

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Fiches, socles fixes de prise de courant, prises mobiles et socles de
connecteur pour usages industriels –
Partie 1: Exigences générales**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PLUGS, FIXED OR PORTABLE SOCKET-OUTLETS AND
APPLIANCE INLETS FOR INDUSTRIAL PURPOSES –****Part 1: General requirements**

FOREWORD

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International Standard IEC 60309-1 has been prepared by subcommittee SC 23H: Plugs, socket-outlets and couplers for industrial and similar applications, and for electric vehicles, of IEC technical committee 23: Electrical accessories.

This fifth edition cancels and replaces the fourth edition published in 1999, Amendment 1:2005 and Amendment 2:2012. This edition constitutes a technical revision.

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

- a) addition of classification, requirements and tests for accessories with shutters;
- b) additional marking to indicate neutral terminal and/or earthing terminal;
- c) replacement of the term "connector" by the term "portable socket-outlet".

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

FDIS	Report on voting
23H/480/FDIS	23H/486/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.

Subsequent parts of IEC 60309 deal with the requirements of particular types of accessories. The clauses of these particular requirements supplement or modify the corresponding clauses in this document.

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A list of all parts in the IEC 60309 series, published under the general title *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes*, can be found on the IEC website.

<https://standards.iteh.ai/catalog/standards/sist/5c62682d-0297-43c1-a974-c6caa80a8c64/iec-60309-1-2021>

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

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

PLUGS, FIXED OR PORTABLE SOCKET-OUTLETS AND APPLIANCE INLETS FOR INDUSTRIAL PURPOSES –

Part 1: General requirements

1 Scope

This document applies to plugs, fixed or portable socket-outlets and appliance inlets hereinafter referred to as accessories, with a rated operating voltage not exceeding 1 000 V DC or 1 000 V AC with a frequency not exceeding 500 Hz and a rated current not exceeding 800 A, primarily intended for industrial use, either indoors or outdoors.

These accessories are intended to be installed by instructed persons or skilled persons only.

The list of preferred ratings is not intended to exclude other ratings.

This document applies to accessories for use when the ambient temperature is normally within the range of –25 °C to +40 °C.

These accessories are intended to be connected to cables of copper or copper alloy only.

This document applies to accessories with screwless-type terminals or insulation piercing terminals, with a rated current up to and including 32 A for series I and 30 A for series II.

The use of these accessories on building sites and for agricultural, commercial and domestic applications is not precluded.

Fixed socket-outlets or appliance inlets incorporated in or fixed to electrical equipment are within the scope of this document. This document also applies to accessories intended to be used in extra-low voltage installations.

This document does not apply to accessories primarily intended for domestic and similar general purposes.

This document does not cover single-pole accessories.

In locations where special conditions prevail, for example on board ship or where explosions are liable to occur, additional requirements can be necessary.

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 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

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

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

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

IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60228:2004, *Conductors of insulated cables*

IEC 60245-4:2011, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 4: Cords and flexible cables*

IEC 60269-1, *Low-voltage fuses – Part 1: General requirements*

IEC 60269-2, *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Examples of standardized systems of fuses A to K*

IEC 60309-4:2021, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes – Part 4: Switched socket-outlets with or without interlock*

IEC 60320 (all parts), *Appliance couplers for household and similar general purposes*

IEC 60417, *Graphical symbols for use on equipment* (available at <http://www.graphical-symbols.info/equipment>)

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply 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 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for 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*

3 Terms and definitions

For the purpose 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 refer to the DC or the AC root mean square (RMS) values.

The application of accessories is shown in Figure 1.

3.1

fixed socket-outlet

part intended to be installed with the fixed wiring or incorporated in equipment

Note 1 to entry: A fixed socket-outlet may also be incorporated in the output circuit of an isolating transformer.

Note 2 to entry: In some countries fixed socket-outlets are called "receptacles".

Note 3 to entry: When the term "socket-outlet" is used alone, it covers both fixed and portable socket-outlets.

