

INTERNATIONAL STANDARD



**Appliance couplers for household and similar general purposes –
Part 2-4: Couplers dependent on appliance weight for engagement**

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**Appliance couplers for household and similar general purposes –
Part 2-4: Couplers dependent on appliance weight for engagement**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**APPLIANCE COUPLERS FOR HOUSEHOLD
AND SIMILAR GENERAL PURPOSES –****Part 2-4: Couplers dependent on appliance
weight for engagement**

FOREWORD

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

International Standard IEC 60320-2-4 has been prepared by subcommittee 23G: Appliance couplers, of IEC technical committee 23: Electrical accessories.

This second edition cancels and replaces the first edition published in 2005 and Amendment 1:2009. This edition constitutes a technical revision.

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

- a) IEC 60320-2-4 is aligned with IEC 60320-1:2015.
- b) IEC 60320-2-4 is aligned with IEC 60335-1 and IEC 60335-2-15. IEC 60320-2-4 appliance couplers are incorporated into appliances designed and manufactured to these standards. To this end, particular attention is drawn to 14.2 and Clause 20.
- c) It also now proposes that appliance couplers with auxiliary contacts be considered.

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

FDIS	Report on voting
23G/402/FDIS	23G/404/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

This Part 2-4 is to be used in conjunction with IEC 60320-1: *Appliance couplers for household and similar general purposes – Part 1: General requirements*. It was established on the basis of the third edition of that standard (2015).

The clauses of this standard supplement or modify the corresponding clauses of IEC 60320-1. When a particular subclause or annex of Part 1 is not mentioned in this Part 2-4, the subclause or annex of IEC 60320-1 applies without modification as far as is reasonable. Where this standard states “addition”, “modification” or “replacement”, the relevant requirement, test specification or explanatory matter in IEC 60320-1 should be adapted accordingly.

Subclauses, figures or tables which are additional to those in Part 1 are numbered starting from 101. Additional annexes are lettered AA, BB, etc.

In this particular standard the following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- explanatory matter: in smaller roman type.

A list of all parts in the IEC 60320 series, published under the general title *Appliance couplers for household and similar general purposes*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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APPLIANCE COUPLERS FOR HOUSEHOLD AND SIMILAR GENERAL PURPOSES –

Part 2-4: Couplers dependent on appliance weight for engagement

1 Scope

This clause of IEC 60320-1 is replaced as follows:

This part of IEC 60320 is applicable to two-pole appliance couplers for alternating current only, with or without earthing contact, with a rated voltage not exceeding 250 V and a rated current not exceeding 16 A, for household and similar general purposes and intended for incorporation or integration within electric appliances or other electric equipment of multi-part construction for 50 Hz or 60 Hz supply which depend on the weight of the appliance to ensure correct engagement.

This document is also applicable to appliance couplers with auxiliary contacts rated for alternating current, direct current or both, with a total rated current not exceeding 16 A.

This document is also valid for appliance inlets/appliance outlets integrated or incorporated in appliances.

NOTE 1 Appliance couplers complying with this document are suitable for use in appliances which are used in an ambient temperature not normally exceeding 25 °C but occasionally reaching 35 °C. However the ambient temperature surrounding the appliance coupler ~~may~~ can exceed these figures and ~~is to~~ can be declared by the manufacturer. It is possible that the maximum working ambient temperature for the appliance inlet and for the connector ~~may~~ can be different.

NOTE 2 Appliance couplers dependent on appliance weight for engagement ~~may~~ can be subject to spillage of liquid in normal use. They are classified according to whether protection against ~~water~~ liquid spillage is provided, when installed in accordance with the manufacturer's installation instructions.

NOTE 3 If appliance inlets according to this document are used with appliances or other equipment which ~~may~~ can be subject to spillage of liquid affecting the appliance inlet when the functioning part of the appliance or equipment is seated on its power base, then protection against moisture is ~~to be~~ provided by the equipment.

NOTE 4 References to standard sheets within IEC 60320-1 do not apply to appliance couplers dependent on appliance weight for engagement.

NOTE 5 Special constructions ~~may~~ can be required:

- in locations where special conditions ~~may~~ can prevail, for example, in ships, vehicles and the like;
- in hazardous locations, for example, where explosions are likely to occur.

NOTE 6 Additional auxiliary contacts can be used as part of the appliance coupler. An example of an auxiliary contact is a contact used to supply a low power device or used to transmit signals for sensors and to/from a microprocessor.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

This clause of IEC 60320-1 applies with the following additions:

IEC TR 60083, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 60320-1:~~2004~~ 2015, *Appliance couplers for household and similar general purposes – Part 1: General requirements*

~~IEC 60320-2-2, Appliance couplers for household and similar general purposes – Part 2-2: Interconnection couplers for household and similar equipment~~

~~IEC 60320-2-3, Appliance couplers for household and similar general purposes – Part 2-3: Appliance couplers with a degree of protection higher than IPX0~~

IEC 60335-1:~~2004~~ 2010, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60335-1:2010/AMD1:2013

IEC 60335-1:2010/AMD2:2016

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

IEC 60664-1:~~1992~~ 2007, *Insulation coordination for equipment within low-voltage systems⁴⁾ – Part 1: Principles, requirements and tests*
~~Amendment 1 (2000)~~

IEC 60695-11-5:2016, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60695-11-10, *Fire hazard testing, – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60730-(all parts), *Automatic electrical controls*

~~IEC 61032, Protection of persons and equipment by enclosures – Probes for verification~~

ISO 9772, *Cellular plastics – Determination of horizontal burning characteristics of small specimens subjected to a small flame*

3 Terms and definitions

This clause of IEC 60320-1 applies with the following additions:

3.101

weight-engaged coupler

coupler that relies on the weight of the functioning part of the appliance, in which it is incorporated or integrated, to ensure correct engagement

Note 1 to entry: The weight-engaged coupler is used in an appliance which is in two parts, in order to supply the part that performs the function of the appliance (the functioning part) from the power base which is connected to the power supply.

⁴⁾ ~~A consolidated edition (1.2) exists containing IEC 60664-1:1992 and its Amendment 1 (2000) and Amendment 2 (2002).~~

3.102**weight-engaged connector**

component part of the weight-engaged coupler which carries the power connections, and engages with the corresponding appliance inlet

3.103**weight-engaged appliance inlet**

component part of a weight-engaged coupler intended for integration or incorporation in the functioning part of the appliance

3.104**rewirable weight-engaged connector**

weight-engaged connector so constructed that the supply cord can be replaced

Note 1 to entry: The method of attachment of the supply cord, when installed in accordance with the manufacturer's installation instructions, is classified according to type X or type Y attachment requirements of the appliance standards.

Note 2 to entry: The requirements for type X or type Y attachment methods are given in IEC 60335-1.

3.105**type X attachment**

method of attachment of the supply cord such that it can easily be replaced

Note 1 to entry: The supply cord may be specially prepared and only available from the manufacturer or its service agent. A specially prepared cord may include a part of the appliance.

3.106**type Y attachment**

method of attachment of the supply cord such that any replacement is intended to be made by the manufacturer, its service agent or similar qualified person

3.107**type Z attachment**

method of attachment of the supply cord such that it cannot be replaced without breaking or destroying the appliance

3.108**auxiliary contact**

contact included in the appliance coupler to operate an auxiliary circuit as part of the normal operation of the appliance, with a maximum allowable current rating of 2 A

Note 1 to entry: An example of an auxiliary contact is a pole used to supply a low current device, used to transmit signals for sensors and to/from a microprocessor.

3.109**non-polarized**

designed so that the inlet and connector auxiliary contact poles are interchangeable

4 General requirements

This clause of IEC 60320-1 applies.

5 General notes on tests

This clause of IEC 60320-1 applies amended as follows:

5.2 Replacement:

The specimens are tested as delivered and under normal conditions of use, in accordance with the installation instructions of the manufacturer. For alternating current they are tested with a.c. at 50 Hz or 60 Hz.

Non-rewirable weight-engaged connectors shall be submitted with a cord at least 1 m long.

For those clauses requiring the tests to be carried out on weight-engaged connectors and weight-engaged appliance inlets installed in accordance with the manufacturer's instructions, representative appliances or appliance parts shall be supplied.

~~5.5 Replacement:~~

~~For weight-engaged appliance inlets three specimens are required, to be subjected to the tests specified.~~

~~For weight-engaged connectors six specimens are required:~~

- ~~— set 1 of three specimens is subjected to the tests specified, with the exception of those of Clauses 14, 15, 16, 19, 20 and 21, and of 24.2;~~
- ~~— set 2 of three specimens is subjected to the tests of 14.1 and of Clauses 15, 16, 19, 20 and 21 (including the repetition of Clause 16).~~

~~For weight-engaged connectors which are declared as providing protection against water spillage, three additional specimens are required, which are subjected to the test of 14.2.~~

~~For weight-engaged connectors of elastomer or thermoplastic material, two additional specimens are required which are subjected to the tests of 24.2.1 or 24.2.2, whichever is applicable.~~

~~For non-rewirable weight-engaged connectors with indicators, three additional specimens with one pole of the indicator disconnected are required for the tests of Clause 15.~~

6 Standard ratings

This clause of IEC 60320-1 is replaced as follows:

6.1 The standard rated voltage is 250 V. Other rated voltages may be declared by the manufacturer provided they do not exceed 250 V.

6.2 The rated current shall be declared by the manufacturer. A coupler may have different current ratings dependent on use within specified applications. The rated current shall not in any case exceed 16 A.

Compliance with the requirements of 6.1 and 6.2 is checked by visual inspection of the marking or the manufacturer's instructions for installation and use.

7 Classification

This clause of IEC 60320-1 ~~applies amended~~ is replaced as follows:

~~7.1 Replacement:~~

~~7.1 Weight-engaged couplers are classified:~~

~~7.1.1 According to whether or not protection against water spillage is provided when the connector is installed according to the manufacturer's instructions.~~

7.1 According to maximum temperature of the corresponding appliance inlet:

- a) appliance couplers for cold conditions, appliance inlet temperature not exceeding 70 °C;
- b) appliance couplers for hot conditions, appliance inlet temperature not exceeding 120 °C;
- c) appliance couplers for very hot conditions, appliance inlet temperature not exceeding 155 °C.

NOTE Appliance couplers for hot conditions can also be used under cold conditions; appliance couplers for very hot conditions can also be used under cold or hot conditions.

~~7.1.2~~ 7.2 According to the type of equipment to be connected:

- a) appliance couplers for class I equipment;
- b) appliance couplers for class II equipment.

NOTE For a description of the classes, see IEC 61140

~~7.1.3 According to whether or not the coupler is intended to be engaged and disengaged with current flowing.~~

7.3 According to protection against liquid spillage when the connector is installed according to the manufacturer's instructions:

- a) protected;
- b) not protected.

7.4 According to breaking capacity:

- a) the coupler is intended to be engaged and disengaged with current flowing;
- b) the coupler is intended to be engaged and disengaged without current flowing.

~~7.1.4~~ 7.5 According to the maximum ambient working temperature of the coupler

NOTE The maximum ambient working temperature of the connector and appliance inlet ~~may~~ can be different.

~~7.1.5~~ 7.6 According to the number of cycles to be performed in the test of Clause 20. Preferred values are:

- ~~7.1.5.1~~ • 100 000
- ~~7.1.5.2~~ • 60 000
- ~~7.1.5.3~~ • 30 000
- ~~7.1.5.4~~ • 20 000
- ~~7.1.5.5~~ • 10 000
- ~~7.1.5.6~~ • 6 000

NOTE Different numbers of endurance cycles ~~may~~ can be declared for different current ratings of the same coupler. A cycle is two strokes as defined in Clause 19, that is, one connection followed by one disconnection.

~~7.2 This subclause of IEC 60320-1 does not apply.~~

~~NOTE The notes at the end of this subclause in IEC 60320-1 are also not applicable.~~

7.7 The following information is recorded to cover required tests:

- a) The specified minimum cross-sectional area of cord.
- b) The maximum allowable terminal temperature rise.
- c) The maximum allowable termination temperature rise.
- d) The maximum allowable contact temperature rise.
- e) The minimum appliance weight required for correct engagement.
- f) The minimum base weight required for correct disengagement.
- g) The end equipment standard.
- h) The type of load to be connected:
 - resistive load
 - inductive load
 - capacitive load
 - specific load
 - direct current (auxiliary contacts)
- i) Type of cord to be connected (e.g. IEC type 52).
- j) Function of the connector:
 - connectors which normally make the connected load
 - connectors which do not normally make the connected load
 - connectors which normally break the connected load
 - connectors which do not normally break the connected load

NOTE Connectors which carry a current of 200 mA or less are considered to be off-load.

- k) For connectors with auxiliary contacts,
 - number of auxiliary contacts
 - maximum current rating of auxiliary contacts
 - maximum voltage rating of auxiliary contacts
 - specified for use in DC applications the contacts shall be classified as
 - i) polarized or
 - ii) non-polarized
 - the insulation classification between the auxiliary circuit and primary circuit

NOTE For SELV and PELV refer to the appropriate intended product standard.

8 Marking

This clause of IEC 60320-1 applies amended as follows:

~~8.1 Replacement:~~

~~Weight-engaged connectors shall be marked with the name, trademark or identification mark of the maker or of the responsible vendor and a type reference.~~

8.2 Replacement:

Weight-engaged appliance inlets shall be marked with the name, trademark or identification mark of the maker or of the responsible vendor and a type reference.

8.5 This subclause of IEC 60320-1 does not apply.

8.6 *Replacement:*

In rewirable, non-reversible weight-engaged connectors, terminals shall be indicated as follows:

- earthing terminal: the symbol  (IEC 60417-5019:2006) or PE
- neutral terminal: the letter N

In non-rewirable, non-reversible weight-engaged connectors, no marking of contacts is necessary, but cores shall be connected as specified in 22.1.

Appliance inlets, other than those integrated or incorporated in an appliance or equipment, for use with connectors according to 8.6, shall have terminal markings to correspond with 8.6.

The marking symbol or letters shall not be placed on screws, removable washers or other removable parts.

~~NOTE The requirement concerning the marking of terminals and the connection of conductors has been introduced to take account of those countries who already require a polarized supply system with regard to a possible future introduction of a unified plug and socket outlet system, which will be to a great extent a polarized system. It is recommended to take this requirement into account already now in countries which at present have no polarized plug and socket outlet system.~~

Rewirable connectors shall be supplied with the following instructions:

- a) a diagram illustrating the method of connection of the conductors, in particular the (excess) length of the earthing conductor and the operation of the cord anchorage;
- b) a full-scale diagram showing the length of sleeving and insulation to be stripped back;
- c) the sizes and types of cords suitable;
- d) the type of attachment for connector and inlet.

NOTE 1 It is essential that the connection of the earthing conductor is shown in an instructive way, preferably with sketches.

NOTE 2 These instructions need not follow connectors supplied directly to an equipment manufacturer.

NOTE 3 In order to comply with the National Electrical Code of the United States, the neutral terminal must be either white in colour, or labelled "white". One way of accomplishing this is to nickel plate the neutral terminal and to leave the other terminal(s) unplated.

Additional subclauses:

8.101 Instructions for installation

Instructions for installation and use shall be supplied with weight-engaged appliance couplers. These instructions shall contain the information necessary to ensure compliance with this document and shall contain the classifications declared by the manufacturer according to Clause 7.

For weight-engaged couplers intended to be exclusively delivered to the equipment manufacturer, the instruction sheet may be replaced by a leaflet, letter, or drawing, etc. It is not necessary for each coupler to be accompanied by such a document.

8.102 Marking of auxiliary contacts

Auxiliary contacts shall be clearly marked to ensure no confusion occurs during installation. For polarized couplers, polarities shall be marked on both the appliance inlet and connector.

9 Dimensions and compatibility

This clause of IEC 60320-1 applies amended as follows:

9.1 *Replacement:*

Appliance couplers shall be designed and constructed so that unintended or improper connection is prevented.

Weight-engaged appliance couplers may take any form appropriate to their function, but shall comply with the requirements of this document as far as applicable.

9.2 This subclause of IEC 60320-1 does not apply.

9.3 *Replacement:*

It shall not be possible to make improper connections between weight-engaged connectors and weight-engaged appliance inlets when installed in accordance with the manufacturer's instructions. In those constructions where the design is such that transient single-pole connections occur as the weight-engaged connector is placed into and withdrawn from the appliance inlet during normal use, ~~then~~ such transient single-pole connections are allowed.

Weight-engaged couplers shall not allow improper connections with plugs or portable socket outlets complying with IEC TR 60083.

Weight-engaged couplers shall not allow improper connections with connectors or appliance inlets complying with the standard sheets of ~~IEC 60320-1, IEC 60320-2-2 or IEC 60320-2-3~~ the IEC 60320 series.

Compliance is checked by examination and reference to the manufacturer's declarations.

NOTE "Improper connections" include single-pole connection and other connections which do not comply with the requirements concerning protection against electric shock.

If in doubt, reference ~~should be~~ is made to the appropriate appliance standards regarding the requirements for weight-engaged connectors and appliance inlets.

~~9.4 Replacement:~~

It shall not be possible to engage connectors for class II equipment with appliance inlets for class I equipment.

Compliance is checked by inspection.

~~9.5 Note 1 of this subclause is not applicable.~~

~~9.6~~9.4 This subclause of IEC 60320-1 does not apply.

10 Protection against electric shock

This clause of IEC 60320-1 applies amended as follows:

10.1 ~~Note 2 of this subclause is not applicable.~~

Replace the first two paragraphs with:

Appliance couplers shall be so designed that live parts of the appliance inlets are not accessible when the connector is in partial or complete engagement.

Weight-engaged appliance connectors shall be so designed that the live parts and parts connected thereto are not accessible when the connector is properly assembled and wired as in normal use.

10.2 *Addition:*

NOTE To be assessed when incorporated in the end product.

Additional subclause (after 10.5):

10.101 Additional protection against access to live parts

Test probe 13 of IEC 61032 is applied without appreciable force through openings in appliance connectors.

NOTE "Without appreciable force" is considered to be a force not exceeding 1 N.

It shall not be possible to touch live parts with the test probe.

11 Provision for earthing

This clause of IEC 60320-1 applies ~~amended as follows~~.

11.2 ~~The note of this clause is not applicable.~~**12 Terminals and terminations**

This clause of IEC 60320-1 applies amended as follows:

~~Replace the first three paragraphs as follows:~~

~~For weight-engaged appliance inlets and weight-engaged connectors integrated in or incorporated in an appliance or equipment, the requirements in the appropriate IEC standard for that appliance or equipment shall apply.~~

12.1 *Replacement:*

For weight-engaged appliance inlets and weight-engaged connectors, the requirements in the appropriate IEC standard for the appliance or equipment into which they are intended to be integrated or incorporated shall apply.

12.2 This subclause of IEC 60320-1 does not apply.

13 Construction

This clause of IEC 60320-1 applies amended as follows:

13.42 The note of this subclause is not applicable.

13.4 Replacement:

Pins of weight-engaged appliance inlets shall

- be securely retained,
- have adequate mechanical strength,
- not be ~~possible to remove~~ removable without the aid of a tool, and
- ~~be~~ have any live parts surrounded by a shroud.

NOTE This requirement does not exclude pins which are to some extent floating.

The security of components designed to function as contact pins, whether in the inlet or connector part, is checked by inspection and by the tests of Clause 19 and Clause 20.

13.5 Replacement:

The contact system of a weight-engaged coupler shall be self-adjusting so as to provide adequate contact pressure.

