# OPTIMAX TECHNOLOGY CORPORATION

# Semitransparent Type Polarizer Specification

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| Document number | | Department | |
| Edition order | | Effective date | |
| Approbation | Verify | | Maker |
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| OPTIMAX | Document number | | Effective date | |
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1.Purpose：To ensure the Semitransparent Polarizer could maintain the constant quality and the product quality.

2.Scope：This specification is suitable for Neutral gray polarizer with Semitransparent film.

3.Authority and responsibility：

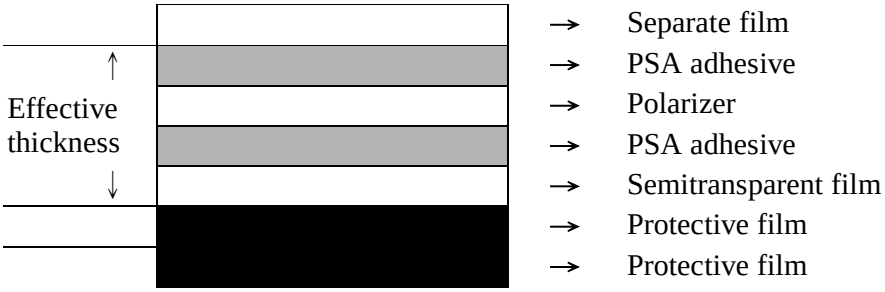
Technology Department：Establish and maintain this specification.

4.Definition：Non

5.Contents：

5.1Structure：

5.1.1 The structure of Neutral gray polarizer with Semitransparent film：



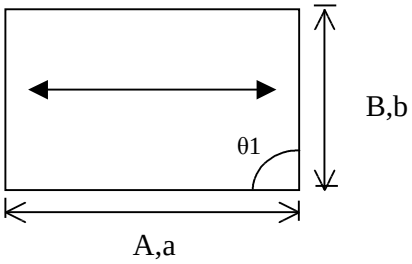

5.2 Dimension、Thickness：

5.2.1 Cut-dimention：Long edge (A) and Short edge (B) is defined by individual specifications.

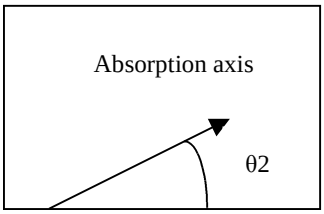
5.2.2 Effective dimension：Long edge (a) and Short edge (b) is defined by individual specifications.

5.2.3 Thickness：Effective thickness is shown in individual specification table “Effective thickness” means total thickness without protective film and separate film.

5.3 Cut-angle：Cut-angle ($q_1$) are shown in individual specification table.



5.4 Absorption axis：Orientation axis angle ($q_2$) are shown in individual specification table.




5.5 Appearance：

5.5.1 Delamination

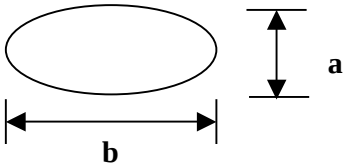
Not allowed within effective dimension area.

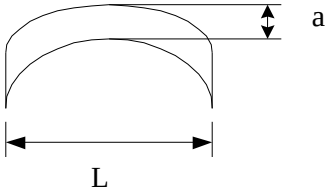
5.5.2 Tunneling

Not allowed within effective dimension area.

5.5.3 Dot defects：include concave, polarizer scratch. Foreign matter bubble. Stain etc. their average diameter are less than 0.15mm. Such care that several dot defects are gathering together in 1cm$^2$, are regarded as 1 defect. The allowed dot detect is shown in individual specification table.

**Average diameter：(a+b)/2**




5.5.4 Piece defects：take example, stain, mura, etc that are remarkab b fect to polarizer, allowed. Such case that several dot defects are gathering together in 1cm , are regarded as 1 defect.

5.5.5 Line defects：take example, scratch pres injury etc. that are remarkable effect to polarizer 1cm are considered as 1 Line defect, les than 1cm are considered as 1 dot defect. Total defect number as dot defect face defect and Line defect are shown in individual specification table.

