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Electric Vehicle Conductive Charging System —Part 1: General Requirements
电动汽车传导充电系统 第 1 部分：通用要求

(English Translation)

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Electric Vehicle Conductive Charging System —Part 1: General Requirements

1 SCOPE

This document specifies the classification, general requirements, communications, protection against electric shock, connection between EV and EV energy transfer equipment, vehicle adapter, special requirements for vehicle coupler and EV plug & socket-outlet, constructional requirements for EV energy transfer equipment, performance requirements for EV energy transfer equipment, overload and short-circuit protection, emergency shutdown, service conditions, repair and maintenance, marking and instructions, with respect to electric vehicle conductive charging system.

Note 1: To avoid confusion, "EV energy transfer equipment" is referred to as "supply equipment" in this document.

This document applies to the off-board conductive supply equipment with current and/or voltage controlled to achieve unidirectional/bidirectional energy flow between the EV REESS and the supply network (power source), which has a rated voltage up to 1,000 V AC or 1,500 V DC at the supply network side (A side) and a rated maximum voltage up to 1,000 V AC or 1,500 V DC at the EV side (B side).

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

This document applies to the conductive charging or bi-directional charging system of the off-vehicle-chargeable/bi-directionally chargeable electric vehicles, including battery electric vehicles, off-vehicle-chargeable hybrid electric vehicles and fuel cell hybrid electric vehicles.

The conductive charging or bi-directional charging system of the tramcars, rail vehicles, and industrial vehicles may use this standard as a reference.

This document does not apply to the safety requirements related to maintenance of electric vehicle conductive charging/bi-directional charging system, the on-board charging equipment specified in GB/T 40432, or the trolley buses.

The parts other than key components (e.g., vehicle inlet at the EV side, control pilot circuit, and EV disconnection device) of electric vehicles specified in this document shall comply with the requirements of appropriate EV standards.

Note 2: The EMC requirements for off-board electric vehicle supply equipment refer to GB/T18487.2-2017.

Note 3: The requirements for electric vehicle top contact charging system refer to GB/T 40425 (all parts).

Note 4: The requirements for in-cable control and protection device (IC-CPD) for mode 2 refer to GB/T 41589.

2 NORMATIVE REFERENCES

The following normative documents contain provisions which, through normative reference in this text, constitute essential provision of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendment) applies.

GB 1002 Single Phase Plugs and Socket-outlets for Household and Similar Purposes - Types, Basic Parameters and Dimensions

GB 1003 Three Phases Plugs and Socket-outlets for Household and Similar Purposes - Types, Basic Parameters and Dimensions

GB/T 2099.1 Plugs and Socket-outlets for Household and Similar Purposes - Part 1: General Requirements

GB/T 2423.3 Environmental testing—Part 2: Test methods—Test Kca: High concentration sulfur dioxid

GB/T 2423.4 Environmental testing—Part 2: Test methods—Test Ff: Vibration—Time-history and sine-beat method

GB/T 7251.1-2013 Low-voltage switchgear and controlgear assemblies—Part 1: General rules

GB/T 10963.1 Electrical Accessories - Circuit-breakers for Overcurrent Protection for Household and Similar Installations - Circuit-breakers for A.C. Operation

GB/T 10963 (all parts) Electrical accessories—Circuit-breakers for overcurrent protection for household and similar installations

GB/T 11918.1 Plugs, Socket-outlet and Couplers for Industrial Purposes - Part 1: General Requirements

GB/T 11918.2 Plugs, socket-outlets and couplers for industrial purposes—Part 2: Dimensional compatibility and interchangeability requirements for pin and contact-tube accessories

GB/T 12113-2003 Methods of Measurement of Touch Current and Protective Conductor Current

GB/T 13539 (all parts) Low-voltage fuses

GB/T 13870.1-2022 Effects of current on human beings and livestock—Part 1: General aspects

GB/T 13870.2-2016 Effects of Current on Human Beings and Livestock - Part 2: Special Aspects

GB/T 14048.2 Low-voltage Switchgear and Controlgear Assemblies - Part 2: Circuit-breakers

GB/T 14048.3 Low-voltage Switchgear and Controlgear Assemblies - Part3: Switches, Disconnectors, Switch-disconnectors and Fuse-combination Units

GB/T 14048.4 Low-voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters (Including Motor Protector)

GB/T 14048.9 Low-voltage switchgear and controlgear - Section 6-2: Multiple function equipment control and protective switching devices (or equipment) (CPS)

GB 14050 Types and safety technical requirements of system earthing

GB/T 14285 Technical code for relaying protection and security automatic equipment

GB/T 16895.3 Low-voltage Electrical Installations - Part 5-54: Selection and Erection of Electrical Equipment - Earthing Arrangements and Protective Conductors

GB/T 16895.22 Electrical Installations of Buildings - Part 5-53: Selection and Erection of Electrical Equipment Isolation, Switching and Control - Section 534: Devices for Protection against Overvoltages

GB/T 16916.1 Residual Current Operated Circuit-breakers without Integral Overcurrent Protection for Household and Similar Uses (RCCB) - Part 1: General Rules

