Designation: F2750 – 16

Standard Test Method for Determining the Effects of Bending a Membrane Switch or Printed Electronic Device[1]

This standard is issued under the fixed designation F2750; 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 a method for the bending of any part of a membrane switch or printed electronic device with conductive circuits.

1.1.1 The values given in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.2 *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. Terminology

2.1 *Definitions:*

2.1.1 *bend*—to force from a straight form into a different and especially a curved one.

2.1.1.1 *Discussion*—In this case, no "hard" or angled crease or fold is to occur. The substrate will only be formed into a radius.

2.1.2 *bend cycle*—a bend of a sample around a specified mandrel which is "rolled" in one direction, followed by rolling in the opposite direction, returning the sample to its original position (see Fig. 1).

2.1.3 *mandrel*—a cylindrically shaped metal rod, such as a brazing or drill rod.

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

2.1.5 *membrane switch tail*—a flexible portion of a membrane switch used for input/output connection.

3. Significance and Use

3.1 Bending of membrane switches, printed electronic device or their components can affect their visual appearance, mechanical integrity or electrical functionality. This test method simulates conditions that may be seen during manufacture, installation or use.

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

3.3 Specific areas of testing include, but are not limited to:

3.3.1 Membrane switch flex tails or printed electronic device, and

3.3.2 Any component of a membrane switch or printed electronic device that may be subjected to bending.

4. Interferences

4.1 The following parameters may affect the results of this test:

4.1.1 temperature,

4.1.2 humidity, and

4.1.3 orientation of the conductor (either extension or compression) could have significant impact on the results.

NOTE 1—Experience has shown that some conductors recover their conductive properties if allowed to stabilize after the dynamic portion of the test. Therefore, continuous monitoring is recommended.

5. Apparatus

5.1 *Mandrel,* allowed to rotate smoothly around its longitudinal axis, rigid, low friction smooth surface. Diameter to be specified.

5.2 Fixture to hold test sample securely in place in a vertical manner (refer to Fig. 1).

5.3 Mechanism capable of providing a consistent force and rate of pull to the sample.

5.4 Equipment for the monitoring and recording of resistance.

NOTE 2—Experience has shown that some conductors recover their conductive properties if allowed to stabilize after the dynamic portion of the test. Therefore, continuous monitoring is recommended.

6. Test Samples

6.1 The test samples may be components, tail assembles or finished switches. If the sample length is too short for the test fixture, a sample coupon of the same construction (layer to layer) must be provided (minimum; 250 mm length by 25 mm width).

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

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