IEC 60670-22

Edition 2.0 2024-12
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Boxes and enclosures for electrical accessories for household and similar fixed electrical installations –
Part 22: Particular requirements for connecting boxes and enclosures

IEC 60670-22:2024-12 RLV(en)

IEC Secretariat
3, rue de Varembé
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 It also gives information on projects, replaced and withdrawn publications.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.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC 60670-22

Edition 2.0 2024-12
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Boxes and enclosures for electrical accessories for household and similar fixed electrical installations –
Part 22: Particular requirements for connecting boxes and enclosures

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.120.10

ISBN 978-2-8327-0113-3

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD 3
1 Scope 6
2 Normative references 6
3 Terms and definitions 6
4 General requirements 8
5 General ~~notes~~ remarks on tests 8
6 Ratings 9
7 Classification 9
8 Marking 9
9 Dimensions 10
10 Protection against electric shock 11
11 Provision for earthing 11
12 Construction 11
13 Resistance to ageing, protection against ingress of solid objects and against harmful ingress of water 12
14 Insulation resistance and electric strength 12
15 Mechanical strength 13
16 Resistance to heat 13
17 Creepage distances, clearances and distances through sealing compound 15
18 Resistance of insulating material to abnormal heat and fire 16
19 Resistance to tracking 16
20 Resistance to corrosion 16
21 Electromagnetic compatibility (EMC) 16
Annex AA (informative) Examples of connecting boxes/enclosures 17
Annex BB (informative) Schematic presentation of connecting devices as a basis for the definitions 19
Annex CC (normative) Additional requirements for boxes and enclosures exposed to direct sunlight 20
Annex DD (normative) Additional requirements for connecting boxes and enclosures having encapsulation capability 21
Bibliography 26

Figure 101 – Single terminal device 14
Figure 102 – Multiway terminal device 14
Figure AA.1 – Four examples of connecting boxes/enclosures 17
Figure AA.2 – Examples of cable joints 18
Figure BB.1 – Schematic presentation 19

Table 101 – Relationship between rated connecting capacity and test current 15
Table 102 – Creepage distances, clearances and distances through sealing compound 15

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

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

Part 22: Particular requirements for connecting boxes and enclosures

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60670-22:2003+AMD1:2015 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60670-22 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories. It is an International Standard.

This second edition cancels and replaces the first edition published in 2003 and Amendment 1:2015. This edition constitutes a technical revision.

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

a) addition of cable joints as a new type of box with the related tests and requirements;
b) addition of tests and requirements for boxes and enclosures exposed to direct sunlight with the related Annex CC;
c) addition of connecting boxes and enclosures having encapsulation capability as a new type of boxes with the related tests, requirements and related Annex DD.

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

Draft	Report on voting
23B/1535/FDIS	23B/1553/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60670 series, published under the general title *Boxes and enclosures for electrical accessories for household and similar fixed installations*, can be found on the IEC website.

This document is to be used in conjunction with IEC 60670-1:2024. It lists the changes necessary to convert that standard into a specific standard for connecting boxes and enclosures.

Where this document states "addition", "modification" or "replacement", the relevant requirement, test specifications or explanatory matter in IEC 60670-1:2024 shall be adapted accordingly.

Clauses and subclauses, notes, figures or tables which are additional to those in IEC 60670-1:2024 are numbered starting from 101.

Additional annexes to IEC 60670-1:2024 are numbered AA, BB, etc.

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 this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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

Part 22: Particular requirements for connecting boxes and enclosures

1 Scope

Clause 1 of IEC 60670-1:2024 applies with the following addition:

Add the following after the ~~fourth~~ third paragraph:

This document applies to junction connecting boxes ~~for junction(s) and/~~ or tapping~~(s)~~ connecting boxes or both.

NOTE Unless otherwise stated, throughout the document the term "boxes" also applies to "enclosures".

2 Normative references

Clause 2 of IEC 60670-1:2024 applies with the following additions:

IEC 60998 (all parts), *Connecting devices for low-voltage circuits for household and similar purposes*

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm^2 up to 35 mm^2 (included)*

ISO 62:2008, *Determination of water absorption*

ISO 178:2019, *Plastics – Determination of flexural properties*

ISO 179-1:2010, *Plastics – Determination of Charpy impact properties – Part ~~1~~ 1: Non-instrumented impact test*

ISO 4892-2:2013, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*
ISO 4892-2:2013/AMD1:2021

3 Terms and definitions

Clause 3 of IEC 60670-1:2024 applies with the following additions:

3.101
connecting box
junction box
box allowing connection of conductors

3.101.1
junction connecting box
connecting box allowing connection of one or more junctions

3.101.2
tapping connecting box
connecting box allowing connection of one or more taps from one or more main conductors

Note 1 to entry: Connecting boxes according to 3.101.1 and 3.101.2 may be combined.

~~**3.101.3**~~
~~**cord outlet connecting box**~~
~~connecting box allowing one or more connections to be made between a fixed installation and a flexible cable~~

3.102
connecting box with integrated clamping units
~~connecting box~~ box allowing connection of conductors in which clamping units are permanently retained as an integrated part of the box (see Annex AA)

Note 1 to entry: For example, see Figure AA.1

3.103
connecting box with incorporated terminals or connecting devices
~~connecting box~~ box allowing connection of conductors with detachable terminals or connecting devices retained within the box by mechanical means (see Annex AA)

Note 1 to entry: For example, see Figure AA.1

3.104
connecting box with provisions for subsequent incorporation of terminals or connecting devices
~~connecting box~~ box allowing connection of conductors with provisions for incorporating terminals or connecting devices to be retained within the box by mechanical means (see Annex AA)

Note 1 to entry: For example, see Figure AA.1

3.105
connecting box for floating terminals or connecting devices
~~connecting box~~ box allowing connection of conductors intended to accommodate terminals or connecting devices but without provision to retain them (see Annex AA)

Note 1 to entry: For example, see Figure AA.1

3.106
rated connecting capacity
cross-sectional area of the largest conductors as declared by the manufacturer

3.107
terminal
conductive part of one pole comprising one or more clamping unit(s) and insulation if necessary

3.108
clamping unit
part(s) of a terminal necessary for the mechanical clamping and the electrical connection of the conductor(s) including the parts which are necessary to ensure correct contact pressure

3.109
connecting device
device for the electrical connection of two or more conductors comprising one or more terminals and if necessary, insulation and/or ancillary parts

Note 1 to entry: For a schematic representation of connecting devices see Figure BB.1 of Annex BB.

3.110
cable joint
connecting enclosure provided with cable glands (or other means) having cable anchorage function, intended to make a connection between two or more insulated cables to form a continuous circuit in the fixed installation

Note 1 to entry: For example, see Figure AA.2

3.111
junction
connection between two or more conductor ends

3.112
tapping
connection of a conductor end (called "tapped conductor") on any point of another conductor (called "main conductor")

Note 1 to entry: The main conductor is not interrupted.

3.113
CBEC
connecting box having encapsulation capability
box allowing the connection of conductors and intended to encapsulate the clamping units, terminals or connecting devices with an encapsulating compound

3.114
encapsulating compound
material to encapsulate the clamping units, terminals or connecting devices in CBEC

4 General requirements

Clause 4 of IEC 60670-1:2024 is applicable with the following addition:

Connecting devices incorporated in connecting boxes shall comply with the requirements of the IEC 60998 series; integrated clamping units shall comply with the requirements of ~~the IEC 60999 series~~ IEC 60999-1:1999.

NOTE 101 In the following countries terminal blocks according to IEC 60947-7-1 and IEC 60947-7-2 are allowed to be incorporated in connecting boxes: DE.

5 General ~~notes~~ remarks on tests

Clause 5 of IEC 60670-1:2024 applies with the following addition:

5.2 *Add at the end of Subclause 5.2:*

Connecting boxes with provision for subsequent incorporation of clamping units are tested with the clamping units recommended by the manufacturer.

Connecting devices that are in accordance with the IEC 60998 series ~~need~~ are not required to be tested again.

NOTE ~~1~~101 In the following countries terminal blocks according to IEC 60947-7-1 and IEC 60947-7-2 ~~need~~ are not required to be tested again: DE.

NOTE ~~2~~102 In the following countries connecting boxes shall be tested either:

- with their incorporated terminals or connecting devices or
- with the terminals or connecting devices recommended by the manufacturer for connecting boxes with provision for subsequent incorporation of terminals or connecting devices: UK.

6 Ratings

Clause 6 of IEC 60670-1:2024 is replaced by the following:

6.1 The preferred values of the rated voltage of the integrated or incorporated connecting devices are 125 V, 250 V, 300 V, 400 V, 500 V, 600 V, 690 V, 800 V, 1 000 V AC and 1 500 V DC.

6.2 The standard rated connecting capacities are 0,2 mm^2, 0,34 mm^2, 0,5 mm^2, 0,75 mm^2, 1 mm^2, 1,5 mm^2, 2,5 mm^2, 4 mm^2, 6 mm^2, 10 mm^2, 16 mm^2, 25 mm^2, 35 mm^2.

NOTE ~~1~~ 101 For the time being, designation by wire gauge may be used in some countries (for example AWG in US and CA), instead of the cross-sectional areas expressed in mm^2.

NOTE ~~2~~ 102 The approximate relation between mm^2 and AWG sizes is given in Annex A of IEC 60999-1:1999.

NOTE ~~3~~ 103 In UK, a standard connecting capacity of 1,25 mm^2 is used.

NOTE ~~4~~ 104 In Japan, standard connecting capacities of 0,9 mm^2,1,25 mm^2, 2,0 mm^2, 3,5 mm^2, 5,5 mm^2, 8 mm^2, 14 mm^2, 22 mm^2 are used.

7 Classification

Clause 7 of IEC 60670-1:2024 applies with the following addition:

Add the following to Table 1:

7.101 The method of fixing the terminals or connecting devices in the connecting box	7.101.1 With integrated clamping units	
	7.101.2 With incorporated terminals or connecting devices	
	7.101.3 With provisions for subsequent incorporation of terminals or connecting devices	
	7.101.4 Without fixing (for floating terminals or connecting devices)	
7.102 The capability to encapsulate the clamping units, terminals or connecting devices	7.102.1 Without the capability to encapsulate the clamping units, terminals or connecting devices	
	7.102.2 With the capability to encapsulate the clamping units, terminals or connecting devices (see Annex DD)	

8 Marking

Clause 8 of IEC 60670-1:2024 applies with the following additions:

8.1 General

~~*Add after j):*~~

~~k) rated insulation voltage for boxes with integrated or incorporated terminals or connecting devices (see note 1),~~

~~l) rated connecting capacity (see notes 1 and 2),~~

~~m) maximum number of conductors to be placed in the box (see notes 1 and 2).~~

~~The information l) and m) are optional for boxes classified according to 7.101.4.~~

~~n) Boxes and enclosures classified according to 7.101.1 or 7.101.2 shall be marked with an appropriate rated current which does not exceed the test current given in Table 101.~~

~~NOTE 1 In the case of:~~

~~– integrated clamping units, k), l) and n) should be marked on the boxes,~~

~~– incorporated terminals or connecting devices, the marking k), l) and n) if marked on the box or on the incorporated terminals or connecting devices, should be visible during installation,~~

~~– empty boxes for floating terminals or connecting devices classified according to 7.101.4, the marking l) and m), if marked on the box, should be visible during installation.~~

~~NOTE 2 The manufacturer may mark or declare more than one combination of l) and m). This information is mandatory for boxes classified according to 7.101.4 in the following countries: DE and SE.~~

Add the following after list item k):

l) rated voltage for boxes with integrated or incorporated terminals or connecting devices;

m) rated connecting capacity (see Note 101);

n) maximum number of conductors to be placed in the box (see Note 101);

The information in items m) and n) is optional for boxes classified according to 7.101.4.

The manufacturer may mark or declare more than one combination of m) and n).

NOTE 101 In the following countries this information in Subclause 8.1 is mandatory for boxes classified according to 7.101.4: DE and SE.

o) boxes and enclosures classified according to 7.101.1 or 7.101.2 shall be marked with an appropriate rated current which does not exceed the test current given in Table 101.

