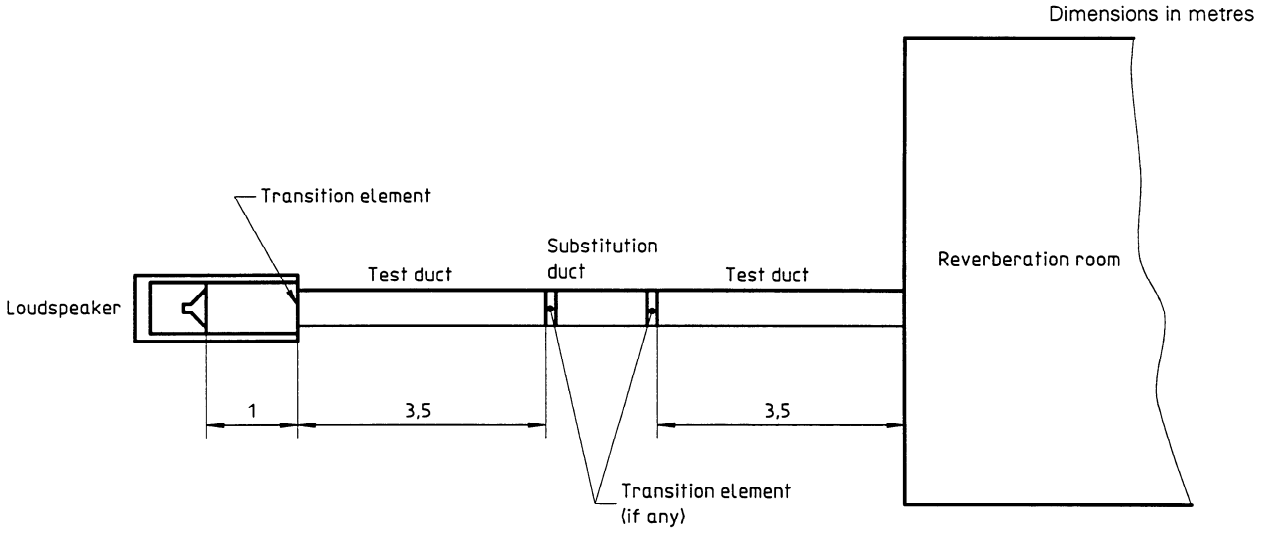

Figure 1 — Test facility

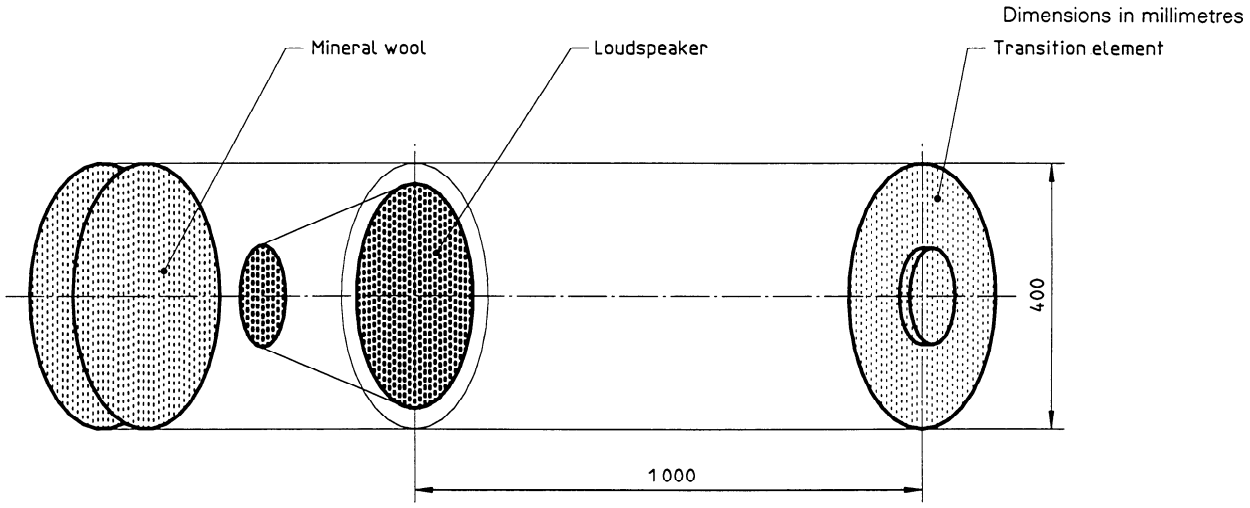

Figure 2 — Sound source