For connectors other than 0,2 A connectors self-adjustment of the contacts shall not depend upon the resiliency of insulating material.

Compliance is checked by inspection.

NOTE The self-adjustment of the contacts ~~may~~ can be provided in either the appliance inlet or the connector or both.

~~13.9 This subclause of IEC 60320-1 applies amended as follows:~~

~~NOTE 2 is not applicable.~~

~~13.11 This subclause of IEC 60320-1 does not apply.~~

13.10 Replacement:

Fuses, relays, thermostats and thermal cut-outs incorporated in weight-engaged connectors and weight-engaged appliance inlets shall comply with the relevant IEC standards.

Switches or energy regulators incorporated in weight-engaged connectors or weight-engaged appliance inlets shall comply with IEC 61058 (all parts) and IEC 60730 (all parts), respectively.

Where a weight-engaged appliance inlet is integrated in or incorporated in an appliance or equipment, then that part which can be identified as the appliance inlet shall comply with the requirements of this document.

Compliance is checked by inspection and by testing the switches, fuses, relays, thermostats, thermal cut-outs or energy regulators according to the relevant IEC standard.

14 Moisture resistance

This clause of IEC 60320-1 is replaced as follows:

14.101 Weight-engaged couplers shall be proof against humid conditions, which may occur in normal use.

NOTE 1 If weight-engaged couplers are used with equipment that is subject to the spillage of liquid in normal use, the protection is assumed to be provided by the equipment.

Compliance is checked by the humidity treatment described in Clause 14, followed immediately by the tests of Clause 15.

Weight-engaged connectors and appliance inlets are not in engagement when subjected to humidity treatment and rewirable weight-engaged connectors are not fitted with a cord.

The humidity test is carried out in a humidity cabinet containing air with a relative humidity maintained between 91 % and 95 %. The temperature of the air, at all places where specimens can be located, is maintained within ± 1 °C of any convenient value t °C, between 20 °C and 30 °C.

Before being placed in the humidity cabinet, the specimens are brought to a temperature between t °C and $(t + 4)$ °C.

The specimens are kept in the cabinet for:

- 168 h (7 days) for connectors with earthing contact and for appliance inlets with earthing contact, which are submitted as individual accessories, not incorporated in other equipment;
- 48 h (2 days) in all other cases.

NOTE-12 In most cases, the specimens ~~may~~ can be brought to the specified temperature by keeping them at this temperature for at least 4 h before the humidity treatment.

NOTE-23 A relative humidity between 91 % and 95 % can be obtained by placing in the humidity cabinet a saturated solution of sodium sulphate (Na_2SO_4) or potassium nitrate (KNO_3) in water, having a sufficiently large contact surface with the air.

~~NOTE 3 In order to achieve the specified conditions within the cabinet, it is necessary to ensure constant circulation of the air within and, in general, to use a cabinet which is thermally insulated.~~

After this treatment, the specimen shall show no damage within the meaning of this document.

~~**14.2** Weight-engaged connectors which are declared as providing protection against water spillage shall be constructed so that, when installed into a representative power base, in accordance with manufacturer's installation instructions, the connector is not affected by water.~~

~~*Compliance is checked by the following test:*~~

~~*The power base is placed on a horizontal surface and 30 ml of water of a minimum conductivity of 1 000 μS is poured over the appliance connector through a vertical tube 20 mm long and having an internal diameter of 8 mm. The outlet of the tube is located 200 mm above the upper surface of the connector and the saline solution is poured steadily over a period of 2 s.*~~

~~*For connectors having multiple contact apertures spaced more than 30 mm apart this test is repeated on clean samples of the power base over each contact aperture or aperture group.*~~

~~*The representative power base and connector installation shall then withstand the electric strength test of 15.3, the voltage for reinforced insulation however, being reduced to 2 500 V.*~~

~~*NOTE An electrical conductivity of 1 000 μS may be obtained by dissolving pure NaCl in de-mineralised water to give a strength of 350 ppm.*~~

14.102 The connecting devices of stands for cordless appliances shall not be affected by water.

Compliance is checked by the following test.

The stand is placed on a horizontal surface and 30 ml of water containing approximately 1 % NaCl is poured onto the connecting device. The solution is poured steadily through a tube having an inner diameter of 8 mm over a period of 2 s, the lower end of the tube being 200 mm above the connecting device.

The stand shall then withstand the following electric strength.

Immediately following the deposition of the water, metal foil is smoothed over the accessible surface of the connector, avoiding contact with any earth connection by means of a hole or gap in the foil. The application of the foil is carried out in such a manner as to minimize any disturbance to water on the surface of the connector, where possible.

The specified test voltage is then applied between:

- a) the live parts and the metal foil over the surface of the connector at 2 500 V AC,*
- b) the live part and the metal foil surface under the appliance base at 2 500 V AC,*
- c) live parts to the earth connector at 1 250 V AC.*

NOTE The above text is taken from IEC 60335-2-15:2012, 15.102, with the scope extended to cover other appliances and the test voltages from CTL sheet PDSH758 and OSM decision 429 added.

The test is performed using the apparatus of Annex BB.

14.103 Weight-engaged appliance couplers intended to be partially or completely immersed in water for cleaning shall have adequate protection against the effects of immersion and shall be tested as defined in the appropriate appliance standard(s) specified in Clause 7 (relevant appliance standards), or the appropriate rating of IEC 60529.

15 Insulation resistance and electric strength

This clause of IEC 60320-1 applies amended as follows:

15.3 Replacement:

Immediately after the test of 15.2 the insulation is subjected for 1 min to a voltage of substantially sine-wave form and having a frequency of 50 Hz ~~to~~ or 60 Hz. The values of the test voltage ~~and the points of application~~ are shown in Table 101.

Accessible parts of insulating material are covered with metal foil.

Care should be taken to avoid overstressing basic insulation. In particular the metal foil shall approach no closer than the specified creepage distance for reinforced insulation to earthed parts.

Weight-engaged connectors are tested when in engagement with a weight-engaged appliance inlet and also when not in engagement.

Initially, not more than half the ~~prescribed~~ specified voltage is applied, then it is raised rapidly to the full value.

No flashover or breakdown shall occur during the test.

Table 101 – Test voltages

Points of application	Test voltage (V)	
	Class II appliances and class II constructions	Other appliances
1. ~~Between live parts and accessible parts separated from live parts by~~ ~~– basic insulation only~~ ~~– reinforced insulation~~	~~-~~ 3 750	1 250 3 750
2. ~~For parts with double insulation, between metal parts separated from live parts by basic insulation only and~~ ~~– live parts~~ ~~– accessible parts~~	1 250 2 500	1 250 2 500
3. ~~Between metal enclosures or covers lined with insulating material and metal foil in contact with the inner surface of the lining, if the distance between live parts and these metal enclosures or covers, measured through the lining, is less than the appropriate clearance as specified in Clause 26~~	2 500	1 250

Insulation or disconnection to be tested ^b	Test voltage (RMS) ^a		
	Rated voltage up to and including 50 V	Rated voltage above 50 V up to and including 130 V	Rated voltage above 130 V up to and including 250 V
	V	V	V
Functional insulation ^c	500	1 300	1 500
Basic insulation ^d	500	1 300	1 500
Supplementary insulation ^e		1 300	1 500
Reinforced insulation ^{d e}	500	2 600	3 000

^a The high-voltage transformer used for the test shall be designed so that, when the output terminals are short circuited after the output voltage has been adjusted to the test voltage, the output current is at least 200 mA. The overcurrent relay shall not trip when the output current is less than 100 mA. Care is taken that the RMS values of the test voltage are measured within $\pm 3\%$.

^b Special components which might render the test impractical such as discharge lamps, coils, windings, or capacitors are disconnected at one pole, or bridged, as appropriate to the insulation being tested.

^c An example is the insulation between poles.

^d For the test, all live parts are connected together and care is taken to ensure that all moving parts are in the most unfavourable position.

^e For appliance couplers incorporating reinforced insulation as well as double insulation, care is taken that the voltage applied to the reinforced insulation does not overstress the basic or the supplementary parts of the double insulation.

NOTE 1 The high-voltage transformer used for the test is so designed that, when the output terminals are short circuited after the output voltage has been adjusted to the appropriate test voltage, the output current is at least 200 mA. The overcurrent relay ~~must~~ shall not trip when the output current is less than 100 mA.

NOTE 2 1 Care is taken that the RMS value of the test voltage is measured within $\pm 3\%$.

NOTE 3 2 Glow discharges without drop in voltage are neglected.

16 Forces necessary to insert and withdraw the connector/appliance outlet

This clause of IEC 60320-1 is replaced as follows:

16.1 The construction of weight-engaged appliance couplers shall be such that the connector will fully engage under the weight of the appliance or equipment, and will disengage under the weight of the power base. The minimum values of these weights shall be specified by the manufacturer's installation instructions.

Compliance is checked by the tests of 16.2 and 16.3, which are made on a connector and an appliance inlet, and are repeated after the test of Clause 21. A representative appliance and power base, each having the minimum weight declared by the manufacturer, may be supplied for this test.

16.2 The minimum weight for full engagement is determined by mounting a weight-engaged connector and weight-engaged appliance inlet so that they may engage freely, and that the axis of engagement is vertical. A force equal to the specified minimum appliance weight, less the weight of the appliance inlet, is applied vertically downwards to the appliance inlet. The appliance inlet shall fully enter the connector, in accordance with the manufacturer's installation instructions. Any initial resistance caused by sealing shutters and the like may be overcome manually, but the coupler shall be fully engaged under the specified force alone.

NOTE The apparatus with which this test is performed will depend on the construction of the weight-engaged appliance coupler under consideration. A representative appliance having the declared minimum weight ~~may~~ can be used to apply the force.

16.3 The minimum weight for correct disengagement of the power base shall be determined by placing the weight-engaged appliance connector on a horizontal surface so that its axis of engagement is vertical, and attaching to the connector a weight equal to the minimum weight declared by the manufacturer. The weight-engaged connector shall be free to move on the surface.

The weight-engaged appliance inlet is then engaged fully with the connector and withdrawn.

The connector shall not remain in the appliance inlet.

NOTE A representative power base of the minimum weight declared by the manufacturer ~~may~~ can be used to provide the weight required in this test.

Weight-engaged connectors for which a maximum ~~operating~~ ambient working temperature is specified in 7.5 that is higher than ambient temperature are tested twice: once at an ambient temperature, and once after the appliance inlet has been raised to the ~~maximum~~ specified ~~operating~~ maximum ambient working temperature.

17 Operation of contacts

This clause of IEC 60320-1 ~~applies amended~~ is replaced as follows:

~~Delete the reference to Clause 18 in the third paragraph of this clause.~~

Operation of contacts is confirmed by establishing compliance with the requirements of Clauses 16, 18, 19, 20, 21 and 25.101.

18 Resistance to heating of appliance couplers for hot conditions or very hot conditions

This clause of IEC 60320-1 ~~does not apply~~ is replaced as follows:

18.1 General

Weight-engaged appliance couplers and inlets shall withstand the heating to which they may be subjected by an appliance or other equipment and the insulation of the conductors shall not be subjected to excessive heating.

Compliance is checked, for the combination of connector and appliance inlet, by the test of 18.2.

18.2 Heating test for connectors and appliance inlets

Rewirable connectors are fitted with an appropriate cord, having the minimum allowed cross-sectional area. Non-rewirable connectors and appliance inlets are tested with the cord as delivered.

The connector is inserted into the appliance inlet and the combined assembly is placed on a horizontal surface. The appliance inlet is secured into position with an additional weight such that the total weight including the appliance inlet is equal to the minimum appliance weight declared in 7.7e). The connector and the appliance inlet may be mounted into a suitable appliance base and body.

The combined assembly is placed in a heating cabinet for 96 h at a temperature of:

- *70 °C ± 2 °C for connectors/appliance inlets for cold conditions classified in 7.1a);*
- *120 °C ± 2 °C for connectors/appliance inlets for hot conditions classified in 7.1b);*
- *155 °C ± 2 °C for connectors/appliance inlets for very hot conditions classified in 7.1c).*

After removal from the heating cabinet, the connectors/appliance inlets are then allowed to cool down to approximately ambient air temperature and are inserted and withdrawn ten times.

The test samples shall show:

- *no damage impairing their further use;*
- *no damage affecting the protection against electric shock;*
- *no loosening of electrical or mechanical connections;*
- *no cracks, swelling, shrinkage or the like.*

19 Breaking capacity

This clause of IEC 60320-1 is replaced as follows:

Weight-engaged appliance couplers shall have adequate breaking capacity.

This test is not carried out on weight-engaged ~~connectors and appliance inlets~~ couplers specifically intended never to be disengaged ~~with~~ while the current is flowing.

Some lateral movement is allowed to simulate intended use.

Compliance is checked, for couplers having a current rating in excess of 0,2 A, by the following test.

The connector shall be mounted in a suitable apparatus.

The appliance inlet shall be positioned so that the plane through the direction of engagement is vertical.

The two live contacts of the appliance inlet are connected internally to one another and an external electrical load is connected in series with the supply. The external load is of such a value that the current is 1,25 times the rated current $\pm 2,5\%$ at a test voltage of 275 V $\pm 1,5\%$, the power factor being $0,95^{+0,05}_0$ for weight-engaged connectors with a rated current of 10 A or greater, and $0,6 \pm 0,05$ for other weight-engaged connectors. The external load is positioned so as not to affect the ambient temperature of the test enclosure. An example of a suitable circuit is shown in IEC 60320-1:2015, Figure 15.5.

NOTE The manufacturer can declare a power factor of 0,95 for resistive load appliances for connectors below 10 A.

The weight-engaged connector and the appliance inlet are connected and disconnected 50 times (100 strokes), at a rate between 15 strokes per minute and 20 strokes per minute. The length of stroke shall be sufficient to ensure separation of the connector and inlet mating faces by at least 30 mm.

No current is passed through the earthing circuit, if any.

If an air core inductor is used, a resistor taking approximately 1 % of the current through the inductor is connected in parallel with it. Iron-core inductors may be used provided the current is of substantially sine-wave form.

During the test, there shall be no flashover between live parts of different polarity or such parts and parts of the earthing circuit, if any; neither shall there be any sustained arcing.

After the test, the specimen shall show no damage impairing its further use and the entry areas for the appliance inlet contacts shall not show any serious damage. In case of doubt the test is repeated with a new appliance inlet fitted to the test apparatus. If the specimen passes this second test without further significant deterioration, the coupler is considered to comply with the requirement.

NOTE 1 A stroke is ~~an insertion~~ a connection or a ~~withdrawal~~ disconnection of the connector.

NOTE 2 This test is carried out at ambient temperature.

20 Normal operation

This clause of IEC 60320-1 is replaced as follows:

Weight-engaged appliance couplers shall withstand, without excessive wear or other harmful effects, the mechanical, electrical and thermal stresses occurring in normal use.

Compliance is checked by ~~testing connectors in the apparatus used for Clause 19~~ the following test:

~~The number of connections and disconnections performed in this test shall be as declared by the manufacturer. Where the weight-engaged coupler system is intended for use in a number of different appliance types, and with different current ratings, tests shall be carried out on a separate set of specimens for the specified number of cycles for each appliance type, the test current being determined from the manufacturer's rated current declarations.~~

~~The connections and other test conditions shall be as specified in Clause 19, except that the current shall be 1,1 times rated current, and the voltage applied shall be the maximum rated voltage. Half the number of strokes shall be applied with current flowing, followed by half the number of strokes without current flowing. On weight-engaged connectors and appliance inlets specifically intended never to be disengaged with current flowing then the full number of strokes shall be applied with no current.~~

~~For weight-engaged couplers which allow a range of angular orientation of engagement, the relative angular position of the weight-engaged appliance inlet and weight-engaged connector during insertion and withdrawal shall be varied by an amount within an arc which shall be the lesser of 45° or the available arc provided by the design. The test shall be carried out in an apparatus which changes the relative position of the weight-engaged appliance inlet and the weight-engaged connector after withdrawal and before the next insertion by an even amount such that the relative insertion orientation is changed between 20 and 30 times within the available arc or 45° whichever applies. The direction of rotation shall be reversed at each end of the arc. Every 250 insertions the weight-engaged appliance inlet and the weight-engaged connector shall be rotated relative to each other in each direction whilst in engagement by the full angular amount allowed by the design or the arc or 45°, whichever is the smaller, returning to the starting position before the next disengagement. For weight-engaged couplers specifically intended never to be disengaged with current flowing, the test current shall be applied only during this engaged rotation for half the number of test cycles declared by the manufacturer.~~

~~After the test, the specimens shall withstand an electric strength test as specified in 15.3.~~

~~The specimen shall show:~~

- ~~— no wear impairing its further use;~~
- ~~— no deterioration of enclosures or barriers;~~
- ~~— no damage to the entry areas in the weight-engaged coupler contacts that might impair proper working;~~
- ~~— no loosening of electrical or mechanical connections;~~
- ~~— no seepage of sealing compound.~~

~~NOTE The humidity treatment is not repeated before the electric strength test of this clause.~~

The two live pins of the appliance coupler are connected together and an external load is connected in series with the supply. The external load is such that the current is 1,1 times rated current with the load as specified in 7.7h).

The appliance inlet is mated with its corresponding connector and withdrawn 10 000 times at a rate of approximately 10 times per minute. The test is continued for a further 10 000 times without current flowing.

NOTE 1 The number of cycles can be higher if declared by the manufacturer or required by the end-product standard.

After the test, the appliance inlet and connector shall be suitable for further use and compliance with Clause 10, 15.3, 25.101 (if applicable) and Clause 26 shall not be impaired.

The test is carried out without current flowing if the connection contacts cannot make or break on load during normal operation.

The conditions for the test are given in Table 102.

The voltage regulator required for this test shall be rated at a minimum of seven times the rated current.

NOTE 2 The humidity treatment is not repeated before the electric strength test of Clause 20.

Some lateral movement of the mating connector to the appliance inlet under test is allowed to simulate intended use.

Table 102 – Ratings for the tests of Clause 20

Rated current	Test voltage	Test current	Power factor	Number of strokes
[A]	[V]	[A]	(cos Φ)	
0,2	–	no current	–	As declared in 7.6
> 0,2 < 10	250	I_n	0,6 ^a	Half the number declared in 7.6
	–	no current	–	The remainder of the number declared in 7.6
≥ 10	250	I_n	0,95	Half the number declared in 7.6
	–	no current	–	The remainder of the number declared in 7.6
Weight-engaged connectors and appliance inlets specifically intended never to be disengaged with current flowing	–	no current	–	As declared in 7.6 ^b

I_n = Rated current

NOTE 1 30 strokes per minute with a continuous movement.

NOTE 2 Current flow period $1,5^{+0,5}_0$ s.

NOTE 3 A stroke is an engagement or a disengagement of the sample under test into the counterpart.

NOTE 4 The value of the test voltage is measured within ± 1,5 % and test current is measured within ± 2,5 %.

^a A power factor of 0,95 can be used if the load in the end equipment is resistive only.

^b For weight-engaged couplers specifically intended never to be disengaged with current flowing, the test current shall be applied only during this engaged rotation for half the number of test cycles declared by the manufacturer.

21 Temperature rise

This clause of IEC 60320-1 is replaced as follows:

Contacts and other current-carrying parts shall be so designed as to prevent excessive temperature rise due to the passage of current.

Compliance is checked, for connectors having a current rating in excess of 0,2 A, by the following test.

