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Entwurf

Einsprüche bis 2019-10-16
Vorgesehen als Ersatz für
DIN EN ISO 17409:2017-07

**Elektrisch angetriebene Straßenfahrzeuge –
Kabelgebundene Energieübertragung –
Sicherheitsanforderungen (ISO/DIS 17409:2019);
Englische Fassung prEN ISO 17409:2019**

Electrically propelled road vehicles –
Conductive power transfer –
Safety requirements (ISO/DIS 17409:2019);
English version prEN ISO 17409:2019

Véhicules routiers à propulsion électrique –
Transfert d'énergie conductive- Exigences de sécurité (ISO/DIS 17409:2019);
Version anglaise prEN ISO 17409:2019

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2019-08-16 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfs besonders zu vereinbaren.

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Gesamtumfang 49 Seiten

DIN-Normenausschuss Automobiltechnik (NAAutomobil)

Nationales Vorwort

Dieses Dokument (prEN ISO 17409:2019) wurde vom Technischen Komitee ISO/TC 22 „Road vehicles“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 301 „Straßenfahrzeuge“, dessen Sekretariat von AFNOR (Frankreich) gehalten wird, erarbeitet.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 052-00-37 AA „Arbeitsausschuss NAAutomobil: Elektrische Straßenfahrzeuge“ des DIN-Normenausschusses Automobiltechnik (NAAutomobil).

Dieses Dokument ist derzeit zur parallelen Abstimmung vorgelegt.

Das Präsidium des DIN hat mit seinem Beschluss 1/2004 festgelegt, dass von dem in den Regeln der europäischen Normungsarbeit von CEN/CENELEC verankerten Grundsatz, wonach Europäische Normen in den drei offiziellen Sprachen Deutsch, Englisch und Französisch veröffentlicht werden, in begründeten Ausnahmefällen abgewichen und auf die deutsche Sprachfassung verzichtet werden kann.

Die Genehmigung dafür hat die DIN-Geschäftsleitung entsprechend ihren in Anlage 1 zu dem DIN-Rundschreiben A 5/2004 festgelegten Kriterien für die vorliegende Norm auf Antrag des NA 052 NAAutomobil als Ergebnis einer Einzelfallentscheidung erteilt, zumal bereits dieser Norm zugrunde liegende Papiere überwiegend in englischer Sprache auch von den deutschen Marktteilnehmern angewendet werden.

Dieser Standard spezifiziert Anforderungen der elektrischen Sicherheit für eine kabelgebundene Verbindung von elektrisch angetriebenen Straßenfahrzeugen mit einem externen elektrischen Stromkreis. Externe elektrischen Stromkreise schließen externe elektrische Energieversorgungen und externe elektrische Ladungen ein. Dieses Dokument enthält Anforderungen für die Lademodi 2, 3,4 und die Rückspeisung.

Änderungen

Gegenüber DIN EN ISO 17409:2017-07 wurden folgende Änderungen vorgenommen:

- a) Anforderungen für Lademodus 1 entfernt, weil nicht länger relevant für das Design;
- b) Anforderungen an die Rückspeisung hinzugefügt;
- c) Anforderungen für das Hochleistungsladen (HPC) hinzugefügt;
- d) Kurzschluss während des Gleichstromladens überarbeitet;
- e) Pantograph-Laden betrachtet.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC22/SC37 “Electrically propelled road vehicles”

This 2nd edition replaces the 1st edition. Beside regular maintenance and update of definitions, the following changes were performed to the 1st edition:

- Requirements for mode 1 removed because it is no longer relevant for new design.
- Requirements for reverse power transfer added
- Requirements for High Power Charging (HPC) added
- Short circuit during DC charging reworked
- Charging with pantograph reflected

With this edition of ISO 17409 the limitation of y-capacitance for protection against electric shock under single failure conditions is no longer applicable as a fault protection measure when the vehicle is conductively connected to an external electric circuit.

Electrically propelled road vehicles – Conductive power transfer – Safety requirements

1 Scope

This standard specifies electric safety requirements for conductive connection of electrically propelled road vehicles to external electric circuits. External electric circuits include external electric power supplies and external electric loads. This document provides requirements for Mode 2, 3, 4 and reverse power flow.

NOTE 1 This edition does not provide requirements for Mode 1.

This standard applies to the on-board sections of vehicle power supply circuits. It applies also to dedicated power supply control functions used for the connection of the vehicle to an external electric circuit.

It does not provide comprehensive safety information for manufacturing, maintenance and repair personnel.

This document provides requirements for the charging modes as defined in IEC 61851-1:2017. For mode 4, this document provides requirements regarding the connection to an isolated DC EV charging station according to IEC 61851-23.

NOTE 2 The requirements when not connected to external electric circuits are specified in ISO 6469-3.