3.2

plug

part integral with or intended to be attached directly to one flexible cable connected to the equipment or to a portable socket-outlet

Note 1 to entry: In French, the resulting assembly when a plug is inserted into a socket-outlet is called "prise de courant".

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3.3

portable socket-outlet

part integral with or intended to be attached to one flexible cable connected to the supply

Note 1 to entry: In general, a portable socket-outlet has the same contact arrangement as a fixed socket-outlet.

Note 2 to entry: The resulting assembly when a plug is inserted into a portable socket outlet is called a "cable coupler".

3.4

appliance inlet

part incorporated in, or fixed to, the equipment or intended to be fixed to it

Note 1 to entry: In general, an appliance inlet has the same contact arrangement as a plug.

Note 2 to entry: The resulting assembly when a portable socket outlet is inserted into an appliance is called an "appliance coupler".

3.5

main part

part of an accessory carrying the contacts

3.6

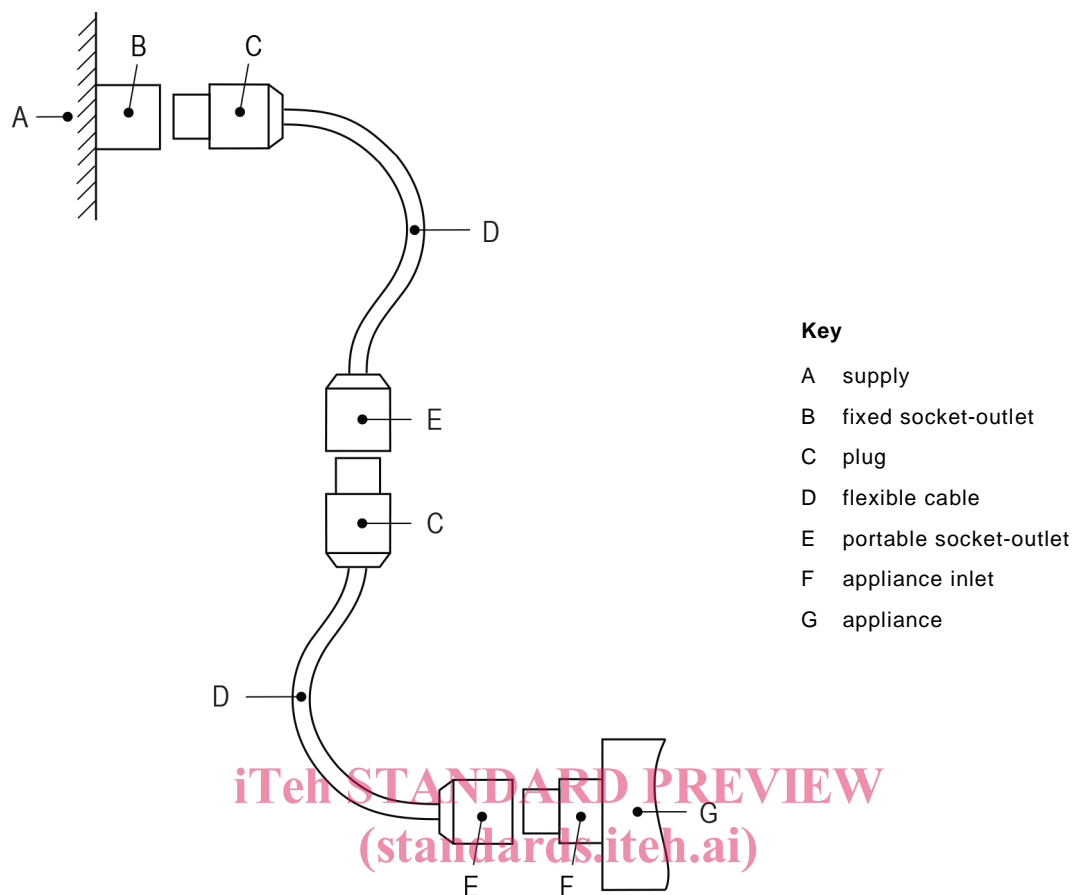
rewireable accessory

accessory so constructed that the flexible cable can be replaced

3.7

non-rewireable accessory

accessory so constructed that the flexible cable cannot be separated from the accessory without making it permanently useless