Connectors shall be fitted with the cord specified by the manufacturer.

The connector shall be fitted to a corresponding appliance inlet ensuring correct engagement as specified by the manufacturer.

~~An alternating current of 1,25 times rated current shall be passed through the current-carrying contacts for 1 h.~~

Alternatively, heating test requirements from the appropriate appliance standard can be used instead of the test at 1,25 times rated current ± 2,5 % for 1 h ± 1min.

For connectors with earthing contact, the current shall then be passed through one current-carrying contact and the earthing contact for $1\text{ h} \pm 1\text{ min}$. For couplers with auxiliary contacts, the auxiliary contacts are loaded at 1,25 times the rated current $\pm 2,5\%$ of the auxiliary contacts whilst the current is flowing through the main live and neutral contacts.

The temperature shall be determined by means of melting particles, colour changing indicators or thermocouples, which shall be so chosen and positioned that they have negligible effect on the temperature being determined.

The temperature rise of terminals or terminations and contacts shall not exceed the value declared by the manufacturer, taking into account the construction and materials of the connector and appliance inlet, and of the specified cord, and the requirements of the relevant appliance standard.

After this test ~~the second set of three specimens specified in 5.5~~, the test samples shall withstand the test of Clause 16.

NOTE 1 During the test, the connector is not exposed to an external source of heat.

NOTE 2 For connectors with an earthing contact, 25.101 is applicable.

22 Cords and their connection

This clause of IEC 60320-1 applies amended as follows:

22.1 ~~Addition~~

Replace paragraph 2 with:

For non-rewirable weight-engaged connectors having a current rating other than those specified in Table 49 the cord shall have a cross-sectional area not less than that specified for the next higher current rating. The type of the cord shall be appropriate to the appliance specified in 25.7 of IEC 60335-1:2010, IEC 60335-1:2010/AMD1:2013 and IEC 60335-1:2010/AMD2:2016.

After paragraph 2, insert:

Alternatively, any cord which is acceptable in the end equipment standard may be used if declared in 7.7i). In this case the suitability of the cord shall be considered to the relevant requirements of the final application including cross-sectional area, temperature rating and type.

NOTE The cross-sectional area requirements of 25.8 of IEC 60335-1:2010, IEC 60335-1:2010/AMD1:2013 and IEC 60335-1:2010/AMD2:2016 do not apply.

22.2 *Replacement:*

Weight-engaged connectors in which the cord anchorage and strain relief are provided wholly by the power base of the appliance or equipment into which they are intended to be integrated or incorporated are not tested to 22.2. Other weight-engaged connectors which provide either partial or complete cord anchorage shall be tested, when installed according to the manufacturer's instructions, according to the requirements of the appropriate IEC standard of the appliance or equipment into which they are intended to be incorporated or integrated.

22.3 This subclause of IEC 60320-1 does not apply.

~~22.4 This subclause of IEC 60320-1 does not apply.~~

23 Mechanical strength

This clause of IEC 60320-1 applies amended as follows:

23.1 Replacement:

Weight-engaged appliance couplers shall have adequate mechanical strength.

Compliance is checked on weight-engaged ~~connectors and appliance inlets~~ couplers, installed as specified by the manufacturer, by the test of 23.54.

23.2 This subclause of IEC 60320-1 does not apply.

23.3 This subclause of IEC 60320-1 does not apply.

~~23.4 This subclause of IEC 60320-1 does not apply.~~

23.54 This subclause of IEC 60320-1 applies amended as follows:

Replace the first paragraph as follows:

Weight-engaged appliance inlets and weight-engaged connectors which have exposed surfaces when integrated or incorporated into an appliance in accordance with the manufacturer's instructions shall have such exposed surfaces tested by means of the spring-operated ~~impact test apparatus shown in Figure 24~~ impact-hammer according to IEC 60068-2-75.

23.65 This subclause of IEC 60320-1 does not apply.

23.86 This subclause of IEC 60320-1 does not apply.

24 Resistance to heat and ageing

This clause of IEC 60320-1 applies amended as follows:

24.1.2 Replacement:

Parts of insulating material of weight-engaged appliance inlets and of weight-engaged connectors ~~not integrated in or incorporated in an appliance or equipment~~, shall be sufficiently resistant to heat if their deterioration could cause the appliance inlet or connector to fail to comply with this document.

This requirement does not apply to parts of the cord anchorage, the cord guard, parts of connectors moulded together with the cord and parts of ceramic.

Compliance is checked by subjecting the relevant part to the ball pressure test of IEC 60695-10-2.

The test is carried out at a temperature of $(40 \pm 2) ^\circ\text{C}$ in excess of the highest temperature measured in Clause 21 or $(125 \pm 2) ^\circ\text{C}$ if this is greater.

~~24.1.3 This subclause of IEC 60320-1 does not apply.~~

25 Screws, current-carrying parts and connections

This clause of IEC 60320-1 applies amended as follows:

25.3 Replacement:

Electrical connections shall be so designed that contact pressure is not transmitted through insulating material other than ceramic, or other material with characteristics at least equivalent.

This requirement does not apply to weight-engaged connectors and appliance inlets, if there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage of the insulating material.

NOTE 1 The suitability of the material is considered with regard to the stability of the dimensions.

Compliance is checked by inspection.

NOTE 2 This requirement does not preclude electrical connections with flat tinsel cord for applications up to 0,2 A where the contact pressure is obtained by insulating material having such properties as to ensure reliable and permanent contact under all conditions of normal use, especially with respect to shrinking, yielding, ageing, and cold flow of the insulating part.

~~25.8 This subclause of IEC 60320-1 does not apply.~~

Additional subclause (following 25.4):

25.101 Earthing contacts

For couplers with earthing contacts, the connection between the earthing terminal or termination and earthed metal parts shall have low resistance.

If the clearances of basic insulation in a protective extra-low voltage circuit are based on the rated voltage of the appliance, this requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit.

Compliance is checked by the following test performed in a representative appliance in which the coupler is intended to be used.

A current derived from a source having a no-load voltage not exceeding 12 V (AC or DC) and equal to 1,5 times the rated current of the appliance or 25 A, whichever is higher, is passed between the earthing terminal or earthing contact of the connector and each of the accessible metal parts of the representative appliance in turn.

The voltage drop between the earthing terminal or termination of the appliance connector and the accessible metal part of the representative appliance is measured. The resistance calculated from the current and this voltage drop shall not exceed 0,1 Ω .

Care is to be taken to ensure that the contact resistance between the tip of the measuring probe and the metal part under test does not influence the test results.

NOTE 1 In case of doubt, the test is carried out until steady conditions have been established.

NOTE 2 The resistance of the supply cord is not included in the measurement.

26 Clearances, creepage distances, ~~clearances~~ and ~~distances through~~ solid insulation

This clause of IEC 60320-1 is replaced as follows:

26.1 General

Appliance inlets and connectors shall be constructed so that the clearances, creepage distances and solid insulation are adequate to withstand the electrical stresses to which they are liable to be subjected.

Weight-engaged connectors are tested when in engagement with a weight-engaged appliance inlet and also when not in engagement.

Compliance is checked by the requirements and tests of 26.12 to 26.34.

NOTE 1 The requirements and tests are based on IEC 60664-1, from which further information can be obtained.

NOTE 2 The assessment of clearances, creepage distances and solid insulation ~~has to be~~ are carried out separately.

NOTE 3 For couplers with auxiliary contacts, the rated voltage for creepage and clearance assessment of those contacts is based on the rated voltage of the auxiliary contacts.

26.2 Clearances

26.2.1 Clearances shall not be less than the values specified in Table 103, taking into account the **rated impulse voltage** for the overvoltage categories of Table ~~102~~ 103.

Appliance inlets and connectors are in overvoltage category II.

NOTE 1 IEC 60664-1 gives information regarding overvoltage categories.

Table ~~102~~ 103 – Rated impulse voltage

Rated voltage V	Rated impulse voltage V Overvoltage category		
	I	II	III
≤ 50	330	500	800
> 50 and ≤ 100	500	800	1500
> 100 and ≤ 150	800	1 500	2 500
> 150 and ≤ 300	1 500	2 500	4 000

Clearances less than those specified in Table ~~103~~ 104 are not allowed for basic insulation.

Table ~~103~~ 104 – Minimum clearances

Rated impulse voltage V	Minimum clearance ^a mm
330	0,5 ^b
500	0,5 ^b
800	0,5 ^b
1 500	0,5
2 500	1,5
4 000	3,0
^a The distances specified apply only to clearances in air.	
^b The smaller clearances specified in IEC 60664-1 have not been adopted for practical reasons, such as mass-production tolerances.	

Compliance is checked by inspection and by measurement.

Parts such as hexagonal nuts that can be tightened to different positions during assembly, and movable parts, are placed in the most unfavourable position.

A force is applied to bare conductors and accessible surfaces to try to reduce clearances when making the measurement. The force is

- $2\text{ N} \pm 0,1\text{ N}$, for bare conductors,
- $30\text{ N} \pm 1,5\text{ N}$, for accessible surfaces.

The force is applied by means of test probe B of IEC 61032. Apertures are assumed to be covered by a piece of flat metal.

NOTE ~~42~~ The way in which clearances are measured is specified in IEC 60664-1 and Figure 101.

26.1.12.2 The clearances of basic insulation shall be sufficient to withstand the overvoltages likely to occur during use, taking into account the **rated impulse voltage**. The values of Table ~~103~~ 104 are applicable.

NOTE The overvoltages ~~may~~ can be derived from external sources or due to switching.

Compliance is checked by measurement.

26.1.22.3 Clearances of supplementary insulation shall be not less than those specified for basic insulation in Table ~~103~~ 104.

Compliance is checked by measurement.

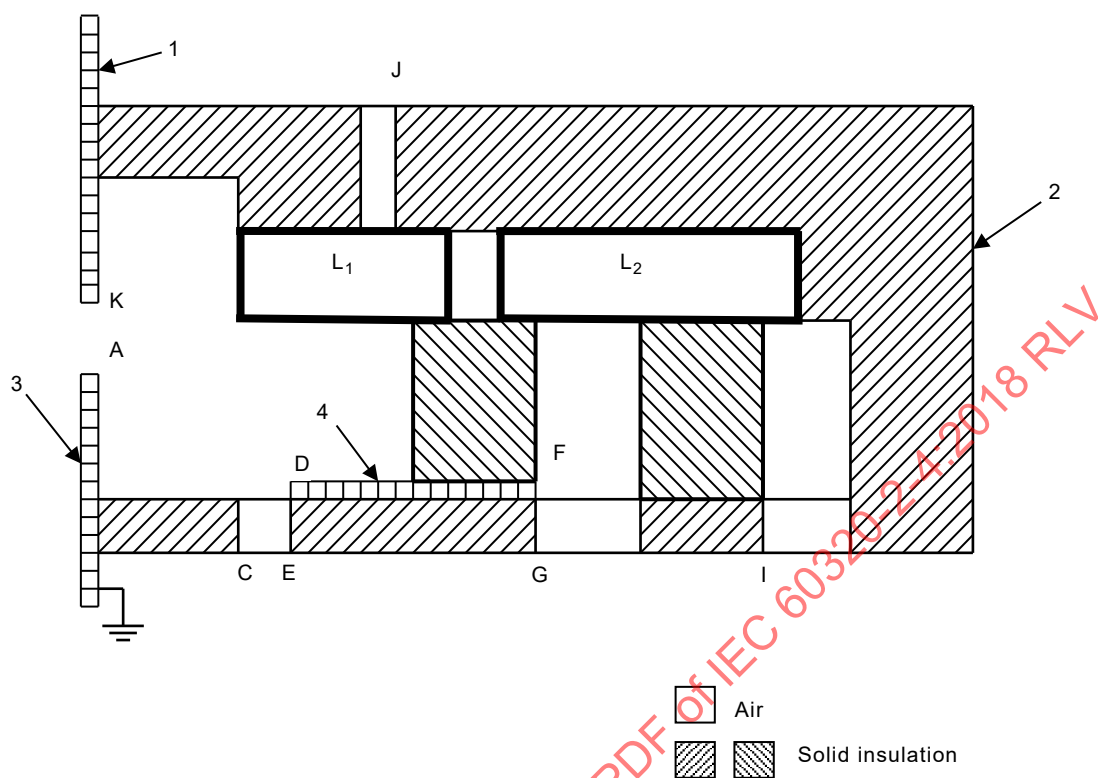
26.1.32.4 Clearances of reinforced insulation shall be not less than those specified for basic insulation in Table ~~103~~ 104 but using the next higher step for rated impulse voltage as a reference.

NOTE For double insulation, when there is no intermediate conductive part between the basic insulation and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation as shown in Figure 101.

Compliance is checked by measurement.

26.1.42.5 For **functional insulation** the values of Table ~~103~~ 104 are applicable.

Compliance is checked by measurement.



IEC

Key

- 1 accessible unearthed metal part
- 2 enclosure
- 3 accessible earthed metal part
- 4 inaccessible unearthed metal part

The live parts L_1 and L_2 are separated from each other and partially surrounded by a plastic enclosure containing apertures, partially by air, and are in contact with solid insulation. A piece of inaccessible metal is incorporated inside the construction. There are two metal covers, one of which is earthed.

Type of insulation	Clearance
Basic insulation	L_1A
	L_1D
	L_2F
Functional insulation	L_1L_2
Supplementary insulation	DE
	FG
Reinforced insulation	L_1K
	L_1J
	L_2I
	L_1C

NOTE If the clearances L_1D or L_2F meet the clearance requirements for reinforced insulation, the clearances DE or FG of supplementary insulation are not measured.

Figure 101 – Examples of clearances

26.3 Creepage distances

26.23.1 Appliance inlets and connectors shall be constructed so that creepage distances are not less than those appropriate for the working voltage, taking into account the material group and the pollution degree.

NOTE 1 The working voltage for parts connected to the neutral is the same as for parts connected to the phase.

Pollution degree 2 applies unless

- precautions have been taken to protect the insulation, in which case pollution degree 1 applies,
- the insulation is subjected to conductive pollution, in which case pollution degree 3 applies.

NOTE 2 An explanation of pollution degree is given in IEC 60664-1.

NOTE 3 Pollution degree 4 is not applicable to appliance couplers.

Compliance is checked by measurement.

NOTE 4 The way in which creepage distances are measured is specified in IEC 60664-1.

Parts such as hexagonal nuts that can be tightened to different positions during assembly, and movable parts, are placed in the most unfavourable position.

A force is applied to bare conductors and accessible surfaces to try to reduce creepage distances when making the measurement. The force is

- 2 N, for bare conductors,
- 30 N, for accessible surfaces.

The force is applied by means of test probe B of IEC 61032.

The relationship between the material group and the comparative tracking index (CTI) values, as given in ~~subclause 2.7.1.3~~ 4.8.1.3 of IEC 60664-1:2007, is

- material group I: $600 \leq CTI$,
- material group II: $400 \leq CTI < 600$,
- material group IIIa: $175 \leq CTI < 400$,
- material group IIIb: $100 \leq CTI < 175$.

These CTI values are obtained in accordance with IEC 60112 using solution A. If the CTI value of the material is unknown, a proof tracking index (PTI) test in accordance with Annex AA of IEC 60320-1:2015 is carried out at the CTI values specified, in order to establish the material group.

NOTE 45 The test for comparative tracking index (CTI) in accordance with IEC 60112 is designed to compare the performance of various insulating materials under test conditions, namely drops of an aqueous contaminant falling on a horizontal surface leading to electrolytic conduction. It gives a qualitative comparison but in the case of insulating materials having a tendency to form tracks it can also give a quantitative comparison, namely the comparative tracking index.

NOTE 56 The procedure for assessing creepage distances is given in IEC 60664-1.

26.2.13.2 Creepage distances of basic insulation shall not be less than those specified in Table 104 105.

Table ~~104~~ 105 – Minimum creepage distances for basic insulation

Working voltage V	Creepage distance mm Pollution degree						
	1	2			3		
		Material group			Material group		
		I	II	IIIa/IIIb	I	II	IIIa/IIIb
≤ 50	0,2	0,6	0,9	1,2	1,5	1,7	1,9 ^a
> 50 and ≤ 125	0,3	0,8	1,1	1,5	1,9	2,1	2,4
> 125 and ≤ 250	0,6	1,3	1,8	2,5	3,2	3,6	4,0
NOTE For glass, ceramics and other inorganic insulating materials that do not track, creepage distances need not be greater than the associated clearance.							
^a Material group IIIb is allowed if the working voltage does not exceed 50 V.							

Compliance is checked by measurement.

26.2.23.3 Creepage distances of supplementary insulation shall be at least those specified for basic insulation in Table ~~104~~ 105.

NOTE In the case of supplementary insulation, the note of Table ~~104~~ 105 does not apply.

Compliance is checked by measurement.

26.2.33.4 Creepage distances of reinforced insulation shall be at least double those specified for basic insulation in Table ~~104~~ 105.

NOTE In the case of reinforced insulation the Note of Table ~~104~~ 105 does not apply.

Compliance is checked by measurement.

26.2.43.5 Creepage distances of functional Insulation shall be not less than those specified in Table ~~104~~ 105.

26.34 Solid insulation

Solid insulation shall have a minimum thickness of 1 mm for supplementary insulation and 2 mm for reinforced insulation.

NOTE 1 This does not imply that the thickness has to be through solid insulation only. The insulation ~~may~~ can consist of solid material plus one or more air layers.

This requirement does not apply

- for supplementary insulation, if the insulation consists of at least two layers, provided that each of the layers withstands the electric strength test of 15.3,
- for reinforced insulation, if the insulation consists of at least three layers, provided that any two layers together withstand the electric strength test of 15.3.

In this case, the layers shall not consist of mica or similar scaly material.

NOTE 2 The layers ~~may~~ can be bonded together as long as it is possible to test them separately before bonding.

Compliance is checked by inspection and by tests.

Solid insulation may have a lower minimum thickness providing accessible parts of solid insulation have sufficient strength to prevent penetration by sharp implements.

Compliance is checked by subjecting the insulation to the following test, unless the thickness of supplementary insulation is at least 1 mm and that of reinforced insulation is at least 2 mm.

The insulation is raised to the temperature measured during the test of Clause 21. The surface of the insulation is then scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°. Its tip is rounded with a radius of 0,25 mm ± 0,02 mm. The pin is held at an angle of 80° to 85° to the horizontal and loaded so that the force exerted along its axis is 10 N ± 0,5 N. The scratches are made by drawing the pin along the surface of the insulation at a speed of approximately 20 mm/s. Two parallel scratches are made. They are spaced sufficiently apart so that they are not affected by each other, their length covering approximately 25 % of the length of the insulation. Two similar scratches are made at 90° to the first pair without crossing them. The test fingernail of Figure 7 of IEC 60335-1:2010, IEC 60335-1:2010/AMD1:2013 and IEC 60335-1:2010/AMD2:2016 is then applied to the scratched surface with a force of approximately 10 N. No further damage, such as separation of the material, shall occur. The insulation shall then withstand the electric strength test of 15.3. The hardened steel pin is then applied perpendicularly with a force of 30 N ± 0,5 N to an unscratched part of the surface. The insulation shall then withstand the electric strength test of 15.3 with the pin still applied and used as one of the electrodes.

27 Resistance of insulating material to heat, fire and tracking

This clause of IEC 60320-1 applies amended as follows:

Replacement:

27.1 Resistance to heat, fire and tracking

27.1.1 General

Parts of non-metallic material shall be resistant to ignition and spread of fire.

