

Akustika. Summutite mõõtmised in situ

Acoustics - Measurements on silencers in situ

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 11820:2000 sisaldab Euroopa standardi EN ISO 11820:1996 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 11.01.2000 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 11820:2000 consists of the English text of the European standard EN ISO 11820:1996.</p> <p>This document is endorsed on 11.01.2000 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>Standard määrab kindlaks summutite in situ-mõõtmised. Standardit saab rakendada akustiliseks analüüsiks, heakskiidukontrolliks ja muudel samalaadsetel juhtudel kasutatavate summutite mõõtmisel.</p>	<p>Scope:</p>
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ICS 17.140.99

Võtmesõnad: akustika, akustilised katsed, akustilised mõõtmised, heakskiidukontroll, katsed, mootorimüra, müra (heli), müra vähendamine, summutid, tõhususkatsed, välikatsed

ICS 17.140.40; 91.140.30

Descriptors: Silencers, testing.

English version

Acoustics

**Measurements on silencers in situ
(ISO 11820:1996)**

Acoustique – Mesurages sur silencieux in situ (ISO 11820:1996)

Akustik – Messungen an Schalldämpfern im Einsatzfall (ISO 11820:1996)

This European Standard was approved by CEN on 1996-11-07 and is identical to the ISO Standard as referred to.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

International Standard

ISO 11820:1996 Acoustics – Measurements on silencers in situ,

which was prepared by ISO /TC 43 'Acoustics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 211 'Acoustics', the Secretariat of which is held by DS, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by June 1997 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 11820:1996 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

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1 Scope

1.1 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 D_{IS} , or
- transmission loss D_{TS} .

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.

Additional characteristic quantities, which could include measurements taken using artificial sound sources or measurements taken to determine the directivity of sound propagation from the silencer, may be agreed upon in accordance with this International Standard.

1.2 This International Standard is applicable to

- a) silencers which are installed either as a whole or in the form of individual baffles in the propagation path of sound (e.g. openings of ducts) originating from a sound source (machine, building, plant

such as a gas turbine generator, scrubbing plant, cooling tower, heating ventilation and air conditioning (HVAC) plant, exhaust stack, air intake duct, weapon, internal combustion engine, compressor, etc.);

- b) all types of passive silencers (absorptive, reactive, reflection and blowdown silencer);
- c) active silencers (involving amplifiers and loudspeakers) as far as the insertion loss of passive silencers is equivalent to the off/on conditions of active devices; and
- d) other measures or means of effecting acoustic attenuation in air or other gases (e.g. components installed in ducting, louvres, grilles and deflector hoods).

Additionally, this International Standard is applicable to the determination of the effect of cleaning or refurbishing silencers.

This International Standard is not applicable to closed high-pressure systems (e.g. silencers in closed pipes) since measurements of structure-borne sound are not anticipated.

1.3 Quantities to be measured include the following:

- a) sound pressure levels in octave bands with centre frequencies at least from 63 Hz to 4 kHz and, if possible and required, from 31,5 Hz to 8 kHz or in one-third-octave bands with centre frequencies from 50 Hz to 5 kHz and, if possible and required, from 25 Hz to 10 kHz
 - at a point or points on the source side of a silencer,
 - at a point or points on the receiver side of a silencer;
- b) static and dynamic pressures, flow velocities and temperatures at selected positions.

Operating data to be determined include flow rate, pressure and speed, which define the operating conditions of the machine or plant to be silenced.

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 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 5221:1984, *Air distribution and air diffusion — Rules to methods of measuring air flow rate in an air handling duct*.

IEC 651:1979, *Sound level meters*.

IEC 651:1979/Amd.1:1993, *Amendment No. 1*.

IEC 804:1985, *Integrating-averaging sound level meters*.

IEC 804:1985/Amd.1:1989, *Amendment No. 1*.

IEC 804:1985/Amd.2:1993, *Amendment No. 2*.

3 Definitions

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

3.1 transmission sound pressure level difference, D_{tps} : Difference, in decibels, between the mean sound pressure levels on the source and receiver side of a silencer:

$$D_{tps} = \overline{L_{p2}} - \overline{L_{p1}} \quad \dots (1)$$

where

$\overline{L_{p1}}$ is the mean sound pressure level (ref. 20 μ Pa), in decibels (in one-third-octave or octave bands, see IEC 1260), on the receiver side of the silencer, for all measuring points used to determine the airborne sound within the duct or propagated from the aperture and external surfaces of the silencer;

$\overline{L_{p2}}$ is the mean sound pressure level (ref. 20 μ Pa), in decibels (in one-third-octave or octave bands), on the source side of the silencer, for all measuring points used to determine the airborne sound reaching the silencer.

NOTE 2 D_{tps} is not self-standing but is an intermediate step towards determining the transmission loss (see 9.1.3).

Mean sound pressure levels $\overline{L_p}$ are defined by

$$\overline{L_p} = 10 \lg \left(\frac{1}{N} \sum_{j=1}^N 10^{0,1L_{pj}} \right) \text{ dB} \quad \dots (2)$$

where

L_{pj} is the individual level;

N is the number of measuring points.

3.2 insertion sound pressure level difference, D_{ips} : Difference, in decibels, in sound pressure levels measured at a point or averaged over a small measurement area before and after installation of a silencer:

$$D_{ips} = L_{pII} - L_{pI} \quad \dots (3)$$

where

L_{pI} is the sound pressure level (ref. 20 μ Pa), in decibels (in one-third-octave or octave bands, see IEC 1260), of the sound source(s) measured at a point or averaged over a small measurement area, after installation of the silencer;

L_{pII} is the sound pressure level (ref. 20 μ Pa), in decibels (in one-third-octave or octave bands), occurring at the same measuring point or over a small measurement area due to the sound source(s) to which the silencer is to be attached, before installation of the silencer.

NOTE 3 As opposed to D_{tps} , D_{ips} is restricted to a point or a small area where certain directivity indices of sound radiation with and without the silencer are effective. The reference to a small area with a diameter of about half a wavelength rather than a point may be useful to avoid strong effects of interference between direct and reflected waves which may occur at certain points.

3.3 transmission loss, D_{ts} : Difference, in decibels, between the levels of the sound power incident upon and transmitted from the silencer: