

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial cable reels

Enrouleurs de câble industriels

STANDARD PREVIEW
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IEC 61316:2021

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INDUSTRIAL CABLE REELS

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International Standard IEC 61316 has been prepared by subcommittee 23H: Plugs, socket-outlets and couplers for industrial and similar applications, and for electric vehicles, of IEC technical committee 23: Electrical accessories.

This third edition cancels and replaces the second edition, published in 1999. This edition constitutes a technical revision.

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

- Implementation of the latest tests and requirements previously included in IEC 60309-1.

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

FDIS	Report on voting
23H/483/FDIS	23H/489/RVD

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

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

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

In this document, the following print types are used:

- requirements proper: in roman type;
- *test specifications: in italic type;*
- notes: in smaller roman type.

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

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INDUSTRIAL CABLE REELS

1 Scope

This document applies to cable reels provided with a non-detachable flexible cable with a rated operating voltage not exceeding 690 V DC and/or 690 V AC with a frequency not exceeding 500 Hz and a rated current not exceeding 63 A, primarily intended for industrial use, either indoors or outdoors, for use with accessories complying with IEC 60309-1, IEC 60309-2 or IEC 60309-4.

This document applies to:

- portable cable reels equipped with one plug or appliance-inlet complying with IEC 60309-1 or IEC 60309-2 and at least one socket-outlet complying with IEC 60309-1, IEC 60309-2 or IEC 60309-4;
- fixed cable reels equipped with at least one socket-outlet complying with IEC 60309-1, IEC 60309-2 or IEC 60309-4;
- cable reels suitable for use at ambient temperature normally within the range of $-25\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$.

The use of this equipment on construction sites and for agricultural, commercial and domestic appliances is not precluded.

This document also applies to cable reels intended to be used in extra-low voltage installations.

In locations where special conditions prevail, for example, on board ships, in vehicles and the like, or where explosions are liable to occur, additional requirements can be necessary.

NOTE 1 This document was not developed for Electric Vehicle (EV) application, but it can be used as guide for cable reels for EV application

NOTE 2 Additional requirements for cable reels for currents higher than 63 A are under consideration.

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.

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

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

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

IEC 60245 (all parts), *Rubber insulated cables – Rated voltages up to and including 450/750 V*

IEC 60245-4, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 4: Cords and flexible cables*

IEC 60309-1:2021, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes – Part 1: General requirements*

IEC 60309-2, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes – Part 2: Dimensional compatibility requirements for pin and contact-tube accessories*

IEC 60309-4, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes – Part 4: Switched socket-outlets with or without interlock*

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

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

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

IEC 60695-10-2, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60730-2-9, *Automatic electrical controls – Part 2-9: Particular requirements for temperature sensing control*

IEC 61000-6-1, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential, commercial and light-industrial environments*

IEC 61000-6-3, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for equipment in residential environments*

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

ISO 1456, *Metallic and other inorganic coatings – Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium*

ISO 2081, *Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel*

ISO 2093, *Electroplated coatings of tin – Specification and test methods*

ISO/IEC Guide 51, *Safety aspects – Guidelines for their inclusion in standards*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

NOTE Where the terms "voltage" and "current" are used, they imply the direct current (DC) or alternating current (AC) root mean square (RMS) values.

3.1

rated operating voltage

voltage assigned to the cable reel by the manufacturer

3.2

rated current

current assigned to the cable reel by the manufacturer

3.3

cable reel

device comprising a flexible cable attached to a reel, so constructed that the cable may be wound on to the reel

Note 1 to entry: Plugs, socket-outlets and appliance inlets, if any, supplied with cable reels are considered as part of the reel.

3.3.1

portable cable reel

cable reel which can be moved easily from one place to another

3.3.2

fixed cable reel

cable reel intended for mounting on a fixed support

3.4

non-detachable flexible cable

flexible cable which is fixed to a cable reel

3.5

rewireable cable reel

cable reel so constructed that the flexible cable can be replaced with the aid of a general-purpose tool

3.6

non-rewireable cable reel

cable reel so constructed that it forms a complete unit with the flexible cable, the plug and the socket-outlets fixed by the manufacturer of the cable reel in such a manner that, after dismantling, the cable reel is rendered unfit for any further purpose

3.7

accessible part

part which can be touched by means of the standard test finger

3.8

detachable part

part which can be removed without the aid of a general-purpose tool

3.9

creepage distance

shortest path along the surface of an insulating material between two conductive parts

