

This is a preview of "ISO 3382-2:2008". [Click here to purchase the full version from the ANSI store.](#)

First edition
2008-06-15

Acoustics — Measurement of room acoustic parameters —

Part 2:

Reverberation time in ordinary rooms

*Acoustique — Mesurage des paramètres acoustiques des salles —
Partie 2: Durée de réverbération des salles ordinaires*



Reference number
ISO 3382-2:2008(E)

© ISO 2008

This is a preview of "ISO 3382-2:2008". [Click here to purchase the full version from the ANSI store.](#)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

This is a preview of "ISO 3382-2:2008". [Click here to purchase the full version from the ANSI store.](#)

Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	1
4 Measurement conditions	2
4.1 General.....	2
4.2 Equipment	3
4.3 Measurement positions.....	4
5 Measurement procedures	5
5.1 General.....	5
5.2 Interrupted noise method	5
5.3 Integrated impulse response method.....	6
6 Evaluation of decay curves	7
7 Measurement uncertainty	7
7.1 Interrupted noise method	7
7.2 Integrated impulse response method.....	8
7.3 Lower limits for reliable results caused by filter and detector	8
8 Spatial averaging	8
9 Statement of results	9
9.1 Tables and curves.....	9
9.2 Test report	9
Annex A (informative) Measurement uncertainty	10
Annex B (informative) Evaluation of non-linear decay curves	14
Annex C (informative) Formulas for the least-squares fit method.....	16
Bibliography	17

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 3382-2 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

ISO 3382-2, together with ISO 3382-1 and ISO 3382-3, cancel and replace ISO 3382:1997.

ISO 3382 consists of the following parts, under the general title *Acoustics — Measurement of room acoustic parameters*:

- *Part 1: Performance rooms*
- *Part 2: Reverberation time in ordinary rooms*

The following part is in preparation:

- *Part 3: Open plan spaces*

This is a preview of "ISO 3382-2:2008". [Click here to purchase the full version from the ANSI store.](#)

Introduction

This part of ISO 3382 specifies three levels of measurement accuracy: survey; engineering; and precision. The main difference concerns the number of measurement positions and thus the time required for the measurements. Annex A contains some additional information about the measurement uncertainty of the reverberation time. The introduction of the option of a survey measurement is intended to promote more frequent measurement of reverberation time in rooms where it is relevant. It is obvious that a very simple measurement is better than no measurement.

There are several reasons to measure reverberation time. First, the sound pressure level from noise sources, the intelligibility of speech, and the perception of privacy in a room are strongly dependent on reverberation time. Rooms may include domestic rooms, stairways, workshops, industrial plants, classrooms, offices, restaurants, exhibition centres, sports halls, and railway and airport terminals. Second, reverberation time is measured to determine the correction term for room absorption inherent in many acoustic measurements, such as sound insulation measurements according to ISO 140 (all parts) and sound power measurements according to ISO 3740.

In some countries, building codes specify the required reverberation times in classrooms and other categories of room. However, in the vast majority of rooms, it is left to the design team to specify and design for a reverberation time that is reasonable for the purpose of a room. This part of ISO 3382 is intended to contribute to the general understanding and acceptance of reverberation time for room quality and usability.

Two different evaluation ranges are defined in this part of ISO 3382, 20 dB and 30 dB. However, a preference has been given to the 20 dB evaluation range for several reasons:

- a) the subjective evaluation of reverberation is related to the early part of the decay;
- b) for the estimation of the steady-state sound level in a room from its reverberation time, it is appropriate to use the early part of the decay: and
- c) the signal-to-noise ratio is often a problem in field measurements, and it is often difficult or impossible to get a evaluation range of more than 20 dB. This requires a signal-to-noise level of at least 35 dB.

The traditional measuring technique is based on visual inspection of every single decay curve. With modern measuring equipment, the decay curves are normally not displayed and this may introduce a risk that abnormal decay curves are used for the determination of the reverberation time. For this reason, Annex B introduces two new measures that quantify the degree of non-linearity and the degree of curvature of the decay curve. These measures may be used to give warnings when the decay curve is not linear, and consequently the result should be marked as less reliable and not having a unique reverberation.

The use of rotating microphones during the measurement of decay curves has been considered by the working group, and this procedure is found to be without a clear physical meaning and thus it is only accepted for the interrupted noise method and only when the result is used for a correction term.

For other reverberation time measurements, ISO 3382-1 covers auditoria and performance spaces, and ISO 354 absorption coefficient measurements in a reverberation room. Neither ISO 3382-1 nor ISO 354 is suitable for measurements in rooms like those mentioned above. Thus, this part of ISO 3382 fills a gap among measurement standards for acoustic properties of buildings.

This part of ISO 3382 does not repeat the technical details of ISO 3382-1, but deals with the measurement of reverberation time, only, in any kind of room.