



Designation: F1578 – 07

Standard Test Method for Contact Closure Cycling of a Membrane Switch¹

This standard is issued under the fixed designation F1578; 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 setup, procedure, and apparatus required to depress and release a membrane switch to a predetermined number of cycles.

1.2 This test method also covers the optional use of specified voltage and current during the cycling of the membrane switch.

1.3 This test method can be used in conjunction with other ASTM standards such as Test Method F1596.

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:*²

D2240 Test Method for Rubber Property—Durometer Hardness

F1596 Test Method for Exposure of Membrane Switches to Temperature and Relative Humidity

F1661 Test Method for Determining the Contact Bounce Time of a Membrane Switch

F1662 Test Method for Verifying the Specified Dielectric Withstand Voltage and Determining the Dielectric Breakdown Voltage of a Membrane Switch

F1689 Test Method for Determining the Insulation Resistance of a Membrane Switch

F1663 Test Method for Determining the Capacitance of a Membrane Switch

F1680 Test Method for Determining Circuit Resistance of a Membrane Switch

F2592 Test Method for Measuring the Force-Displacement

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 For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

of a Membrane Switch

3. Terminology

3.1 *Definitions:*

3.1.1 *contact closure*—the event at which a specified resistance is achieved.

3.1.2 *duty cycle*—the ratio of switch closed time to total cycle time.

3.1.3 *test rate*—the number of depressions and release cycles per second.

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

4. Significance and Use

4.1 This testing is performed to determine the electrical contact reliability under switching conditions and the physical changes caused by mechanical actuation of the switch assembly in the environments in which the assemblies operate. Evidence of deterioration, that is, cracking of substrate, domes both metal and polyester, ink delamination, etc., resulting from this test can at times be determined by visual examination. However, the effects may be more readily ascertained by measurements made prior to, during, and after exposure. Total circuit resistance, force-displacement, dielectric strength, insulation resistance, and capacitance are types of measurements that show the deleterious effects due to exposure.

5. Apparatus

5.1 *Suitable Electronic Monitoring Device*, to detect and count contact closure at a predetermined or specified test rate and duty cycle.

5.2 *Surface*, flat, smooth, unyielding, and larger than the switch.

5.3 *Test Probes*, built to either of the configurations shown in Fig. 1 or Fig. 2, are acceptable but must be made of an inert elastomeric material with a hardness number equivalent to A/45 \pm 5 as measured in accordance with Test Method D2240. Test probes that do not meet this criteria must be specified and recorded fully.

5.4 *Device*, which will cycle the probe repeatedly into and away from the switch at a specified test rate and duty cycle, and