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**Elfordonsladdning –
Konduktiv laddning –
Del 3-1: Utrustning för laddning med likström skyddad genom dubbel eller
förstärkt isolering –
Fordringar på stationär utrustning**

*Electric vehicles 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
(CENELEC Technical Specification 61851-3-1:2023)*

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English Version

**Electric vehicles 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 61851-3-1:2023)**

Système de charge conductive pour véhicules électriques -
Partie 3-1 : Exigences générales relatives aux systèmes de
charge conductive en courant alternatif et continu des
véhicules électriques légers
(IEC/TS 61851-3-1:2023)

Konduktive Ladesysteme für Elektrofahrzeuge - Teil 3-1:
Gleichstrom-Versorgungseinrichtungen für
Elektrofahrzeuge mit Schutzwirkung durch doppelte oder
verstärkte Isolierung - Allgemeine Regeln und
Anforderungen für ortsfeste Betriebsmittel
(IEC/TS 61851-3-1:2023)

This Technical Specification was approved by CENELEC on 2023-12-04.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (CLC IEC/TS 61851-3-1:2023) consists of the text of IEC/TS 61851-3-1:2023, prepared by IEC/TC 69 "Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks".

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This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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Endorsement notice

The text of the International Technical Specification IEC/TS 61851-3-1:2023 was approved by CENELEC as a European Technical Specification without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60309 series	NOTE Approved as EN IEC 60309 series
IEC 60309-1:2021	NOTE Approved as EN IEC 60309-1:2022 (not modified)
IEC 60309-4:2021	NOTE Approved as EN IEC 60309-4:2022 (not modified)
IEC 60309-5:2017	NOTE Approved as EN IEC 60309-5:2019 (not modified)
IEC 60320-1:2021	NOTE Approved as EN IEC 60320-1:2021 (not modified)
IEC 60364 series	NOTE Approved as HD 60364 series
IEC 61557-8:2014	NOTE Approved as EN 61557-8:2015 (not modified)
IEC 61851-21-1:2017	NOTE Approved as EN 61851-21-1:2017 (not modified)
IEC 61851-21-2:2018	NOTE Approved as EN IEC 61851-21-2:2021 (not modified)
IEC 62053-21:2020	NOTE Approved as EN IEC 62053-21:2021 (not modified) + A11:2021
IEC 62196-3:2022	NOTE Approved as EN IEC 62196-3:2022 (not modified)
IEC 62196-6:2022	NOTE Approved as EN IEC 62196-6:2022 (not modified)
ISO 4628-3:2016	NOTE Approved as EN ISO 4628-3:2016 (not modified)
ISO 18246:2023	NOTE Approved as EN ISO 18246:2023 (not modified)
IEC 60068-2-2	NOTE Approved as EN 60068-2-2
IEC 60068-2-5:2018	NOTE Approved as EN IEC 60068-2-5:2018 (not modified)
IEC 60068-2-6:2007	NOTE Approved as EN 60068-2-6:2008 (not modified)