3.10

clearance

shortest distance in air between two conductive parts

3.11**thermal cut-out**

temperature-sensing control device intended to switch off automatically under abnormal operating conditions and which has no provision for adjustment by the user

3.12**current cut-out**

current-sensing control device intended to switch off automatically under abnormal operating conditions and which has no provision for adjustment by the user

3.13**trip-free mechanism**

mechanism designed so that disconnection can neither be prevented nor inhibited by a reset mechanism, and so that the contacts can neither be prevented from opening nor be maintained closed against a continuation of excess temperature or current

3.14**non-self-resetting thermal or current cut-out**

thermal or current cut-out which can only be reset by a manual action directly acting on the device which is used exclusively for this purpose and which is mounted in the cable reel or for fixed cable reel as a separate unit within sight of the cable reel

3.15**basic insulation**

insulation of hazardous-live-parts which provides basic protection

[SOURCE: IEC 60050-195:1998, 195-06-06, modified – note to entry omitted.]

3.16**supplementary insulation**

independent insulation applied in addition to the basic insulation, for fault protection

[SOURCE: IEC 60050-195:1998, 195-06-07]

3.17**double insulation**

insulation comprising both basic insulation and supplementary insulation

[SOURCE: IEC 60050-195:1998, 195-06-08]

3.18**reinforced insulation**

insulation of hazardous-live-parts which provides a degree of protection against electric shock equivalent to double insulation

Note 1 to entry: Reinforced insulation may comprise several layers which cannot be tested singly as basic insulation or supplementary insulation.

[SOURCE: IEC 60050-195:1998, 195-06-09]

3.19**termination**

insulated or non-insulated connecting device for non-reusable connection of the conductors of the supply cable

3.20 terminal

conductive part of one pole, composed of one or more clamping unit(s) and insulation if necessary

3.20.1 pillar terminal

terminal in which the conductor is inserted into a hole or cavity, where it is clamped under the shank of the screw or screws

Note 1 to entry: The clamping pressure may be applied directly by the shank of the screw or through an intermediate clamping member to which pressure is applied by the shank of the screw (see Figure 1).

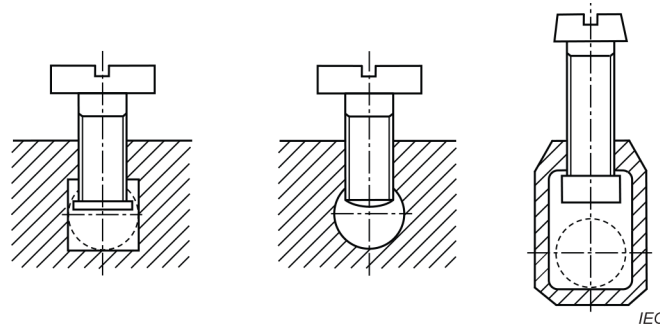


Figure 1 – Pillar terminals
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3.20.2 screw terminal

terminal in which the conductor is clamped under the head of the screw

Note 1 to entry: The clamping pressure may be applied directly by the head of the screw or through an intermediate part, such as a washer, clamping plate or anti-spread device (see Figure 2).

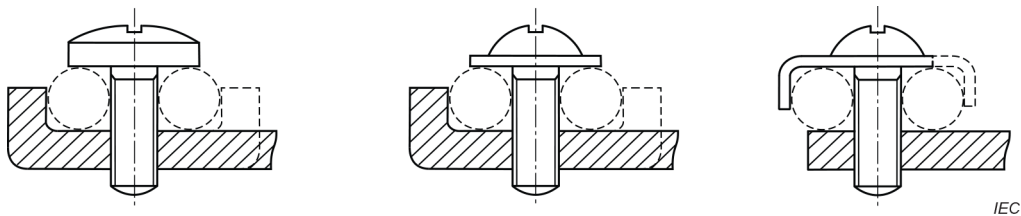


Figure 2 – Screw terminals

3.20.3 stud terminal

terminal in which the conductor is clamped under a nut

Note 1 to entry: The clamping pressure may be applied directly by a suitably shaped nut or through an intermediate part, such as a washer, clamping plate or anti-spread device (see Figure 3).

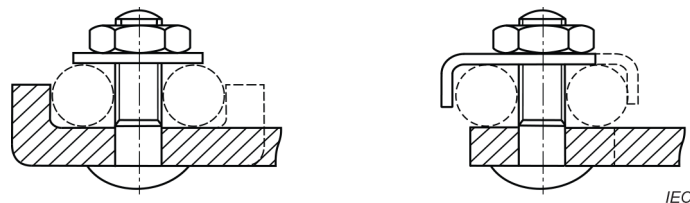


Figure 3 – Stud terminals

3.20.4 saddle terminal

terminal in which the conductor is clamped under a saddle by means of two or more screws or nuts

Note 1 to entry: See Figure 4.

