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Indian Standard

METHODS OF TEST FOR CABLES

PART 28 WATER ABSORPTION TEST (ELECTRICAL)

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 for measurement of water absorption by elastomeric insulation of electric cables.

2. Significance — Whenever the insulated cores are exposed to water/moisture, there is possibility of absorbing of the same by the insulants thereby deteriorating the electrical parameters. The degree of water absorbed will depend on the quantity as well as the quality of the various ingredients used for compounding of elastomers. Water absorption tests will indicate the quality of the compound used and also its suitability for critical application areas.

3. Terminology — When insulated cores are kept immersed in water, the capacitance values of the same are changed due to absorption of water. The degrees of water absorption is measured by recording the increase in capacitance from 1 to 14 days and from 7 to 14 days which are expressed as percentage of the one day and the seven days values respectively.

4. Apparatus

4.1 *Water Tank* — with heating arrangement.

4.2 *Suitable Bridge* — for measurement of capacitance.

4.3 *High Voltage Source* — 50 Hz.

4.4 *Insulated Mats*

5. Material — Water.

6. Test Specimen — A sample of the core about 5 m long is taken after vulcanization, but before the application of any covering except tape applied before vulcanization. Wherever possible, such tape is removed before the test.

7. Conditioning — The test specimen is prepared from the sample not less than 48 h after vulcanization by drying it for 24 ± 1 h in air at 70 ± 5°C. The specimen is allowed to cool to 50 ± 2°C before immersion in water.

8. Procedure

8.1 The test specimen is accommodated in a water tank so that its middle portion for a length of 3 m is immersed whilst the ends are above the water level, each for a length of 0·75 m. Tap water is used, the temperature of which is maintained at 50 ± 2°C for 14 days. A tightly fitting cover is placed directly above the water surface with suitable water tight bushings for the ends of the specimen. The water level is kept constant.

8.2 The test is carried out with the average stress as specified in individual specification.

8.3 The capacitance is measured after 1, 7 and 14 days' continuous immersion, with the water at same temperature for all measurements.

9. Tabulation of Observations

Sample No.	*No. of days*	*Water Temperature °C*	*Testing Stress V/mm*	*Capacitance μF*		
				1 Day	*7 Days*	*14 Days*

Adopted 14 March 1984

Gr 1

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

10. Calculation

10.1 Percentage increase in capacitance for

$$1 \text{ to } 14 \text{ days} = \frac{C_{14} - C_1}{C_1} \times 100$$

Percentage increase in capacitance for

$$7 \text{ to } 14 \text{ days} = \frac{C_{14} - C_7}{C_7} \times 100$$

where

C_1 = the capacitance value after 1 day (after 24 h)

C_7 = the capacitance value after 7 days (after 168 h)

C_{14} = the capacitance value after 14 days (after 336 h)

11. Report

11.1 *Water Absorption Test of Elastomeric Insulation*

Cable Type

Batch No./Lot No.

Cable No./Drum No.

Date of Testing

11.2 Results

Reference specification_____

Sample No.	*Percentage Increase in Capacitance*			
	1 to 14 days		*7 to 14 days*	
	Observed	Specified	Observed	Specified

11.3 *Conclusion* — The specimen meets/does not meet the requirements of the specification.