GB/T 16917.1 Residual Current Operated Circuit-breakers with Integral Overcurrent Protection for Household and Similar Uses (RCBOs) - Part 1: General Rules

GB/T 16935.1-2008 Insulation Coordination for Equipment within Low-voltage Systems - Part 1: Principles, Requirements and Tests

GB/T 17045-2020 Protection against Electric Shock - Common Aspects for Installations and Equipment

GB 18384-2020 Electric Vehicles Safety Requirements

GB/T 18487.2-2017 Electric Vehicle Conductive Charging System - Part 2: EMC Requirements for Off-board Electric Vehicle Supply Equipment

GB/T 18802.11 Low-voltage Surge Protective Devices (SPD) - Part 11: Surge Protective Devices Connected to Low-voltage Power Systems - Requirements and Test Methods

GB/T 18802.21 Low-voltage Surge Protective Devices - Part 21: Surge Protective Devices (SPD) Connected to Telecommunications and Signaling Networks - Performance Requirements and Testing Methods

GB/T 19596-2017 Terminology of Electric Vehicles

GB/T 20234.1-2023 Connection set for conductive charging of electric vehicles—Part 1: General requirements

GB/T 20234.2-2015 Connection set for conductive charging of electric vehicles—Part 2: AC charging coupler

GB/T 20234.3-2023 Connection set for conductive charging of electric vehicles—Part 3: DC charging coupler

GB/T 20234.4-2023 Connection set of conductive charging for electric vehicles—Part 4: High power DC charging coupler

GB/T 21711.1-2008 Electromechanical Elementary Relays - Part 1: General and Safety Requirements

GB/T 22794 Type F and Type B Residual Current Operated Circuit-breakers with and without Integral Overcurrent Protection for Household and Similar Uses

GB/T 27930-2023 Digital communication protocols between off-board conductive charger and electric vehicle

GB/T 29317-2021 Terminology of Electric Vehicle Charging/Battery Swap Infrastructure

GB/T 32694-2021 Plug-in Hybrid Electric Passenger Cars

GB/T 40432 Conductive On-board Charger for Electric Vehicles

GB/T 40820-2021 Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles

GB/T 41589 In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)

GB 50057-2010 Code for Design Protection of Structures against Lightning

DL/T 584 Setting guide for 3kV～110kV power system protection equipment

DL/T 621 Grounding for AC Electrical Installations

NB/T 10202 Plugs with Thermal Protection Function for Charging Mode 2 of Electric Vehicles

NB/T 10902 Technical Conditions and Installation Requirements for Off-board DC Charger of 20kW and below

NB/T 33001-2018 Specification for Electric Vehicle Off-board Conductive Charger

NB/T 33002-2018 Specification for Electric Vehicle AC Charging Spot

ISO 17049:2020 Electrically propelled road vehicles-Conductive power transfer-Safety requirements

IEC 62477-1:2016 Safety Requirements for Power Electronic Converter Systems and Equipment - Part 1: General

3 TERMS AND DEFINITIONS

For the purposes of this document, the terms and definitions given in GB/T 19596-2017, GB/T 20234.4-2023, GB/T 29317-2021 and GB/T 32694-2021, as well as the followings apply.

3.1 Charging/Bi-Directional Charging System

3.1.1 Charging

Condition voltage/current provided by the AC or DC supply network (mains) to an appropriate value to supply electric energy to the EV's rechargeable electrical energy storage system (REESS)

3.1.2 bi-directional charging

Condition voltage/current provided by the AC or DC supply network (mains) to an appropriate value to supply electric energy to the EV's REESS, or condition voltage/current provided by the EV that serves as power supply to an appropriate value and output to the AC or DC supply network (mains), or supply electric energy to the load

3.1.3 Conductive charge

A method to charge the battery via electrical conduction

[Source: GB/T 19596-2017, 3.4.2.1]

3.1.4 Charging modes

A method for connection of an EV to the supply network (mains) to supply energy to the EV

Note: Mode 1, mode 2, mode 3 and mode 4 also apply to bi-directional charging.

3.1.4.1 Mode 1

a method for the connection of an EV to the supply network (mains) utilizing a plug and socket-outlet on the supply side which meet the requirements of GB 2099.1 and GB 1002, and utilizing phase, neutral and protective earthing conductors on the supply side

3.1.4.2 Mode 2

a method for the connection of an EV to the supply network (mains) utilizing a standard plug/socket-outlet on the supply side, and utilizing phase, neutral and protective earthing conductors on the supply side, together with an in-cable control and protection device (IC-CPD) for charging connection

3.1.4.3 Mode 3

a method for the connection of an EV to the supply network (mains) utilizing dedicated supply equipment which directly connects the EV to the AC supply network, where a control pilot device is installed on the dedicated supply equipment

3.1.4.4 Mode 4

a method for the connection of an EV to the supply network (mains) utilizing a DC supply equipment with control pilot function

3.1.5 Type of connection

A method for the connection of an EV to the supply network using cables and connectors

3.1.5.1 Case A connection

Connection of an EV to the supply network/supply equipment using a cable assembly fitted with a standard plug/EV plug permanently attached to the EV, see Figure 1

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