NOTE 102 In the following country the marking of the rated current is optional: DE

Add the following subclauses:

8.101 Symbols

When symbols are used they shall be as follows:

Volt V

Rated connecting capacity ..... mm^2 or ☐ or AWG

8.102 Instructions for cable joints

Information shall be given in the manufacturer's instructions that cable joints are not intended for portable use or for being buried underground. These instructions are not required to be provided with the product.

9 Dimensions

Clause 9 of IEC 60670-1:2024 applies.

10 Protection against electric shock

Clause 10 of IEC 60670-1:2024 applies.

11 Provision for earthing

Clause 11 of IEC 60670-1:2024 applies.

12 Construction

Clause 12 of IEC 60670-1:2024 applies with the following modifications:

12.2.1 *Add the following after the first paragraph:*

In connecting boxes where the fixing means of covers or cover-plates serve also to fix the connecting device, ~~it~~ the fixing means shall maintain the connecting device in the correct position after removal of the cover or cover-plate.

Compliance is checked by inspection.

12.3 Drain holes

Add after the last paragraph:

This Subclause 12.3 does not apply for cable joints.

12.7 Boxes and enclosures with a cable anchorage(s)

Subclause 12.7 of IEC 60670-1:2024 applies with the following addition before Figure 12:

For the purpose of cable joints, the test of 12.7 is repeated with rigid cables as specified in the instructions.

Add the following subclauses:

12.101 Connecting boxes shall have adequate space to allow the correct connection of conductors which are specified in the relevant clauses of the particular requirements of ~~Parts 2 of IEC 60998~~ IEC 60998-2-1, IEC 60998-2-2, IEC 60998-2-3, and IEC 60998-2-4 concerning the number and cross-sectional area of the conductors.

For connecting boxes classified according to 7.101.1, 7.101.2 and 7.101.3, compliance is checked by fitting the maximum number of conductors of the maximum cross-sectional area if that is the worst-case combination. If not, the most unfavourable combination shall be checked.

This test shall be carried out in conjunction with that of 12.102.

~~*For boxes classified according to 7.101.4 the test is made only if l) and m) of 8.1 are marked or declared.*~~

For boxes classified according to 7.101.4 compliance is checked by fitting the maximum number of conductors and connecting devices as declared in 8.1 m) and 8.1 n). The test is carried out only if m) and n) of 8.1 are marked or declared.

12.102 Retention means for terminals or connecting devices shall withstand the mechanical stresses occurring during installation and normal use.

Compliance is checked by connecting conductors in accordance with ~~the relevant Part(s) 2 of IEC 60998~~ IEC 60998-2-1, IEC 60998-2-2, IEC 60998-2-3 or IEC 60998-2-4 as applicable for the type of the connecting device used.

After the test there shall be no harmful deformation, cracks or similar damage which would lead to non-compliance with this document.

12.103 Connecting boxes classified according to 7.101.1, 7.101.2 and 7.101.3 shall comply with the temperature rise requirements of 16.102.

12.104 Cable joints shall be classified according to 7.4.2, having means for cable anchorage, and provided with cable glands or other means as defined by the manufacturer.

Compliance is checked by inspection and by the test of 12.7.

NOTE IEC 62444 is applicable to cable glands for electrical installations.

13 Resistance to ageing, protection against ingress of solid objects and against harmful ingress of water

Clause 13 of IEC 60670-1:2024 applies with the following addition:

13.3.3 *Replace the last paragraph by the following:*

The specimens, except connecting boxes classified according to 7.101.4, shall withstand an electric strength test specified in 14.2 which shall be started within 5 min of the completion of the test according to this Subclause 13.3.3.

14 Insulation resistance and electric strength

Clause 14 of IEC 60670-1:2024 applies with the following addition:

Add the following:

14.2.101 *For boxes with integrated or incorporated terminals or connecting devices, the measurements are made consecutively as indicated below.*

Each clamping unit of a connecting device shall be tested when connected ~~alternatively~~ with conductors of the smallest and tested when connected with connectors of the largest cross-sectional area.

The insulation resistance is then measured with a DC voltage of approximately 500 V applied, the measurement being made 1 min after application of the voltage:

a) between all clamping units connected together and the body for connecting devices without fixing means or between all clamping units connected together and the mounting base for connecting devices with fixing means;

b) between each clamping unit and all others connected to the body for connecting devices without fixing means or between each clamping unit and all others connected to the mounting base for connecting devices with fixing means.

The metal foil is applied in such a way that the sealing compound, if any, is effectively tested.

The insulation resistance shall be not less than 5 MΩ.

15 Mechanical strength

Clause 15 of IEC 60670-1:2024 applies with the following ~~amendment~~ modifications:

15.2 Impact test at low temperature

Replace the sixth paragraph with the following paragraph:

Damage to the finish, small dents which do not reduce creepage distances or clearances below the value specified in Table 102 and small chips which do not adversely affect the protection against electric shock or harmful ingress of water are disregarded.

Add the following subclause:

15.101 Additional requirements for boxes and enclosures exposed to direct sunlight

When boxes or enclosures are declared to be resistant to UV radiation, they are tested according to Annex CC of this document.

This test applies only to boxes and enclosures classified according to 7.1.1, 7.1.3 and 7.1.4.

16 Resistance to heat

Clause 16 of IEC 60670-1:2024 applies with the following addition:

Add the following subclauses:

16.101 Resistance to heat of connecting devices

16.101.1 Connecting devices having parts of insulating material shall be sufficiently resistant to heat.

Compliance is checked by the test of 16.101.~~1~~2 to 16.101.~~3~~4 performed on three extra specimens.

16.101.~~1~~2 *The specimens or portions of the specimens are kept for 1 h in a heating cabinet at a temperature of (85 ± 2) °C.*

During the test they shall not undergo any change impairing their further use and sealing compound if any, shall not flow to such an extent that live parts are exposed.

After the test and after the specimens have been allowed to cool to approximately ambient temperature, there shall be no access to live parts which are normally not accessible when the specimens are mounted as in normal use, even if the test probe B of IEC 61032 is applied with a force not exceeding 5 N.

After the test, markings shall still be legible.

16.101.~~2~~3 *Parts of the insulating material not necessary to retain current carrying parts and parts of the earthing circuit in position, even though they are in contact with them, are subjected to a ball-pressure test as described in IEC 60670-1:2024, Clause 16 but at a temperature of (70 ± 2) °C or (40 ± 2) °C, plus the highest temperature rise determined for the relevant part during the test of 16.102.~~4~~5, whichever is the higher.*

16.101.~~3~~4 *Parts of the insulating material necessary to retain current carrying parts and parts of the earthing circuit in position are subjected to a ball pressure test in a heating cabinet at a temperature of (125 ± 2) °C.*

16.102 Resistance to heat of connecting devices integrated in connecting boxes

16.102.1 *Connecting devices integrated in connecting boxes shall be so constructed that the temperature rise in normal use does not exceed the value specified in 16.102.~~4~~5.*

Compliance is checked by the tests of 16.102.~~1~~2 to 16.102.3.

NOTE 101 In the following countries connecting devices integrated or incorporated in connecting boxes shall be so constructed that the temperature rise in normal use does not exceed the values specified in 16.102.~~4~~5. Compliance is checked by the tests of 16.102.~~1~~2 to 16.102.~~3~~4: UK.

16.102.~~1~~2 *Connecting devices with a single terminal (see Figure 101) having one or more clamping units shall be connected to conductors in the intended manner and under the most unfavourable conditions.*

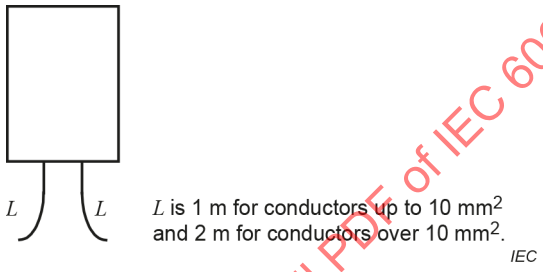


Figure 101 – Single terminal device

16.102.~~2~~3 *For multiway terminal devices a maximum of three adjacent terminals are connected in series. If single pole connecting devices are designed to be mounted side by side, three devices are placed in the intended manner and connected together (see Figure 102).*

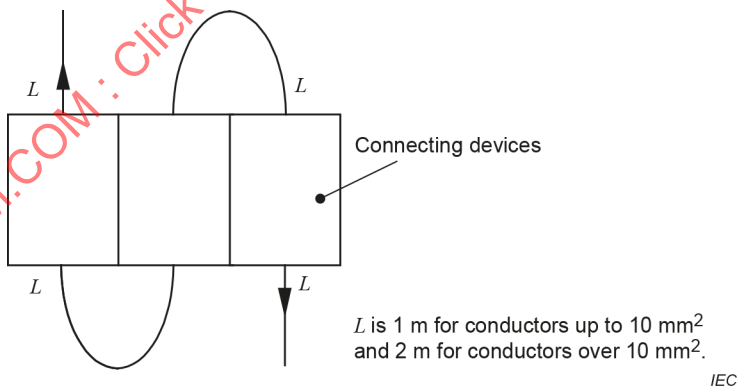


Figure 102 – Multiway terminal device

16.102.~~3~~4 *The connections are made with new rigid or flexible conductors of the largest cross-sectional area appropriate to the clamping units, the clamping units being connected according to the specifications of the relevant part of IEC 60998.*

Conductor length shall be 1 m for a cross-sectional area up to and including 10 mm^2 and 2 m for a cross-sectional area above 10 mm^2. Conductor length may be reduced in agreement with the manufacturer.

16.102.45 *Temperature rise measurements are made when the device under test has reached thermal equilibrium. It is generally accepted that the temperature is stable when the temperature of the part under test does not increase by more than 1 K/h. During the test the devices are loaded with an alternating current having the value shown in Table 101 for the corresponding rated connecting capacity.*

The temperature is determined by means of colour changing indicators or thermocouples, so chosen and positioned that they have a negligible effect on the temperature being determined (e.g. on the metallic part in contact with the conductor).

Table 101 – Relationship between rated connecting capacity and test current

Rated connecting capacity mm^2	Test current A
0,2	4
0,34	5
0,5	6
0,75	9
1	13,5
1,5	17,5
2,5	24
4	32
6	41
10	57
16	76
25	101
35	125

The temperature rise of current-carrying parts of the clamping unit shall not exceed 45 K, it being understood that in the case of an insulated device the temperature rise of the conductor shall be measured as close as possible to the clamping unit.

~~NOTE~~ For the purpose of the test of 16.101.~~2~~3, the temperature rise of external parts of insulating material not necessary to retain current-carrying parts and parts of the earthing circuit in position, even though they are in contact with them, is also determined.

17 Creepage distances, clearances and distances through sealing compound

Creepage distances, clearances and distances through sealing compound shall not be less than the value shown in Table 102.

This test does not apply to connecting boxes for floating terminals or connecting devices classified according to 7.101.4.

Table 102 – Creepage distances, clearances and distances through sealing compound

Rated voltage V	Creepage distance, clearance and distance through sealing compound mm
≤ 130	1,5
> 130 and ≤ 250	3,0

> 250 and ≤ 450	4,0
> 450 and ≤ 750	6,0
> 750	8,0

Compliance is checked by measurement between the following parts:

Creepage distances and clearances:

– *between live parts of different polarity;*
– *between live parts and*
  - *metal covers and boxes without insulating lining;*
  - *the surface on which the box is mounted.*

Distances through sealing compound:

– *between live parts covered with sealing compound and the surface on which the box is mounted.*

For multi-way terminal devices and terminals without fixing means but with protection, distances are measured between live parts and any opening which represents the closest point liable to touch any other part when the terminal is fitted with conductors having the largest cross-sectional area.

In cases where various terminals or connecting devices may be mounted in the box, the most unfavourable combinations shall be tested.

18 Resistance of insulating material to abnormal heat and fire

Clause 18 of IEC 60670-1:2024 applies.

19 Resistance to tracking

Clause 19 of IEC 60670-1:2024 applies.

20 Resistance to corrosion

Clause 20 of IEC 60670-1:2024 applies.

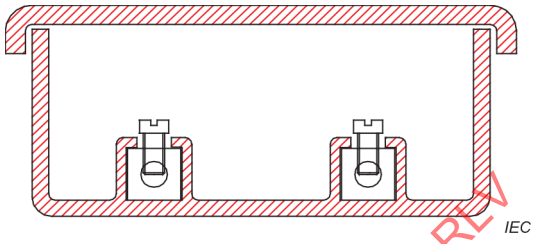
21 Electromagnetic compatibility (EMC)

Clause 21 of IEC 60670-1:2024 applies.

