Akustika. Katse-eeskiri pöörlevate elektrimasinate õhumüra mõõtmiseks. Osa 2: Seiremeetod

Acoustics - Test code for measurement of airborne noise emitted by rotating electrical machinery - Part 2: Survey method

EESTI STANDARDIKESKUS
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NATIONAL FOREWORD

See Eesti standard EVS-EN 21680-2:1999 sisaldab Euroopa standardi EN 21680-2:1991 ingliskeelset teksti.	This Estonian standard EVS-EN 21680-2:1999 consists of the English text of the European standard EN 21680-2:1991.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 09.10.1991.	Date of Availability of the European standard is 09.10.1991.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English version

Acoustics - Test code for the measurement of airborne noise emitted by rotating electrical machinery - Part 2: Survey method (Identical with ISO 1680-2:1986)

Acoustique - Code d'essai pour le mesurage du bruit aérien émis par les machines tournantes - Partie 2: Méthode de controle (Identique à l'ISO 1680-2:1986)

Akustik - Verfahren zur Messung der Geräuschemission von rotierenden elektrischen Maschinen - Teil 2: Verfahren der Genauigkeitsklasse 3 (Identisch mit ISO 1680-2:1986)

This European Standard was approved by CEN on 1991-10-07 and is identical to the ISO standard as referred to.
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This European Standard exists 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.

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CEN

European Committee for Standardization
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Europäisches Komitee für Normung

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

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Foreword

This European Standard has been taken over by CEN/TC 211 "Acoustics" from the work of the International Organization for Standardization (ISO).

This document has been submitted to the formal vote and has been approved.

Natonal Standards identical to this European Standard shall be published at the latest by 92-04-09 and conflicting national standards shall be withdrawn at the latest 92-04-09.

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, United Kingdom.

Endorsement notice

The text of the International Standard ISO 1680-2:1986 has been approved by CEN as a European Standard without any modification.

International Standard 1680/2

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Acoustics — Test code for the measurement of airborne noise emitted by rotating electrical machinery — Part 2 : Survey method

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1680/2 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

It cancels and replaces ISO Recommendation R 1680-1970, of which it constitutes a technical revision.

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Acoustics — Test code for the measurement of airborne noise emitted by rotating electrical machinery — Part 2: Survey method

0 Introduction

This part of ISO 1680 is based on ISO 3746 and has been drafted in accordance with ISO 3740.

The main purpose of this part of ISO 1680 is to specify a survey method requiring less effort for the measurements than laid down in the engineering method (see ISO 1680/1) and which, in general, results in a lower grade of accuracy. It may also be applied in those cases where one or several conditions (such as operating conditions, number or positioning of microphones) for an otherwise engineering type of measurement cannot be obtained.

1 Scope and field of application

1.1 General

This part of ISO 1680 defines a measurement method for rotating electrical machines operating under steady noise conditions, the result of which can be expressed in sound power levels so that all machines tested using this code can be directly compared.

This part of ISO 1680 applies to the measurement of airborne noise from rotating electrical machines, such as motors and generators (d.c. and a.c. machines) of all sizes, when fitted with all auxiliaries which are necessary to achieve the agreed operating conditions (see clause 6).

This part of ISO 1680 requires the sound pressure levels to be measured on a rectangular parallelepiped surface enveloping the machines from which the A-weighted sound power level produced by the machine is calculated. It outlines the procedures which shall be used to evaluate the test environment and specifies the characteristics of suitable measuring instruments.

This part of ISO 1680 applies to measurements carried out in environmental conditions that meet the criteria given in clause 4 and annex A (environmental correction $K \leqslant 7$ dB, correction for background noise $\leqslant 3$ dB).

1.2 Measurement uncertainty

Measurements carried out in conformity with this part of ISO 1680 usually result in standard deviations which are equal to or less than those given in table 1.

Table 1 — Uncertainty in determining A-weighted sound power level by the survey method

Application	Standard deviation dB
For a source which produces sounds that contain prominent discrete tones	5
For a source which produces broad-band sounds without prominent discrete tones	4

NOTES

1 The standard deviations in table 1 include the effects of allowable variations in the positioning of the measurement positions and in the selection of the stipulated measurement surface.

2 The standard deviations given in table 1 reflect the cumulative effects of all causes of measurement uncertainty, excluding variations in the sound power level from test to test, which may be caused, for example, by changes in the mounting or operating conditions of the source. The reproducibility and repeatability of the test results may be considerably better (that is, smaller standard deviations) than the uncertainties given in table 1 would indicate.

