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TECHNICAL SPECIFICATION

Vehicle connector, vehicle inlet and cable assembly for megawatt DC charging

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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IEC TS 63379 has been prepared by subcommittee 23H: Plugs, socket-outlets and couplers for industrial and similar applications, and for electric vehicles, of IEC technical committee TC 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/574/DTS	23H/590/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.

This document is to be read in conjunction with IEC 62196-1:2022 and IEC 62196-3:2022. The clauses of the particular requirements supplement or modify the corresponding clauses in IEC 62196-1 or IEC 62196-3. Where the text indicates an "addition" to or a "replacement" of the relevant requirement, test specification or explanation of IEC 62196-1 or IEC 62196-3, these changes are made to the relevant text of IEC 62196-1 or IEC 62196-3, which then becomes part of the standard.

Subclauses, figures, tables or notes which are additional to those in IEC 62196-1 or IEC 62196-3 are numbered starting from 100.

In this document, the following print types are used:

– requirements proper: in roman type;

– *test specifications: in italic 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– withdrawn, or

– revised.

INTRODUCTION

Responding to global challenges of CO2 reduction and energy safety, the automobile industries have been accelerating the development and commercialization of electric vehicles (EV) and hybrid electric vehicles. Plug-in hybrid electric vehicles and battery electric vehicles are all mass-marketed today and continue to gain market share in all vehicle categories. To support the broad diffusion of such vehicles, this document provides the standard interface configurations of vehicle couplers and accessories to be used in conductive charging of electric vehicles, taking the most frequent charging situations into consideration.

To meet the market demand for instance the Truck and Bus industry to quickly charge electric heavy-duty vehicles within a reasonable time, a new solution for high-power commercial vehicle charging is needed. Enabling rapid charging of these expensive assets increases vehicle flexibility and enables fleet owners to optimize their total cost of ownership (TCO). Other industries will also benefit from this quick charging solution. Other electric vehicles can also use this charging system to fulfil their high-power charging needs. All of these applications will focus on power in the range of 1 MW and above, which implies cooling measures and direct current usage only.

In order to enable this charging rate, batteries with larger capacities are integrated. To rapidly charge those large-capacity batteries, overall charging power is increased. In order to boost the charging power, both charging voltage and current need are increased. The larger charging current implies either larger conductor cross-sections for the cable assembly, according to existing standards, or additional measures in the cable assembly. A mandatory use of a handling support for these accessories is not necessary.

The large conductor cross sections that are required according to the existing design requirements and test methods result in significantly thicker and heavier cable assemblies. These are difficult to handle and thus less desirable for public use. Therefore, to improve the usability of charging systems this document makes use of thermal management techniques to enhance the performance of the accessories.

For the future, the application of automated charging by using auxiliary machines is an option which is considered when defining the geometrical and mechanical boundaries.

This document provides definitions, requirements, and tests for EV couplers, which supports backward compatibility to definitions, requirements and tests according to IEC 62196 series.

1 Scope

This document is applicable to vehicle couplers with pins and contact-tubes of standardized configuration, herein also referred to as "accessories", and to cable assemblies intended for use in electric vehicle conductive charging systems which incorporate control means, with rated operating voltage not exceeding 1 500 V DC and a rated current up to and including 3 000 A that employ:

a) thermal sensing, or

b) thermal transport and thermal sensing,

with the system architecture described in 4.100.

These accessories and cable assemblies are used only in conductive charging systems for circuits specified in IEC 61851-23-3:20—.

These accessories are intended to be connected to cables according to IEC 62893-4-1 or IEC TS 62893-4-2.

As an option, these accessories are intended to operate with an automated connection means according to IEC 61851-27.

These accessories and cable assemblies are intended to be used at an ambient temperature between −30 °C and +40 °C.

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

NOTE Different materials for conductors need further consideration

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.

Clause 2 of IEC 62196-3:2022 applies, except as follows:

Additional normative references:

IEC 60216-5, *Electrical insulating materials - Thermal endurance properties - Part 5: Determination of relative temperature index (RTI) of an insulating material*

IEC 60364-4-41, *Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock*

IEC 60364-4-43:2023, *Low-voltage electrical installations - Part 4-43: Protection for safety - Protection against overcurrent*

IEC 60364-5-54:2011, *Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements and protective conductors*

IEC 60811-501, *Electric and optical fibre cables - Test methods for non-metallic materials – Part 501: Mechanical tests - Tests for determining the mechanical properties of insulating and sheathing compounds*

IEC 61851-23-3:20—, *Electric vehicle conductive charging system - Part 23-3: DC electric vehicle supply equipment for Megawatt charging systems*[1]

IEC TS 61851-27:20—, *Electric vehicle conductive charging system - Part 27: EV supply equipment with automated connection of a vehicle coupler according to IEC 62196-2 or IEC 62196-3*[2]

IEC 62196-1:2022, *Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements*

IEC 62196-3:2022, *Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 3: Dimensional compatibility requirements for DC and AC/DC pin and contact-tube vehicle couplers*

IEC 62893-4-1, *Charging cables for electric vehicles of rated voltages up to and including 0,6/1 kV - Part 4-1: Cables for DC charging according to mode 4 of IEC 61851-1 - DC charging without use of a thermal management system*

IEC TS 62893-4-2, *Charging cables for electric vehicles of rated voltages up to and including 0,6/1 kV - Part 4-2: Cables for DC charging according to mode 4 of IEC 61851-1 - Cables intended to be used with a thermal management system*

ISO/IEC 11801-1:2017*, Information technology, Generic cabling for customer premises – Part 1: General requirements*

ISO 2719:2016*, Determination of flash point - Pensky-Martens closed cup method*

ISO 20457:2018*, Plastics moulded parts - Tolerances and acceptance conditions*

ISO 5474-3:2024, *Electrically propelled road vehicles - Functional and safety requirements for power transfer between vehicle and external electric circuit - Part 3: DC power transfer*

ISO 25178-1:2016, *Geometrical product specifications (GPS) - Surface texture: Areal - Part 1: Indication of surface texture*

ANSI/UL 746B*, Standard for Polymeric Materials - Long Term Property Evaluations*

IEEE 802.3*, IEEE Standard for Ethernet*

OECD Guidelines for the Testing of Chemicals, Section 3, Test No. 301: Ready Biodegradability, 17 July 1992

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[1] Under preparation. Stage at the time of publication: IEC RFDIS 61851-23-3:2026.

[2] Under preparation. Stage at the time of publication: IEC BPUB 61851-27:2026.

Bibliography

IEC 60216-1, *Electrical insulating materials - Thermal endurance properties - Part 1: Ageing procedures and evaluation of test results*

IEC 61851-24, *Electric vehicle conductive charging system - Part 24: Digital communication between a DC EV supply equipment and an electric vehicle for control of DC charging*

IEC 62196 (all parts), *Plugs, socket-outlets, vehicle connectors and vehicle inlets*

IEC Guide 117:2010, *Electrotechnical equipment - Temperatures of touchable hot surfaces*

ISO 4032, *Fasteners - Hexagon regular nuts (style 1)*

ISO 4762:2004, *Hexagon socket head cap screws*

ISO 7089:2000, *Plain washers - Normal series - Product grade A*

ISO 13715, *Technical product documentation - Edges of undefined shape - Indication and dimensioning*

DIN 6796:2009-08, *Conical spring washers for bolted connections*

DIN 7349:2009-08, *Plain washers for bolts with heavy clamping sleeves*

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