

INTERNATIONAL STANDARD



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

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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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CONTENTS

FOREWORD	7
INTRODUCTION	10
1 Scope	11
2 Normative references	11
3 Terms and definitions	13
4 General	25
4.1 General requirements	25
4.2 Components	26
4.2.1 Ratings	26
4.2.2 Mechanical assembly	26
4.2.3 Current-carrying parts of incorporated components	26
4.2.4 Electrical connections	26
4.3 General notes on tests	27
5 Ratings	27
5.1 Preferred rated operating voltage ranges	27
5.2 Preferred rated currents	28
5.2.1 General	28
5.2.2 Rated current for signal or control purposes	28
5.2.3 Accessories not suitable for making and breaking an electrical circuit under load	28
5.2.4 Accessories suitable for, or not suitable for, making and breaking an electrical circuit under load	29
6 Connection between the power supply and the electric vehicle	29
6.1 General	29
6.2 Types of vehicle inlets	29
6.3 Types of vehicle connectors	29
6.4 Universal interface	29
6.5 Basic interface	29
6.6 D.C. configurations	29
6.7 Combined interface	29
6.8 Contact sequencing	29
6.1 Interfaces	34
6.2 Basic interface	35
6.3 DC interface	35
6.4 Combined interface	35
7 Classification of accessories	35
7.1 According to purpose	35
7.2 According to the method of connecting the conductors	35
7.3 According to serviceability	35
7.4 According to electrical operation	35
7.5 According to interface	35
7.6 According to use with cable management systems	35
7.7 According to the locking and interlock functions:	35
7.6 According to locking facilities	35
7.7 According to interlock facilities	36
7.8 According to the presence of shutter(s)	36

8	Marking	36
9	Dimensions	38
10	Protection against electric shock	39
10.1	General	39
10.2	Accessories with shutters	41
10.3	Contact sequencing and order of contact insertion and withdrawal	46
10.4	Misassembly	47
11	Size and colour of protective earthing and neutral conductors	47
12	Provisions for protective earthing	48
13	Terminals	51
13.1	Common requirements	51
13.2	Screw type terminals	53
13.3	Mechanical tests on terminals	55
14	Interlocks	59
14.1	Accessories with interlock	59
14.2	Accessories with integral switching device	66
14.3	Control circuit devices and switching elements	66
14.4	Pilot contacts and auxiliary circuits	67
15	Resistance to ageing of rubber and thermoplastic material	67
16	General construction	67
17	Construction of EV socket-outlets – General	71
	17.1 General	71
	17.2 Contact tubes	71
18	Construction of EV plugs and vehicle connectors	73
19	Construction of vehicle inlets	74
20	Degrees of protection	75
21	Insulation resistance and dielectric strength	76
22	Breaking capacity	77
23	Normal operation	81
23.1	Mechanical, electrical, and thermal stresses and contaminants	81
23.2	Load endurance test	82
23.3	No-load endurance test	83
23.4	Lid springs	84
24	Temperature rise	84
25	Flexible cables and their connection	86
25.1	Strain relief	86
25.2	Requirements for EV plugs and vehicle connectors	86
25.2.1	Non-rewirable EV plugs and vehicle connectors	86
25.2.2	Rewirable EV plugs and vehicle connectors	86
25.3	EV plugs and vehicle connectors provided with a flexible cable	87
26	Mechanical strength	90
26.1	General	90
26.2	Degree of protection Ball impact	91
26.3	Rewirable plugs and vehicle connectors Drop test	94
26.4	Non-rewirable accessories Flexing test	95
26.5	Cable gland test	97

