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Electric vehicle conductive charging system -
Part 23-3: DC electric vehicle supply equipment - Megawatt charging systems

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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IEC 61851-23-3 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
69/1132/FDIS	69/1147/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 61851-1:2017 and IEC 61851-23:2023.

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, where [clause] indicated the relevant clause. Replaced tables and figures are numbered starting from 201. Any additional items (clause, subclause, figure, etc.), which are not included in IEC 61851-23:2023, have a number starting from 201, for example 3.201, 201.1, etc. 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.

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 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 the global challenges of CO_2 reduction and energy security, the automobile industry has started the development and commercialization of heavy-duty electric vehicles (EV). These heavy duty EVs are equipped with significantly larger batteries than passenger cars or light commercial vehicles. The charging power provided by standards published before the publication of this document does not allow recharging of these batteries within the time needed for a commercial application of heavy duty EVs – especially considering long routes with limited time for intermediate charging. Consequently, this document allows for superior charging power up to several megawatts and describes the related safety and interoperability requirements. Table 201 shows the comparison between IEC 61851-23 and this document.

Table 201 – Comparison between IEC 61851-23 and IEC 61851-23-3

Topic	IEC 61851-23:2023	IEC 61851-23-3
Rated maximum voltage of the EV supply equipment at side B (EV side)	1 000 V	1 250 V
Rated continuous current of the EV supply equipment at side B (EV side)	Maximum as defined in IEC 62196-3	As defined in IEC TS 63379
Basic signalling	CP and PP (Annex CC)	CE and ID
Digital communication	HomePlug GreenPHY (IEC 61851-24) with ISO 15118-2, ISO 15118-20 or DIN SPEC 70121 as application layer	Ethernet 10BASE-T1S (ISO 15118-10) with ISO 15118-20 as application layer

Although the system described in this document has been developed for heavy duty EVs, its application is not limited practically to these.

1 Scope

This part of IEC 61851 applies to the EV supply equipment to provide energy transfer between the supply network and electric vehicles (EVs), with a rated maximum voltage at side A (supply network side) up to 1 000 V AC or up to 1 500 V DC and a rated maximum voltage at side B (EV side) up to 1 250 V DC.

NOTE A rated maximum voltage of the EV supply equipment at side B of up to 1 500 V DC is under consideration.

This document specifies the EV supply equipment of megawatt charging system (MCS) equipped with a coupler according to IEC TS 63379. Systems different to MCS using a coupler specified in IEC TS 63379 are under consideration.

The requirements for bidirectional power flow systems are under consideration.

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

This document specifies systems with protective separation between side A and side B.

The requirements for digital communication between the EV supply equipment and the EV for control of energy transfer are defined in ISO 15118-10 and ISO 15118-20.

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

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

The requirements for such use cases are not specified in this document but are under consideration.

The requirements for EVs mated to EV supply equipment according to this document are specified in ISO 5474-3:2024, Annex B.

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 60364-4-43:2023, *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 61851-23:2023, *Electric vehicle conductive charging system - Part 23: DC electric vehicle supply equipment*

IEC TS 63379:2026, *Vehicle connector, vehicle inlet and cable assembly for megawatt DC charging*

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 15118-10:2025, *Road vehicles - Vehicle-to-grid communication interface - Part 10: Physical layer and data link layer requirements for single-pair Ethernet*

ISO 15118-20:2022, *Road vehicles - Vehicle-to-grid communication interface - Part 2: 2nd generation network layer and application layer requirements*
ISO 15118-20:2022/AMD1:2026

IEEE 802.3-2022*, IEEE Standard for Ethernet*

10BASE-T1S channel and components requirements for link segments - Electrical requirements and measurements specification for 10BASE-T1S channels and components [online], Open Alliance Inc. Version 1.1, 2025, [viewed 2026-02-05]. Available at: https://opensig.org/wp-content/uploads/2025/06/10BASE-T1S-Channel-and-Component-Requirements-for-Link-Segments.pdf

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

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 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests*
IEC 60664-1:2020/AMD1:2025

IEC 61557-18, *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC - Equipment for testing, measuring or monitoring of protective measures - Part 18: DC EV supply equipment monitoring device*[7]

IEC 61851-23:2014, *Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station*[8]

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

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 62196-3, *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 62477-1:2022*, Safety requirements for power electronic converter systems and equipment - Part 1: General*

ISO 15118-2:2014*, Road vehicles - Vehicle-to-grid communication interface - Part 2: Network and application protocol requirements*

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

ISO 5474-1:2024, *Electrically propelled road vehicles - Functional and safety requirements for power transfer between vehicle and external electric circuit - Part 1: General requirements for conductive power transfer*

ISO 6469-3:2011, *Electrically propelled road vehicles - Safety specifications - Part 3: Protection of persons against electric shock*[10]

ISO 17409:2015, *Electrically propelled road vehicles - Connection to an external electric power supply - Safety requirements*[11]

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[7] Under preparation. Stage at the time of publication: IEC/CCDV 61557-18:2025.

[8] This publication has been withdrawn.

[9] Edition 3 under preparation. Stage at the time of publication: IEC/CD 61851-23:2025.

[10] This publication has been withdrawn.

[11] This publication has been withdrawn.

ISO/PAS 19295:2016, *Electrically propelled road vehicles - Specification of voltage sub-classes for voltage class B*[12]

DIN SPEC 70121:2014*, Electromobility - Digital communication between a DC EV charging station and an electric vehicle for control of DC charging in the combined charging system*

UL 2231-2:2012*, Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems*

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[12] This publication has been withdrawn.