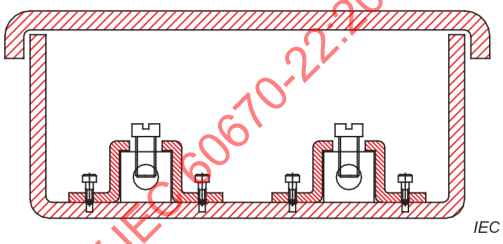
Annex AA
(informative)

Examples of connecting boxes/enclosures

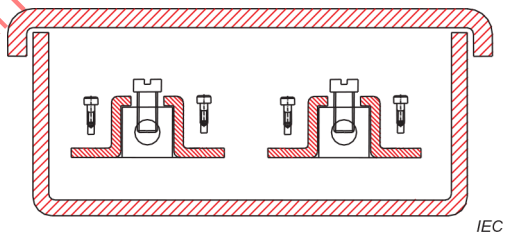
a) ~~Enclosures~~Connecting box with integrated clamping units according to 7.101.1



b) ~~Enclosures~~Connecting box with incorporated terminals or connecting devices according to 7.101.2



c) ~~Enclosures~~Connecting box with provisions for subsequent incorporation of terminals or connecting devices according to 7.101.3



d) ~~Enclosures~~Connecting box without fixing (for floating terminals or connecting devices) according to 7.101.4

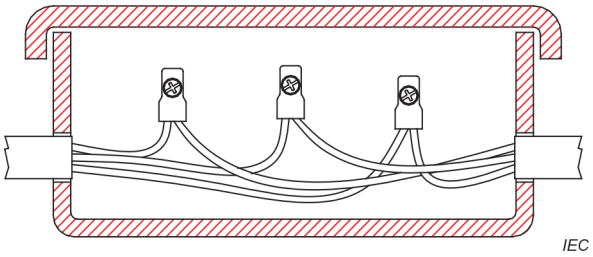
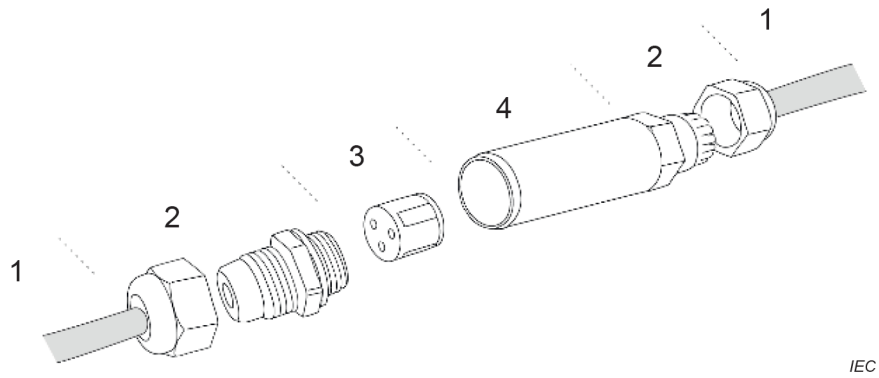


Figure AA.1 – Four examples of connecting boxes/enclosures



Key

1) Cable
2) Cable gland
3) Connecting device
4) Box

Figure AA.2 – Examples of cable joints

Annex BB
(informative)

Schematic presentation of connecting devices as a basis for the definitions

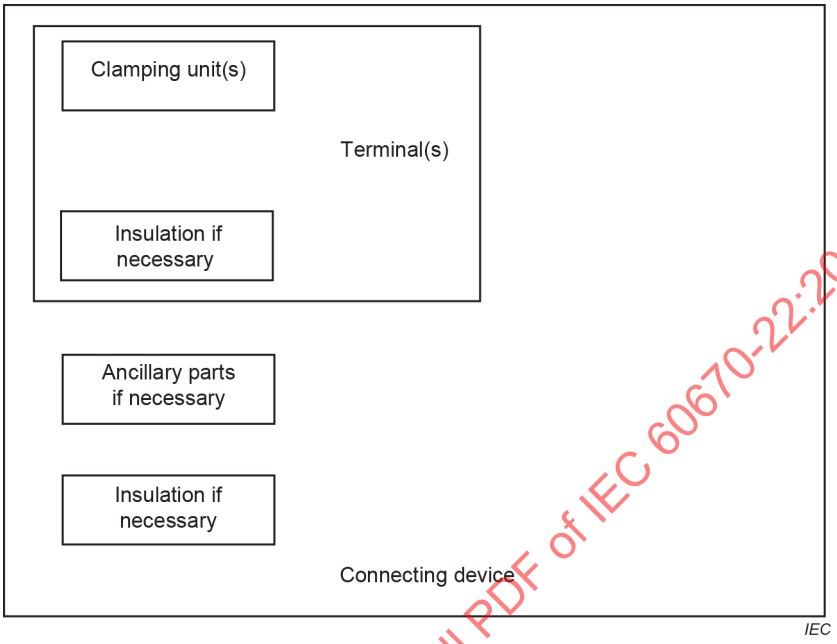


Figure BB.1 – Schematic presentation

Annex CC
(normative)

Additional requirements for boxes and enclosures exposed to direct sunlight

Boxes and enclosures declared to be resistant to UV radiation shall comply with the following tests.

The tests shall be made on six test specimens of standard size according to ISO 178:2019 and on six test specimens of standard size according to ISO 179-1 exposed for 500 h to Xenon-arc, Method A, Cycle 1 in accordance with ISO 4892-2. The specimens shall be mounted in the UV apparatus in an appropriate manner:

- *suitable for both the product to be tested and the test equipment and,*
- *so that the samples do not touch each other.*

Compliance is checked by verification that the flexural strength (according to ISO 178) and Charpy impact (according to ISO 179-1) of synthetic materials have 70 % minimum retention.

For the test carried out in accordance with ISO 178, the surface of the specimens exposed to UV shall be turned face down and the pressure applied to the non-exposed surface.

For the test carried out in accordance with ISO 179-1 no notch shall be cut into the specimens and the impact shall be applied to the exposed surface. For materials whose impact bending strength cannot be determined prior to exposure because no rupture has occurred, not more than three of the exposed test specimens shall be allowed to break.

The specimens shall not show cracks or deterioration visible to normal or corrected vision without additional magnification.

These tests are not required to be carried out if the manufacturer can provide data from the material supplier to demonstrate that materials of the same thickness or thinner comply with this requirement.

Annex DD
(normative)

Additional requirements for connecting boxes and enclosures having encapsulation capability

DD.1 General

Under certain ambient conditions, water condensation inside boxes or enclosures and the entry of water and solid objects can lead to insulation faults and failure of internally connected circuits. Encapsulation with a compound is intended to prevent this from occurring.

DD.2 Applicability of this annex

This Annex DD applies to boxes and enclosures having the capability to encapsulate the clamping units, terminals or connecting devices and their connections with conductors according to classification 7.102.2.

These boxes and enclosures are intended to prevent the formation of water condensation and the entry of water and solid objects.

NOTE Boxes and enclosures according to this Annex DD can be used for example in the ground, high humidity areas, flooded areas (temporarily submerged) and ground-level installation (rain, snow).

The use of connecting boxes having encapsulation capability (CBEC) buried in the ground is limited to use at a reduced depth and where they are not subjected to significant compression forces due to the passage of vehicles, people or similar case.

This Annex DD does not apply to

– cable accessories (for example products covered by EN 50393);
– products buried in the ground with traffic loads;
– other inaccessible, encapsulated connections.

NOTE The following modifications to this document are applicable to connecting boxes and enclosures having encapsulation capability. The clause numbers in that follow refer to the clause numbers in the main body text of this document that are modified.

DD.3 General requirements

Add the following at the end of the clause:

CBEC shall be used with connecting devices and encapsulating compound according to the manufacturer's instructions.

5.1 Test conditions and number of samples

Add the following at the end of the subclause:

CBEC shall be tested when mounted, assembled and wired as for normal use according to the manufacturer's instructions.

CBECs are tested filled with encapsulating compound unless otherwise specified in this Annex DD.

8 Marking

Modification:

8.1 General

Add the following at the end of the subclause, after NOTE 103:

The encapsulating compound to be used shall be specified in the manufacturer's instructions.

If different IP codes are declared for a CBEC when it is filled with encapsulating compound or without encapsulating compound, both IP codes shall be marked so that it is clear to which situation each IP code corresponds.

8.101 Symbols

Add the following at the end of the subclause:

IP code when encapsulated 

(IEC 60417-6458 (2023-11))

NOTE 101 In the IP code, the letter "X" is replaced by the relevant number.

NOTE 102 The marking of double IP code can be, for example, as follows: 

8.103 Instructions for CBEC

Information shall be given in the manufacturer's instructions, which is not required to be provided with the product, stating that the use of CBEC buried in the ground is limited to use at a depth down to 1 m and where they are not subjected to significant compression forces due to the passage of vehicles, people or similar cases.

12 Construction

Add the following:

12.105 Encapsulating compound

The encapsulating compound shall comply with the following requirements:

– *the insulation resistance and electric strength shall be adequate.*

Compliance is checked by the tests of 14.2.101 and 14.2.

– *the encapsulating compound shall be capable of completely encapsulating the current carrying parts to protect them against harmful ingress of solid foreign objects and against harmful ingress of water.*

Compliance is checked by inspection and by the test of Clause 13.

– *the characteristics of the encapsulating compound shall allow the fluid to adequately fill empty spaces in the box and terminals.*

Compliance is checked by the following test:

When ready for filling according to the manufacturer's instructions, the volume of water necessary to fill a box shall be measured. The volume of encapsulating compound necessary to repeat the process with a new specimen shall not be less than 90 % of the measured water volume.

A sufficient period of time shall be allowed for the compound to fill the volume inside the CBEC.

After the test, it shall be verified that the current carrying parts are completely encapsulated by the compound.

– *the encapsulating compound water absorption level shall not exceed 3 %.*

Compliance is checked according to ISO 62, method 1.

The encapsulating compound shall be chemically compatible with materials used for the current carrying parts and the materials of the CBEC, such as conductors and their insulation.

Compliance is checked by inspection and/or chemical analysis.

12.106 It is recommended that connections are accessible for inspection, testing and maintenance after installation. If the accessory is declared as suitable for this purpose in the manufacturer's instructions, the encapsulating compound shall be removed for inspection, testing and maintenance and then replaced by refilling the box, ensuring that terminals are completely encapsulated by the encapsulating compound after installation.

When carrying out maintenance and changing the wiring in the box, the terminals shall be replaced by new ones as specified in the manufacturer's instructions.

Compliance is checked by inspection and by the tests of Clause 14.

12.107 CBEC shall provide a degree of protection of IP 6X according to IEC 60529, when encapsulated.

Compliance is checked by the test of 13.2.

13 Resistance to ageing, protection against ingress of solid objects and against harmful ingress of water

13.2 Protection against the ingress of solid objects

Add the following paragraph at the end of the subclause:

CBEC are tested with and without encapsulating compound.

13.3 Protection against harmful ingress of water

13.3.1

Add the following paragraph at the end of the subclause:

CBEC with encapsulating compound are tested according to 13.3.3 only.

CBEC are tested with encapsulating compound according to the manufacturer specification.

13.3.3

Replace the last paragraph with the following:

Compliance is checked by the relevant tests of IEC 60529.

CBEC with compound shall be checked by inspection that no water can touch live parts so as to reduce insulation resistance below the value given in 14.2.

CBEC with compound shall comply with the electric insulation resistance test as specified in 14.2.101 which shall be started within 5 min of the completion of the test according to this Subclause 13.3.3.

14 Insulation resistance and electric strength

14.2

Add the following paragraph at the end of the subclause:

CBEC are tested without encapsulating compound

14.2.101

Add the following paragraph at the end of the subclause:

CBEC are tested with and without encapsulating compound.

15 Mechanical strength

15.1 General

Add the following paragraph at the end of the subclause:

CBEC are tested without encapsulating compound.

15.6 Test for boxes and enclosures declared with IK code

Add the following paragraph at the end of the subclause:

CBEC are tested with encapsulating compound.

16 Resistance to heat

Add the following paragraph at the end of IEC 60670-1:2024, 16.1:

The tests of 16.1 and 16.2 do not apply to the encapsulating compound.