26.6	Shutters	98
26.7	Insulated end caps	98
26.7.1	General.....	98
26.7.2	Insulated end caps – Change of temperature test	99
26.7.3	Insulated end caps – Pull test	99
27	Screws, current-carrying parts and connections	99
28	Creepage distances, clearances and distances through sealing compound	102
29	Resistance to heat, and to fire and to tracking	103
30	Corrosion and resistance to rusting.....	105
31	Conditional short-circuit current withstand test	105
31.1	General	105
31.2	Ratings and test conditions	105
31.3	Test circuit	106
31.4	Calibration.....	112
31.5	Test procedure	112
31.6	Behaviour of the equipment under test	113
31.7	Acceptance conditions.....	113
32	Electromagnetic compatibility	113
32.1	Immunity	113
32.2	Emission	113
33	Vehicle drive over	113
34	Thermal cycling.....	114
34.1	General	114
34.2	Initial temperature rise test	114
34.3	Thermal cycling test.....	114
34.4	Final temperature rise test	114
35	Humidity exposure	115
35.1	General	115
35.2	Initial temperature rise test	115
35.3	Humidity test	115
35.4	Final temperature rise test	115
36	Misalignment	115
36.1	General	115
36.2	Samples	116
36.3	Misalignment test	116
37	Contact endurance test	118
37.1	Equipment.....	118
37.2	Test sequence.....	119
37.3	Compliance	120
	Bibliography.....	122
	List of comments.....	124
	Figure 1 – Diagram showing the use of the accessories.....	15
	Figure 2 – Lug terminals.....	20
	Figure 3 – Standard test finger	20
	Figure 3 – Mantle terminals	20

Figure 4 – Pillar terminals.....	21
Figure 5 – Saddle terminals.....	23
Figure 6 – Screw-type terminals	23
Figure 7 – Stud terminals	24
Figure 8 – Test piston	38
Figure 9 – Gauge "A" for checking shutters.....	44
Figure 10 – Gauge "B" for checking shutters	46
Figure 11 – Gauges for testing insertability of round unprepared conductors having the maximum specified cross-section.....	54
Figure 12 – Equipment test arrangement.....	56
Figure 13 – Apparatus for checking the withdrawal force	63
Figure 14 – Verification of the latching device	65
Figure 15 – Circuit diagrams for breaking capacity and normal operation tests.....	80
Figure 16 – Points of measurement	85
Figure 17 – Apparatus for testing the cable anchorage	89
Figure 18 – Ball impact test.....	92
Figure 19 – Arrangement for mechanical strength test for EV plugs and vehicle connectors.....	94
Figure 20 – Apparatus for flexing test.....	97
Figure 21 – Diagram of the test circuit for the verification of short-circuit current withstand of two-pole equipment on a single-phase AC or DC.....	108
Figure 22 – Diagram of the test circuit for the verification of short-circuit current withstand of three-pole equipment	110
Figure 23 – Diagram of the test circuit for the verification of short-circuit current withstand of four-pole equipment.....	112
Figure 24 – Overview of the mechanical load test.....	117
Figure 25 – Application of external mechanical load (mounted according to Figure 24).....	117
Figure 26 – Temperature rise criteria under external mechanical load.....	118
Figure 27 – Forced-air circulating oven	118
Figure 28 – Thermal cycling	120
Figure 29 – Pass/fail based on temperature rise criteria	121
Table 1 – Compatibility of mating accessories at vehicle
Table 2 – Overview of the universal vehicle interface
Table 3 – Overview of the basic vehicle interface
Table 4 – Overview of the d.c. vehicle interface
Table 5 – Overview of the combined a.c./d.c. vehicle interface
Table 1 – Size for conductors	48
Table 2 – Short-time test currents.....	50
Table 3 – Values for flexing under mechanical load test	58
Table 4 – Value for terminal pull test.....	59
Table 5 – Withdrawal force with respect to ratings.....	66
Table 6 – Cable length used to determine pull force on retaining means	69
Table 7 – Test voltage for dielectric strength test	77
Table 8 – Breaking capacity	81

Table 9 – Normal operation	83
Table 10 – Test current and nominal cross-sectional areas of copper conductors for temperature rise test	85
Table 11 – Pull force and torque test values for cable anchorage.....	90
Table 12 – Gauges to measure withdrawal force
Table 13 – Diameter of pins of the test plug
Table 14 – Maximum withdrawal force
Table 12 – Summary of mechanical tests	90
Table 13 – Impact energy for ball impact test	93
Table 14 – Mechanical load flexing test.....	95
Table 15 – Torque test values for glands	98
Table 16 – Pulling force on insulated end caps.....	99
Table 17 – Tightening torque for verification of mechanical strength of screw-type terminals.....	100

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[IEC 62196-1:2022](#)

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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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This commented version (CMV) of the official standard IEC 62196-1:2022 edition 4.0 allows the user to identify the changes made to the previous IEC 62196-1:2014 edition 3.0. Furthermore, comments from IEC SC 23H experts are provided to explain the reasons of the most relevant changes.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

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. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2014. This edition constitutes a technical revision.

