IEC 62196-1

Edition 3.0 2014-06

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

IEC 62196-1:2014-06(en-fr)

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CONTENTS

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:

– requirements proper: in roman type;

– *test specifications: in italic type*;

– notes: in smaller roman type.

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 3[1]: Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contact-tube vehicle couplers.

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 °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*

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.

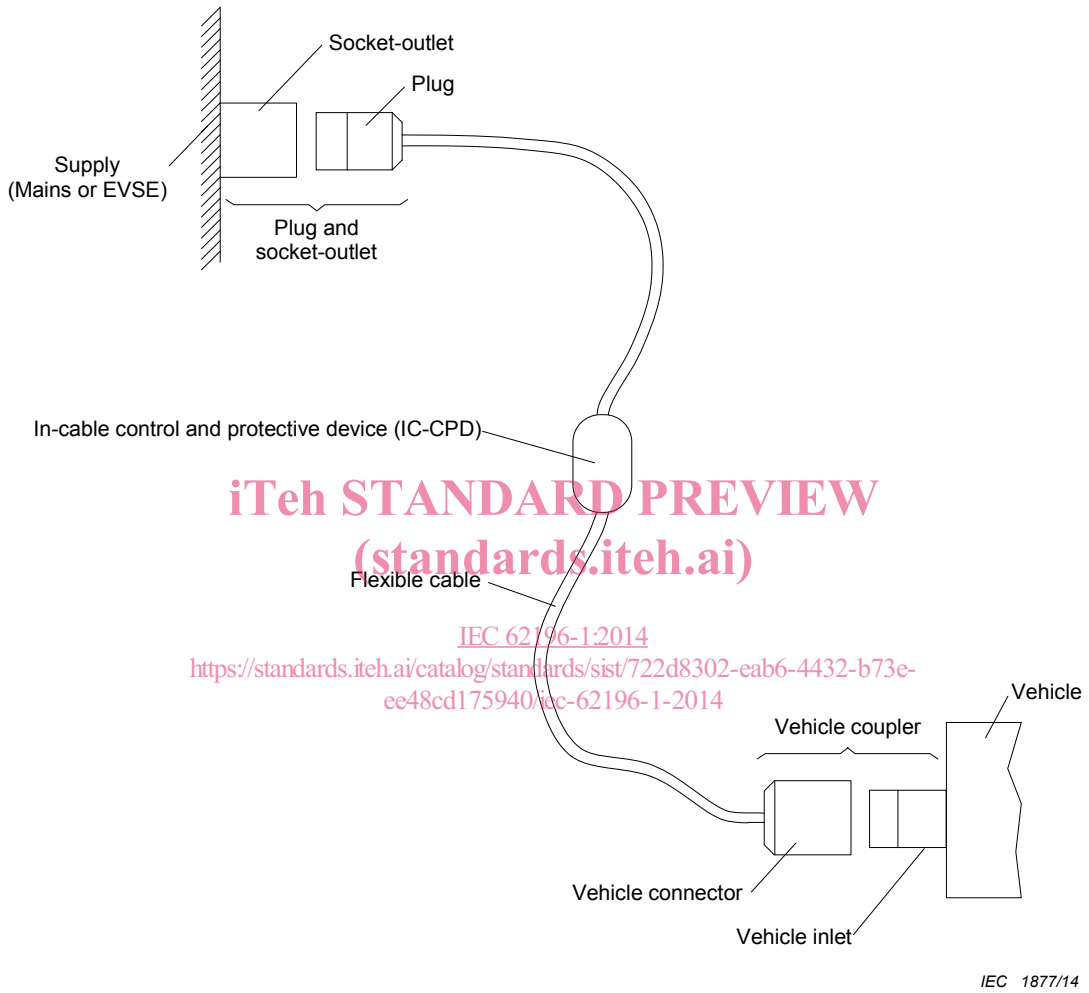

Figure 1 – Diagram showing the use of the accessories

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

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

[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-IIIc 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.