IEC 60670-22

Edition 2.0 2024-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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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)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.120.10

ISBN 978-2-8327-0046-4

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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

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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.*

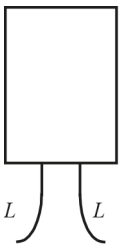
16.102 Resistance to heat of connecting devices integrated in connecting boxes

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.

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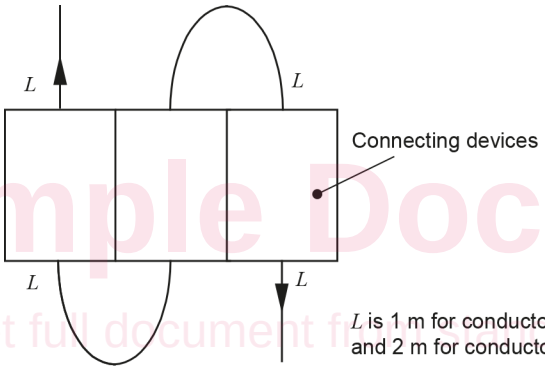
Figure 101 – Single terminal device

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.

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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).