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TECHNICAL SPECIFICATION

Electric vehicle conductive charging system -
Part 27: EV supply equipment with automatic docking of a vehicle coupler according to IEC 62196-2, IEC 62196-3 or IEC TS 62196-3-1

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IEC TS 61851-27 has been prepared by IEC technical committee 69: Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks. It is a Technical Specification.

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

Draft	Report on voting
69/1109/DTS	69/1126/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.

In this document, the following print type is used: *test specifications: in italic type*.

A list of all parts in the IEC 61851 series, published under the general title *Electric vehicle conductive charging system,* can be found on the IEC website.

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– withdrawn, or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

This part of the IEC 61851 series provides requirements for EV supply equipment with automatic docking for the transfer of electric energy between EV supply equipment and electric road vehicles. The vehicle and the EV supply equipment make up a complete system that is covered by a number of IEC and ISO Standards.

Automatic docking is indispensable for autonomous vehicles, and it is also helpful for disabled users of electric vehicles and for all users of electric vehicles seeking additional comfort. In the case of public electric vehicle supply equipment, automatic docking can also provide a convenient solution for queued vehicles, through automatic electric vehicle supply equipment that is either fully mobile or movable on rails. Automatic docking can increase the number of electric vehicles that are available to the grid to provide grid services.

Within the IEC 61851 series, the following documents cover different aspects of automatic docking:

– IEC 61851-23-1[1]: DC electric vehicle charging station with an automated connection device;
– IEC TS 61851-26: EV supply equipment with automatic docking of a vehicle coupler located at the underbody of an electric vehicle;
– IEC TS 61851-28[2]: Communication between EV supply equipment with automatic docking and vehicles.

Automatic docking enables conductive energy transfer at the complete range of voltage and current as specified in the following documents:

– IEC 61851-1: General requirements, which is a system standard that serves as a basis for all the subsequent standards in the series; it is the product standard for mode 3 EV supply equipment;
– IEC 61851-23: DC electric vehicle supply equipment;
– IEC 61851-23-3[3]: DC electric vehicle supply equipment for megawatt charging systems.

At the time of publication of this document, automatic conductive energy transfer is still in an early development stage. The intention of this document is to guide further development of the technology. As a Technical Specification, it is possible that this document does not yet contain the full specification for interoperability as needed especially for public applications.

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1 Under preparation. Stage at the time of publication: IEC/CCDV 61851-23-1:2025.

2 Under preparation. Stage at the time of publication: IEC TS/ACD 61851-28:2024.

3 Under preparation. Stage at the time of publication: IEC/CCDV 61851-23-3:2025.

1 Scope

This document, in combination with IEC 61851-1 or IEC 61851-23, gives the requirements for EV supply equipment with automatic docking and undocking functions (aEVSE) of a vehicle coupler according to IEC 62196-2, IEC 62196-3 or IEC TS 62196-3-1 for power transfer with electrically propelled road vehicles according to ISO TS 5474-5.

Use of aEVSE with the megawatt charging system is under consideration.

NOTE 1 Where this document refers to IEC 61851-23 and IEC 62196-3 or IEC TS 62196-3-1, it is intended to alternatively use IEC 61851-23-3 and IEC TS 63379[4].

This document provides requirements for aEVSE with a single vehicle connector.

Requirements for aEVSE with more than one vehicle connector are under consideration.

This document only applies to aEVSE with automatic couplers of category 1, which use a vehicle coupler defined by IEC 62196-2, IEC 62196-3 or IEC TS 62196-3-1.

NOTE 2 Category 1 is planned to also include the use of an electro-mechanical interface defined by IEC TS 63379.

This document only specifies automatic conductive energy transfer using a vehicle connector and a vehicle inlet; it does not specify automatic conductive power transfer using a plug and a socket-outlet.

This document does not apply to aEVSE with automatic couplers of category 2, which use an electro-mechanical interface defined by EN 50696.

NOTE 3 Category 2 is planned to also include the use of an electro-mechanical interface defined by IEC 63407[5].

This document does not apply to aEVSE with automatic coupler of category 3 (see IEC TS 61851-26).

NOTE 4 Category 3 is planned to use the electro-mechanical interface for AC up to 22 kW defined by IEC TS 63644[6]. Another document that extends category 3 and defines an electro-mechanical interface for combined AC/DC power transfer is under consideration.

EMC requirements for EV supply equipment are defined in IEC 61851-21-2.

Interoperable communication for docking and undocking between an aEVSE and an EV, extending the communication between an EV supply equipment and an EV as specified in IEC 61851-1, IEC 61851-23, IEC 61851-24 and the ISO 15118 series, is under consideration.

