

This is a preview of "ISO 1996-1:2016". [Click here to purchase the full version from the ANSI store.](#)

Third edition  
2016-03-01

---

---

# Acoustics — Description, measurement and assessment of environmental noise —

## Part 1: Basic quantities and assessment procedures

*Acoustique — Description, mesurage et évaluation du bruit de  
l'environnement —*

*Partie 1: Grandeurs fondamentales et méthodes d'évaluation*



Reference number  
ISO 1996-1:2016(E)

© ISO 2016



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

This is a preview of "ISO 1996-1:2016". Click here to purchase the full version from the ANSI store.

## Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
3.1 Expression of levels.....	2
3.2 Time intervals.....	3
3.3 Ratings.....	4
3.4 Sound designations.....	4
3.5 Impulsive sound sources.....	6
3.6 Day, evening, night sound levels.....	6
<b>4 Symbols</b> .....	<b>7</b>
<b>5 Descriptors for environmental noise(s)</b> .....	<b>8</b>
5.1 Single events.....	8
5.1.1 Descriptors.....	8
5.1.2 Event duration.....	8
5.2 Repetitive single events.....	8
5.3 Continuous sound.....	9
<b>6 Noise annoyance</b> .....	<b>9</b>
6.1 Descriptors for community noise.....	9
6.2 Frequency weightings.....	9
6.3 Adjusted levels.....	9
6.3.1 Adjusted sound exposure levels.....	9
6.3.2 Adjusted equivalent continuous sound pressure level.....	10
6.4 Rating levels.....	10
6.4.1 One sound source.....	10
6.4.2 Combined sources.....	10
6.5 Composite whole-day rating levels.....	11
<b>7 Noise limit requirements</b> .....	<b>11</b>
7.1 General.....	11
7.2 Specifications.....	12
7.2.1 Noise descriptors.....	12
7.2.2 Relevant time intervals.....	12
7.2.3 Sound sources and their operating conditions.....	12
7.2.4 Locations.....	12
7.2.5 Propagation conditions.....	13
7.2.6 Uncertainties.....	13
<b>8 Reporting assessments of environmental noise(s) and estimation of long-term community annoyance response</b> .....	<b>13</b>
8.1 Estimation of long-term annoyance response of communities.....	13
8.2 Test report.....	13
<b>Annex A (informative) Adjustments for sound source rating levels</b> .....	<b>15</b>
<b>Annex B (informative) High-energy impulse sounds</b> .....	<b>20</b>
<b>Annex C (informative) Sounds with strong low-frequency content</b> .....	<b>22</b>
<b>Annex D (informative) Relationships to estimate the percentage of a population highly annoyed and the 95 % prediction interval as a function of adjusted day-evening-night and day-night sound levels</b> .....	<b>24</b>
<b>Annex E (informative) Estimated prevalence of a population highly annoyed as a function of adjusted day-evening-night or day-night sound levels using the community</b> .....	<b>24</b>

This is a preview of "ISO 1996-1:2016". [Click here to purchase the full version from the ANSI store.](#)

<b>tolerance level formulation</b> .....	<b>26</b>
<b>Annex F (informative) Estimated prevalence of a population highly annoyed as a function of adjusted day-evening-night or day-night sound level using a regression formulation</b> .....	<b>33</b>
<b>Annex G (informative) Annoyance caused by exposure to sound in multi-source environments</b> .....	<b>39</b>
<b>Annex H (informative) Theory-based approach to predict the growth of annoyance</b> .....	<b>41</b>
<b>Bibliography</b> .....	<b>45</b>

This is a preview of "ISO 1996-1:2016". [Click here to purchase the full version from the ANSI store.](#)

## 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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*, Subcommittee SC 1, *Noise*.

This third edition cancels and replaces the second edition (ISO 1996-1:2003), which has been technically revised. In particular, the following subclauses and annexes have been added or revised: [3.6](#), [6.3.1](#), [6.5](#), [8.1](#), [8.2.1 i](#)), [Annex A](#), [Annex D](#), [Annex E](#), [Annex F](#), [Annex G](#), and [Annex H](#).

ISO 1996 consists of the following parts, under the general title *Acoustics — Description, measurement and assessment of environmental noise*:

- *Part 1: Basic quantities and assessment procedures*
- *Part 2: Determination of sound pressure levels*

## Introduction

To be of practical use, any method of description, measurement, and assessment of environmental noise is intended to be related in some way to what is known about human response to noise. Many adverse consequences of environmental noise increase with increasing noise, but the precise dose-response relationships involved continue to be the subject of scientific debate. In addition, it is important that all methods used be practicable within the social, economic, and political climate in which they are used. For these reasons, there is a very large range of different methods in use around the world for different types of noise, and this creates considerable difficulties for international comparison and understanding.

The broad aim of the ISO 1996 series is to contribute to the international harmonization of methods of description, measurement, and assessment of environmental noise from all sources.

The methods and procedures described in this part of ISO 1996 are intended to be applicable to noise from various sources, individually or in combination, which contribute to the total exposure at a site. At the stage of technology at the time of publication of this part of ISO 1996, the evaluation of long-term noise annoyance seems to be best met by adopting the adjusted A-weighted equivalent continuous sound pressure level, which is termed a "rating level".

The aim of the ISO 1996 series is to provide authorities with material for the description and assessment of noise in community environments. Based on the principles described in this part of ISO 1996, national standards, regulations, and corresponding acceptable limits for noise can be developed.