IEC 60670-1

Edition 1.1 2011-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Boxes and enclosures for electrical accessories for household and similar fixed electrical installations –
Part 1: General requirements

Boîtes et enveloppes pour appareillage électrique pour installations électriques fixes pour usages domestiques et analogues –
Partie 1: Règles générales

IEC 60670-1:2002+A1:2011

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BOXES AND ENCLOSURES FOR ELECTRICAL ACCESSORIES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

Part 1: General requirements

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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This consolidated version of IEC 60670-1 consists of the first edition (2002) [documents 23B/681/FDIS and 23B/693/RVD], its amendment 1 (2011) [documents 23B/981/FDIS and 23B/991/RVD] and its corrigendum of February 2003. It bears the edition number 1.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

International Standard IEC 60670-1 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories.

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

In this publication, the following print types are used:

– requirements proper: in roman type

– *test specifications: in italic type*

– notes: in smaller roman type.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site 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.

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BOXES AND ENCLOSURES FOR ELECTRICAL ACCESSORIES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

Part 1: General requirements

1 Scope

This part of IEC 60670 applies to boxes, enclosures and parts of enclosures (hereafter called "boxes" and "enclosures") for electrical accessories with a rated voltage not exceeding 1 000 V a.c. and 1 500 V d.c. intended for household or similar fixed electrical installations, either indoors or outdoors.

NOTE Requirements for particular types of boxes and enclosures are given in the relevant parts 2 of IEC 60670.

Boxes and enclosures complying with this standard are suitable for use at ambient temperature not normally exceeding 25 °C but occasionally reaching 35 °C.

This International Standard is intended to apply to boxes and enclosures for electrical accessories within the scope of IEC technical committee 23.

NOTE This standard may also be used as a reference document for other IEC technical committees and subcommittees.

A box or an enclosure which is an integral part of an electrical accessory and provides protection for that accessory against external influences (for example mechanical impact, ingress of solid objects or water, etc.) is covered by the relevant standard for such an accessory.

This standard does not apply to

– ceiling roses;
– luminaire supporting couplers;
– boxes, enclosures and parts of enclosures specifically designed to be used for cable trunking and ducting systems complying with IEC 61084 and which are not intended to be installed outside of these systems.

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 60068-2-75:1997, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60112:1979, *Method for determining the comparative and the proof-tracking indices of solid insulating materials under moist conditions*

IEC 60423:1993, *Conduits for electrical purposes – Outside diameters of conduits for electrical installations and threads for conduits and fittings*

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

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products*

IEC 60695-10-2:1995, *Fire hazard testing – Part 10-2: Guidance and test methods for the minimization of the effects of abnormal heat on electrotechnical products involved in fires – Method for testing products made from non-metallic materials for resistance to heat using the ball pressure test*

IEC 60981:1989, *Extra-heavy duty rigid steel conduits for electrical installations*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61084 (all parts), *Cable trunking and ducting systems for electrical installations*

IEC 61140:2001, *Protection against electric shock – Common aspects for installation and equipment*

IEC 62444:2010, *Cable glands for electrical installations*

3 Definitions

For the purposes of this part of IEC 60670, the following definitions apply.

3.1
enclosure
combination of parts, such as boxes, covers, cover-plates, lids, box extensions, accessories, etc., providing after assembly and installation as in normal use, an appropriate protection against external influences, and a defined protection against contact with enclosed live parts from any accessible direction (see Annex A)

3.2
box
part of an enclosure provided with means for fixing a cover, cover-plate, accessory, etc., and intended to receive accessories (such as socket-outlets, switches, etc.)

3.3
box extension
part of an enclosure which is intended to extend a box for the purpose of either increasing the internal volume of the box or enclosure or to adjust for mounting the box flush or semi-flush with the finished surface of a wall or the like

3.4
lid, cover or cover-plate
part of an enclosure, not integral with or part of an accessory, which may either retain an accessory in position or enclose it

3.5
raised cover
cover intended for mounting directly onto a box to provide for the attachment of accessories and to increase the internal volume of the enclosure

NOTE The centre portion of the cover is raised to accommodate a specific wall or ceiling thickness and to permit the mounting of the accessory on it, flush with the surface of the wall or ceiling.