- Key**
- A supply
 - B fixed socket-outlet
 - C plug
 - D flexible cable
 - E portable socket-outlet
 - F appliance inlet
 - G appliance

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Figure 1 – Diagram showing the use of the accessories

3.8 interlock

device, either electrical or mechanical, which prevents the contacts of a plug from becoming live before it is in proper engagement with a socket-outlet, and which either prevents the plug from being withdrawn while its contacts are live or makes the contacts dead before separation

3.9 retaining device

mechanical arrangement which holds a plug or portable socket-outlet in position when it is in proper engagement, and prevents its unintentional withdrawal

3.10 rated current

current assigned to the accessory by the manufacturer

3.11 insulation voltage

voltage assigned to the accessory by the manufacturer and to which dielectric tests, clearances and creepage distances are referred

3.12 rated operating voltage

nominal voltage of the supply for which the accessory is intended to be used

Note 1 to entry: An accessory may have a rated operating voltage range.

Note 2 to entry: An accessory may have more than one rated operating voltage.

3.13 basic insulation

insulation necessary for the proper functioning of the accessory and for basic protection against electric shock

3.14 supplementary insulation protective insulation

independent insulation provided in addition to the basic insulation, in order to ensure protection against electric shock in the event of a failure of the basic insulation

3.15 double insulation

insulation comprising both basic insulation and supplementary insulation

3.16 reinforced insulation

improved basic insulation with such mechanical and electrical qualities that it provides the same degree of protection against electric shock as double insulation

3.17 terminal

conductive part provided for the connection of a conductor to an accessory

3.17.1 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

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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 2).

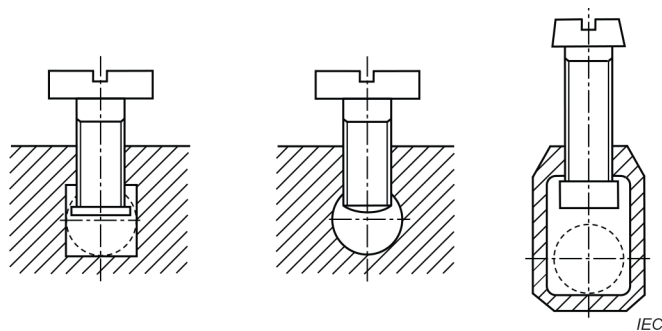


Figure 2 – Pillar terminals

3.17.2 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 3).

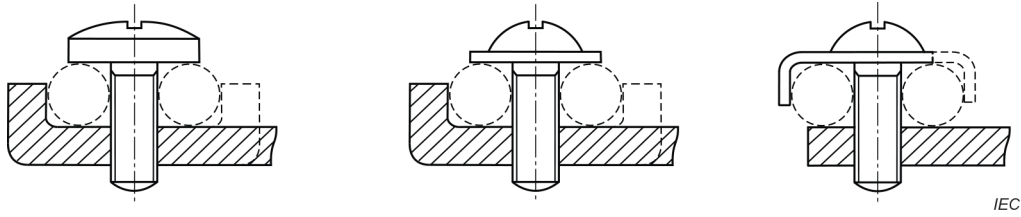


Figure 3 – Screw terminals

3.17.3 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 4).