Add the following at the end of 16.102.1:

For CBEC, the test is repeated with an extra set of specimens with encapsulating compound.

18 Resistance of insulating material to abnormal heat and fire

Add the following at the end of the clause:

For CBEC, an additional specimen can be needed to test the encapsulating compound.

Modify the second paragraph after the last bullet point as follows:

External conductors and encapsulating compound cannot be considered as retaining the current-carrying parts.

Bibliography

Addition:

EN 50393:2015, *Test methods and requirements for accessories for use on distribution cables of rated voltage 0,6/1,0 (1,2) kV*

_____

IEC 60670-22

Edition 2.0 2024-12

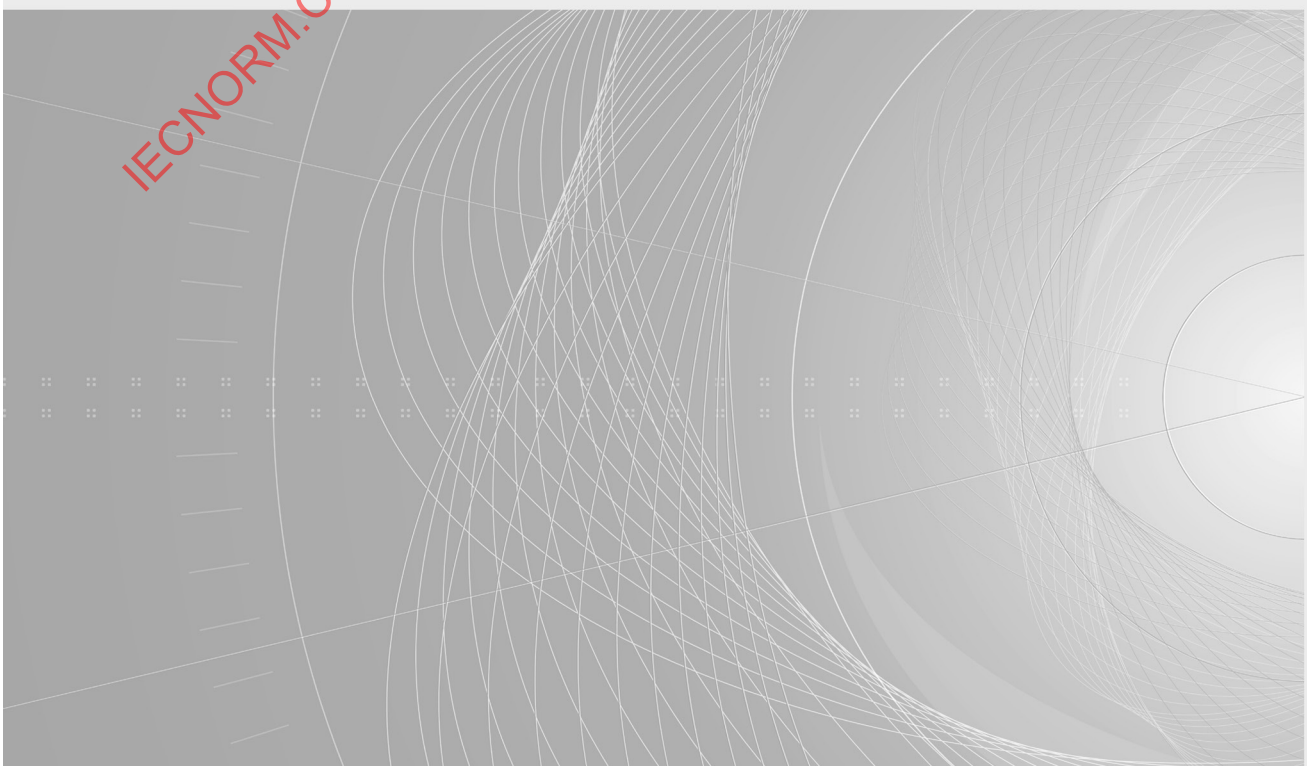
INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Boxes and enclosures for electrical accessories for household and similar fixed electrical installations – Part 22: Particular requirements for connecting boxes and enclosures

Boîtes et enveloppes pour appareillage électrique pour installations électriques fixes pour usages domestiques et analogues – Partie 22: Exigences particulières pour les boîtes et enveloppes de connexion



IEC 60670-22:2024-12(en-fr)

CONTENTS

FOREWORD 3
1 Scope 5
2 Normative references 5
3 Terms and definitions 5
4 General requirements 7
5 General remarks on tests 7
6 Ratings 8
7 Classification 8
8 Marking 9
9 Dimensions 9
10 Protection against electric shock 9
11 Provision for earthing 9
12 Construction 10
13 Resistance to ageing, protection against ingress of solid objects and against harmful ingress of water 11
14 Insulation resistance and electric strength 11
15 Mechanical strength 11
16 Resistance to heat 12
17 Creepage distances, clearances and distances through sealing compound 14
18 Resistance of insulating material to abnormal heat and fire 15
19 Resistance to tracking 15
20 Resistance to corrosion 15
21 Electromagnetic compatibility (EMC) 15
Annex AA (informative) Examples of connecting boxes/enclosures 16
Annex BB (informative) Schematic presentation of connecting devices as a basis for the definitions 18
Annex CC (normative) Additional requirements for boxes and enclosures exposed to direct sunlight 19
Annex DD (normative) Additional requirements for connecting boxes and enclosures having encapsulation capability 20
Bibliography 25

Figure 101 – Single terminal device 13
Figure 102 – Multiway terminal device 13
Figure AA.1 – Four examples of connecting boxes/enclosures 16
Figure AA.2 – Examples of cable joints 17
Figure BB.1 – Schematic presentation 18

Table 101 – Relationship between rated connecting capacity and test current 14
Table 102 – Creepage distances, clearances and distances through sealing compound 14

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

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

Part 22: Particular requirements for connecting boxes and enclosures

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60670-22 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories. It is an International Standard.

This second edition cancels and replaces the first edition published in 2003 and Amendment 1:2015. This edition constitutes a technical revision.

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

a) addition of cable joints as a new type of box with the related tests and requirements;
b) addition of tests and requirements for boxes and enclosures exposed to direct sunlight with the related Annex CC;

c) addition of connecting boxes and enclosures having encapsulation capability as a new type of boxes with the related tests, requirements and related Annex DD.

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

Draft	Report on voting
23B/1535/FDIS	23B/1553/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60670 series, published under the general title *Boxes and enclosures for electrical accessories for household and similar fixed installations*, can be found on the IEC website.

This document is to be used in conjunction with IEC 60670-1:2024. It lists the changes necessary to convert that standard into a specific standard for connecting boxes and enclosures.

Where this document states "addition", "modification" or "replacement", the relevant requirement, test specifications or explanatory matter in IEC 60670-1:2024 shall be adapted accordingly.

Clauses and subclauses, notes, figures or tables which are additional to those in IEC 60670-1:2024 are numbered starting from 101.

Additional annexes to IEC 60670-1:2024 are numbered AA, BB, etc.

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 this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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

Part 22: Particular requirements for connecting boxes and enclosures

1 Scope

Clause 1 of IEC 60670-1:2024 applies with the following addition:

Add the following after the third paragraph:

This document applies to junction connecting boxes or tapping connecting boxes or both.

NOTE Unless otherwise stated, throughout the document the term "boxes" also applies to "enclosures".

2 Normative references

Clause 2 of IEC 60670-1:2024 applies with the following additions:

IEC 60998 (all parts), *Connecting devices for low-voltage circuits for household and similar purposes*

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm^2 up to 35 mm^2 (included)*

ISO 62:2008, *Determination of water absorption*

ISO 178:2019, *Plastics – Determination of flexural properties*

ISO 179-1:2010, *Plastics – Determination of Charpy impact properties – Part 1: Non-instrumented impact test*

ISO 4892-2:2013, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*
ISO 4892-2:2013/AMD1:2021

3 Terms and definitions

Clause 3 of IEC 60670-1:2024 applies with the following additions:

3.101
connecting box
junction box
box allowing connection of conductors

3.101.1
junction connecting box
connecting box allowing connection of one or more junctions

3.101.2
tapping connecting box
connecting box allowing connection of one or more taps from one or more main conductors

Note 1 to entry: Connecting boxes according to 3.101.1 and 3.101.2 may be combined.

3.102
connecting box with integrated clamping units
box allowing connection of conductors in which clamping units are permanently retained as an integrated part of the box (see Annex AA)

Note 1 to entry: For example, see Figure AA.1

3.103
connecting box with incorporated terminals or connecting devices
box allowing connection of conductors with detachable terminals or connecting devices retained within the box by mechanical means (see Annex AA)

Note 1 to entry: For example, see Figure AA.1

3.104
connecting box with provisions for subsequent incorporation of terminals or connecting devices
box allowing connection of conductors with provisions for incorporating terminals or connecting devices to be retained within the box by mechanical means (see Annex AA)

Note 1 to entry: For example, see Figure AA.1

3.105
connecting box for floating terminals or connecting devices
box allowing connection of conductors intended to accommodate terminals or connecting devices but without provision to retain them (see Annex AA)

Note 1 to entry: For example, see Figure AA.1

3.106
rated connecting capacity
cross-sectional area of the largest conductors as declared by the manufacturer

3.107
terminal
conductive part of one pole comprising one or more clamping unit(s) and insulation if necessary

3.108
clamping unit
part(s) of a terminal necessary for the mechanical clamping and the electrical connection of the conductor(s) including the parts which are necessary to ensure correct contact pressure

3.109
connecting device
device for the electrical connection of two or more conductors comprising one or more terminals and if necessary, insulation and/or ancillary parts

Note 1 to entry: For a schematic representation of connecting devices see Figure BB.1 of Annex BB.

3.110
cable joint
connecting enclosure provided with cable glands (or other means) having cable anchorage function, intended to make a connection between two or more insulated cables to form a continuous circuit in the fixed installation

Note 1 to entry: For example, see Figure AA.2

3.111
junction
connection between two or more conductor ends

3.112
tapping
connection of a conductor end (called "tapped conductor") on any point of another conductor (called "main conductor")

Note 1 to entry: The main conductor is not interrupted.

3.113
CBEC
connecting box having encapsulation capability
box allowing the connection of conductors and intended to encapsulate the clamping units, terminals or connecting devices with an encapsulating compound

3.114
encapsulating compound
material to encapsulate the clamping units, terminals or connecting devices in CBEC

4 General requirements

Clause 4 of IEC 60670-1:2024 is applicable with the following addition:

Connecting devices incorporated in connecting boxes shall comply with the requirements of the IEC 60998 series; integrated clamping units shall comply with the requirements of IEC 60999-1:1999.

NOTE 101 In the following countries terminal blocks according to IEC 60947-7-1 and IEC 60947-7-2 are allowed to be incorporated in connecting boxes: DE.

5 General remarks on tests

Clause 5 of IEC 60670-1:2024 applies with the following addition:

5.2 *Add at the end of Subclause 5.2:*

Connecting boxes with provision for subsequent incorporation of clamping units are tested with the clamping units recommended by the manufacturer.

Connecting devices that are in accordance with the IEC 60998 series are not required to be tested again.

NOTE 101 In the following countries terminal blocks according to IEC 60947-7-1 and IEC 60947-7-2 are not required to be tested again: DE.

NOTE 102 In the following countries connecting boxes shall be tested either:

- with their incorporated terminals or connecting devices or
- with the terminals or connecting devices recommended by the manufacturer for connecting boxes with provision for subsequent incorporation of terminals or connecting devices: UK.

6 Ratings

Clause 6 of IEC 60670-1:2024 is replaced by the following:

6.1 The preferred values of the rated voltage of the integrated or incorporated connecting devices are 125 V, 250 V, 300 V, 400 V, 500 V, 600 V, 690 V, 800 V, 1 000 V AC and 1 500 V DC.

6.2 The standard rated connecting capacities are 0,2 mm^2, 0,34 mm^2, 0,5 mm^2, 0,75 mm^2, 1 mm^2, 1,5 mm^2, 2,5 mm^2, 4 mm^2, 6 mm^2, 10 mm^2, 16 mm^2, 25 mm^2, 35 mm^2.

NOTE 101 For the time being, designation by wire gauge may be used in some countries (for example AWG in US and CA), instead of the cross-sectional areas expressed in mm^2.

