



Designation: F 2072 – 00₁

Standard Practice for Hosedown of a Membrane Switch¹

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 ~~resistance to~~ 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.

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 ~~Dec. June 10, 2000~~₁. Published ~~February August~~ 2001. Originally published as F 2072-00. Last previous edition F 2072-00.

2. Referenced Documents

- 2.1 NEMA Publication 250-1991²

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 *silver migration, n*—~~the growth of fine crystals between silver conductors of a thick film circuit due to an ionic reaction to the presence of water and an applied dc voltage potential.~~
- ~~3.1.3~~ *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 ~~Water Hose and~~ 1 Nozzle with 1 in. Nozzle: (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 ~~(65 gal/min)~~ 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
- 10.1.3 Functional test data, if required.

11. Keywords

- 11.1 hose down; membrane switch; water spray

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