5.5.6 Total defect number：totalize the defects shown in 5.5.3~5.5.5 that is the total defect number, which is show in individual specifications.

5.6 Optical performances：

Single transmittance, crossed transmittance, polarizing co-efficiency, hue(L,a,b),UV-cut performance are shown in individual specification table.

5.7 Performance of Semitransparent film：Transmittance and Reflectance are show in individual specification table.

5.8 Durability performances：

The change of values on single transmittance are show in individual specification table.

5.8.1 General type:

| Item | Test condition | Time(hr.) |
|---|---|---|
| Heat resistance<br>Humidity resistance<br>Artificial resistance<br><br>Cold resistance | Heat resistance 70°C Dry<br>40℃，95%RH<br>400W mercury lamp from the height of 30cm<br>-20℃ | 240 |

5.8.2 Middle durability type:

| Item | Test condition | Time(hr.) |
|---|---|---|
| Heat resistance<br>Humidity resistance<br>Artificial resistance<br><br>Cold resistance | Heat resistance 80°C Dry<br>60℃，90%RH<br>400W mercury lamp from the height of 30cm<br>-30℃ | 240 |

5.9 Adhesive performance：

The characteristics of adhesive are shown in individual specification table.

| Item | Test conditions | | Determination |
|---|---|---|---|
| Peel strength(to glass) | JIS C 2107 | | 500～2000gf/25mm |
| Cohesion(to glass) | JIS Z 1528 | | below 0.5mm/25*25mm/1hr |
| Adhesive transmittance | | | Above 90% |
| Peel strength to releasing film | JIS C 2107 | | 4~20gf/25mm |
| Residue of glue | 24hrs later since attached to glass to room temperature(size 15*50mm) | | Area under 10% |
| Heat resistance | 80℃ | 240hr | Delamination and bubbles |
| Humidity resistance | 60℃ 90% RH | 240hr | Delamination and bubbles |
| Artificial ray resistance | 400W mercury lamp from the height of 30cm | 240hr | Delamination and bubbles |
| Cold resistance | -30℃ | 240hr | Delamination and bubbles |

5.10 Inspection methods：

5.10.1 Thickness

Thickness shall be measured at therr points by using Dial Gauges of 1/1000mm and the average value of 3 points is described as thickness.

5.10.2 Optical performances

5.10.2.1 Single transmittance

Single transmittance is measured by spectro-photometer on every 10nm (400~700nm). And average transmittance is calculated according to JIS Z 8701 (Method of color difinition by X-Y-Z system with view range of 2 degrees.).

In case of AG-type, integrating-sphere shall be used in addition to spectro-photometer.

5.10.2.2 Polarizing efficiency

Polarizing efficiency (V) is calculated by following formula;

$V= \sqrt{(H_0-H_{90})/(H_0+H_{90})}\times 100\%$

$H_0$ ; Parallel transmittance

Two polarizers are settled absorption axis in parallel, and measured like 2-1. as above.

$H_{90}$ ; Crossed transmittance

Two polarizers are settled absorption axis in 90 degrees, and measured like 2-1. as above.

5.10.2.3 Hue

Single transmittance and Crossed transmittance are measured by spectro-photometer on every 10nm (400~700nm).

L-a-b values(unit:NBS) against C-light are calculated according to JIS Z 8730.

5.10.2.4 Performance of UV-barrier

Transmittance at 380nm is measured by the same method as above 2-1.

5.10.2.5 Haze(AG-Type)

Haze is measured according to JIS K 7105.

5.10.3 Hardness of surface (Hard coat type)

Surface hardness is judged whether hard coat layers have been torn or not by pencil scratch.(JIS K 5400).

5.10.4 Scratch resistance (Hard coat type)

Judgment is done visually whether scratches occur or not after scrubbing 10 times by steel wool #0000(with pressure of 400g).

5.10.5 Durability performance：

Polarizer samples are laminated to a glass and treated by autoclave in condition off (50℃，5kg/$cm^2$，20min). After that, left in room temperature for 1hrs. and put into every test conditions.

