

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 1: General requirements

Fiches, socles de prise de courant, prises mobiles de véhicule et socles de connecteur de véhicule – Charge conductive des véhicules électriques – Partie 1: Règles générales



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CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Normative references	9
3 Terms and definitions	11
4 General	19
4.1 General requirements	19
4.2 General notes on tests	19
5 Ratings.....	20
5.1 Preferred rated operating voltage ranges	20
5.2 Preferred rated currents.....	20
5.2.1 General	20
5.2.2 Rated current for signal or control purposes	20
5.2.3 Accessories not suitable for making and breaking an electrical circuit under load	21
5.2.4 Accessories suitable for, or not suitable for, making and breaking an electrical circuit under load.....	21
6 Connection between the power supply and the electric vehicle.....	21
6.1 General.....	21
6.2 Types of vehicle inlets	21
6.3 Types of vehicle connectors.....	21
6.4 Universal interface.....	22
6.5 Basic interface.....	23
6.6 D.C. configurations	24
6.7 Combined interface.....	25
6.8 Contact sequencing	26
7 Classification of accessories.....	26
7.1 According to purpose	26
7.2 According to the method of connecting the conductors.....	27
7.3 According to serviceability	27
7.4 According to electrical operation	27
7.5 According to interface	27
7.6 According to use with cable management systems.....	27
7.7 According to the locking and interlock functions:.....	27
7.7.1 According to locking facilities.....	27
7.7.2 According to interlock facilities:	27
7.8 According to the presence of shutter(s).....	27
8 Marking	27
9 Dimensions	29
10 Protection against electric shock	30
11 Size and colour of protective earthing conductors.....	35
12 Provisions for protective earthing	35
13 Terminals	37
13.1 Common requirements.....	37
13.2 Screw type terminals.....	40

13.3	Mechanical tests on terminals	43
14	Interlocks.....	45
14.1	Accessories with interlock.....	45
14.2	Accessories with integral switching device	49
14.3	Control circuit devices and switching elements	49
14.4	Pilot contacts and auxiliary circuits	49
15	Resistance to ageing of rubber and thermoplastic material	50
16	General construction	50
17	Construction of socket-outlets	53
17.1	General.....	53
17.2	Contact tubes	53
18	Construction of plugs and vehicle connectors	55
19	Construction of vehicle inlets	56
20	Degrees of protection	56
21	Insulation resistance and dielectric strength	58
22	Breaking capacity	59
23	Normal operation	62
24	Temperature rise	63
25	Flexible cables and their connection	65
25.1	Strain relief	65
25.2	Requirements for plugs and vehicle connectors	65
25.2.1	Non-rewirable plugs and vehicle connectors	65
25.2.2	Rewirable plugs and vehicle connectors	65
25.3	Plugs and vehicle connectors provided with a flexible cable	66
26	Mechanical strength	67
26.1	General.....	67
26.2	Degree of protection	68
26.3	Rewirable plugs and vehicle connectors.....	69
26.4	Non-rewirable accessories	70
26.5	Cable glands.....	72
26.6	Shutters	72
26.7	Insulated end caps.....	72
26.8	Change of temperature test.....	73
26.9	Pull test	73
27	Screws, current-carrying parts and connections.....	73
28	Creepage distances, clearances and distances	76
29	Resistance to heat, to fire and to tracking.....	77
30	Corrosion and resistance to rusting	79
31	Conditional short-circuit current withstand test.....	79
31.1	General.....	79
31.2	Ratings and test conditions	79
31.3	Test circuit.....	80
31.4	Calibration	83
31.5	Test procedure.....	83
31.6	Behaviour of the equipment under test.....	83
31.7	Acceptance conditions	84

