

SEMI D46-1019

TERMINOLOGY FOR FPD POLARIZING FILMS

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1 Purpose

1.1 In this Standard, definition and interpretation of each term provides material characteristics used for flat panel display (FPD) manufacturing. This Standard benefits unification of terminologies generally used for Polarizing Films of FPD manufacturing.

2 Scope

2.1 This Standard is applicable for Polarizing Films of FPD manufacturing. It covers terminologies related to Polarizing Films of FPD manufacturing, used in the area of material, inspection, and measurement.

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 The intention of this Standard is providing terminologies for Polarizing Films of FPD manufacturing only. Hence, it does not cover any specific terminology used in a peculiar area (e.g., specialized terms based on personal subjectivity) or minor materials and details of those materials either for special and general purpose.

4 Referenced Standards and Documents

4.1 SEMI Standards and Safety Guidelines

SEMI D34 — Test Method for FPD Polarizing Films

SEMI D50 — Test Method for Surface Hardness of FPD Polarizing Film

SEMI D60 — Test Method of Surface Scratch Resistance for FPD Polarizing Film and Its Materials

SEMI D67 — Test Methods for Antifouling Property and Chemical Resistance of FPD Polarizing Films and its Materials

4.2 ISO Standards¹

ISO 11664-1 (CIE S 014-1/E) — Colorimetry – Part 1: CIE Standard Colorimetric Observers

ISO 11664-4 (CIE S 014-4/E) — Colorimetry – Part 4: CIE 1976 L*a*b* Colour Space

4.3 JIS Standards²

JIS K 5600 — Testing Methods for Paints

JIS K 7136 — Plastics-Determination of Haze for Transparent Materials

JIS K 7374 — Plastics-Determination of Image Clarity

JIS Z 0237 — Testing Methods of Pressure-Sensitive Adhesive Tapes and Sheets

JIS Z 8741 — Specular Glossiness-Methods of Measurement

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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>

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

5 Terminology

5.1 Definitions and Interpretations

5.1.1 Types of Polarizer (1–7) (see Table 1)

5.1.2 Films and Layers Composing Polarizing Films (1–15) (see Table 2)

5.1.3 Type of Polarizing Film (1–5) (see Table 3)

5.1.4 Characteristic (1–19) (see Table 4)

5.1.5 Inspection/Defect (1–10) (see Table 5)

5.1.6 Optical Factor (1–10) (see Table 6)

5.1.7 Function (1–3) (see Table 7)

Table 1 Types of Polarizer

No	Term	Definition	Interpretation
1	Polarizer	Generic term of optical devices which are capable to generate polarized light from natural light.	Poly vinyl alcohol (PVA) is generally used for base films.
2	Absorbing Polarizer	Polarizer which generate polarized light using polarized two-color absorption. It mainly functions as linear polarizer.	Depending on the type of dicronic absorber, they include iodine type, dye type, etc. Polarizers made of PVA with iodine or dyes impregnated are generally used.
3	Iodine Type Polarizer	Polarizer using iodic complex as two-color absorber.	They are highly balanced in transmissivity, polarization degree, and achromatic property, and are currently mainstream of polarizers used for FPDs.
4	Dye Type Polarizer	Polarizer using dye as two-color absorber.	As the dye itself has high durability, they are suitable for applications requiring higher durability such as in-car products.
5	Reflecting Polarizer	Polarizer which generates polarized light using selective reflection. There are two types: linear polarization selectivity and circular polarization selectivity.	They include polarizers using circular dichronism of cholesteric liquid crystal and polarizers using mismatching between birefringence and refraction factors of layers. They also include polarizers using selective reflection of linear polarization on inclined incident multilayer thin films, which are broadly used with absorbing polarizers for improving light utilization efficiency. Especially, the latter ones are abundantly used for projectors, etc.
6	Inorganic Polarizer	Polarization layer with grid structure made of metal or inorganic substance.	Polarization given by fine slit structure of metal or inorganic layer on glass substrate. Durability and light fastness are better than organic type. Inorganic polarizer is able to polarize infrared light and ultra violet light.

No	Term	Definition	Interpretation
7	Organic Polarizer	Polarization layer with iodine and dye as dichroic absorber	Iodine polarizer type is majority for FPD industry due to excellent optical properties. Dye polarizer type gives high durability and is applied for heavy duty usage such as automotive grade.

Table 2 Films and Layers Composing Polarizing Films

No	Term	Definition	Interpretation
1	Retarder	Optical device which gives phase shift to polarized light depending on its optical axis.	They are generally called $\lambda/4$ films or $\lambda/2$ films, and are the generic name of optical devices which change polarizing conditions.
2	Retardation Film	Optical-anisotropic film that possesses either single or double optical axis.	As one with the polarizing film, makes possible black/white display and expands the viewing angle of the LCD panel.
3	Compensation Film	Name of the optical film used to improve the display characteristics of the LCD panel.	Depending on the LCD panel design, compensation film is selected and combined with the polarizing film.
4	Wide Viewing Angle Film	Film that widens LCD panel viewing angle.	Generally acts as a visual angle compensating layer in the film that forms the polarizing film.
5	Protective Layer	Film used to protect the polarizer.	TAC (Tri Acetyl Cellulose) is used the most as a base film. Example of base film TAC (Cellulose triacetate). The protective film has a UV absorbing function for protecting the PVA layer and the liquid crystal (see Figure 1).
6	Anti-Glare	Treatment performed on a film surface to reduce glare by forming micro-structure on its top surface layer to induce scattering.	Generally, particles such as silica are mixed in the UV hardening resin, forming unevenness on the surface (see Figure 4).
7	Hard Coat	Resin coated on the surface of protection layer in order to prevent damage to the surface of the polarizing film.	Generally, there is anti-glare (AG) hard coat and clear hard coat, and particl TACes such as silica are mixed into AG hard coat (see Figure 4).
8	Anti-Reflection	Treatment performed on a film surface to eliminate reflected light, for example, by coating of film having different refractive indexes.	In contrast to antiglare, which disperses light, anti-reflection has the function of decreasing reflected light (see Figure 4).
9	Anti-smudge coating	Resin layer coated for preventing dirt or removing dirt easily.	Resin coated on the Anti-Glare or Anti-Reflection layer on the surface of protection layer.
10	Adhesive	Chemical compound which acts as an adhesion layer to attach the polarizing film to the FPD panel.	An adhesive that can be peeled off afterwards (see Figure 4).
11	Separator	De-molded film adhered on adhesive layer of polarizing film, which is also called 'Release Liner.'	Generally, silicon-processed polyester film is used (see Figure 4).
12	Reflector	Optical device which symmetrically reflects light on the normal line.	For the devices with high reflectivity, metal reflection or multilayer reflection with dielectric materials is used.