5.10.6 Appearance：

Appearance inspection will be carried out by eye-sight at distance of 30cm under a fluorescent light with a brightness of 1000Lx above.

5.11 Storage condition, and Guaranteed terms.

5.11.1 Storage condition

Polarizers shall be stored with standard packing.(Aluminum bags sealed.)

5.11.2 Temperature and humidity conditions

Temperature and humidity conditions shall be 20~26℃ and 60~70%RH.

5.11.3 Guaranteed terms

Six months after delivery from Optimax under storage conditions as above.

5.12 Packaging and marks：

5.12.1 Inner Packaging：polarizers are packed with aluminum foils.

5.12.2 Outer Packaging：aluminum foil are packed in a carton box

5.12.3 Mark：Optimax type number, size, quantities, Lot. number and manufacturer name are marked on outer carton box.

5.12.4 Others：Optimax will be responsible for any quality defect caused from packaging.

5.13 Incidental matters：

If there may be any doubt in this specification, discussion shall be held by both parties in order to make settlement.

6.Relvent document：

6.1 JIS Z 8701、JIS Z 8730、JIS K 5400、JIS C2107。

7.Application form：NONE。

8.Enclosed document：

8.1 LL82-12STHC-1 individual specification.

8.2 MIC2-55-18STMA individual specification.

8.3 MIC2-55-18STMB individual specification.

8.4 MIC2-55-18STME individual specification.

8.5 MIC2-55-18STHC-1 individual specification.

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## Individual specifications

Customer：

Product：MIC2-5518STMA

Polarizer color : Neutral



| Check point | | Unit | Specified value |
|---|---|---|---|
| Cut Dimensions | A | mm | a (-5～+10) |
| | B | mm | b(-0～+10) |
| Effective Dimensions | a | mm | 1000 |
| | b | mm | 630 |
| Effective Thickness | | μm | 295±10% |
| Release film Thickness | | μm | 38±10% |
| Cut axis angle | θ 1 | ° | 90± 1.0 |
| Absorption axis angle | θ 2 | ° | ± 2.0 |
| Optical performance | Single transmittance | % | 43.00± 1.00 |
| | Crossed transmittance | % | ≦0.3 |
| | Polarizing efficiency | % | ≧99.80 |
| Single Hue | a | NBS | -1.40± 1.50 |
| | b | NBS | +2.98± 1.50 |
| Haze | | % | mm |
| Hardness of surface | | 500g | |
| Scratch resistance | | | % |
| Curl | | mm | % |
| UV CUT (at 380nm) | | | 有 |
| Semitransparent performance | transmittance | % | ≧40 |
| | reflectance | % | ≧45 |
| Adhesive performance | Peel strength against glass | gf/25mm | 500～2000 |
| | Peel strength of release film | gf/25mm | 4～20 |

| Durability Performance | |
|---|---|
| Grade | General purpose |
| Test condition | Chang of value on single transmittance |
| Heat resistance | ≦3.0% |
| Humidity resistance | ≦3.0% |
| Artificial ray resistance | ≦3.0% |
| Cold resistance | ≦3.0% |
| Total defect acceptable | ≦16/Sheet |

REMARKS :

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## Individual specifications

Customer：

Product：MIC2-5518STMB

Polarizer color : Neutral



| Check point | | Unit | Specified value |
|---|---|---|---|
| Cut Dimensions | A | mm | a (-5～+10) |
| | B | mm | b(-0～+10) |
| Effective Dimensions | a | mm | 1000 |
| | b | mm | 630 |
| Effective Thickness | | μm | 300±10% |
| Release film Thickness | | μm | 38±10% |
| Cut axis angle | θ1 | ° | 90± 1.0 |
| Absorption axis angle | θ2 | ° | ± 2.0 |
| Optical performance | Single transmittance | % | 43.00± 1.00 |
| | Crossed transmittance | % | ≦0.3 |
| | Polarizing efficiency | % | ≧99.80 |
| Single Hue | a | NBS | -1.40± 1.50 |
| | b | NBS | +2.98± 1.50 |
| Curl | | mm | mm |
| UV CUT (at 380nm) | | | 有 |
| Semitransparent performance | transmittance | % | ≧35 |
| | reflectance | % | ≧55 |
| Adhesive performance | Peel strength against glass | gf/25mm | 500～2000 |
| | Peel strength of release film | gf/25mm | 4～20 |

| Durability Performance | |
|---|---|
| Grade | Middle durability type |
| Test condition | Chang of value on single transmittance |
| Heat resistance | ≦3.0% |
| Humidity resistance | ≦3.0% |
| Artificial ray resistance | ≦3.0% |
| Cold resistance | ≦3.0% |
| Total defect acceptable | ≦16/Sheet |

