



Standard Practice for Exposure of Membrane Switches to Temperature and Relative Humidity¹

This standard is issued under the fixed designation F 1596; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This practice covers a procedure for temperature and humidity cycling of membrane switches.

1.2 This practice is designed to determine changes induced by temperature and humidity.

1.3 This practice is not intended to be a thermal shock procedure; a gradual ramp rate between conditions is required.

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. Terminology

2.1 Definition:

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

3. Significance and Use

3.1 Changes in temperature and humidity during shipping, storage or use can affect the visual appearance, mechanical integrity, or electrical functionality of switches. This practice simulates three different environments to which membrane switches may be exposed.

3.2 The three industry-recognized switch categories based on performance levels are Level 1, Level 2, and Level 3 (see section 7.1).

3.3 Additionally, there may be custom requirements that

vary by application, therefore, these requirements can be determined by customer and vendor agreement and be established as a Level 4.

3.4 This practice defines the duration of a single cycle. Multiple cycles may be appropriate depending on the requirements of the application.

4. Apparatus

4.1 *Closed system*, with temperature and humidity control.²

4.2 The formation of condensation during rising temperature cycles is acceptable; the formation of ice during low temperature cycling is not acceptable.

5. Test Specimens

5.1 The specimens shall be finished switches as delivered and mounted to an actual or agreed upon substrate.

6. Conditioning

6.1 Condition all specimens for 72 h at 20 to 25°C (68 to 77°F) and 20 to 80 % relative humidity (RH) immediately prior to exposure, or prior to temperature and humidity cycling. This is to enable the specimens to stabilize.

7. Procedure

7.1 Subject the preconditioned specimens to the exposure test cycle as illustrated in Table 1.

7.2 Return to room temperature and prepare for evaluation.

8. Keywords

8.1 membrane switch; relative humidity (RH); temperature

¹ This practice is under the jurisdiction of ASTM Committee F1 on Electronics and is the direct responsibility of Subcommittee F01.18 on Membrane Switches.

Current edition approved Dec. 10, 2000. Published February 2001. Originally published as F 1596–95. Last previous edition F 1596–95.

² A closed system such as a Tenney T3ORC, Despatch EC 619, or Espec EMX, available from Tenney, Inc., Union, NJ 07083; Despatch Industries, Minneapolis, MN 55440-1320; ESPEC Corp., Grand Rapids, MI 49509, have been found satisfactory for this purpose.

TABLE 1 Exposure Test Cycle

Level 1 [−40°C (−40°F) to 85°C (185°F)] 72 h at 85°C (185°F) ^A dry heat 24 h at 38°C (100°F) ^A and 95 % RH ^B 8 h at −40°C (−40°F) 40 h at 85°C (185°F) ^A —dry heat 24 h at 38°C (100°F) ^A and 95 % RH ^B 72 h at −40°C (−40°F) ^A —dry heat Level 3 [−10°C (14°F) to 55°C (131°F)] 72 h at 55°C (131°F) ^A 24 h at 38°C (100°F) ^A and 95 % RH ^A 8 h at −10°C (14°F) ^A 40 h at 55°C (131°F) ^A 24 h at 38°C (100°F) ^A and 95 % RH ^A 72 h at −10°C (14°F) ^A	Level 2 [−25°C (−13°F) to 70°C (158°F)] 72 h at 70°C (158°F) ^A 24 h at 38°C (100°F) ^A and 95 % RH ^B 8 h at −25°C (−13°F) ^A 40 h at 70°C (158°F) ^A 24 h at 38°C (100°F) ^A and 95 % RH ^B 72 h at −25°C (−13°F) ^A Level 4 (Custom Requirement) See 3.3
---	---

^A ($\pm 2^{\circ}\text{C} \pm 3.6^{\circ}\text{F}$ and $\pm 6.0\%$ RH).

^B Place these samples in a rack at a 45° angle to allow condensate to drain from samples and arrange to allow adequate air flow between samples.

The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).