

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Radiation protection instrumentation – Recommended climatic, electromagnetic and mechanical performance requirements and methods of tests

Instrumentation pour la radioprotection – Exigences recommandées en matière de performances climatiques, électromagnétiques et mécaniques et méthodes d'essai





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2019 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 l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
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 corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

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 It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC

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

A propos des publications IEC

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

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.



IEC 62706

Edition 2.0 2019-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Radiation protection instrumentation – Recommended climatic, electromagnetic and mechanical performance requirements and methods of tests

Instrumentation pour la radioprotection – Exigences recommandées en matière de performances climatiques, électromagnétiques et mécaniques et méthodes d'essai

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 13.280

ISBN 978-2-8322-7567-2

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions, abbreviated terms and symbols, quantities and units.....	9
3.1 Terms and definitions.....	9
3.2 Abbreviated terms and symbols	10
3.3 Quantities and units	10
4 General characteristics and requirements.....	11
5 General test procedure	11
5.1 Nature of tests	11
5.2 Standard test conditions	11
5.3 Use of this document	11
5.3.1 General	11
5.3.2 Recommendations for influence quantities.....	12
5.3.3 Climatic requirements	12
5.3.4 Mechanical requirements.....	12
5.3.5 Electromagnetic requirements	13
5.3.6 Functionality test	13
5.3.7 Additional requirements and test methods	13
6 Radiation detection requirements	13
7 Climatic requirements.....	13
7.1 General.....	13
7.2 Ambient temperature.....	14
7.2.1 Requirements	14
7.2.2 Method of test.....	14
7.2.3 Setup guidance.....	15
7.3 Temperature shock	15
7.3.1 Requirements	15
7.3.2 Method of test.....	15
7.3.3 Setup guidance.....	16
7.4 Low/high temperature start-up	16
7.4.1 Requirements	16
7.4.2 Method of test.....	16
7.5 Relative humidity	16
7.5.1 Requirements	16
7.5.2 Method of test.....	16
7.5.3 Setup guidance.....	17
7.6 IP (degree of protection) classification	17
7.6.1 Requirements	17
7.6.2 Method of test.....	17
7.6.3 Setup guidance.....	18
7.7 Other environments and long-term installations.....	18
7.7.1 Other environments – Guidance	18
7.7.2 Long-term installations – Guidance.....	18

7.7.3	Recommended method of test	18
8	Mechanical requirements	19
8.1	General.....	19
8.2	Drop	19
8.2.1	Requirements	19
8.2.2	Method of test.....	19
8.2.3	Setup recommendations	19
8.3	Vibration test	20
8.3.1	Requirements for handheld, body-worn, backpack and transportable instruments.....	20
8.3.2	Requirements for installed instruments	20
8.3.3	Requirements for mobile instruments	21
8.4	Microphonics/impact	21
8.4.1	Requirements for handheld and body-worn instruments	21
8.4.2	Requirements – All others.....	21
8.4.3	Method of test.....	21
8.4.4	Setup recommendations	22
8.5	Mechanical shock	22
8.5.1	Requirements	22
8.5.2	Method of test.....	22
8.5.3	Setup recommendations	22
9	Electromagnetic requirements	22
9.1	General setup recommendations.....	22
9.2	Electrostatic discharge.....	23
9.2.1	Requirements – all instrument types	23
9.2.2	Method of test.....	23
9.2.3	Setup recommendations	24
9.3	Radio frequency (RF) immunity	24
9.3.1	Requirements	24
9.3.2	Setup recommendations	24
9.3.3	Method of test – body-worn instruments	25
9.3.4	Method of test – handheld instruments	25
9.3.5	Method of test – installed instruments.....	25
9.4	Radiated emissions.....	26
9.4.1	Requirements	26
9.4.2	Method of test.....	26
9.4.3	Setup recommendations	26
9.5	Magnetic fields.....	26
9.5.1	Requirements	26
9.5.2	Method of test.....	27
9.5.3	Setup recommendations	27
9.6	AC line powered equipment requirements	27
9.6.1	Voltage and frequency fluctuations	27
9.6.2	Immunity from conducted RF	28
9.6.3	Surges and ring waves	28
10	Documentation	29
Annex A (informative)	Identifying mutually orthogonal (perpendicular) planes	30
Bibliography	31

Figure A.1 – Cartesian coordinate system..... 30

Table 1 – Standard test conditions 11

Table 2 – Field use temperature and IP requirements 14

Table 3 – Mechanical requirements..... 19

Table 4 – Electromagnetic requirements 23

Table 5 – Emission frequency range 26

Table A.1 – Numbered IUT sides and the corresponding Cartesian coordinate
reference 30

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RADIATION PROTECTION INSTRUMENTATION –
RECOMMENDED CLIMATIC, ELECTROMAGNETIC AND MECHANICAL
PERFORMANCE REQUIREMENTS AND METHODS OF TESTS**

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 62706 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, issued in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) addition of more details to selected methods of test;
- b) revised radio frequency testing requirements based on measurements made at various locations;
- c) added equipment and instrument setup guidance and recommendations.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
45B/942/FDIS	45B/947/RVD

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

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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

INTRODUCTION

Radiation protection instrumentation including those instruments used for the detection and identification of radioactive material and radionuclides are used in many different environments. They are typically exposed to different temperatures, humidity levels, electromagnetic fields, and mechanical stresses such as shock and vibration during normal use. Radiation detection instrumentation may be worn on the body, handheld, mounted to a vehicle, transported from location to location, or installed. All the conditions associated with these very different uses are considered when developing instrument-specific requirements. To ensure consistency between standards, this climatic, electromagnetic, and mechanical performance requirements standard was established.