32	Electromagnetic compatibility	84
32.1	Immunity	84
32.2	Emission	84
33	Vehicle driveover	84
	Bibliography.....	86
	Figure 1 – Diagram showing the use of the accessories	11
	Figure 2 – Examples of terminals	16
	Figure 3 – Standard test finger.....	31
	Figure 4 – Gauge “A” for checking shutters	33
	Figure 5 – Gauge “B” for checking shutters	34
	Figure 6 – Gauges for testing insertability of round unprepared conductors having the maximum specified cross-section.....	41
	Figure 7 – Equipment test arrangement	43
	Figure 8 – Apparatus for checking the withdrawal force	47
	Figure 9 – Verification of the latching device.....	48
	Figure 10 – Circuit diagrams for breaking capacity and normal operation tests	61
	Figure 11 – Apparatus for testing the cable anchorage	66
	Figure 12 – Ball Impact test	68
	Figure 13 – Arrangement for mechanical strength test for plugs and vehicle connectors	70
	Figure 14 – Apparatus for flexing test	71
	Figure 15 – Diagram of the test circuit for the verification of short-circuit current withstand of a two-pole equipment on a single-phase a.c. or d.c.	81
	Figure 16 – Diagram of the test circuit for the verification of short-circuit current withstand of a three-pole equipment	82
	Figure 17 – Diagram of the test circuit for the verification of short-circuit current withstand of a four-pole equipment	83
	Table 1 – Compatibility of mating accessories at vehicle.....	22
	Table 2 – Overview of the universal vehicle interface.....	23
	Table 3 – Overview of the basic vehicle interface.....	24
	Table 4 – Overview of the d.c. vehicle interface	25
	Table 5 – Overview of the combined a.c./d.c. vehicle interface	26
	Table 6 – Short-time test currents	36
	Table 7 – Size for conductors	37
	Table 8 – Values for flexing under mechanical load test.....	44
	Table 9 – Value for terminal pull test.....	45
	Table 10 – Withdrawal force with respect to ratings	49
	Table 11 – Cable length used to determine pull force on retaining means	51
	Table 12 – Gauges to measure withdrawal force.....	54
	Table 13 – Diameter of pins of the test plug.....	54
	Table 14 – Maximum withdrawal force	55
	Table 15 – Test voltage for dielectric strength test.....	59
	Table 16 – Breaking capacity.....	62

Table 17 – Normal operation.....	63
Table 18 – Test current and nominal cross-sectional areas of copper conductors for temperature rise test.....	64
Table 19 – Pull force and torque test values for cable anchorage.....	67
Table 20 – Impact energy for ball impact test.....	69
Table 21 – Mechanical load flexing test	71
Table 22 – Torque test values for glands	72
Table 23 – Pulling force on insulated end caps	73
Table 24 – Tightening torque for verification of mechanical strength of screw-type terminals.....	74

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PLUGS, SOCKET-OUTLETS, VEHICLE
CONNECTORS AND VEHICLE INLETS –
CONDUCTIVE CHARGING OF ELECTRIC VEHICLES –****Part 1: General requirements**

FOREWORD

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International Standard IEC 62196-1 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 2011 and constitutes a technical revision.

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

- a) addition of a preferred operating voltage of 1 000 V d.c.;
- b) addition of a preferred rated current of 80 A d.c.;
- c) addition of a provision for a combined interface a.c./d.c.;
- d) description of d.c. configurations (previously under consideration);

- e) addition of requirements pertaining to the locking mechanism, the interlock and the latching device;
- f) addition of a test for accessories not suitable for making and breaking an electrical circuit under load;
- g) addition of requirements and tests for insulated end caps.

The text of this standard is based on the following documents:

FDIS	Report on voting
23H/302/FDIS	23H/305/RVD

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

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

A list of all the parts in the IEC 62196 series, under the general title *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles*, can be found on the IEC website.

Subsequent parts of IEC 62196 deal with the requirements of particular types of accessories. The clauses of these particular requirements supplement or modify the corresponding clauses in Part 1.

