BS EN ISO 1683:2015

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Acoustics — Preferred reference values for acoustical and vibratory levels

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National foreword

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Acoustics - Preferred reference values for acoustical and vibratory levels (ISO 1683:2015)

Acoustique - Valeurs de référence recommandées pour les niveaux acoustiques et vibratoires (ISO 1683:2015)

Akustik - Bevorzugte Bezugswerte für Pegel in der Akustik und Schwingungstechnik (ISO 1683:2015)

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Foreword

This document (EN ISO 1683:2015) has been prepared by Technical Committee ISO/TC 43 “Acoustics” in collaboration with Technical Committee CEN/TC 211 “Acoustics” the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by November 2015, and conflicting national standards shall be withdrawn at the latest by November 2015.

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.

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 43, *Acoustics*.

This third edition cancels and replaces the second edition (ISO 1683:2008), which has been technically revised.

Introduction

Various kinds of acoustical and vibratory levels expressed in decibels are commonly used in acoustics. In order to establish a uniform basis for the expression of those levels, a set of agreed reference values is needed.

The reference value determines whether the level for a particular quantity is positive or negative. For general measurements and many engineering specifications, it is desirable that levels of a given kind be consistently positive (or consistently negative) rather than both positive and negative.

In general, a reference value is expressed as the number one and a derived SI unit formed by the use of an appropriate SI prefix.

The values specified in this International Standard represent the values internationally adopted.

For airborne sound, a special reference value for sound pressure is stated according to widespread use and legal implications.

INTERNATIONAL STANDARD **ISO 1683:2015(E)**

Acoustics — Preferred reference values for acoustical and vibratory levels

1 Scope

This International Standard specifies reference values used in acoustics, in order to establish a uniform basis for the expression of acoustical and vibratory levels.

The reference values are mandatory for use in acoustics for sounds in air and other gases, sounds in water and other liquids, and for structure-borne sound, but can also be used in other applications.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable to its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2041, *Mechanical vibration, shock and condition monitoring — Vocabulary*

ISO/TR 25417, *Acoustics — Definitions of basic quantities and terms*

ISO 80000-8, *Quantities and units — Part 8: Acoustics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2041, ISO/TR 25417, ISO 80000-8, and the following apply.

3.1
reference value
quantity value used as a basis for comparison with values of quantities of the same kind

[SOURCE: ISO/IEC Guide 99:2007, 5.18]

Note 1 to entry: For the purposes of this International Standard, a reference value is expressed in terms of a number and an appropriate unit of measurement used to form a ratio of dimension one when defining a logarithmic quantity.

4 Specifications

4.1 Reference values for airborne sound quantities

Reference values for various sound quantities in air and other gases are given in Table 1.

Table 1 — Reference values for sound quantities in air and gases

Quantity	Reference value[a]
Sound pressure	20 µPa
Sound exposure	$(20\ \mu Pa)^2$ s
Sound power	1 pW
Sound energy	1 pJ
Sound intensity	1 pW/m^2

[a] The reference value used to establish a level for a certain acoustical quantity should always be stated together with the respective level.

4.2 Reference values for sound quantities in liquids

Reference values for various sound quantities in water and other liquids are given in Table 2.

Table 2 — Reference values for sound quantities in water and other liquids

Quantity	Reference value[a]
Sound pressure[b]	1 µPa
Sound exposure	1 µPa^2 s
Sound power	1 pW
Sound energy	1 pJ
Sound intensity	1 pW/m^2
Sound particle displacement	1 pm
Sound particle velocity	1 nm/s
Sound particle acceleration	1 µm/s^2
Distance[c]	1 m

[a] The reference value used to establish a level for a certain acoustical quantity should always be stated together with the respective level.

[b] A sound pressure level with a reference value of 1 µPa is numerically 10 $\lg(20^2/1^2)$ dB, which is approximately 26,0 dB greater than the sound pressure level for the same sound pressure but with a reference value of 20 µPa.

[c] The reference value for distance is used to form reference values for compound quantities, such as the product of sound pressure and distance (for which the reference value is 1 µPa m) or sound exposure and squared distance (for which the reference value is 1 µPa^2 m^2 s). Ratios of these compound quantities to other sound quantities lead to further compound quantities with dimensions of distance (with reference value 1 m) or area (with reference value 1 m^2).

4.3 Reference values for vibratory quantities

Reference values for various vibratory quantities are given in Table 3.

Table 3 — Reference values for vibratory quantities

Quantity	Reference value[a]
Vibratory displacement	1 pm
Vibratory velocity[b]	1 nm/s
Vibratory acceleration	1 $\mu m/s^2$
Vibratory force	1 µN

[a] The reference value used to establish a level for a certain vibratory quantity should always be stated together with the respective level.

[b] In connection with structure-borne sound, a reference value of 50 nm/s is also in use. In this event, the vibratory velocity level takes values close to the associated sound pressure and sound intensity levels.

Bibliography

[1] ISO/IEC Guide 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

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