IEC 60950-22

Edition 2.0 2016-01

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

IEC 60950-22:2016-01(en-fr)

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CONTENTS

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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.
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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.

NOTE 1 The temperature values are based on IEC 60721-3-4 class 4K2. These temperatures do not take into account severe environments (for example, extremely cold or extremely warm), nor do they include provision for heating by radiation from the sun (solar loading).

NOTE 2 Attention is drawn to IEC 61587-1 for additional information on performance levels C1, C2 and C3.

NOTE 3 In Finland, Norway and Sweden, the temperature in winter can be extremely low. For OUTDOOR EQUIPMENT this will demand special design so that the equipment can stand transport, erection and operation/service at temperatures down to –50 °C.

4.2 Mains supply

4.2.1 General

Mains-operated OUTDOOR EQUIPMENT shall be suitable for the highest MAINS TRANSIENT VOLTAGE expected in the installation location.

Consideration shall be given to the following:

– the prospective fault current of the supply to OUTDOOR EQUIPMENT can be higher than for indoor equipment, see IEC 60364-4-43; and

– the MAINS TRANSIENT VOLTAGE for OUTDOOR EQUIPMENT can be higher than for indoor equipment.

Within a certain overvoltage category, components within OUTDOOR EQUIPMENT that reduce the MAINS TRANSIENT VOLTAGE or the prospective fault current shall comply with the requirements of the IEC 61643-series.

NOTE 1 The overvoltage category of OUTDOOR EQUIPMENT is normally considered to be one of the following:

– if powered via the normal building installation wiring, overvoltage category II;

– if powered directly from the mains distribution system, overvoltage category III;

– if at, or in the proximity of, the origin of the electrical installation, overvoltage category IV.

NOTE 2 For further information regarding protection from overvoltages, see IEC 60364-5-53.

Compliance is checked by inspection of the equipment and the installation instructions.

4.2.2 Mains transient voltage on AC mains supply

Equipment that is part of the building installation, or that may be subject to transient overvoltages exceeding those for overvoltage category II, shall be designed for overvoltage category III or IV, unless additional protection is to be provided internally or externally to the equipment. In this case, the installation instructions shall state the need for such additional protection. Clearances in equipment designed for overvoltage category III or IV shall comply with Annex G of IEC 60950-1:2005. The insulation system used in such equipment shall be capable of withstanding the test voltage given in Table 5C of IEC 60950-1:2005/AMD2:2013.

4.2.3 Mains transient voltage on DC mains supply

The transient on a D.C. MAINS SUPPLY depends on the source and the installation of the D.C. MAINS SUPPLY. When determining the D.C. MAINS TRANSIENT VOLTAGE, the installation and the source of the D.C. MAINS shall be taken into account. If these are not known, the MAINS TRANSIENT VOLTAGE on the D.C. MAINS SUPPLY shall be assumed to be 1,5 kV.

The manufacturer shall declare the MAINS TRANSIENT VOLTAGE on the D.C. MAINS SUPPLY in the installation instructions.

4.3 Rise of earth potential

Attention is drawn to the fact that during fault clearing conditions, HAZARDOUS VOLTAGES may exist and be accessible for longer periods than for indoor equipment and special earthing conditions may be necessary. These are typically specified in local installation codes.

NOTE In the USA, these requirements are contained in the National Electrical Code. In Canada, they are contained in the Canadian Electrical Code.

Compliance is checked by evaluation of the installation instructions.

5 Marking and instructions

The installation instructions for OUTDOOR EQUIPMENT shall include details of any special features needed for protection from conditions in the OUTDOOR LOCATION (see 1.7.2 of IEC 60950-1:2005).

If a manufacturer of an OUTDOOR ENCLOSURE classifies a product in accordance with IEC 60529, the IP code shall be declared, however it is not required to mark the IP code on the OUTDOOR ENCLOSURE. It is not required to make such a declaration for OUTDOOR EQUIPMENT.

Compliance is checked by inspection.