REMARKS :

# OPTIMAX TECHNOLOGY CORPORATION

## Individual specifications

Customer：

Product：MIC2-5518STME

Polarizer color : Neutral



| Check point | | | Unit | Specified value |
|---|---|---|---|---|
| Cut Dimensions | | A | mm | a (-5～+10) |
| | | B | mm | b(-0～+10) |
| Effective Dimensions | | a | mm | 1000 |
| | | b | mm | 500 |
| Effective Thickness | | | μm | 290±10% |
| Release film Thickness | | | μm | 38±10% |
| Cut axis angle | | $\theta$ 1 | ° | 90± 1.0 |
| Absorption axis angle | | $\theta$ 2 | ° | ± 2.0 |
| Optical performance | Single transmittance | | % | 43.00± 1.00 |
| | Crossed transmittance | | % | ≦0.3 |
| | Polarizing efficiency | | % | ≧99.80 |
| Single Hue | | a | NBS | -1.40± 1.50 |
| | | b | NBS | +2.98± 1.50 |
| Curl | | | mm | -50～+50 |
| UV CUT (at 380nm) | | | | 有 |
| Semitransparent performance | transmittance | | % | 35± 3.5 |
| | reflectance | | % | ≧50 |
| Adhesive performance | Peel strength against glass | | gf/25mm | 500～2000 |
| | Peel strength of release film | | gf/25mm | 4～20 |

| Durability Performance | |
|---|---|
| Grade | Middle durability type |
| Test condition | Chang of value on single transmittance |
| Heat resistance | ≦3.0% |
| Humidity resistance | ≦3.0% |
| Artificial ray resistance | ≦3.0% |
| Cold resistance | ≦3.0% |
| Total defect acceptable | ≦13/Sheet |

REMARKS :

# OPTIMAX TECHNOLOGY CORPORATION

## Individual specifications

Customer：

Product：MIC2-5518STHC-1

Polarizer color : Neutral



| Check point | | | Unit | Specified value |
|---|---|---|---|---|
| Cut Dimensions | | A | mm | a (-5～+10) |
| | | B | mm | b(-0～+10) |
| Effective Dimensions | | a | mm | 1000 |
| | | b | mm | 500 |
| Effective Thickness | | | μm | 290±10% |
| Release film Thickness | | | μm | 38±10% |
| Cut axis angle | | $\theta$ 1 | ° | 90± 1.0 |
| Absorption axis angle | | $\theta$ 2 | ° | ± 2.0 |
| Optical performance | Single transmittance | | % | 43.00± 1.00 |
| | Crossed transmittance | | % | ≦0.3 |
| | Polarizing efficiency | | % | ≧99.80 |
| Single Hue | | a | NBS | -1.40± 1.50 |
| | | b | NBS | +2.98± 1.50 |
| Curl | | | mm | mm |
| UV CUT (at 380nm) | | | | 有 |
| Semitransparent performance | transmittance | | % | 20± 3.5 |
| | reflectance | | % | ≧60 |
| Adhesive performance | Peel strength against glass | | gf/25mm | 500～2000 |
| | Peel strength of release film | | gf/25mm | 4～20 |

| Durability Performance | |
|---|---|
| Grade | Middle durability type |
| Test condition | Chang of value on single transmittance |
| Heat resistance | ≦3.0% |
| Humidity resistance | ≦3.0% |
| Artificial ray resistance | ≦3.0% |
| Cold resistance | ≦3.0% |
| Total defect acceptable | ≦13/Sheet |

REMARKS :