

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Electric vehicle conductive charging system –  
Part 1: General requirements**

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**Systeme de charge conductive pour vehicules electriques –  
Partie 1: Exigences generales**

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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Electric vehicle conductive charging system –  
Part 1: General requirements**

**Système de charge conductive pour véhicules électriques –  
Partie 1: Exigences générales**

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## CONTENTS

FOREWORD.....	9
INTRODUCTION.....	12
1 Scope.....	14
2 Normative references .....	15
3 Terms and definitions .....	17
3.1 Electric supply equipment .....	17
3.2 Insulation .....	19
3.3 Functions .....	20
3.4 Vehicle .....	21
3.5 Cords, cables and connection means .....	21
3.6 Service and usage .....	24
3.7 General terms .....	25
4 General requirements .....	27
5 Classification.....	27
5.1 Characteristics of power supply and output.....	27
5.1.1 Characteristics of power supply input.....	27
5.1.2 Characteristics of power supply output.....	28
5.2 Normal environmental conditions.....	28
5.3 Special environmental conditions.....	28
5.4 Access.....	28
5.5 Mounting method .....	28
5.6 Protection against electric shock.....	28
5.7 Charging modes.....	29
6 Charging modes and functions .....	29
6.1 General.....	29
6.2 Charging modes.....	29
6.2.1 Mode 1 .....	29
6.2.2 Mode 2 .....	30
6.2.3 Mode 3 .....	30
6.2.4 Mode 4 .....	30
6.3 Functions provided in Mode 2, 3 and 4.....	31
6.3.1 Mandatory functions in Modes 2, 3, and 4.....	31
6.3.2 Optional functions for Modes 2, 3 and 4.....	32
7 Communications .....	33
7.1 Digital communication between the EV supply equipment and the EV .....	33
7.2 Digital communication between the EV supply equipment and the management system .....	34
8 Protection against electric shock .....	34
8.1 Degrees of protection against access to hazardous-live-parts .....	34
8.2 Stored energy .....	35
8.2.1 Disconnection of plug connected EV supply equipment.....	35
8.2.2 Loss of supply voltage to permanently connected EV supply equipment .....	35
8.3 Fault protection.....	35
8.4 Protective conductor .....	35
8.5 Residual current protective devices.....	36

8.6	Safety requirements for signalling circuits between the EV supply equipment and the EV .....	37
8.7	Isolating transformers .....	37
9	Conductive electrical interface requirements .....	37
9.1	General .....	37
9.2	Functional description of standard accessories .....	37
9.3	Functional description of the basic interface .....	38
9.4	Functional description of the universal interface .....	38
9.5	Functional description of the DC interface .....	38
9.6	Functional description of the combined interface .....	38
9.7	Wiring of the neutral conductor .....	38
10	Requirements for adaptors .....	39
11	Cable assembly requirements .....	39
11.1	General .....	39
11.2	Electrical rating .....	39
11.3	Dielectric withstand characteristics .....	40
11.4	Construction requirements .....	40
11.5	Cable dimensions .....	40
11.6	Strain relief .....	40
11.7	Cable management and storage means for cables assemblies .....	40
12	EV supply equipment constructional requirements and tests .....	41
12.1	General .....	41
12.2	Characteristics of mechanical switching devices .....	41
12.2.1	General .....	41
12.2.2	Switch and switch-disconnector .....	41
12.2.3	Contactors .....	42
12.2.4	Circuit-breaker .....	42
12.2.5	Relays .....	42
12.2.6	Inrush current .....	42
12.2.7	Residual direct current monitoring device (RDC MD) .....	42
12.3	Clearances and creepage distances .....	42
12.4	IP degrees .....	43
12.4.1	Degrees of protection against solid foreign objects and water for the enclosures .....	43
12.4.2	Degrees of protection against solid foreign objects and water for basic, universal and combined and DC interfaces .....	43
12.5	Insulation resistance .....	44
12.6	Touch current .....	44
12.7	Dielectric withstand voltage .....	45
12.7.1	AC withstand voltage .....	45
12.7.2	Impulse dielectric withstand (1,2 µs/50 µs) .....	45
12.8	Temperature rise .....	45
12.9	Damp heat functional test .....	46
12.10	Minimum temperature functional test .....	46
12.11	Mechanical strength .....	46
13	Overload and short-circuit protection .....	46
13.1	General .....	46
13.2	Overload protection of the cable assembly .....	47
13.3	Short-circuit protection of the charging cable .....	47