NOTE 3 Safety requirements for conductive connection of electrically propelled mopeds and motorcycles to external electric power supplies are covered by ISO 18246.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6469-3:2018, *Electrically propelled road vehicles — Safety specifications — Part 3: Protection of persons against electric shock*

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

ISO 20653, *Road vehicles — Degrees of protection (IP code) — Protection of electrical equipment against foreign objects, water and access*

ISO 26262 (all parts), *Road vehicles — Functional safety*

IEC 60038, *IEC standard voltages*

IEC 60309-1, *Plugs, socket-outlets and couplers for industrial purposes — Part 1: General requirements*

IEC 60309-2, *Plugs, socket-outlets and couplers for industrial purposes — Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories*

IEC 60364-4-41:2005; *Low-voltage electrical installations –Part 4-41: Protection for safety –Protection against electric shock*

IEC 60364-4-43:2008, *Electrical installations of buildings — Part 4-43: Protection for safety — Protection against overcurrent*

IEC 60364-5-54, *Low-voltage electrical installations — Part 5-54: Selection and erection of electrical equipment — Earthing arrangements and protective conductors*

IEC 60364-6, *Low-voltage electrical installations — Part 6: Verification*

IEC 60664 (all parts), *Insulation coordination for equipment within low-voltage systems*

IEC 61000-3-3; *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 ≤ 16 A per phase and not subject to conditional connection*

IEC 61000-3-11, *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 ≤ 75 A and subject to conditional connection*

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

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

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

IEC 62196-2, *Plugs, socket-outlets, vehicle connectors and vehicle inlets — Conductive charging of electric vehicles — Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories*

IEC 62196-3:2015, *Plugs, socket-outlets, vehicle connectors and vehicle inlets — conductive charging of electric vehicles — Part 3: Dimensional compatibility and interchangeability requirements for dedicated d.c. and combined a.c./d.c. pin and contact-tube vehicle couplers*

IEC 62196-3-1, *Plugs, socket-outlets, vehicle connectors and vehicle inlets — conductive charging of electric vehicles — Part 3-1: Vehicle connector, vehicle inlet and cable assembly intended to be used with a thermal management system for DC charging*

3 Terms and definitions

3.1

autoconnect charging device

ACD

active device where the physical connection between EV supply equipment and vehicle is made without user interaction providing an electromechanical interface.

[SOURCE: IEC 61851-23-1:–1, 3.1.203]

3.2

ACD counterpart

passive device which is used in combination with an ACD to make the physical connection between EV supply equipment and vehicle providing an electromechanical interface without user interaction.

[SOURCE: IEC 61851-23-1:-1, 3.1.204]

3.3

automatic coupler

system comprising of an ACD and ACD counterpart.

[SOURCE: IEC 61851-23-1:-1, 3.1.205]

3.4

balance of electric power system

remaining section of an electric circuit when all electric power sources that are energized (e.g. RESS and fuel cell stacks) are disconnected

[SOURCE: ISO 6469-3: 2018, 3.2]

3.5

basic insulation

insulation of hazardous live parts which provides basic protection

Note 1 to entry: This concept does not apply to insulation used exclusively for functional purposes.

[SOURCE: ISO 6469-3: 2018, 3.3]

3.6

case A

connection of an EV to the supply network with a plug and cable permanently attached to the EV

Note 1 to entry: The cable assembly is part of the vehicle.

[SOURCE: IEC 61851-1:2017, 3.1.10]

3.7

case B

connection of an EV to the supply network with a cable assembly detachable at both ends

Note 1 to entry: The cable assembly is not part of the vehicle or the EV charging station.

[SOURCE: IEC 61851-1:2017, 3.1.11]

3.8

case C

connection of an EV to the supply network utilizing a cable and vehicle connector permanently attached to the EV charging station.

Note 1 to entry: The cable assembly is part of the EV charging station.

[SOURCE: IEC 61851-1:2017, 3.1.12]

3.9

case D

connection of an EV to a supply network utilizing an automatic coupler which has an ACD on the EV supply equipment

[SOURCE: IEC 61851-23-1:-1, 3.1.201]

3.10

case E

connection of an EV to a supply network utilizing an automatic coupler which has an ACD on the EV

[SOURCE: IEC 61851-23-1:-1, 3.1.202]

3.11

charger

power converter at the vehicle power supply circuit which supplies electric power, e.g. for charging a RESS

3.12

conductive part

part which can carry electric current

[SOURCE: ISO 6469-3: 2018, 3.6]

3.13

control pilot function

function used to monitor and control the interaction between the EV and the EV supply equipment

[SOURCE: IEC 61851-1:2017, 3.3.3]

3.14

cut-off current

let-through current

the maximum instantaneous value of current attained during the breaking operation of a switching device or a fuse

Note 1 to entry: This concept of particular importance when the switching device or the fuse operates in such a manner that the prospective peak current of the circuit is not reached.

