

RESISTANCE TO SOLVENTS

1. PURPOSE. The purpose of this test is to verify that the markings will not become illegible on the component parts when subjected to solvents. The solvents will not cause deleterious, mechanical or electrical damage, or deterioration of the materials or finishes.

1.1 Formulation of solvents. The formulation of solvents herein is considered typical and representative of the desired stringency as far as the usual coatings and markings are concerned. Many available solvents which could be used are either not sufficiently active, too stringent, or even dangerous to humans when in direct contact or when the fumes are inhaled.

1.2 Check for conflicts. When this test is referenced, care should be exercised to assure that conflicting requirements, as far as the properties of the specified finishes and markings are concerned, are not invoked.

2. MATERIALS.

2.1 Solvent solutions. The solvent solutions used in this test shall consist of the following: 1/

a. At 20-30°C a mixture consisting of the following:

- (1) One part by volume of an aliphatic alcohol and/or aliphatic ester, USP grade or better.
- (2) Three parts by volume of mineral spirits in accordance with A-A-2904, type II, previously designated as TT-T-291, type II, grade A, or three parts by volume of a mixture of 80 percent by volume of kerosene and 20 percent by volume of ethylbenzene.

b. A semiaqueous or nonaqueous based organic solvent e.g., a terpene or heterocyclic compound. 2/

c. This solvent has been deleted. When a suitable replacement for this solvent has been found, it will be added as solution c.

d. At 63°C to 70°C, a mixture consisting of the following: 1/

- (1) 42 parts by volume of deionized water.
- (2) 1 part by volume of propylene glycol monomethyl ether.
- (3) 1 part by volume of monoethanolamine or equivalent inorganic base to achieve the same pH.

2.1.1 Solvent solutions, safety aspects. Solvent solutions listed in a through d above exhibit some potential for health and safety hazards. The following safety precautions should be observed:

- a. Avoid contact with eyes.
- b. Avoid prolonged contact with skin.
- c. Provide adequate ventilation.
- d. Avoid open flame.
- e. Avoid contact with very hot surfaces.

1/ Normal safety precautions for handling these solutions (e.g., same as those for diluted ammonium hydroxide) based on O.S.H.A rules for Monoethanolamine or other precautionary measures with regard to flash point, toxicity, etc.

2/ Or any EPA demonstrated equivalent. When using EPA approved alternative solutions for test, the device manufacturer should consider the recommended temperature for cleaning specified by the solvent supplier.

2.2 Vessel. The vessel shall be a container made of inert material, and of sufficient size to permit complete immersion of the specimens in the solvent solutions specified in 2.1.

* 2.3 Brush. The brush shall be a toothbrush with a handle made of a nonreactive material. The brush shall have at least three long rows of hard (or firm) bristles, the free ends of which shall lie substantially in the same plane. The toothbrush shall be used exclusively with a single solvent and when there is any evidence of softening, bending, wear, or loss of bristles, it shall be discarded.

3. PROCEDURE. The specimens subjected to this test shall be divided into three equal groups. Each group shall be individually subjected to one of the following procedures:

Note: Metal lidded leadless chip carrier (LCC) packages shall be preconditioned by immersing the specimens in room temperature flux type symbols "A" or "B" (flux types "LO" or "L1") in accordance with ANSI/J-STD-004 previously designated as RMA flux in accordance with MIL-F-14256, for 5 to 10 seconds. The specimens shall then be subjected to an ambient temperature of $215\text{ }^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 60 seconds $+5, -0$ seconds. After the preconditioning, each device lid shall be cleaned with isopropyl alcohol.

- a. The first group shall be subjected to the solvent solution as specified in 2.1a maintained at a temperature of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
- b. The second group shall be subjected to the solvent solution as specified in 2.1b maintained at a suitable temperature.
- c. This solution has been deleted, (see 2.1c).
- d. The fourth group shall be subjected to the solvent solution as specified in 2.1d maintained at a temperature of 63°C to 70°C .

The specimens and the bristle portion of the brush shall be completely immersed for 1 minute minimum in the specified solution contained in the vessel specified in 2.2. Immediately following emersion, the specimen shall be brushed with normal hand pressure (approximately 2 to 3 ounces) for 10 strokes on the portion of the specimen where marking has been applied, with the brush specified in 2.3. Immediately after brushing, the above procedure shall be repeated two additional times, for a total of three immersions followed by brushings. The brush stroke shall be directed in a forward direction, across the surface of the specimen being tested. After completion of the third immersion and brushing, devices shall be rinsed and all surfaces air blown dry. After 5 minutes, the specimens shall be examined to determine the extent, if any, of deterioration that was incurred.

3.1 Optional procedure for the fourth group. The test specimens shall be located on a test surface of known area which is located 15 ± 2.5 centimeters (6 ± 1 inches) below a spray nozzle(s) which discharges 0.6 ± 0.02 liters/minute (0.139 gpm) of solution (2.1d) per 6.5 square centimeters (1 in^2) surface area at a pressure of 140 ± 30 kilopascal (20 ± 5 psi). The specimens shall be subjected to this spray for a period of 10 minutes minimum. After removal and within 5 minutes the specimens shall be examined in accordance with 3.1.1. The specimens may be rinsed with clear water and air blow dried prior to examination.

3.1.1 Failure criteria. After subjection to the test, evidence of damage to the device and any specified markings which are missing in whole or in part, faded, smeared, blurred, or shifted (dislodged) to the extent that they cannot be readily identified from a distance of at least 15.0 cm (6 inches) with normal room lighting and without the aid of magnification or with a viewer having a magnification no greater than 3X shall constitute a failure.

4. SUMMARY. The following detail shall be specified in the individual specification: The number of specimens to be tested (see 3).