



## Standard Practice for Hosedown of a Membrane Switch<sup>1</sup>

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 ( $\epsilon$ ) 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 ingress of 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<sup>2</sup>

### 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 in 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.

<sup>1</sup> 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. 10, 2000. Published February 2001.

<sup>2</sup> National Electrical Manufacturers Association (NEMA), 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209.

### 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 65 gal/min through a 1 in. 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 in. Nozzle.*

### 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) at test specimen at all angles from a distance of 10 to 12 ft for 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

*The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or [service@astm.org](mailto:service@astm.org) (e-mail); or through the ASTM website ([www.astm.org](http://www.astm.org)).*