This requirement does not apply to decorative trims, and other parts unlikely to be ignited or to propagate flames that originate inside an appliance in which the connector or appliance inlet is incorporated or integrated.

Compliance is checked by the tests of 27.1.42 and 27.1.23.

The tests are carried out on parts of non-metallic material that have been removed from the connector or appliance inlet. When the glow-wire test is carried out, they are placed in the same orientation as they would be in normal use.

These tests are not carried out on the insulation of wires.

27.1.42 Glow wire requirements for all non-metallic materials

Parts of non-metallic material are subjected to the glow-wire test of IEC 60695-2-11, which is carried out at 550 °C.

The glow-wire test is not carried out on parts of material classified at least HB40 according to IEC 60695-11-10, provided that the test sample is no thicker than the relevant part.

Parts for which the glow-wire test cannot be carried out, such as those made of soft or foamy material, shall meet the requirements specified in ISO 9772 for category FH3 material, the test sample being no thicker than the relevant part.

27.1.23 Additional glow wire requirements for non-metallic materials

27.1.3.1 Connectors and appliance inlets are tested as specified in 27.1.3.2-4 and 27.1.2-23.3. However, the tests are not applicable to

- parts supporting welded connections,
- soldered connections on printed circuit boards,
- connections on small components that are mounted on printed circuit boards,
- parts within 3 mm of any of these connections.

NOTE Examples of small components are diodes, transistors, resistors, inductors, integrated circuits and capacitors not directly connected to the supply mains.

27.1.2-43.2 Parts of insulating material supporting connections that carry a current exceeding 0,2 A during normal operation, and parts of insulating material within a distance of 3 mm of such connections, shall have a glow-wire flammability index of at least 850 °C according to IEC 60695-2-12, the test sample being no thicker than the relevant part.

27.1.2-23.3 Parts of insulating material supporting current-carrying connections, and parts of insulating material within a distance of 3 mm of such connections, are subjected to the glow-wire test of IEC 60695-2-11. However, the glow-wire test is not carried out on parts of material classified as having a glow-wire ignition temperature according to IEC 60695-2-13 of at least

- 775 °C, for connections which carry a current exceeding 0,2 A during normal operation,
- 675 °C, for other connections,

provided that the test sample was no thicker than the relevant part.

When the glow-wire test of IEC 60695-2-11 is carried out, the temperatures are

- 750 °C, for connections which carry a current exceeding 0,2 A during normal operation,
- 650 °C, for other connections.

NOTE 1 Contacts in components such as switch contacts are considered to be connections.

NOTE 2 The tip of the glow-wire is applied to the part in the vicinity of the connection.

Parts that withstand the glow-wire test of IEC 60695-2-11, but which, during the test, produce a flame that persists for longer than 2 s, are further tested as follows. Parts above the connection within the envelope of a vertical cylinder having a diameter of 20 mm and a height of 50 mm are subjected to the needle-flame test of Annex-BB AA. However, parts shielded by a barrier that meets the needle-flame test of Annex-BB AA are not tested.

The needle-flame test is not carried out on parts of material classified as V-0 or V-1 according to IEC 60695-11-10, provided that the test sample was no thicker than the relevant part.

~~27.2 This subclause of IEC 60320-1 does not apply.~~

28 Resistance to rusting

This clause of IEC 60320-1 applies.

29 Electromagnetic compatibility (EMC) requirements

This clause of IEC 60320-1 applies.

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~~Annex AA~~
~~(normative)~~

~~Proof tracking test~~

~~The proof tracking test is carried out in accordance with IEC 60112 with the following modifications.~~

~~10 Determination of proof tracking index (PTI)~~

~~Addition:~~

~~The specified voltage is 100 V, 175 V, 400 V or 600 V, as appropriate.~~

~~The test is made on five specimens.~~

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Annex-~~BB~~AA (normative)

Needle-flame test

The needle-flame test is carried out in accordance with IEC 60695-11-5:2016 with the following modifications.

7 ~~Severities~~ Flame application times

This clause of IEC 60695-11-5 applies amended as follows:

Replacement:

The duration of application of the test flame is $30\text{ s} \pm 1\text{ s}$.

9 Test procedure

9.2 Position of test specimen

Modification:

This subclause of IEC 60695-11-5 applies amended as follows:

Replace the first paragraph with the following:

The specimen is arranged so that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1.

Addition:

If possible, the flame is applied at least 10 mm from a corner.

~~9.3~~9.4 Number of test specimens

This subclause of IEC 60695-11-5 applies amended as follows:

Replace the first paragraph with the following:

The test is made on one specimen. If the specimen does not withstand the test, the test may be repeated on two further specimens, both of which shall then withstand the test.

11 Evaluation of test results

Modification:

This clause of IEC 60695-11-5 applies amended as follows:

Replace item b) with the following:

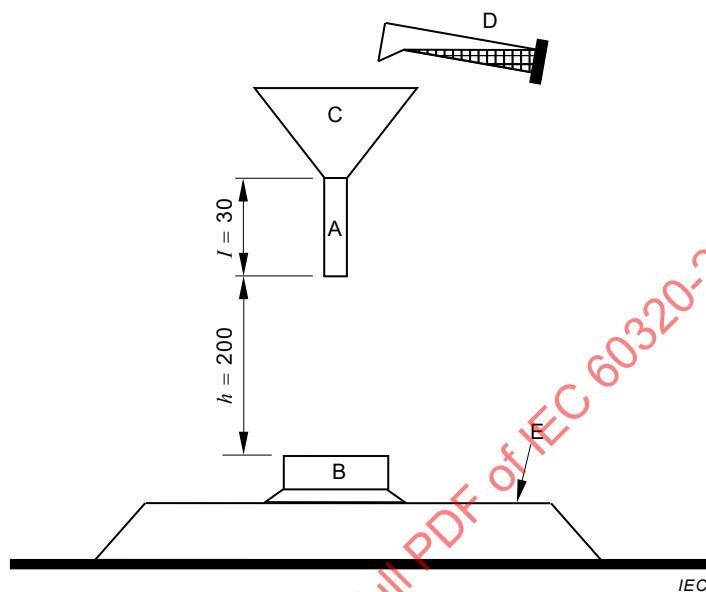
The duration of burning (t_b) shall not exceed 30 s. However, for printed circuit boards, it shall not exceed 15 s.

Annex BB (normative)

Apparatus for the test of 14.102

See Figure BB.1.

Dimensions in millimetres



Key

- A Funnel tube with inner diameter of 8 mm
- B Item under test
- C Funnel
- D Container with 30 ml of saline solution
- E Horizontal surface

NOTE The water from the container D is intended to be poured onto the side of the funnel C to ensure correct dispersion of the outlet flow.

Figure BB.1 – Apparatus for the test of Subclause 14.102

Replace Annex C with:

Annex C (normative)

Test schedule

Table C.1

Table C.1 is replaced as follows:

Set	Clause/ subclause	Description of the tests	Weight-enganged appliance inlet	Weight-enganged connector	Weight-enganged appliance inlet with auxiliary contacts	Weight-enganged connector with auxiliary contacts
1 3 samples	8	Marking	x	x	x	x
	9	Dimensions and compatibility	x	x	x	x
	10	Protection against electrical shock	x	x	x	x
	11	Provision for earthing	x	x	x	x
	12	Terminals and terminations	x	x	x	x
	13	Construction	x	x	x	x
	16	Forces necessary to insert and to withdraw the connector/appliance outlet		x	x	
	17	Operation of contacts	x	x	x	x
	18	Resistance to heating of appliance couplers for hot conditions or very hot conditions	x	x		
	23	Mechanical strength	x	x	x	x
	23.2	Free fall test		x		x
	23.3	Lateral pull test		x	x	
	25	Screws, current-carrying parts and connections	x	x	x	x
	26	Clearances, creepage distances and solid insulation	x	x	x	x
	28	Resistance to rusting	x	x	x	x
	29	Electromagnetic compatibility (EMC) requirements	x	x	x	x

Set	Clause/ subclause	Description of the tests	Weight-enganged appliance inlet	Weight-enganged connector	Weight-enganged appliance inlet with auxiliary contacts	Weight-enganged connector with auxiliary contacts
2 3 samples^a	14	Moisture resistance	x	x	x	x
	15	Insulation resistance and electric strength	x	x	x	x
	16	Forces necessary to insert and to withdraw the connector/appliance outlet		x	x	
	19	Breaking capacity		x	x	
	20	Normal operation		x	x	
	21	Temperature rise		x	x	
3 3 samples^b	22	Cords and their connection		x		x
4 3 samples^b	22.3	Flexing test		x		x
5 2 samples^a	24	Resistance to heat and ageing	x	x	x	x
6 2 samples^a	24.2	Ageing test for appliance couplers made of rubber or thermoplastic material	x	x	x	x
7 2 samples^a	27	Resistance of insulating material to heat, fire and tracking				
	27.1.5	Glow wire test 750 °C (sample 1)	x	x	x	x
	27.1.5	Glow wire test 650 °C (sample 2)	x	x	x	x
8 3 samples^a	27	Resistance of insulating material to heat, fire and tracking				
	27.2	Resistance to tracking	x	x	x	x

Set	Clause/ subclause	Description of the tests	Weight-engaged appliance inlet	Weight-engaged connector	Weight-engaged appliance inlet with auxillary contacts	Weight-engaged connector with auxillary contacts
9 3 samples ^a	14.102	Protection against liquid spillage		x		
10 2 samples ^a	24.2	Weight-engaged connectors of elastomeric or thermoplastic material				
		Weight-engaged connectors of elastomeric material	x	x		
		Weight-engaged connectors of thermoplastic material	x	x		
11 3 samples ^a	15	Non-rewirable weight-engaged connectors with indicators	x	x		
12 3 samples ^a	14	Moisture resistance	x	x		
		Insulation resistance and electric strength	x	x		
		Forces necessary to insert and to withdraw the connector/appliance outlet		x		
	19	Breaking capacity		x		
	20	Normal operation		x		
	21	Temperature rise		x		
^a The number of samples specified is for each different material ^b The number of samples specified is for each type of cable, cross-sectional area and manufacturer of the cable.						

a The number of samples specified is for each different material

^b The number of samples specified is for each type of cable, cross-sectional area and manufacturer of the cable.

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Appliance couplers for household and similar general purposes –
Part 2-4: Couplers dependent on appliance weight for engagement**

**Connecteurs pour usages domestiques et usages généraux analogues –
Partie 2-4: Connecteurs à connexion par gravité**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**APPLIANCE COUPLERS FOR HOUSEHOLD
AND SIMILAR GENERAL PURPOSES –****Part 2-4: Couplers dependent on appliance
weight for engagement**

FOREWORD

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International Standard IEC 60320-2-4 has been prepared by subcommittee 23G: Appliance couplers, of IEC technical committee 23: Electrical accessories.

This second edition cancels and replaces the first edition published in 2005 and Amendment 1:2009. This edition constitutes a technical revision.

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

- a) IEC 60320-2-4 is aligned with IEC 60320-1:2015.
- b) IEC 60320-2-4 is aligned with IEC 60335-1 and IEC 60335-2-15. IEC 60320-2-4 appliance couplers are incorporated into appliances designed and manufactured to these standards. To this end, particular attention is drawn to 14.2 and Clause 20.
- c) It also now proposes that appliance couplers with auxiliary contacts be considered.

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

FDIS	Report on voting
23G/402/FDIS	23G/404/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

This Part 2-4 is to be used in conjunction with IEC 60320-1: *Appliance couplers for household and similar general purposes – Part 1: General requirements*. It was established on the basis of the third edition of that standard (2015).

The clauses of this standard supplement or modify the corresponding clauses of IEC 60320-1. When a particular subclause or annex of Part 1 is not mentioned in this Part 2-4, the subclause or annex of IEC 60320-1 applies without modification as far as is reasonable. Where this standard states “addition”, “modification” or “replacement”, the relevant requirement, test specification or explanatory matter in IEC 60320-1 should be adapted accordingly.

Subclauses, figures or tables which are additional to those in Part 1 are numbered starting from 101. Additional annexes are lettered AA, BB, etc.

In this particular standard the following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- explanatory matter: in smaller roman type.

A list of all parts in the IEC 60320 series, published under the general title *Appliance couplers for household and similar general purposes*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

APPLIANCE COUPLERS FOR HOUSEHOLD AND SIMILAR GENERAL PURPOSES –

Part 2-4: Couplers dependent on appliance weight for engagement

1 Scope

This clause of IEC 60320-1 is replaced as follows:

This part of IEC 60320 is applicable to two-pole appliance couplers for alternating current only, with or without earthing contact, with a rated voltage not exceeding 250 V and a rated current not exceeding 16 A, for household and similar general purposes and intended for incorporation or integration within electric appliances or other electric equipment of multi-part construction for 50 Hz or 60 Hz supply which depend on the weight of the appliance to ensure correct engagement.

This document is also applicable to appliance couplers with auxiliary contacts rated for alternating current, direct current or both, with a total rated current not exceeding 16 A.

This document is also valid for appliance inlets/appliance outlets integrated or incorporated in appliances.

NOTE 1 Appliance couplers complying with this document are suitable for use in appliances which are used in an ambient temperature not normally exceeding 25 °C but occasionally reaching 35 °C. However the ambient temperature surrounding the appliance coupler can exceed these figures and can be declared by the manufacturer. It is possible that the maximum working ambient temperature for the appliance inlet and for the connector can be different.

NOTE 2 Appliance couplers dependent on appliance weight for engagement can be subject to spillage of liquid in normal use. They are classified according to whether protection against liquid spillage is provided, when installed in accordance with the manufacturer's installation instructions.

NOTE 3 If appliance inlets according to this document are used with appliances or other equipment which can be subject to spillage of liquid affecting the appliance inlet when the functioning part of the appliance or equipment is seated on its power base, then protection against moisture is provided by the equipment.

NOTE 4 References to standard sheets within IEC 60320-1 do not apply to appliance couplers dependent on appliance weight for engagement.

NOTE 5 Special constructions can be required:

- in locations where special conditions can prevail, for example, in ships, vehicles and the like;
- in hazardous locations, for example, where explosions are likely to occur.

NOTE 6 Additional auxiliary contacts can be used as part of the appliance coupler. An example of an auxiliary contact is a contact used to supply a low power device or used to transmit signals for sensors and to/from a microprocessor.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

This clause of IEC 60320-1 applies with the following additions:

IEC TR 60083, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 60320-1:2015, *Appliance couplers for household and similar general purposes – Part 1: General requirements*

IEC 60335-1:2010, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60335-1:2010/AMD1:2013

IEC 60335-1:2010/AMD2:2016

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

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695-11-5:2016, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60730-(all parts), *Automatic electrical controls*

ISO 9772, *Cellular plastics – Determination of horizontal burning characteristics of small specimens subjected to a small flame*

3 Terms and definitions

This clause of IEC 60320-1 applies with the following additions:

3.101

weight-engaged coupler

coupler that relies on the weight of the functioning part of the appliance, in which it is incorporated or integrated, to ensure correct engagement

Note 1 to entry: The weight-engaged coupler is used in an appliance which is in two parts, in order to supply the part that performs the function of the appliance (the functioning part) from the power base which is connected to the power supply.

3.102

weight-engaged connector

component part of the weight-engaged coupler which carries the power connections, and engages with the corresponding appliance inlet

3.103

weight-engaged appliance inlet

component part of a weight-engaged coupler intended for integration or incorporation in the functioning part of the appliance

3.104

rewirable weight-engaged connector

weight-engaged connector so constructed that the supply cord can be replaced

Note 1 to entry: The method of attachment of the supply cord, when installed in accordance with the manufacturer's installation instructions, is classified according to type X or type Y attachment requirements of the appliance standards.

Note 2 to entry: The requirements for type X or type Y attachment methods are given in IEC 60335-1.

3.105

type X attachment

method of attachment of the supply cord such that it can easily be replaced

Note 1 to entry: The supply cord may be specially prepared and only available from the manufacturer or its service agent. A specially prepared cord may include a part of the appliance.

3.106

type Y attachment

method of attachment of the supply cord such that any replacement is intended to be made by the manufacturer, its service agent or similar qualified person

3.107

type Z attachment

method of attachment of the supply cord such that it cannot be replaced without breaking or destroying the appliance

3.108

auxiliary contact

contact included in the appliance coupler to operate an auxiliary circuit as part of the normal operation of the appliance, with a maximum allowable current rating of 2 A

Note 1 to entry: An example of an auxiliary contact is a pole used to supply a low current device, used to transmit signals for sensors and to/from a microprocessor.

3.109

non-polarized

designed so that the inlet and connector auxiliary contact poles are interchangeable

4 General requirements

This clause of IEC 60320-1 applies.

5 General notes on tests

This clause of IEC 60320-1 applies amended as follows:

5.2 Replacement:

The specimens are tested as delivered and under normal conditions of use, in accordance with the installation instructions of the manufacturer. For alternating current they are tested at 50 Hz or 60 Hz.

Non-rewirable weight-engaged connectors shall be submitted with a cord at least 1 m long.

For those clauses requiring the tests to be carried out on weight-engaged connectors and weight-engaged appliance inlets installed in accordance with the manufacturer's instructions, representative appliances or appliance parts shall be supplied.

6 Standard ratings

This clause of IEC 60320-1 is replaced as follows:

6.1 The standard rated voltage is 250 V. Other rated voltages may be declared by the manufacturer provided they do not exceed 250 V.

6.2 The rated current shall be declared by the manufacturer. A coupler may have different current ratings dependent on use within specified applications. The rated current shall not in any case exceed 16 A.

Compliance with the requirements of 6.1 and 6.2 is checked by visual inspection of the marking or the manufacturer's instructions for installation and use.

7 Classification

This clause of IEC 60320-1 is replaced as follows:

7.1 According to maximum temperature of the corresponding appliance inlet:

- a) appliance couplers for cold conditions, appliance inlet temperature not exceeding 70 °C;
- b) appliance couplers for hot conditions, appliance inlet temperature not exceeding 120 °C;
- c) appliance couplers for very hot conditions, appliance inlet temperature not exceeding 155 °C.

NOTE Appliance couplers for hot conditions can also be used under cold conditions; appliance couplers for very hot conditions can also be used under cold or hot conditions.

7.2 According to the type of equipment to be connected:

- a) appliance couplers for class I equipment;
- b) appliance couplers for class II equipment.

NOTE For a description of the classes, see IEC 61140.

7.3 According to protection against liquid spillage when the connector is installed according to the manufacturer's instructions:

- a) protected;
- b) not protected.

7.4 According to breaking capacity:

- a) the coupler is intended to be engaged and disengaged with current flowing;
- b) the coupler is intended to be engaged and disengaged without current flowing.

7.5 According to the maximum ambient working temperature of the coupler

NOTE The maximum ambient working temperature of the connector and appliance inlet can be different.

7.6 According to the number of cycles to be performed in the test of Clause 20. Preferred values are:

- 100 000
- 60 000
- 30 000
- 20 000
- 10 000
- 6 000

NOTE Different numbers of endurance cycles can be declared for different current ratings of the same coupler. A cycle is two strokes as defined in Clause 19, that is, one connection followed by one disconnection.

