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General requirements for electric vehicle charging station

电动汽车充电站通用要求

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Foreword

This Standard is drafted according to the rules specified in GB/T 1.1-2009.

This Standard was proposed by National Energy Administration and Ministry of Industry and Information Technology of P.R China.

This Standard shall be under the jurisdiction of China Electricity Council.

The responsible drafting organizations of this Standard: State Grid Corporation, China Electric Power Research Institute, State Grid Electric Power Research Institute, China Automotive Technology & Research Center, Shenzhen BYD Automobile Co., Ltd, Beijing Institute of Technology, Beijing Jiaotong University and Harbin Coslight Power Co., Ltd.

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General requirements for electric vehicle charging station

1 Scope

This Standard specifies the site-selection principles, power-supply system, charging system, monitoring-control system, electric energy metering, driving-lane, parking lot, safety requirements, signs and marks for electric vehicle charging station (hereinafter referred to as the charging station).

This Standard applies to the charging station which adopts the whole-vehicle charging mode to perform the conductive charging mode to the power storage battery of electric vehicle.

2 Normative references

The articles contained in the following documents have become part of this Standard when they are quoted herein. For the dated documents so quoted, all the modifications (including all corrections) or revisions made thereafter shall be applicable to this Standard.

GB/T 14549-1993 Quality of electric energy supply - Harmonics in public supply network

GB/T 18487.1 Electric vehicle conductive charging system - Part 1: General requirements

GB 50016-2006 Code of design on building fire protection and prevention

GB 50052 Code for design electric power supply systems

GB 50053 Code for design of 20kV and below substation

GB 50054 Code for design of low voltage electrical installations

GB 50057 Design code for protection of structures against lightning

GB 50058 Electrical installations design code for explosive atmospheres and fire hazard

GB 50140 Code for design of extinguisher distribution in buildings

GB 50219 Code of design for water spray extinguishing systems

GB 50229-2006 Code for design of fire protection for fossil fuel power plants and substations

DL/T 620 Overvoltage protection and insulation coordination for AC electrical installations

DL 5027 Specification for fire protection of electric power installation

3 Terms and definitions

The terms and definitions defined in GB/T 18487.1 AND the followings apply to this document.

3.1

AC charging spot

AC power supply unit

The special device which provides AC electric energy for the electric vehicle with vehicle-mounted charger by using conductive mode.

3.2

Off-board charger

The special device which is fixedly mounted on the ground, converts the grid AC to DC, and charges the power storage battery for electric vehicle by using conductive mode.

3.3

Charging equipment

The special equipment providing electric energy for the storage battery of electric vehicle, including AC charging spot, off-board charger and so on.

3.4

EV charging station

The place where three or more EV chargers (with at least one off-board charger) are available and can carry out condition monitoring of the chargers during charging the electric vehicle.

3.5

EV charging system

5.3 The charging station within the urban area shall be close to the urban roads, but shall not be in the vicinity of the intersection of urban arterial roads and heavy traffic roads.

5.4 A reasonably safe distance between the charging station and important or personnel-intensive public buildings such as party and government office buildings, primary and secondary schools, kindergartens, outpatient building and inpatient buildings of hospitals, large libraries, cultural relics and historic sites, museums, large stadiums, movie theaters and so on.

5.5 The charging station shall be kept away from the place with potential hazards, and shall comply with relevant provisions of GB 50058 in the case of adjoining buildings with explosion or fire hazards.

5.6 The charging station shall not be located in the places with dust or corrosive gases, and shall not be located at the downwind side of the prevailing wind direction of source of pollution when such sources cannot be avoided.

5.7 The charging station shall not be located in the place with severe vibration or high temperature.

5.8 The charging station shall not be located in low-lying places or places possibly accumulating water.

5.9 The charging area shall be well ventilated.

5.10 For some areas where severe wet weather may occur, equipment and tools for monitoring and treatment of air humidity shall be available.

6 Power-supply systems

6.1 Layout requirements

Following factors shall be considered for layout of transformer room, power distribution room and power distribution box within the charging station:

a) Shall not hinder the development of charging station; and the possibility of expansion shall be considered.

b) Shall be located at the side to the incoming line of power supply within the charging station.

c) It is easy to enter and exit the power supply line.

d) It is easy to transport equipment.

6.2 Technical requirements

7.1.1 The layout of charging equipment shall be easy to park the electric vehicles to be charged, and carry out operation by charging personnel.

7.2.2 When several vehicles are charged simultaneously, each charge and vehicle shall not affect the charging of other chargers and vehicles.

7.2.3 When the charging equipment is installed outdoor, the rain and snow proof ceiling shall be installed.

7.2.4 When the charging equipment is installed indoor, ventilation facilities shall be installed to prevent overheating.

7.2.5 The charging equipment shall be installed with a certain height from the ground to meet the requirements for rain and accumulated water-proof.

7.2.6 The layout of charging equipment shall make the length of charging cable as short as possible in order to save material and energy consumption.

8 Monitoring-control system

8.1 Composition

The monitoring-control system of charging station consists of charging monitoring-control system, power supply monitoring-control system, and safety-protection monitoring-control system.

8.2 Charging monitoring-control system

8.2.1 Basic functions

8.2.1.1 The charging monitoring-control system achieves monitoring, protection, control and management of charging equipment during operation and charging, and emergency treatment in case of an accident, as well as data storage, display and statistics.

8.2.1.2 The charging monitoring-control system of charging station consists of master monitoring-control station, monitoring-control terminal and communication network.

8.2.1.3 The master monitoring-control station achieves the collection and real-time display of relevant information about charging equipment, and remote control of charging equipment, as well as data storage, inquiry and statistics, etc.