14	Automatic reclosing of protective devices .....	47
15	Emergency switching or disconnect (optional) .....	48
16	Marking and instructions .....	48
16.1	Installation manual of EV charging stations .....	48
16.2	User manual for EV supply equipment .....	49
16.3	Marking of EV supply equipment .....	49
16.4	Marking of charging cable assemblies case B .....	49
16.5	Durability test for marking .....	50
Annex A (normative) Control pilot function through a control pilot circuit using a PWM signal and a control pilot wire.....		51
A.1	General.....	51
A.2	Control pilot circuit.....	51
A.2.1	General .....	51
A.2.2	Typical control pilot circuit .....	52
A.2.3	Simplified control pilot circuit .....	53
A.2.4	Additional components and high frequency signals .....	53
A.3	Requirements for parameters and system behaviour .....	54
A.4	Test procedures .....	72
A.4.1	General .....	72
A.4.2	Constructional requirements of the EV simulator .....	72
A.4.3	Test procedure .....	72
A.4.4	Oscillator frequency and generator voltage test .....	73
A.4.5	Duty cycle test .....	73
A.4.6	Pulse wave shape test .....	74
A.4.7	Sequences test .....	74
A.4.8	Test of interruption of the protective conductor .....	76
A.4.9	Test of short-circuit values of the voltage.....	76
A.4.10	Example of a test simulator of the vehicle (informative) .....	76
A.4.11	Optional hysteresis test .....	79
A.5	Implementation hints.....	80
A.5.1	Retaining a valid authentication until reaching CP State B .....	80
A.5.2	Load control using transitions between state x1 and x2 .....	81
A.5.3	Information on difficulties encountered with some legacy EVs for wake-up after a long period of inactivity (informative) .....	81
Annex B (normative) Proximity detection and cable current coding circuits for the basic interface .....		82
B.1	Circuit diagram for vehicle couplers using an auxiliary switch associated with the proximity detection contact.....	82
B.2	Circuit for simultaneous proximity detection and current coding .....	83
Annex C (informative) Examples of circuit diagrams for a basic and universal vehicle couplers.....		86
C.1	General.....	86
C.2	Circuits diagrams for Mode 1, Mode 2 and Mode 3, using a basic single phase vehicle coupler .....	86
C.3	Circuits diagrams for Mode 3, using a basic single phase or three-phase accessory without proximity switch.....	90
C.4	Example of circuit diagram for Mode 4 connection using universal coupler.....	91
Annex D (informative) Control pilot function that provides LIN communication using the control pilot circuit.....		93
D.1	Overview.....	93

D.1.1	General .....	93
D.1.2	LIN-CP features.....	93
D.1.3	Normative references .....	93
D.1.4	Terms and abbreviations .....	94
D.2	Scope and context .....	94
D.3	Overview of control pilot functions .....	96
D.4	Control pilot circuit.....	97
D.4.1	General .....	97
D.4.2	Control pilot circuit.....	97
D.4.3	Charging station control pilot circuit interface .....	98
D.4.4	EV control pilot circuit interface .....	99
D.4.5	LIN communication transceiver .....	99
D.4.6	Optional cable assembly node .....	100
D.5	Control pilot circuit interaction.....	100
D.5.1	General .....	100
D.5.2	Control pilot circuit states and transitions .....	101
D.6	System requirements .....	102
D.6.1	General .....	102
D.6.2	Control of LIN signals .....	102
D.6.3	Control of the S2 switch and the vehicle load current.....	103
D.6.4	Control of the switching device in the charging station .....	103
D.6.5	Control of latching and unlatching of IEC 62196-2 type 2 socket-outlets and vehicle inlets .....	104
D.7	Charging sequences .....	105
D.7.1	General .....	105
D.7.2	Start-up of normal AC charging sequence .....	105
D.7.3	Normal EV-triggered stop of charging .....	107
D.7.4	Normal stop of charging triggered by charging station.....	109
D.8	LIN Communication.....	110
D.8.1	General .....	110
D.8.2	Schedules.....	110
D.8.3	Frames .....	117
D.8.4	Signals .....	120
D.9	Requirements for charging stations and EVs that implement both LIN-CP and PWM-CP .....	128
D.9.1	General .....	128
D.9.2	Interoperability between charging stations and EVs .....	128
D.9.3	Control pilot circuit hardware .....	129
D.9.4	Control pilot circuit functionality .....	129
D.9.5	Sequence to select LIN-CP or PWM-CP after plug-in .....	130
D.10	Procedures for test of charging stations .....	131
D.10.1	General .....	131
D.10.2	Test of normal use.....	131
D.10.3	Test of disconnection under load .....	131
D.10.4	Overcurrent test.....	132
D.10.5	Test of interruption of LIN communication.....	132
D.10.6	Test of short circuit between the control pilot conductor and the protective conductor .....	132
D.10.7	Test of options.....	132