IEC 60068-2-14:2009	NOTE	Approved as EN 60068-2-14:2009 (not modified)
IEC 60068-2-27:2008	NOTE	Approved as EN 60068-2-27:2009 (not modified)
IEC 60068-2-52:2017	NOTE	Approved as EN IEC 60068-2-52:2018 (not modified)
IEC 60068-2-53:2010	NOTE	Approved as EN 60068-2-53:2010 (not modified)
IEC 60068-2-75	NOTE	Approved as EN 60068-2-75
IEC 60085	NOTE	Approved as EN 60085
IEC 60112	NOTE	Approved as EN IEC 60112
IEC 60216-1:2013	NOTE	Approved as EN 60216-1:2013 (not modified)
IEC 60364-4-43:2008	NOTE	Approved as HD 60364-4-43:2010
IEC 60364-4-44:2007	NOTE	Approved as HD 60364-4-44:2010
IEC 60364-4-44:2007/A1:2015	NOTE	Approved as HD 60364-4-44:2016
IEC 60364-6:2016	NOTE	Approved as HD 60364-6:2016 (not modified) + A11:2017
IEC 60695-2-11:2021	NOTE	Approved as EN IEC 60695-2-11:2021 (not modified)
IEC 60695-10-2:2014	NOTE	Approved as EN 60695-10-2:2014 (not modified)
IEC 60947-1:2020	NOTE	Approved as EN IEC 60947-1:2021 (not modified)
IEC 60947-6-1:2021	NOTE	Approved as EN IEC 60947-6-1:2023 (not modified)
IEC 61140:2016	NOTE	Approved as EN 61140:2016 (not modified)
IEC 61316:2021	NOTE	Approved as EN IEC 61316:2021 (not modified)
IEC 61439-1:2020	NOTE	Approved as EN IEC 61439-1:2021 (not modified)
IEC 61558-1:2017	NOTE	Approved as EN IEC 61558-1:2019 (not modified)
IEC 61558-2-4:2021	NOTE	Approved as EN IEC 61558-2-4:2021 (not modified) ¹
IEC 61558-2-12:2011	NOTE	Approved as EN 61558-2-12:2011 (not modified)
IEC 61558-2-16:2021	NOTE	Approved as EN IEC 61558-2-16:2021 ² (not modified)
IEC 62052-11:2020	NOTE	Approved as EN IEC 62052-11:2021 (not modified) + A11:2022
IEC 62752:2016	NOTE	Approved as EN 62752:2016 (not modified)
IEC 62752:2016/A1:2018	NOTE	Approved as EN 62752:2016/A1:2020 (not modified)
ISO 13849-1:2023	NOTE	Approved as EN ISO 13849-1:2023 (not modified)
ISO 17409:2020	NOTE	Approved as EN ISO 17409:2020 (not modified)

¹ To be published. Stage at the time of publication: FprEN IEC 61558-2-4:2021.

² To be published. Stage at the time of publication: FprEN IEC 61558-2-16:2021.

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60038	-	IEC standard voltages	EN 60038	-
IEC 60068-2-1	2007	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	2007
IEC 60068-2-11	2021	Environmental testing - Part 2-11: Tests - Test Ka: Salt mist	EN IEC 60068-2-11	2021
IEC 60068-2-30	2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	2005
IEC 60068-2-78	2012	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2013
IEC 60269	series	Low-voltage fuses	EN 60269	series
IEC 60309-2	2021	Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes - Part 2: Dimensional compatibility requirements for pin and contact-tube accessories	EN IEC 60309-2	2022
IEC 60320	-	Appliance couplers for household and - similar general purposes	-	-
IEC 60335-1	2020	Household and similar electrical appliances - Safety - Part 1: General requirements	-	-
IEC 60364-4-41 (mod)	2005	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41	2017
+ A1	2017		-	-
-	-		+ A11	2017
-	-		+ A12	2019
IEC 60364-7-722 (mod)	2018	Low-voltage electrical installations - Part 7-722: Requirements for special installations or locations - Supplies for electric vehicles	HD 60364-7-722	2018
IEC 60529	-	Degrees of protection provided by - enclosures (IP Code)	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60664-1	2020	Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests	EN IEC 60664-1	2020
IEC 60884-1	2022	Plugs and socket-outlets for household and similar purposes - Part 1: General requirements		-
IEC 60898	-	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations		-
IEC 60898-1	-	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 1: Circuit-breakers for a.c. operation	EN 60898-1	-
IEC 60947-2	-	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers	EN 60947-2	-
IEC 60947-3	2020	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units	EN IEC 60947-3	2021
IEC 60947-4-1	2018	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters	EN IEC 60947-4-1	2019
IEC 60947-6-2	2020	Low-voltage switchgear and controlgear - Part 6-2: Multiple function equipment - Control and protective switching devices (or equipment) (CPS)	EN IEC 60947-6-2	2023
IEC 60950-1	2005	Information technology equipment - Safety - Part 1: General requirements		-
+ A1	2009		-	-
+ A2	2013		-	-
IEC 61180	2016	High-voltage test techniques for low-voltage equipment - Definitions, test and procedure requirements, test equipment	EN 61180	2016
IEC 61439-7	2022	Low-voltage switchgear and controlgear - assemblies - Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicle charging stations		-
IEC 61558-2-6	-	Safety of transformers, reactors, power supply units and combinations thereof - Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications	EN IEC 61558-2-6 ³	-
IEC 61810-1	-	Electromechanical elementary relays - Part 1: General and safety requirements	EN 61810-1	-

³ To be published. Stage at the time of publication: FprEN IEC 61558-2-6:2021.