3.6
exposed conductive part
conductive part of electrical equipment, which can be touched and which is not normally live, but which can become live when basic insulation fails

3.7
surface mounting box or enclosure
box or enclosure which is intended for mounting on a surface (see Annex A)

3.8
flush-mounting box or enclosure
box or enclosure which is intended for mounting flush with the surface (see Annex A)

3.9
semi-flush mounting box or enclosure
box or enclosure which is intended to fit within a mounting surface and partially projects from the mounting surface

3.10
cable gland
~~device designed to permit the entry of a cable into an enclosure and which provides sealing and retention. It may also provide other functions such as earthing, bonding, insulation, cable guarding, strain relief or a combination of these~~

a device designed to permit the entry of a cable, flexible cable or insulated conductor into an enclosure, and which provides sealing and retention. It may also provide other functions such as earthing, bonding, insulation, cable guarding, strain relief or a combination of these

3.11
seal (packing)
material used to fill up the space between the inside of a gland and the cable passing through, usually compressed by the gland and thereby forming a joint

3.12
gasket
material introduced between mating surfaces of an enclosure which in compression forms a joint

3.13
grommet
component used to support and protect the cable or conduit at the point of entry. It may also prevent the ingress of moisture or contaminants (see Figure 1)

3.14
entry membrane
component or an integral part of an enclosure used to protect the cable which may be used to support the cable or conduit at the point of entry

NOTE An entry membrane may also prevent the ingress of moisture or contaminants and may be part of a grommet (see Figure 1).

3.15
protecting membrane
component or an integral part of an enclosure that is not intended to be penetrated in normal use and is intended to provide protection against ingress of water or solid objects and/or to allow the operation of an accessory (see Figure 1).

3.16
composite material
combination of metal and insulating material

3.17
spout (hub)
open entry of a box permitting the insertion and containment of a conduit

3.18
cable retention
ability to limit the displacement of a fitted cable against pull forces

3.19
cable anchorage
ability to limit the displacement of a fitted flexible cable against pull and push forces and torques

3.20
blanking-plug
a blanking-plug is a component used to close an open inlet or an open knock out

4 General requirements

Each part of the enclosure shall be so designed and constructed that, when mounted and installed as for normal use, the enclosure ensures adequate electrical and mechanical protection to the parts so enclosed and minimizes the risk of danger to the user or surroundings.

Compliance is checked by carrying out the relevant tests specified.

5 General notes on tests

5.1 Tests according to this standard are type tests.

Unless otherwise specified boxes and enclosures are tested as delivered.

Accessories complying with other standards are not tested.

Tests on boxes and enclosures of insulating material shall be performed after a preconditioning of at least 10 days at ambient temperature and relative air humidity of between 45 % and 85 %.

Unless otherwise specified the tests shall be carried out in the order of the clauses at an ambient temperature of (20 ± 5) °C on a set of three new specimens.

5.2 If one of the specimens does not satisfy a test due to an assembly or a manufacturing fault, that test and any preceding ones which may have influenced the results of the test shall be repeated and also the tests which follow shall be made in the required sequence on another full set of specimens, all of which shall comply with the requirements.

NOTE When submitting the first set of specimens, the applicant may also submit the additional set of specimens which may be necessary, should one specimen fail. The testing station will then, without further request, test the additional set of specimens and will only reject if a further failure occurs. If the additional set of specimens is not submitted at the same time, the failure of one specimen will entail rejection.

6 Ratings

See relevant parts 2 of this standard.

7 Classification

Boxes and enclosures are classified according to Table 1.

Table 1 – Classification of boxes and enclosures

Classification criteria		
7.1 The nature of their material	7.1.1 Insulating	
	7.1.2 Metallic	
	7.1.3 Composite	
7.2 The method of installation [a]	7.2.1 Flush, semi-flush or embedded in	7.2.1.1 Non-combustible walls, non-combustible ceilings or non-combustible floors
		7.2.1.2 Combustible walls, combustible ceilings or combustible floors
		7.2.1.3 Hollow walls, hollow ceilings, hollow floors or furniture
	7.2.2 Surface mounting on	7.2.2.1 Non-combustible walls, non-combustible ceilings, non-combustible floors or non-combustible furniture
		7.2.2.2 Combustible walls, combustible ceilings, combustible floors or combustible furniture
	7.2.3 Placement	7.2.3.1 Suitable for installation into concrete during the casting process (see 7.6)
		7.2.3.2 Suitable for all types of installation except into concrete
7.3 The type(s) of inlets (outlets) [b]	7.3.1 With inlets for sheathed cables for fixed installations	
	7.3.2 With inlets for flexible cables	
	7.3.3 With inlets for plain or corrugated conduits	
	7.3.4 With inlets for threaded conduits	
	7.3.5 With inlets for other types of conductors/cables or conduits	
	7.3.6 With spouts (hub)	
	7.3.7 Without inlets. Inlet openings will be made during installation	
7.4 The clamping means	7.4.1 With cable retention	
	7.4.2 With cable anchorage	
	7.4.3 With clamping means for flexible conduit	
	7.4.4 Without clamping means	
7.5 The minimum and maximum temperatures during installation	7.5.1 –5 °C to +60 °C	
	7.5.2 –15 °C to +60 °C	
	7.5.3 –25 °C to +60 °C	
7.6 The maximum temperature during the casting process [c]	7.6.1 +60 °C	
	7.6.2 +90 °C [d]	