[SOURCE: IEC 60050-441:1984, 441-17-12]

3.15

DC EV charging station

EV charging station that supplies direct current to an EV

[SOURCE: IEC 61851-1:2017, 3.1.6]

3.16

degree of protection

protection provided by an enclosure against access, foreign objects and/or water and verified by standardized test methods

[SOURCE: ISO 20653:2013, 3.2]

3.17

direct contact

electric contact of persons or animals with live parts

[SOURCE: ISO 6469-3: 2018, 3.10]

3.18

displacement power factor

cos φ

cosine of the phase angle between the fundamental frequency of the voltage between a line conductor and earth and the current in this line conductor

[SOURCE: VDE-AR-N 4100:-1, 3.1.59, modified – translated to English]

3.19

distortion power factor

coefficient, used to take into account harmonics influence into the true power factor

Note 1 to entry: Calculation is as follows:

$$\text{distortion power factor} = \frac{1}{\sqrt[2]{1 + THDi^2}}$$

THDi being the total harmonic distortion for current.

3.20

double insulation

insulation comprising both basic insulation and supplementary insulation

[SOURCE: ISO 6469-3: 2018, 3.11]

3.21

electrically propelled vehicle

EV

vehicle with one or more electric drive(s) for vehicle propulsion

[SOURCE: ISO 6469-3: 2018, 3.15]

3.22

electric chassis

conductive parts of a vehicle that are electrically connected and whose potential is taken as reference

¹ Under preparation. Stage at the time of publication: Entwurf, 2018-01-23

[SOURCE: ISO 6469-3: 2018, 3.12]

3.23

electric drive

combination of traction motor, power electronics and their associated controls for the conversion of electric to mechanical power and vice versa

[SOURCE: ISO 6469-3: 2018, 3.13]

3.24

electric shock

physiological effect resulting from an electric current through a human body or animal body

[SOURCE: ISO 6469-3: 2018, 3.14]

3.25

EV charging station

stationary part of EV supply equipment connected to the supply network

[SOURCE: IEC 61851-1: 2017, 3.1.5]

3.26

EV plug

specific plug intended to be used as part of EV supply equipment or for the connection of EV to EV supply equipment, and defined in the IEC 62196 series

[SOURCE: IEC 61851-1: 2017, 3.5.8]

3.27

EV supply equipment

equipment or a combination of equipment, providing dedicated functions to supply electric energy from a fixed electrical installation or supply network to an EV for the purpose of charging

EXAMPLE 1: For Mode 3 case B, the EV supply equipment consists of the EV charging station and the cable assembly.

EXAMPLE 2: For Mode 3 case C, the EV supply equipment consists of the EV charging station with its cable assembly.

[SOURCE: IEC 61851-1:2017, 3.1.1]

3.28

exposed conductive part

conductive part of equipment which can be touched and which is not normally live, but which can become live when basic insulation fails

[SOURCE: ISO 6469-3: 2018, 3.18]

3.29

external electric circuit

electric circuit which connects to the vehicle power supply circuit using the plug (case A), the vehicle inlet (case B and case C), the ACD counterpart (case D) or the ACD (case E)

EXAMPLE: EV charging station, external electric load.

3.30

external electric power supply

electric power source that is not part of the vehicle for supplying electric energy to an EV using an EV supply equipment

3.31

hazard

potential source of harm

[SOURCE: IEC 60050-903:2013, 903-01-02]

3.32

hazardous live part

live part which, under certain conditions, can give a harmful electric shock

[SOURCE: ISO 6469-3: 2018, 3.22, modified – Note 1 to entry removed.]

3.33

interlock function

function that prevents the power contacts of a socket-outlet/vehicle connector from becoming live before it is in proper engagement with a plug/vehicle inlet, and which either prevents the plug/vehicle connector from being withdrawn while its power contacts are live or makes the power contacts dead before separation

[SOURCE: IEC 61851-1:2017, 3.5.16, modified – term changed from “interlock” to “interlock function”, definition changed from “device or combination of devices” to “function”]

3.34

isolation resistance

insulation resistance

resistance between live parts of an electric circuit and the electric chassis as well as other electric circuits which are insulated from this electric circuit

[SOURCE: ISO 6469-3: 2018, 3.23]

3.35

isolation resistance monitoring system

system that periodically or continuously monitors the isolation resistance between live parts and the electric chassis

[SOURCE: ISO 6469-3: 2018, 3.24]

3.36

live conductor

conductor which is energized in normal operation and capable of contributing to the transmission or distribution of electric energy

Note 1 to entry: Live conductors include line conductors (including DC+ conductors and DC- conductors) and neutral conductors.

