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

GB/T 18213-2025

Replacing GB/T 18213-2000

**Guide to the calculation of d. c. resistance of plain and coated
copper conductor of low-frequency cables and wires**

低频电缆和电线无镀层和有镀层铜导体直流电阻计算导则

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document supersedes GB/T 18213-2000 "Guidelines for Calculating the Resistance of Unplated and Plated Copper Conductors in Low-Frequency Cables and Wires", and is consistent with...

Compared with GB/T 18213-2000, apart from structural adjustments and editorial changes, the main technical changes are as follows.

- a) The description of the calculation method in the scope has been revised (see Chapter 1, Chapter 1 of the 2000 edition);
- b) Added normative reference documents (see Chapter 2);
- c) Added terms and definitions (see Chapter 3);
- d) Four parameters for the nominal cross-section of the conductor have been added (see Table 5).

This document adopts the equivalent of IEC TR60344:2007 "Calculation method for DC resistance of bare copper and plated copper conductors in low frequency cables and wires".

The document type of the "Application Guidelines" has been changed from an IEC technical report to a Chinese national standard.

This document adds a chapter on "Normative References".

This document includes a new chapter on "Terms and Definitions".

The following minimal editorial changes have been made to this document.

---To align with existing standards, the standard name has been changed to "Guidelines for Calculating DC Resistance of Unplated and Plated Copper Conductors in Low-Frequency Cables and Wires".

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Electrical Equipment Industry Association.

This document is under the jurisdiction of the National Technical Committee on Standardization of Wires and Cables (SAC/TC213).

1 Scope

This document describes a general method for calculating the DC resistance of copper conductors.

This document applies to low-frequency cables and wires used in communications.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 2900.10-2013 Electrical Terminology - Cables (IEC 60050-461:2008, IDT)

3 Terms and Definitions

The terms and definitions defined in GB/T 2900.10-2013 apply to this document.

4 General Calculation Method

The maximum DC resistance of a copper conductor at 20°C is calculated according to formula (1).

$$R=R_0k_1k_2k_3k_4 \quad (1)$$

In the formula.

R --- The maximum DC resistance of a copper conductor at 20°C, expressed in ohms per kilometer (ohm/km);

R₀ --- value is $21.95/nd^2$;

n --- the number of single wires in the conductor ($n=1$ for a solid conductor);

d --- The nominal diameter of a single wire in a conductor, expressed in millimeters (mm) (for solid conductors, this is their nominal diameter);

k1 --- A coefficient considering the diameter of a single wire and whether the conductor is unplated or plated; k1 values are shown in Table 1.

k2 --- A coefficient considering the conductor type ($k_2 = 1.00$ for solid conductors; $k_2 = 1.04$ for stranded conductors);

k3 --- The stranding coefficient of the wire group considering the size of the conductor and the stranding method of the insulated cores. The values of k3 are shown in Table 2 ($k_3=1$ for single-core wires);

k4 --- For cables consisting of more than one cable element, the stranding factor depends on the conductor size and stranding method; for cables consisting of only one element...

For cables with one cable element and shielded wires with no more than five insulated conductors, the coefficient depends on the conductor size, k4 value.

See Table 3.

Note: The conductivity of copper is $58 \text{ m}/(\text{ohm}\cdot\text{mm}^2)$.

The R values for solid conductors are shown in Table 4, and the R values for stranded conductors are shown in Table 5.

These R values were calculated using different coefficients k1, k2, k3, and k4. The results are given with six significant figures. They can be found in this document.

Select values from the table and round them to the nearest value; when the R value is less than 1000 ohm/km , take 3 significant figures; when the R value is 1000 ohm/km or higher, take 3 significant figures;