6 Protection from electrical shock in an outdoor location

6.1 Voltage limits of user-accessible parts in outdoor locations

USER-accessible conductive parts in an OUTDOOR LOCATION shall meet the requirements for an SELV CIRCUIT in 2.2.2 and 2.2.3 of IEC 60950-1:2005/AMD2:2013, except that the voltage limits shall not exceed:

– 15 V a.c., 21,2 V peak, or 30 V d.c. under normal operating conditions (see 2.2.2),

– 15 V a.c., 21,2 V peak, or 30 V d.c. for longer than 0,2 s under single fault conditions (see 2.2.3). Moreover, the voltage shall not exceed 30 V a.c., 42,4 V peak or 60 V d.c.

The exception in 2.2.3 of IEC 60950-1:2005/AMD2:2013 relating to 2.3.2.1 b) of the same publication, does not apply to USER-accessible conductive parts.

NOTE 1 Lower voltage limits apply because the contact resistance of the body is reduced when subjected to wet conditions.

NOTE 2 In Denmark, the installation rules require the maximum safe to touch nominal voltage to be 6 V a.c. r.m.s. or 15 V ripple-free d.c. for outside environment, where the installation normally can be humid or wet due to the weather condition including area with shelters, but not in protected walls e.g. carports.

Compliance is checked by measurement.

6.2 Limited current circuits in outdoor locations

The requirements of 2.4 of IEC 60950–1:2005/AMD1:2009/AMD2:2013, apply without change.

6.3 Protection for socket-outlet in outdoor locations

A residual current protective device (RCD) with rated residual operating current not exceeding 30 mA shall be used in the MAINS SUPPLY to socket-outlets intended for general use and with a rated current not exceeding 20 A.

The RCD shall be an integral part of the equipment or of the building installation. If the RCD is part of the building installation, instructions for installations of the RCD shall be provided with the equipment.

7 Wiring terminals for connection of external conductors

The mains supply terminations for OUTDOOR EQUIPMENT that is intended to be powered:

– via the normal building installation wiring, shall be as specified in 3.3 of IEC 60950-1:2005/AMD2:2013;

– directly from the mains distribution system, shall be as specified in the IEC 60364 parts.

NOTE For other terminals, IEC 60950-1 applies.

Compliance is checked by inspection.

8 Construction requirements for outdoor enclosures

8.1 General

Protection against corrosion shall be provided by the use of suitable materials or by the application of a protective coating applied to the exposed surface, taking into account the intended conditions of use.

Parts, such as dials or connectors, that serve as a functional part of an OUTDOOR ENCLOSURE shall comply with the same environmental protection requirements as for the OUTDOOR ENCLOSURE.

NOTE 1 Aspects affecting safety which require the integrity of the OUTDOOR ENCLOSURE through the life of the product include:

– continued protection against access to hazardous parts, including after mechanical strength tests;

– continued protection against ingress of dust and water;

– continued provision of earth continuity.

An OUTDOOR ENCLOSURE shall not be used to carry current during normal operation if this could cause corrosion that would impair safety. This does not preclude connection of a conductive part of an OUTDOOR ENCLOSURE to protective earth for the purpose of carrying fault currents.

NOTE 2 The action of a current flowing through a joint can increase corrosion under wet conditions.

Where a conductive part of an OUTDOOR ENCLOSURE is connected to protective earth for the purpose of carrying fault currents, the resulting connection shall meet the requirements of 2.6 of IEC 60950-1:2005/AMD1:2009/AMD2:2013, after the appropriate weather conditioning tests, see 8.3.

Compliance is checked by inspection and, if necessary, by the tests of 2.6 of IEC 60950-1:2005/AMD1:2009/AMD2:2013 and 8.3 of this standard.

8.2 Resistance to ultra-violet radiation

Non-metallic parts of an OUTDOOR ENCLOSURE required for compliance with this standard shall be sufficiently resistant to degradation by ultra-violet (UV) radiation.

Table 1 – Minimum property retention limits after UV exposure

Parts to be tested	Property	Standard for the test method	Minimum retention after test
Parts providing mechanical support	Tensile strength [a] or	ISO 527	70 %
	Flexural strength [a, b]	ISO 178	70 %
Parts providing impact resistance	Charpy impact [c] or	ISO 179	70 %
	Izod impact [c] or	ISO 180	70 %
	Tensile impact [c]	ISO 8256	70 %
All parts	Flammability classification	1.2.12 and Annex A of IEC 60950-1:2005	see [d]

[a] Tensile strength and flexural strength tests are to be conducted on specimens no thicker than the actual thicknesses.

