SEMI D19-0305 (Reapproved 0412)
TEST METHOD FOR THE DETERMINATION OF CHEMICAL RESISTANCE OF FLAT PANEL DISPLAY COLOR FILTERS

This Standard was technically approved by the Flat Panel Display – Materials & Components Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on December 24, 2011. Available at www.semiviews.org and www.semi.org in April 2012; originally published in 1999; previously published March 2005.

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1 Purpose

1.1 This Standard establishes two methods for evaluating the chemical resistance of FPD color filters. One of these methods is qualitative, the other is quantitative.

2 Scope

2.1 These methods may be used by suppliers and users of color filters for FPD applications, for use in judging quality of production and developing samples.

2.2 These methods test the chemical resistance of color filters by utilizing chemicals and conditions typically employed in FPD manufacturing.

2.3 These methods are destructive.

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 Limitations

3.1 This Standard specifies only the methods for testing and evaluating chemical resistance of FPD color filters; however, it does not specify the criteria against which the test results are compared.

3.2 This Standard specifies only items for color filters, but not for flat panel displays incorporating color filters.

4 Referenced Standards and Documents

4.1 *JIS Standards*[1] (available in Japanese only)

JIS Z 8113 — Glossary of Lighting Terms

JIS Z 8120 — Glossary of Optical Terms

JIS Z 8722 — Methods of Measurement of Color of Reflecting

JIS Z 8730 — Method for Specification of Color Difference for Opaque Materials

4.2 *Other Documents*

IEC Publication 50 (845) — International Electro-chemical Vocabulary (IEV)[2]

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

5 Terminology

5.1 *Definitions*

5.1.1 *color illuminator* — a light source having a uniform illumination plane which radiates diffuse light onto the back surface of a sample to permit direct observation of the sample.

[1] 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

[2] International Electrotechnical Commission, 3 rue de Varembé, Case Postale 131, CH-1211 Geneva 20, Switzerland; Telephone: +41.22.919.02.11, Fax: +41.22.919.03.00, http://www.iec.ch

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5.1.2 Definitions of additional terms used in this Document may be found in JIS Z 8113, JIS Z 8122 and IEC Publication 50 (845).

6 Summary of Method

6.1 A sample is placed in a suitable test container at controlled temperature for a specified period of time.

6.2 The sample is removed from the bath and residual chemicals removed.

6.3 The sample is examined visually for qualitative changes in appearance.

6.4 The sample is examined by microscope and/or surface profiler (stylus type) for material swelling.

6.5 The sample is measured per color layer for spectra transmittance.

6.6 The color difference for each color layer is calculated in one of two systems.

7 Apparatus

7.1 *Test Container* — A clean container shall be used with a sufficient size and depth to accommodate the sample and appropriate chemicals. The container material must be chosen which will not be affected by tests executed under this method. Note that chemicals should not change in quality by test container.

7.2 *Instrumentation*

7.2.1 *Color Illuminator* — This light source shall have chromaticity, color rendering, luminance and intensity uniformity, diffusion, and a sufficient illumination area for observation of the samples to be measured.

7.2.2 *Floodlight* — This light shall have luminance uniformity and an illumination area sufficient for the samples to be measured.

7.2.3 *Microscope* — The microscope used shall have appropriate magnification, normally 50× to 400×.

7.2.4 *Spectrophotometer* — The spectrophotometer shall be in conformance with JIS Z 8722 or an equivalent standard.

7.2.5 *Surface Profiler* — The equipment which can measure the thickness with X-Y stage.

8 Reagents and Test Conditions

8.1 No specific requirements are described for the reagents. As long as the test conditions are reported with the test result, any combination of chemical reagents with any condition can be used for the test. The test conditions should reflect actual process conditions, which are specific for the selected FPD manufacturer. Some reagents suggested for the test are given in Table 1.

Table 1 Chemicals Used for Chemical Resistance Tests and Related Conditions

Chemical[#1]	*Liquid Temperature (°C)*	*Soak Time (minutes)*
N-methyl-2 pyrolidone (NMP)	23 ± 2	30
γ-butyrolactone	23 ± 2	30
2-propanol (IPA)	23 ± 2	30
propylene glycol monomethyl ether Acetate	23 ± 2	30
ethylene glycol monobutyl ether	23 ± 2	30
2.38% tetramethyl-ammoniumhydroxide (TMAH)	23 ± 2	30
18% HCl	23 ± 2	30
18% HCl	40 ± 5	10
5% NaOH	23 ± 2	10
5% KOH	23 ± 2	10

#1 % = % by weight.

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