

INTERNATIONAL STANDARD

IEC 60746-1

Second edition
2003-01

Expression of performance of electrochemical analyzers –

Part 1: General

*Expression des qualités de fonctionnement
des analyseurs électrochimiques –*

*Partie 1:
Généralités*

© IEC 2003 — Copyright - all rights reserved

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 the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

T

For price, see current catalogue

CONTENTS

FOREWORD	3
INTRODUCTION	4
1 Scope	5
2 Normative references.....	5
3 Terms and definitions	6
4 Comparison of IEC Standards for Specification and Evaluation.....	10
5 Procedure for specification	11
5.1 Specification of values and ranges	11
5.2 General	11
5.3 Performance characteristics requiring statements of rated values	12
5.4 Uncertainty limits to be stated for each specified range	12
5.5 Other performance characteristics	13
6 Verification of values	13
6.1 General	13
6.2 Test procedures.....	15
6.2.1 Intrinsic uncertainty.....	15
6.2.2 Linearity uncertainty.....	15
6.2.3 Repeatability.....	15
6.2.4 Output fluctuation	15
6.2.5 Drift	15
6.2.6 Delay (T_{10}) and 90 % (T_{90}) response times	16
6.2.7 Warm-up time	16
6.2.8 Variations	16
6.2.9 Primary influence quantities	17
6.2.10 Other influence quantities	17
Annex A (informative) Recommended standard values of influence – Quantities affecting performance from IEC 60359	19

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPRESSION OF PERFORMANCE OF ELECTROCHEMICAL ANALYZERS –

Part 1: General

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60746-1 has been prepared by subcommittee 65D: Analysing equipment, of IEC technical committee 65: Industrial-process measurement and control.

This second edition cancels and replaces the first edition published in 1982 and constitutes a technical revision.

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

FDIS	Report on voting
65D/89A/FDIS	65D/93/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.

For this second edition, the text has been changed to reflect revision and introduction of International Standards since 1982. An Informative Annex A has been introduced.

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

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

INTRODUCTION

This standard specifies the statements which manufacturers should make to describe analyzers so that users may compare the performance characteristics of any analyzer to their requirements. It includes the terminology and definitions of the terms to be used in such statements. It describes the tests that are applicable to all types of electrochemical analyzers, which may be used to determine these performance characteristics by either the manufacturer or the user.

This standard is applicable to electrochemical analyzers used for the determination of certain properties of (generally aqueous) solutions such as pH value, electrical conductivity, dissolved oxygen content, the concentration of specified ions and redox potential. Other standards in this series describe those aspects that are particular to specific types of analyzer, for example IEC 60746-2. It is in accordance with the general principles set out in IEC 60359 and takes into account documents specifying methods for evaluating performance, IEC 60770 and IEC 61298.

This standard is applicable to analyzers specified for installation in any location and to analyzers having either flow-through or immersible type sensors. It 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.

It does not apply to accessories used in conjunction with the analyzers, such as chart recorders or data acquisition systems. However, when multiple analyzers are combined and sold with a single electronic unit for measurements of several properties in parallel, 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 that are not an integral part of the analyzer are not included.

Safety requirements are dealt with in IEC 61010.

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

Specifications for values of influence quantities for the testing of performance characteristics can be found in IEC 60654-1 and methods of testing in IEC 60068.

Requirements for documentation to be supplied with instruments are dealt with in some National Standards and also IEC 61187.

General principles concerning quantities, units and symbols are dealt with in ISO 1000. See also ISO 31, Parts 0 to 13.

EXPRESSION OF PERFORMANCE OF ELECTROCHEMICAL ANALYZERS –

Part 1: General

1 Scope

This standard is intended:

- to specify the terminology and definitions of terms related to the performance characteristics of electrochemical analyzers used for the continuous determination of certain aspects of (generally aqueous) solutions;
- to specify uniform methods to be used in making statements on the performance characteristics of such analyzers;
- to specify general test procedures to determine and verify the performance characteristics of electrochemical analyzers, taking into account the differences of approach in IEC documents specifying test methods (IEC 60359, IEC 60770, IEC 61298);
- to provide basic documents to support the application of standards of quality assurance: ISO 9001, ISO 9002 and ISO 9003.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60359:2001, *Electrical and electronic measurement equipment – Expression of performance*

IEC 60381-1, *Analogue signals for process control systems – Part 1: Direct current signals*

IEC 60382, *Analogue pneumatic signal for process control systems*

IEC 60654-1, *Industrial-process measurement and control equipment – Operating conditions – Part 1: Climatic conditions*

IEC 60770-1, *Transmitters for use in industrial-process control systems – Part 1: Methods for performance evaluation*

IEC 61298, (all parts): *Process measurement and control devices – General methods and procedures for evaluating performance*

ISO 9001, *Quality management systems – Requirements*

ISO 9002, *Quality systems – Model for quality assurance in production, installation and servicing*

ISO 9003, *Quality systems – Model for quality assurance in final inspection and test*