CLC IEC/TS 61851-3-1:2023 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61851-1	2017	Electric vehicle conductive charging system - Part 1: General requirements	EN IEC 61851-1	2019
IEC 61851-3	series	Electric vehicle conductive charging system - Part 3: DC EV supply equipment where protection relies on double or reinforced insulation	EN 61851-3	series
IEC/TS 61851-3-2	2023	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	2023	Electric vehicles 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	-	-
IEC/TS 61851-3-5	2023	Electric vehicles conductive charging system - Part 3-5: DC EV supply equipment where protection relies on double or reinforced insulation - Pre-defined communication parameters and general application objects	-	-
IEC 62262	-	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	EN 62262	-
IEC 62196-1	2022	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements	EN IEC 62196-1	2022
IEC/TS 62196-4	2022	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	-	-
IEC 62477-1	2022	Safety requirements for power electronic converter systems and equipment - Part 1: General	-	-
IEC/PAS 62840-3	2021	Electric vehicle battery swap system - Part 3: Particular safety and interoperability requirements for battery swap systems operating with removable RESS/battery systems	-	-
ISO 11898-1	2015	Road vehicles - Controller area network (CAN) - Part 1: Data link layer and physical signalling	-	-
			EN 50325-4	2002
			EN 50604-1	2016
			+ A1	2021



TECHNICAL SPECIFICATION

**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**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 43.120

ISBN 978-2-8322-7073-8

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**

FOREWORD

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IEC TS 61851-3-1 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
69/845/DTS	69/882/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 types are used:

- requirements: in roman type;
- *test specifications: in italic type*;
- notes: in small roman type.

A list of all parts in the IEC 61851 all parts, published under the general title *Electric vehicles 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,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This document is published in separate parts according to the following structure:

IEC TS 61851-3-1, *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, *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, *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*

IEC TS 61851-3-5, *Electric vehicle conductive charging system – Part 3-5: DC EV supply equipment where protection relies on double or reinforced insulation – Pre-defined communication parameters and general application objects*

IEC TS 61851-3-6, *Electric vehicle conductive charging system – Part 3-6: DC EV supply equipment where protection relies on double or reinforced insulation – Voltage converter unit communication*

IEC TS 61851-3-7, *Electric vehicle conductive charging system – Part 3-7: DC EV supply equipment where protection relies on double or reinforced insulation – Battery system communication*

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

1 Scope

This part of IEC 61851, which is a Technical Specification, applies to the equipment, including stationary equipment

- for the conductive transfer of electric power between the supply network and
 - an electric road vehicle, or
 - a removable rechargeable energy storage system (RESS), or
 - an on-board RESS of an electric road vehicle,
- when the equipment is connected to the supply network having a supply voltage up to 480 V AC or up to 400 V DC and a rated output voltage up to 120 V DC, and
- where the protection against electric shock relies on double or reinforced insulation, and with double or reinforced insulation between all AC and DC inputs and outputs.

NOTE 1 In the following countries, the acceptable nominal supply voltage is up to 600 V AC: CA, US.

Particular requirements for portable and mobile DRI EV supply equipment are covered by IEC TS 61851-3-2023.

Equipment for the conductive transfer of electric power between the supply network and an electric road vehicle/RESS according to the IEC TS 61851-3 series is intended to be connected to vehicles where the vehicle power supply circuit is protected against electric shock by double or reinforced insulation.

NOTE 2 For information regarding protection against electric shock by double or reinforced insulation of the EV or of the vehicle power supply circuit, see ISO 18246:2023, 6.1.1 b) and Table 3.

Requirements for bidirectional energy transfer DC to AC are under consideration and are not part of this document.

This document also applies to EV supply equipment supplied from on-site storage systems (e.g. buffer batteries).

This document applies to VCUs intended to be a part of DRI EV supply equipment specified in this document.

