



**NSAI**  
Standards

Irish Standard  
I.S. EN 62703:2013

# Expression of performance of fluorometric oxygen analyzers in liquid media (IEC 62703:2013 (EQV))

## I.S. EN 62703:2013

*Incorporating amendments/corrigenda issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

<i>This document replaces:</i>	<i>This document is based on:</i> EN 62703:2013	<i>Published:</i> 30 August, 2013
This document was published under the authority of the NSAI and comes into effect on:  5 September, 2013		ICS number: 17.020 71.040 71.120
<b>NSAI</b> 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie  W NSAI.ie	<b>Sales:</b> T +353 1 857 6730 F +353 1 857 6729 W standards.ie
Údarás um Chaighdeán Náisiúnta na hÉireann		

**I.S. EN 62703:2013**

**EUROPEAN STANDARD**  
**NORME EUROPÉENNE**  
**EUROPÄISCHE NORM**

**EN 62703**

August 2013

ICS 17.020; 71.040; 71.120

English version

**Expression of performance of fluorometric oxygen analyzers in liquid media**  
**(IEC 62703:2013)**

Expression des performances des  
analyseurs d'oxygène fluométriques en  
milieu liquide  
(CEI 62703:2013)

Angabe zum Betriebsverhalten von  
fluorometrischen Sauerstoffanalysatoren  
in flüssigen Medien  
(IEC 62703:2013)

This European Standard was approved by CENELEC on 2013-08-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## **Foreword**

The text of document 65B/867/FDIS, future edition 1 of IEC 62703, prepared by IEC/TC 65B "Measurement and control devices, of IEC technical committee 65: Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62703:2013.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-05-01
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-08-01

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

## **Endorsement notice**

The text of the International Standard IEC 62703:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60654 (all parts)	NOTE	Harmonised as EN 60654 (all parts).
IEC 60654-1	NOTE	Harmonised as EN 60654-1.
IEC 60770-1	NOTE	Harmonised as EN 60770-1.
IEC 61207-1:2010	NOTE	Harmonised as EN 61207-1:2010.
IEC 61207-2	NOTE	Harmonised as EN 61207-2.
IEC 61298 (all parts)	NOTE	Harmonised as EN 61298 (all parts).
IEC 61326 (all parts)	NOTE	Harmonised as EN 61326 (all parts).
ISO 5814:2012	NOTE	Harmonised as EN ISO 5814:2012.
ISO 7888:1985	NOTE	Harmonised as EN 27888:1993.
ISO 9001	NOTE	Harmonised as EN ISO 9001.
ISO 80000-1:2009	NOTE	Harmonised as EN ISO 80000-1:2013.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068	series	Environmental testing	EN 60068	series
IEC 60359	2001	Electrical and electronic measurement equipment - Expression of performance	EN 60359	2002
IEC 61010-1	-	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements	-	-
IEC 61187 (mod)	-	Electrical and electronic measuring equipment - Documentation	EN 61187 + Corr. March	-

*This page is intentionally left BLANK.*

## CONTENTS

FOREWORD .....	4
1 Scope .....	6
2 Normative references .....	7
3 Terms, definitions, quantities and units .....	7
3.1 Basic terms and definitions .....	7
3.2 General terms and definitions of devices and operations .....	10
3.3 Terms and definitions for manners of expression .....	11
3.4 Specific terms and definitions for fluorometry .....	13
3.5 Specific terms and definitions for fluorometric oxygen analyzers .....	15
3.6 Influence quantities for fluorometric oxygen analyzers .....	17
3.7 Quantities and units .....	18
4 Procedure for specification .....	19
4.1 Specification of values and ranges for fluorometric oxygen analyzers .....	19
4.2 Operation, storage and transport conditions .....	19
4.2.1 Rated operating conditions .....	19
4.2.2 Performance under rated operating conditions .....	19
4.2.3 Performance under rated operating conditions while inoperative .....	19
4.2.4 Construction materials .....	19
4.3 Performance characteristics requiring statements of rated values .....	19
4.4 Uncertainty limits .....	20
4.4.1 Limits of intrinsic uncertainty .....	20
4.4.2 Interference uncertainties .....	20
4.4.3 Repeatability .....	20
4.4.4 Drift .....	20
5 Test methods .....	20
5.1 Test procedures .....	20
5.2 Influence quantities .....	20
5.3 Operational conditions .....	21
5.4 Calibration .....	21
5.5 Reference conditions .....	21
5.5.1 Reference conditions during measurement of intrinsic uncertainty .....	21
5.5.2 Reference conditions during measurement of influence quantity .....	21
5.6 Testing procedures .....	21
5.6.1 Intrinsic uncertainty .....	21
5.6.2 Repeatability .....	22
5.6.3 Output fluctuation .....	22
5.6.4 Drift .....	23
5.6.5 Delay time, rise time and fall time .....	24
5.6.6 Warm-up time .....	24
5.6.7 Procedure for determining interference uncertainty .....	24
5.6.8 Variations .....	25
Annex A (informative) Recommended standard values of influence – Quantities affecting performance from IEC 60359 .....	26
Annex B (informative) Performance characteristics calculable from drift tests .....	32
Annex C (informative) Physico-chemical data of oxygen in water .....	33
Bibliography .....	41

