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TECHNICAL SPECIFICATION

colour inside

Electric vehicles conductive charging system – Part 3-7: DC EV supply equipment where protection relies on double or reinforced insulation – Battery system communication

IEC TS 61851-3-7:2023-07(en)

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FOREWORD

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IEC TS 61851-3-7 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
69/653/DTS	69/674/RVDTS 69/674A/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.

The following print types are used:

– requirements: in roman type;

– notes: in small roman type;

– **text formatted in bold and using mixed capital and underline are used as state names and are not to be translated**.

A list of all parts in the IEC 61851 series, 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- withdrawn,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 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 61851-3-2, *Electric vehicles conductive charging – 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 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, *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 TS 61851-3-6, *Electric vehicles 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 vehicles conductive charging system – Part 3-7: DC EV supply equipment where protection relies on double or reinforced insulation – Battery system communication*

ELECTRIC VEHICLES CONDUCTIVE CHARGING SYSTEM –

Part 3-7: DC EV supply equipment where protection relies on double or reinforced insulation – Battery system communication

1 Scope

This part of IEC 61851, which is a Technical Specification, applies to CANopen communication for the conductive transfer of electric power between the supply network and an electric road vehicle or a removable RESS or traction-battery of an electric road vehicle.

This document specifies application objects provided by the battery system.

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 TS 61851-3-4:2023 *Electric vehicles conductive charging system – 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*

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 61851-3-4 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms given in IEC TS 61851-3-4 and the following apply:

Ag	silver
AGM	absorbent glass mat
Al	aluminium
Cd	cadmium
Fe	iron
Li	lithium
MeO	metal oxide
Ni	nickel
Ni-MH	nickel metal hydride
SOC	state of charge
SOH	state of health
TiO	titanium oxide
Zn	zinc

5 Operating principles

5.1 General

In addition to the finite state automaton (FSA) defined by 9.1 of IEC TS 61851-3-4:2023, this document defines an additional battery system specific FSA to operate batteries in a common way. Any battery system supports the mandatory FSA states. State transitions within the FSA are based on device internal events (e.g. occurrence of device errors) or on the reception of the FSA control word.

5.2 Battery system specific FSA

The battery system specific FSA as defined in Figure 1 shall start with the initial entry in the EMS FSA state **Disconnected** and shall exist as long as the EMS FSA is not left.

The FSA defines the application behaviour of the battery system (see also Table 1). The battery system shall ensure safety by providing independent local control according to EN 50604-1:2016 (even when the CAN network is not working properly). The NMT slave FSA as defined in EN 50325-4:2002, the EMS FSA and the battery system FSA are coupled in the following way: a state change in any of the involved FSAs may trigger state changes in the other FSAs.

For state transitions (numbers in Figure 1), see Table 2.

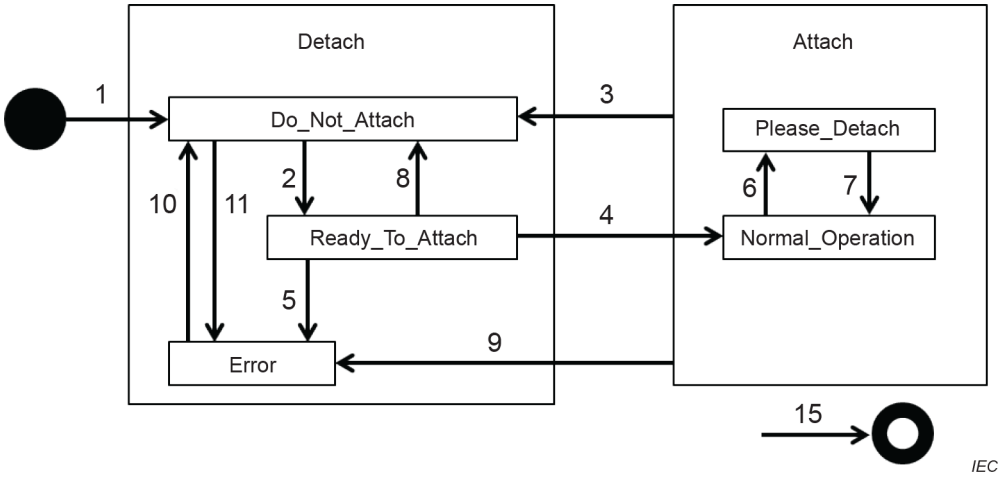

Figure 1 – FSA for battery system

5.3 State definitions

The FSA for battery systems as shown in Figure 1 shall provide the following states with the described state behaviour in Table 1 and state transitions in Table 2.

NOTE 1 States refer to removable and non-removable battery systems.

NOTE 2 "Detached" does not mean "removable".

Table 1 – States behaviour

Name	Behaviour
Initial	Pseudo state indicating the activation of the FSA
Detached	Battery system is not connected to the power circuit
Do_Not_Attach	Battery system may be configured and is not prepared to be connected to the power circuit
Ready_To_Attach	Battery system is prepared and ready to be attached to the power circuit.
Attached	Battery system is connected to the power circuit
Normal_Operations	Battery system is operating on the power circuit
Please_Detach	Battery system indicates itself that it requires to be disconnected from the power circuit (e.g. because the battery system operates no longer within the operating limits).
Error	The battery system is in an error condition. There is no power transferred. See also Clause 7 of IEC TS 61851-3-4:2023.
Final	Pseudo state, indicating the deactivation of the FSA

5.4 Transitions in the FSA for battery systems

The FSA for battery systems shall support the transitions as given in Table 2.