



# INTERNATIONAL STANDARD

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**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**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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ICS 33.100.10; 43.120

ISBN 978-2-8322-5123-2

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### **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**

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61851-21-2 has been prepared by IEC technical committee 69: Electric road vehicles and electric industrial trucks.

This first edition, together with IEC 61851-21-1, cancels and replaces IEC 61851-21:2001. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 61851-21:2001:

- a) this document addresses now only EMC related tests instead of other electrical tests;
- b) Clauses 2 and 3 have been updated;
- c) the port definition, the test-setups and their corresponding limits as well as the operation modes are defined more precisely;

d) Annexes A to F have been added.

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

FDIS	Report on voting
69/531/FDIS	69/545/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of 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 "<http://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.

A bilingual version of this publication may be issued at a later date.

## 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

#### 1 Scope

This part of IEC 61851 defines the EMC requirements for any off-board components or equipment of such systems used to supply or charge electric vehicles with electric power by conductive power transfer (CPT), with a rated input voltage, according to IEC 60038:2009, up to 1 000 V AC or 1 500 V DC and an output voltage up to 1 000 V AC or 1 500 V DC.

This document covers off-board charging equipment for mode 1, mode 2, mode 3 and mode 4 charging as defined in IEC 61851-1:2017.

Cables where there is no electronics or no electric/electronic switching are considered as passive (benign) and are deemed to comply with the emission and immunity requirements of this document without any need for testing.

This document does not apply to any on-board components or equipment of charging or power supply systems being part of the vehicles. The EMC requirements for such equipment are covered by IEC 61851-21-1: 2017.

Compliance with the emission and immunity requirements of this document is verified where it can be demonstrated that the equipment under test (EUT) meets the respective limits, during type tests in the measuring arrangement of this document.

Requirements for electric vehicle wireless power transfer (WPT) systems are covered in IEC 61980 (all parts).

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

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

IEC 60038:2009, *IEC standard voltages*

IEC 62053-21:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 21: Static meters for active energy (classes 1 and 2)*

IEC 61000-3-2:2014, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)*

IEC 61000-3-3:2013, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connexion*

IEC 61000-3-11:2017, *Electromagnetic compatibility (EMC) – Part 3-11 – Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current  $\leq 75$  A and subject to conditional connection*

IEC 61000-3-12:2011, *Electromagnetic compatibility (EMC) – Part 3-12 – Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current  $> 16$  A and  $\leq 75$  A per phase*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*  
IEC 61000-4-3:2006/AMD1:2007  
IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*  
IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*  
IEC 61000-4-11:2004/AMD1:2017

IEC 61000-4-34:2005, *Electromagnetic compatibility (EMC) – Part 4-34: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current more than 16 A per phase*  
IEC 61000-4-34:2005/AMD1:2009

IEC 61000-6-1:2016, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential, commercial and light-industrial environments*

IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61000-6-3:2006, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*  
IEC 61000-6-3:2006/AMD1:2010

IEC 61000-6-4:2006, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*  
IEC 61000-6-4:2006/AMD1:2010

CISPR 16-1-2:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Coupling devices for conducted disturbance measurements*

CISPR 16-1-4:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements*

CISPR 16-1-4:2010/AMD1:2012

CISPR 16-1-4:2010/AMD2:2017

CISPR 25:2008, *Vehicles, boats and internal combustion engines – Radio disturbance characteristics – Limits and methods of measurement for the protection of on-board receivers*<sup>1</sup>

CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission requirements*

MIL-STD-461F:2007, *Department of Defense interface standard requirements for the control of electromagnetic interference characteristics of subsystems and equipment*

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<sup>1</sup> 3<sup>rd</sup> edition (2008). This 3<sup>rd</sup> edition has been replaced in 2016 by a 4<sup>th</sup> edition CISPR 25:2016, *Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers*.