

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Information technology equipment – Safety –
Part 22: Equipment to be installed outdoors**

**Matériels de traitement de l'information – Sécurité –
Partie 22: Matériels destinés à être installés à l'extérieur**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2016 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
Fax: +41 22 919 03 00
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 corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

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 also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 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.

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: csc@iec.ch.

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.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

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 aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

65 000 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.

Service Clients - webstore.iec.ch/csc

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

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Information technology equipment – Safety –
Part 22: Equipment to be installed outdoors**

**Matériels de traitement de l'information – Sécurité –
Partie 22: Matériels destinés à être installés à l'extérieur**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.020; 35.020

ISBN 978-2-8322-3108-1

**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.....	4
INTRODUCTION.....	6
1 Scope.....	7
1.1 Equipment covered.....	7
1.2 Additional requirements.....	7
2 Normative references.....	7
3 Terms and definitions.....	8
4 Conditions for outdoor equipment.....	8
4.1 Ambient air temperature.....	8
4.2 Mains supply.....	9
4.2.1 General.....	9
4.2.2 Mains transient voltage on AC mains supply.....	9
4.2.3 Mains transient voltage on DC mains supply.....	9
4.3 Rise of earth potential.....	10
5 Marking and instructions.....	10
6 Protection from electrical shock in an outdoor location.....	10
6.1 Voltage limits of user-accessible parts in outdoor locations.....	10
6.2 Limited current circuits in outdoor locations.....	10
6.3 Protection for socket-outlet in outdoor locations.....	10
7 Wiring terminals for connection of external conductors.....	11
8 Construction requirements for outdoor enclosures.....	11
8.1 General.....	11
8.2 Resistance to ultra-violet radiation.....	11
8.3 Resistance to corrosion.....	12
8.3.1 General.....	12
8.3.2 Test apparatus.....	12
8.3.3 Test procedure.....	13
8.3.4 Compliance criteria.....	13
8.4 Bottoms of fire enclosures.....	13
8.5 Gaskets.....	13
8.5.1 General.....	13
8.5.2 Oil resistance.....	14
8.5.3 Securing means.....	14
9 Protection of equipment within an outdoor enclosure.....	14
9.1 Protection from moisture.....	14
9.2 Protection from plants and vermin.....	15
9.3 Protection from excessive dust.....	15
9.3.1 General.....	15
9.3.2 IP5X equipment.....	15
9.3.3 IP6X equipment.....	16
10 Mechanical strength of enclosures.....	16
10.1 General.....	16
10.2 Impact test.....	16
11 Outdoor equipment containing valve regulated or vented batteries.....	16

11.1	Risk of explosion from lead acid, NiCd and NiMH batteries	16
11.2	Ventilation preventing an explosive gas concentration	17
11.3	Ventilation test	19
Annex A	(normative) Water-saturated sulphur dioxide atmosphere (see 8.3.2 and 8.3.3	20
Annex B	(normative) Water spray test (see 9.1)	21
Annex C	(normative) Ultraviolet light conditioning test (see 8.2)	24
C.1	Test apparatus	24
C.2	Mounting of test samples	24
C.3	Carbon-arc light-exposure apparatus	24
C.4	Xenon-arc light-exposure apparatus	24
Annex D	(normative) Gasket tests (see 8.5)	25
D.1	Gasket tests	25
D.2	Tensile strength and elongation tests	25
D.3	Compression test	25
D.4	Oil immersion test	26
Annex E	(informative) Rationale	27
E.1	General	27
E.2	Electric shock	27
E.3	Energy related hazards	27
E.4	Fire	27
E.5	Mechanical hazards	28
E.6	Heat related hazards	28
E.7	Radiation	28
E.8	Chemical hazards	28
E.9	Biological hazards	28
E.10	Explosion hazards	29
Bibliography		30
Figure B.1	– Water-spray test spray-head piping	22
Figure B.2	– Water-spray test spray head	23
Figure D.1	– Gasket test	26
Table 1	– Minimum property retention limits after UV exposure	12
Table 2	– Examples of the provision of pollution degree environments	14
Table 3	– Values for current I_{float} and I_{boost} , factors f_g and f_s , and voltages U_{float} and U_{boost}	18

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INFORMATION TECHNOLOGY EQUIPMENT – SAFETY –

Part 22: Equipment to be installed outdoors

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 60950-22 has been prepared by IEC TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology.

This second edition cancels and replaces the first edition published in 2005. It constitutes a technical revision.

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

- more extensive requirements for battery ventilation.

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

FDIS	Report on voting
108/615/FDIS	108/634/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.

This Part 22 of IEC 60950 is intended to be used with IEC 60950-1:2005. The subclauses of IEC 60950-1 apply as far as reasonable. Where safety aspects are similar to those of Part 1 the relevant Part 1 clause or subclause is shown for reference in parentheses after the clause or subclause title in Part 22. Where a requirement in Part 22 refers to a requirement or criterion of Part 1, a specific reference to IEC 60950-1, is made.

A list of all parts in the IEC 60950 series, published under the general title *Information technology equipment – Safety*, can be found on the IEC website.