Table 1 *(continued)*

Classification criteria		
7.7 Boxes and enclosures for hollow walls and the like according to 7.2.1.3 are classified as	7.7.1 Class Ha	
	7.7.2 Class Hb	7.7.2.1 Class Hb for walls
		7.7.2.2 Class Hb for ceilings
	7.7.3 According to the degree of protection of the part mounted in the hollow wall	7.7.3.1 IP2X
		7.7.3.2 >IP2X
7.8 The provision for fixing accessories to boxes	7.8.1 Boxes supplied with screws	
	7.8.2 Boxes intended to receive screws	
	7.8.3 Boxes intended to receive claws	
	7.8.4 Boxes intended to receive other means	

[a] Boxes and enclosures may be suitable for more than one method of installation.

[b] Boxes and enclosures may have more than one type of inlet.

[c] These apply only to boxes and enclosures classified according to 7.2.3.1.

[d] These types are for use in concrete and will temporarily withstand temperatures up to +90 °C during the casting process.

8 Marking

8.1 Boxes and enclosures shall be marked with

a) the name, trade mark or identification mark of the manufacturer or the responsible vendor.

In addition enclosures shall be marked with

b) the IP code against ingress of solid objects if higher than IP2X in which case the second IP numeral shall also be marked;

c) the IP code against harmful ingress of water if higher than IPX0 in which case the first IP numeral shall also be marked.

d) the following marking IPXX on cover of flush enclosures intended to be mounted on rough surfaces and where the IP is dependent on the surface (see Figure 5).

The IP code, if applicable, shall be marked on the outside of the enclosure so as to be easily discernible when the enclosure is mounted and wired as for normal use.

e) the type reference, which may be a catalogue number;

NOTE In the following country the marking of the type reference is not used: UK.

The following information shall be marked on the boxes and enclosures or provided by the manufacturer on the smallest package unit or in the instructions of the manufacturer:

f) the maximum temperature during the building process if 90 °C;

g) the necessary information concerning the openings which can be made during installation in the case of boxes and enclosures classified according to 7.3.7;

h) the minimum temperature during installation for boxes classified according to 7.5.2 and 7.5.3;

i) for boxes and enclosures classified as in 7.7.2, the minimum internal volume in cm^3 as determined by the test in 12.15 ~~2.5~~. The internal volume shall be marked on the inside of the box or enclosure. The marking on a box or enclosure shall be such that the value can be read after installation of the box in the normal manner but before the installation of the wiring devices and wiring;

j) the symbol Ha for boxes classified according to 7.7.1 and the symbol Hb for boxes classified according to 7.7.2.

Unless self-evident, further information for the correct use of the enclosure shall be given in the manufacturer's catalogue or in an instruction sheet.

In special cases, in order to achieve a higher degree of protection by the use of special parts an instruction sheet should be provided and should indicate the higher degree of protection. In such a case, the marking covers the initial degree of protection.

8.2 The marking on the boxes and enclosures shall be durable and easily legible.

Compliance with 8.1 and 8.2 is checked by inspection and by the following test.

The test is made by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

NOTE 1 Marking made by ~~impression,~~ moulding, pressing or engraving is considered durable and is therefore not subjected to this test.

NOTE 2 It is recommended that the petroleum spirit used consist of a solvent hexane with an aromatic content of maximum 0,1 % by volume, a kauributanol value of approximately 29, an initial boiling-point of approximately 65 °C, a dry point of approximately 69 °C and a density of approximately 0,68 g/cm³.

After the test the marking shall still be legible.

9 Dimensions

Boxes and enclosures shall comply with the appropriate standard sheets, if any.

Compliance is checked by inspection and measurement.

10 Protection against electric shock

~~Boxes and enclosures shall be so designed that, when they are assembled, equipped and installed as for normal use in accordance with the manufacturer's instructions, the live parts are not accessible.~~

~~Enclosures shall have a degree of protection of at least IPXXB, when assembled, equipped and installed as for normal use.~~

~~Where enclosures are supplied without a cover, cover-plate or an accessory they are tested with the appropriate parts fitted according to the information given in the manufacturer's instructions.~~

~~*Compliance is checked by inspection and in case of doubt by the following test.*~~

~~*Enclosures shall be tested with test probe 11 according to IEC 61032 applied for 1 min with a force of 20 N, and the test probe shall not enter that part of the enclosure where live parts are to be installed according to the manufacturer's instructions.*~~

~~*Tests shall be carried out on parts which are accessible after installation.*~~