SEMI D29-1101 (Reapproved 1113)
TEST METHOD FOR HEAT RESISTANCE IN FLAT PANEL DISPLAY (FPD) COLOR FILTERS

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1 Purpose

1.1 The purpose of this Document is to standardize the method for measurement of heat resistance in color filters used for flat panel displays (FPD).

2 Scope

2.1 This method is to be used by suppliers and users of FPD color filters to measure quality in products as well as items under development.

2.2 This method is used in general FPD production to test the resistance of color filters to heat.

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 *SEMI Standards and Safety Guidelines*

SEMI D19 — Test Method for the Determination of Chemical Resistance of Flat Panel Display Color Filter

SEMI D22 — Test Method for the Determination of Color, Transmittance of Flat Panel Display Color Filter Assemblies

3.2 *ISO Standard*[1]

ISO 7724[2,3] — Paints and Varnishes – Colorimetry

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

4 Terminology

4.1 *Definitions*

4.1.1 *atomic force microscope (AFM)* — a device which precisely measures surface shape by gauging the reciprocal active force between atoms through use of a probe.

4.1.2 *clean oven* — a device that heats a specimen through circulation of heated air through an air filter.

4.1.3 *confocal scanning laser microscope* — a microscope which is able to create an image of just the focal point by concentrating light on a specimen using a confocal laser. This device can also measure surface shape by recording height information, which matches the focal point of each scans line image.

5 Summary of Method

5.1 Measure spectral transmittance, chromaticity, and surface shape of specimen.

[1] International Organization for Standardization, ISO Central Secretariat, 1 rue de Varembé, 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 Standards Association, 4-1-24 Akasaka, Minato-ku, Tokyo 107-8440, Japan; Telephone: +81.3.3583.8005, Fax: +81.3.3586.2014, http://www.jsa.or.jp

[3] The expression method of its color differences is equal to the method defined in Publication of CIE No. 87 (1990) Parametric Effects in Color – Difference Evaluation. Commission Internationale de l'Eclairage, Kegelgasse 27, A-1030 Vienna, Austria; Telephone: +43.1.714.31.87.0

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5.2 Place specimen in heating device and leave at specified temperature for specified length of time.

5.3 Remove specimen from heating device and cool them.

5.4 Observe visually and by microscope to see if any exterior changes have occurred in the specimen.

5.5 Measure spectral transmittance, chromaticity, and surface shape of specimen.

6 Apparatus

6.1 *Heating Device and Holders*

6.1.1 *Heating Device* — Use a clean oven. The heating device being used must have the accuracy of temperature verified. Also, the device should have enough capacity to be able to heat the specimen evenly to the target temperature promptly. For example, there are devices where it is necessary to place a metal block inside to increase the heating capacity to the specimen.

6.1.2 *Holder* — First the holder should be raised to the specified temperature and then the specimen should be set in the holder.

6.2 *Measurement Devices*

6.2.1 *3-Dimensional Profile Measurement Device* — Use a Stylus type surface roughness measurement device, AFM or laser microscope.

6.2.2 Color Illuminator — See SEMI D19.

6.2.3 *Floodlight* — See SEMI D19.

6.2.4 *Microscope* — See SEMI D19.

6.2.5 *Spectrophotometer* — Use a device in conformance with SEMI D22.

7 Test Conditions

7.1 As long as the test condition should be written in the test result, any combination of temperature and heating time can be acceptable in the conditions. The test conditions used should reflect actual conditions in the manufacturing process of flat panel displays. Table 1 contains a reference for test temperature, maintain time and atmosphere.

Table 1 Test Conditions

Item	*Device Condition*	*Test Temperature*	*Maintain Time*
1	Room Air	180°C (±2°C) 200°C (±2°C) 230°C (±2°C)	1 hour (±5%)
2	Nitrogen Gas	180°C (±2°C) 200°C (±2°C) 230°C (±2°C)	1 hour (±5%)

8 Test Specimen

8.1 Use FPD color filters for specimens. In the test report, note the existence or nonexistence of Transparent Conductive Film (ITO etc.).

9 Procedure

9.1 Adjust the temperature on the heating device and make sure of the furnace temperature.

9.2 Measure the spectral transmittance, chromaticity. Observe the surface of each color layer of the specimen. (The measurement method is described in §§ 9.6 and 9.7.)

9.3 Mount the specimen in the heating device.

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