IEC 61535

Edition 1.1 2012-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Installation couplers intended for permanent connection in fixed installations

Coupleurs d'installation pour connexions permanentes dans les installations fixes

IEC 61535:2009+A1:2012

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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FOREWORD

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This consolidated version of IEC 61535 consists of the first edition (2009) [documents 23/466/FDIS and 23/471/RVD] and its amendment 1 (2012) [documents 23/577/FDIS and 23/581/RVD]. It bears the edition number 1.1.

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

International Standard IEC 61535 has been prepared by technical committee 23: Electrical accessories.

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

In this standard the following print types are used:

– requirements proper: in roman type;

– *test specifications: in italic type*;

– Explanatory matter: in smaller roman type.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

The contents of the corrigendum of January 2014 have been included in this copy.

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

INSTALLATION COUPLERS INTENDED FOR PERMANENT CONNECTION IN FIXED INSTALLATIONS

1 Scope

This standard applies to two up to five wire installation couplers including earth, if provided, with a rated voltage up to and including 500 V a.c. and a rated connecting capacity up to and including 10 mm^2 for permanent connection in indoor electrical installations. Installation couplers with additional contacts for voltages other than mains voltages are outside the scope of this standard.

NOTE 1 Installation couplers according to this standard are used e.g. in prefabricated buildings, installation cavities, such as suspended floors and ceilings, or cable tray systems, cable ladder systems, cable ducting systems and cable trunking systems or in commercial show rooms, in partition walls and in any similar application or in furniture complying with IEC 60364-7-713.

NOTE 2 This standard may be used as a guide for installation couplers with additional contacts for voltages other than mains voltages.

NOTE 3 In the UK, where installation couplers have more than 5 wires, they shall meet the requirements of IEC 61535 as though they were included in the scope and shall be tested in such a way that all of the mains voltage pins are subjected to the same level of testing.

NOTE 4 In the USA, these installation couplers are not permitted to be used where they will not be visible after installation.

An installation coupler consists of an installation female connector and an installation male connector for permanent connection not intended to be engaged or disengaged under load nor to be engaged or disengaged other than during first installation or during reconfiguration or maintenance of the wiring system in which installation couplers have been installed. This means that installation couplers are only intended for infrequent use.

Installation couplers are not suitable for use in place of socket-outlet systems. Installation couplers are not suitable for use in place of devices for connecting luminaires (DCLs) according to IEC 61995 or luminaire supporting couplers (LSCs).

NOTE 5 For lower limits of in-service temperatures the necessary information is given in the manufacturer's installation instructions.

In locations where special conditions prevail, as in ships, vehicles and the like and in hazardous locations, for example where explosions are liable to occur, special constructions may be required.

NOTE 6 Particular requirements for installation couplers e.g. for. use at higher ambient temperatures, with higher mechanical durability (e.g. metal housings), with higher fire resistance and for use in control circuits (e.g. SELV), are under consideration.

NOTE 7 National rules may have requirements concerning the accessibility of installation couplers.

NOTE 8 Installation couplers are intended to be installed by instructed or skilled persons.

NOTE 9 National rules may specify who is allowed to carry out the connection and disconnection of installation couplers.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-31:2008, *Environmental testing – Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens*

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60364 (all parts), *Electrical installations of buildings*

IEC 60529:2001, *Degrees of protection provided by enclosures (IP Code)*

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

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

IEC 60998-2-3:2002, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-3: Particular requirements for connecting devices as separate entities with insulation-piercing clamping units*

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

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

Where the terms "voltage" and "current" are used in this standard, they are r.m.s. values, unless otherwise specified.

3.1
rated voltage
voltage assigned to the installation coupler by the manufacturer

3.2
rated current
maximum current assigned to the installation coupler by the manufacturer

NOTE Rated current refers to the installation coupler itself and not to an electric circuit.

3.3
rated connecting capacity
cross-sectional area of the largest conductor(s) to be connected as stated by the manufacturer of the installation coupler

3.4
permanent connection
connecting method in an installation which is only opened for maintenance or wiring system re-configuration

NOTE The expression "permanent connection" is to be understood as a connection which is maintained as long as an installation exists.

3.5
installation coupler
connecting device consisting of an installation female connector and an installation male connector provided with retaining means for permanent connection not intended to be engaged or disengaged under load nor to be engaged or disengaged other than during first installation, during maintenance of the wiring system or during re-configuration of the wiring system

3.5.1
installation male connector
load side portion of an installation coupler which contains the male contacts

3.5.2
installation female connector
supply side portion of an installation coupler which contains the female contacts

3.6
installation coupler system
family of installation couplers consisting of one or more installation female connectors compatible by mechanical coding features with one or more installation male connectors, with the same ratings produced according to the specification of one manufacturer

3.7
wiring system
assembly made up of a cable or cables or busbars and the parts which secure and if necessary enclose the cables or busbars

NOTE See IEC 60364-5-52.