7.7 The following information is recorded to cover required tests:

- a) The specified minimum cross-sectional area of cord.
- b) The maximum allowable terminal temperature rise.
- c) The maximum allowable termination temperature rise.
- d) The maximum allowable contact temperature rise.
- e) The minimum appliance weight required for correct engagement.
- f) The minimum base weight required for correct disengagement.
- g) The end equipment standard.
- h) The type of load to be connected:
 - resistive load
 - inductive load
 - capacitive load
 - specific load
 - direct current (auxiliary contacts)
- i) Type of cord to be connected (e.g. IEC type 52).
- j) Function of the connector:
 - connectors which normally make the connected load
 - connectors which do not normally make the connected load
 - connectors which normally break the connected load
 - connectors which do not normally break the connected load

NOTE Connectors which carry a current of 200 mA or less are considered to be off-load.

- k) For connectors with auxiliary contacts,
 - number of auxiliary contacts
 - maximum current rating of auxiliary contacts
 - maximum voltage rating of auxiliary contacts
 - specified for use in DC applications the contacts shall be classified as
 - i) polarized or
 - ii) non-polarized
 - the insulation classification between the auxiliary circuit and primary circuit

NOTE For SELV and PELV refer to the appropriate intended product standard.

8 Marking

This clause of IEC 60320-1 applies amended as follows:

8.2 Replacement:

Weight-engaged appliance inlets shall be marked with the name, trademark or identification mark of the maker or of the responsible vendor and a type reference.

8.5 This subclause of IEC 60320-1 does not apply.

8.6 Replacement:

In rewirable, non-reversible weight-engaged connectors, terminals shall be indicated as follows:

- earthing terminal: the symbol  (IEC 60417-5019:2006) or PE
- neutral terminal: the letter N

In non-rewirable, non-reversible weight-engaged connectors, no marking of contacts is necessary, but cores shall be connected as specified in 22.1.

Appliance inlets, other than those integrated or incorporated in an appliance or equipment, for use with connectors according to 8.6, shall have terminal markings to correspond with 8.6.

The marking symbol or letters shall not be placed on screws, removable washers or other removable parts.

Rewirable connectors shall be supplied with the following instructions:

- a) a diagram illustrating the method of connection of the conductors, in particular the (excess) length of the earthing conductor and the operation of the cord anchorage;
- b) a full-scale diagram showing the length of sleeving and insulation to be stripped back;
- c) the sizes and types of cords suitable;
- d) the type of attachment for connector and inlet.

NOTE 1 It is essential that the connection of the earthing conductor is shown in an instructive way, preferably with sketches.

NOTE 2 These instructions need not follow connectors supplied directly to an equipment manufacturer.

NOTE 3 In order to comply with the National Electrical Code of the United States, the neutral terminal must be either white in colour, or labelled "white". One way of accomplishing this is to nickel plate the neutral terminal and to leave the other terminal(s) unplated.

Additional subclauses:

8.101 Instructions for installation

Instructions for installation and use shall be supplied with weight-engaged appliance couplers. These instructions shall contain the information necessary to ensure compliance with this document and shall contain the classifications declared by the manufacturer according to Clause 7.

For weight-engaged couplers intended to be exclusively delivered to the equipment manufacturer, the instruction sheet may be replaced by a leaflet, letter, or drawing, etc. It is not necessary for each coupler to be accompanied by such a document.

8.102 Marking of auxiliary contacts

Auxiliary contacts shall be clearly marked to ensure no confusion occurs during installation. For polarized couplers, polarities shall be marked on both the appliance inlet and connector.

9 Dimensions and compatibility

This clause of IEC 60320-1 applies amended as follows:

9.1 Replacement:

Appliance couplers shall be designed and constructed so that unintended or improper connection is prevented.

Weight-engaged appliance couplers may take any form appropriate to their function, but shall comply with the requirements of this document as far as applicable.

9.2 This subclause of IEC 60320-1 does not apply.

9.3 *Replacement:*

It shall not be possible to make improper connections between weight-engaged connectors and weight-engaged appliance inlets when installed in accordance with the manufacturer's instructions. In those constructions where the design is such that transient single-pole connections occur as the weight-engaged connector is placed into and withdrawn from the appliance inlet during normal use, such transient single-pole connections are allowed.

Weight-engaged couplers shall not allow improper connections with plugs or portable socket outlets complying with IEC TR 60083.

Weight-engaged couplers shall not allow improper connections with connectors or appliance inlets complying with the standard sheets of the IEC 60320 series.

Compliance is checked by examination and reference to the manufacturer's declarations.

NOTE "Improper connections" include single-pole connection and other connections which do not comply with the requirements concerning protection against electric shock.

If in doubt, reference is made to the appropriate appliance standards regarding the requirements for weight-engaged connectors and appliance inlets.

It shall not be possible to engage connectors for class II equipment with appliance inlets for class I equipment.

Compliance is checked by inspection.

9.4 This subclause of IEC 60320-1 does not apply.

10 Protection against electric shock

This clause of IEC 60320-1 applies amended as follows:

10.1 *Replace the first two paragraphs with:*

Appliance couplers shall be so designed that live parts of the appliance inlets are not accessible when the connector is in partial or complete engagement.

Weight-engaged appliance connectors shall be so designed that the live parts and parts connected thereto are not accessible when the connector is properly assembled and wired as in normal use.

10.2 *Addition:*

NOTE To be assessed when incorporated in the end product.

Additional subclause (after 10.5):

10.101 Additional protection against access to live parts

Test probe 13 of IEC 61032 is applied without appreciable force through openings in appliance connectors.

NOTE "Without appreciable force" is considered to be a force not exceeding 1 N.

It shall not be possible to touch live parts with the test probe.

11 Provision for earthing

This clause of IEC 60320-1 applies.

12 Terminals and terminations

This clause of IEC 60320-1 applies amended as follows:

12.1 Replacement:

For weight-engaged appliance inlets and weight-engaged connectors, the requirements in the appropriate IEC standard for the appliance or equipment into which they are intended to be integrated or incorporated shall apply.

12.2 This subclause of IEC 60320-1 does not apply.

13 Construction

This clause of IEC 60320-1 applies amended as follows:

13.2 The note of this subclause is not applicable.

13.4 Replacement:

Pins of weight-engaged appliance inlets shall

- be securely retained,
- have adequate mechanical strength,
- not be removable without the aid of a tool, and
- have any live parts surrounded by a shroud.

NOTE This requirement does not exclude pins which are to some extent floating.

The security of components designed to function as contact pins, whether in the inlet or connector part, is checked by inspection and by the tests of Clause 19 and Clause 20.

13.5 Replacement:

The contact system of a weight-engaged coupler shall be self-adjusting so as to provide adequate contact pressure.

For connectors other than 0,2 A connectors self-adjustment of the contacts shall not depend upon the resiliency of insulating material.

Compliance is checked by inspection.

NOTE The self-adjustment of the contacts can be provided in either the appliance inlet or the connector or both.

13.10 Replacement:

Fuses, relays, thermostats and thermal cut-outs incorporated in weight-engaged connectors and weight-engaged appliance inlets shall comply with the relevant IEC standards.

Switches or energy regulators incorporated in weight-engaged connectors or weight-engaged appliance inlets shall comply with IEC 61058 (all parts) and IEC 60730 (all parts), respectively.

Where a weight-engaged appliance inlet is integrated in or incorporated in an appliance or equipment, then that part which can be identified as the appliance inlet shall comply with the requirements of this document.

Compliance is checked by inspection and by testing the switches, fuses, relays, thermostats, thermal cut-outs or energy regulators according to the relevant IEC standard.

14 Moisture resistance

This clause of IEC 60320-1 is replaced as follows:

14.101 Weight-engaged couplers shall be proof against humid conditions, which may occur in normal use.

NOTE 1 If weight-engaged couplers are used with equipment that is subject to the spillage of liquid in normal use, the protection is assumed to be provided by the equipment.

Compliance is checked by the humidity treatment described in Clause 14, followed immediately by the tests of Clause 15.

Weight-engaged connectors and appliance inlets are not in engagement when subjected to humidity treatment and rewirable weight-engaged connectors are not fitted with a cord.

The humidity test is carried out in a humidity cabinet containing air with a relative humidity maintained between 91 % and 95 %. The temperature of the air, at all places where specimens can be located, is maintained within ± 1 °C of any convenient value t °C, between 20 °C and 30 °C.

Before being placed in the humidity cabinet, the specimens are brought to a temperature between t °C and $(t + 4)$ °C.

The specimens are kept in the cabinet for:

- *168 h (7 days) for connectors with earthing contact and for appliance inlets with earthing contact, which are submitted as individual accessories, not incorporated in other equipment;*
- *48 h (2 days) in all other cases.*

NOTE 2 In most cases, the specimens can be brought to the specified temperature by keeping them at this temperature for at least 4 h before the humidity treatment.

NOTE 3 A relative humidity between 91 % and 95 % can be obtained by placing in the humidity cabinet a saturated solution of sodium sulphate (Na_2SO_4) or potassium nitrate (KNO_3) in water, having a sufficiently large contact surface with the air.

After this treatment, the specimen shall show no damage within the meaning of this document.

14.102 The connecting devices of stands for cordless appliances shall not be affected by water.

Compliance is checked by the following test.

The stand is placed on a horizontal surface and 30 ml of water containing approximately 1 % NaCl is poured onto the connecting device. The solution is poured steadily through a tube having an inner diameter of 8 mm over a period of 2 s, the lower end of the tube being 200 mm above the connecting device.

The stand shall then withstand the following electric strength.

Immediately following the deposition of the water, metal foil is smoothed over the accessible surface of the connector, avoiding contact with any earth connection by means of a hole or gap in the foil. The application of the foil is carried out in such a manner as to minimize any disturbance to water on the surface of the connector, where possible.

The specified test voltage is then applied between:

- a) the live parts and the metal foil over the surface of the connector at 2 500 V AC,*
- b) the live part and the metal foil surface under the appliance base at 2 500 V AC,*
- c) live parts to the earth connector at 1 250 V AC.*

NOTE The above text is taken from IEC 60335-2-15:2012, 15.102, with the scope extended to cover other appliances and the test voltages from CTL sheet PDSH758 and OSM decision 429 added.

The test is performed using the apparatus of Annex BB.

14.103 Weight-engaged appliance couplers intended to be partially or completely immersed in water for cleaning shall have adequate protection against the effects of immersion and shall be tested as defined in the appropriate appliance standard(s) specified in Clause 7 (relevant appliance standards), or the appropriate rating of IEC 60529.

15 Insulation resistance and electric strength

This clause of IEC 60320-1 applies amended as follows:

15.3 Replacement:

Immediately after the test of 15.2 the insulation is subjected for 1 min to a voltage of substantially sine-wave form and having a frequency of 50 Hz or 60 Hz. The values of the test voltage are shown in Table 101.

Accessible parts of insulating material are covered with metal foil.

Care should be taken to avoid overstressing basic insulation. In particular the metal foil shall approach no closer than the specified creepage distance for reinforced insulation to earthed parts.

Weight-engaged connectors are tested when in engagement with a weight-engaged appliance inlet and also when not in engagement.

Initially, not more than half the specified voltage is applied, then it is raised rapidly to the full value.

No flashover or breakdown shall occur during the test.

Table 101 – Test voltages

Insulation or disconnection to be tested ^b	Test voltage (RMS) ^a		
	Rated voltage up to and including 50 V	Rated voltage above 50 V up to and including 130 V	Rated voltage above 130 V up to and including 250 V
	V	V	V
Functional insulation ^c	500	1 300	1 500
Basic insulation ^d	500	1 300	1 500
Supplementary insulation ^e		1 300	1 500
Reinforced insulation ^{d e}	500	2 600	3 000
^a The high-voltage transformer used for the test shall be designed so that, when the output terminals are short circuited after the output voltage has been adjusted to the test voltage, the output current is at least 200 mA. The overcurrent relay shall not trip when the output current is less than 100 mA. Care is taken that the RMS values of the test voltage are measured within $\pm 3\%$. ^b Special components which might render the test impractical such as discharge lamps, coils, windings, or capacitors are disconnected at one pole, or bridged, as appropriate to the insulation being tested. ^c An example is the insulation between poles. ^d For the test, all live parts are connected together and care is taken to ensure that all moving parts are in the most unfavourable position. ^e For appliance couplers incorporating reinforced insulation as well as double insulation, care is taken that the voltage applied to the reinforced insulation does not overstress the basic or the supplementary parts of the double insulation.			

The high-voltage transformer used for the test is so designed that, when the output terminals are short circuited after the output voltage has been adjusted to the appropriate test voltage, the output current is at least 200 mA. The overcurrent relay shall not trip when the output current is less than 100 mA.

NOTE 1 Care is taken that the RMS value of the test voltage is measured within $\pm 3\%$.

NOTE 2 Glow discharges without drop in voltage are neglected.

16 Forces necessary to insert and withdraw the connector/appliance outlet

This clause of IEC 60320-1 is replaced as follows:

16.1 The construction of weight-engaged appliance couplers shall be such that the connector will fully engage under the weight of the appliance or equipment, and will disengage under the weight of the power base. The minimum values of these weights shall be specified by the manufacturer's installation instructions.

Compliance is checked by the tests of 16.2 and 16.3, which are made on a connector and an appliance inlet, and are repeated after the test of Clause 21. A representative appliance and power base, each having the minimum weight declared by the manufacturer, may be supplied for this test.

16.2 The minimum weight for full engagement is determined by mounting a weight-engaged connector and weight-engaged appliance inlet so that they may engage freely, and that the axis of engagement is vertical. A force equal to the specified minimum appliance weight, less the weight of the appliance inlet, is applied vertically downwards to the appliance inlet. The appliance inlet shall fully enter the connector, in accordance with the manufacturer's installation instructions. Any initial resistance caused by sealing shutters and the like may be overcome manually, but the coupler shall be fully engaged under the specified force alone.

NOTE The apparatus with which this test is performed will depend on the construction of the weight-engaged appliance coupler under consideration. A representative appliance having the declared minimum weight can be used to apply the force.

16.3 The minimum weight for correct disengagement of the power base shall be determined by placing the weight-engaged appliance connector on a horizontal surface so that its axis of engagement is vertical, and attaching to the connector a weight equal to the minimum weight declared by the manufacturer. The weight-engaged connector shall be free to move on the surface.

The weight-engaged appliance inlet is then engaged fully with the connector and withdrawn.

The connector shall not remain in the appliance inlet.

NOTE A representative power base of the minimum weight declared by the manufacturer can be used to provide the weight required in this test.

Weight-engaged connectors for which a maximum ambient working temperature is specified in 7.5 that is higher than ambient temperature are tested twice: once at an ambient temperature, and once after the appliance inlet has been raised to the specified maximum ambient working temperature.

17 Operation of contacts

This clause of IEC 60320-1 is replaced as follows:

Operation of contacts is confirmed by establishing compliance with the requirements of Clauses 16, 18, 19, 20, 21 and 25.101.

18 Resistance to heating of appliance couplers for hot conditions or very hot conditions

This clause of IEC 60320-1 is replaced as follows:

18.1 General

Weight-engaged appliance couplers and inlets shall withstand the heating to which they may be subjected by an appliance or other equipment and the insulation of the conductors shall not be subjected to excessive heating.

Compliance is checked, for the combination of connector and appliance inlet, by the test of 18.2.

18.2 Heating test for connectors and appliance inlets

Rewirable connectors are fitted with an appropriate cord, having the minimum allowed cross-sectional area. Non-rewirable connectors and appliance inlets are tested with the cord as delivered.

The connector is inserted into the appliance inlet and the combined assembly is placed on a horizontal surface. The appliance inlet is secured into position with an additional weight such that the total weight including the appliance inlet is equal to the minimum appliance weight declared in 7.7e). The connector and the appliance inlet may be mounted into a suitable appliance base and body.

The combined assembly is placed in a heating cabinet for 96 h at a temperature of:

- *70 °C ± 2 °C for connectors/appliance inlets for cold conditions classified in 7.1a);*
- *120 °C ± 2 °C for connectors/appliance inlets for hot conditions classified in 7.1b);*
- *155 °C ± 2 °C for connectors/appliance inlets for very hot conditions classified in 7.1c).*

After removal from the heating cabinet, the connectors/appliance inlets are then allowed to cool down to approximately ambient air temperature and are inserted and withdrawn ten times.

The test samples shall show:

- *no damage impairing their further use;*
- *no damage affecting the protection against electric shock;*
- *no loosening of electrical or mechanical connections;*
- *no cracks, swelling, shrinkage or the like.*

19 Breaking capacity

This clause of IEC 60320-1 is replaced as follows:

Weight-engaged appliance couplers shall have adequate breaking capacity.

This test is not carried out on weight-engaged couplers specifically intended never to be disengaged while the current is flowing.

Some lateral movement is allowed to simulate intended use.

Compliance is checked, for couplers having a current rating in excess of 0,2 A, by the following test.

The connector shall be mounted in a suitable apparatus.

The appliance inlet shall be positioned so that the plane through the direction of engagement is vertical.

The two live contacts of the appliance inlet are connected internally to one another and an external electrical load is connected in series with the supply. The external load is of such a value that the current is 1,25 times the rated current ± 2,5 % at a test voltage of 275 V ± 1,5 % , the power factor being $0,95^{+0,05}_0$ for weight-engaged connectors with a rated current of 10 A or greater, and $0,6 \pm 0,05$ for other weight-engaged connectors. The external load is positioned so as not to affect the ambient temperature of the test enclosure. An example of a suitable circuit is shown in IEC 60320-1:2015, Figure 5.

NOTE The manufacturer can declare a power factor of 0,95 for resistive load appliances for connectors below 10 A.

The weight-engaged connector and the appliance inlet are connected and disconnected 50 times (100 strokes), at a rate between 15 strokes per minute and 20 strokes per minute.

The length of stroke shall be sufficient to ensure separation of the connector and inlet mating faces by at least 30 mm.

No current is passed through the earthing circuit, if any.

If an air core inductor is used, a resistor taking approximately 1 % of the current through the inductor is connected in parallel with it. Iron-core inductors may be used provided the current is of substantially sine-wave form.

During the test, there shall be no flashover between live parts of different polarity or such parts and parts of the earthing circuit, if any; neither shall there be any sustained arcing.

After the test, the specimen shall show no damage impairing its further use and the entry areas for the appliance inlet contacts shall not show any serious damage. In case of doubt the test is repeated with a new appliance inlet fitted to the test apparatus. If the specimen passes this second test without further significant deterioration, the coupler is considered to comply with the requirement.

NOTE 1 A stroke is a connection or a disconnection of the connector.

NOTE 2 This test is carried out at ambient temperature.

20 Normal operation

This clause of IEC 60320-1 is replaced as follows:

Weight-engaged appliance couplers shall withstand, without excessive wear or other harmful effects, the mechanical, electrical and thermal stresses occurring in normal use.

Compliance is checked by the following test:

The two live pins of the appliance coupler are connected together and an external load is connected in series with the supply. The external load is such that the current is 1,1 times rated current with the load as specified in 7.7h).

The appliance inlet is mated with its corresponding connector and withdrawn 10 000 times at a rate of approximately 10 times per minute. The test is continued for a further 10 000 times without current flowing.

NOTE 1 The number of cycles can be higher if declared by the manufacturer or required by the end-product standard.

After the test, the appliance inlet and connector shall be suitable for further use and compliance with Clause 10, 15.3, 25.101 (if applicable) and Clause 26 shall not be impaired.

The test is carried out without current flowing if the connection contacts cannot make or break on load during normal operation.

The conditions for the test are given in Table 102.

The voltage regulator required for this test shall be rated at a minimum of seven times the rated current.

NOTE 2 The humidity treatment is not repeated before the electric strength test of Clause 20.

Some lateral movement of the mating connector to the appliance inlet under test is allowed to simulate intended use.