In this standard, the following print types are used:

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- *test specifications*: in italic type; <https://standards.iteh.ai/catalog/standards/sist/722d8302-eab6-4432-b73e-ee48cd175940/iec-62196-1-2014>
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The committee has decided that the contents of this publication 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.

INTRODUCTION

IEC 61851-1 specifies electric vehicle conductive charging equipment.

The IEC 62196 series specifies the requirements for plugs, socket-outlets, vehicle connectors, vehicle inlets and cable assemblies as described in IEC 61851-1.

Some charging can be achieved by direct connection from an electric vehicle to common mains socket-outlets.

Some modes of charging require a dedicated supply and charging equipment incorporating control and communication circuits.

IEC 62196 covers the mechanical, electrical and performance requirements for dedicated plugs, socket outlets, vehicle connectors and vehicle inlets for interfacing between such dedicated charging equipment and the electric vehicle.

IEC 62196 is divided into several parts as follows:

- Part 1: General requirements, comprising clauses of a general character.
- Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories.
- Part 3¹: Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contact-tube vehicle couplers.

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¹ To be published

PLUGS, SOCKET-OUTLETS, VEHICLE CONNECTORS AND VEHICLE INLETS – CONDUCTIVE CHARGING OF ELECTRIC VEHICLES –

Part 1: General requirements

1 Scope

This part of IEC 62196 is applicable to plugs, socket-outlets, vehicle connectors, vehicle inlets and cable assemblies for electric vehicles, herein referred to as “accessories”, intended for use in conductive charging systems which incorporate control means, with a rated operating voltage not exceeding

- 690 V a.c. 50 Hz to 60 Hz, at a rated current not exceeding 250 A,
- 1 500 V d.c. at a rated current not exceeding 400 A.

These accessories are intended to be installed by instructed persons (IEC 60050-195:1998, IEC 60050-195/AMD1:2001, 195-04-02) or skilled persons (IEC 60050-195:1998, IEC 60050-195/AMD1:2001, 195-04-01) only.

These accessories and cable assemblies are intended to be used for circuits specified in IEC 61851-1 which operate at different voltages and frequencies and which may include extra-low voltage and communication signals.

These accessories and cable assemblies are to be used at an ambient temperature between -30 °C and $+50\text{ °C}$.

NOTE 1 In some countries, other requirements may apply.

NOTE 2 the following countries, -35 °C applies: SE.

These accessories are intended to be connected only to cables with copper or copper-alloy conductors.

The accessories covered by this part of IEC 62196 are for use in certain modes of charging electric vehicles. These modes are defined in IEC 61851-1. These definitions and a description of the types of connection (cases A, B and C), are described in IEC 61851-1:2010, 6.2 and 6.3.1.

NOTE 3 In the following countries, mode 1 will not be allowed: UK, US, CA, SG.

This part of IEC 62196 does not apply to those standardised accessories used in charging systems where the use of such accessories constructed to the requirements of other standards is permitted (e.g. in mode 1 and mode 2). Such standardized accessories may be used for those situations (mode and case) identified in IEC 61851-1.

This part of IEC 62196 may be used as a guide for accessories with a lesser number of contacts and lower ratings for use with light duty vehicles.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 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, *Rubber insulated cables of 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 authorised persons (fuses mainly for industrial application) – Examples of standardized systems of fuses A to K*
- IEC 60309-4:2006, *Plugs, socket-outlets and couplers for industrial purposes – Part 4: Switched socket-outlets and connectors with or without interlock*
- IEC 60449, *Voltage bands for electrical installations of buildings*
- IEC 60529:1989, *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*
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- 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*
- IEC 60695-10-2, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test*
- IEC 61851-1:2010, *Electric vehicle conductive charging system – Part 1: General requirements*
- IEC 61851-23:2014, *Electric vehicle conductive charging system – Part 23: d.c. electric vehicle charging station*
- 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 purposes of this document, the terms and definitions given in IEC 61851-1:2010 as well as the following apply.

