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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 20234.1-2015
Replace GB/T 20234.1-2011

电动汽车传导充电用连接装置
第 1 部分：通用要求
Connection Set for Conductive Charging of Electric
Vehicles—Part 1: General Requirements

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Foreword

GB/T 20234, *Connection set for conductive charging of electric vehicles*, consists of three parts:

— Part 1: General Requirements;

— Part 2: AC Charging Coupler;

— Part 3: DC Charging Coupler;

This part is Part 1 of GB/T 20234.

This part was drafted according to the rules given in GB/T 1.1-2009.

This part is to replace GB/T 20234.1-2011, *Connection set for conductive charging of electric vehicles — Part 1: General Requirements*. Compared with GB/T 20234.1-2011, the following technical changes have been made:

- A rated operating voltage (preferred) of 1,000V (DC) and three rated operating currents (preferred) of 10A (AC), 80A (DC) and 200A (DC) was added. The corresponding revisions was made to the relevant sections (See Clause 5 & 7);
- The requirements that the charging connection set with rated operating voltage exceeding 16A (16A not included) shall be provided with a control pilot circuit (See 6.1.5, GB/T 20234.1-2011);
- Modified the protection requirements for the plug/socket-outlet and vehicle coupler (See 6.2.1 and 6.9.1);
- Specified that the vehicle connector of DC charging coupler shall be equipped with electronic locking device (See 6.3.3);
- Deleted the requirements that the terminals with rated current exceeding 250A shall be in non-rewireable mode (See 6.7.2, GB/T 20234.1-2011);
- Modified certain parameters for test methods (See Table 2, 3, 4, 5, 6 and 7).

This part was formulated, based on the domestic situations, by reference to IEC 62196-1: 2014, *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles –Part 1: General requirements*.

This Part was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This Part is under the jurisdiction of National Technical Committee 114 on Road Vehicles of Standardization Administration of China (SAC/TC 114).

This Part was mainly drafted by China Automotive Technology and Research Centre, China Electricity Council, China National Electric Apparatus Research Institute Co., Ltd.

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The previous standards substituted by this Part:

- GB/T 20234-2006, GB/T 20234.1-2011.

Connection Set for Conductive Charging of Electric Vehicles

— Part 1: General Requirements

1 SCOPE

This part of GB/T 20234 specifies the definitions, requirements, test methods and inspection rules of connection set for conductive charging of electric vehicles (EV).

This part is applicable to the connection set for conductive charging of electric vehicles, as follows:

- Up to 690V (AC rated voltage), 50 Hz, at a rated current not exceeding 250 A;
- Up to 1,000V (DC rated voltage), at a rated current not exceeding 400 A.

If the plug and socket-outlet of connection set for charging employs the standardized plug and socket complying with GB 2099.1 and GB 1002, this part does not apply to these plugs and socket-outlets.

Note: Vehicles involved in this part refer to plug-in electric vehicles.

2 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application 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.

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

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

GB/T 3956 Conductors of Insulated Cables

GB 4208 Degrees of Protection Provided by Enclosure (IP Code)

GB/T 5013.4 Rubber Insulated Cables of Rated Voltages Up to and Including 450/750 V - Part 4: Cords and Flexible Cables

GB/T 5023 (All Parts) Polyvinyl Chloride Insulated Cables of Rated Voltages Up to and Including 450/750V

GB/T 11918.1-2014 Plugs, Socket-outlet and Couplers for Industrial Purposes - Part 1: General Requirements

GB/T 18487.1 Electric Vehicle Conductive Charging System - Part 1: General Requirements

GB/T 19596 Terminology of Electric Vehicles

3 TERMS AND DEFINITIONS

For the purpose of this document, the following terms and definitions and those contained in GB/T 19596, GB/T 18487.1 and GB/T 11918.1-2014 apply.

3.1

Connection set for charging

A subassembly connecting electric vehicle with electric vehicle supply equipment (EVSE) when the electric vehicle is charging; in addition to cable, it may also include plug and socket-outlet, vehicle coupler, in-cable control and protection device (IC-CPD) and cap, etc. The diagram of connection set for charging is shown in Figure 1.

NOTE: See Annex A for the charging modes and connection cases applicable for connection set for charging mentioned in this standard.

