Designation: F2072 – 14

Standard Test Method for Hosedown of a Membrane Switch[1]

This standard is issued under the fixed designation F2072; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method establishes procedures for the hosedown of a membrane switch to verify adequate protection from ingress of water from a high-volume water spray.

1.2 This test method can also be used to verify the ability of a membrane switch or graphics layer to act as a liquid seal for a finished product.

1.3 Additional test methods or practices can be incorporated to investigate specific results or capabilities.

1.4 This test method is a modification of NEMA Publication Number 250-2008 Section 6.7 which is a test for hosedown of a finished product housing.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F1595 Practice for Viewing Conditions for Visual Inspection of Membrane Switches

F1680 Test Method for Determining Circuit Resistance of a Membrane Switch

F1689 Test Method for Determining the Insulation Resistance of a Membrane Switch

2.2 *NEMA Publication:*

250-2008 [3]

3. Terminology

3.1 *Symbols:*

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

3.1.2 *specified resistance, n*—maximum allowable resistance as measured between two terminations whose internal switch contacts, when held closed, complete a circuit.

4. Significance and Use

4.1 The presence of water inside a membrane switch can affect its mechanical operation or electrical functionality, or both.

4.2 This practice establishes a procedure to verify the ability of a membrane switch to resist the entry of liquid into itself or a finished product, or both. It is useful in identifying design deficiencies.

4.3 Hosedown testing may be destructive, therefore any samples tested should be considered unfit for future use.

5. Interferences

5.1 *External Venting*— Any deliberate external venting of the switch will allow liquid to enter.

5.2 *Atmospheric Pressure*—Significant changes in atmospheric pressure during the test or at different facilities may alter the time in which leakage might occur.

5.3 *Duration of Test*— Longer exposure time increases the possibility of leakage.

5.4 *Dye Coloring*—Choose a dye coloring that will not chemically attack the materials.

6. Apparatus

6.1 *Water Supply,* capable of delivering a stream of water at a rate of at least 65 gal/min through a 1 in. (25 mm) internal diameter nozzle for the specified duration,

6.2 An appropriate device or fixture to hold the switch in a fixed position,

6.3 Any additional equipment as required by other test methods employed, and

6.4 *Nozzle* with 1 in. (25 mm) internal diameter.

7. Test Specimen

7.1 The test specimen will be a membrane switch with or without graphics laminated to a rigid material or the final intended mounting configuration (using a clear material will facilitate visual inspection).

8. Conditioning

8.1 Condition specimens by exposure to ambient conditions for 72 h prior to hosedown to allow full cure of adhesives.

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[1] This test method is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.18 on Membrane Switches.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] National Electrical Manufacturers Association (NEMA), 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209.

9. Procedure

9.1 *Pre-Test Setup:*

9.1.1 Fixture Unit Under Test (UUT) as specified.

9.2 *In-Process Test:*

9.2.1 Test switch for proper function if required.

9.2.1.1 Visually inspect in accordance with Practice F1595 and note anything that could affect results or of interest to compare after test. Pictures of UUT may be useful as well but not required.

9.2.1.2 Measure circuit resistance in accordance with Test Method F1680 of preselected (or all switches).

9.2.1.3 Measure insulation resistance in accordance with Test Method F1689 of preselected (or all) conductive points.

9.2.2 Direct water flow at test specimen at all angles of potential water entry such as seams, joints, external operating mechanisms, etc. from a distance of 10 to 12 ft (3.0 to 3.5 m) for a total of 5 min or as specified.

9.2.3 Measure and observe the characteristics of the switch as in 9.2.1 and if liquid has penetrated the UUT record as much detail as possible the extent of penetration seen by visual inspection. Pictures of UUT may be useful as well but not required.

10. Report

10.1 Report the following information:

10.1.1 Duration of test,

10.1.2 *Physical/Aesthetic Changes:*

10.1.2.1 Visual inspection description.

10.1.2.2 Liquid penetration description.

10.1.2.3 Pictures of UUT (if available).

10.1.3 *Electrical Characteristic Changes:*

10.1.3.1 Circuit resistance (Test Method F1680).

10.1.3.2 Insulation resistance (Test Method F1689).

10.1.4 Water temperature.

10.1.5 Atmospheric pressure.

10.1.6 Method of mechanically conditioning, if any.

11. Keywords

11.1 hose down; membrane switch; water spray