NOTE 1 Where the terms voltage and current are used, they imply r.m.s. values, unless otherwise specified.

NOTE 2 The application of accessories is shown in Figure 1.

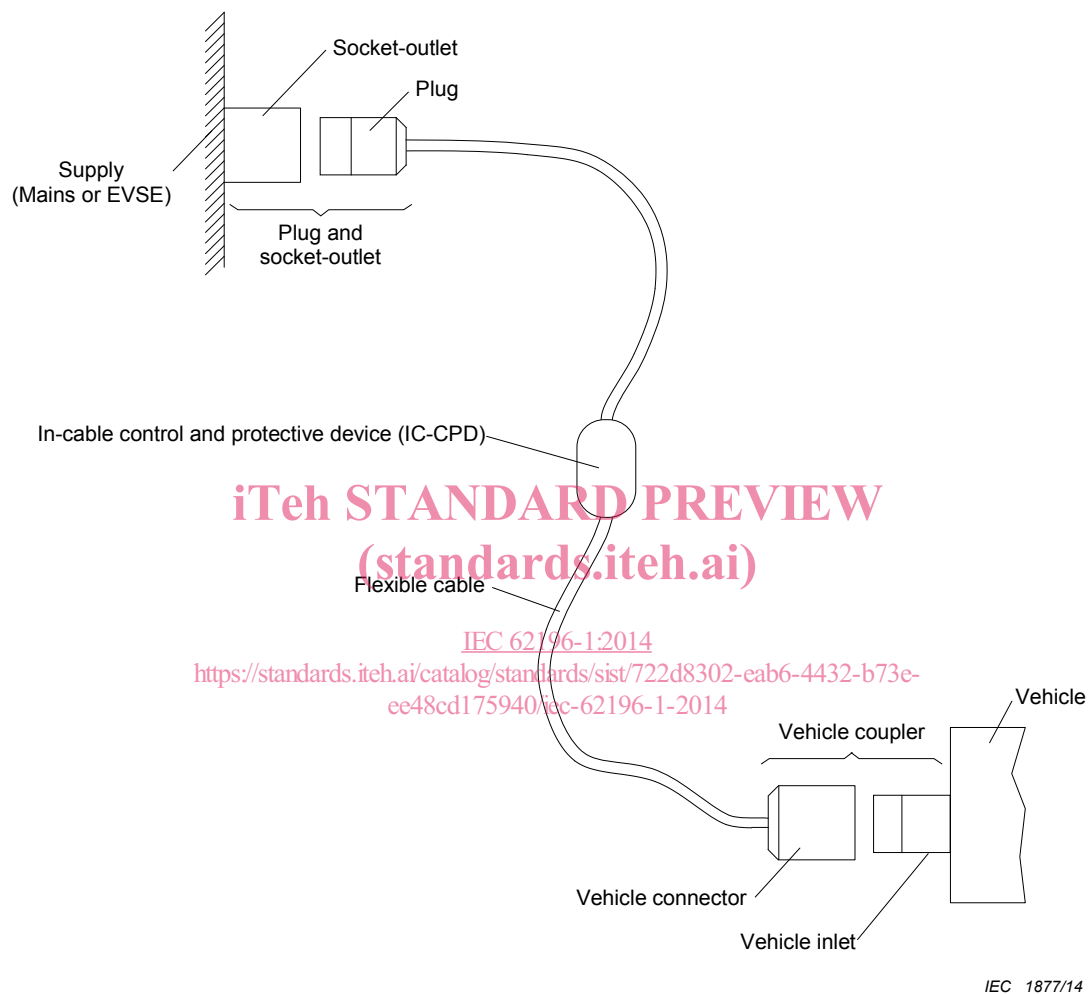


Figure 1 – Diagram showing the use of the accessories

3.1 cable assembly

piece of equipment that is used to establish the connection between the electric vehicle and the electric vehicle supply equipment

Note 1 to entry: A cable assembly may be either fixed to and included in one of these devices, or detachable. It includes the flexible cable, the vehicle connector and/or plug that are required for proper connection.

