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Replacing GB/T 3953-2009

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**Round copper wire for electrical purposes**

电工圆铜线

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## Foreword

This document was drafted in accordance with the provisions of GB/T 1.1-2020 “*Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents*”.

This document replaces GB/T 3953-2009 “*Round copper wire for electrical purposes*”. Compared with GB/T 3953-2009, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- ADD the terms and definitions (see Clause 3 of this document);
- ADD the model, specification and technical requirements for Class 1 soft round copper wire (see 4.1, 4.3 and Clause 5 of this document);
- MODIFY the model name of extra-hard round copper wire to Class 1 hard round copper wire (see 4.1 of this document, 3.1 of the 2009 edition);
- ADD the representation method, technical requirements and test methods for multiline-wire structure (see 4.2, 5.2 and 6.2 of this document);
- MODIFY the representation method for round copper wire for electrical purposes (see 4.4 of this document, 3.3 of the 2009 edition);
- MODIFY the specification range and dimensional deviation of round copper wire for electrical purposes (see 4.3 and 5.4 of this document, 3.2 and Clause 5 of the 2009 edition);
- MODIFY the technical requirements and test methods for the surface quality of round copper wire for electrical purposes (see 5.3 and 6.2 of this document, Clause 8 of the 2009 edition);
- MODIFY the technical requirements for tensile strength and elongation of some specifications (see 5.5 of this document, Clause 6 of the 2009 edition);
- MODIFY the technical requirements for volume resistivity of some specifications of hard round copper wire (see 5.6 of this document, Clause 7 of the 2009 edition);
- MODIFY the delivery requirements for round copper wire for electrical purposes (see Clause 7 of this document, Clause 9 of the 2009 edition);
- MODIFY the acceptance rules for round copper wire for electrical purposes, and ADD the acceptance rules for multiline-wire structure round copper wire for electrical purposes (see Clause 8 of this document, Clause 10 of the 2009 edition);
- MODIFY the packaging and marking requirements for round copper wire for electrical purposes (see Clause 9 of this document, Clause 10 of the 2009 edition).

# Round copper wire for electrical purposes

## 1 Scope

This document specifies the model, structure, specification, representation, technical requirements, delivery requirements, packaging, storage, transportation and marking of round copper wire for electrical purposes, describes the test methods, and establishes acceptance rules.

This document applies to the manufacture, testing and application of round copper wire for wires and cables, motors and other electrical and electronic devices.

## 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 3048.2-2007 Test methods for electrical properties of electric cables and wires  
- Part 2: Test of electrical resistivity of metallic materials

GB/T 3952 Copper drawing stock for electrical purpose

GB/T 4909.1-2009 Test methods for bare wires - Part 1: General

GB/T 4909.2-2009 Test methods for bare wires - Part 2: Measurement of dimensions

GB/T 4909.3-2009 Test methods for bare wires - Part 3: Tensile test

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

## 3 Terms and definitions

For the purpose of this document, the terms and definitions defined in GB/T 3048.2-2007, GB/T 4909.1-2009, GB/T 4909.2-2009, GB/T 4909.3-2009 and the following apply.

### 3.1

**lot**

#### **4.4 Representation method**

Round copper wire is represented by model, structure, specification and serial number of this document.

Example 1: Soft round copper wire with a nominal diameter of 2.60 mm using a single-wire structure is represented as TR-2.6 GB/T 3953-2024.

Example 2: 16 pieces of Class 1 soft round copper wires with a nominal diameter of 0.500 mm using a multilane-wire structure are represented as TR1-16/0.5 GB/T 3953-2024.

Example 3: Hard round copper wire with a nominal diameter of 0.0300 mm using a single-wire structure is represented as TY-0.03 GB/T 3953-2024.

Example 4: Class 1 hard round copper wire with a nominal diameter of 2.15 mm using a single-wire structure is represented as TY1-2.15 GB/T 3953-2024.

### **5 Technical requirements**

#### **5.1 Materials**

Round copper wire shall be made of copper drawing stocks that comply with GB/T 3952.

#### **5.2 Structure**

The number of round copper wires in multilane wires shall be consistent with the nominal number.

#### **5.3 Surface quality**

The surface of round copper wire shall be smooth and continuous, and shall not have cracks, scars, burrs, adhesions and other defects that are inconsistent with good industrial products.

## 6.2 Structure and surface quality

The surface quality and structure of round copper wire shall be visually inspected with normal vision. If there is a higher requirement, the supply and demand parties shall negotiate and determine the use of a magnifying glass with the required magnification for observation.

## 6.3 Dimensions and deviations

The dimensions and deviations of round copper wire shall be measured in accordance with the provisions of GB/T 4909.2-2009. TR type/TR1 type round copper wire with a nominal diameter less than 0.0500 mm and TY type round copper wire with a nominal diameter less than 0.0300 mm shall be measured for the cross-sectional area in accordance with 5.4.2 of GB/T 4909.2-2009, and then calculated according to formula (1) to obtain the diameter. The measurement shall be performed 3 times in total.

$$d = 2 \sqrt{\frac{S}{\pi}} \quad \dots\dots\dots (1)$$

where:

$d$  - diameter of round copper wires, in millimeters (mm);

$S$  - cross-sectional area of round copper wires, in square millimeters (mm<sup>2</sup>).

If agreed upon by both supply and demand parties, TR type/TR1 type round copper wire with a nominal diameter of 0.0300 mm ~ 0.0500 mm and TY type round copper wire with a nominal diameter of 0.0200 mm ~ 0.0300 mm can also be tested in accordance with the provisions of 5.2 in GB/T 4909.2-2009.

NOTE: For TR type/TR1 type round copper wire with a nominal diameter less than 0.0300 mm and TY type/TY1 type round copper wire with a nominal diameter less than 0.0200 mm, the sample preparation shall refer to the provisions of 14.2.1 of GB/T 15077-2008.

## 6.4 Tensile strength and elongation

The tensile strength and elongation test of round copper wire shall be carried out in accordance with the provisions of GB/T 4909.3-2009.

## 6.5 Volume resistivity

The volume resistivity test of round copper wire at 20 °C shall be carried out in accordance with the provisions of GB/T 3048.2-2007.

large, it shall be not more than 20 reels or 20 rolls (cages), where each reel (roll or cage) of round copper wire using multiline wire structure shall be regarded as a single reel (roll or cage) during sampling. The sampling rules of single wire in the reel (roll or cage) shall be specified by the supply party or agreed upon by the supply and demand parties. When the first inspection item fails, double the number of samples shall be taken, and the second test shall be conducted on the unqualified item. If it still fails, the lot shall be judged to be unqualified.

## **9 Packaging, storage, transportation and marking**

### **9.1 Packaging, storage and transportation**

Round copper wire shall be supplied in reels or rolls (cages) and properly packaged with paper or film. The reeled round copper wire shall be evenly wound on the bobbin, the wire ends shall be fixed, and the outermost wire shall be kept at an appropriate distance from the edge of the reel side plate to prevent bumps and scratches.

Round copper wire shall be stored in a dry place without corrosive atmosphere.

During hoisting and transportation, round copper wire shall not be dropped from a height, which may damage the surface of the round copper wire and the wiring.

### **9.2 Marking**

Each reel or roll (cage) of round copper wire shall be attached with a label containing the following information:

- a) manufacturer name;
- b) model, structure, specification;
- c) gross weight and net weight, kg;
- d) manufacturing date: year, month;
- e) serial number of this document: GB/T 3953-2024.

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