

Nuclear instrumentation — Constructional requirements and classification of radiometric gauges

The European Standard EN 60405:2007 has the status of a
British Standard

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National foreword

This British Standard is the UK implementation of EN 60405:2007. It is derived from IEC 60405:2003.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by **[C]** **<C]**.

The UK participation in its preparation was entrusted to Technical Committee NCE/2, Radiation protection and measurement.

A list of organizations represented on this committee can be obtained on request to its secretary.

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**Nuclear instrumentation -
Constructional requirements and classification of radiometric gauges
(IEC 60405:2003, modified)**

Instrumentation nucléaire -
Prescriptions de construction
et classification pour les jauges
de mesure des rayonnements ionisants
(CEI 60405:2003, modifiée)

Strahlungsmessgeräte -
Konstruktionsanforderungen
und Klassifikation radiometrischer
Einrichtungen
(IEC 60405:2003, modifiziert)

This European Standard was approved by CENELEC on 2007-07-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of the International Standard IEC 60405:2003, prepared by IEC TC 45, Nuclear instrumentation, together with common modifications prepared by CENELEC BTTF 111-3, Nuclear instrumentation and radiation protection instrumentation, was submitted to the formal vote and was approved by CENELEC as EN 60405 on 2007-07-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
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- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2010-07-01

Clauses, subclauses, notes, tables and figures which are additional to those in IEC 60405:2003 are prefixed “Z”.

Annexes ZA and ZB have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60405:2003 was approved by CENELEC as a European Standard with agreed common modifications.

CONTENTS

1	Scope and object	5
2	Normative references	5
3	Definitions	6
4	Classification of radiometric gauge types	7
4.1	Category A: Radiometric gauges with restricted beam	7
4.2	Category B: radiometric gauges with omnidirectional beam	8
4.3	Shielding classes	9
4.4	Temperature classes	9
5	General requirements	9
5.1	Measuring gap	10
5.2	Source holder	10
5.3	Source housing	10
5.4	Alignment of the useful beam	10
5.5	Other requirements	10
6	Protection against ionizing radiation	11
6.1	General requirements	11
6.2	Requirements for Category A gauges	11
6.3	Requirements for Category B gauges	11
6.4	Resistance of the source housing in case of fire	12
6.5	Detector housing	12
6.6	Measuring head	12
7	Other safety devices	12
7.1	General	12
7.2	Protection against non-authorized use	12
7.3	Indication of the shutter position	12
7.4	Additional warning device	12
8	Determination of the dose equivalent rate	13
8.1	General	13
8.2	Dose equivalent rate measurements in the case of closed shutters	15
8.3	Dose equivalent rate measurements in the case of open shutters	15
8.4	Procedure for dose equivalent rate measurements	15
8.5	Determining the relevant values of the dose equivalent rate	15
9	Test methods	15
9.1	General	16
9.2	Temperature cycle test on the shutters and the source holder	16
9.3	Test for checking the resistance of the shutter, the source holder and the source container in case of fire	17
9.4	Test for checking the mechanical resistance of the shutter and the source holder	17
10	System classification coding and labelling	18
10.1	Classification code	18
10.2	Labelling	18
11	Accompanying documents	19

Annex ZA (informative) Guideline for installation of radiometric gauges	20
Annex ZB (normative) Normative references to international publications with their corresponding European publications	22
Figure 1 – Schematic arrangement of Category A gauges	7
Figure 2 – Schematic arrangement of Category B gauges	8
Figure 3 – Schematic representation of isodistance gauging faces in the case of thickness gauges	13
Figure 4 – Schematic representation of isodistance gauging faces in the case of level and density gauges and back-scatter gauges	14
Figure ZA.1 – Examples of protection methods and principles	21
Table 1 – Shielding classes	9
Table 2 – Temperature classes	9

NUCLEAR INSTRUMENTATION – CONSTRUCTIONAL REQUIREMENTS AND CLASSIFICATION OF RADIOMETRIC GAUGES

1 Scope and object

This International Standard applies to the manufacture and installation of electrical measuring systems and instruments utilizing radioactive sources (radiometric gauges, hereinafter called gauges).

It does not apply to portable gauges which, because of their construction and purposes for use, are intended to be operated as mobile equipment and it does not apply to gauges operated with X-ray tubes, but it can be analogously applicable to these gauges.

The purpose of this standard is to specify constructional requirements for the design of instruments and the radiation protection to be provided in the case of radiometric gauges.  In this context, special attention may be attached to the stability of the source housing in the event of fire .

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 60476:1993, *Nuclear instrumentation – Electrical measuring systems and instruments utilizing ionizing radiation sources – General aspects*

IEC 60692:1999, *Nuclear instrumentation – Density gauges utilizing ionizing radiation – Definitions and test methods*

 EN 60846:2004, *Radiation protection instrumentation – Ambient and/or directional dose equivalent (rate) meters and/or monitors for beta, X and gamma radiation* (IEC 60846:2002, modified) 

IEC 60982:1989, *Level measuring systems utilizing ionizing radiation with continuous or switching output*

 EN 61005:2004, *Radiation protection instrumentation – Neutron ambient dose equivalent (rate) meters* (IEC 61005:2003, modified) 

IEC 61010-1:2001, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements*

 Text deleted 

IEC 61336:1996, *Nuclear instrumentation – Thickness measurement systems utilizing ionizing radiation – Definitions and test methods*

ISO 361:1975, *Basic ionizing radiation symbol*

ISO 921:1997, *Nuclear energy – Vocabulary*

ISO 2919:1999, *Radiation protection – Sealed radioactive sources – General requirements and classification*

 Text deleted 

3 Terms and definitions

For the purposes of this document, the terms and definitions as specified in ISO 921 and IEC 60476 and the following apply.

3.1

radiometric gauge

control and measuring assembly consisting of at least one radioactive source, at least one detector and the mechanical devices required for non-destructive measurement of a process quantity

3.2

permanently installed radiometric gauge

radiometric gauge that is permanently installed at the measuring location

NOTE The measuring location may also be situated on mobile equipment (e.g. on a ship or a vehicle). The detector housing and the source housing may be installed both rigidly fixed and movable. The mobility of the system is limited and determined by the purpose for which it was designed.

3.3

sealed source

radioactive source that is sealed in a solid and inert capsule or is permanently incorporated in solid and inert materials so that dispersion of radioactive substances under normal conditions of use is substantially prevented; one dimension shall be at least 0,2 cm

3.4

source holder

 device used to support and fix the radioactive source

NOTE Z1 In the context of this standard the term source holder means the part of the device which fixes or holds the source. This can be e.g. the shutter or a part of the housing. 

3.5

measuring head

subassembly comprising one or several radioactive sources and detectors along with compensation sensors, if necessary, and devices that can be used to measure and correct the effects of undesirable influences

NOTE The measuring head may consist of separate source-housing and detector-housing subassemblies and it may include electronic devices for signal processing.

3.6

source housing

that portion of the measuring head which includes the radioactive source, its holder and primary shielding device and shutter mechanism, if any

 NOTE Z1 If the source housing is not part of a measuring head the term source container shall be used (see definition 3.Z1). 

3.7

detector housing

that portion of the measuring head that includes the detector

NOTE This assembly may be incorporated with the source housing, especially in the case of a back-scatter measurement system.

3.8

useful radiation; useful beam

portion of radiation that is emitted by the radioactive source and used for measurement