3.8
rewirable installation coupler
installation coupler so constructed that the cable can be replaced

3.9
non-rewirable installation coupler
installation coupler so constructed that it forms a complete unit with the cable after connection and assembly by the manufacturer

NOTE See also 12.15.

3.9.1
non-rewirable moulded-on installation coupler
non-rewirable installation coupler so constructed that the contacts, terminals or connections and the attached cable end are surrounded by insulating material manufactured by a moulding process

3.9.2
non-rewirable non-moulded-on installation coupler
non-rewirable installation coupler so constructed that the contacts, terminals or connections and the attached cable end are surrounded by separate parts of insulating material

3.10
distribution block
device intended for branching of circuits

3.11
retaining means
arrangement by which an installation female connector and an installation male connector are held in position when they are properly engaged and prevents unintentional disengagement

NOTE The disengagement may be made by hand or by the use of a tool.

3.12
cap
removable barrier to prevent ready accessibility to an unused installation female connector

3.13
routine test
test to which each device is subjected during and/or after manufacture to ascertain whether it complies with certain criteria

3.14
type test
test of one or more devices made to a certain design to show that the design meets certain requirements

3.15
readily accessible
accessibility to touch extending from any point on a surface where persons usually stand or move about to the limits which a person can reach with the hand, in any direction without assistance

NOTE See IEC 60364-4-41 Annex B.

3.16
terminal
part of an accessory to which a conductor is attached, providing a reusable connection

3.17
termination
part of an accessory to which a conductor is permanently attached

[IEV 442-06-06]

4 General requirements

Installation couplers shall be so designed and constructed that, in normal use, their performance is reliable and without danger to the user or damage to the surroundings.

Compliance is checked by carrying out all the relevant tests specified.

5 General notes on tests

5.1 Tests shall be carried out to check compliance with the relevant requirements of this standard.

Tests are as follows:

- type tests shall be made on representative specimens of each type of installation coupler;
- routine tests shall be made on each installation coupler as required in this standard.

Tests of 5.2 to 5.6 are applicable to type tests and 5.7 to routine tests.

5.2 Unless otherwise specified, the tests shall be carried out on specimens as delivered and under conditions of normal use at an ambient temperature between 15 ºC and 35 ºC.

Where the value of the temperature is of importance, the test shall be carried out at 20 ºC ± 5 ºC.

5.3 For testing purposes non-rewirable installation couplers shall be provided with cables of at least 1 m length unless otherwise specified in this standard.

5.4 If not otherwise specified in this standard, the tests shall be carried out in the order of the clauses as specified in Table C.1. Installation male connectors, caps, installation female connectors and distribution blocks shall be tested in connection with their matching counterparts complying with this standard.

5.5 The sets of test specimens shall undergo the tests as specified in Table C.1.

5.6 Specimen are deemed not to comply with this standard if there is more than one specimen failure in any one of the tests.

If one specimen of a given set fails in a test due to an assembly or manufacturing fault, that test and those preceding, which may have influenced the result of that test, are repeated on another set of specimens of the same set number as specified in Table C.1, all of which shall then comply with the repeated tests.

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

5.7 Routine tests for non-rewirable installation couplers are specified in Annex A.

6 Ratings

6.1 Installation couplers should preferably have a rated voltage chosen from Table 1.

All components of the same installation coupler system shall have the same phase to neutral voltage rating.

Table 1 – Voltage rating for installation couplers

Nominal voltage of power supply system V	Rated voltage V	Rated impulse voltage kV
100	125	2,5
100/200	125/250	2,5
230	250	4,0
230/400	250/400	4,0
277/480	320/500	4,0

6.2 Installation couplers should preferably have a rated current chosen from the following values:

– 10 A
– 16 A
– 20 A
– 25 A
– 32 A

6.3 The preferred values for rated connecting capacities are 1,5 mm^2, 2,5 mm^2, 4 mm^2, 6 mm^2, 10 mm^2.

Compliance of 6.1, 6.2 and 6.3 is checked by inspection of markings according to Clause 8.

7 Classification

Installation couplers are classified according to the

7.1 rated impulse voltage:

7.1.1 rated impulse voltage of 2,5 kV;

7.1.2 rated impulse voltage of 4 kV.

7.2 method of connecting the cable:

7.2.1 rewirable installation couplers;

7.2.2 non-rewirable installation couplers.

7.3 degree of protection against ingress of foreign solid objects and ingress of water according to IEC 60529 (IP-Code)

7.4 location where installation couplers will be installed:

7.4.1 readily accessible installation couplers;

7.4.2 non-readily accessible installation couplers.