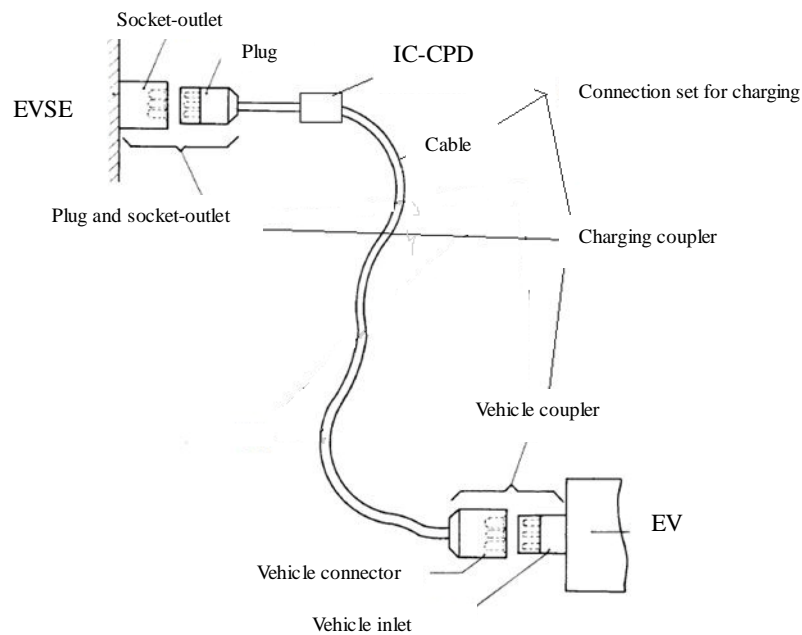


Figure 1 Diagram of Connection set for conductive charging of electric vehicles

3.2

Charging coupler

A subassembly refers to the parts contained in connection set for charging, in addition to the cable and IC-CPD (if any), which consists of the plug and socket-outlet and vehicle coupler.

3.3

Plug and socket-outlet

A device enabling the connection between cable and power supply or EVSE; it consists of a plug and a socket-outlet, which corresponds to the plug and socket-outlet set out in GB/T 11918.1-2014.

3.3.1

Socket-outlet

The fixed part of plug and socket-outlet intended to be connected with power supply cable or EVSE; it corresponds to the socket-outlet set out in GB/T 11918.1-2014.

3.3.2

Plug

The moving part of plug and socket-outlet integral with charging cable; it corresponds to the plug set out in GB/T 11918.1-2014.

3.4

Vehicle coupler

A part enabling the connection of a cable to an EV; it consists of a vehicle connector and a vehicle inlet, which corresponds to the appliance coupler set out in GB/T 11918.1-2014.

3.4.1

Vehicle inlet

The part of vehicle coupler fixed to the EV, and intended to be connected with on-board charger or on-board power battery through cable; it corresponds to the vehicle inlet set out in GB/T 11918.1-2014.

3.4.2

Vehicle connector

The moving part of vehicle coupler integral with charging cable; it corresponds to the connector set out in GB/T 11918.1-2014.

3.5

In-cable control and protection device (IC-CPD)

A device which is incorporated in the cable assembly in charging mode 2, and which performs control functions and safety functions.

Note: The IC-CPD is located in a detachable cable assembly or plug that is not part of the fixed installation.

4 SYMBOLS AND ABBREVIATIONS

For the purpose of this document, the following symbols and abbreviations apply.

A	Ampere
V	Volt
Hz	Hertz
~ or AC	Alternating Current
— or DC	Direct Current
L1, L2, L3	AC Power Phase Line
N	Neutral conductor
⊕	Protective Earthing (PE)
DC+	Positive DC Power Supply or Battery Positive Terminal
DC-	Negative DC Power Supply or Battery Negative Terminal
CP	Control Pilot
CC	Charging Connection Confirm
S+	Charging Communication 1
S-	Charging Communication 2
A+	Positive Low-Voltage Auxiliary Power Supply (e.g. 12V+)
A-	Negative Low-Voltage Auxiliary Power Supply (e.g. 12V-)
IPXX (numbers)	IP Code (the degrees of protection specified in GB 4208)

5 RATINGS OF CONNECTION SET FOR CHARGING

5.1 Preferred rated voltages

250 V (AC)

440 V (AC)

690 V (AC)

400 V (DC)

750 V (DC)

1000 V (DC)

0V ~ 30 V (DC) (For signal, control or low-voltage auxiliary power supply purposes)

