

SEMI D50-0707

TEST METHOD FOR SURFACE HARDNESS OF FPD POLARIZING FILM

This standard was technically approved by the global Flat Panel Display – Color Filter & Optical Elements Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on May 16, 2007. It was available at www.semi.org in June 2007 and on CD-ROM in July 2007.

1 Purpose

1.1 This specification defines the procedural guideline for measuring the surface hardness of a polarizing film and its materials for FPD. These procedures are applicable to manufacturing, quality control, and development work.

1.2 This specification clarifies the differences when evaluating a polarizing film and its materials, using ISO15184:1998 “Paint and Vanishes – Determination of Film Hardness by Pencil Test,” the specification defined for determining the hardness of coating films. It specifically clarifies the load in the test method and evaluation items in the evaluation method.

2 Scope

2.1 This specification defines the measurement method of surface hardness of a polarizing film and its materials for FPD applications.

NOTICE: This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard 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 SEMI Standards

3.1.1 None.

3.2 ISO Standard¹

ISO 15184:1998 — Paints and varnishes – Determination of film hardness by pencil test

3.3 JIS Standard²

JIS K 5600-5-4:1999 — Testing methods for paints – Part 5: Mechanical property of film – Section 4: Scratch hardness (Pencil method)

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

4 Test Method

4.1 *Equipment and Instruments* — For the test equipment, pencil, pencil sharpener, abrasive paper, and sampling method, those specified in ISO15184:1998 are to be employed. Test equipment can be of another shape as long as it is based on the same principles as in ISO15184:1998. However, if equipment other than the kind specified in ISO15184:1998 is used, types of test equipment used shall be recorded in the test result report and any other such documents. Also, the load applied in the test shall be changed to $4.9\text{N} \pm 0.1$, since surface hardness of polarizing film is generally weaker than coated films.

4.2 *Test Plate* — Test piece is prepared by cutting the target polarizing film and its materials into the shape and size suitable for the test. Whether the sample is tested as a polarizing film or as raw material shall be clearly stated in the test result report and other such documents.

1 International Organization for Standardization, ISO Central Secretariat, 1 rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland. Telephone: 41.22.749.01.11; Fax: 41.22.733.34.30; <http://www.iso.ch>

2 Japanese Industrial Standards, Available through the Japanese Standards Association, 1-24, Akasaka 4-Chome, Minato-ku, Tokyo 107-8440, Japan. Telephone: 81.3.3583.8005; Fax: 81.3.3586.2014; <http://www.jsa.or.jp>

4.3 Procedure

4.3.1 *Running the Test* — Methods and conditions specified in ISO15184:1998 shall be used for the test environment, conditioning of the pencil, mounting of the polarizing film, and use of test equipment. However, the speed of the test equipment shall be 0.5 mm/s and the scratch length shall be from 5 to 10 mm. For other test methods, the test equipment shall be operated as specified in ISO15184:1998.

4.3.2 *Evaluation* — Visual inspection can be performed immediately after the measurement. If there is dent, a check shall be made if the dent recovers after one (1) hour. For the evaluation of scratches, the reflective test shall be performed on a blackboard using fluorescent light. Other evaluations shall be conducted in accordance with the methods specified in ISO15184:1998.

4.3.3 Evaluation Items

4.3.3.1 *Scratch* — Irrecoverable visual change on the surface of the polarizing film.

4.3.3.2 *Dent* — Visual change caused on the surface of the polarizing film that recovers with time. Dent that recovers within an hour is out of the scope of this specification. If there are other specific evaluation items, they shall be described separately in the test items.

5 Accuracy

5.1 All the measurements shall conform to the accuracy specified in ISO15184:1998.

6 Test Result Report

6.1 Results of the test items defined in § 4.3.3 and contents specified in ISO15184:1998 shall be reported. If dent is not evaluated, it shall be commented upon in the report as required.

6.2 The following information shall be included as additional items.

1. Type of the test equipment used.
2. Whether the sample is polarizing film or its material.
3. If there is any special condition such as the evaluation result depends on measurement direction.

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