Table 102 – Ratings for the tests of Clause 20

Rated current [A]	Test voltage [V]	Test current [A]	Power factor (cos Φ)	Number of strokes
0,2	–	no current	–	As declared in 7.6
> 0,2 < 10	250	I_n	0,6 ^a	Half the number declared in 7.6
	–	no current	–	The remainder of the number declared in 7.6
≥ 10	250	I_n	0,95	Half the number declared in 7.6
	–	no current	–	The remainder of the number declared in 7.6
Weight-engaged connectors and appliance inlets specifically intended never to be disengaged with current flowing	–	no current	–	As declared in 7.6 ^b

I_n = Rated current

NOTE 1 30 strokes per minute with a continuous movement.

NOTE 2 Current flow period $1,5^{+0,5}_0$ s.

NOTE 3 A stroke is an engagement or a disengagement of the sample under test into the counterpart.

NOTE 4 The value of the test voltage is measured within ± 1,5 % and test current is measured within ± 2,5 %.

^a A power factor of 0,95 can be used if the load in the end equipment is resistive only.

^b For weight-engaged couplers specifically intended never to be disengaged with current flowing, the test current shall be applied only during this engaged rotation for half the number of test cycles declared by the manufacturer.

21 Temperature rise

This clause of IEC 60320-1 is replaced as follows:

Contacts and other current-carrying parts shall be so designed as to prevent excessive temperature rise due to the passage of current.

Compliance is checked, for connectors having a current rating in excess of 0,2 A, by the following test.

Connectors shall be fitted with the cord specified by the manufacturer.

The connector shall be fitted to a corresponding appliance inlet ensuring correct engagement as specified by the manufacturer.

Alternatively, heating test requirements from the appropriate appliance standard can be used instead of the test at 1,25 times rated current ± 2,5 % for 1 h ± 1 min.

For connectors with earthing contact, the current shall then be passed through one current-carrying contact and the earthing contact for 1 h ± 1 min. For couplers with auxiliary contacts,

the auxiliary contacts are loaded at 1,25 times the rated current $\pm 2,5$ % of the auxiliary contacts whilst the current is flowing through the main live and neutral contacts.

The temperature shall be determined by means of melting particles, colour changing indicators or thermocouples, which shall be so chosen and positioned that they have negligible effect on the temperature being determined.

The temperature rise of terminals or terminations and contacts shall not exceed the value declared by the manufacturer, taking into account the construction and materials of the connector and appliance inlet, and of the specified cord, and the requirements of the relevant appliance standard.

After this test, the test samples shall withstand the test of Clause 16.

NOTE 1 During the test, the connector is not exposed to an external source of heat.

NOTE 2 For connectors with an earthing contact, 25.101 is applicable.

22 Cords and their connection

This clause of IEC 60320-1 applies amended as follows:

22.1 Replace paragraph 2 with:

For non-rewirable weight-engaged connectors having a current rating other than those specified in Table 9 the cord shall have a cross-sectional area not less than that specified for the next higher current rating. The type of the cord shall be appropriate to the appliance specified in 25.7 of IEC 60335-1:2010, IEC 60335-1:2010/AMD1:2013 and IEC 60335-1:2010/AMD2:2016.

After paragraph 2, insert:

Alternatively, any cord which is acceptable in the end equipment standard may be used if declared in 7.7i). In this case the suitability of the cord shall be considered to the relevant requirements of the final application including cross-sectional area, temperature rating and type.

NOTE The cross-sectional area requirements of 25.8 of IEC 60335-1:2010, IEC 60335-1:2010/AMD1:2013 and IEC 60335-1:2010/AMD2:2016 do not apply.

22.2 Replacement:

Weight-engaged connectors in which the cord anchorage and strain relief are provided wholly by the power base of the appliance or equipment into which they are intended to be integrated or incorporated are not tested to 22.2. Other weight-engaged connectors which provide either partial or complete cord anchorage shall be tested, when installed according to the manufacturer's instructions, according to the requirements of the appropriate IEC standard of the appliance or equipment into which they are intended to be incorporated or integrated.

22.3 This subclause of IEC 60320-1 does not apply.

23 Mechanical strength

This clause of IEC 60320-1 applies amended as follows:

23.1 Replacement:

Weight-engaged appliance couplers shall have adequate mechanical strength.

Compliance is checked on weight-engaged couplers, installed as specified by the manufacturer, by the test of 23.4.

23.2 This subclause of IEC 60320-1 does not apply.

23.3 This subclause of IEC 60320-1 does not apply.

23.4 This subclause of IEC 60320-1 applies amended as follows:

Replace the first paragraph as follows:

Weight-engaged appliance inlets and weight-engaged connectors which have exposed surfaces when integrated or incorporated into an appliance in accordance with the manufacturer's instructions shall have such exposed surfaces tested by means of the spring-operated impact-hammer according to IEC 60068-2-75.

23.5 This subclause of IEC 60320-1 does not apply.

23.6 This subclause of IEC 60320-1 does not apply.

24 Resistance to heat and ageing

This clause of IEC 60320-1 applies amended as follows:

24.1 Replacement:

Parts of insulating material of weight-engaged appliance inlets and of weight-engaged connectors shall be sufficiently resistant to heat if their deterioration could cause the appliance inlet or connector to fail to comply with this document.

This requirement does not apply to parts of the cord anchorage, the cord guard, parts of connectors moulded together with the cord and parts of ceramic.

Compliance is checked by subjecting the relevant part to the ball pressure test of IEC 60695-10-2.

The test is carried out at a temperature of $(40 \pm 2) ^\circ\text{C}$ in excess of the highest temperature measured in Clause 21 or $(125 \pm 2) ^\circ\text{C}$ if this is greater.

25 Screws, current-carrying parts and connections

This clause of IEC 60320-1 applies amended as follows:

25.3 Replacement:

Electrical connections shall be so designed that contact pressure is not transmitted through insulating material other than ceramic, or other material with characteristics at least equivalent.

This requirement does not apply to weight-engaged connectors and appliance inlets, if there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage of the insulating material.

NOTE 1 The suitability of the material is considered with regard to the stability of the dimensions.

Compliance is checked by inspection.

NOTE 2 This requirement does not preclude electrical connections with flat tinsel cord for applications up to 0,2 A where the contact pressure is obtained by insulating material having such properties as to ensure reliable and permanent contact under all conditions of normal use, especially with respect to shrinking, yielding, ageing, and cold flow of the insulating part.

Additional subclause (following 25.4):

25.101 Earthing contacts

For couplers with earthing contacts, the connection between the earthing terminal or termination and earthed metal parts shall have low resistance.

If the clearances of basic insulation in a protective extra-low voltage circuit are based on the rated voltage of the appliance, this requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit.

Compliance is checked by the following test performed in a representative appliance in which the coupler is intended to be used.

A current derived from a source having a no-load voltage not exceeding 12 V (AC or DC) and equal to 1,5 times the rated current of the appliance or 25 A, whichever is higher, is passed between the earthing terminal or earthing contact of the connector and each of the accessible metal parts of the representative appliance in turn.

The voltage drop between the earthing terminal or termination of the appliance connector and the accessible metal part of the representative appliance is measured. The resistance calculated from the current and this voltage drop shall not exceed 0,1 Ω .

Care is to be taken to ensure that the contact resistance between the tip of the measuring probe and the metal part under test does not influence the test results.

NOTE 1 In case of doubt, the test is carried out until steady conditions have been established.

NOTE 2 The resistance of the supply cord is not included in the measurement.

26 Clearances, creepage distances and solid insulation

This clause of IEC 60320-1 is replaced as follows:

26.1 General

Appliance inlets and connectors shall be constructed so that the clearances, creepage distances and solid insulation are adequate to withstand the electrical stresses to which they are liable to be subjected.

Weight-engaged connectors are tested when in engagement with a weight-engaged appliance inlet and also when not in engagement.

Compliance is checked by the requirements and tests of 26.2 to 26.4.

NOTE 1 The requirements and tests are based on IEC 60664-1, from which further information can be obtained.

NOTE 2 The assessment of clearances, creepage distances and solid insulation are carried out separately.

NOTE 3 For couplers with auxiliary contacts, the rated voltage for creepage and clearance assessment of those contacts is based on the rated voltage of the auxiliary contacts.

26.2 Clearances

26.2.1 Clearances shall not be less than the values specified in Table 103, taking into account the rated impulse voltage for the overvoltage categories of Table 103.

Appliance inlets and connectors are in overvoltage category II.

NOTE 1 IEC 60664-1 gives information regarding overvoltage categories.

Table 103 – Rated impulse voltage

Rated voltage V	Rated impulse voltage V Overvoltage category		
	I	II	III
≤ 50	330	500	800
> 50 and ≤ 100	500	800	1500
> 100 and ≤ 150	800	1 500	2 500
> 150 and ≤ 300	1 500	2 500	4 000

Clearances less than those specified in Table 104 are not allowed for basic insulation.

Table 104 – Minimum clearances

Rated impulse voltage V	Minimum clearance ^a mm
330	0,5 ^b
500	0,5 ^b
800	0,5 ^b
1 500	0,5
2 500	1,5
4 000	3,0
^a The distances specified apply only to clearances in air. ^b The smaller clearances specified in IEC 60664-1 have not been adopted for practical reasons, such as mass-production tolerances.	

Compliance is checked by inspection and by measurement.

Parts such as hexagonal nuts that can be tightened to different positions during assembly, and movable parts, are placed in the most unfavourable position.

A force is applied to bare conductors and accessible surfaces to try to reduce clearances when making the measurement. The force is

- $2\text{ N} \pm 0,1\text{ N}$, for bare conductors,
- $30\text{ N} \pm 1,5\text{ N}$, for accessible surfaces.

The force is applied by means of test probe B of IEC 61032. Apertures are assumed to be covered by a piece of flat metal.

NOTE 2 The way in which clearances are measured is specified in IEC 60664-1 and Figure 101.

26.2.2 The clearances of basic insulation shall be sufficient to withstand the overvoltages likely to occur during use, taking into account the rated impulse voltage. The values of Table 104 are applicable.

NOTE The overvoltages can be derived from external sources or due to switching.

Compliance is checked by measurement.

26.2.3 Clearances of supplementary insulation shall be not less than those specified for basic insulation in Table 104.

Compliance is checked by measurement.

26.2.4 Clearances of reinforced insulation shall be not less than those specified for basic insulation in Table 104 but using the next higher step for rated impulse voltage as a reference.

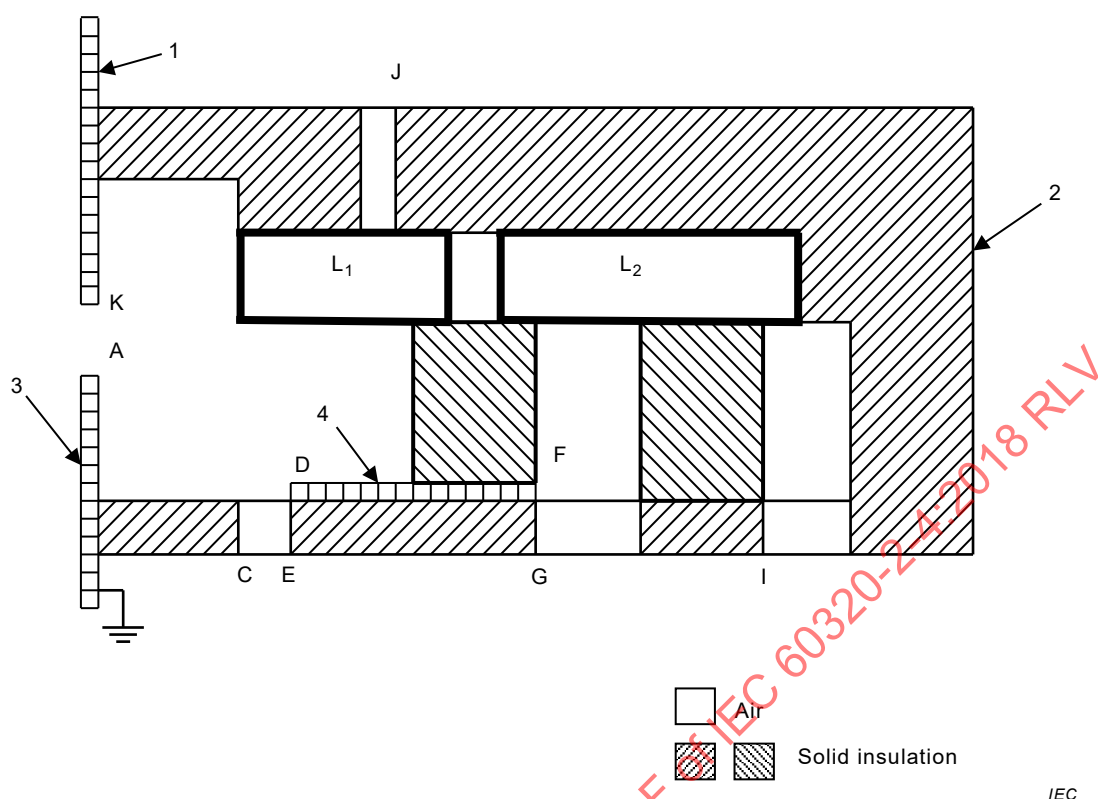
NOTE For double insulation, when there is no intermediate conductive part between the basic insulation and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation as shown in Figure 101.

Compliance is checked by measurement.

26.2.5 For functional insulation the values of Table 104 are applicable.

Compliance is checked by measurement.

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Key

- 1 accessible unearthed metal part
- 2 enclosure
- 3 accessible earthed metal part
- 4 inaccessible unearthed metal part

The live parts L_1 and L_2 are separated from each other and partially surrounded by a plastic enclosure containing apertures, partially by air, and are in contact with solid insulation. A piece of inaccessible metal is incorporated inside the construction. There are two metal covers, one of which is earthed.

Type of insulation	Clearance
Basic insulation	L_1A
	L_1D
	L_2F
Functional insulation	L_1L_2
Supplementary insulation	DE
	FG
Reinforced insulation	L_1K
	L_1J
	L_2I
	L_1C

NOTE If the clearances L_1D or L_2F meet the clearance requirements for reinforced insulation, the clearances DE or FG of supplementary insulation are not measured.

Figure 101 – Examples of clearances

26.3 Creepage distances

26.3.1 Appliance inlets and connectors shall be constructed so that creepage distances are not less than those appropriate for the working voltage, taking into account the material group and the pollution degree.

NOTE 1 The working voltage for parts connected to the neutral is the same as for parts connected to the phase.

Pollution degree 2 applies unless

- precautions have been taken to protect the insulation, in which case pollution degree 1 applies,
- the insulation is subjected to conductive pollution, in which case pollution degree 3 applies.

NOTE 2 An explanation of pollution degree is given in IEC 60664-1.

NOTE 3 Pollution degree 4 is not applicable to appliance couplers.

Compliance is checked by measurement.

NOTE 4 The way in which creepage distances are measured is specified in IEC 60664-1.

Parts such as hexagonal nuts that can be tightened to different positions during assembly, and movable parts, are placed in the most unfavourable position.

A force is applied to bare conductors and accessible surfaces to try to reduce creepage distances when making the measurement. The force is

- 2 N, for bare conductors,
- 30 N, for accessible surfaces.

The force is applied by means of test probe B of IEC 61032.

The relationship between the material group and the comparative tracking index (CTI) values, as given in 4.8.1.3 of IEC 60664-1:2007, is

- material group I: $600 \leq CTI$,
- material group II: $400 \leq CTI < 600$,
- material group IIIa: $175 \leq CTI < 400$,
- material group IIIb: $100 \leq CTI < 175$.

These CTI values are obtained in accordance with IEC 60112 using solution A. If the CTI value of the material is unknown, a proof tracking index (PTI) test in accordance with Annex A of IEC 60320-1:2015 is carried out at the CTI values specified, in order to establish the material group.

NOTE 5 The test for comparative tracking index (CTI) in accordance with IEC 60112 is designed to compare the performance of various insulating materials under test conditions, namely drops of an aqueous contaminant falling on a horizontal surface leading to electrolytic conduction. It gives a qualitative comparison but in the case of insulating materials having a tendency to form tracks it can also give a quantitative comparison, namely the comparative tracking index.

NOTE 6 The procedure for assessing creepage distances is given in IEC 60664-1.

26.3.2 Creepage distances of basic insulation shall not be less than those specified in Table 105.

Table 105 – Minimum creepage distances for basic insulation

Working voltage V	Creepage distance mm Pollution degree						
	1	2			3		
		Material group			Material group		
		I	II	IIIa/IIIb	I	II	IIIa/IIIb
≤ 50	0,2	0,6	0,9	1,2	1,5	1,7	1,9 ^a
> 50 and ≤ 125	0,3	0,8	1,1	1,5	1,9	2,1	2,4
> 125 and ≤ 250	0,6	1,3	1,8	2,5	3,2	3,6	4,0
NOTE For glass, ceramics and other inorganic insulating materials that do not track, creepage distances need not be greater than the associated clearance.							
^a Material group IIIb is allowed if the working voltage does not exceed 50 V.							

Compliance is checked by measurement.

26.3.3 Creepage distances of supplementary insulation shall be at least those specified for basic insulation in Table 105.

NOTE In the case of supplementary insulation, the note of Table 105 does not apply.

Compliance is checked by measurement.

26.3.4 Creepage distances of reinforced insulation shall be at least double those specified for basic insulation in Table 105.

NOTE In the case of reinforced insulation the Note of Table 105 does not apply.

Compliance is checked by measurement.

26.3.5 Creepage distances of functional Insulation shall be not less than those specified in Table 105.

26.4 Solid insulation

Solid insulation shall have a minimum thickness of 1 mm for supplementary insulation and 2 mm for reinforced insulation.

NOTE 1 This does not imply that the thickness has to be through solid insulation only. The insulation can consist of solid material plus one or more air layers.

This requirement does not apply

- for supplementary insulation, if the insulation consists of at least two layers, provided that each of the layers withstands the electric strength test of 15.3,
- for reinforced insulation, if the insulation consists of at least three layers, provided that any two layers together withstand the electric strength test of 15.3.

In this case, the layers shall not consist of mica or similar scaly material.

NOTE 2 The layers can be bonded together as long as it is possible to test them separately before bonding.

Compliance is checked by inspection and by tests.

Solid insulation may have a lower minimum thickness providing accessible parts of solid insulation have sufficient strength to prevent penetration by sharp implements.

Compliance is checked by subjecting the insulation to the following test, unless the thickness of supplementary insulation is at least 1 mm and that of reinforced insulation is at least 2 mm.

The insulation is raised to the temperature measured during the test of Clause 21. The surface of the insulation is then scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°. Its tip is rounded with a radius of 0,25 mm ± 0,02 mm. The pin is held at an angle of 80° to 85° to the horizontal and loaded so that the force exerted along its axis is 10 N ± 0,5 N. The scratches are made by drawing the pin along the surface of the insulation at a speed of approximately 20 mm/s. Two parallel scratches are made. They are spaced sufficiently apart so that they are not affected by each other, their length covering approximately 25 % of the length of the insulation. Two similar scratches are made at 90° to the first pair without crossing them. The test fingernail of Figure 7 of IEC 60335-1:2010, IEC 60335-1:2010/AMD1:2013 and IEC 60335-1:2010/AMD2:2016 is then applied to the scratched surface with a force of approximately 10 N. No further damage, such as separation of the material, shall occur. The insulation shall then withstand the electric strength test of 15.3. The hardened steel pin is then applied perpendicularly with a force of 30 N ± 0,5 N to an unscratched part of the surface. The insulation shall then withstand the electric strength test of 15.3 with the pin still applied and used as one of the electrodes.