NOTE 102 The approximate relation between mm^2 and AWG sizes is given in Annex A of IEC 60999-1:1999.

NOTE 103 In UK, a standard connecting capacity of 1,25 mm^2 is used.

NOTE 104 In Japan, standard connecting capacities of 0,9 mm^2,1,25 mm^2, 2,0 mm^2, 3,5 mm^2, 5,5 mm^2, 8 mm^2, 14 mm^2, 22 mm^2 are used.

7 Classification

Clause 7 of IEC 60670-1:2024 applies with the following addition:

Add the following to Table 1:

7.101 The method of fixing the terminals or connecting devices in the connecting box	7.101.1 With integrated clamping units	
	7.101.2 With incorporated terminals or connecting devices	
	7.101.3 With provisions for subsequent incorporation of terminals or connecting devices	
	7.101.4 Without fixing (for floating terminals or connecting devices)	
7.102 The capability to encapsulate the clamping units, terminals or connecting devices	7.102.1 Without the capability to encapsulate the clamping units, terminals or connecting devices	
	7.102.2 With the capability to encapsulate the clamping units, terminals or connecting devices (see Annex DD)	

8 Marking

Clause 8 of IEC 60670-1:2024 applies with the following additions:

8.1 General

Add the following after list item k):

l) rated voltage for boxes with integrated or incorporated terminals or connecting devices;

m) rated connecting capacity (see Note 101);

n) maximum number of conductors to be placed in the box (see Note 101);

The information in items m) and n) is optional for boxes classified according to 7.101.4.

The manufacturer may mark or declare more than one combination of m) and n).

NOTE 101 In the following countries this information in Subclause 8.1 is mandatory for boxes classified according to 7.101.4: DE and SE.

o) boxes and enclosures classified according to 7.101.1 or 7.101.2 shall be marked with an appropriate rated current which does not exceed the test current given in Table 101.

NOTE 102 In the following country the marking of the rated current is optional: DE

Add the following subclauses:

8.101 Symbols

When symbols are used they shall be as follows:

Volt V

Rated connecting capacity ..... mm^2 or ☐ or AWG

8.102 Instructions for cable joints

Information shall be given in the manufacturer's instructions that cable joints are not intended for portable use or for being buried underground. These instructions are not required to be provided with the product.

9 Dimensions

Clause 9 of IEC 60670-1:2024 applies.

10 Protection against electric shock

Clause 10 of IEC 60670-1:2024 applies.

11 Provision for earthing

Clause 11 of IEC 60670-1:2024 applies.

12 Construction

Clause 12 of IEC 60670-1:2024 applies with the following modifications:

12.2.1 *Add the following after the first paragraph:*

In connecting boxes where the fixing means of covers or cover-plates serve also to fix the connecting device, the fixing means shall maintain the connecting device in the correct position after removal of the cover or cover-plate.

Compliance is checked by inspection.

12.3 Drain holes

Add after the last paragraph:

This Subclause 12.3 does not apply for cable joints.

12.7 Boxes and enclosures with a cable anchorage(s)

Subclause 12.7 of IEC 60670-1:2024 applies with the following addition before Figure 12:

For the purpose of cable joints, the test of 12.7 is repeated with rigid cables as specified in the instructions.

Add the following subclauses:

12.101 Connecting boxes shall have adequate space to allow the correct connection of conductors which are specified in the relevant clauses of the particular requirements of IEC 60998-2-1, IEC 60998-2-2, IEC 60998-2-3, and IEC 60998-2-4 concerning the number and cross-sectional area of the conductors.

For connecting boxes classified according to 7.101.1, 7.101.2 and 7.101.3, compliance is checked by fitting the maximum number of conductors of the maximum cross-sectional area if that is the worst-case combination. If not, the most unfavourable combination shall be checked.

This test shall be carried out in conjunction with that of 12.102.

For boxes classified according to 7.101.4 compliance is checked by fitting the maximum number of conductors and connecting devices as declared in 8.1 m) and 8.1 n). The test is carried out only if m) and n) of 8.1 are marked or declared.

12.102 Retention means for terminals or connecting devices shall withstand the mechanical stresses occurring during installation and normal use.

Compliance is checked by connecting conductors in accordance with IEC 60998-2-1, IEC 60998-2-2, IEC 60998-2-3 or IEC 60998-2-4 as applicable for the type of the connecting device used.

After the test there shall be no harmful deformation, cracks or similar damage which would lead to non-compliance with this document.

12.103 Connecting boxes classified according to 7.101.1, 7.101.2 and 7.101.3 shall comply with the temperature rise requirements of 16.102.

12.104 Cable joints shall be classified according to 7.4.2, having means for cable anchorage, and provided with cable glands or other means as defined by the manufacturer.

Compliance is checked by inspection and by the test of 12.7.

NOTE IEC 62444 is applicable to cable glands for electrical installations.

13 Resistance to ageing, protection against ingress of solid objects and against harmful ingress of water

Clause 13 of IEC 60670-1:2024 applies with the following addition:

13.3.3 *Replace the last paragraph by the following:*

The specimens, except connecting boxes classified according to 7.101.4, shall withstand an electric strength test specified in 14.2 which shall be started within 5 min of the completion of the test according to this Subclause 13.3.3.

14 Insulation resistance and electric strength

Clause 14 of IEC 60670-1:2024 applies with the following addition:

Add the following:

14.2.101 *For boxes with integrated or incorporated terminals or connecting devices, the measurements are made consecutively as indicated below.*

Each clamping unit of a connecting device shall be tested when connected with conductors of the smallest and tested when connected with connectors of the largest cross-sectional area.

The insulation resistance is then measured with a DC voltage of approximately 500 V applied, the measurement being made 1 min after application of the voltage:

a) between all clamping units connected together and the body for connecting devices without fixing means or between all clamping units connected together and the mounting base for connecting devices with fixing means;

b) between each clamping unit and all others connected to the body for connecting devices without fixing means or between each clamping unit and all others connected to the mounting base for connecting devices with fixing means.

The metal foil is applied in such a way that the sealing compound, if any, is effectively tested.

The insulation resistance shall be not less than 5 MΩ.

15 Mechanical strength

Clause 15 of IEC 60670-1:2024 applies with the following modifications:

15.2 Impact test at low temperature

Replace the sixth paragraph with the following paragraph:

Damage to the finish, small dents which do not reduce creepage distances or clearances below the value specified in Table 102 and small chips which do not adversely affect the protection against electric shock or harmful ingress of water are disregarded.

Add the following subclause:

15.101 Additional requirements for boxes and enclosures exposed to direct sunlight

When boxes or enclosures are declared to be resistant to UV radiation, they are tested according to Annex CC of this document.

This test applies only to boxes and enclosures classified according to 7.1.1, 7.1.3 and 7.1.4.

16 Resistance to heat

Clause 16 of IEC 60670-1:2024 applies with the following addition:

Add the following subclauses:

16.101 Resistance to heat of connecting devices

16.101.1 Connecting devices having parts of insulating material shall be sufficiently resistant to heat.

Compliance is checked by the test of 16.101.2 to 16.101.4 performed on three extra specimens.

16.101.2 *The specimens or portions of the specimens are kept for 1 h in a heating cabinet at a temperature of (85 ± 2) °C.*

During the test they shall not undergo any change impairing their further use and sealing compound if any, shall not flow to such an extent that live parts are exposed.

After the test and after the specimens have been allowed to cool to approximately ambient temperature, there shall be no access to live parts which are normally not accessible when the specimens are mounted as in normal use, even if the test probe B of IEC 61032 is applied with a force not exceeding 5 N.

After the test, markings shall still be legible.

16.101.3 *Parts of the insulating material not necessary to retain current carrying parts and parts of the earthing circuit in position, even though they are in contact with them, are subjected to a ball-pressure test as described in IEC 60670-1:2024, Clause 16 but at a temperature of (70 ± 2) °C or (40 ± 2) °C, plus the highest temperature rise determined for the relevant part during the test of 16.102.5, whichever is the higher.*

16.101.4 *Parts of the insulating material necessary to retain current carrying parts and parts of the earthing circuit in position are subjected to a ball pressure test in a heating cabinet at a temperature of (125 ± 2) °C.*

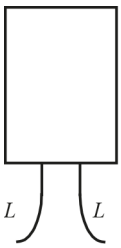
16.102 Resistance to heat of connecting devices integrated in connecting boxes

16.102.1 *Connecting devices integrated in connecting boxes shall be so constructed that the temperature rise in normal use does not exceed the value specified in 16.102.5.*

Compliance is checked by the tests of 16.102.2 to 16.102.3.

NOTE 101 In the following countries connecting devices integrated or incorporated in connecting boxes shall be so constructed that the temperature rise in normal use does not exceed the values specified in 16.102.5. Compliance is checked by the tests of 16.102.2 to 16.102.4: UK.

16.102.2 *Connecting devices with a single terminal (see Figure 101) having one or more clamping units shall be connected to conductors in the intended manner and under the most unfavourable conditions.*

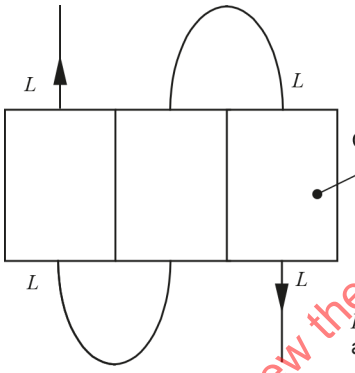


L is 1 m for conductors up to 10 mm^2 and 2 m for conductors over 10 mm^2.

IEC

Figure 101 – Single terminal device

16.102.3 *For multiway terminal devices a maximum of three adjacent terminals are connected in series. If single pole connecting devices are designed to be mounted side by side, three devices are placed in the intended manner and connected together (see Figure 102).*



L is 1 m for conductors up to 10 mm^2 and 2 m for conductors over 10 mm^2.

IEC

Figure 102 – Multiway terminal device

16.102.4 *The connections are made with new rigid or flexible conductors of the largest cross-sectional area appropriate to the clamping units, the clamping units being connected according to the specifications of the relevant part of IEC 60998.*

Conductor length shall be 1 m for a cross-sectional area up to and including 10 mm^2 and 2 m for a cross-sectional area above 10 mm^2. Conductor length may be reduced in agreement with the manufacturer.

16.102.5 *Temperature rise measurements are made when the device under test has reached thermal equilibrium. It is generally accepted that the temperature is stable when the temperature of the part under test does not increase by more than 1 K/h. During the test the devices are loaded with an alternating current having the value shown in Table 101 for the corresponding rated connecting capacity.*

The temperature is determined by means of colour changing indicators or thermocouples, so chosen and positioned that they have a negligible effect on the temperature being determined (e.g. on the metallic part in contact with the conductor).

Table 101 – Relationship between rated connecting capacity and test current

Rated connecting capacity mm^2	Test current A
0,2	4
0,34	5
0,5	6
0,75	9
1	13,5
1,5	17,5
2,5	24
4	32
6	41
10	57
16	76
25	101
35	125

The temperature rise of current-carrying parts of the clamping unit shall not exceed 45 K, it being understood that in the case of an insulated device the temperature rise of the conductor shall be measured as close as possible to the clamping unit.

For the purpose of the test of 16.101.3, the temperature rise of external parts of insulating material not necessary to retain current-carrying parts and parts of the earthing circuit in position, even though they are in contact with them, is also determined.

17 Creepage distances, clearances and distances through sealing compound

Creepage distances, clearances and distances through sealing compound shall not be less than the value shown in Table 102.

This test does not apply to connecting boxes for floating terminals or connecting devices classified according to 7.101.4.

Table 102 – Creepage distances, clearances and distances through sealing compound

Rated voltage V	Creepage distance, clearance and distance through sealing compound mm
≤ 130	1,5
> 130 and ≤ 250	3,0
> 250 and ≤ 450	4,0
> 450 and ≤ 750	6,0
> 750	8,0

Compliance is checked by measurement between the following parts:

Creepage distances and clearances:

– *between live parts of different polarity;*
– *between live parts and*
  - *metal covers and boxes without insulating lining;*
  - *the surface on which the box is mounted.*

Distances through sealing compound:

– *between live parts covered with sealing compound and the surface on which the box is mounted.*

For multi-way terminal devices and terminals without fixing means but with protection, distances are measured between live parts and any opening which represents the closest point liable to touch any other part when the terminal is fitted with conductors having the largest cross-sectional area.

