

Winding wires —

Part 2: Methods of test —

Section 2.5 Electrical properties —

(Implementation of CENELEC HD 490.5 S2)

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Cables and Insulation Standards Policy Committee (CIL/-) to Technical Committee CIL/55, upon which the following bodies were represented:

- British Cable Makers' Confederation
- Covered Conductors Association
- EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)
- Electrical and Electronic Insulation Association (BEAMA Ltd.)
- Electronic Components Industry Federation
- Transmission and Distribution Association (BEAMA Ltd.)

This British Standard, having been prepared under the direction of the Cables and Insulation Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 31 January 1992

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The following BSI references relate to the work on this standard:
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National foreword

This Section of BS 6811 has been prepared under the direction of the Cables and Insulation Standards Policy Committee. It is identical with IEC Publication 851-5:1985 “*Methods of test for winding wires — Part 5: Electrical properties*”, including amendment 1:1990 published by the International Electrotechnical Commission (IEC).

NOTE This Section should be read in conjunction with BS 6811-0 “*General introduction and list of Parts*”.

This Section of BS 6811 implements HD 490.5 S2 which was ratified on 23 September 1991.

The following dates were fixed by CENELEC:

- latest date of announcement of the HD at national level (doa) 1992-01-01
- latest date of publication of a harmonized national standard (dop) 1992-07-01
- latest date of withdrawal of conflicting national standards (dow) 1992-07-01

Annexes designated “normative” are part of the body of the standard. In this standard, Annex ZA is normative.

Cross-references

International standard	Corresponding British Standard
	BS 6811 Winding wires Part 2: Methods of test
IEC 851-1:1985	Section 2.1:1987 General test conditions and schedule of tests (Identical)

IEC Publication 251 “*Method of test for winding wires*” has been superseded by IEC Publication 851.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Introduction

The reader is referred to the General Introduction in IEC Publication 851-1.

1 Scope

This standard relates to:

- Test 5: Electrical resistance
- Test 13: Breakdown voltage
- Test 14: Continuity of covering
- Test 19: Dielectric loss tangent ($\tan \delta$)

and groups the relevant texts laid down in the former IEC Publication 251.

2 Object

To standardize the electrical properties of winding wires.

3 Test 5: Electrical resistance

The resistance of the wire shall be expressed as the d.c. resistance at 20 °C. The method used shall provide an accuracy of 0.5 %.

For bunched wires a length of up to 10 m shall be used and the ends shall be soldered before the measurement.

When measuring the resistance to check for an excessive number of broken ends, a length of 10 m of bunched wire shall be used.

If the resistance is measured at a temperature t other than 20 °C (R_t), the resistance R_{20} at 20 °C shall be calculated by means of the formula:

$$R_{20} = \frac{R_t}{1 + \alpha(t - 20)}$$

where:

t = actual temperature in Celsius degrees during the measurement

α = temperature coefficient

- for copper: $\alpha_{20\text{ °C}} = 3.96 \times 10^{-3} \text{ K}^{-1}$;
- for aluminium: $\alpha_{20\text{ °C}} = 4.07 \times 10^{-3} \text{ K}^{-1}$;
- for the temperature range from 15 °C to 25 °C.

One measurement shall be made.

4 Test 13: Breakdown voltage

4.1 Test voltage

The voltage to be applied shall be an a.c. voltage and have a nominal frequency of 50 Hz or 60 Hz of an approximately sine waveform, the peak factor being within the limits of $\sqrt{2} \pm 5\%$ (1.34 to 1.48). The test transformer shall have a rated power of at least 500 VA and shall provide a current of essentially undistorted waveform under test conditions.

To detect breakdown, the overcurrent device shall operate when a current of 5 mA or more flows in the high-voltage circuit. The test voltage source shall have a capacity to supply a current of 5 mA with a maximum voltage drop of 2 %.

The voltage, expressed as its peak-value divided by $\sqrt{2}$, shall be applied at zero and increased at a uniform rate of approximately 100 V per second until breakdown occurs. In the event of breakdown occurring in less than 5 s, the rate of increase shall be reduced. Where the specified breakdown voltage is equal to or greater than 2 500 V, the rate-of-rise shall be approximately 500 V per second.

4.2 Enamelled round wires with a nominal conductor diameter up to and including 0.1 mm

4.2.1 Test at room temperature

A polished metal cylinder of approximately 25 mm diameter is mounted with its axis horizontal and is connected electrically to one terminal of the voltage test apparatus. The other terminal is mounted vertically above the cylinder (see Figure 1).

A specimen of enamelled wire from which the enamel has been removed at one end shall be connected to the upper terminal and wound once round the cylinder. A force (weight) as specified in Table I is applied to the lower end of the wire to keep the specimen in close contact with the cylinder.

The test voltage shall be applied between the conductor and the cylinder according to Subclause 4.1.

Five specimens shall be tested.

4.2.2 Test at elevated temperature

Test required but not yet under consideration.

4.3 Enamelled round wires with a nominal conductor diameter over 0.1 mm and up to and including 2.5 mm

4.3.1 Test at room temperature

A specimen approximately 400 mm in length shall be twisted back on itself for a distance of 125 mm on an apparatus as shown in Figure 2. The force (weight) applied to the wire pair while being twisted and the number of twists are given in Table II.