5.2 Preferred rated currents

10 A (AC)

16 A (AC)

32 A (AC)

63 A (AC)

125 A (AC)

250 A (AC)
80 A (DC)
125 A (DC)
200 A (DC)
250 A (DC)
400 A (DC)
2 A (DC) (For signal or control purposes only)
20 A (DC) (For low-voltage auxiliary power supply purpose only)

6 REQUIREMENTS

6.1 General Requirements

- 6.1.1 The connection set for charging shall be so designed that in normal use their performance is reliable and minimizes the risk of danger to the user or surroundings.
- 6.1.2 The connection set for charging are to be used in an ambient temperature of between -30°C and +50°C.
- 6.1.3 Accessible surfaces of connection set for charging shall be free from burrs, flashes and similar sharp edges.
- 6.1.4 The enclosure of plug, socket-outlet, vehicle connector and vehicle inlet shall be marked with either the name or trade mark of the manufacturer, product model, rated voltage and rated current, etc.
- 6.1.5 In the Case B Connection, the plug, socket-outlet and vehicle coupler shall be distinguished with visible and clear identifications.

6.2 Structure Requirements

- 6.2.1 The plug, socket-outlet, vehicle connector and vehicle inlet shall be fitted with protective device, so as to ensure the requirements of paragraph 6.9 are met when the plug and socket-outlet are not engaged. The protective device can either be an independent protective cover or integrated with EVSE or EV.
- 6.2.2 The plug, socket-outlet, vehicle connector and vehicle inlet shall include earthing terminal and contact, and the earthing contact shall be the first engaged and the last disengaged during the process of engagement and disengagement.
- 6.2.3 The enclosure of plug and vehicle connector shall be so designed that the terminals and charging cable ends are completely enclosed.
- 6.2.4 The parts of plug and vehicle connector, e.g. terminals, pins and enclosures, etc., shall be securely fixed in such a way that they will not work loose in normal use, and cannot be removed from the plug or vehicle connector without the aid of a tool.
- 6.2.5 The charging coupler shall be so designed as to ensure the user cannot change the position of earthing contactor or neutral contactor, if any.
- 6.2.6 The sole relative position shall be employed to engage plug with socket-outlet, and vehicle connector with vehicle inlet, so as to avoid any contact of conductive parts of pins and bushes with different functions contained in the plug and socket due to misengagement.
- 6.2.7 Cable entries shall allow the introduction of the conduit or the protective covering of the cable to afford complete mechanical protection for the cable.
- 6.2.8 Insulating linings, barriers and the like shall have adequate mechanical strength. They shall be secured to the enclosure or body in such a way that:
- they cannot be removed without being seriously damaged, or
 - they cannot be replaced in an incorrect position.

6.3 Locking mechanism

- 6.3.1 The charging coupler shall be furnished with locking function to prevent any accidental interruption in the charging process.

6.3.2 When applying a withdrawal force of 200N in the lock mode, the connection shall not be interrupted and the locking mechanism shall be free from any damage.

6.3.3 For DC charging vehicle couplers, the electronic locks shall be mounted on the vehicle connector, so as to prevent interruption of vehicle coupler when carrying load.

6.4 Insertion and Withdrawal force

The force to insert and withdraw a plug from a socket-outlet or a vehicle connector from a vehicle inlet shall meet the followings:

- Less than 100 N for AC charging coupler;
- Less than 140N for DC charging coupler.

The charging coupler can be furnished with a power assisting device; if there is a power assisting device, its operating force shall comply with the above conditions when performing insertion and withdrawal movements.

6.5 Protection against electric shock

6.5.1 The protection against electric shock for plug, socket-outlet, vehicle connector and vehicle inlet shall comply with the requirements given in Clause 9 of GB/T 11918.1-2014.

NOTE: Neutral terminals and control pilot terminals of vehicle connectors and vehicle inlets are deemed to be live parts. Signal transmission contacts and earth terminals are not considered as live parts.

6.5.2 When inserting the plug or vehicle connector,

- the earth connection shall be made first;
- the control pilot connection shall be made after the phase and neutral connections are made.

6.5.3 When withdrawing the plug or vehicle connector,

- the earth connection shall be broken last;
- the control pilot connection shall be broken before the phase and neutral connections are broken.