In cases where various terminals or connecting devices may be mounted in the box, the most unfavourable combinations shall be tested.

18 Resistance of insulating material to abnormal heat and fire

Clause 18 of IEC 60670-1:2024 applies.

19 Resistance to tracking

Clause 19 of IEC 60670-1:2024 applies.

20 Resistance to corrosion

Clause 20 of IEC 60670-1:2024 applies.

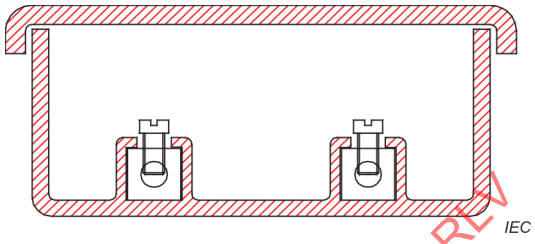
21 Electromagnetic compatibility (EMC)

Clause 21 of IEC 60670-1:2024 applies.

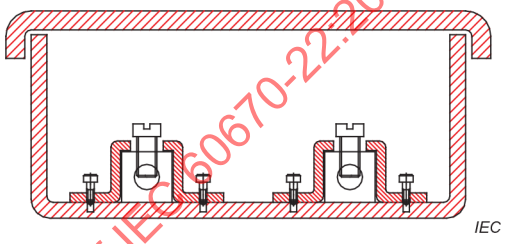
Annex AA
(informative)

Examples of connecting boxes/enclosures

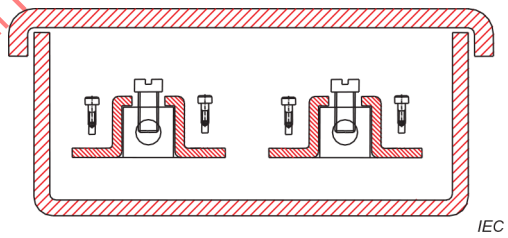
a) Connecting box with integrated clamping units according to 7.101.1



b) Connecting box with incorporated terminals or connecting devices according to 7.101.2



c) Connecting box with provisions for subsequent incorporation of terminals or connecting devices according to 7.101.3



d) Connecting box without fixing (for floating terminals or connecting devices) according to 7.101.4

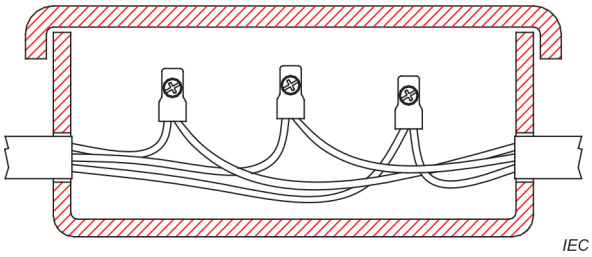
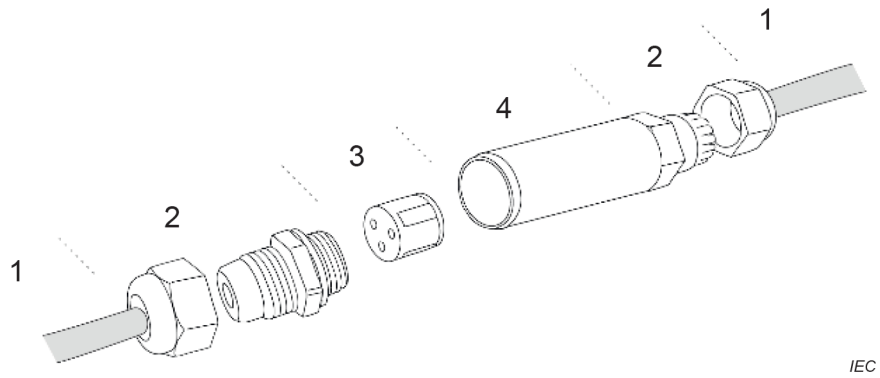


Figure AA.1 – Four examples of connecting boxes/enclosures



Key

1) Cable
2) Cable gland
3) Connecting device
4) Box

Figure AA.2 – Examples of cable joints

Annex BB
(informative)

Schematic presentation of connecting devices as a basis for the definitions

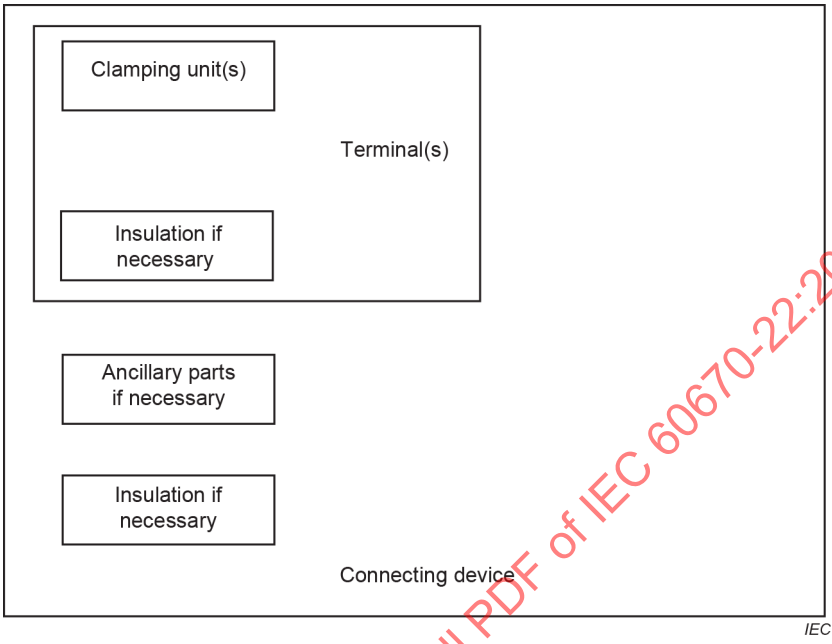


Figure BB.1 – Schematic presentation

Annex CC
(normative)

Additional requirements for boxes and enclosures exposed to direct sunlight

Boxes and enclosures declared to be resistant to UV radiation shall comply with the following tests.

The tests shall be made on six test specimens of standard size according to ISO 178:2019 and on six test specimens of standard size according to ISO 179-1 exposed for 500 h to Xenon-arc, Method A, Cycle 1 in accordance with ISO 4892-2. The specimens shall be mounted in the UV apparatus in an appropriate manner:

- *suitable for both the product to be tested and the test equipment and,*
- *so that the samples do not touch each other.*

Compliance is checked by verification that the flexural strength (according to ISO 178) and Charpy impact (according to ISO 179-1) of synthetic materials have 70 % minimum retention.

For the test carried out in accordance with ISO 178, the surface of the specimens exposed to UV shall be turned face down and the pressure applied to the non-exposed surface.

For the test carried out in accordance with ISO 179-1 no notch shall be cut into the specimens and the impact shall be applied to the exposed surface. For materials whose impact bending strength cannot be determined prior to exposure because no rupture has occurred, not more than three of the exposed test specimens shall be allowed to break.

The specimens shall not show cracks or deterioration visible to normal or corrected vision without additional magnification.

These tests are not required to be carried out if the manufacturer can provide data from the material supplier to demonstrate that materials of the same thickness or thinner comply with this requirement.

Annex DD
(normative)

Additional requirements for connecting boxes and enclosures having encapsulation capability

DD.1 General

Under certain ambient conditions, water condensation inside boxes or enclosures and the entry of water and solid objects can lead to insulation faults and failure of internally connected circuits. Encapsulation with a compound is intended to prevent this from occurring.

DD.2 Applicability of this annex

This Annex DD applies to boxes and enclosures having the capability to encapsulate the clamping units, terminals or connecting devices and their connections with conductors according to classification 7.102.2.

These boxes and enclosures are intended to prevent the formation of water condensation and the entry of water and solid objects.

NOTE Boxes and enclosures according to this Annex DD can be used for example in the ground, high humidity areas, flooded areas (temporarily submerged) and ground-level installation (rain, snow).

The use of connecting boxes having encapsulation capability (CBEC) buried in the ground is limited to use at a reduced depth and where they are not subjected to significant compression forces due to the passage of vehicles, people or similar case.

This Annex DD does not apply to

– cable accessories (for example products covered by EN 50393);
– products buried in the ground with traffic loads;
– other inaccessible, encapsulated connections.

NOTE The following modifications to this document are applicable to connecting boxes and enclosures having encapsulation capability. The clause numbers in that follow refer to the clause numbers in the main body text of this document that are modified.

DD.3 General requirements

Add the following at the end of the clause:

CBEC shall be used with connecting devices and encapsulating compound according to the manufacturer's instructions.

5.1 Test conditions and number of samples

Add the following at the end of the subclause:

CBEC shall be tested when mounted, assembled and wired as for normal use according to the manufacturer's instructions.

CBECs are tested filled with encapsulating compound unless otherwise specified in this Annex DD.

8 Marking

Modification:

8.1 General

Add the following at the end of the subclause, after NOTE 103:

The encapsulating compound to be used shall be specified in the manufacturer's instructions.

If different IP codes are declared for a CBEC when it is filled with encapsulating compound or without encapsulating compound, both IP codes shall be marked so that it is clear to which situation each IP code corresponds.

8.101 Symbols

Add the following at the end of the subclause:

IP code when encapsulated 

(IEC 60417-6458 (2023-11))

NOTE 101 In the IP code, the letter "X" is replaced by the relevant number.

NOTE 102 The marking of double IP code can be, for example, as follows: 

8.103 Instructions for CBEC

Information shall be given in the manufacturer's instructions, which is not required to be provided with the product, stating that the use of CBEC buried in the ground is limited to use at a depth down to 1 m and where they are not subjected to significant compression forces due to the passage of vehicles, people or similar cases.

12 Construction

Add the following:

12.105 Encapsulating compound

The encapsulating compound shall comply with the following requirements:

– *the insulation resistance and electric strength shall be adequate.*

  Compliance is checked by the tests of 14.2.101 and 14.2.

– *the encapsulating compound shall be capable of completely encapsulating the current carrying parts to protect them against harmful ingress of solid foreign objects and against harmful ingress of water.*

  Compliance is checked by inspection and by the test of Clause 13.

– *the characteristics of the encapsulating compound shall allow the fluid to adequately fill empty spaces in the box and terminals.*

Compliance is checked by the following test:

When ready for filling according to the manufacturer's instructions, the volume of water necessary to fill a box shall be measured. The volume of encapsulating compound necessary to repeat the process with a new specimen shall not be less than 90 % of the measured water volume.

A sufficient period of time shall be allowed for the compound to fill the volume inside the CBEC.

After the test, it shall be verified that the current carrying parts are completely encapsulated by the compound.

– *the encapsulating compound water absorption level shall not exceed 3 %.*

Compliance is checked according to ISO 62, method 1.

The encapsulating compound shall be chemically compatible with materials used for the current carrying parts and the materials of the CBEC, such as conductors and their insulation.

Compliance is checked by inspection and/or chemical analysis.

12.106 It is recommended that connections are accessible for inspection, testing and maintenance after installation. If the accessory is declared as suitable for this purpose in the manufacturer's instructions, the encapsulating compound shall be removed for inspection, testing and maintenance and then replaced by refilling the box, ensuring that terminals are completely encapsulated by the encapsulating compound after installation.

When carrying out maintenance and changing the wiring in the box, the terminals shall be replaced by new ones as specified in the manufacturer's instructions.

Compliance is checked by inspection and by the tests of Clause 14.

12.107 CBEC shall provide a degree of protection of IP 6X according to IEC 60529, when encapsulated.

Compliance is checked by the test of 13.2.

13 Resistance to ageing, protection against ingress of solid objects and against harmful ingress of water

13.2 Protection against the ingress of solid objects

Add the following paragraph at the end of the subclause:

CBEC are tested with and without encapsulating compound.

13.3 Protection against harmful ingress of water

13.3.1

Add the following paragraph at the end of the subclause:

CBEC with encapsulating compound are tested according to 13.3.3 only.

CBEC are tested with encapsulating compound according to the manufacturer specification.

13.3.3

Replace the last paragraph with the following:

Compliance is checked by the relevant tests of IEC 60529.

CBEC with compound shall be checked by inspection that no water can touch live parts so as to reduce insulation resistance below the value given in 14.2.

