Designation: F 1681 – 96

Standard Test Method for Determining Current Carrying Capacity of a Conductor as Part of a Membrane Switch Circuit[1]

This standard is issued under the fixed designation F 1681; 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 covers the determination of the current carrying capacity of a conductor as part of a membrane switch.

1.2 This test method may be used to test a circuit to destruction, that is, to determine its maximum current carrying capacity, or it may be used to test the ability of a circuit to withstand a desired current level.

1.3 This test method applies only to static conditions, and does not apply to contact closure cycling of a membrane switch under current load (test method forthcoming).

1.4 *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 *ASTM Standards:*

F 1680 Test Method for Determining the Circuit Resistance of a Membrane Switch[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *conductor resistance*—the measured electrical resistance through a circuit loop between two test points.

3.1.2 *Discussion*—When a switch is included in that loop, it shall be ''closed" in accordance with Test Method F 1680.

3.1.3 *current carrying capacity (CCC)*—the maximum level of electrical current that a circuit can conduct without sustaining damage.

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

3.1.5 *power capacity*—electrical power is defined as current × voltage = V × I (watts).

3.1.6 *test points*—two preselected conductive points in a circuit loop, possibly including a switch.

4. Significance and Use

4.1 Current carrying capacity is used by designers and manufacturers of electronic interface circuitry to ensure that the membrane switch can reliably handle the loads occurring in normal use and under extreme circumstances. A thorough understanding of CCC allows manufacturers to take it into account when developing design rules for membrane switches.

4.2 Failures due to exceeding the CCC of a circuit may take the form of a significant change in conductor resistance, insulation breakdown (shorts), or conductor breakdown (opens).

4.3 Since a number of design parameters, such as trace width, ink film thickness, etc. affect the final test results, any conclusions should only be applied to specific designs, rather than to a general combination of materials.

4.4 Current carrying capacity tests may be destructive and units that have been tested should be considered unreliable for future use.

4.5 Current carrying capacity may be significantly different for static loads and dynamic (that is, cycling) loads. Failure modes are also generally different.

5. Interferences

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

5.1.1 Temperature,

5.1.2 Relative humidity, and

5.1.3 Barometric pressure.

6. Apparatus

6.1 *Suitable Device*, providing a controlled voltage, capable of supplying sufficient current for the range in question.

6.2 *Suitable Meter(s)*, capable of measuring current and resistance (with range appropriate to the test). Do not apply a voltage greater than the intended operating range of the circuit under test.

6.3 *Discreet Resistors*, sufficient to provide at least 2 times the current range desired for the test (at the preselected voltage level) if the power supply current cannot be limited and measured directly. At the specified test voltage, the smallest resistor should correspond to twice the maximum current level

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

Current edition approved Feb. 10, 1996. Published April 1996.

[2] *Annual Book of ASTM Standards*, Vol 10.05.