

SEMI D60-0818 (Reapproved 0224) TEST METHOD FOR SURFACE SCRATCH RESISTANCE FOR FPD POLARIZING FILM AND COVER PLASTICS FOR MOBILE DISPLAYS

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NOTICE: Paragraphs entitled ‘NOTE:’ are not an official part of this Standard or Safety Guideline and are not intended to modify or supersede the official Standard or Safety Guideline. These have been supplied by the global technical committee to enhance the usage of the Standard or Safety Guideline.

1 Purpose

1.1 This Standard establishes implementation practice for the test method of scratch resistance for the surface of FPD polarizing film and cover plastics for mobile displays.

1.2 This Test Method can be applied to manufacturing, quality control, and development work.

2 Scope

2.1 This Standard specifies the test method to compare and evaluate the scratch resistance for the surface of FPD polarizing film and cover plastics for mobile displays, such as tablets, smart phones, and watches.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 None.

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Terminology

4.1 Definitions

4.1.1 *steel wool* — a special alloy steel which is processed into a thin and long fibrous form. Its cross-section surface is polyhedral with edges; it is generally used as an abrasive.

NOTE 1: There are several kinds of steel wool depending on used fiber diameter. Average line diameter of #0000 is about 0.012 mm, but it is not standardized.

5 Summary of Test Method

5.1 Testing Environment

5.1.1 The environment for this test is as follows:

- Temperature: $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- Humidity: $60\% \pm 15\% \text{ RH}$

5.2 Instruments to be Used for the Test

5.2.1 The following instruments are used for conducting this test.

- Steel wool #0000
- Abrasion head:
 - The bottom surface is flat and has either a round or square shape of 0.8 cm^2 to 4.9 cm^2 .

- The load per unit area is 0.80 N/cm² to 2.45 N/cm² as standard.
- The load per unit area is equal to or more than 5 N/cm² and equal to or less than 20 N/cm², for the test of the surface film for mobile applications.

5.3 Test Samples

5.3.1 *Specimens* — The test sample shall be a cutout from the polarizing film and its material to be tested and fixed on a flat surface. The sample piece shall be large enough to compare the abrasion part and non-abrasion part; for example, 30 mm to 70 mm wide and 110 mm to 160 mm long is recommended.

5.3.2 *Sample Structure* — When the test sample are panel or module, the structure of the sample, which may be layered films and adhesives, should be agreed between the provider and the customer.

6 Procedure

6.1 Steel Wool Scratch Test

6.1.1 *Procedure* — On the test sample, place a steel wool piece then a weight and scrub the surface horizontally at 80 mm/sec. to 120 mm/sec. speed. The scrubbing surface shall be between 60 mm and 100 mm in length.

6.1.2 *Test Conditions* — The standard load shall be 2.0 N/cm² and the number of scrubbing shall be 10 times. For the test of surface film for mobile applications, the load shall be 10 N/cm² and the number of scrubbing shall be 100 to 10,000 times. Other test conditions can be used based on the agreement between the provider and the customer, however any deviation from the test conditions which are described above shall be reported.

6.1.3 The direction of steel wool motion shall be perpendicular to the direction of steel wool fibers. The direction of steel wool motion can be parallel to the direction of steel wool fibers. When the parallel direction is applied, it shall be reported.

6.2 Evaluation

6.2.1 Visually inspect the tested sample piece under a fluorescent light reflection in a dark room and report the surface conditions.

6.2.2 When there is a reference sample or grade samples of the surface conditions, which are agreed by the provider and the customer, the tested samples shall be compared with those reference or grade samples.

6.2.3 When a black film is attached to the rear side of the test sample for observation, it shall be attached after the test. The observation conditions shall be noted in the report.

7 Calculations

7.1 No calculation is needed.

8 Report

8.1 Results of visual inspection shall be reported.

8.2 In addition, when special test conditions are used other than those specified above, such conditions shall be reported.

9 Related Documents

9.1 *SEMI Standards and Safety Guidelines*

SEMI D46 — Terminology for FPD Polarizing Films