IS 10810-5 (1984): Methods of test for cables, Part 5: Conductor resistance test [ETD 9: Power Cables]

BLANK PAGE

UDC 621·315·55 [669·3+669·71] : 621·317·332·3

Indian Standard

METHODS OF TEST FOR CABLES

PART 5 CONDUCTOR RESISTANCE TEST

(Reaffirmed 2001)

Power Cables Sectional Committee, ETDC 59; Panel for Methods of Tests for Cables, ETDC 59/P1 [Ref : Doc : ETDC 59 (2240)]

1. Scope — Covers a method to determine the dc resistance of copper and aluminium conductors.

2. Significance — Accurate control of resistance is necessary to meet system design parameters Resistance is influenced by conductor dimensions and construction, processing, conditions., temperature and resistivity (composition/impurities and temper of the material). It is expressed in terms of ohms per kilometre corrected to 20°C.

3. Terminology — As given in IS : 1885 (Part 32)-1971 'Electrotechnical vocabulary: Part 32 Cables, conductors and accessories for electricity supply'.

4. Apparatus

4.1 Kelvin double bridge of accuracy 0·2 percent having current and potential terminals;

or

Wheatstone bridge of accuracy 0·5 percent.

Note 1 — For resistance values up to 1 Ω, only kelvin double bridge shall be used.

Note 2 — Digital meters having these accuracies may also be used.

4.2 DC source corresponding to the requirement of the bridge.

4.3 Sensitive galvanometer.

4.4 Suitable connecting leads.

4.5 Thermometer, least count 1°C.

5. Material — No material other than the specimen is required.

6. Test Specimen

6.1 The drum length of cable or sample length of cable or conductor as indicated below shall constitute the test specimen:

a) All solid circular conductor	Drum length or 1 m
b) All stranded or sector shaped solid conductors up to and including 25 mm² size	Drum length or 5 m
c) All stranded or sector shaped solid conductors greater than 25 mm² size	Drum length or 10 m

Note — The length of the test specimen is the length which lies between the potential terminals.

6.2 Number of specimens — One.

7. Conditioning — It shall be ensured that the test specimen has attained the ambient temperature.

8. Procedure

8.1 The test specimen is connected to the resistance measuring bridge. Adequate care is to be taken in this connection to minimize contact resistance.

8.2 The resistance of the test specimen is measured and the ambient temperature recorded. During the resistance measurement the magnitude of the current shall be such that there is no heating up of the test specimen.

8.3 The measured resistance is converted to the standard temperature and standard length.

Adopted 14 March 1984 | | Gr 2

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

9. Tabulation of Observations

Sample No.	*Nominal Conductor Size* mm²	*Length* m	*Material Al/Cu*	*Class of Conductor*	*Temperature, t* °C	*Observed Resistance* Ω

10. Calculation — The value of resistance R shall be calculated from observed resistance at a particular temperature as indicated below:

$$R = \frac{R_t \times k}{L} \times 1\,000\ \Omega/\text{km at } 20°C$$

Where

R_t = observed resistance,

k = temperature correction factor (*see* Table 1), and

L = length of test specimen in m.

11. Report

11.1 *Reference Specification* _____

Sample No.	*Nominal Conductor Size* mm²	*Material Al/Cu*	*Class of Conductor*	*Resistance at 20°C*	
				Obtained Ω/km	Specified Ω/km

11.2 *Conclusion* — The sample meets/does not meet the requirements of the specification.

TABLE 1 TEMPERATURE CORRECTION FACTORS FOR CONDUCTOR RESISTANCE TO CORRECT THE MEASURED RESISTANCE AT t°C to 20°C

(*Clause* 10)

Temperature of Conductor at Time of Measurement, t °C	Temperature Correction Factor *k*
5	1·064
6	1·059
7	1·055
8	1·050
9	1·046
10	1·042
11	1·037
12	1·033
13	1·029
14	1·025
15	1·020

(*Continued*)

TABLE 1 TEMPERATURE CORRECTION FACTORS FOR CONDUCTOR RESISTANCE TO CORRECT THE MEASURED RESISTANCE AT t°C to 20°C — *Contd*

Temperature of Conductor at Time of Measurement, t °C	Temperature Correction Factor *k*
16	1·016
17	1·012
18	1·008
19	1·004
20	1·000
21	0·996
22	0·992
23	0·988
24	0·984
25	0·980
26	0·977
27	0·973
28	0·969
29	0·965
30	0·962
31	0·958
32	0·954
33	0·951
34	0·947
35	0·943
36	0·940
37	0·936
38	0·933
39	0·929
40	0·926
41	0·923
42	0·919
43	0·916
44	0·912
45	0·909
46	0·906
47	0·903
48	0·899
49	0·896
50	0·893

Note — For any other temperature, the correction factor may be calculated from the following formula :

$$k = \frac{1}{1 + 0{\cdot}004\ (t - 20)}$$

Printed at New India Printing Press, Khurja, India