

Acoustics — Measurement of sound pressure level from service equipment in buildings — Engineering method

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National foreword

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The UK participation in its preparation was entrusted by Technical Committee EH/1, Acoustics, to Subcommittee EH/1/6, Building acoustics, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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Summary of pages

This document comprises a front cover, an inside front cover, the EN ISO title page, pages 2 to 23 and a back cover.

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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN ISO 16032:2004) has been prepared by Technical Committee CEN/TC 126 “Acoustic properties of building products and of buildings”, the secretariat of which is held by AFNOR, in collaboration with Technical Committee ISO/TC 43 “Acoustics”.

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of an identical text or by endorsement, at the latest by March 2005, and conflicting national standards shall be withdrawn at the latest by March 2005.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This document specifies the engineering method for the measurement of sound pressure level from service equipment in buildings. For use of this document measurements are performed under specified operation conditions and operating cycles. Such conditions are given in Annex B.

The operating conditions and operating cycles given in Annex B are only used if they are not opposed to national requirements and regulations.

1 Scope

This document specifies methods for measuring the sound pressure level from service equipment in buildings installed to building structures. This document covers specifically measurements of sanitary installations, mechanical ventilation, heating and cooling service equipment, lifts, rubbish chutes, boilers, blowers, pumps and other auxiliary service equipment, and motor driven car park doors, but can also be applied to other equipment attached to or installed in buildings.

The methods are suitable for rooms with volumes of approximately 300 m³ or less in e.g. dwellings, hotels, schools, offices and hospitals. The standard is not in general intended for measurements in large auditoria and concert halls. However, the operating conditions and operating cycles in Annex B can be used in such cases.

The service equipment sound pressure level is determined as the maximum *A*-weighted and optionally *C*-weighted sound pressure level occurring during a specified operation cycle of the service equipment under test, or as the equivalent continuous sound pressure level determined with a specified integration time. *A*-weighted and *C*-weighted values are calculated from octave-band measurements.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 60942, *Electroacoustics — Sound calibrators* (IEC 60942:2003).

EN 61260, *Electroacoustics — Octave-band and fractional-octave-band filters* (IEC 61260:1995).

EN 61672-1, *Electroacoustics - Sound level meters - Part 1: Specifications* (IEC 61672-1:2002).

EN 61672-2, *Electroacoustics - Sound level meters - Part 2: Pattern evaluation tests* (IEC 61672-2:2003).

EN ISO 3382, *Acoustics - Measurement of the reverberation time of rooms with reference to other acoustical parameters* (ISO 3382:1997).

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

sound pressure level

L

ten times the logarithm to the base 10 of the ratio of the square of the sound pressure, $p^2(t)$, to the square of the reference sound pressure p_0^2 , measured with a particular time weighting and a particular frequency weighting, selected from those defined in EN 61672-1. It is expressed in decibels. The reference sound pressure is 20 µPa

3.2**average sound pressure level** $\bar{L}$

$$\bar{L} = 10 \lg \left(\frac{\sum_{i=1}^n 10^{0,1 \times L_i}}{n} \right) \text{ dB} \quad (1)$$

where

L_i is the sound pressure level at different microphone positions, in decibels, to be averaged

3.3**A- weighted sound pressure level calculated from octave-band values in the frequency range 63 Hz to 8 000 Hz** L_A

$$L_A = 10 \lg \sum_{i=1}^n 10^{0,1(L_i + A_i)} \text{ dB} \quad (2)$$

where

L_i is the sound pressure level in octave-band i , and A_i is the A -weighting correction for octave-band i (see Annex A). The value of L_i depends on the measurements, but can be all the parameters of 3.6

3.4**C- weighted sound pressure level calculated from octave-band values in the frequency range 31,5 Hz to 8 000 Hz** L_C

$$L_C = 10 \lg \sum_{i=1}^n 10^{0,1(L_i + C_i)} \text{ dB} \quad (3)$$

where

L_i is the sound pressure level in octave-band i , and C_i is the C -weighting correction for octave-band i (see Annex A). The value of L_i depends on the measurements, but can be all the parameters of 3.6