8.2.1.4 Monitoring-control terminal (refers specifically to off-board charger and AC charging spot in this Standard) captures the status and charging operation data of charging equipment, which are uploaded to the master monitoring-control station, and receives and executes the control commands of the master monitoring-control station.

8.2.2 Technical requirements

of operation information on power-supply system, and conduct monitoring and control of power-supply status, quality of electric energy, switch status, and equipment operating parameters, etc.

8.4 Safety-protection monitoring-control system

Safety-protection monitoring-control system consists of charging station environmental monitoring-control, equipment safety monitoring-control, and monitoring-control of fire protection, prevention of burglary and video, etc. Audible alarm shall be issued in case of an accident endangering the safety; the monitoring-control information before and after the accident can be displayed, recorded and played back; the information storage time shall meet relevant regulatory requirements.

9 Electric energy metering

9.1 Composition

The electric energy metering of the charging station consists of two parts: metering between charging station and power grid; and metering between charging equipment and electric vehicle.

9.2 Metering between charging station and power grid

The metering between charging station and power grid shall be conducted by power supply unit in accordance with national standard.

9.3 Metering between charging equipment and electric vehicle

9.3.1 The AC electric energy meter in line with the national metering standard shall be conducted to meter the AC charging spot, which shall be installed between the AC charging spot and electric vehicle.

9.3.2 The DC electric energy meter in line with the national metering standard shall be conducted to meter the off-board charger, which shall be installed between the off-board charger and electric vehicle.

10 Driving-lanes and parking lots

10.1 The driving-lanes can be unidirectional or bidirectional layout, based on the size of charging station and arrangement of charging equipment.

10.2 The width of single driving-lane within the charging station shall not be less than 3.5 m, and dual-driving-lane width shall not be less than 6 m.

10.3 The turning radius of road within the charging station shall be determined in accordance with models of travelling vehicles, and shall not be less than 9 m. The road

gradient shall not exceed 6%, and shall be sloped-down to the outside of charging station.

10.4 Layout principles of parking lots: the electric vehicles shall not impede the passage of other vehicles, in the case of charging at the parking lot.

10.5 Appropriate number of temporary parking lots shall be considered to set up.

11 Safety requirements

11.1 Fire protection

11.1.1 Fire protection of buildings (structures)

11.1.1.1 The combustion property and duration of fire resistance of buildings (structures) within the charging station, as well as the fire protection distance between the buildings (structures) within the charging station and civil buildings (structures) outside the charging station, and various types of plants, warehouses, storage yards and storage tanks shall comply with the requirements of chapter 3 in GB 50016-2006.

11.1.1.2 The doors to the transformer room, power distribution room and storage battery room shall be open towards the evacuation direction; grade B fire doors shall be adopted in the case of being public walkways or other rooms outdoor; the two-way spring doors made of non-combustible materials shall be adopted on the middle wall.

11.1.1.3 The doors to the monitoring-control room, office and lounge shall be made of non-combustible materials, and shall be open outwards; the doors shall lead to the sites without explosion and fire hazards; the windows with non-anti-explosive structural design shall face the direction without explosion and fire hazards.

11.1.1.4 For the entrance of cables from outside to inside, entrance and exit of cable vertical-shaft, cable joints, cable trenches or cable tunnels between the monitoring-control room and cable interlayer as well as the length exceeding 100m, retardant or segregation measures shall be taken to prevent the spreading of fire; one or more of the following measures shall be taken in accordance with the size and importance of the charging station:

a) Adopt fire-resistant wall or partition; plug the holes for cables through with fireproof materials;

b) Fire retardant coating shall be applied to; or firebreaks and fire compartments shall be adopted locally for cables.

11.1.2 Fire protection of power equipment

11.1.2.1 The fire resistance rating of transformer room, power distribution room and outdoor power equipment, and fire protection distance between other buildings (structures) and equipment shall comply with the requirements of chapter 11 in GB 50229-2006.

emergency lighting power shall be class-II load power supply.

11.1.5.2 The separate power supply circuit shall be adopted for fire electrical equipment, which can still ensure the power supply for fire protection when the power supply for production and living is cut off in case of fire; its distribution equipment shall be clearly marked.

11.1.5.3 The distribution line of fire electrical equipment shall meet the need of continuous power supply in case of fire.

11.1.5.4 The fire emergency lighting shall be set up within the control room, power distribution room, fire water pump room and evacuation routes.

11.1.5.5 The illuminance of emergency lighting for personnel evacuation shall not be less than 0.51x; the emergency lighting for continuous work shall not be less than 10% of illuminance value of normal lighting.

11.1.5.6 The continuous power supply time of standby power supply for fire emergency lighting shall not be less than 30 minutes.

11.2 Lightning protection

11.2.1 The requirements for lightning protection within the charging station shall comply with relevant provisions of GB 50057 and DL/T 620.

11.2.2 When the special power transformer is configured within the charging station, the power line shall adopt cables with metal sheath or insulation sheath, and shall be introduced into the charging station through underground in steel pipe; the metal sheath of power cables or both ends of the steel pipe can be grounded nearby.

11.2.3 The signal cables shall enter or exit the charging station underground. Corresponding surge arresters shall be added to the core wires of cables at the entrance. The protective grounding shall be conducted for the idle lines with surge arresters and cables. The overhead cables shall not be laid with the charging station.

11.2.4 The protective grounding shall be conducted for the normal uncharged metal parts of power supply equipment within the charging station, and both end of the arrester; zero-protection shall not be conducted.

11.2.5 The ground wire of lightning protection within the electrical equipment shall be connected with the nearby enclosure.

11.3 Others

11.1 The channels facilitating safe evacuation for operators within the monitoring-control room, office, lounge and charging areas shall be provided within the charging station.

11.2 The safety of facilities within the charging station, charging vehicles, power storage

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