This document applies to equipment for the conductive transfer of electric power between the supply network and an electric road vehicle/RESS intended to be installed and/or used at an altitude of up to 2 000 m.

The aspects covered in this document include

- the connection to the vehicle,
- characteristics to be complied with by the vehicle with respect to the AC or DC,
- the specification for required level of electrical safety for the double or reinforced insulated (DRI) EV supply equipment,

- operators and third-party electrical safety,
- requirements for command and control communication for safety and process matters, if required,
- requirements for bidirectional power transfer DC to DC, and
- the connection to installations according to IEC 60364-7-722.

NOTE 3 In the following countries, electrical installation codes other than those from IEC 60364-7-722 are used: CA, US.

Equipment covered by this document is not intended to be located in hazardous areas where flammable gas or vapour and/or combustible materials, fuels or other combustible or explosive materials are present. Additional requirements can apply to these locations.

This document does not apply to

- aspects related to maintenance,
- electrical devices and components, which are covered by their specific product standards,
- trolley buses and rail vehicles,
- vehicle power supply circuit, which is covered by ISO 18246, and
- EMC requirements for on-board equipment while connected to the supply, which are covered by IEC 61851-21-1.

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 60038, *IEC standard voltages*

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-11:2021, *Environmental testing – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60269 (all parts), *Low-voltage fuses*

IEC 60309-2:2021, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes – Part 2: Dimensional compatibility requirements for pin and contact-tube accessories*

IEC 60320 (all parts), *Appliance couplers for household and similar general purposes*

IEC 60335-1:2020, *Household and similar electrical appliances – Safety – Part 1: General requirements*

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 60364-7-722:2018, *Low-voltage electrical installations – Part 7-722: Requirements for special installations or locations – Supplies for electric vehicles*

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

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

IEC 60884-1:2022, *Plugs and socket-outlets for household and similar purposes – Part 2: General requirements*

IEC 60898 (all parts), *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations*

IEC 60898-1, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Part 1: Circuit-breakers for a.c. operation*

IEC 60947-2, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-3:2020, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 60947-4-1:2018, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

IEC 60947-6-2, *Low-voltage switchgear and controlgear – Part 6-2: Multiple function equipment – Control and protective switching devices (or equipment) (CPS)*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*
IEC 60950-1:2005/AMD1:2009
IEC 60950-1:2005/AMD2:2013

IEC 60990:2016, *Methods of measurement of touch current and protective conductor current*

IEC 61009-1:2010, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*
IEC 61009-1:2010/AMD1:2012
IEC 61009-1:2010/AMD2:2013

IEC 61180:2016, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*

IEC 61439-7:2022, *Low-voltage switchgear and controlgear assemblies – Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicles charging stations*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications*

IEC 61810-1, *Electromechanical elementary relays – Part 1: General and safety requirements*

IEC 61851-1:2017, *Electric vehicle conductive charging system – Part 1: General requirements*

IEC 61851-3 (all parts), *Electric vehicle conductive charging system – Part 3: DC EV supply equipment where protection relies on double or reinforced insulation*

IEC TS 61851-3-2:2023, *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 61851-3-4:2023, *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*

IEC TS 61851-3-5:2023, *Electric vehicle conductive charging system – Part 3-5: DC EV supply equipment where protection relies on double or reinforced insulation – Pre-defined communication parameters and general application objects*

IEC 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

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

IEC TS 62196-4:2022, *Plugs, socket-outlets, vehicle connectors and vehicles 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*

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

IEC PAS 62840-3:2021, *Electric vehicle battery swap system – Part 3: Particular safety and interoperability requirements for battery swap systems operating with removable RESS/battery systems*

ISO 11898-1:2015, *Road vehicles – Controller area network (CAN) – Part 1: Data link layer and physical signalling*

EN 50325-4:2002, *Industrial communications subsystem based on ISO 11898 (CAN) for controller-device interfaces – Part 4: CANopen*

EN 50604-1:2016, *Secondary lithium batteries for light EV (electric vehicle) applications – Part 1: General safety requirements and test methods*
EN 50604-1:2016/AMD1:2021