IEC TS 62196-4

Edition 1.0 2022-10

TECHNICAL SPECIFICATION

Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 4: Dimensional compatibility and interchangeability requirements for DC pin and contact-tube accessories for Class II or Class III applications

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 29.120.30; 43.120

ISBN 978-2-8322-5370-0

Warning! Make sure that you obtained this publication from an authorized distributor.

® Registered trademark of the International Electrotechnical Commission

CONTENTS

FOREWORD 3
INTRODUCTION 5
1 Scope 6
2 Normative references 6
3 Terms and definitions 7
4 General 7
5 Ratings 7
6 Connection between the power supply and the electric vehicle 8
7 Classification of accessories 10
8 Marking 10
9 Dimensions 10
10 Protection against electric shock 10
11 Size and colour of protective earthing conductors 11
12 Provisions for protective earthing 11
13 Terminals 12
14 Interlocks 12
15 Resistance to ageing of rubber and thermoplastic material 12
16 General construction 12
17 Construction of socket-outlets 12
18 Construction of plugs and of vehicle connectors 13
19 Construction of vehicle inlets 13
20 Degrees of protection 13
21 Insulation resistance and dielectric strength 13
22 Breaking capacity 14
23 Normal operation 14
24 Temperature rise 14
25 Flexible cables and their connection 14
26 Mechanical strength 14
27 Screws, current-carrying parts and connections 15
28 Creepage distances, clearances and distances 15
29 Resistance to heat, to fire and to tracking 15
30 Corrosion and resistance to rusting 15
31 Conditional short-circuit current withstand test 15
32 Electromagnetic compatibility 15
33 Vehicle driveover 15
STANDARD SHEETS 4-I 16
STANDARD SHEETS 4-II 24
STANDARD SHEETS 4-III 37
STANDARD SHEETS 4-IV 45
Bibliography 56

Table 401 – Overview of the rated voltages and currents 8
Table 402 – Overview of the DC vehicle coupler 9

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

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

Part 4: Dimensional compatibility and interchangeability requirements for DC pin and contact-tube accessories for Class II or Class III applications

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC TS 62196-4 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 a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
23H/382/DTS	23H/385B/RVDTS 23H/385A/RVDTS 23H/385/RVDTS

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 Technical Specification 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/publications.

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.

This part of IEC 62196 is to be read in conjunction with IEC 62196-1:2014. The clauses of the particular requirements in Part 4 supplement or modify the corresponding clauses in Part 1. Where the text indicates an "addition" to or a "replacement" of the relevant requirement, test specification or explanation of Part 1, these changes are made to the relevant text of Part 1, which then becomes part of the standard.

Subclauses, figures, tables or notes which are additional to those in IEC 62196-1 are numbered starting from 401.

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.

INTRODUCTION

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

Some conductive transfer of electric power can be achieved by direct connection from an electric vehicle to common mains socket-outlets.

IEC 62196-4 covers the mechanical, electrical and performance requirements for dedicated accessories for conductive transfer of electric power between the supply network and a light electric road vehicle according to IEC TS 61851-3 (all parts).

IEC 62196 is divided into several 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 3: Dimensional compatibility and interchangeability requirements for DC and AC/DC pin and contact-tube vehicle couplers;
- Part 4: Dimensional compatibility and interchangeability requirements for dedicated DC pin and contact-tube accessories for Class II or Class III applications.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent no. EP1537632 B1 concerning Standard sheets 4-I.

IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from:

Rosenberger Hochfrequenztechnik GmbH & Co. KG

Hauptstraße 1, 83413 Fridolfing, Germany

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

Part 4: Dimensional compatibility and interchangeability requirements for DC pin and contact-tube accessories for Class II or Class III applications

1 Scope

This part of IEC 62196 is applicable to plugs, socket-outlets, vehicle connectors and vehicle inlets, herein referred to as “accessories”, of standardized configuration for DC power supply of electric road vehicles, where the protection against electric shocks relies on double or reinforced insulation between all AC and DC inputs and outputs of the EV supply equipment, intended for use in conductive power supply systems which can incorporate control means, with a maximum operating voltage up to 120 V DC, not exceeding 60 A.

These accessories are intended to be used for circuits specified in IEC 61851-3 (all parts).

The accessories covered by this part of IEC 62196 are intended to be used only with electric vehicles that provide a vehicle power supply circuit with double or reinforced insulation or battery systems covered by IEC 61851-3 (all parts).

These accessories and cable assemblies are intended to be used in an ambient temperature of between −30 °C and +50 °C.

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

2 Normative references

Clause 2 of IEC 62196-1:2014 applies except as follows:

Addition:

NOTE All EMC related standard references are given in IEC 61851-21-1 and IEC 61851-21-2.

IEC TS 61851-3-1:–[1], *Electric vehicle conductive charging system – Part 3-1: DC EV supply equipment where protection relies on double or reinforced insulation – General rules and requirements for stationary equipment*

IEC TS 61851-3-2:–[2], *Electric vehicle conductive charging system – Part 3-2: DC EV supply equipment where protection relies on double or reinforced insulation – Particular requirements for portable and mobile equipment*

IEC TS 61851-3-4:–[3], *Electric vehicle conductive charging system – Part 3-4: DC EV supply equipment where protection relies on double or reinforced insulation – General definitions and requirements for CANopen communication*

_____

1 Under preparation. Stage at the time of publication: IEC DTS 61851-3-1:2022.

2 Under preparation. Stage at the time of publication: IEC DTS 61851-3-2:2022.

3 Under preparation. Stage at the time of publication: IEC TS 61851-3-4:2022.

IEC 61851-21-1, *Electric vehicle conductive charging system – Part 21-1 Electric vehicle on-board charger EMC requirements for conductive connection to AC/DC supply*

ISO 17409, *Electrically propelled road vehicles – Connection to an external electric power supply – Safety requirements*