
**Acoustics — Measurement of speech
level reduction of furniture ensembles
and enclosures —**

**Part 1:
Laboratory method**

*Acoustique — Mesure de la réduction du niveau de la parole par les
ensembles de meubles et les enceintes —*

Partie 1: Méthode de laboratoire



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Published in Switzerland

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

A list of all parts in the ISO 23351 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

An increasing number of office occupants are working in open-plan offices and activity-based offices. Occupants attempting to concentrate on independent tasks are easily distracted by surrounding speech. In addition, many communications require speech privacy, which is difficult to achieve in an occupied office without moving to a place providing enhanced sound isolation to the surrounding spaces.

Examples of furniture ensembles are conventional workstations, working pods, meeting pods, partially enclosed sofa groups and partially enclosed chairs. Examples of enclosures are mobile phone booths for a single occupant, mobile working booths for 1 to 2 occupants and mobile meeting booths for up to 6 occupants. Enclosures are usually equipped with a door, electric outlets, lighting, glazing and a ventilation fan.

Both furniture ensembles and enclosures (herein called "product") are assembled on site using elements which can be transferred into any room through normal-sized passage doors. They are not fixtures and they are usually purchased and owned by the user. They are not treated as a fixed part of the building and, therefore, they are beyond the scope of building regulations. Products are typically assembled in a finished room and not during the construction of the building.

The diversity and the market of above-mentioned products has grown. However, present acoustic test standards, such as ISO 354, ISO 11654 or ISO 20189, cannot be applied to describe the acoustic performance of these products because they have a special purpose of providing local enhanced speech privacy for a single occupant or a group of occupants. In addition, the products can be either open, partially enclosed or fully enclosed with a door. Both open and enclosed products should preferably be tested with the same method since the market needs a procedure to compare different products, which are designed for the same purpose. Therefore, the application of existing standards describing sound insulation measurements, such as ISO 10140-2, ISO 16283-1, ISO 10052, ISO 11546-1 or ISO 11957, are not applicable. There are also methods for describing the properties of screens (see ISO 10053, ISO 11821, or ISO 10847) but they are not applicable for describing the acoustic performance of an entire workstation nor an enclosure. The lack of a harmonized test standard which would be suitable for both furniture ensembles and enclosures has caused confusion and frustration among acousticians, furniture manufacturers, office designers and users.

This document provides a method to determine the potential for speech level reduction of furniture ensembles and enclosures which are intended to provide increased speech privacy for an occupant speaking inside the product. The main outcome of this document is a single-number quantity, the speech level reduction. It is tied to standard effort speech because it is the most probable sound produced inside a product. The speech level reduction describes how much the A-weighted sound power level of occupant's speech is reduced when the speaking occupant moves inside the product. The speech level reduction is a standardized technical value which can be used to compare the acoustical effect of different products in regard of their abilities to reduce the A-weighted sound power level of speech. It enables ranking of alternative products.

The level reduction obtained by this document is independent from the environment because it is based on repeated sound power level measurements. However, the reduction of sound pressure level in situ in a specified position can be larger than the level reduction obtained by this method if the room contains large amounts of sound absorption materials and/or screens, or if the openings of the product are oriented to the opposite direction than the position under interest.

Acoustics — Measurement of speech level reduction of furniture ensembles and enclosures —

Part 1: Laboratory method

1 Scope

This document specifies a laboratory method to facilitate the comparison of furniture ensembles and enclosures with respect to their ability to reduce the speech level of the occupant speaking inside the product.

In this method, the sound power level is measured in two scenarios: 1) without the product, and 2) with the product. During scenario 1), the test signal is produced by the sound source in an empty room while the product is absent. During scenario 2), the test signal is produced by the sound source inside the product in the occupant's position. Level reduction is the difference of the sound power levels measured in the two scenarios in 1/1-octave frequency bands from 125 Hz to 8 000 Hz. Speech level reduction is a single-number quantity that expresses the corresponding reduction in A-weighted sound power level of standard speech within the entire frequency range from 125 Hz to 8 000 Hz.

The method is applicable for entire furniture ensembles or enclosures, which form a unity that serves one or several occupants, and which are also used to provide improved speech privacy.

This method is not intended for single components used in workstations, such as a screen, a storage unit, a table, a luminaire, a cupboard, a bookshelf, a standard chair, a wall absorber or a ceiling absorber.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 3741, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for reverberation test rooms*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

artificial mouth

instrument primarily used as the sound source inside the test specimen for measuring the *level reduction* (3.4)

Note 1 to entry: Requirements for an artificial mouth are specified in ITU-T P.51.