Note 2 to entry: A cable assembly may include one or more cables, with or without a fixed jacket, which may be in a flexible tube, conduit or wire way.

3.2 plug and socket-outlet

means enabling the connection at will of a flexible cable to fixed wiring

Note 1 to entry: It consists of two parts: a socket-outlet and a plug.

3.2.1

plug

part of a plug and a socket-outlet integral with or intended to be attached to one flexible cable connected to the electric vehicle or to a vehicle connector

Note 1 to entry: It may include mechanical, electrical or electronic components and circuitry, which perform control functions.

3.2.2

socket-outlet

part of a plug and a socket-outlet intended to be installed with the fixed wiring or incorporated in equipment

3.3

vehicle coupler

electric vehicle coupler

means enabling the connection at will of a flexible cable to an electric vehicle

Note 1 to entry: It consists of two parts: a vehicle connector and a vehicle inlet

3.3.1

vehicle connector

electric vehicle connector

part of a vehicle coupler integral with, or intended to be attached to, one flexible cable

3.3.2

vehicle inlet

electric vehicle inlet

part of a vehicle coupler incorporated in, or fixed to, the electric vehicle

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3.4

shutter

movable part incorporated into an accessory arranged to automatically shield at least the live contacts when the accessory is withdrawn from the complementary accessory

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[SOURCE: IEC 60884-1:2002, IEC 60884-1/AMD2:2013, 3.27, modified – "socket-outlet" has been replaced by "accessory" in order to cover socket-outlets, plugs, vehicle connectors and vehicle inlets.]

3.5

insulated end cap

part made of insulating material, located at the tip of a contact, ensuring a protection against access to hazardous parts with a standard test finger (IPXXB)

3.6

pilot contact

auxiliary electric contact for use in a control, signalling, monitoring or interlock function

Note 1 to entry: Pilot contact is not considered to be a pole.

[SOURCE: IEC 60309-4:2006, 2.108, modified – "signalling" has been added.]

3.7

compatibility

compatible

ability of accessories to join together and be functional

Note 1 to entry: Non-compatible accessories may physically join together, but not be functional.

3.8

interchangeability **interchangeable**

ability of an accessory to replace another, without any modification

Note 1 to entry: Interchangeable accessories generally have similar outer dimensions, fixing centres, etc.

3.9

retaining means

device (e.g. mechanical or electromechanical) which holds a plug or vehicle connector in position when it is in proper engagement, and prevents its unintentional withdrawal

EXAMPLE See standard sheets in IEC 62196-2 and -3.

3.10

latching device

part of the interlock mechanism provided to hold a plug in the socket-outlet or to hold a vehicle connector in the vehicle inlet and to prevent its intentional or unintentional withdrawal

EXAMPLE See standard sheets 2-II and 2-IIId in IEC 62196-2:2011 and 3-IIId in IEC 62196-3:2014.

3.11

locking mechanism

means intended to reduce the likelihood of tampering with, or an unauthorised removal, of the accessories

EXAMPLE A provision for padlocking.

3.12

interlock

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

3.13 Wiring

3.13.1

rewirable accessory

accessory so constructed that the cable or wiring can be replaced; it can be either a user-serviceable accessory or a field-serviceable accessory

3.13.2

non-rewirable accessory

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

EXAMPLE A plug which is integrally moulded to the cable is an example of non-rewirable accessory.

3.13.3

user-serviceable accessory

accessory so constructed that it can be rewired, or parts can be replaced, using commonly available tools and without having to replace individual parts of the accessory

EXAMPLE An ordinary plug, which can be disassembled and wired using a common screwdriver, is an example of user-serviceable accessory.