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Electric vehicle conductive charging system -
Part 23-1: DC electric vehicle supply equipment - Automated connection device

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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IEC 61851-23-1 has been prepared by IEC technical committee 69: Electric power/energy transfer systems for electrically propelled road vehicles and industrial trucks. It is an International Standard.

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

Draft	Report on voting
69/1127/FDIS	69/1133/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/publications.

This document is to be read in conjunction with IEC 61851-23:2023 and IEC 61851-1:2017.

The clauses of particular requirements in this document supplement or modify the corresponding clauses in IEC 61851-23:2023 and IEC 61851-1:2017. Where the text of subsequent clauses indicates an "addition", an "amendment" to or a "replacement" of the relevant requirement, test specification or explanation of IEC 61851-23:2023 or IEC 61851-1:2017, these changes are made to the relevant text of IEC 61851-23:2023 or IEC 61851-1:2017, which then becomes part of this document. Where no change is necessary, the words " IEC 61851-23:2023, [clause], is applicable " are used. The new clauses which are not included in IEC 61851-23:2023 have a clause number starting from 201, for example 3.201, 201.2, etc. Replaced tables and figures are numbered starting from 201. The new annexes of this document are numbered using triple-alphabet, for example Annex AAA to avoid confusion with the annexes of IEC 61851-23:2023. If the text in this document is to be read with IEC 61851-23:2023 and IEC 61851-1:2017, the following terms are replaced:

– "vehicle coupler", as defined by IEC 61851-1:2017, with "automatic coupler" as defined in Clause 3,
– "vehicle connector", as defined by IEC 61851-1:2017, with "part of the automatic coupler mounted on the EV supply equipment", and
– "vehicle inlet", as defined by IEC 61851-1:2017, with "part of the automatic coupler mounted on the EV".

In this document, the following print types are used:

– *test specifications: italic type.*
– notes: smaller roman 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 https://webstore.iec.ch/?ref=menu in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

The introduction and commercialisation of electric vehicles have been accelerated in the global market, responding to the global concerns on CO_2 reduction and energy security. Concurrently, the development of charging infrastructure for electric vehicles has also been expanding. As a complement to the DC EV supply equipment with a vehicle connector, DC supply equipment using an automated connection device is recognized as an alternative solution for electric vehicles, for example buses and trucks.

The international standardization of charging infrastructure with an automated connection device is indispensable for the diffusion of electric vehicles, and this document is developed for the manufacturers' convenience by providing general and basic requirements for DC EV supply equipment using an automatic conductive connection to the vehicle.

1 Scope

This part of IEC 61851 provides the requirements for DC EV supply equipment with an automated connection device (ACD) for conductive connection to the vehicle, with a rated maximum voltage at side A of up to 1 000 V AC or up to 1 500 V DC and a rated maximum voltage at side B up to 1 500 V DC.

NOTE 1 This document includes information on EV for conductive connection but limited to the necessary content for describing the power and signalling interface.

This document specifies the DC EV supply equipment with an automated connection device based on

– system B described in IEC 61851-23:2023, Annex BB, and
– system C described in IEC 61851-23:2023, Annex CC.

The requirements for reverse power transfer (RPT) and bidirectional power transfer (BPT) are under consideration and are not specified in this document.

EMC requirements for DC EV supply equipment are defined in IEC 61851-21-2:2018.

This document provides the general requirements for the control communication between a DC EV supply equipment and an EV.

The requirements for digital communication between DC EV supply equipment and electric vehicle for control of DC energy transfer are defined in ISO 15118-20:2022 and IEC 61851-24:2023.

This document only applies to automatic couplers of category 2, i.e. using an electro-mechanical interface: automatic coupler for an automated charging system according to IEC 63407.

This document does not apply to automatic coupler of category 1 as described in IEC TS 61851-27.

This document does not apply to automatic coupler of category 3 as described in IEC TS 61851-26.

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

Requirements for systems not providing simple separation or protective separation between side A and side B are under consideration.

Requirements for EV supply equipment without control of current, voltage or power are under consideration.

EV supply equipment in compliance with this document are not intended to provide energy transfer to a single EV with

– multiple vehicle connectors of the same EV supply equipment, or
– multiple EV supply equipment.

NOTE 2 Requirements for EVs mated to an EV supply equipment are specified in the ISO 5474 series.

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 60364-4-41:2005, *Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock*
IEC 60364-4-41:2005/AMD1:2017

IEC 60364-5-53:2019, *Low-voltage electrical installations - Part 5-53: Selection and erection of electrical equipment - Devices for protection for safety, isolation, switching, control and monitoring*
IEC 60364-5-53:2019/AMD2:2024

IEC 60479-1:2018, *Effects of current on human beings and livestock - Part 1: General aspects*

IEC 60479-2:2019, *Effects of current on human beings and livestock - Part 2: Special aspects*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61496 (all parts), *Safety of machinery - Electro-sensitive protective equipment*

IEC 61643 (all parts), *Low-voltage surge protective devices*

IEC 61643-11, *Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods*

IEC 61643-21, *Low voltage surge protective devices - Part 21: Surge protective devices connected to telecommunications and signalling networks - Requirements and testing methods*

IEC 61851-1:2017, *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 61851-24:2023, *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 62368-1:2023, *Audio/video, information and communication technology equipment - Part 1:Safety requirements* IEC 63407:—, *Conductive charging of electric vehicles - Contact interface for automated connection device (ACD)*[1]

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 6469-3:2021, *Electrically propelled road vehicles - Safety specifications - Part 3: Electrical safety*

[1] Under preparation. Stage at the time of publication: IEC/ACDV 63407:2025.

Bibliography

IEC 60050-826, *International Electrotechnical Vocabulary (IEV) - Part 826: Electrical installations,* available at www.electropedia.org

IEC 60479 (all parts), *Effects of current on human beings and livestock*

IEC 61140:2016, *Protection against electric shock - Common aspects for installation and equipment*

IEC 61496-1:2020, *Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests*

IEC 61643-41:2025, *Low-voltage surge protective devices - Part 41: Surge protective devices connected to DC low-voltage power systems - Requirements and test methods*

IEC 61851-21-2:2018, *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*

IEC TS 61851-26, *Electric vehicle conductive charging system - Part 26: EV supply equipment with automated docking of a vehicle coupler located at the underbody of an electric vehicle*

IEC TS 61851-27, *Electric vehicle conductive charging system - Part 27: EV supply equipment with automated docking of a vehicle coupler according to IEC 62196-2, IEC 62196-3 or IEC TS 62196-3-1*

IEC 62128-1:2013, *Railway applications - Fixed installations - Electrical safety, earthing and the return circuit - Part 1: Protective provisions against electric shock*

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 62196-3:2022, *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 62305 (all parts), *Protection against lightning*

IEC 62305-4, *Protection against lightning - Part 4: Electrical and electronic systems within structures*

IEC TS 63379, *Vehicle connector, vehicle inlet and cable assembly for megawatt DC charging*[4]

ISO 17409:2015, *Electrically propelled road vehicles - Connection to an external electric power supply - Safety requirements*[5]

ISO 5474 (all parts), *Electrically propelled road vehicles - Functional requirements and safety requirements for power transfer between vehicle and external electric circuit*

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

5 This publication has been withdrawn.

ECE/TRANS/WP.29/2017/138, *(GRSP) Proposal for a new UN GTR on Electric Vehicle Safety (EVS)*

SAE J1772:2024, *SAE electric vehicle and plug in hybrid electric vehicle conductive charge coupler*

SAE J3105:2023, *Electric vehicle power transfer system using conductive automated connection devices*

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