CBEC with compound shall comply with the electric insulation resistance test as specified in 14.2.101 which shall be started within 5 min of the completion of the test according to this Subclause 13.3.3.

14 Insulation resistance and electric strength

14.2

Add the following paragraph at the end of the subclause:

CBEC are tested without encapsulating compound

14.2.101

Add the following paragraph at the end of the subclause:

CBEC are tested with and without encapsulating compound.

15 Mechanical strength

15.1 General

Add the following paragraph at the end of the subclause:

CBEC are tested without encapsulating compound.

15.6 Test for boxes and enclosures declared with IK code

Add the following paragraph at the end of the subclause:

CBEC are tested with encapsulating compound.

16 Resistance to heat

Add the following paragraph at the end of IEC 60670-1:2024, 16.1:

The tests of 16.1 and 16.2 do not apply to the encapsulating compound.

Add the following at the end of 16.102.1:

For CBEC, the test is repeated with an extra set of specimens with encapsulating compound.

18 Resistance of insulating material to abnormal heat and fire

Add the following at the end of the clause:

For CBEC, an additional specimen can be needed to test the encapsulating compound.

Modify the second paragraph after the last bullet point as follows:

External conductors and encapsulating compound cannot be considered as retaining the current-carrying parts.

Bibliography

Addition:

EN 50393:2015, *Test methods and requirements for accessories for use on distribution cables of rated voltage 0,6/1,0 (1,2) kV*

_____

SOMMAIRE

AVANT-PROPOS 29
1 Domaine d'application 32
2 Références normatives 32
3 Termes et définitions 32
4 Exigences générales 34
5 Généralités sur les essais 35
6 Caractéristiques assignées 35
7 Classification 36
8 Marquage 36
9 Dimensions 37
10 Protection contre les chocs électriques 37
11 Dispositions relatives à la mise à la terre 37
12 Construction 37
13 Résistance au vieillissement, protection contre la pénétration de corps solides et contre la pénétration nuisible de l'eau 38
14 Résistance d'isolement et rigidité diélectrique 38
15 Résistance mécanique 39
16 Résistance à la chaleur 39
17 Lignes de fuite, distances d'isolement dans l'air et distances à travers le matériau d'étanchéité 42
18 Résistance du matériau isolant à la chaleur anormale et au feu 43
19 Résistance au cheminement 43
20 Résistance à la corrosion 43
21 Compatibilité électromagnétique (CEM) 43
Annexe AA (informative) Exemples de boîtes/enveloppes de connexion 44
Annexe BB (informative) Présentation schématique de dispositifs de connexion comme base pour les définitions 46
Annexe CC (normative) Exigences supplémentaires pour les boîtes et enveloppes directement exposées à la lumière du soleil 47
Annexe DD (normative) Exigences supplémentaires pour les boîtes et enveloppes de connexion avec aptitude d'encapsulage 48
Bibliographie 53

Figure 101 – Dispositif de connexion à une seule borne 40
Figure 102 – Barrette de jonction 41
Figure AA.1 – Quatre exemples de boîtes/enveloppes de connexion 44
Figure AA.2 – Exemples de jonctions de câbles 45
Figure BB.1 – Présentation schématique 46

Tableau 101 – Relations entre la capacité assignée de connexion et le courant d'essai 41
Tableau 102 – Lignes de fuite, distances d'isolement dans l'air et distances à travers le matériau d'étanchéité 42

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

_____

BOÎTES ET ENVELOPPES POUR APPAREILLAGE ÉLECTRIQUE POUR INSTALLATIONS ÉLECTRIQUES FIXES POUR USAGES DOMESTIQUES ET ANALOGUES –

Partie 22: Exigences particulières pour les boîtes et enveloppes de connexion

AVANT-PROPOS

1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
9) L'IEC attire l'attention sur le fait que la mise en application du présent document peut entraîner l'utilisation d'un ou de plusieurs brevets. L'IEC ne prend pas position quant à la preuve, à la validité et à l'applicabilité de tout droit de brevet revendiqué à cet égard. À la date de publication du présent document, l'IEC n'avait pas reçu notification qu'un ou plusieurs brevets pouvaient être nécessaires à sa mise en application. Toutefois, il y a lieu d'avertir les responsables de la mise en application du présent document que des informations plus récentes sont susceptibles de figurer dans la base de données de brevets, disponible à l'adresse https://patents.iec.ch. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets.

L'IEC 60670-22 a été établie par le sous-comité 23B: Prises de courant et interrupteurs, du comité d'études 23 de l'IEC: Petit appareillage. Il s'agit d'une Norme internationale.

Cette deuxième édition annule et remplace la première édition parue en 2003 et son Amendement 1:2015. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) des jonctions de câbles ont été ajoutées en tant que nouveau type de boîte, ainsi que les essais et exigences associés;

b) des essais et exigences ont été ajoutés pour les boîtes et enveloppes exposées à la lumière directe du soleil, ainsi que l'Annexe CC associée;

c) des boîtes et enveloppes de connexion avec aptitude d'encapsulage ont été ajoutées en tant que nouveau type de boîtes, ainsi que les essais, les exigences et l'Annexe DD associés.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
23B/1535/FDIS	23B/1553/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

La version française de la norme n'a pas été soumise au vote.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

Une liste de toutes les parties de la série IEC 60670, publiées sous le titre général *Boîtes et enveloppes pour appareillage électrique pour installations fixes pour usages domestiques et analogues*, se trouve sur le site web de l'IEC.

Le présent document doit être utilisé conjointement avec l'IEC 60670-1:2024. Il répertorie les modifications nécessaires pour transformer cette norme en une norme spécifique pour les boîtes et enveloppes de connexion.

Lorsque le présent document mentionne "addition", "modification" ou "remplacement", l'exigence, les modalités d'essais ou le texte explicatif correspondant de l'IEC 60670-1:2024 doit être adapté en conséquence.

Les articles et paragraphes, notes, figures ou tableaux qui sont ajoutés à ceux de l'IEC 60670-1:2024 sont numérotés à partir de 101.

Les annexes supplémentaires dans l'IEC 60670-1:2024 sont numérotées AA, BB, etc.

Dans la présente publication, les caractères d'imprimerie suivants sont utilisés:

- exigences proprement dites: caractères romains;
- *modalités d'essais: caractères italiques;*
- notes: petits caractères romains.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé, ou
- révisé.

IMPORTANT – Le logo "colour inside" qui se trouve sur la page de couverture de ce document indique qu'il contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer ce document en utilisant une imprimante couleur.

BOÎTES ET ENVELOPPES POUR APPAREILLAGE ÉLECTRIQUE POUR INSTALLATIONS ÉLECTRIQUES FIXES POUR USAGES DOMESTIQUES ET ANALOGUES –

Partie 22: Exigences particulières pour les boîtes et enveloppes de connexion

1 Domaine d'application

L'Article 1 de l'IEC 60670-1:2024 s'applique, avec l'ajout suivant:

Ajouter ce qui suit après le troisième alinéa:

Le présent document s'applique aux boîtes de connexion pour jonction ou aux boîtes de connexion pour dérivation, ou aux deux.

NOTE Sauf spécification contraire, le terme “boîtes” s'applique aussi aux “enveloppes” dans la suite du document.

2 Références normatives

L'Article 2 de l'IEC 60670-1:2024 s'applique, avec les ajouts suivants:

IEC 60998 (toutes les parties), *Dispositifs de connexion pour circuits basse tension pour usage domestique et analogue*

IEC 60999-1:1999, *Dispositifs de connexion – Conducteurs électriques en cuivre – Prescriptions de sécurité pour organes de serrage à vis et sans vis – Partie 1: Prescriptions générales et particulières pour les organes de serrage pour les conducteurs de 0,2 mm^2 à 35 mm^2 (inclus)*

ISO 62:2008, *Détermination de l'absorption d'eau*

ISO 178:2019, *Plastiques – Détermination des propriétés en flexion*

ISO 179-1:2010*Plastiques – Détermination des caractéristiques au choc Charpy – Partie 1: Essai de choc non instrumenté*

ISO 4892-2:2013, *Plastiques – Méthodes d'exposition à des sources lumineuses de laboratoire – Partie 2: Lampes à arc au xénon*
ISO 4892-2:2013/AMD1:2021

3 Termes et définitions

L'Article 3 de l'IEC 60670-1:2024 s'applique, avec les ajouts suivants:

3.101
boîte de connexion
boîte de jonction
boîte qui permet la connexion de conducteurs

3.101.1
boîte de connexion pour jonction
boîte de connexion qui permet la connexion d'une ou de plusieurs jonctions

3.101.2
boîte de connexion pour dérivation
boîte de connexion qui permet la connexion d'une ou de plusieurs dérivations à partir d'un ou de plusieurs conducteurs principaux

Note 1 à l'article: Les boîtes de connexion selon le 3.101.1 et le 3.101.2 peuvent être combinées.

3.102
boîte de connexion avec organes de serrage intégrés
boîte de connexion dans laquelle des organes de serrage sont assujettis de façon permanente en tant que partie intégrante de la boîte (voir l'Annexe AA)

Note 1 à l'article: Pour obtenir un exemple, voir la Figure AA.1.

3.103
boîte de connexion avec bornes ou dispositifs de connexion intégrés
boîte de connexion équipée de bornes ou dispositifs de connexion amovibles fixés dans la boîte par des moyens mécaniques (voir l'Annexe AA)

Note 1 à l'article: Pour obtenir un exemple, voir la Figure AA.1.

3.104
boîte de connexion avec dispositions pour l'incorporation ultérieure de bornes ou de dispositifs de connexion
boîte de connexion équipée de dispositifs permettant d'incorporer et de maintenir les bornes ou les dispositifs de connexion en place dans la boîte par des moyens mécaniques (voir l'Annexe AA)

Note 1 à l'article: Pour obtenir un exemple, voir la Figure AA.1.

3.105
boîte de connexion pour bornes ou dispositifs de connexion flottants
boîte de connexion destinée à recevoir des bornes ou des dispositifs de connexion, mais qui ne comporte pas de dispositions pour les fixer (voir l'Annexe AA)

Note 1 à l'article: Pour obtenir un exemple, voir la Figure AA.1.

3.106
capacité assignée de connexion
section des plus grands conducteurs, déclarée par le fabricant

3.107
borne
partie conductrice d'un pôle qui comporte un ou plusieurs organes de serrage et une isolation, si nécessaire

3.108
organe de serrage
une ou plusieurs pièces d'une borne nécessaires au serrage mécanique et à la connexion électrique du ou des conducteurs y compris les pièces nécessaires pour assurer une pression de contact adéquate

3.109
dispositif de connexion
dispositif destiné à la connexion électrique de deux ou plusieurs conducteurs équipés d'une ou de plusieurs bornes et, au besoin, d'une isolation et/ou de pièces complémentaires

Note 1 à l'article: Pour une représentation schématique des dispositifs de connexion, voir la Figure BB.1 de l'Annexe BB.

3.110
jonction de câbles
enveloppe de connexion équipée de presse-étoupes (ou d'autres moyens) et qui comprennent une fonction de serre-câbles, destinée à établir une connexion entre deux ou plusieurs câbles isolés en vue de former un circuit continu dans l'installation fixe

Note 1 à l'article: Pour obtenir un exemple, voir la Figure AA.2.

3.111
jonction
connexion entre deux ou plusieurs extrémités de conducteurs

3.112
dérivation
connexion d'une extrémité de conducteur (appelé "conducteur dérivé") en tout point d'un autre conducteur (appelé "conducteur principal")

Note 1 à l'article: Le conducteur principal n'est pas interrompu.

3.113
CBEC
boîte de connexion avec aptitude d'encapsulage
boîte qui permet de connecter des conducteurs et qui est destinée à encapsuler les organes de serrage, les bornes ou les dispositifs de connexion au moyen d'un matériau encapsulant

Note 1 à l'article: L'abréviation "CBEC" est dérivée du terme anglais développé correspondant "connecting box having encapsulation capability".

3.114
matériau encapsulant
substance qui permet d'encapsuler les organes de serrage, les bornes ou les dispositifs de connexion dans la CBEC

4 Exigences générales

L'Article 4 de l'IEC 60670-1:2024 s'applique, avec l'ajout suivant:

Les dispositifs de connexion incorporés dans des boîtes de connexion doivent être conformes aux exigences de la série IEC 60998. Les organes de serrage intégrés doivent être conformes aux exigences de l'IEC 60999-1:1999.

