



BSI Standards Publication

Radiation protection instrumentation – Ambient and/or directional dose equivalent (rate) meters and/or monitors for beta, X and gamma radiation

Part 2: High range beta and photon dose and dose rate portable instruments for emergency radiation protection purposes (IEC 60846-2:2015, modified)

National foreword

This British Standard is the UK implementation of EN 60846-2:2018. It is derived from IEC 60846-2:2015. It supersedes BS IEC 60846-2:2015, which is withdrawn.

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 tags **[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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2018
Published by BSI Standards Limited 2018

ISBN 978 0 580 98114 2

ICS 13.280

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2016.

Amendments/corrigenda issued since publication

Date	Text affected
30 June 2018	This corrigendum renumbers BS IEC 60846-2:2015 as BS EN 60846-2:2018

**Radiation protection instrumentation – Ambient and/
or directional dose equivalent (rate) meters and/or
monitors for beta, X and gamma radiation – Part 2: High
range beta and photon dose and dose rate portable
instruments for emergency radiation protection
purposes (IEC 60846-2:2015, modified)**

Instrumentation pour la radioprotection
– Instruments pour la mesure et/ou la
surveillance de l'équivalent de dose (ou du
débit d'équivalent de dose) ambiant et/ou
directionnel pour les rayonnements bêta, X et
gamma – Partie 2: Instruments portables de
grande étendue, pour la mesure de la dose et du
débit de dose des rayonnements photoniques
et bêta dans des situations d'urgence de
radioprotection (IEC 60846-2:2015, modifiée)

Strahlenschutz-Messgeräte – Umgebungs—
und RichtungsÄquivalentdosis(leistungs)-
Messgeräte und/oder Monitore für Beta-,
Röntgen- und Gammastrahlung – Teil 2: Tragbare
Messgeräte mit erweiterten Messbereichen
zur NotfallStrahlenschutzdosimetrie für
Beta- und Photonendosis und -dosisleistung
(IEC 60846-2:2015, modifiziert)

This European Standard was approved by CENELEC on 2017-11-13. 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN 60846-2:2018) consists of the text of IEC 60846-2:2015 prepared by SC 45B "Radiation protection instrumentation" of IEC/TC 45 "Nuclear instrumentation", together with the common modifications prepared by CLC/TC 45B "Radiation protection instrumentation".

The following dates are fixed:

- latest date by which this document has to be implemented at national level (dop) 2018-10-13
by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with this document (dow) 2021-04-13
have to be withdrawn

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

Endorsement notice

The text of the International Standard IEC 60846-2:2015 was approved by CENELEC as a European Standard with agreed common modifications.

☐ Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Annex ZA of EN 60846-1:2014 applies except as follows:

Add

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60325 (mod.)	2002	Radiation protection instrumentation — Alpha, beta and alpha/beta (beta energy > 60 keV) contamination meters and monitors	EN 60325	2004
IEC 60846-1 (mod.)	2009	Radiation protection instrumentation — Ambient and/or directional dose equivalent (rate) meters and/or monitors for beta, X and gamma radiation — Part 1: Portable workplace and environmental meters and monitors	EN 60846-1	2014 ☐

Contents

Page

FOREWORD	vi
1 Scope and object	1
2 Normative references	1
3 Terms and definitions	2
4 Units and list of symbols	2
5 General characteristics of ambient dose equivalent (rate) meters for emergency purposes	2
5.2 Read-out	2
5.3 Dose equivalent and dose equivalent rate range	2
5.5 Minimum range of measurement	2
5.15 Portability	2
5.16 Protection of switches	3
5.17 Use of extension probe	3
5.18 Contamination probe	3
6 General test procedures	3
7 Additivity of indicated value	3
8 Radiation performance requirements and tests	3
8.4 Variation of the response due to photon radiation energy and angle of incidence	3
8.4.3 Measuring quantity $H'(0,07)$, $\dot{H}'(0,07)$, $H^*(10)$ or $\dot{H}^*(10)$ for telescopic or remote cylindrical probes	3
8.5 Variation of the response due to beta radiation energy and angle of incidence	5
8.5.1 Measuring quantity $H'(0,07)$ or $\dot{H}'(0,07)$	5
8.7 Linearity and statistical fluctuations	5
8.7.2 Requirements	5
8.14 Extracameral response	5
8.14.1 Requirements	5
8.14.2 Method of test	5
8.15 Response of instrument with extended probe	6
8.15.1 Requirements	6
8.15.2 Method of test	6
9 Electrical characteristics of directional and ambient dose equivalent (rate) meters	6
9.2 Warm-up time	6
9.2.1 Requirements	6
9.2.2 Test method	6
9.2.3 Interpretation of the results	6
10 Mechanical characteristics of directional and ambient dose equivalent (rate) meters	6
10.4 Drop test	7
10.4.1 Requirements	7
10.4.2 Method of test	7
10.4.3 Interpretation of the results	7
11 Environmental characteristics, performance requirements and tests	7
11.2 Ambient temperature	7
11.2.1 Requirements	7
11.2.2 Test method	8
11.2.3 Interpretation of the results	8
11.3 Relative humidity	8
11.3.1 Requirements	8
11.8 Temperature shock	8
11.8.1 Requirements	8
11.8.2 Method of test	8

	11.8.3 Interpretation of the results	9
12	Software	9
13	Summary of characteristics	9
14	Documentation	9

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 60846-2 has been prepared by subcommittee 45B: Radiation protection instrumentation, of IEC technical committee 45: Nuclear instrumentation.

This second edition cancels and replaces the first edition of IEC 60846-2, issued in 2007, as well as IEC 61018, issued in 1991; it constitutes a technical revision.

The main technical change with regard to the previous edition consists of an update to the revised edition of [\[C\] EN 60846-1:2014 \[C\]](#).

This International Standard IEC 60846-2 is to be used in conjunction with [\[C\] EN 60846-1:2014 \[C\]](#). For the purposes of this standard, clauses/subclauses of [\[C\] EN 60846-1:2014 \[C\]](#) apply, without modifications, except when stated. The modified clauses/subclauses are identified by the same number as in [\[C\] EN 60846-1:2014 \[C\]](#) or, for new clauses/subclauses, by a higher number not used in [\[C\] EN 60846-1:2014 \[C\]](#).