

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Workplace atmospheres –
Part 1: Gas detectors – Performance requirements of detectors for toxic gases**

**Atmosphères des lieux de travail –
Partie 1: Détecteurs de gaz – Exigences d'aptitude à la fonction des détecteurs
de gaz toxiques**

IEC 62990-1:2019

<https://standards.iteh.ai/catalog/standards/iso/847a73f5-c66b-40ef-97fb-7031658dff96/iec-62990-1-2019>



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2019 IEC, Geneva, Switzerland

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 IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

<https://standards.iteh.ai/catalog/standards/iso/847a73f5-c66b-40ef-97fb-7031658dff96/iec-62990-1-2019>



IEC 62990-1

Edition 1.0 2019-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Workplace atmospheres –
Part 1: Gas detectors – Performance requirements of detectors for toxic gases

Atmosphères des lieux de travail –
Partie 1: Détecteurs de gaz – Exigences d'aptitude à la fonction des détecteurs
de gaz toxiques

IEC 62990-1:2019

<https://standards.iteh.ai/catalog/standards/iso/847a73f5-c66b-40ef-97fb-7031658dff96/iec-62990-1-2019>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.260.20

ISBN 978-2-8322-7080-6

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	8
3 Terms and definitions	8
4 General requirements	16
4.1 Overview.....	16
4.2 Design	17
4.2.1 General	17
4.2.2 Indicating devices	17
4.2.3 Alarm signal	19
4.2.4 Fault signals	19
4.2.5 Adjustments.....	20
4.2.6 Battery-powered equipment	20
4.2.7 Gas detection transmitter for use with separate gas detection control units	20
4.2.8 Separate gas detection control units for use with gas detection transmitter(s)	21
4.2.9 Software-controlled equipment	21
4.3 Labelling and marking.....	22
4.4 Instruction manual	23
5 Test methods.....	25
5.1 General.....	25
5.2 General requirements for tests	26
5.2.1 Samples and sequence of tests	26
5.2.2 Preparation of equipment before each test.....	27
5.2.3 Mask for calibration and test.....	28
5.3 Normal conditions for test	28
5.3.1 General	28
5.3.2 Test gas(es)	28
5.3.3 Flow rate for test gases	28
5.3.4 Power supply.....	29
5.3.5 Temperature.....	29
5.3.6 Pressure.....	29
5.3.7 Humidity	29
5.3.8 Acclimation time	29
5.3.9 Orientation.....	29
5.3.10 Communications options.....	29
5.3.11 Gas detection equipment as part of systems.....	30
5.4 Tests	30
5.4.1 General	30
5.4.2 Unpowered storage	30
5.4.3 Measurement of deviations	31
5.4.4 Mechanical tests.....	31
5.4.5 Environmental tests	33
5.4.6 Performance tests	36
5.4.7 Electrical tests	41

5.4.8	Stability	44
5.4.9	Fault signal tests	45
5.4.10	Software controlled equipment.....	46
5.4.11	Protection against water	46
6	Uncertainty of measurement and lower limit of measurement for type HM equipment	47
6.1	General.....	47
6.2	Method of calculation of uncertainty of measurement	47
6.2.1	Basic concept	47
6.2.2	Sources of uncertainty	48
6.2.3	Calculation of relative expanded uncertainty	53
6.3	Method of calculation of lower limit of measurement	54
6.4	Acceptance criteria	55
6.4.1	Uncertainty of measurement	55
6.4.2	Lower limit of measurement	55
6.5	Relation between uncertainty and accuracy	55
Annex A	(normative) Gas specific performance requirements	56
Annex B	(informative) Determination of time of response and time of recovery	57
B.1	Aspirated equipment	57
B.1.1	Test rig	57
B.1.2	Equipment without internal pump	57
B.1.3	Equipment with internal pump	57
B.2	Equipment that samples by diffusion	58
B.2.1	Calibration mask method	58
B.2.2	Diffusion or flow methods	58
Bibliography		60
Figure 1	– Relationship between indication range and measuring range	14
Figure 2	– Warm-up time in clean air (typical)	15
Figure 3	– Warm-up time in standard test gas (typical)	15
Figure 4	– Example of zero uncertainty	16
Figure B.1	– Schematic example of test rig for use with aspirated equipment.....	58
Figure B.2	– Schematic example of test chamber for diffusion method	59
Figure B.3	– Schematic example of test chamber for flow method	59
Table 1	– Factors to be considered in the expanded uncertainty estimate	48
Table A.1	– Gas specific performance requirements	56

IEC 62990-1:2019

<https://standards.iteh.ai/catalog/standards/iso/847a73f5-c66b-40ef-97fb-7031658dff96/iec-62990-1-2019>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WORKPLACE ATMOSPHERES –**Part 1: Gas detectors –
Performance requirements of detectors for toxic gases****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62990-1 has been prepared by Joint Working Group (JWG) 45 of IEC technical committee 31: Equipment for explosive atmospheres in cooperation with ISO technical committee 146: Air quality, sub-committee 2: Workplace atmospheres.

It is published as a dual logo standard.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
31/1463/FDIS	31/1480/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62990 series, published under the general title *Workplace atmospheres*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of December 2019 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 62990-1:2019](https://standards.iteh.ai/catalog/standards/iso/847a73f5-c66b-40ef-97fb-7031658dff96/iec-62990-1-2019)

<https://standards.iteh.ai/catalog/standards/iso/847a73f5-c66b-40ef-97fb-7031658dff96/iec-62990-1-2019>