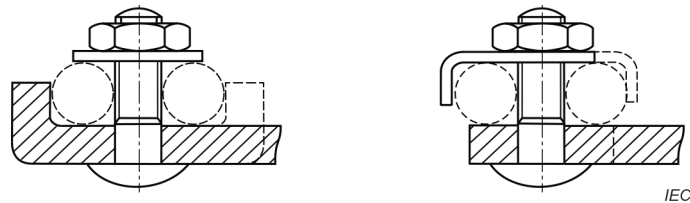


Figure 4 – Stud terminals

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3.17.4 saddle terminal

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

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SEE: Figure 5

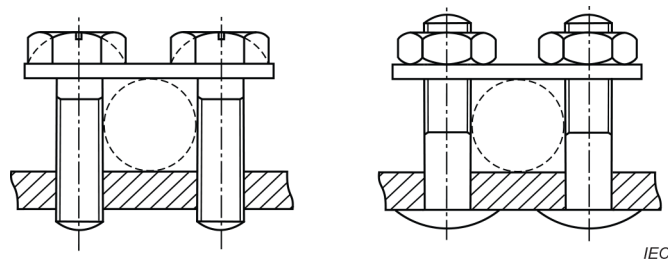


Figure 5 – Saddle terminals

3.17.5 lug terminal

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

SEE: Figure 6

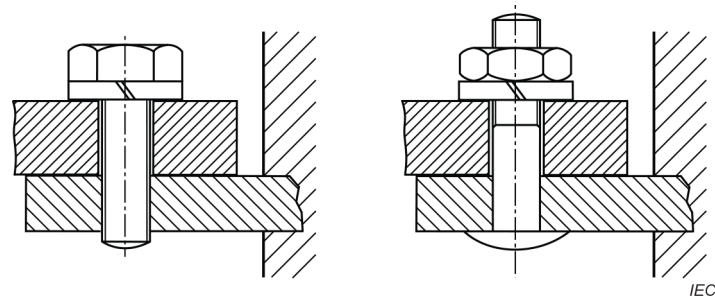


Figure 6 – Lug terminals

3.17.6 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 7).

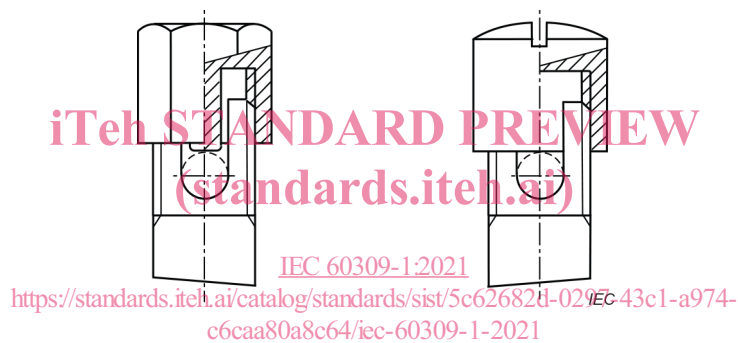
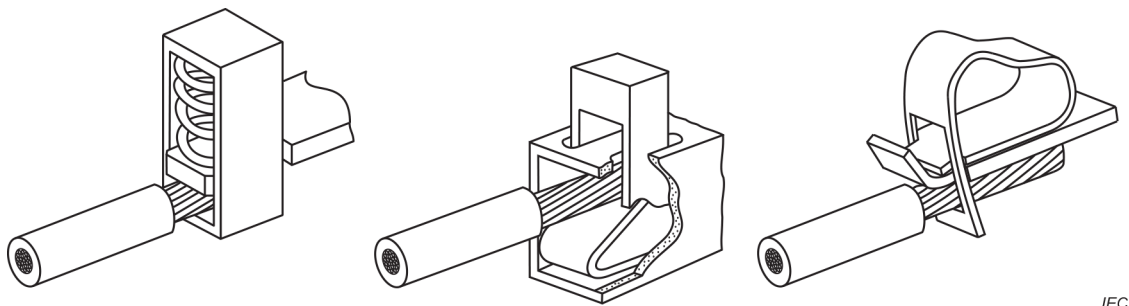


Figure 7 – Mantle terminals

3.17.7 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 8.



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Figure 8 – Screwless terminals