



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 33594-2017

Charging cables for electric vehicles

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Table of Contents

Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	6
4 Use features	8
5 Code, model and product expression method	9
6 Technical requirements	12
7 Cable marking	21
8 Insulated core identification	21
9 Routine test	23
10 Sample test	24
11 Type test	26
12 Inspection rules	42
13 Packaging, transportation and storage	45
Appendix A (Normative) Insulation hardness determination	46
Appendix B (Normative) Sheath tear resistance test method	49
Appendix C (Normative) Saponification test	52

1 Scope

This standard specifies the use characteristics, expression methods, technical requirements, marking, test methods and requirements, inspection rules and cable packaging, transportation and storage of charging cables for electric vehicles.

This standard applies to the charging cables (which may include the signal or control core) having a rated voltage AC 450/750 V and below and DC 1.0 kV and below for the conductive charging device of electric vehicles.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this Standard.

GB/T 1690-2010 Rubber, vulcanized or thermoplastic - Determination of the effect of liquids

GB/T 2423.3-2006 Environmental testing for electric and electronic products - Part 2. Testing method test Cab. Damp heat steady state

GB/T 2951.11-2008 Common test methods for insulating and sheathing materials of electric and optical cables - Part 11. Methods for general application - Measurement of thickness and overall dimensions

GB/T 2951.12-2008 Common test methods for insulating and sheathing materials of electric and optical cables - Part 12. Methods for general application - Thermal ageing methods

GB/T 2951.13-2008 Common test methods for insulating and sheathing materials of electric and optical cables - Part 13. Methods for general application - Measurement for determining the density - Water

GB/T 2951.14-2008 Common test methods for insulating and sheathing materials of electric and optical cables - Part 14. Methods for general application - Test at low temperature

GB/T 2951.21-2008 Common test methods for insulating and sheathing materials of electric and optical cables - Part 21. Methods specific to elastomeric compounds - Ozone resistance, hot set and mineral

3 Terms and definitions

The terms and definitions as defined in GB/T 2900.10 AND the following terms and definitions apply to this document.

3.1 Nominal value

It refers to the specified magnitude which is often used in forms.

Note. In this standard, the magnitude which is usually introduced by the nominal value is verified through measurement under the consideration of the specified tolerance.

3.2 Median value

It refers to the middle value of the several values obtained from test AND arranged in the order of ascending (or descending) if the number of values is odd, OR the average of the middle two values if the number of values is even.

3.3 Rated voltage

It refers to the reference voltage which is used for cable design, use and electrical performance test.

3.4 Routine tests

It refers to the test performed by the manufacturer on all the manufacturing length of the cable to verify that all cables comply with the specified requirements.

3.5 Sample tests

It refers to the test performed by the manufacturer on the finished cable sample OR on some components from the finished cable to the required frequency, to verify that the cables comply with the specified requirements.

3.6 Type tests It refers to the test performed on one type of cables covered in this standard in accordance with general commercial principles before the cable is supplied, to demonstrate that the cable has good properties that satisfy the intended service conditions.

4.1 Rated voltage

AC. U_0/U is 450/750 V and below.

DC. U_0 is 1.0 kV and below.

4.2 Temperature range

Ambient temperature range is $-40\text{ }^{\circ}\text{C} \sim +50\text{ }^{\circ}\text{C}$, AND it shall select appropriate cables during use based on environmental needs.

5.1.1 Product code

EV. electric vehicle AC (can be omitted). for AC charging DC. for DC charging

5.1.2 Conductor structure

(Omitted). the fifth copper conductor R. the 6th copper conductor

5.1.3 Insulation material code

S. Thermoplastic elastomer at continuous working temperature $70\text{ }^{\circ}\text{C}$ (TPE)

S90. Thermoplastic elastomer at continuous working temperature $90\text{ }^{\circ}\text{C}$ (TPE)

E. The ethylene-propylene rubber or similar synthetic rubber at continuous working temperature $90\text{ }^{\circ}\text{C}$ EY. Rigid ethylene-propylene rubber or similar halogen-free synthetic material

5.1.4 Sheath (inner sheath) material code

S. Thermoplastic elastomer at continuous working temperature $70\text{ }^{\circ}\text{C}$ (TPE)

5.2.1 The cable model composition and arrangement sequence are as shown
in Figure 1.

6.1 Conductor

Conductor shall be of the 5th or 6th annealed copper conductor with/without metal plating in GB/T 3956-2008. Signal or control core conductors are allowed to be reinforced with a suitable material. Conductor nominal cross-sectional area is as shown in Table 3.

6.2 Isolation layer

It is allowed for conductor to be wrapped with a layer of suitable material to form an isolation layer.

6.3 Insulation (including main insulation core, grounding core, auxiliary power core)

6.3.1 Structure

The insulation shall be wrap tightly around the conductor or isolation layer, AND shall be able to be stripped without damaging the insulation, conductor or tin plating, if any.

6.3.2 Materials

Insulation shall use one of the extruded molding insulation material mixtures as listed in Table 1.

6.3.3 Thickness

The nominal thickness of the insulation is as shown in Table 4, AND the thickness of any isolation layer shall not be included in the insulation thickness.

The average value of the insulation thickness measurement shall not be less than the specified nominal thickness, wherein the minimum measurement value shall not be less than 90% of the nominal value ~ 0.1 mm.

6.3.4 Spark test

Insulated core shall be subjected to the working frequency spark test as specified in Table 5 of GB/T 3048.9-2007 as an intermediate inspection.

6.4.1 Structure

It is allowed for one or more signals or control cores.