Designation: F 2072 – 01

Standard Practice for Hosedown of a Membrane Switch[1]

This standard is issued under the fixed designation F 2072; 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 practice 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 practice 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 practice is a modification of NEMA Publication Number 250-1991 Section 6.7 which is a test for hosedown of a finished product housing.

2. Referenced Documents

2.1 NEMA Publication 250-1991[2]

3. Terminology

3.1 *Definitions:*

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.

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.

9.2.2 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 Test switch for proper function if required.

9.2.4 Perform visual inspection to determine if liquid has penetrated the UUT.

10. Report

10.1 Report the following information:

10.1.1 Duration of test,

10.1.2 Physical/Aesthetic changes, and

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

Current edition approved June 10, 2001. Published August 2001. Originally published as F 2072–00. Last previous edition F 2072–00.

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

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10.1.3 Functional test data, if required.

11. Keywords

11.1 hose down; membrane switch; water spray

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