

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Expression of performance of gas analyzers –
Part 1: General**

**Expression des performances des analyseurs de gaz –
Partie 1: Généralités**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2010 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 la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: 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 corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

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 It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

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

A propos des publications CEI

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

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Expression of performance of gas analyzers –
Part 1: General**

**Expression des performances des analyseurs de gaz –
Partie 1: Généralités**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

W

ICS 19.080; 71.040.40

ISBN 978-2-88910-947-0

CONTENTS

FOREWORD.....	4
1 Scope and object.....	6
2 Normative references	7
3 Terms and definitions	7
3.1 General.....	7
3.2 Basic terms and definitions.....	8
3.3 General terms and definitions of devices and operations	11
3.4 Terms and definitions on manners of expression	15
3.5 Specific terms and definitions for gas analyzers	18
4 Procedure for specification	20
4.1 Specification of values and ranges	20
4.2 Operation, storage and transport conditions	21
4.3 Performance characteristics requiring statements of rated values	21
4.4 Uncertainty limits to be stated for each specified range	22
4.4.1 General	22
4.4.2 Limits of intrinsic uncertainty	22
4.4.3 Variations	22
4.5 Other performance characteristics.....	23
5 Procedure for compliance testing	23
5.1 General.....	23
5.1.1 Compliance tests	23
5.1.2 Test instruments.....	23
5.1.3 Test instrument uncertainties.....	23
5.1.4 Influence quantities	24
5.1.5 Operational conditions.....	24
5.2 Calibration gases	24
5.3 Adjustments made during tests.....	24
5.4 Reference conditions during measurement of intrinsic uncertainty.....	24
5.5 Reference conditions during measurement of influence quantity.....	24
5.6 Testing procedure	25
5.6.1 General	25
5.6.2 Intrinsic uncertainty	25
5.6.3 Linearity uncertainty	25
5.6.4 Repeatability	26
5.6.5 Output fluctuation	26
5.6.6 Drift.....	27
5.6.7 Delay time, rise time and fall time	27
5.6.8 Warm-up time.....	28
5.6.9 Interference uncertainty.....	28
5.6.10 Variations	29
Annex A (informative) Recommended standard values of influence – Quantities affecting performance from IEC 60359.....	31
Annex B (informative) Performance characteristics calculable from drift tests	37
Bibliography.....	38
Figure 1 – Rise and fall times	20

Figure 2 – Output fluctuations	26
Table A.1 – Mains supply voltage	35
Table A.2 – Mains supply frequency	35
Table A.3 – Ripple of d.c. supply	36
Table B.1 – Data: applied concentration 1 000 units	37

Currently in preview, click buy full version

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPRESSION OF PERFORMANCE OF GAS ANALYZERS –

Part 1: General

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 61207-1 has been prepared by subcommittee 65B: Devices and process analysis, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 1994 and constitutes a technical revision.

The significant technical changes with respect to the first edition are the following:

- a) All references (normative and informative) have been updated, deleted or added, as appropriate.
- b) All the terms and definitions relating to this International Standard have been updated.
- c) All references to "errors" have been replaced by "uncertainties" and appropriate updated definitions applied.
- d) Where only one value is quoted for a performance specification, such as intrinsic uncertainty, linearity uncertainty or repeatability throughout a measurement range, this

has now been defined as the maximum value, rather than an average or “representative” value. This was previously undefined.

- e) Where zero and 100 % span calibration gases are used, there is now a defined requirement that the analyser must be able to respond within its standard performance specifications beyond its normal measurement range, to allow for any under or over response of the instrument to be recorded.
- f) A new Annex A has been added giving recommended standard values of influence.

The text of this standard is based on the following documents:

FDIS	Report on voting
65B/741/FDIS	65B/752/RVD

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

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

A list of all parts of the IEC 61207 series, under the general title *Expression of performance of gas analyzers*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under ["http://webstore.iec.ch"](http://webstore.iec.ch) in the data related to the specific publication. At this date, the publication will be

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

EXPRESSION OF PERFORMANCE OF GAS ANALYZERS –

Part 1: General

1 Scope and object

This part of IEC 61207 is applicable to gas analyzers used for the determination of certain constituents in gaseous mixtures.

This part of IEC 61207 specifies the terminology, definitions, requirements for statements by manufacturers and tests that are common to all gas analyzers. Other international standards in this series, for example IEC 61207-2, describe those aspects that are specific to certain types (utilizing high-temperature electrochemical sensors).

This part IEC 61207 is in accordance with the general principles set out in IEC 60359 and IEC 60770.

This standard is applicable to analyzers specified for permanent installation in any location (indoors or outdoors) and to such analyzers utilizing either a sample handling system or an *in situ* measurement technique.

This standard is applicable to the complete analyzer when supplied by one manufacturer as an integral unit, comprised of all mechanical, electrical and electronic portions. It also applies to sensor units alone and electronic units alone when supplied separately or by different manufacturers.

For the purposes of this standard, any regulator for mains-supplied power or any non-mains power supply, provided with the analyzer or specified by the manufacturer, is considered part of the analyzer whether it is integral with the analyzer or housed separately.

Safety requirements are dealt with in IEC 61010-1.

If one or more components in the sample is flammable, and air or another gas mixture containing oxygen or other oxidizing component is present, then the concentration range of the reactive components are limited to levels which are not within flammability limits.

Standard range of analogue d.c. current and pneumatic signals used in process control systems are dealt with in IEC 60381-1 and IEC 60382.

Specifications for values for the testing of influence quantities can be found in IEC 60654.

Requirements for documentation to be supplied with instruments are dealt with in IEC 61187.

Requirements for general principles concerning quantities, units and symbols are dealt with in ISO 1000. See also ISO 31-0.

This part of IEC 61207 does not apply to:

- accessories such as recorders, analogue-to-digital converters or data acquisition systems used in conjunction with the analyzer, except that when two or more such analyzers are combined and sold as a subsystem and a single electronic unit is supplied to provide continuous measurement of several properties, that read-out unit is considered to be part of the analyzer. Similarly, e.m.f.-to-current or e.m.f.-to-pressure converters which are an integral part of the analyzer are included.