6.6 Provision for earthing

6.6.1 The earthing protection for EV connection set for charging shall comply with the requirements set out in Clause 10 of GB/T 11918.1-2014.

6.6.2 The earthing protection for EV connection set for charging shall be subjected to a short-time high current withstand test in terms of paragraph 7.6, and the parts contained in earthing circuit shall not be fused, broken or damaged.

6.6.3 The conductors connected with earth terminals shall be identified by the color combination green-and-yellow. The cross-sectional area of earthing conductor and of the neutral conductor, if any, shall be at least equal to that of phase conductors, or as specified in Table 2.

6.7 Terminals

The terminals of charging couplers shall comply with the requirements specified in Clause 11 of GB/T 11918.1-2014.

6.8 Resistance to ageing of rubber and thermoplastic materials

The aging resistant performance of rubber and thermoplastic materials used by EV charging coupler shall comply with the requirements specified in Clause 13 of GB/T 11918.1-2014.

6.9 Degrees of protection

6.9.1 The plug, socket-outlet, vehicle connector and vehicle inlet shall have the minimum degrees of protection of

IP54 after having been connected with the mating protective devices.

6.9.2 After the plug is integrated with socket-outlet and the vehicle connector is integrated with vehicle inlet, they shall have the minimum degrees of protection of IP55.

6.10 Insulation resistance and dielectric strength

The insulation resistance and dielectric strength of EV charging coupler shall comply with the requirements specified in Clause 9 of GB/T 11918.1-2014.

6.11 Breaking capacity

6.11.1 The charging coupler that is equipped with control pilot function and can avoid breaking an electrical circuit under load shall not cause fire or electric shock hazard during the test specified in paragraph 7.11; after the test completes, the charging coupler is not required to keep the original functions.

6.11.2 The connection set for charging without control pilot function or the control pilot circuit failing to avoid breaking an electrical circuit under load shall be subjected to the test in paragraph 7.11, the sample shall be free from any damage adverse to further usage after the completion of the test.

6.12 Useful life (Normal Operation)

The plug and socket-outlet, vehicle connector and vehicle inlet shall be subjected to insertion and withdrawal life test in terms of paragraph 7.12 separately. After the test, the samples shall show:

- no wear impairing the further use of the accessory or of its locking mechanism;
- no deterioration of enclosures or barriers;
- no loosening of insulation cap on the plug pin;
- no loosening of electrical or mechanical connections;
- no seepage of sealing compound;
- the continuity of signal transmission between two contacts are maintained.
- the performance retest of dielectric strength meets the relevant requirements in paragraph 6.10.

6.13 Surface temperature and terminal temperature rise

The connection set for charging shall be tested in accordance with the test method given in paragraph 7.13, and the following requirements shall be complied with:

a) The maximum permissible temperature of those parts of the plug and the vehicle connector that can be grasped shall not exceed:

- 50 °C for metal parts;
- 60 °C for non-metal parts.

b) For parts which may be touched but not grasped the permissible temperature are:

- 60 °C for metal parts;
- 85 °C for non-metal parts.

c) The temperature rise of terminals shall not exceed 50 K.

6.14 Cables and their connection

The cables and their connection of connection set for charging shall comply with the requirements specified in Clause 23 of GB/T 11918.1-2014, but part of test methods and requirements for cable displacement refer to paragraph 7.14.

6.15 Mechanical strength

The mechanical strength of connection set for charging shall comply with the requirements specified in

Clause 24 of GB/T 11918.1-2014.

6.16 Screws, current-carrying parts and connections

The screws, current-carrying parts and connections of charging coupler shall comply with the requirements specified in Clause 25 of GB/T 11918.1-2014.

6.17 Creepage distances, clearances, and distances through sealing compound

The creepage distances, clearances and distances through sealing compound of charging coupler shall comply with the requirements specified in Clause 26 of GB/T 11918.1-2014.

6.18 Resistance to heat, fire and tracking

The resistance to heat, fire and tracking of charging coupler shall comply with the requirements specified in Clause 27 of GB/T 11918.1-2014.

6.19 Resistance to corrosion and rusting

The resistance to corrosion and rusting performance of charging coupler shall comply with the requirements specified in Clause 28 of GB/T 11918.1-2014.