3.37

live part

conductor or conductive part intended to be energized in normal use, but by convention not the electric chassis

[SOURCE: ISO 6469-3: 2018, 3.25]

3.38

maximum working voltage

highest value of AC voltage (rms) or of DC voltage that can occur under normal operating conditions according to the manufacturer's specifications, disregarding transients and ripple

[SOURCE: ISO 6469-3: 2018, 3.26, modified – term “any” deleted from “normal operating conditions”]

3.39

mode 1

method for the connection of an EV to a standard socket-outlet of an AC supply network, utilizing a cable and plug, both of which are not fitted with any supplementary pilot or auxiliary contacts

[SOURCE: IEC 61851-1:2017, 6.2.1]

3.40

mode 2

method for the connection of an EV to a standard socket-outlet of an AC supply network utilizing an AC EV supply equipment with a cable and plug, with a control pilot function and system for personal protection against electric shock placed between the standard plug and the EV

[SOURCE: IEC 61851-1:2017, 6.2.2]

3.41

mode 3

method for the connection of an EV to an AC EV supply equipment permanently connected to an AC supply network, with a control pilot function that extends from the AC EV supply equipment to the EV

Note 1 to entry: Mode 3 includes the use of cable assembly not permanently connected to the a.c supply network (case A and case B).

[SOURCE: IEC 61851-1:2017, 6.2.3, modified – Note 1 to entry added.]

3.42

mode 4

method for the connection of an EV to an AC or DC supply network utilizing a DC EV supply equipment, with a control pilot function that extends from the DC EV supply equipment to the EV

[SOURCE: IEC 61851-1:2017, 6.2.4]

3.43

overcurrent protection

protection intended to operate when the current is in excess of a predetermined value

Note 1 to entry: a charge control function is not considered an overcurrent protection

[SOURCE: ISO 6469-3: 2018, 3.28]

3.44

overload protection

protection intended to operate in the event of overload on the protected section

[SOURCE: ISO 6469-3: 2018, 3.27]

3.45

plug

accessory having contacts designed to engage with the contacts of a socket-outlet, also incorporating means for the electrical connection and mechanical retention of flexible cables or cords

[SOURCE: IEC 61851-1:2017, 3.5.9]

3.46

protective barrier

part providing protection against direct contact from any usual direction of access

[SOURCE: ISO 6469-3: 2018, 3.29]

3.47

protective conductor

conductor provided for purposes of safety, for example protection against electric shock

EXAMPLE Examples of a protective conductor include a protective bonding conductor, protective earthing conductor and an earthing conductor when used for protection against electric shock.

[SOURCE: IEC 61851-1:2017, 3.7.2]

3.48

protective enclosure

electrical enclosure surrounding internal parts of equipment to prevent access to hazardous live parts from any direction

[SOURCE: ISO 6469-3: 2018, 3.30]

3.49

radio frequency interference filter

RFI filter

electrical device or circuit that mitigates the radio frequency electromagnetic noise present on the power and signal lines

3.50

rated current

current assigned by the manufacturer for a specified operating condition

[SOURCE: IEC 60050-442: 442-01-02, modified – “of an accessory” removed from end of definition.]

3.51

rechargeable energy storage system

RESS

rechargeable system that stores energy for delivery of electric energy for the electric drive

Examples to entry: Battery, capacitor, flywheel.

[SOURCE: ISO 6469-1:-2, 3.22]

3.52

reinforced insulation

insulation of hazardous live parts which provides a degree of protection against electric shock equivalent to double insulation

Note 1 to entry: Reinforced insulation may comprise several layers that cannot be tested singly as basic insulation or supplementary insulation.

[SOURCE: ISO 6469-3: 2018, 3.32]

3.53

residual current device

RCD

mechanical switching device designed to make, carry and break currents under normal service conditions and to cause the opening of the contacts when the residual current attains a given value under specified conditions

Note 1 to entry: A residual current device can be a combination of various separate elements designed to detect and evaluate the residual current and to make and break current.

[SOURCE: IEC 60050-442:1998, 442-05-02]

3.54

reverse power transfer

supply of electric power from an EV using the EV plug (case A), the vehicle inlet (case B and case C), the ACD counterpart (case D) or the ACD (case E) to an external electric circuit

Note 1 to entry: Unintended current flow from an EV to an external electric circuit is not considered a reverse power transfer.

Note 2 to entry: Supply of power by using an on-board equipment that is equipped with a socket-outlet is not reverse power transfer.

3.55

socket-outlet

accessory having socket-contacts designed to engage with the contacts of a plug and having terminals for the connection of cables or cords

[SOURCE: IEC 61851-1:2017, 3.5.10]

² Under preparation. Stage at the time of publication: ISO/FDIS 6469-1:2019