NOTE 101 Dans le pays suivant, les blocs de jonction conformes à l'IEC 60947-7-1 et à l'IEC 60947-7-2 peuvent être incorporés dans des boîtes de connexion: DE.

5 Généralités sur les essais

L'Article 5 de l'IEC 60670-1:2024 s'applique, avec l'ajout suivant:

5.2 *Ajouter ce qui suit à la fin du 5.2:*

Les boîtes de connexion qui comportent des dispositions pour l'incorporation ultérieure d'organes de serrage sont soumises à l'essai avec les organes de serrage recommandés par le fabricant.

Il n'est pas exigé de soumettre à nouveau les dispositifs de connexion conformes à la série IEC 60998 à l'essai.

NOTE 101 Dans le pays suivant, il n'est pas exigé de soumettre à nouveau à l'essai les blocs de jonction conformes à l'IEC 60947-7-1 et à l'IEC 60947-7-2 DE.

NOTE 102 Dans le pays suivant, les boîtes de connexion doivent être soumises à l'essai:

- avec leurs bornes ou dispositifs de connexion incorporés; ou
- avec les bornes ou dispositifs de connexion recommandés par le fabricant pour les boîtes de connexion, avec des dispositions pour l'incorporation ultérieure des bornes ou dispositifs de connexion: UK.

6 Caractéristiques assignées

L'Article 6 de l'IEC 60670-1:2024 est remplacé par ce qui suit:

6.1 Les valeurs préférentielles de la tension assignée des dispositifs de connexion intégrés ou incorporés sont les suivantes: 125 V, 250 V, 300 V, 400 V, 500 V, 600 V, 690 V, 800 V, 1 000 V en courant alternatif et 1 500 V en courant continu.

6.2 Les capacités assignées de connexion normalisées sont de 0,2 mm^2, 0,34 mm^2, 0,5 mm^2, 0,75 mm^2, 1 mm^2, 1,5 mm^2, 2,5 mm^2, 4 mm^2, 6 mm^2, 10 mm^2, 16 mm^2, 25 mm^2, 35 mm^2.

NOTE 101 Pour le moment, la désignation "calibre de câble" peut être utilisée dans certains pays (par exemple, AWG aux États-Unis et au Canada), au lieu des sections exprimées en mm^2.

NOTE 102 L'équivalence approximative entre les dimensions mm^2 et AWG est fournie à l'Annexe A de l'IEC 60999-1:1999.

NOTE 103 Au Royaume-Uni, une capacité de connexion normalisée de 1,25 mm^2 est utilisée.

NOTE 104 Au Japon, des capacités de connexion normalisées de 0,9 mm^2,1,25 mm^2, 2,0 mm^2, 3,5 mm^2, 5,5 mm^2, 8 mm^2, 14 mm^2, 22 mm^2 sont utilisées.

7 Classification

L'Article 7 de l'IEC 60670-1:2024 s'applique, avec l'ajout suivant:

Ajouter ce qui suit au Tableau 1:

7.101 Méthode de fixation des bornes ou dispositifs de connexion dans la boîte de connexion	7.101.1 Avec organes de serrage intégrés	
	7.101.2 Avec bornes ou dispositifs de connexion incorporés	
	7.101.3 Avec dispositions pour l'incorporation ultérieure de bornes ou de dispositifs de connexion	
	7.101.4 Sans fixation (pour bornes ou dispositifs de connexion flottants)	
7.102 Aptitude à encapsuler les organes de serrage, les bornes ou les dispositifs de connexion	7.102.1 Sans aptitude à encapsuler les organes de serrage, les bornes ou les dispositifs de connexion	
	7.102.2 Avec aptitude à encapsuler les organes de serrage, les bornes ou les dispositifs de connexion (voir l'Annexe DD)	

8 Marquage

L'Article 8 de l'IEC 60670-1:2024 s'applique, avec les ajouts suivants:

8.1 Généralités

Ajout de ce qui suit après le point k):

l) tension assignée pour les boîtes qui intègrent ou incorporent des bornes ou des dispositifs de connexion;

m) capacité assignée de connexion (voir la Note 101);

n) nombre maximal de conducteurs à placer dans la boîte (voir la Note 101);

Les informations qui figurent aux points m) et n) sont facultatives pour les boîtes classées selon le 7.101.4.

Le fabricant peut marquer ou déclarer plus d'une combinaison de m) et n).

NOTE 101 Dans les pays suivants, ces informations du 8.1 sont obligatoires pour les boîtes classées selon le 7.101.4: DE et SE.

o) les boîtes et enveloppes classées selon le 7.101.1 ou le 7.101.2 doivent comporter un marquage indiquant un courant assigné approprié qui ne dépasse pas le courant d'essai indiqué dans le Tableau 101.

NOTE 102 Dans le pays suivant, le marquage du courant assigné est facultatif: DE.

Ajouter les paragraphes suivants:

8.101 Symboles

Lorsqu'il est fait usage de symboles, il doit s'agir des suivants:

Volt V

Capacité assignée de connexion.....mm^2 ou ☐ ou AWG

8.102 Instructions pour les jonctions de câbles

Les instructions du fabricant doivent comporter des informations indiquant que les jonctions de câbles ne sont pas destinées à être portables ni a être enterrées dans le sol. La fourniture de ces instructions avec le produit n'est pas exigée.

9 Dimensions

L'Article 9 de l'IEC 60670-1:2024 s'applique.

10 Protection contre les chocs électriques

L'Article 10 de l'IEC 60670-1:2024 s'applique.

11 Dispositions relatives à la mise à la terre

L'Article 11 de l'IEC 60670-1:2024 s'applique.

12 Construction

L'Article 12 de l'IEC 60670-1:2024 s'applique, avec les modifications suivantes:

12.2.1 *Ajouter ce qui suit après le premier alinéa:*

Pour les boîtes de connexion où les moyens de fixation des capots ou plaques de recouvrement servent également à fixer le dispositif de connexion, les moyens de fixation doivent maintenir le dispositif de connexion dans la position appropriée après l'enlèvement du capot ou de la plaque de recouvrement.

La conformité est vérifiée par examen.

12.3 Trous de drainage

Ajouter après le dernier alinéa:

Le présent 12.3 ne s'applique pas aux jonctions de câbles.

12.7 Boîtes et enveloppes équipées de serre-câbles

Le 12.7 de l'IEC 60670-1:2024 s'applique, avec l'ajout suivant avant la Figure 12:

Pour les besoins des jonctions de câbles, l'essai du 12.7 est répété avec des câbles rigides de la manière spécifiée dans les instructions.

Ajouter les paragraphes suivants:

12.101 Les boîtes de connexion doivent comprendre un espace suffisant pour permettre la connexion appropriée des conducteurs selon les spécifications qui figurent dans les paragraphes correspondants des exigences particulières de l'IEC 60998-2-1, l'IEC 60998-2-2, l'IEC 60998-2-3 et l'IEC 60998-2-4 en ce qui concerne le nombre et la section des conducteurs.

Pour les boîtes de connexion classées selon le 7.101.1, le 7.101.2 et le 7.101.3, la conformité est vérifiée en installant le nombre maximal de conducteurs de la section maximale, si cette combinaison est la plus défavorable. Sinon, la combinaison la plus défavorable doit être soumise à l'essai.

Cet essai doit être réalisé conjointement avec celui du 12.102.

Pour les boîtes classées selon le 7.101.4, la conformité est vérifiée en installant le nombre maximal de conducteurs et de dispositifs de connexion, comme cela est déclaré au 8.1 m) et au 8.1 n). L'essai est effectué uniquement si les informations m) et n) du 8.1 sont marquées ou déclarées.

12.102 Les dispositifs de retenue pour les bornes ou dispositifs de connexion doivent résister aux contraintes mécaniques rencontrées pendant l'installation et en usage normal.

La conformité est vérifiée par la connexion de conducteurs conformément à l'IEC 60998-2-1, l'IEC 60998-2-2, l'IEC 60998-2-3 ou l'IEC 60998-2-4, selon le type de dispositif de connexion utilisé.

Après l'essai, il ne doit y avoir aucune déformation nuisible, ni fissure ou dommage analogue susceptible de conduire à une non-conformité au présent document.

12.103 Les boîtes de connexion classées selon le 7.101.1, le 7.101.2 ou le 7.101.3 doivent satisfaire aux exigences d'échauffement du 16.102.

12.104 Les jonctions de câbles doivent être classées selon le 7.4.2, équipées de moyens serre-câbles ainsi que de presse-étoupes ou d'autres moyens définis par le fabricant.

La conformité est vérifiée par examen et par l'essai du 12.7.

NOTE L'IEC 62444 s'applique aux presse-étoupes pour installations électriques.

13 Résistance au vieillissement, protection contre la pénétration de corps solides et contre la pénétration nuisible de l'eau

L'Article 13 de l'IEC 60670-1:2024 s'applique, avec l'ajout suivant:

13.3.3 *Remplacer le dernier alinéa par le suivant:*

Les échantillons, à l'exception des boîtes de connexion classées selon le 7.101.4, doivent résister à l'essai de rigidité diélectrique spécifié au 14.2 qui doit commencer dans les 5 min qui suivent la fin de l'essai conformément au présent 13.3.3.

14 Résistance d'isolement et rigidité diélectrique

L'Article 14 de l'IEC 60670-1:2024 s'applique, avec l'ajout suivant:

Ajouter ce qui suit:

14.2.101 *Pour les boîtes de connexion qui intègrent ou incorporent des bornes ou des dispositifs de connexion, les mesurages sont effectués successivement comme cela est indiqué ci-après.*

Chaque organe de serrage d'un dispositif de connexion doit être soumis à l'essai lorsqu'il est connecté avec les conducteurs de la plus petite section et lorsqu'il est connecté avec les conducteurs de la plus grande section.

La résistance d'isolement est alors mesurée sous une tension continue appliquée d'environ 500 V, le mesurage étant effectué 1 min après l'application de la tension:

a) entre tous les organes de serrage reliés entre eux et le châssis pour les dispositifs de connexion sans moyens de fixation et entre tous les organes de serrage reliés entre eux et la base pour les dispositifs de connexion équipés de moyens de fixation;

b) entre chaque organe de serrage et tous les autres reliés au châssis pour les dispositifs de connexion sans moyens de fixation et entre chaque organe de serrage et tous les autres reliés à la base pour les dispositifs de connexion équipés de moyens de fixation.

La feuille métallique est appliquée de façon que le matériau d'étanchéité éventuel soit effectivement soumis à l'essai.

La résistance d'isolement doit être d'au moins 5 MΩ.

15 Résistance mécanique

L'Article 15 de l'IEC 60670-1:2024 s'applique, avec les modifications suivantes:

15.2 Essai de choc à basse température

Remplacer le sixième alinéa par l'alinéa suivant:

Une détérioration de la finition, les petites ébréchures qui ne réduisent pas les lignes de fuite ou les distances d'isolement dans l'air au-dessous des valeurs spécifiées dans le Tableau 102, ainsi que les petits éclats qui ne compromettent pas la protection contre les chocs électriques ou la pénétration nuisible de l'eau sont ignorés.

Ajouter le paragraphe suivant:

15.101 Exigences supplémentaires pour les boîtes et enveloppes directement exposées à la lumière du soleil

Lorsque les boîtes ou enveloppes sont déclarées résistantes aux rayons UV, elles sont soumises à l'essai conformément à l'Annexe CC du présent document.

Cet essai ne s'applique qu'aux boîtes et enveloppes classées selon le 7.1.1, le 7.1.3 et le 7.1.4.

16 Résistance à la chaleur

L'Article 16 de l'IEC 60670-1:2024 s'applique, avec l'ajout suivant:

Ajouter les paragraphes suivants:

16.101 Résistance à la chaleur des dispositifs de connexion

16.101 Les dispositifs de connexion qui comportent des parties en matériau isolant doivent être suffisamment résistants à la chaleur.

La conformité est vérifiée en effectuant les essais du 16.101.2 à 16.101.4 sur trois échantillons supplémentaires.

16.101.2 *Les échantillons ou portions d'échantillons sont maintenus pendant 1 h dans une étuve à une température de (85 ± 2) °C.*