6.20 Conditional short-circuit current withstand test

The conditional short-circuit current withstand test of charging coupler shall comply with the requirements specified in Clause 29 of GB/T 11918.1-2014.

6.21 Vehicle driveover

The followings shall be avoided after the plugs and vehicle connectors have been subjected to the vehicle driveover test in accordance with the method specified in paragraph 7.21.

- Degrees of protection fail to meet the requirements in paragraph 6.9;
- Creepage distances, clearances and distances through sealing compound fail to meet the requirements in paragraph 6.17;
- The other damage signs that is likely to increase the possibility of occurrence of fire or electric shock;
- Failing to meet the requirements of dielectric strength in paragraph 6.10.

7 TEST METHODS

7.1 General Provisions

7.1.1 Unless otherwise specified, the samples shall be tested as delivered and at an ambient temperature of $(20 \pm 5) ^\circ\text{C}$.

7.1.2 All test instruments and devices shall have adequate accuracy, which shall be at least one order of magnitude higher than the tested indicator accuracy, or the error is less than one-third of the permissible error of tested parameter.

7.1.3 Tests defined in this Part are type tests. If a part of connection set for charging has previously passed tests for a given degree of severity, the relevant type tests shall not be repeated if the severity is not greater.

7.1.4 The tests shall be carried out in the sequence of the test items of this Part.

7.1.5 Three samples shall be subjected to all the tests, except if necessary for the test of paragraph 7.19, additional samples are required to be tested.

7.1.6 When conductors are to be tested, all conductors shall be provided by the manufacturer, or copper conductors complying with the requirements of GB/T 5023 (All parts), GB/T 3956 or GB/T 5013.4.

7.2 Appearance and structure

The appearance and structure of connection set for charging shall be inspected by visual inspection and manual test.

7.3 Locking mechanism

Check the function of locking mechanism after inserting a vehicle connector into a vehicle inlet and a plug into a socket-outlet, and applying a withdrawal force of 200N.

7.4 Insertion and withdrawal force

The insertion and withdrawal force between a plug and a socket-outlet, a vehicle connector and a vehicle inlet shall be tested by means of instrument, e.g. spring scale and weights, etc.

7.5 Protection against electric shock

The test shall be carried out by reference to the Clause 9 of GB/T 11918.1-2014.

NOTE: The pins of vehicle connector and the pin bushes of vehicle inlet mentioned in this Part are likely to be different from those in GB/T 11918.

7.6 Provision for earthing

7.6.1 The test shall be carried out in accordance with the Clause 10 of GB/T 11918.1-2014.

7.6.2 The short-time high current withstand test shall be performed in terms of the following procedure:

a) The plug, socket-outlet, vehicle connector and vehicle inlet shall be fitted by simulating the actual service condition;

b) An earthing conductor of not less than 0.6 m long and meeting the size requirement specified in Table 1 is to be connected to the protective earthing terminal, with the terminals employed to hold the conductor tightened using a torque as specified by the manufacturer. Socket-outlets and vehicle inlets are to be wired with the minimum allowable size copper conductor. Plugs and vehicle connectors are to be wired with the cables in mating rated current. In addition, the well-wired components are allowed to be employed directly.

c) The test shall be carried out in accordance with the current and time shown in Table 1;

d) Any indicating device such as an ohmmeter, or the like, may be used to determine whether the continuity exists between the earthing conductors after test completes.

Table 1 Parameters of Short-Time High Current Withstand Test of Earthing Terminal

Rated Current of Charging Coupler A	Minimum Size of Copper Earthing Conductor mm ²	Time S	Test Current A
10	2.5	4	300
16, 20	4	4	470
32	6	4	750
63	10	4	1180

80	10	4	1180
125	16	6	1530
200	16	6	1530
250	25	6	2450
400	35	6	3100

7.7 Terminal

The test shall be carried out in accordance with the Clause 11 of GB/T 11918.1-2014, and the Table 3 in GB/T 11918.1-2014 shall be replaced by the following Table 2.

