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

This standard is issued under the fixed designation F1895; 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 submerging of a membrane switch to verify resistance to ingress of a specified liquid.

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 National Electrical Manufacturers Assoc. (NEMA) Publication 250-1991 Section 6.10, which is a test for submersion of a finished product housing.

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *National Electrical Manufacturers Assoc.:* [2]
(NEMA) Publication 250-1991

3. Terminology

3.1 *Definitions:*

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

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

3.1.3 *silver migration*—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.

4. Significance and Use

4.1 The presence of water inside a membrane switch can affect its mechanical operation or electrical functionality, or both. Electrical failure can result as short circuits due to silver migration or exceeding the specified resistance due to oxidation.

4.2 This test method 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 Submersion 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 submersion time increases the possibility of leakage.

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

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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] Available from National Electrical Manufacturers Association (NEMA), 1300 N. 17th St., Suite 1752, Rosslyn, VA 22209, http://www.nema.org.