



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

GB/T 45370-2025

Textiles - Determination of yarn electrical conductivity

纺织品 纱线导电性能的测定

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Table of Contents

Foreword...	3
1 Scope...	4
2 Normative references...	4
3 Terms and definitions...	4
4 Principle...	5
5 Instruments and equipment...	5
6 Atmospheric conditions for conditioning and testing...	9
7 Sample preparation...	9
8 Test steps...	10
9 Result calculation...	10
10 References...	12

Foreword

This document was drafted in accordance with the provisions of GB/T 1.1-2020 Directives for standardization - Part

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1 Scope

GB/T 45370-2025 gives the determination of the electrical conductivity of yarn. Conductive yarns are what make a textile electronic: they carry the signal in a heated garment, an antistatic workwear fabric, an EMI shielding cloth or a wearable sensor, and they are made variously by blending carbon or metal fibres, by coating with silver, or by spinning a metal filament into the ply - constructions whose resistance behaves quite differently with humidity, tension and length. Measuring them meaningfully requires the conditions to be fixed. The standard sets the principle, the instruments and equipment, the atmospheric conditions for conditioning and testing, the preparation of the specimens, the test steps, the calculation of the result and the test report. It takes effect on 1 September 2025.

This document describes a method for determining the electrical conductivity of yarns in terms of electrical resistance per unit. This document applies to yarns made by blending or combining electro-conductive fibers with other fibers. This document is not applicable to yarns in which the electro-conductive fibers are in a core structure inside the yarn.

2 Normative references

The provisions of the following documents constitute the essential clauses of this document through normative references in this text. Among them, for referenced documents with dates, only the versions corresponding to the dates are applicable to this document; for referenced documents without dates, the latest versions (including all amendments) are applicable to this document.

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

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 electrical resistance per unit The resistance per unit length of yarn. NOTE. The unit is Omega/cm.

3.2 electro conductive fibers Fibers made entirely or partially of conductive or sub-conductive materials such as metals or conductive organic substances. NOTE. Electro conductive fibers include conductive staple fibers and conductive filaments. [Source: GB/T 4146.2-2017, 4.14]

8 Test steps

8.1 Place the sample rack (5.1.5) in the shielding box (5.1.3) and lead the electrode wires out of the box through the test hole.

8.2 Place the prepared sample plate on the sample rack so that the sample plate is in the middle of the clamping plate; press down the four clamping handles, connect the measuring electrodes and the connecting terminals, and close the shielding box door.

8.3 Turn on the resistance tester (5.1.2), select 50 V voltage and 103 Omega resistance. If the resistance tester displays a valid reading, stabilize for 1 min, then read and record the resistance value. Otherwise, select 100 V voltage and start from 104 Omega resistance, and select the resistance range from low to high until the resistance tester displays a valid reading, stabilize for 1 min, then read and record the resistance value.

8.4 Repeat

8.3 to complete the resistance test for the other four samples in turn and record the data.

9 Result calculation

Calculate the electrical resistance per unit (R_L) according to formula (1) and round off the result to two significant figures according to the provisions of GB/T 8170. where. R_L -- the electrical resistance per unit of the sample, in ohms per centimeter (Omega/cm); R_i -- the resistance of the i -th sample (parallel resistance), in ohms (Omega); n -- number of samples, $n=5$; L -- the effective length of the sample, in centimeters (cm), $L=20$ cm. NOTE. When $R_i \leq 1 \times 10^3$ Omega, it is recorded as $R_L \leq 1 \times 10^3$ Omega/cm.

10 Test report

The test report shall include the following.