NOTE 1 Installation couplers for readily accessible areas can also be used in non-readily accessible areas.

7.5 existence of an earthing contact:

7.5.1 installation couplers with earthing contact;

7.5.2 installation couplers without earthing contact.

7.6 type of conductor to be connected:

7.6.1 solid conductor only;

7.6.2 rigid (solid and stranded) conductor only;

7.6.3 flexible conductor only;

7.6.4 both rigid (solid and stranded) and flexible conductors.

7.7 type of terminals for rewirable installation couplers only:

7.7.1 installation couplers with screw-type terminals;

7.7.2 installation couplers with screwless terminals;

7.7.3 installation couplers with insulation piercing terminals.

8 Marking and documentation

8.1 Installation couplers shall be marked with

a) rated current in amperes (A);

b) rated voltage in volts (V);

c) manufacturer's or responsible vendor's name, trade mark or identification mark;

d) IP-code if higher than IP43 as follows:

The first characteristic numeral for the degree of protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects shall be marked if declared to be higher than 4, in which case the second characteristic numeral shall also be marked.

The second characteristic numeral for the degree of protection against harmful effects due to ingress of water shall be marked if declared to be higher than 1, in which case the first characteristic numeral shall also be marked.

e) type reference;

f) rated connecting capacity for rewirable installation coupler in mm^2;

g) connected conductor size in mm^2 for non-rewirable installation coupler.

8.2 When symbols or letters are used, they shall be as follows:

rated connecting capacity in square millimetres	mm^2 or □
volts	V
amperes	A
alternating current	~ or AC
neutral	N
earth	⏚ or PE

8.3 Markings on the installation coupler according to items in 8.1 shall be readily visible before installation.

8.4 Terminal markings shall be L1, L2, L3 or 1, 2, 3 or equivalent. Earthing terminals in rewirable installation couplers shall have the relevant marking. Neutral terminals shall be marked with N. These markings shall not be placed on screws, removable washers or any other easily removable parts.

If terminals are designed to accept only one type of conductor, e.g. flexible, or rigid (stranded or solid), this shall either be clearly marked on the installation coupler by the letter "f" for flexible or "r" for rigid or "s" for solid or shall be indicated on the smallest packaging unit or in the technical information and catalogue.

8.5 Markings shall be durable and clearly legible.

Compliance is checked by inspection and by the following test:

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

NOTE Petroleum spirit is defined as an aliphatic solvent hexane with a content of aromatics of maximum 0,1 volume percentage, a kauri-butanol value of 29, an initial boiling point of approximately 65 °C, a dry-point of approximately 69 °C and a density of approximately 0,68 g/cm^3.

Markings made by impression, moulding, pressing or engraving or the alike are not subjected to this test.

8.6 The manufacturer's catalogue or installation instructions shall contain the following information:

a) installation couplers are intended for connection and disconnection without load, only;

b) types of cables intended to be fitted into the installation couplers;

c) if the installation coupler is not suitable for installation in readily accessible areas;

d) if additional parts or precautions are necessary for use in readily accessible areas;

e) an appropriate marking indicating the length of insulation to be removed before the insertion of the conductor into the screwless terminal;

f) length of slack of a PE-conductor for rewirable installation couplers (see 12.14);

g) warning advising the installer that the dangerous compatibility between different manufacturer installation coupler systems is not automatically prevented by compliance with IEC 61535;

h) statement that installation coupler systems are not replacements for the national domestic plug and socket outlet-system;

i) if looping-in is intended, wiring instructions shall be specified in the manufacturer's technical documentation.

j) statement that installation couplers shall be used with the retaining means as provided by the manufacturers (refer to 12.10).

The installation instructions shall be available in the manufacturer's catalogue, in the technical documentation or in or on the smallest packaging unit.

9 Dangerous compatibility

9.1 An installation coupler system shall be designed and constructed so that unintended or improper connection is prevented.

NOTE Unintended or improper connection includes single-pole connection, except for earth-to-earth connection.

Compliance is checked by inspection and the following test.

It shall not be possible to insert the installation male connector into the installation female connector resulting in a dangerous situation.

Engagement of the installation male and installation female connector is attempted in any unintended configuration using a force of 80 N for installation couplers marked as "10 A", "16 A" and "20 A" or 120 N for installation couplers marked as 25 A and 32 A. The force shall be applied on the same axis of the connection for 1 min during which time the installation male and installation female connector contacts shall not engage.

Where the use of elastomeric or thermoplastic material is likely to influence the results of the test, it shall be carried out at an ambient temperature of the 35 °C ± 2 °C, all parts installation coupler being at this temperature.

During the test no contact shall occur.