NOTE 5 Where this document refers to "interoperable communication for docking and undocking", it is intended to use communication according to IEC TS 61851-28. However, at the time of publication of this document, IEC TS 61851-28 has not yet reached sufficient maturity to be normatively referenced.

This document does not cover all safety aspects related to maintenance.

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4 Under preparation. Stage at the time of publication: IEC TS/CDTS 63379:2025.

5 Under preparation. Stage at the time of publication: IEC/CCDV 63407:2024.

6 Under preparation. Stage at time of publication: IEC TS/ACD 63644:2025.

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 60364-7-722, *Low-voltage electrical installations - Part 7-722: Requirements for special installations or locations - Supplies for electric vehicles*

IEC 61851-1, *Electric vehicle conductive charging system - Part 1: General requirements*

IEC 61851-23:2023, *Electric vehicle conductive charging system - Part 23: DC electric vehicle supply equipment*

IEC 62196-2, *Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility requirements for AC pin and contact-tube accessories*

IEC 62196-3, *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 TS 62196-3-1, *Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 3-1: Vehicle connector, vehicle inlet and cable assembly for DC charging intended to be used with a thermal management system*

ISO TS 5474-5:2024, *Electrically propelled road vehicles - Functional requirements and safety requirements for power transfer between vehicle and external electric circuit - Part 5: Automatic conductive power transfer*

ISO 10218-1, *Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots*

ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction*

ISO TS 15066:2016, *Robots and robotic devices - Collaborative robots*

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[2] IEC 60050-195, *International Electrotechnical Vocabulary (IEV) - Part 195: Earthing and protection against electric shock, available at www.electropedia.org*

[3] IEC 60204-1, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

[4] IEC 61851-23-1, *Electric vehicle conductive charging system - Part 23-1: DC electric vehicle supply equipment - Automated connection device*[9]

[5] IEC 61851-21-2, *Electric vehicle conductive charging system - Part 21-2: Electric vehicle requirements for conductive connection to an AC/DC supply - EMC requirements for off board electric vehicle charging systems*

[6] IEC 61851-23-3, *Electric vehicle conductive charging system - Part 23-3: DC electric vehicle supply equipment - Megawatt charging systems*[10]

[7] 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*

[8] IEC TS 61851-26, *Electric vehicle conductive charging system - EV supply equipment with automatic docking of a vehicle coupler located at the underbody of an electric vehicle*

[9] IEC TS 61851-28, *Electric vehicle conductive charging system - Part 28: Communication between automatic EV supply equipment and vehicles*[11]

[10] IEC 62196 (all parts), *Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles*

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

[12] IEC TS 63379, *Vehicle connector, vehicle inlet and cable assembly for megawatt DC charging*[12]

[13] IEC TS 63644, *Coupler for contact interface for automated connection device underbody (ACD-U) systems*[13]

[14] ISO 6707-1:2020, *Buildings and civil engineering works - Vocabulary - Part 1: General terms*

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9 Under preparation. Stage at the time of publication: IEC/CCDV 61851-23-1:2025.

10 Under preparation. Stage at the time of publication: IEC/CCDV 61851-23-3:2025.

11 Under preparation. Stage at the time of publication: IEC TS/ACD 61851-28:2024.

12 Under preparation. Stage at the time of publication: IEC TS/CDTS 63379:2025.

13 Under preparation. Stage at time of publication: IEC TS/ACD 63644:2025.

[15] IEC 63407, *Conductive charging of electric vehicles - Contact interface for automated connection device (ACD)*[14]

[16] ISO 9241 (all parts), *Ergonomics of human-system interaction*

[17] ISO TR 11065:1992, *Industrial automation glossary*

[18] ISO 12768-1, *Intelligent transport systems - Automated valet driving systems (AVDS) – Requirements, system framework, communication interfaces and test procedures* [15]

[19] ISO 14539:2000, *Manipulating industrial robots - Object handling with grasp-type grippers - Vocabulary and presentation of characteristics*

[20] ISO 15118 (all parts), *Road vehicles - Vehicle to grid communication interface*

[21] EN 842:1997, *Safety of machinery - Visual danger signals - General requirements, design and testing*
EN 842/AMD1:2008

[22] EN 50696, *Contact interface for automated connection device*

[23] ISO 10218-1:2011, *Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots*[16]

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[14] Under preparation. Stage at the time of publication: IEC/CCDV 63407:2024.

[15] Under preparation. Stage at the time of publication: ISO/CD 12768-1:2024.

[16] This publication has been withdrawn.