Annex E (informative) Charging station designed with a standard socket-outlet – Minimum gap for connection of Modes 1 and 2 cable assembly .....	133
E.1 Overview.....	133
E.2 General.....	133
E.3 Minimum gap for connection of Mode 2 cables with type E/F plug and socket-outlet systems .....	134
E.4 Minimum gap for connection of Mode 2 cables with type BS1363 plug and socket-outlet systems .....	134
E.5 Minimum gap for connection of Mode 2 cables with IEC 60309-2 straight plug and socket-outlet systems .....	134
Bibliography.....	136
Figure 1 – Case A connection .....	18
Figure 2 – Case B connection .....	18
Figure 3 – Case C connection .....	19
Figure A.1 – Typical control pilot circuit (equivalent circuit).....	52
Figure A.2 – Simplified control pilot circuit (equivalent circuit).....	53
Figure A.3 – State diagram for typical control pilot (informative) .....	60
Figure A.4 – State diagram for simplified control pilot (informative).....	61
Figure A.5 – Test sequence using a typical control pilot circuit.....	75
Figure A.6 – Test sequence using the simplified control pilot circuit.....	75
Figure A.7 – Optional test sequence with interruption by EV supply equipment .....	76
Figure A.8 – Example of a test circuit (EV simulator) .....	78
Figure B.1 – Equivalent circuit diagram for proximity function using an auxiliary switch and no current coding .....	82
Figure B.2 – Equivalent circuit diagram for simultaneous proximity detection and current coding.....	84
Figure C.1 – Example of Mode 1 case B using the proximity circuit as in B.1 .....	87
Figure C.2 – Example of Mode 2 case B using proximity detection as in B.1 .....	88
Figure C.3 – Example of Mode 3 case B using proximity detection as in B.1 .....	89
Figure C.4 – Example of Mode 3 case C using proximity detection as in B.1 .....	90
Figure C.5 – Example of Mode 3 case B using proximity detection as in B.2 (without proximity push button switch S3).....	91
Figure C.6 – Example of Mode 4 case C using the universal vehicle coupler.....	92
Figure D.1 – Example of an EV charging system with a typical configuration of functions, information flow and power flow .....	95
Figure D.2 – Electrical equivalent circuit for connection of LIN nodes to the control pilot circuit.....	98
Figure D.3 – Control pilot circuit state diagram for LIN-CP (key list in Table D.5) .....	101
Figure D.4 – Example of timing diagram for start-up of normal AC charging sequence .....	105
Figure D.5 – Timing diagram for normal EV-triggered stop of charging.....	107
Figure D.6 – Example of timing diagram for normal stop of charging triggered by charging station .....	109
Figure D.7 – State diagram of the LIN node in the charging station.....	111
Figure D.8 – Energy transfer between different charging stations and EVs that are equipped with accessories according to IEC 62196-2.....	129