Table 2 Cross-Sectional Area of the Conductors Connectable With Terminals

Rated current of contact A	Cross-Sectional Area of the cables integrated with plug, vehicle connector and vehicle inlet, mm ²		Cross-Sectional Area of the cables integrated with socket-outlet mm ²	
	Non-Earthing Conductor	Earthing Conductor	Non-Earthing Conductor	Earthing Conductor
2	0.5	—	0.5	—
10	1.0-1.5	2.5	1.0-1.5	2.5
16, 20	1.0-2.5	2.5	1.5-4	4
32	2.5-6	6	2.5-10	10
63	6-16	16	6-25	25
80	10-25	25	16-35	25
125	25-70	25	35-95	50
200	70-150	25	70-185	95
250	70-150	25	70-185	95
400	240	120	300	150

7.8 Resistance to ageing of rubber and thermoplastic materials

The test shall be carried out in compliance with the requirements specified in Clause 13 of GB/T 11918.1-2014.

7.9 Degrees of protection

The degrees of protection test shall be carried out in compliance with GB 4208.

7.10 Insulation resistance and dielectric strength

The test shall be carried out in compliance with the requirements specified in Clause 19 of GB/T 11918.1-2014.

7.11 Breaking capacity

The breaking capacity test shall be carried out in accordance with the requirements in Clause 20 of GB/T 11918.1-2014. For the charging coupler with control pilot circuit, its control pilot circuit shall be switched to off-working state and subjected to breaking capacity test on the basis of the parameters specified in Table 3, which replaces the Table 9 in GB/T 11918.1-2014. DC interfaces shall be subjected to the test with equivalent AC current.

Table 3 Breaking Capacity Test Parameters

Rated current of contact, A	Test Current A (AC)	Test Voltage V (AC)	cosΦ ±0.05	Times of Breaking Cycle
16, 20	20	1.1×Rated Value	0.8	3
32	40	1.1×Rated Value	0.8	3
63	70	1.1×Rated Value	0.8	1
>63 (DC)	Rated Current	1.1×Rated Value	0.8	1

7.12 Useful life (Normal Operation)

Fasten the fixed parts (socket-outlet or vehicle inlet), perform reciprocating motion of moving parts (plug or vehicle connector) and conduct insertion and withdrawal cycle for 10,000 times under rated voltage and no current. The dielectric strength test shall be carried out in accordance with paragraph 7.10 after the test completes; but for the accessories with rated voltage of exceeding 50V, the test voltage shall be decreased by 500 V on the basis of that specified in Table 8 of GB/T 11918.1-2014.

NOTE: The test equipment, sample installation method, insertion and withdrawal rate are the same to those in paragraph 7.11.

7.13 Temperature rise

The temperature rise test shall be carried out at an ambient temperature of 25±5 °C in accordance with the method prescribed in Clause 22 of GB/T 11918.1-2014; the test current is an alternating current of the value shown in Table 4, which replaces the Table 11 in GB/T 11918.1-2014. When testing, the connection set for charging wired with cable provided by the manufacturer shall be recommended, if no such cable, the cable shall be employed with the cross-sectional area as specified in Table 4. The temperature rise value shall be read after the thermal stabilization is reached.

NOTE: Thermal stabilization is considered to have occurred when three successive readings, taken at intervals of not less than 10 min, indicate no increase greater than 2 K.

Table 4 Test Current for Temperature Rise Test

Rated current of contact A	Test Current A (AC)	Cross-sectional area(s) of the conductors (mm ²)	
		Vehicle Connector and Plug	Vehicle Inlet and Socket-Outlet
2	2	0.5	0.5
10	13	1.5	2.5
16, 20	22	2.5	4
32	42	6	10
63	Rated Current	16	25
80		25	35
125		50	70
200		150	150
250		150	185
400		250	300

7.14 Cables and their connection

The test shall be carried out in compliance with the requirements specified in Clause 23 of GB/T 11918.1-2014 with a part of content being replaced by the following content:

——Non-rewireable plugs, socket-outlets, vehicle connectors and vehicle inlets shall be provided with a suitable cable appropriate for the rating of the accessory and as specified by the manufacturer, and they shall be tested as a cable assembly.

——The pulling force and torque values, as well as the permissible maximum displacement value of cable after test are shown in Table 5, which replaces the Table 14 in GB/T 11918.1-2014. The cable shall undergo pull tests for 100 times with each application of 1s. Subsequently, the cable shall undergo torque test for 1 min.

