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Standard Test Method for Verifying the Specified Dielectric Withstand Voltage of a Membrane Switch¹

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1. Scope

1.1 This test method covers the verification of a specified dielectric withstand voltage of a membrane switch.

2. Terminology

2.1 Definitions:

2.1.1 *dielectric withstand voltage*—the maximum voltage a dielectric can withstand without a visual change from a voltage discharge or specified change of insulation resistance, or both.

2.1.2 *insulation resistance, R*—the electrical resistance between test points.

2.1.3 *membrane switch*—a momentary switching device in which at least one contact is on, or made of, a flexible substrate.

2.1.4 *test points*—two preselected mutually insulated locations on switch assembly.

3. Significance and Use

3.1 Dielectric withstand voltage testing is useful for design verification, quality control of materials, and workmanship.

3.2 This test is designed to determine product integrity and resistance at voltage levels that exceed normal operating levels.

3.3 Specific areas of testing are, but not limited to:

3.3.1 Conductor/dielectric/conductor crossing point,

3.3.2 Close proximity of conductors, and

3.3.3 Any other conductive surface such as shielding or metal backing panel.

3.4 Dielectric withstand voltage testing may be destructive and units that have been tested should be considered unreliable for future use.

4. Interferences

4.1 The following parameters may affect the results of this test:

4.1.1 Humidity,

4.1.2 Contamination,

4.1.3 Barometric pressure, and

4.1.4 Temperature.

5. Apparatus

5.1 *Electric Device*, suitable to provide a controlled dc or ac voltage.

6. Procedure

6.1 Pretest Setup:

6.1.1 Measure the insulation resistance between the two test points. Record insulation resistance as R_i .

6.1.2 Connect two test points on the switch assembly to the voltage source.

6.2 In-Process Test—Constant Voltage Method:

6.2.1 Adjust voltage and frequency to a specified level.

6.2.2 Apply voltage to switch assembly for a specified interval.

6.3 In Process Test—Ramp Voltage Method:

6.3.1 Set the following parameters to specified levels (if applicable):

6.3.1.1 Voltage ramp rate, and

6.3.1.2 Maximum ramp voltage.

6.3.2 Perform test.

6.4 Disconnect switch assembly from power supply.

6.5 Inspect switch assembly for visual change.

6.6 Measure the insulation resistance using the same procedure used in 6.1.1.

6.7 Record insulation resistance as R_f .

7. Calculation

7.1 Calculate the change in the insulation resistance as follows:

$$\Delta R = \text{Change in Insulation Resistance} = |R_i - R_f|$$

8. Report

8.1 Report the following information:

8.1.1 Temperature,

8.1.2 Relative humidity,

8.1.3 Barometric pressure,

8.1.4 Specified voltage,

8.1.5 Actual applied voltage or failure voltage,

8.1.6 Frequency of applied voltage,

8.1.7 Duration of applied voltage (if applicable),

8.1.8 Description of test equipment,

8.1.9 Initial voltage and voltage ramp rate (if applicable),

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- 8.1.10 Part number or description of switch, or both,
- 8.1.11 Description of test points,
- 8.1.12 Date of test,
- 8.1.13 Description of visual change (if applicable),
- 8.1.14 Specified ΔR Limits, and
- 8.1.15 Change in insulation resistance ΔR (as calculated in 7.1).

9. Precision and Bias

9.1 The precision and bias of this test method are under investigation.

10. Keywords

10.1 dielectric withstand voltage; insulation resistance; membrane switch

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