GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 43.040.10
T 36

GB/T 30038-2013

Road vehicles - Degrees of electrical equipment protection (IP-Code)

道路车辆 电气电子设备防护等级（IP 代码）

(ISO 20653:2006, MOD)

Issued on: November 27, 2013 **Implemented on: July 01, 2014**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;

Standardization Administration of the People's Republic of China.

Table of Contents

Foreword

This Standard was drafted in accordance with the rules given GB/T 1.1-2009.

This Standard uses the redrafting method to modify and use ISO 20653:2006 “Road vehicle - Degree of protection (IP-Code) - Protection of electrical equipment against foreign objects, water and access”.

Technical differences between this Standard and ISO 20653:2006 and the reasons are as follows:

- IEC 60529 (identical to GB 4208), which is referenced in ISO 20653:2006, is deleted in this Standard, because it is not used in the text, but only indicates the source of the definition in the term.

- The header of Table 2, Table 3, Table 4 is adjusted;

- In 8.4.1 of ISO 20653:2006, Figures 3-7 is the error of the original text, which is modified to Figures 3-6 in this Standard [Translator note: this standard still uses Figures 3-7 in 8.4.1].

- In 9.3 of ISO 20653:2006, Figure 7 is the error of the original text, which is modified to Figure 7 and Figure 8 in this Standard; the three items in the original text and the note of Figure 7 are repeated and not exactly the same, so the three items are deleted in this Standard to facilitate understanding.

- In the “9K” column of Table 7 of ISO 20653:2006, Figure 8 is the error of the original text, which is modified to Figure 9 in this Standard [Translator note: this standard still uses Figure 8].

- There are several errors in Table 5 and Table 6 of ISO 20653:2006, which are corrected in this standard basing on the context and the understanding of the standard.

- In the “4K” column of Table 7 of ISO 20653:2006, 0.4 mm is the error of the original text, which is modified to 0.8 mm in this Standard [Translator note: this standard still uses 0.4mm], to be consistent with Figure 4.

- It does not give a note for “*a*” in Figure 4 of ISO 20653:2006, so a note “*a* - maximum 200” is added in this Standard with reference to GB 4208.

The editorial modifications are as follows: This Standard is used in conjunction with GB/T 28046 series of standards, so the “electrical equipment” in the original heading and scope is modified to “electrical and electronic equipment”, to correspond to the text.

Road vehicles - Degrees of electrical equipment protection (IP-Code)

1 Scope

This Standard specifies degrees of protection (IP-Code) provided by enclosures of the electrical equipment of road vehicles, and requirements and tests for each degree of protection.

This Standard applies to electrical systems/components of road 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/T 2423.37 Environmental testing for electric and electronic products - Part 2: Test methods - Test L: Dust and sand (GB/T 2423.37-2006, IEC 60068-2-68:1994, IDT)

GB/T 28957.1 Road vehicles - Test dust for filter evaluation - Part 1: Silicon dioxide test dust (ISO 12103-1, MOD)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

enclosure

Part providing protection of electrical equipment against certain external influences such as foreign objects and water, and in any direction against direct access of human body.

3.2

degree of protection

IPX5	omitting first characteristic numeral;
IP2X	omitting second characteristic numeral;
IP20C	using additional letter;
IPXXC	omitting both characteristic numerals, using additional letter;
IPX1C	omitting first characteristic numeral, using additional letter;
IP3XD	omitting second characteristic numeral, using additional letter;
IP23S	using supplementary letter;
IP21CM	using additional letter and supplementary letter;
IPX5/IPX7	giving two different degrees of protection by an enclosure against both water jets and temporary immersion for “versatile” application.

5 Degrees of protection against foreign objects and against access

Tables 2 and 3 give brief descriptions of the degrees of protection against foreign objects and against access with the relevant requirements.

If the degrees of protection against foreign objects and access are the same, both of them are only indicated by the first characteristic numeral. Different degrees of protection may be defined by additional letter, whereby in this case the first characteristic numeral only defines the protection against foreign objects and the additional letter only the protection against access. Additional letters may only be used if:

- the degree of protection against access is higher than indicated by the first characteristic numeral;
- only the degree of protection against access is to be indicated (first characteristic numeral substituted by X).

9K	Water during high-pressure/steam-jet cleaning	Water which is directed against the enclosure from any direction shall not have any detrimental effect.

7 Designation examples

7.1 General

The degree of protection shall be indicated using the IP-Code.

7.2 Example IP34K

IP-Code IP34K means:

- 3 indicates protection of the electrical equipment within the enclosure against foreign objects with a diameter of more than 2.5 mm (protection against foreign objects); and protection of persons handling rods of 2.5 mm diameter or more against access within the enclosure (protection against access).

- 4K indicates protection of electrical equipment within the enclosure against harmful effects resulting from water splashing against the enclosure with increased pressure from any direction (protection against water).

7.3 Example IP16KB

IP-Code IP16KB means:

- 1 indicates protection of the electrical equipment within the enclosure against foreign objects with a diameter of more than 50 mm (protection against foreign objects).

- 6K indicates protection of electrical equipment within the enclosure against harmful effects resulting from water directed against the enclosure from any direction as a strong jet with increased pressure (protection against water).

- B indicates protection of persons against finger contact with hazardous parts within the enclosure (protection against access).

7.4 Example IP2X/IP5KX

The designation IP2X is the degree of protection for the complete enclosure, and IP5KX is the degree of protection for the cover of a part inside the complete enclosure.

The meanings are as follows:

- 2 indicates protection of the electrical equipment within the complete

enclosure against foreign objects with a diameter of more than 12.5 mm (protection against foreign objects); and protection of persons against finger contact with hazardous parts within the complete enclosure (protection against access).

- X indicates no statement on and additional requirements for the degree of protection against water for the complete enclosure

- 5K indicates protection of the part against harmful effects resulting from ingress of dust (protection against foreign objects); and protection of persons handling wires of 1 mm diameter or more against contact with hazardous parts within the cover of this part (protection against access).

- X indicates no statement on the degree of protection against ingress of water for the cover of this part.

NOTE 1: If all other parts are also not harmed by the penetrated dust, apart from protection against foreign objects degree 2, insensitivity to dust within the complete enclosure is also achieved.

NOTE 2: This higher degree of protection of the cover of the part located within the complete enclosure does not influence the complete enclosure surrounding it, whose lower degree of protection 2 applies.

8 Requirements and testing

8.1 Atmospheric conditions

Unless otherwise specified, tests shall be carried out under the following ambient atmospheric conditions:

- Temperature range: 23 °C ± 5 °C;

- Relative humidity: 25 % ~ 75 %;

- Atmospheric pressure: 86 kPa ~ 106 kPa.

8.2 Device under test (DUT)

Unless otherwise agreed, the DUT shall be unused and clean. Other requirements for the DUT may be negotiated by both supply and demand parties.

8.3 Requirements and tests for degrees of protection against foreign objects and access

8.3.1 Test set-up

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