Table 5 Test Values of Pulling Force and Torque of Cable Fixed Parts and Permissible Maximum Displacement Value of Cable

Rated current of contact A	Pulling force N	Torque N•m	Maximum Displacement mm
10-20	160	0.6	2
32	200	0.7	2
63	240	1.2	2
80	240	1.2	2
125	240	1.5	2
200	250	2.3	2
250	500	11.0	5
400	500	11.0	5

7.15 Mechanical strength

The charging coupler shall be subjected to the test as specified in Clause 24 of GB/T 11918.1-2014, wherein the pendulum ball impact energy in impact test, mechanical load flexing test and other specific parameters see Table 6 and Table 7 respectively, which replaces Table 15 and Table 16 in GB/T 11918.1-2014.

Table 6 Impact Energy for Ball Impact Test

Rated current of charging coupler (I), A	Energy, J	
	Vehicle Inlet	Socket-Outlet
$I \leq 32$	1	1
$32 < I \leq 100$	2	2
$100 < I \leq 150$	3	3
$150 < I \leq 400$	4	4

Table 7 Mechanical Load Flexing Test

Rated Current (I), A	Force, N
$I \leq 20$	20
$20 < I \leq 32$	25
$32 < I \leq 70$	50
$70 < I \leq 250$	75
$250 < I \leq 400$	100

7.16 Screws, current-carrying parts and connections

The test shall be carried out in compliance with the method specified in Clause 25 of GB/T 11918.1-2014.

7.17 Creepage distances, clearances and distances through sealing compound

The test shall be carried out in compliance with the method specified in Clause 26 of GB/T 11918.1-2014.

7.18 Resistance to heat, fire and tracking

The test shall be carried out in compliance with the method specified in Clause 27 of GB/T 11918.1-2014.

7.19 Resistance to corrosion and rusting

The test shall be carried out in compliance with the method specified in Clause 28 of GB/T 11918.1-2014.

7.20 Conditional short-circuit current withstand test

The test shall be carried out in compliance with the method specified in Clause 29 of GB/T 11918.1-2014.

7.21 Vehicle driveover

The plugs and vehicle connectors wired with the cables recommended by the manufacturer shall be placed on a concrete floor in any normal position of rest. A crushing force of $(5,000 \pm 250)$ N shall be applied by a conventional automotive tire, P225/75R15 or an equivalent tire suitable for the load, mounted on a steel rim and inflated to a pressure of (220 ± 10) kpa. The wheel is to be rolled over the vehicle connector or plug at a speed of (8 ± 2) km/h. The accessory is to be oriented in a natural resting position before applying the force in a different direction for each sample. The accessory under test shall not move substantially during the application of the applied force. In no case is the force to be applied to the projecting pins.

8 INSPECTION RULES

Samples are deemed to comply with this Part if no sample fails in all tests. If one sample fails in a test, such test and those preceding which may have influenced the test result are repeated on another set of three samples, all of which shall then pass the repeated tests.

Annex A
(Informative)
Electric Vehicles Charging Modes and Cases of Connection

A.1 EV Charging Modes

A.1.1 Charging Mode 1: When connecting the EV to the AC supply network (mains), utilize the plugs and sockets complying with the requirements of GB 2099.1 and GB 1002 at the supply side, and utilize phase, neutral and protective earth conductors at the supply side.

A.1.2 Charging Mode 2: When connecting the EV to the AC supply network (mains), utilize the plugs and sockets complying with the requirements of GB 2099.1 and GB 1002 at the supply side, and utilize phase, neutral and protective earth conductors, together with an in-cable control and protection device (IC-CPD) installed on the charging connection cable, at the supply side. .

A.1.3 Charging Mode 3: When connecting the EV to the AC supply network (mains), utilize dedicated EV supply equipment to realize direct connection between them, and install a control pilot device on the dedicated EV supply equipment.

A.1.4 Charging Mode 4: When connecting the EV to the AC supply network (mains), utilize a DC supply equipment with control pilot function.

A.2 Cases of Connection

A.2.1 Case A connection: When connecting the EV to the AC supply network (mains), utilize a charging cable and plug permanently attached to the EV.

A.2.2 Case B connection: When connecting the EV to the AC supply network (mains), utilize a detachable cable assembly with a vehicle connector and plug.

A.2.3 Case C connection: When connecting the EV to the AC supply network (mains), utilize a charging cable and vehicle connector permanently attached to the EV supply equipment.