Figure D.9 – Control pilot circuit state diagram for LIN-CP and PWM-CP (See key list in Table D.5).....	130
Figure E.1 – Examples of standard plugs that are considered for this Annex E .....	133
Figure E.2 – Packaging configurations allowing the use of a large part of the common products for standard plugs and socket-outlets .....	135
Table 1 – Touch current limits.....	44
Table A.1 – Maximum allowable high frequency signal voltages on control pilot conductor and the protective conductor.....	54
Table A.2 – Control pilot circuit parameters and values for the EV supply equipment.....	55
Table A.3 – EV control pilot circuit values and parameters and values for the EV .....	56
Table A.4 – System states detected by the EV supply equipment.....	57
Table A.5 – State behaviour.....	59
Table A.6 – List of sequences .....	61
Table A.7 – PWM duty cycle provided by EV supply equipment .....	71
Table A.8 – Maximum current to be drawn by vehicle.....	71
Table A.9 – Test resistance values .....	72
Table A.10 – Parameters of control pilot voltages .....	73
Table A.11 – Test parameters of control pilot signals .....	74
Table A.12 – Parameters for sequence tests.....	75
Table A.13 – Position of switches.....	79
Table A.14 – Initial settings of the potentiometer at the beginning of each test.....	79
Table B.1 – Component values proximity circuit without current coding.....	83
Table B.2 – Current coding resistor for EV plug and vehicle connector .....	85
Table C.1 – Component description for Figure C.6 Mode 4 case C.....	92
Table D.1 – Control pilot functions in LIN-CP and PWM-CP .....	96
Table D.2 – Additional LIN-CP control pilot functions .....	97
Table D.3 – Generation and detection of CP voltage levels .....	99
Table D.4 – Generation and detection of LIN communication levels .....	100
Table D.5 – Key list for Figure D.3 and Figure D.9 .....	102
Table D.6 – Control of LIN signals .....	103
Table D.7 – Control of the S2 switch and the vehicle load .....	103
Table D.8 – Control of the switching device .....	104
Table D.9 – Control of latching and unlatching .....	104
Table D.10 – Timing for start-up of normal charging sequence.....	106
Table D.11 – Timing for normal EV-triggered stop of charging .....	108
Table D.12 – Timing for normal stop of charging triggered by charging station.....	110
Table D.13 – States of the LIN node in the charging station and frame schedule description.....	112
Table D.14 – Transitions of the LIN node in the charging station.....	113
Table D.15 – Frames for AC charging .....	118
Table D.16 – General signals.....	125
Table D.17 – Signals for version negotiation .....	125
Table D.18 – Signals for system initialization .....	126

Table D.19 – Signals for EV status information .....	127
Table D.20 – Signals for charging station status information .....	127
Table D.21 – Codes for the frame <i>StNotReadyList</i> .....	127
Table D.22 – Codes for frame <i>EvS2openList</i> .....	128
Table D.23 – Codes for frame <i>StErrorList</i> .....	128
Table D.24 – Codes for frame <i>EvErrorList</i> .....	128
Table D.25 – Normal charge cycle test .....	131

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**ELECTRIC VEHICLE CONDUCTIVE CHARGING SYSTEM –****Part 1: General requirements**

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International Standard IEC 61851-1 has been prepared by IEC technical committee 69: Electric road vehicles and electric industrial trucks.

This third edition cancels and replaces the second edition published in 2010. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) The contents of IEC 61851-1:2010 have been re-ordered. Numbering of clauses has changed as new clauses were introduced and some contents moved for easy reading. The following lines give an insight to the new ordering in addition to the main technical changes.
- b) All requirements from IEC 61851-22 have been moved to this standard, as work on IEC 61851-22 has ceased.

- c) Any requirements that concern EMC have been removed from the text and are expected to be part of the future version of 61851-21-21.
- d) Clause 4 contains the original text from IEC 61851-1:2010 and all general requirements from Clause 6 of IEC 61851-1:2010.
- e) Clause 5 has been introduced to provide classifications for EV supply equipment.
- f) Previous general requirements of Clause 6 have been integrated into Clause 4. Clause 6 contains all Mode descriptions and control requirements. Specific requirements for the combined use of AC and DC on the same contacts are included.
- g) Clause 9 is derived from previous Clause 8. Adaptation of the description of DC accessories to allow for the DC charging modes that have only recently been proposed by industry and based on the standards IEC 61851-23, IEC 61851-24 as well as IEC 62196-1, IEC 62196-2 and IEC 62196-3. Information and tables contained in the IEC 62196 series standards have been removed from this standard.
- h) Clause 10 specifically concerns the requirements for adaptors, initially in Clause 6.
- i) Clause 11 includes new requirements for the protection of the cable.
- j) Specific requirements for equipment that is not covered in the IEC 62752 remain in the present document.
- k) Previous Clause 11 is now treated in Clauses 12 to 13. The requirements in 61851-1 cover the EV supply equipment of both mode 2 and mode 3 types, with the exception in-cable control and protection devices for mode 2 charging of electric road vehicles (IC-CPD) which are covered by IEC 62752.
- l) Clause 14 gives requirements on automatic reclosing of protection equipment.
- m) Clause 16 gives requirements for the marking of equipment and the contents of the installation and user manual. This makes specific mention of the need to maintain coherence with the standards for the fixed installation. It also contains an important text on the markings for temperature ratings.
- n) Annex A has been reviewed to introduce complete sequences and tests and to make the exact cycles explicit. Annex A in this edition supersedes IEC TS 62763 (Edition 1).
- o) Annex B is normative and has requirements for proximity circuits with and without current coding.
- p) Previous Annex C has been removed and informative descriptions of pilot function and proximity function implementations initially in Annex B are moved to Annex C.
- q) New informative Annex D describing an alternative pilot function system has been introduced.
- r) Dimensional requirements for free space to be left around socket-outlets used for EV energy supply are given in the informative Annex E.
- s) The inclusion of protection devices within the EV supply equipment could, in some cases, contribute to the protection against electric shock as required by the installation. This is covered by the information required for the installation of EV supply equipment in Clause 16 (Marking).