Figure 1 – Output fluctuations .....	23
Table 1 – Time intervals for statement of stability limits .....	23
Table A.1 – Mains supply voltage .....	30
Table A.2 – Mains supply frequency.....	30
Table A.3 – Ripple of d.c. supply .....	31
Table B.1 – Data: applied concentration 1 000 units .....	32
Table C.1 – Correlation conductivity-salinity .....	33
Table C.2 – Elevation barometric pressure (example) .....	34
Table C.3 – Solubility of oxygen in water exposed to water-saturated air at atmospheric pressure (1 013 hPa) (Salinity see Table C.1).....	35
Table C.4 – Solubility of oxygen in water vs. temperature and barometric pressure (lower range) .....	37
Table C.5 – Solubility of oxygen in water vs. temperature and barometric pressure (upper range).....	38
Table C.6 – Pressure conversions .....	39



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**EXPRESSION OF PERFORMANCE OF FLUOROMETRIC  
OXYGEN ANALYZERS IN LIQUID MEDIA**

## 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 62703 has been prepared by subcommittee 65B: Measurement and control devices, of IEC technical committee 65: Industrial-process measurement, control and automation.

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

FDIS	Report on voting
65B/867/FDIS	65B/871/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.

**I.S. EN 62703:2013**

62703 © IEC:2013

– 5 –

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>" 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 FLUOROMETRIC OXYGEN ANALYZERS IN LIQUID MEDIA

### 1 Scope

This International Standard is applicable to fluorometric oxygen analyzers used for the continuous determination of dissolved oxygen partial pressure or concentration. It applies to fluorometric oxygen analyzers suitable for use in water containing liquids, ultrapure waters, fresh or potable water, sea water or other aqueous solutions, industrial or municipal waste water from water bodies (e.g. lakes, rivers, estuaries) as well as for industrial process streams and process liquids. Whilst in principle fluorometric oxygen-analyzers are applicable in gaseous phases, the expression of performance in the gas-phase will not be subject of this standard.

The sensor unit of a fluorometric oxygen analyzer being in contact with the media to be measured contains a luminophore in a polymer-membrane permeable for oxygen or within other oxygen permeable materials (or substrates).

This standard specifies the terminology, definitions, requirements for statements by manufacturers and tests for fluorometric oxygen analyzers.

This standard is in accordance with the general principles set out in IEC 60359 and IEC 60770 series.

This standard is applicable to analyzers specified for permanent installation in any location (indoors or outdoors) utilizing an on-line measurement technique.

Safety requirements are dealt with in IEC 61010-1.

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

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

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 80000-1:2009.

The object of IEC 62703 is:

- to specify the general aspects in the terminology and definitions related to the performance of fluorometric oxygen analyzers used for the continuous determination of dissolved oxygen partial pressure or concentration in liquid media;
- to unify methods used in making and verifying statements on the functional performance of such analyzers;
- to specify which tests should be performed in order to determine the functional performance and how such tests should be carried out;
- to provide basic documents to support the application of standards of quality assurance within ISO 9001.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068 (all parts), *Environmental testing*

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

IEC 61010-1, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements*

IEC 61187, *Electrical and electronic measuring equipment – Documentation*

## 3 Terms, definitions, quantities and units

For the purposes of this document, the following terms, definitions, quantities and units apply.

NOTE Terms and definitions are taken partially from IEC 60359:2001 and IEC 61207-1:2010.

### 3.1 Basic terms and definitions

#### 3.1.1

##### **measurand**

quantity subjected to measurement, evaluated in the state assumed by the measured system during the measurement itself

Note 1 to entry: The value assumed by a quantity subjected to measurement when it is not interacting with the measuring instrument may be called unperturbed value of the quantity.

Note 2 to entry: The unperturbed value and its associated uncertainty can only be computed through a model of the measured system and of the measurement interaction with the knowledge of the appropriate metrological characteristics of the instrument that may be called instrumental load.

#### 3.1.2

##### **result of a measurement**

set of values attributed to a measurand, including a value, the corresponding uncertainty and the unit of measurement

Note 1 to entry: The mid-value of the interval is called the value (see 3.1.3) of the measurand and its half-width the uncertainty (see 3.1.4).

Note 2 to entry: The measurement is related to the indication (see 3.1.5) given by the instrument and to the values of correction obtained by calibration.

Note 3 to entry: The interval can be considered as representing the measurand provided that it is compatible with all other measurements of the same measurand.

Note 4 to entry: The width of the interval, and hence the uncertainty, can only be given with a stated level of confidence (see 3.1.4, NOTE 1).

[SOURCE: IEC 60050-300:2001, 311-01-01, modified – revision of the definition and the notes]

#### 3.1.3

##### **measure-value**

mid element of the set assigned to represent the measurand

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-