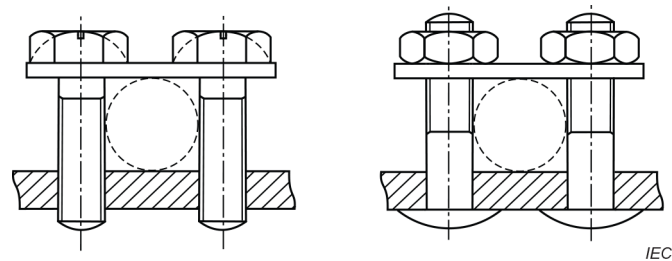


Figure 4 – Saddle terminals

3.20.5 lug terminal

screw terminal or a stud terminal, designed for clamping a cable lug or bar by means of a screw or nut

Note 1 to entry: See Figure 5.

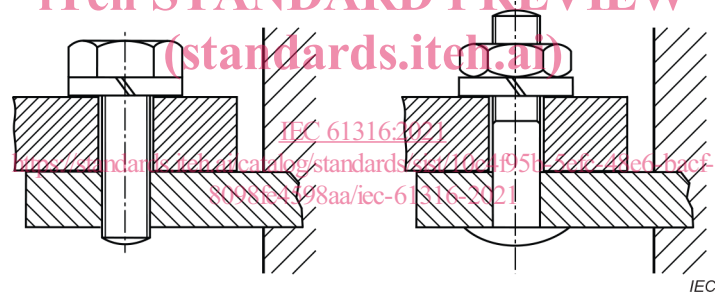


Figure 5 – Lug terminals

3.20.6 mantle terminal

terminal in which the conductor is clamped against the base of a slot in a threaded stud by means of a nut

Note 1 to entry: The conductor is clamped against the base of the slot by a suitably shaped washer under the nut, by a central peg if the nut is a cap nut, or by equally effective means for transmitting the pressure from the nut to the conductor within the slot (see Figure 6).

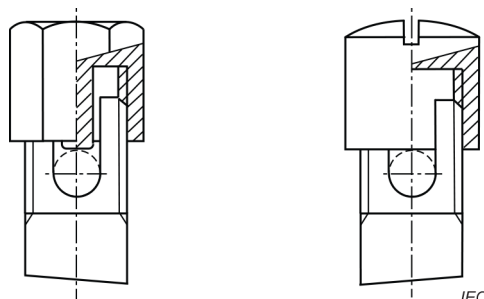


Figure 6 – Mantle terminals

**3.20.7
screwless type terminal**

terminal for the connection and subsequent disconnection of one or more conductors, the connection being made, directly or indirectly, by means other than screws

Note 1 to entry: Examples of screwless type terminals are given in Figure 7.