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

- a) deletion of references to universal AC and DC interfaces;
- b) additional requirements for contact materials and plating;
- c) changes to the temperature rise test to include additional points of measurement;
- d) additional tests for accessories to address thermal stresses and stability, mechanical wear and abuse, and exposure to contaminants;
- e) relocation of information and requirements for DC charging to IEC 62196-3.

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

Draft	Report on voting
23H/499/FDIS	23H/503/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.

A list of all parts in the IEC 62196 series, published 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 those particular requirements supplement or modify the corresponding clauses in this document.

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

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

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INTRODUCTION

IEC 61851-~~1~~⁴ (all parts) specifies requirements for electric vehicle (EV) conductive charging ~~equipment~~ systems.

IEC 62196 (all parts) specifies the requirements for plugs, socket-outlets, vehicle connectors, vehicle inlets and cable assemblies as described in the IEC 61851-~~1~~⁴ series.

Some charging can be achieved by direct connection from an electric vehicle to ~~common-mains~~ standard socket-outlets connected to a supply network (mains or electrical grid).

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

IEC 62196 (all parts) covers the mechanical, electrical and performance requirements for ~~dedicated~~ plugs, socket-outlets, vehicle connectors and vehicle inlets for ~~interfacing between such dedicated charging~~ the connection between the EV supply equipment and the electric vehicle.

The IEC 62196 series consists of the following parts:

- Part 1: General requirements, comprising clauses of a general character.
- Part 2: Dimensional compatibility and interchangeability requirements for AC pin and contact-tube accessories.
- Part 3⁴: Dimensional compatibility and interchangeability requirements for DC and AC/DC pin and contact-tube vehicle couplers.
- Part 3-1: Vehicle connector, vehicle inlet and cable assembly intended to be used with a thermal management system for DC charging.
- Part 4²: Dimensional compatibility and interchangeability requirements for DC pin and contact-tube accessories for Class II or Class III applications.
- Part 6: Dimensional compatibility and interchangeability requirements for DC pin and contact-tube couplers for applications using a system of protective electrical separation.

⁴ ~~To be published~~

² Pending publication.

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 EV plugs, EV **1** socket-outlets, vehicle connectors, vehicle inlets, herein referred to as "accessories", and to cable assemblies for electric vehicles (EV) intended for use in conductive charging systems which incorporate control means, with a rated operating voltage not exceeding:

- 690 V AC 50 Hz to 60 Hz, at a rated current not exceeding 250 A;
- 1 500 V DC at a rated current not exceeding ~~400~~ 800 A **2**.

These accessories and cable assemblies are intended to be installed by instructed persons (IEV 195-04-02) or skilled persons (IEV 195-04-01) only.

These accessories and cable assemblies are intended to be used for circuits specified in IEC 61851-4 (all parts), which operate at different voltages and frequencies, and which ~~may~~ can include extra-low voltage and communication signals.

These accessories and cable assemblies are intended to be used at an ambient temperature between -30 °C and $+50\text{ °C}$ **3**.

NOTE 1 In some countries, other requirements ~~may~~ can apply.

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

NOTE 3 The manufacturer can enlarge the temperature range on the condition that the specified range information is provided.

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

The accessories covered by this document are ~~for use in certain modes of charging electric vehicles~~ intended for use in electric vehicle supply equipment in accordance with IEC 61851 (all parts). ~~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.~~

This document 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)~~ standard plug and socket-outlets used for mode 1 and mode 2 according to IEC 61851-1:2017, 6.2. ~~Such standardized accessories may be used for those situations (mode and case) identified in IEC 61851-1.~~

NOTE 4 In the following countries, mode 1 ~~will not be~~ is not allowed: UK, US, CA, SG.

~~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 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 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

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 – 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 60309-4:2006/2021, *Plugs, fixed or portable socket-outlets and ~~couplers~~ appliance inlets 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 60529:1989/AMD1:1999

IEC 60529:1989/AMD2:2013

IEC 60664-1:2007/2020, *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 60947-3:2020, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 60947-5-1, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

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

IEC 61058-1:2016, *Switches for appliances – Part 1: General requirements*