27 Resistance of insulating material to heat, fire and tracking

This clause of IEC 60320-1 applies amended as follows:

Replacement:

27.1 Resistance to heat, fire and tracking

27.1.1 General

Parts of non-metallic material shall be resistant to ignition and spread of fire.

This requirement does not apply to decorative trims, and other parts unlikely to be ignited or to propagate flames that originate inside an appliance in which the connector or appliance inlet is incorporated or integrated.

Compliance is checked by the tests of 27.1.2 and 27.1.3.

The tests are carried out on parts of non-metallic material that have been removed from the connector or appliance inlet. When the glow-wire test is carried out, they are placed in the same orientation as they would be in normal use.

These tests are not carried out on the insulation of wires.

27.1.2 Glow wire requirements for all non-metallic materials

Parts of non-metallic material are subjected to the glow-wire test of IEC 60695-2-11, which is carried out at 550 °C.

The glow-wire test is not carried out on parts of material classified at least HB40 according to IEC 60695-11-10, provided that the test sample is no thicker than the relevant part.

Parts for which the glow-wire test cannot be carried out, such as those made of soft or foamy material, shall meet the requirements specified in ISO 9772 for category FH3 material, the test sample being no thicker than the relevant part.

27.1.3 Additional glow wire requirements for non-metallic materials

27.1.3.1 Connectors and appliance inlets are tested as specified in 27.1.3.2 and 27.1.3.3. However, the tests are not applicable to

- parts supporting welded connections,
- soldered connections on printed circuit boards,
- connections on small components that are mounted on printed circuit boards,
- parts within 3 mm of any of these connections.

NOTE Examples of small components are diodes, transistors, resistors, inductors, integrated circuits and capacitors not directly connected to the supply mains.

27.1.3.2 Parts of insulating material supporting connections that carry a current exceeding 0,2 A during normal operation, and parts of insulating material within a distance of 3 mm of such connections, shall have a glow-wire flammability index of at least 850 °C according to IEC 60695-2-12, the test sample being no thicker than the relevant part.

27.1.3.3 Parts of insulating material supporting current-carrying connections, and parts of insulating material within a distance of 3 mm of such connections, are subjected to the glow-wire test of IEC 60695-2-11. However, the glow-wire test is not carried out on parts of material classified as having a glow-wire ignition temperature according to IEC 60695-2-13 of at least

- 775 °C, for connections which carry a current exceeding 0,2 A during normal operation,
- 675 °C, for other connections,

provided that the test sample was no thicker than the relevant part.

When the glow-wire test of IEC 60695-2-11 is carried out, the temperatures are

- 750 °C, for connections which carry a current exceeding 0,2 A during normal operation,
- 650 °C, for other connections.

NOTE 1 Contacts in components such as switch contacts are considered to be connections.

NOTE 2 The tip of the glow-wire is applied to the part in the vicinity of the connection.

Parts that withstand the glow-wire test of IEC 60695-2-11, but which, during the test, produce a flame that persists for longer than 2 s, are further tested as follows. Parts above the connection within the envelope of a vertical cylinder having a diameter of 20 mm and a height of 50 mm are subjected to the needle-flame test of Annex AA. However, parts shielded by a barrier that meets the needle-flame test of Annex AA are not tested.

The needle-flame test is not carried out on parts of material classified as V-0 or V-1 according to IEC 60695-11-10, provided that the test sample was no thicker than the relevant part.

28 Resistance to rusting

This clause of IEC 60320-1 applies.

29 Electromagnetic compatibility (EMC) requirements

This clause of IEC 60320-1 applies.

Annex AA (normative)

Needle-flame test

The needle-flame test is carried out in accordance with IEC 60695-11-5:2016 with the following modifications.

7 Flame application times

This clause of IEC 60695-11-5 applies amended as follows:

Replacement:

The duration of application of the test flame is $30 \text{ s} \pm 1 \text{ s}$.

9 Test procedure

9.2 Position of test specimen

This subclause of IEC 60695-11-5 applies amended as follows:

Replace the first paragraph with the following:

The specimen is arranged so that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1.

If possible, the flame is applied at least 10 mm from a corner.

9.4 Number of test specimens

This subclause of IEC 60695-11-5 applies amended as follows:

Replace the first paragraph with the following:

The test is made on one specimen. If the specimen does not withstand the test, the test may be repeated on two further specimens, both of which shall then withstand the test.

11 Evaluation of test results

This clause of IEC 60695-11-5 applies amended as follows:

Replace item b) with the following:

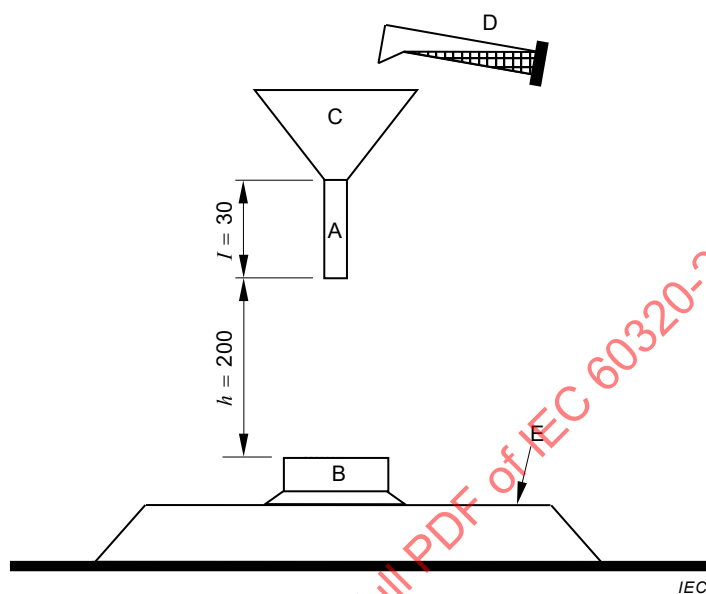
The duration of burning (t_b) shall not exceed 30 s. However, for printed circuit boards, it shall not exceed 15 s.

Annex BB (normative)

Apparatus for the test of 14.102

See Figure BB.1.

Dimensions in millimetres



Key

- A Funnel tube with inner diameter of 8 mm
- B Item under test
- C Funnel
- D Container with 30 ml of saline solution
- E Horizontal surface

NOTE The water from the container D is intended to be poured onto the side of the funnel C to ensure correct dispersion of the outlet flow.

Figure BB.1 – Apparatus for the test of Subclause 14.102

Replace Annex C with:

Annex C (normative)

Test schedule

Table C.1

Table C.1 is replaced as follows:

Set	Clause/ subclause	Description of the tests	Weight-enganged appliance inlet	Weight-enganged connector	Weight-enganged appliance inlet with auxillary contacts	Weight-enganged connector with auxillary contacts
1 3 samples	8	Marking	x	x	x	x
	9	Dimensions and compatibility	x	x	x	x
	10	Protection against electrical shock	x	x	x	x
	11	Provision for earthing	x	x	x	x
	12	Terminals and terminations	x	x	x	x
	13	Construction	x	x	x	x
	16	Forces necessary to insert and to withdraw the connector/appliance outlet		x	x	
	17	Operation of contacts	x	x	x	x
	18	Resistance to heating of appliance couplers for hot conditions or very hot conditions	x	x		
	23	Mechanical strength	x	x	x	x
	23.2	Free fall test		x		x
	23.3	Lateral pull test		x	x	
	25	Screws, current-carrying parts and connections	x	x	x	x
	26	Clearances, creepage distances and solid insulation	x	x	x	x
	28	Resistance to rusting	x	x	x	x
	29	Electromagnetic compatibility (EMC) requirements	x	x	x	x

Set	Clause/ subclause	Description of the tests	Weight-enganged appliance inlet	Weight-enganged connector	Weight-enganged appliance inlet with auxiliary contacts	Weight-enganged connector with auxiliary contacts
2 3 samples^a	14	Moisture resistance	x	x	x	x
	15	Insulation resistance and electric strength	x	x	x	x
	16	Forces necessary to insert and to withdraw the connector/appliance outlet		x	x	
	19	Breaking capacity		x	x	
	20	Normal operation		x	x	
	21	Temperature rise		x	x	
3 3 samples^b	22	Cords and their connection		x		x
4 3 samples^b	22.3	Flexing test		x		x
5 2 samples^a	24	Resistance to heat and ageing	x	x	x	x
6 2 samples^a	24.2	Ageing test for appliance couplers made of rubber or thermoplastic material	x	x	x	x
7 2 samples^a	27	Resistance of insulating material to heat, fire and tracking				
	27.1.5	Glow wire test 750 °C (sample 1)	x	x	x	x
	27.1.5	Glow wire test 650 °C (sample 2)	x	x	x	x
8 3 samples^a	27	Resistance of insulating material to heat, fire and tracking				
	27.2	Resistance to tracking	x	x	x	x

Set	Clause/ subclause	Description of the tests	Weight-enganged appliance inlet	Weight-enganged connector	Weight-enganged appliance inlet with auxiliary contacts	Weight-enganged connector with auxiliary contacts
9 3 samples^a	14.102	Protection against liquid spillage		x		
10 2 samples^a	24.2	Weight-enganged connectors of elastomeric or thermoplastic material				
	24.2.1	Weight-enganged connectors of elastomeric material	x	x		
	24.2.2	Weight-enganged connectors of thermoplastic material	x	x		
11 3 samples^a	15	Non-rewirable weight-enganged connectors with indicators	x	x		
12 3 samples^a						
	14	Moisture resistance	x	x		
	15	Insulation resistance and electric strength	x	x		
	16	Forces necessary to insert and to withdraw the connector/appliance outlet		x		
	19	Breaking capacity		x		
	20	Normal operation		x		
	21	Temperature rise		x		
^a The number of samples specified is for each different material						
^b The number of samples specified is for each type of cable, cross-sectional area and manufacturer of the cable.						

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

CONNECTEURS POUR USAGES DOMESTIQUES ET USAGES GÉNÉRAUX ANALOGUES –

Partie 2-4: Connecteurs à connexion par gravité

AVANT-PROPOS

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- 9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 60320-2-4 a été établie par le sous-comité 23G: Connecteurs, du comité d'études 23 de l'IEC: Petit appareillage.

Cette deuxième édition annule et remplace la première édition parue en 2005 et l'Amendement 1:2009. Cette édition constitue une révision technique.

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

- a) L'IEC 60320-2-4 s'aligne sur l'IEC 60320-1:2015.
- b) L'IEC 60320-2-4 s'aligne sur l'IEC 60335-1 et avec l'IEC 60335-2-15. Les connecteurs de l'IEC 60320-2-4 sont incorporés dans les appareils d'utilisation conçus et fabriqués pour ces normes. À cet effet, une attention particulière est apportée au 14.2 et à l'Article 20.

- c) Il est également désormais proposé que les connecteurs avec contacts auxiliaires soient pris en considération.

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

FDIS	Rapport de vote
23G/402/FDIS	23G/404/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

La présente partie 2-4 doit être utilisée conjointement avec l'IEC 60320-1: *Connecteurs pour usages domestiques et usages généraux analogues – Partie 1: Exigences générales*. Elle a été établie sur la base de la troisième édition de cette norme (2015).

Les articles de la présente norme complètent ou modifient les articles correspondants de l'IEC 60320-1. Lorsqu'un paragraphe particulier ou une annexe particulière de la Partie 1 n'est pas mentionné(e) dans la présente Partie 2-4, le paragraphe ou l'annexe de l'IEC 60320-1 s'applique sans modification dans la mesure du raisonnable. Lorsque la présente norme spécifie «addition», «modification» ou «remplacement», il convient d'adapter en conséquence l'exigence, la modalité d'essai ou le commentaire correspondant(e) de l'IEC 60320-1.

Les paragraphes, figures ou tableaux complémentaires à ceux de la Partie 1 sont numérotés à partir de 101. Les annexes complémentaires sont dénommées AA, BB, etc.

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

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

Une liste de toutes les parties de la série IEC 60320, publiées sous le titre général *Connecteurs pour usages domestiques et usages généraux analogues*, peut être consultée sur le site web de l'IEC.

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 "<http://webstore.iec.ch>" dans les données relatives au document recherché. A cette date, le document sera

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- amendé.

CONNECTEURS POUR USAGES DOMESTIQUES ET USAGES GÉNÉRAUX ANALOGUES –

Partie 2-4: Connecteurs à connexion par gravité

1 Domaine d'application

L'article correspondant de l'IEC 60320-1 est remplacé comme suit:

La présente partie de l'IEC 60320 est applicable aux connecteurs bipolaires pour courant alternatif seulement, avec ou sans contact de mise à la terre, de tension assignée ne dépassant pas 250 V et de courant assigné ne dépassant pas 16 A, pour usages domestiques et généraux analogues, destinés à l'incorporation ou à l'intégration dans des appareils électriques d'utilisation ou dans d'autres matériels électriques réalisés par assemblage et alimentés à 50 Hz ou 60 Hz et qui dépendent du poids de l'appareil d'utilisation pour assurer un engagement correct.

Le présent document s'applique également aux connecteurs avec contacts auxiliaires assignés en courant alternatif, en courant continu ou les deux, avec un courant assigné total ne dépassant pas 16 A.

Le présent document est également valable pour les socles de connecteurs d'appareils et prises de connecteurs intégrés ou incorporés dans des appareils d'utilisation.

NOTE 1 Les connecteurs conformes au présent document sont adaptés à une utilisation dans des appareils d'utilisation utilisés sous une température ambiante ne dépassant généralement pas 25 °C mais pouvant occasionnellement atteindre 35 °C. Toutefois, la température ambiante autour du connecteur peut dépasser ces valeurs et peut être déclarée par le fabricant. Il est possible que les températures ambiantes de service maximales pour le socle de connecteur d'appareil et pour la prise mobile soient différentes.

NOTE 2 Les connecteurs à connexion par gravité peuvent être soumis à des débordements de liquide en utilisation normale. Ils sont classés en fonction de l'existence ou non d'une protection contre les débordements de liquide lorsqu'ils sont installés conformément aux instructions d'installation du fabricant.

NOTE 3 Si les socles de connecteurs conformes au présent document sont utilisés dans des appareils d'utilisation ou dans d'autres matériels pouvant être soumis à des débordements de liquide affectant le socle de connecteur d'appareil lorsque la partie en fonction de l'appareil d'utilisation ou du matériel est en place sur son socle alimenté, alors une protection contre l'humidité est fournie par le matériel.

NOTE 4 Les références aux feuilles de norme de l'IEC 60320-1 ne s'appliquent pas aux connecteurs à connexion par gravité.

NOTE 5 Des constructions spéciales peuvent être exigées pour:

- des emplacements pouvant présenter des conditions particulières, par exemple à bord des navires, dans des véhicules, etc.;
- des emplacements à atmosphère dangereuse, présentant par exemple des dangers d'explosion.

NOTE 6 Des contacts auxiliaires supplémentaires peuvent être utilisés comme faisant partie du connecteur. Un contact utilisé pour alimenter un dispositif de faible puissance ou pour transmettre des signaux de capteurs et vers/depuis un microprocesseur est un exemple de contact auxiliaire.

2 Références normatives

Les documents suivants cités dans le texte constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

L'article correspondant de l'IEC 60320-1 s'applique avec les ajouts suivants:

IEC TR 60083, *Prises de courant pour usages domestiques et analogues normalisées par les pays membres de l'IEC*

IEC 60320-1:2015, *Connecteurs pour usages domestiques et usages généraux analogues – Partie 1: Exigences générales*

IEC 60335-1:2010, *Appareils électrodomestiques et analogues – Sécurité – Partie 1: Exigences générales*

IEC 60335-1:2010/AMD1:2013

IEC 60335-1:2010/AMD2:2016

IEC 60529, *Degrés de protection procurés par les enveloppes (Code IP)*

IEC 60664-1:2007, *Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse tension – Partie 1: Principes, exigences et essais*

IEC 60695-11-5:2016, *Essais relatifs aux risques du feu – Partie 11-5: Flammes d'essai – Méthode d'essai au brûleur-aiguille – Appareillage, dispositif d'essai de vérification et lignes directrices*

IEC 60695-11-10, *Essais relatifs aux risques du feu – Partie 11-10: Flammes d'essai – Méthodes d'essai horizontal et vertical à la flamme de 50 W*

IEC 60730-(toutes les parties), *Dispositifs de commande électrique automatiques*

ISO 9772, *Plastiques alvéolaires – Détermination des caractéristiques de combustion de petites éprouvettes en position horizontale, soumises à une petite flamme*

3 Termes et définitions

L'article correspondant de l'IEC 60320-1 s'applique avec les ajouts suivants:

3.101

connecteur connecté par gravité

coupleur dépendant du poids de la partie en fonctionnement de l'appareil d'utilisation dans lequel il est incorporé ou intégré afin d'assurer un engagement correct

Note 1 à l'article – Le connecteur connecté par gravité est utilisé dans un appareil d'utilisation constitué de deux parties, afin d'alimenter la partie qui réalise la fonction de l'appareil d'utilisation (la partie en fonctionnement) à partir du socle d'alimentation qui est raccordé à l'alimentation.

3.102

prise mobile connectée par gravité

partie constituante d'un coupleur connecté par gravité qui porte les liaisons d'alimentation, et s'engage dans le socle de connecteur d'appareil correspondant

3.103

socle de connecteur d'appareil connecté par gravité

partie constituante d'un coupleur connecté par gravité destiné à être intégré ou incorporé dans la partie en fonctionnement de l'appareil d'utilisation

3.104

prise mobile démontable connectée par gravité

prise mobile connectée par gravité construite de façon telle que le câble d'alimentation puisse être remplacé

Note 1 à l'article: La méthode de fixation du câble d'alimentation, lorsqu'il est installé conformément aux instructions d'installation du fabricant, est classée selon les exigences de fixation du type X ou du type Y des normes d'appareils d'utilisation.

Note 2 à l'article: Les exigences concernant les méthodes de fixation du type X ou du type Y sont données dans l'IEC 60335-1.

3.105

fixation du type X

méthode de fixation du câble d'alimentation telle qu'il puisse être facilement remplacé

Note 1 à l'article: Le câble d'alimentation peut être spécialement préparé, et disponible seulement auprès du fabricant ou de son service après-vente. Un câble spécialement préparé peut comporter une partie de l'appareil d'utilisation.

3.106

fixation du type Y

méthode de fixation du câble d'alimentation telle que le remplacement de celui-ci est destiné à être réalisé par le fabricant, son service après-vente ou une personne de qualification similaire

3.107

fixation du type Z

méthode de fixation du câble d'alimentation telle qu'il ne puisse être remplacé sans casser ou détruire l'appareil d'utilisation

3.108

contact auxiliaire

contact inclus dans le connecteur afin de faire fonctionner un circuit auxiliaire dans le cadre du fonctionnement normal de l'appareil d'utilisation, avec un courant assigné maximal admissible de 2 A

Note 1 à l'article: Un contact utilisé pour alimenter un dispositif de faible puissance ou pour transmettre des signaux de capteurs et vers/depuis un microprocesseur est un exemple de contact auxiliaire.

3.109

non polarisé

conçu de sorte que le socle et le contact auxiliaire de la prise mobile soient interchangeables

4 Exigences générales

L'article correspondant de l'IEC 60320-1 s'applique.