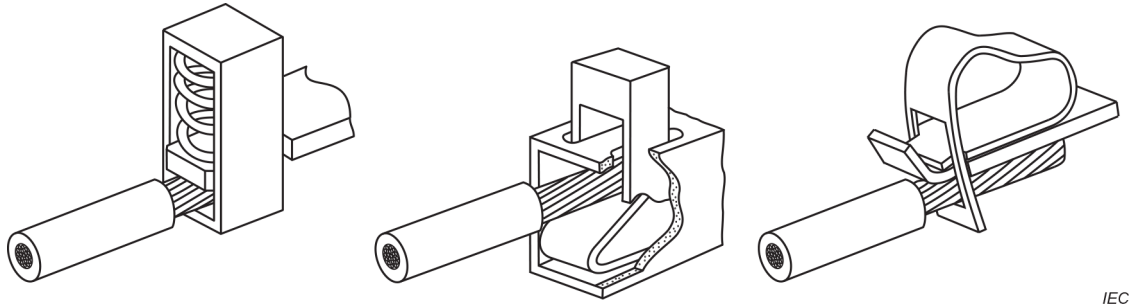


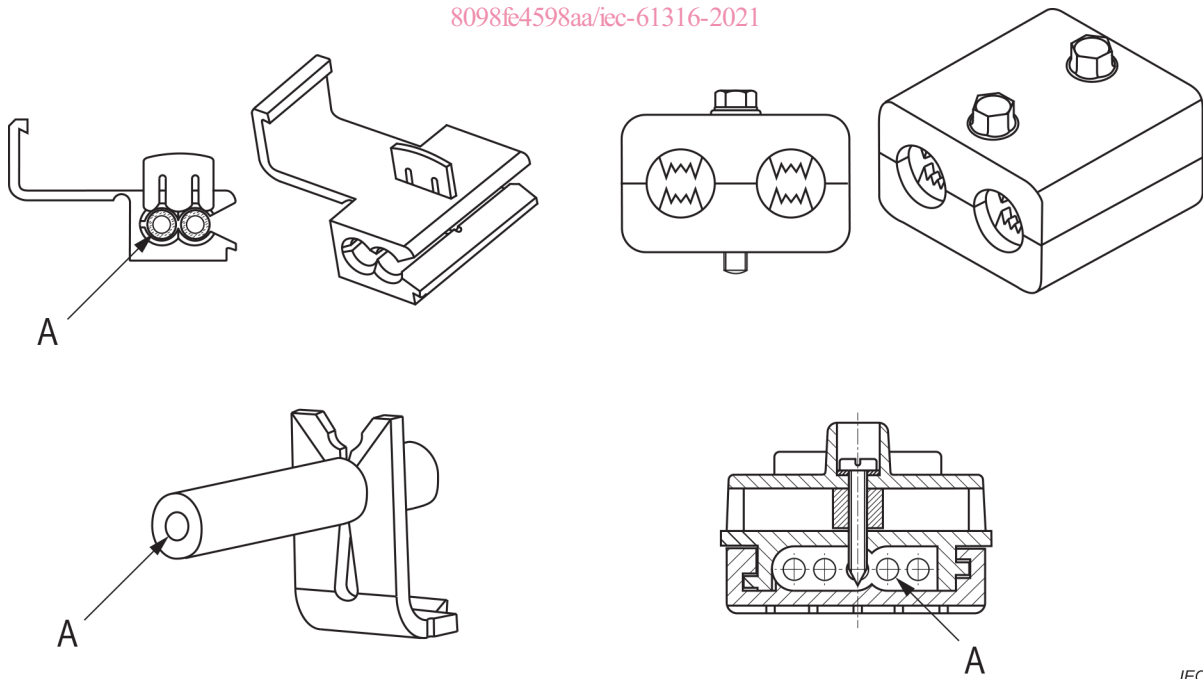
Figure 7 – Screwless terminals

**3.20.8
insulation piercing terminal
IPT**

terminal for the connection and subsequent disconnection of one or more conductors, the connection being made by piercing, boring through, cutting through, displacing or making ineffective in some other manner the insulation of the conductor(s) without previous stripping

Note 1 to entry: The removal of the outer sheath of the cable, if necessary, is not considered as a previous stripping.

Note 2 to entry: Examples of IPT are given in Figure 8.
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Key

A Conductor

Figure 8 – Insulation piercing terminals

3.21 clamping unit

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

3.22 connecting device

device for the electrical connection of one (or more) conductor(s), either fixed to a base or forming an integral part of the equipment

4 General requirements

4.1 Industrial cable reels shall be so designed and constructed that, in normal use, their performance is reliable, and safety is achieved by reducing risk to a tolerable level, as defined in ISO/IEC Guide 51.

Unless otherwise stated, the normal use environment in which the cable reels complying with this document are normally used is pollution degree 3 according to IEC 60664-1.

If other pollution degrees are needed, creepage distances and clearances shall be in accordance with IEC 60664-1. The comparative tracking index (CTI) value shall be evaluated in accordance with IEC 60112. Test and requirements are specified in 21.3.

Cable reels shall have a minimum degree of protection IP24D (see 6.3) according to IEC 60529.

In general, compliance is checked by carrying out all the tests specified.

4.2 Unless otherwise stated, one sample is submitted to all the tests, and the requirements are satisfied if all the tests are met. The sample is tested as delivered and under normal conditions of use, at an ambient temperature of (20 ± 5) °C. Tests are carried out in the order of the clauses of this document.

4.3 If the sample does not satisfy a test due to an assembly or manufacturing fault which is not representative of the design, that test and any preceding one which may have influenced the results of the test shall be repeated in the required sequence. Tests which follow shall be made on another sample, which shall comply with the requirements of this document.

5 Standard ratings

The rated current shall not be higher than the maximum rated current of the plug or the appliance inlet or the socket-outlet.

Preferred rated currents are given in Table 1.

Table 1 – Preferred rated currents

Series I	Series II
A	A
16	20
32	30
63	60

NOTE 1 "Preferred ratings" do not exclude other ratings.