Designation: F 2114 – 02

Standard Guide for ASTM Standard Test Methods, Standard Practices, and Typical Values of a Membrane Switch[1]

This standard is issued under the fixed designation F 2114; 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 guide contains a list of the current test methods and practices generated by Subcommittee F01.18 on Membrane Switches along with typical values for specifying certain performance characteristics of a membrane switch.

1.2 As a minimum, for any particular membrane switch, the values for the required characteristics should be specified.

1.3 Additional performance characteristics may be required and should be specified accordingly.

2. Referenced Documents

2.1 *ASTM Standards:*

F 1570 Test Method for Determining the Tactile Ratio of a Membrane Switch[2]

F 1578 Practice for Contact Closure Cycling of a Membrane Switch[2]

F 1595 Practice for Visual Inspection of a Membrane Switch[2]

F 1596 Practice for Exposure of Membrane Switches to Temperature and Relative Humidity[2]

F 1597 Test Method for Determining the Actuation Force and Contact Force of a Membrane Switch[2]

F 1598 Test Method to Determine the Effects of Chemical/Solvent Exposure to a Membrane Switch/Graphic Overlay (Spot Test Method)[2]

F 1661 Test Method for Determining the Contact Bounce Time of a Membrane Switch[2]

F 1662 Test Method for Verifying the Specified Dielectric Withstand Voltage of a Membrane Switch[2]

F 1663 Test Method for Determining the Capacitance of a Membrane Switch[2]

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

F 1682 Test Method for Determining the Travel of a Membrane Switch[2]

F 1683 Practice for Creasing and Bending a Membrane Switch, Membrane Switch Assembly or Membrane Switch Component[2]

F 1689 Test Method for Determining the Insulation Resistance of a Membrane Switch[2]

F 1762 Practice for Determining the Effects of Variation in Atmospheric Pressure on a Membrane Switch[2]

F 1812 Test Method for Determining the Effectiveness of Membrane Switch ESD Shielding[2]

F 1843 Practice for Determining the Specular Gloss of Flexible Substrates, both Printed and Unprinted[2]

F 1895 Practice for Submersion of a Membrane Switch[2]

F 1995 Test Method for Determining the Bond Strength of a Surface Mount Device (SMD) on a Membrane Switch by Applying a Shear Force[2]

F 1996 Test Method for Silver Migration for Membrane Switch Circuitry[2]

F 1997 Test Method for Determining the Sensitivity (Teasing) of a Tactile Membrane Switch[2]

F 2072 Practice for Hosedown of a Membrane Switch[2]

3. Significance and Use

3.1 In establishing guidelines for specifying a membrane switch, it is important to allow application design engineers to base their decisions on requirements using known reasonable, achievable performance levels.

3.2 Over-specification increases cost and complexity; under-specification risks not meeting performance criteria.

4. Procedure

4.1 In specifying the performance levels of a membrane switch, select the characteristics you require from Table 1.

4.1.1 If the typical values do not meet your requirements, specify an alternative value.

4.1.2 Choose only those specifications relevant to your application.

4.1.3 Required characteristics are the minimum requirements to be specified for a membrane switch. Recommended characteristics are appropriate to most applications. Optional characteristics can be specified for more demanding applications.

[1] This guide 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, 2003. Published February 2003.

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

TABLE 1 Typical Values

Characteristic	ASTM Designation	Required or Optional	Typical Values
Operating Voltage[A]		Required	5 – 24 V DC
Operating Current[A]		Required	1mA – 150mA
Circuit Resistance[A]	F 1680	Required	5 Ohms – 1K Ohms
Contact Closure Cycles	F 1578	Required	100K – 1M Cycles
Temperature / Humidity	F 1596	Recommended	See F 1596 Level 1
Visual Inspection	F 1595	Recommended	To be Specified
Contact Bounce Time	F 1661	Recommended	≤10ms
Actuation Force and Contact Force	F 1597	Optional	2 oz – 32 oz
Chemical / Solvent	F 1598	Optional	To be Specified
Dielectric Withstand Voltage	F 1662	Optional	250 VDC – 1K VDC 1 min
Capacitance	F 1663	Optional	≤50 pf
Travel	F 1682	Optional	0.002 – 0.10 in.
Tactile Ratio	F 1570	Optional	0.40 to 0.60
Bend	F 1683	Optional	0.125 to 1.0 in. radius Mandrel 10 - 20 cycles
Crease	F 1683	Optional	1 – 5 cycles
Insulation Resistance	F 1689	Optional	>10M Ohms Voltage Range: 100 VDC -250 VDC Dwell Time: 1 min
Atmospheric Pressure	F 1762	Optional	8K ft to 40K ft at 1500 ft/min
ESD Contact Discharge	F 1812	Optional	2KV – 25KV
Gloss Preparation / Gloss Reading	F 1843 D 523	Optional	To be Specified
Submersion	F 1895	Optional	To be Specified
SMD Shear	F 1995	Optional	To be Specified
Silver Migration	F 1996	Optional	2× operating voltage, 38C – 50C at 95 % RH – 98 % RH, 48 – 96 h
Sensitivity (Teasing)	F 1997	Optional	To be Specified
Hosedown	F 2072	Optional	To be Specified

[A] Pertaining to silver conductive ink circuits.

4.2 Specifically note each of the values on the detailed drawing or specification for the membrane switch you are working on.

5. Keywords

5.1 actuation force; atmospheric pressure; bend; capacitance; circuit resistance; contact bounce time; contact closure cycles; contact force; crease; dielectric withstand voltage; displacement; ESD; gloss; hosedown; humidity; insulation resistance; life; membrane switch; resistance; sensitivity; shear; short circuit; silver migration; SMD; solvent; submersion; tactile ratio; teasing; temperature; travel; visual inspection; voltage