3 If the method specified in this part of ISO 1680 is used to compare the A-weighted sound power levels of similar machines which radiate noise acoustically omnidirectional and broad-band in its character, the uncertainty in comparison tends to result in a standard deviation which is equal to or less than 3 dB, provided that the measurements are carried out in the same environment.

4 The standard deviations given in table 1 may be higher when the environmental correction, K, established in accordance with the procedure given in annex A, exceeds 7 dB.

2 References

ISO 354, *Acoustics — Measurement of sound absorption in a reverberation room.*

ISO 1680/1, *Acoustics — Test code for the measurement of airborne noise emitted by rotating electrical machinery — Part 1: Engineering method for free-field conditions over a reflecting plane.*

ISO 3740, *Acoustics — Determination of sound power levels of noise sources — Guidelines for the use of basic standards and for the preparation of noise test codes.*

ISO 3745, *Acoustics — Determination of sound power levels of noise sources — Precision methods for anechoic and semi-anechoic rooms.*

ISO 3746, *Acoustics — Determination of sound power levels of noise sources — Survey method.*

ISO 6926, *Acoustics — Determination of sound power levels of noise sources — Characterization and calibration of reference sound sources.* [1)]

IEC Publication 34-1, *Rotating electrical machines — Part 1: Rating and performance.*

IEC Publication 651, *Sound level meters.*

3 Definitions

For the purposes of this part of ISO 1680, the following definitions apply.

3.1 sound pressure level, L_p, in decibels: Twenty times the logarithm to the base 10 of the ratio of the sound pressure to the reference sound pressure. The weighting network used shall be indicated: for example, A-weighted sound pressure level, L_{pA}. The reference sound pressure is 20 µPa.

3.2 surface sound pressure level, $\overline{L_{pf}}$, in decibels: The sound pressure level averaged over the measurement surface and corrected as required in clause 8. The weighting network used shall be indicated: for example, A-weighted surface sound pressure level, $\overline{L_{pAf}}$. The reference sound pressure is 20 µPa.

3.3 sound power level, L_W, in decibels: Ten times the logarithm to the base 10 of the ratio of a given sound power to the reference sound power. The weighting network used shall be indicated: for example, A-weighted sound power level, L_{WA}. The reference sound power is 1 pW ($=10^{-12}$ W).

3.4 measurement surface: A hypothetical surface of area S enveloping the source on which the microphone positions are located and which terminates on the reflecting plane.

3.5 reference box: A hypothetical surface which is the smallest rectangular parallelepiped that just encloses the source and terminates on the reflecting plane.

3.6 measurement distance: The minimum distance between the reference box and the measurement surface.

3.7 background noise: The sound pressure level at each microphone position with the source inoperative.

4 Acoustic environment

4.1 Criteria for adequacy of the test environment

Test environments that meet the qualification requirements of annex A are suitable for measurements in accordance with this part of ISO 1680. The test environment shall be adequately isolated from extraneous noise (see 4.2).

To comply with this part of ISO 1680, the environmental correction K shall not exceed 7 dB.

4.2 Criterion for background noise

At each microphone position, the A-weighted sound pressure level of the background noise shall be at least 3 dB below the A-weighted sound pressure level with the source operating.

NOTE — Results determined with higher levels of background noise are not in accordance with this part of ISO 1680, but may be useful as an indication of the upper limit of the sound power level of the source.

The effects of noise sources other than the rotating electrical machine, for example coupled machinery (see 6.3) or wind (see 4.3) which may increase the background noise shall be minimized.

4.3 Wind

The wind velocity existing at the test site or caused by the machine under test shall be less than 6 m/s. A windscreen should be used for wind velocities above 1 m/s to ensure that the level of the background noise (caused by the cumulative effect of the wind and other background noise sources) is at least 3 dB below the level with the source operating.

5 Instrumentation

5.1 General

A sound level meter that meets the requirements for a type 1 instrument in accordance with IEC Publication 651 shall be used with the time weighting "S".

The observer shall not stand between the microphone and the source, the sound power level of which is being determined.

5.2 Calibration

At least before each series of measurements, an acoustical calibrator with an accuracy of ±0,5 dB shall be applied to the microphone to calibrate the entire measuring system, including cable, if used, at one or more frequencies. One calibration frequency shall be in the range from 250 to 1 000 Hz. The calibrator shall be checked annually to verify that its acoustical output has not changed.

1) At present at the stage of draft.