5 Notes générales sur les essais

L'article correspondant de l'IEC 60320-1 s'applique avec les modifications suivantes:

5.2 Remplacement:

Les échantillons sont soumis à l'essai en l'état de livraison et dans les conditions normales d'emploi, conformément aux instructions d'installation du fabricant. En courant alternatif, les essais sont exécutés à 50 Hz ou 60 Hz.

Les prises mobiles connectées par gravité non démontables doivent être présentées avec un câble souple d'au moins 1 m de longueur.

Pour les articles exigeant que les essais soient réalisés sur les prises mobiles connectées par gravité et les socles de connecteur connectés par gravité installés conformément aux

instructions du fabricant, des appareils d'utilisation représentatifs ou des parties d'appareils d'utilisation représentatives doivent être fourni(e)s.

6 Valeurs assignées normales

L'article correspondant de l'IEC 60320-1 est remplacé comme suit:

6.1 La valeur normale de la tension assignée est 250 V. D'autres tensions assignées peuvent être déclarées par le fabricant sous réserve qu'elles ne dépassent pas 250 V.

6.2 Le courant assigné doit être déclaré par le fabricant. Un connecteur peut avoir différentes valeurs assignées de courant dépendant de l'utilisation à l'intérieur d'applications particulières. Le courant assigné ne doit en aucun cas dépasser 16 A.

La conformité aux exigences de 6.1 et de 6.2 est vérifiée par examen visuel du marquage ou des instructions du fabricant pour l'installation et l'utilisation.

7 Classification des connecteurs

L'article correspondant de l'IEC 60320-1 est remplacé comme suit:

7.1 Selon la température maximale du socle de connecteur d'appareil correspondant:

- a) connecteurs pour conditions froides, température du socle de connecteur d'appareil ne dépassant pas 70 °C;
- b) connecteurs pour conditions chaudes, température du socle de connecteur d'appareil ne dépassant pas 120 °C;
- c) connecteurs pour conditions très chaudes, température du socle de connecteur d'appareil ne dépassant pas 155 °C.

NOTE Les connecteurs pour conditions chaudes peuvent également être utilisés dans des conditions froides; les connecteurs pour conditions très chaudes peuvent également être utilisés dans des conditions froides ou chaudes.

7.2 Selon le type de matériel à raccorder en:

- a) connecteurs pour matériels de la classe I;
- b) connecteurs pour matériels de la classe II.

NOTE Pour la description des classes, voir l'IEC 61140.

7.3 Selon la protection contre les débordements de liquide lorsque le connecteur est installé selon les instructions du fabricant:

- a) protégé;
- b) non protégé.

7.4 Selon le pouvoir de coupure:

- a) le connecteur est destiné à être engagé et désengagé avec le courant circulant;
- b) le connecteur est destiné à être engagé et désengagé sans que le courant ne circule;

7.5 Selon la température ambiante de service maximale du connecteur.

NOTE Les températures ambiantes de service maximales de la prise mobile et du socle de connecteur d'appareil peuvent être différentes.

7.6 Selon le nombre de cycles à réaliser au cours de l'essai de l'Article 20: Les valeurs préférentielles sont:

- 100 000
- 60 000
- 30 000
- 20 000
- 10 000
- 6 000

NOTE Des valeurs différentes de nombre de cycles d'endurance peuvent être déclarées pour les différentes valeurs assignées de courant d'un même connecteur. Un cycle correspond à deux changements de position comme défini à l'Article 19, c'est-à-dire une connexion suivie d'une déconnexion.

7.7 Les informations suivantes sont enregistrées afin de couvrir les essais exigés:

- a) La section minimale spécifiée du câble souple.
- b) L'échauffement des bornes maximal admissible.
- c) L'échauffement des terminaisons maximal admissible.
- d) L'échauffement des contacts maximal admissible.
- e) Le poids minimal de l'appareil d'utilisation exigé pour un engagement correct.
- f) Le poids minimal du socle exigé pour un désengagement correct.
- g) La norme du matériel complet.
- h) Le type de charge à raccorder:
 - charge résistive
 - charge inductive
 - charge capacitive
 - charge spécifique
 - courant continu (contacts auxiliaires)
- i) Le type de câble souple à raccorder (par exemple IEC type 52).
- j) Fonction de la prise mobile:
 - connecteurs établissant généralement la charge raccordée
 - connecteurs n'établissant généralement pas la charge raccordée
 - connecteurs interrompant généralement la charge raccordée
 - connecteurs n'interrompant généralement pas la charge raccordée

NOTE Les connecteurs transportant un courant de 200 mA ou moins sont considérées comme étant hors charge.

- k) Pour les connecteurs avec contacts auxiliaires,
 - nombre de contacts auxiliaires
 - courant assigné maximal des contacts auxiliaires
 - tension assignée maximale des contacts auxiliaires
 - spécifiés pour utilisation dans des applications en courant continu, les contacts doivent être classés comme
 - i) polarisés ou
 - ii) non polarisés
 - la classification d'isolation entre le circuit auxiliaire et le circuit primaire

NOTE Pour la TBTS et la TBTP, voir la norme de produit prévue correspondante.

8 Marquage

L'article correspondant de l'IEC 60320-1 s'applique avec les modifications suivantes:

8.2 Remplacement:

Les socles de connecteurs connectés par gravité doivent porter les indications du nom, de la marque de fabrique ou de la marque d'identification du fabricant ou du fournisseur responsable ainsi que de la référence du type.

8.5 Le paragraphe correspondant de l'IEC 60320-1 ne s'applique pas.

8.6 Remplacement:

Dans le cas de prises mobiles/socles de connecteurs connecté(e)s par gravité, non réversibles et démontables, les bornes doivent être marquées de la manière suivante:

- borne de terre: le symbole  (IEC 60417-5019:2006) ou PE
- borne neutre: la lettre N

Dans le cas de prises mobiles/socles de connecteurs connecté(e)s par gravité non réversibles et non démontables, aucun marquage des contacts n'est nécessaire mais les âmes doivent être raccordées comme spécifié en 22.1.

Les bornes des socles de connecteurs autres que ceux intégrés ou incorporés dans un appareil d'utilisation ou un matériel et destinés à être utilisés avec des prises mobiles répondant aux exigences du 8.6 doivent être marquées conformément aux exigences du 8.6.

Le symbole ou les lettres ne doivent pas être placé(e)s sur des vis, des rondelles amovibles ou d'autres parties amovibles.

Les prises mobiles/socles de connecteurs démontables doivent être fournies avec les instructions suivantes:

- a) un schéma indiquant la méthode de raccordement des conducteurs, en particulier la longueur (supplémentaire) du conducteur de terre, ainsi que la mise en œuvre du dispositif d'arrêt de traction;
- b) un schéma à l'échelle 1 donnant la longueur de gaine et d'isolant à retirer;
- c) les types et tailles de câble souple acceptables;
- d) le type de fixation pour la prise mobile et le socle de connecteur.

NOTE 1 Il est essentiel que le raccordement du conducteur de terre soit indiqué de façon pédagogique, de préférence avec des dessins.

NOTE 2 Il n'est pas nécessaire de joindre ces instructions aux connecteurs destinés à l'approvisionnement d'un équipementier.

NOTE 3 Afin de satisfaire au Code National de l'Électricité des États-Unis, la borne neutre doit être soit de couleur blanche, soit étiquetée «white». Une façon de réaliser cette exigence est de recouvrir de nickel la borne neutre et de laisser la ou les autres bornes en leur état normal.

Paragraphe supplémentaire:

8.101 Instructions pour l'installation

Les instructions pour l'installation et l'emploi doivent être fournies avec les connecteurs connectés par gravité. Ces instructions doivent contenir les informations nécessaires pour assurer la conformité au présent document et doivent contenir les classifications déclarées par le fabricant selon l'Article 7

Pour les connecteurs connectés par gravité destinés à être uniquement délivrés à l'équipementier, la feuille d'instructions peut être remplacée par une plaquette, un courrier ou un dessin, etc. Il n'est pas nécessaire que chaque connecteur soit accompagné d'un tel document.

8.102 Marquage des contacts auxiliaires

Les contacts auxiliaires doivent porter des indications claires de façon à éviter toute confusion durant l'installation. Dans le cas de connecteurs polarisés, les polarités doivent être indiquées à la fois sur le socle de connecteur d'appareil et sur la prise mobile.

9 Dimensions et compatibilité

L'article correspondant de l'IEC 60320-1 s'applique avec les modifications suivantes:

9.1 Remplacement:

Les connecteurs doivent être conçus et construits de façon à empêcher toute connexion involontaire ou indésirable.

Les connecteurs connectés par gravité peuvent prendre toute forme adaptée à leur fonction mais doivent satisfaire, dans toute la mesure du possible, aux exigences du présent document.

9.2 Le paragraphe correspondant de l'IEC 60320-1 ne s'applique pas.

9.3 Remplacement:

Il doit être impossible d'établir des connexions indésirables entre des prises mobiles connectées par gravité et des socles de connecteurs connectés par gravité lorsqu'ils sont installés conformément aux instructions du fabricant. Dans les constructions dont la conception est telle que des connexions unipolaires transitoires se produisent alors que la prise mobile connectée par gravité est mise en place et retirée du socle de connecteur d'appareil au cours de l'utilisation normale, de telles connexions unipolaires transitoires sont admises.

Les connecteurs connectés par gravité ne doivent pas permettre des connexions indésirables avec les fiches et socles de prises de courant conformes à l'IEC TR 60083.

Les connecteurs connectés par gravité ne doivent pas permettre des connexions indésirables avec les prises mobiles ou les socles de connecteurs conformes aux feuilles de norme de la série IEC 60320.

La conformité est vérifiée par examen et par référence aux déclarations du fabricant.

NOTE Les «connexions indésirables» comprennent les connexions unipolaires et toute autre connexion non conformes aux exigences concernant la protection contre les chocs électriques.

En cas de doute, il est fait référence aux normes d'appareils d'utilisation appropriées en ce qui concerne les exigences pour les prises mobiles et socles de connecteurs connectés par gravité.

Il doit être impossible d'engager les prises mobiles destinées au raccordement des matériels de la classe II dans les socles de connecteurs prévus pour des matériels de la classe I.

La conformité est vérifiée par examen.

9.4 Le paragraphe correspondant de l'IEC 60320-1 ne s'applique pas.

10 Protection contre les chocs électriques

L'article correspondant de l'IEC 60320-1 s'applique avec les modifications suivantes:

10.1 Remplacer les deux premiers alinéas par:

Les connecteurs doivent être conçus de sorte que les parties actives des socles de connecteurs ne soient pas accessibles lorsque la prise mobile est partiellement ou complètement engagée.

Les connecteurs connectés par gravité doivent être conçus de sorte que les parties actives et les parties qui y sont raccordées ne soient pas accessibles lorsque la prise mobile est convenablement assemblée et câblée comme en utilisation normale.

10.2 Addition:

NOTE À évaluer après incorporation dans le produit fini.

Paragraphe supplémentaire (après 10.5):

10.101 Protection supplémentaire contre l'accès aux parties actives

Le calibre d'essai 13 de l'IEC 61032 est appliqué sans force notable au travers des ouvertures des prises mobiles.

NOTE «Sans force notable» signifie une force ne dépassant pas 1 N.

Il ne doit pas être possible de mettre en contact les parties actives avec le calibre d'essai.

11 Dispositions en vue de la mise à la terre

L'article correspondant de l'IEC 60320-1 s'applique.

12 Bornes et terminaisons

L'article correspondant de l'IEC 60320-1 s'applique avec les modifications suivantes:

12.1 Remplacement:

Pour les socles de connecteurs et prises mobiles connectés par gravité, les exigences de la norme IEC correspondant à l'appareil d'utilisation ou au matériel dans lequel il est prévu qu'ils soient intégrés ou incorporés doivent s'appliquer.

12.2 Le paragraphe correspondant de l'IEC 60320-1 ne s'applique pas.

13 Construction

L'article correspondant de l'IEC 60320-1 s'applique avec les modifications suivantes:

13.2 La note du présent paragraphe ne s'applique pas.

13.4 Remplacement:

Les broches des socles de connecteurs connectés par gravité doivent

- être maintenues de façon sûre,

- avoir une résistance mécanique suffisante,
- ne pas être démontables sans l'aide d'un outil, et
- avoir toutes les parties actives entourées par une collerette de protection.

NOTE Cette exigence n'exclut pas les broches qui sont, dans une certaine mesure, flottantes.

La sécurité des composants conçus pour fonctionner comme des broches, que ce soit dans la partie socle ou dans la partie prise mobile, est vérifiée par examen et par les essais des Articles 19 et 20.

13.5 Remplacement:

Le système des contacts d'un connecteur connecté par gravité doit s'aligner de lui-même afin d'assurer une pression de contact appropriée.

Pour les connecteurs autres que le type 0,2 A, l'autoalignement des contacts ne doit pas être fonction de l'élasticité de la matière isolante.

La conformité est vérifiée par examen.

NOTE L'autoalignement des contacts peut être réalisé soit dans le socle de connecteur d'appareil, soit dans la prise mobile, soit dans les deux à la fois.

13.10 Remplacement:

Les fusibles, relais, thermostats et coupe-circuit thermiques incorporés dans les prises mobiles connectées par gravité et les socles de connecteurs connectés par gravité doivent satisfaire aux normes IEC applicables.

Les interrupteurs et les régulateurs d'énergie incorporés à des prises mobiles connectées par gravité ou à des socles de connecteurs connectés par gravité doivent satisfaire respectivement à l'IEC 61058 (toutes les parties) et à l'IEC 60730 (toutes les parties).

Lorsqu'un socle de connecteur d'appareil connecté par gravité est intégré ou incorporé dans un appareil d'utilisation ou dans un matériel, la partie pouvant être identifiée comme le socle de connecteur d'appareil doit alors satisfaire aux exigences du présent document.

La conformité est vérifiée par examen et en soumettant à l'essai les interrupteurs, les fusibles, les relais, les thermostats, les coupe-circuit thermiques et les régulateurs d'énergie conformément à la norme IEC applicable.

14 Résistance à l'humidité

L'article correspondant de l'IEC 60320-1 est remplacé comme suit:

14.101 Les connecteurs connectés par gravité doivent résister aux conditions d'humidité pouvant être rencontrées en utilisation normale.

NOTE 1 Si des connecteurs connectés par gravité sont utilisés avec des matériels qui sont sujets, en utilisation normale, à des débordements de liquide, la protection contre l'humidité est en principe assurée par le matériel.

La conformité est vérifiée par l'épreuve hygroscopique décrite dans l'Article 14, immédiatement suivie des essais de l'Article 15.

Les prises mobiles et socles de connecteurs connectés par gravité ne sont pas engagés lorsqu'ils sont soumis à l'épreuve hygroscopique; les connecteurs démontables connectés par gravité ne sont pas équipés d'un câble souple.

L'épreuve hygroscopique est effectuée dans une enceinte humide contenant de l'air ayant une humidité relative maintenue entre 91 % et 95 %. La température de l'air, en tout endroit où les échantillons peuvent être placés, est maintenue, à ± 1 °C près, à une valeur appropriée t °C, comprise entre 20 °C et 30 °C.

Avant d'être placés dans l'enceinte humide, les échantillons sont portés à une température comprise entre t °C et $(t + 4)$ °C.

Les échantillons sont maintenus dans l'enceinte pendant:

- 168 h (7 jours) dans le cas des prises mobiles avec contacts de mise à la terre et des socles de connecteurs avec contacts de mise à la terre lorsqu'ils sont présentés comme appareils individuels, non incorporés dans d'autres matériels;
- 48 h (2 jours) dans tous les autres cas.

NOTE 2 Dans la plupart des cas, les échantillons peuvent être portés à la température spécifiée en les maintenant à cette température pendant au moins 4 h avant l'épreuve hygroscopique.

NOTE 3 Une humidité relative comprise entre 91 % et 95 % peut être obtenue en plaçant dans l'enceinte humide une solution saturée de sulfate de sodium (Na_2SO_4) ou de nitrate de potassium (KNO_3) dans de l'eau ayant une surface de contact suffisamment grande avec l'air.

Après cette épreuve, l'échantillon ne doit présenter aucun dommage au sens du présent document.

14.102 Les dispositifs de connexion des socles d'alimentation pour appareils d'utilisation sans câble souple ne doivent pas être affectés par l'eau.

La conformité est vérifiée par l'essai suivant.

Le socle d'alimentation est placé sur une surface horizontale et 30 ml d'eau contenant environ 1 % de NaCl sont versés sur le dispositif de connexion. La solution saline est versée régulièrement, en 2 s, à travers un tube d'un diamètre intérieur de 8 mm, l'extrémité inférieure du tube étant située à 200 mm au-dessus du dispositif de connexion.

Le socle d'alimentation doit alors satisfaire à l'essai de rigidité diélectrique suivant.

Immédiatement après que l'eau a été versée, la surface accessible du connecteur et la prise mobile est recouverte d'une feuille métallique en évitant tout contact avec une connexion de terre au moyen d'un trou ou d'une ouverture dans la feuille. Dans la mesure du possible, la feuille est appliquée de façon à réduire le plus possible toute perturbation due à l'eau sur la surface du connecteur.

La tension d'essai spécifiée est ensuite appliquée entre:

- a) les parties actives et la surface de la feuille métallique sur la surface du connecteur à 2 500 V en courant alternatif,*
- b) la partie active et la surface de la feuille métallique sous la base de l'appareil d'utilisation à 2 500 V en courant alternatif,*
- c) les parties actives et connexion de terre à 1 250 V en courant alternatif.*

NOTE Le texte ci-dessus est repris de 15.102 de l'IEC 60335-2-15:2012, avec le domaine d'application étendu à d'autres appareils d'utilisation et les tensions d'essai de la feuille CTL PDSH758 et la décision OSM 429.

L'essai est réalisé en utilisant le dispositif représenté à l'Annexe BB.

14.103 Les connecteurs connectés par gravité destinés à être partiellement ou entièrement immergés dans l'eau pour nettoyage doivent comporter une protection appropriée contre les

effets de l'immersion et doivent être soumis à l'essai comme défini dans la ou les normes d'appareils d'utilisation correspondantes spécifiées à l'Article 7 (normes d'appareils d'utilisation correspondantes) ou avec les caractéristiques assignées correspondantes de l'IEC 60529.

15 Résistance d'isolement et rigidité diélectrique

L'article correspondant de l'IEC 60320-1 s'applique avec les modifications suivantes:

15.3 Remplacement:

Immédiatement après l'essai de 15.2, l'isolant est soumis pendant 1 min à une tension de forme pratiquement sinusoïdale et de fréquence 50 Hz ou 60 Hz. Les valeurs de la tension d'essai sont indiquées dans le Tableau 101.

Les parties accessibles de la matière isolante sont recouvertes d'une feuille métallique.

Il convient de porter attention à éviter des contraintes excessives sur l'isolation principale. Notamment, la feuille de métal ne doit pas être à une distance inférieure à la ligne de fuite spécifiée entre l'isolation renforcée et les parties mises à la terre.

Les prises mobiles connectées par gravité sont soumises à l'essai lorsqu'elles sont engagées dans un socle de connecteur d'appareil connecté par gravité et aussi lorsqu'elles sont désengagées.

Au début de l'essai, la tension appliquée ne dépasse pas la moitié de la valeur prescrite, puis elle est amenée rapidement à la pleine valeur.

Au cours de l'essai, il ne doit se produire ni contournement ni perforation.