[b] The side of the sample exposed to UV radiation is to be in contact with the two loading points when using the three-point loading method.

[c] Tests conducted on 3,0 mm thick specimens for Izod impact and tensile impact tests and 4,0 mm thick specimens for Charpy impact tests are considered representative of other thicknesses, down to 0,8 mm.

[d] The flammability classification may change as long as it does not fall below that specified in Clause 4 of IEC 60950-1:2005/AMD1:2009/AMD2:2013.

Compliance is checked by examination of the construction and of available data regarding the UV resistance characteristics of the ENCLOSURE *material and any associated protective coating. If such data is not available, the tests in Table 1 are carried out on the parts.*

Samples taken from the parts, or consisting of identical material, are prepared according to the standard for the test to be carried out. They are then conditioned according to Annex C. After conditioning, the samples shall show no signs of significant deterioration, such as crazing or cracking. They are then kept at room ambient conditions for not less than 16 h and not more than 96 h, after which they are tested according to the standard for the relevant test.

In order to evaluate the percent retention of properties after test, samples that have not been conditioned according to Annex C are tested at the same time as the conditioned samples. The retention shall be as specified in Table 1.

8.3 Resistance to corrosion

8.3.1 General

Metallic parts of OUTDOOR ENCLOSURES, with or without protective coatings, shall be resistant to the effects of water-borne contaminants.

Compliance is checked by either:

– *inspection and by evaluation of data provided by the manufacturer; or*

– *the tests and criteria as specified in 8.3.2 through 8.3.4; or*

– *the applicable performance level (A1, A2 or A3) of IEC 61587-1.*

8.3.2 Test apparatus

The apparatus for the salt spray test shall consist of a test chamber and spraying devices as described in IEC 60068-2-11.

The apparatus for the test in a water-saturated sulphur dioxide atmosphere shall consist of an inert, hermetically sealed, chamber containing a water-saturated sulphur dioxide atmosphere (see Annex A) in which the test specimens and their supports are held. The chamber is as described in ISO 3231.

8.3.3 Test procedure

The test shall consist of two identical and successive 12 day periods.

Each 12 day period consists of test a) followed by test b):

test a) – 168 h of exposure to the salt spray atmosphere. The concentration of the saline solution forming the salt spray atmosphere is 5 % ± 1 % by weight and the temperature of the test chamber is maintained at 35 °C ± 2 °C.

test b) – 5 exposure cycles each consisting of an 8 h exposure to a water-saturated sulphur dioxide-rich atmosphere, (see Annex A), during which the temperature of the test chamber is maintained at 40 °C ± 3 °C , followed by 16 h at rest with the test chamber door open.

After each 12 day period, the test specimens are washed with demineralized water.

Alternatively, the test procedures as described in the following standards may be used to show compliance:

- *ISO 21207 Method B; or*
- *ISO 14993; or*
- *any other equivalent standard.*

8.3.4 Compliance criteria

Compliance is checked by visual inspection. The equipment shall not show rust, other than surface corrosion of the protective coating, cracking or other deterioration that will jeopardize the safety aspects as follows:

- *continued protection against access to hazardous parts, including after mechanical strength tests; and*
- *continued protection against ingress of dust and water; and*
- *continued provision of earth continuity.*

However, surface corrosion of the protective coating is permitted.

8.4 Bottoms of fire enclosures

The bottom of a FIRE ENCLOSURE of OUTDOOR EQUIPMENT shall comply with 4.6.2 of IEC 60950-1:2005, except there are no requirements for the bottoms of FIRE ENCLOSURES of OUTDOOR EQUIPMENT provided that the installation instructions specify that the equipment is to be mounted directly and permanently on a non-combustible surface (such as concrete or metal). There is no need for a marking on the equipment.

Compliance is checked by inspection.

8.5 Gaskets

8.5.1 General

When gaskets are used as the method providing protection against the ingress of potential contaminants, 8.5.1 through 8.5.3 shall apply as appropriate.