The text of this standard is based on the following documents:

FDIS	Report on voting
69/436/FDIS	69/469/RVD

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

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

1 Under preparation.

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

In this standard, the following print types are used:

- *test specifications and instructions regarding application of Part 1: italic type.*
- notes: smaller roman type.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

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## INTRODUCTION

This standard is the first part of the IEC 61851 series of standards that gives the general requirements for the supply<sup>2</sup> of electric energy to Electric road vehicles<sup>3</sup>. It is to be noted that the vehicle and the EV supply equipment<sup>2</sup> make up a complete system that is covered by a number of IEC and ISO standards.

IEC 61851 covers the mechanical, electrical, communications, EMC and performance requirements for EV supply equipment used to charge electric vehicles, including light electric vehicles.

IEC 61851 is divided into several parts as follows:

- *Part 1: General Requirements*,  
This document gives the general requirements that serve as a basis for all the subsequent standards in the series. It includes the requirements for AC EV supply equipment.
- *Part 21-1<sup>4</sup>: Electric vehicle onboard charger EMC requirements for conductive connection to an AC/DC supply*. This part will cover requirements for EMC onboard the vehicle.
- *Part 21-2<sup>5</sup>: EMC requirements for OFF board electric vehicle charging systems*. This part will cover all requirements for AC and DC EV supply equipment. EMC requirements for wireless power transfer systems (WPT) will not be included.
- *Part 23: DC electric vehicle charging station (2014)*. This part covers the requirements for DC charging stations both permanently wired and cable and plug connected.
- *Part 24: Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging (2014)*. This part provides the requirements for communication between the vehicle and the DC charging stations of Part 23.

IEC 61851-3 subseries is under development and is intended to cover EV supply equipment with a DC output ~~not exceeding 120 V where reinforced or double insulation or class III is used as the principal means of protection against electric shock (information on scope as available on 3/2016)~~.<sup>4</sup>

- *Part 3-1: Electric vehicles conductive power supply system – Part 3-1: General Requirements for Light Electric Vehicles (LEV) AC and DC conductive power supply systems*.
- *Part 3-2: Electric vehicles conductive power supply system – Part 3-2: Requirements for Light Electric Vehicles (LEV) DC off-board conductive power supply systems*.
- *Part 3-3: Electric vehicles conductive power supply system – Part 3-3: Requirements for Light Electric Vehicles (LEV) battery swap systems*.
- *Part 3-4: Electric vehicles conductive power supply system – Part 3-4: Requirements for Light Electric Vehicles (LEV) communication*.
- *Part 3-5: Electric vehicles conductive power supply system – Part 3-5: Requirements for Light Electric Vehicles communication – Pre-defined communication parameters*.
- *Part 3-6: Electric vehicles conductive power supply system – Part 3-6: Requirements for Light Electric Vehicles communication – Voltage converter unit*.
- *Part 3-7: Electric vehicles conductive power supply system – Part 3-7: Requirements for Light Electric Vehicles communication – Battery system*.

<sup>2</sup> The term “supply or electric energy” is used to designate energy flow to and from the electric vehicle. The term “charging” used in the title is also used to designate such energy flow.

<sup>3</sup> The reader is advised to refer to the definitions clause 3 for this and all subsequent terms that are used in this document.

<sup>4</sup> Under preparation.

<sup>5</sup> Under preparation.

Documents directly related to the present document:

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

This document gives requirements for electric vehicle that is to be connected to the EV supply equipment. It covers all the classes of vehicles that are in the scope of ISO/TC 22/SC 37.

- IEC 62752:2016, *In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)*.

This product standard gives the requirements for Mode 2 cable assemblies that include supplementary protective and control devices that allow the safe connection of a vehicle to a mains socket-outlet of an installation.

- ISO/IEC 15118 (all parts), *Road vehicles — Vehicle to grid communication interface*

This series of documents gives the description and the requirements for high level data communication between the EV and the EV supply equipment.

Requirements for wireless power transfer systems are given in IEC 61980-1.

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