In this standard, the following print types are used:

- requirements proper and normative annexes: roman type;
- *compliance statements and test specifications: italic type*;
- notes in the text and in tables: smaller roman type;
- terms that are defined on Clause 3 and in IEC 60950-1: SMALL CAPITALS.

The following differing practices of a less permanent nature exist in the countries indicated below.

- 4.1: Outdoor equipment demand special design at temperatures down to –50 °C (Finland, Norway, Sweden)
- 4.3: Rise of earth potential requirements (USA, Canada)
- 8.5.1: Enclosure types specifications (USA, Canada).
- D.4: In Canada and United States, IRM Immersion Oil No. 903 is accepted (USA, Canada).

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

INTRODUCTION

This standard proposes safety requirements for information technology equipment intended to be installed, when exposed wholly or partly, in a location where protection from the weather and other outdoor influences such as rain, dust, etc. normally provided by a building or other structure is limited or non-existent. There are many examples of information technology equipment in use throughout the world that are housed in special ENCLOSURES located on pavements, mounted on telecommunications poles and situated underground. Presently, IEC 60950 has no requirements for such equipment and this proposal would rectify this omission. The proposed requirements would not apply to portable or transportable equipment that may be occasionally used outdoors, but are not intended to be installed in conditions of inclement weather.

It is expected that IEC TC108 will continue to coordinate the output of its work with other technical committees dealing with equipment installed outdoors, such as IEC TC70 (Degrees of protection provided by enclosures, responsible for IEC 60529) and IEC TC 48 (Electrical connectors and mechanical structures for electrical and electronic equipment).

Annex E describes the rationale behind the treatment of specific safety aspects in this standard.

INFORMATION TECHNOLOGY EQUIPMENT – SAFETY –

Part 22: Equipment to be installed outdoors

1 Scope

1.1 Equipment covered

This part of IEC 60950 applies to information technology equipment intended to be installed in an OUTDOOR LOCATION.

The requirements for OUTDOOR EQUIPMENT also apply, where relevant, to OUTDOOR ENCLOSURES suitable for direct installation in the field and supplied for housing information technology equipment to be installed in an OUTDOOR LOCATION.

1.2 Additional requirements

Each installation may have particular requirements. Some examples are given in 4.2. In addition, requirements for protection of the OUTDOOR EQUIPMENT against the effects of direct lightning strikes are not covered by the standard. For information on this subject, see IEC 62305-1.

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 60068-2-11, *Environmental testing procedures – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60529:1989/AMD1:1999

IEC 60529:1989/AMD2:2013

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

IEC 60950-1:2005/AMD1:2009

IEC 60950-1:2005/AMD2:2013

IEC 62368-1:2014, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

ISO 178, *Plastics – Determination of flexural properties*

ISO 179 (all parts), *Plastics – Determination of Charpy impact properties*

ISO 180, *Plastics – Determination of Izod impact strength*

ISO 527 (all parts), *Plastics – Determination of tensile properties*

ISO 3231, *Paints and varnishes – Determination of resistance to humid atmospheres containing sulfur dioxide*

ISO 4892-1, *Plastics – Methods of exposure to laboratory light sources – General guidance*

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Xenon-arc lamps*

ISO 4892-4, *Plastics – Methods of exposure to laboratory light sources – Open-flame carbon-arc lamps*

ISO 8256, *Plastics – Determination of tensile-impact strength*

ISO/TS 18173:2005, *Non-destructive testing – General terms and definitions*

ASTM D471-98, *Standard Test Method for Rubber Property-Effect of Liquids*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60950-1 and the following apply.

3.1

OUTDOOR LOCATION

location for equipment where protection from the weather and other outdoor influences provided by a building or other structure is limited or non-existent

3.2

OUTDOOR EQUIPMENT

equipment specified by the manufacturer to be installed where exposed wholly or partly to the conditions in an OUTDOOR LOCATION

Note 1 to entry: TRANSPORTABLE EQUIPMENT, for example, a laptop or notebook computer, or a telephone, is not OUTDOOR EQUIPMENT unless specified by the manufacturer for continuous use in an OUTDOOR LOCATION.

3.3

OUTDOOR ENCLOSURE

part of OUTDOOR EQUIPMENT that is exposed to the adverse conditions in an OUTDOOR LOCATION and that is intended to protect the interior of the equipment from those conditions

Note 1 to entry: An OUTDOOR ENCLOSURE can also perform the functions of one or more of the following: a FIRE ENCLOSURE; an ELECTRICAL ENCLOSURE; a MECHANICAL ENCLOSURE.

Note 2 to entry: A separate cabinet or housing into which the equipment is placed can provide the function of an OUTDOOR ENCLOSURE.

4 Conditions for outdoor equipment

4.1 Ambient air temperature

OUTDOOR EQUIPMENT and OUTDOOR ENCLOSURES shall be suitable for use at any temperature in the range specified by the manufacturer. If not specified by the manufacturer, the range shall be taken as:

- minimum ambient temperature: –33 °C;
- maximum ambient temperature: +40 °C.

Compliance is checked by inspection and by evaluation of the data provided by the manufacturer.