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Classification No. PF-OCN-01-01



SPECIFICATION OF POLARIZER
FOR USE OF LCDS

Description: EHC-125R 40RU

Customer: Messrs. Ocular China Co., Ltd.

Approval Signature
Date: , 2010

Manufacturer: Polatechno Co., Ltd.

Approval Signature
Date: Jun. 9, 2010

Approved by	M. Yoshikawa
Checked by	T. Nakajima
Checked by	C. Miyamoto
Drawn by	K. Fukuchi

配付枚: 海外×1

1. SCOPE

This specification is applicable for the polarizer produced by Polatechno Co., Ltd. and the product is delivered to Messrs. Ocular China Co., Ltd.

2. CONTROL OF SPECIFICATIONS

Messrs. Ocular China Co., Ltd. and Polatechno Co., Ltd. will each keep a copy of the Specification. Both parties shall check and verify the contents.

3. CONSTRUCTION

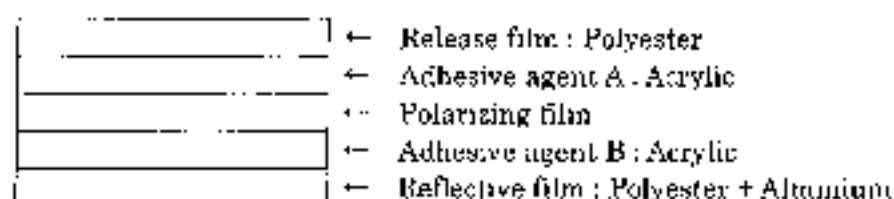


Figure 1 Cross-section view

4. DIMENSION, AXIS ANGLE, THICKNESS

Dimension, axis angle and thickness are each stated as standard value in the Table 3.

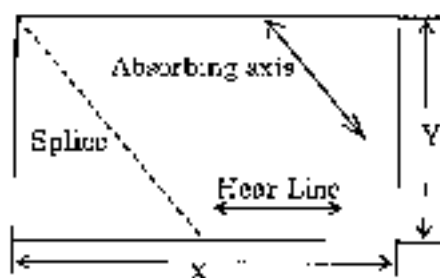


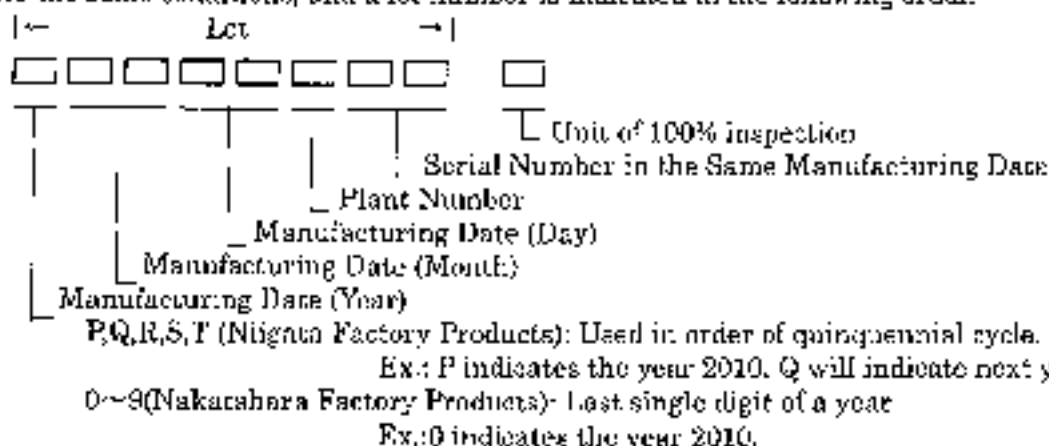
Figure 2 Plain view (with adhesive side up)

5. QUALITY STANDARD

Inspection shall be conducted in accordance with the Table 1, and each standard value in the Table 3 shall be satisfied.

6. DEFINITION OF LOT

One lot is defined as a unit of products manufactured continuously from the same materials under the same conditions, and a lot number is indicated in the following order.



7. INSPECTION ITEMS AND INSPECTION METHODS

Table 1 Inspection items and inspection methods

Items	Inspection Method No.	Process Inspection	Shipping Inspection
Dimension	8.1	—	Sampling inspection (by lot), n=3, c=0
Thickness	8.2	—	—
Axis Angle	8.3	At the first delivery, at the process change	
Optical Characteristics	8.4	—	Sampling inspection (by lot), n=3, c=0
Durability	8.5	At the first delivery, at the process change	
Shipping Inspection	8.5	—	Sampling inspection (by lot), n=3, c=0
Peel Strength	8.6	—	—
Curling	8.7	—	—
Appearance	8.8	100% inspection	—

8. INSPECTION METHOD

8.1 Dimension

Linear dimension shall be measured using a metal ruler with 1mm minimum scale value.

8.2 Thickness

Thickness shall be measured using a micrometer with 1/1000mm minimum scale value.

8.2.1 Effective layer thickness

Sample of polarizer shall be measured without protective film(t₂), then release film shall be peeled off and measured(t₁).

Effective layer thickness must be calculated using the following equation:

$$\text{Effective layer thickness} = (t_2) - (t_1)$$

8.2.2 Thickness of adhesive layer A

Sample of polarizer shall be measured with release film(t_2), then release film shall be peeled off and the adhesive A shall be wiped off. Release film shall be put back to the polarizer, and measured(t_3). Thickness of adhesive layer A must be calculated using the following equation:

$$\text{Thickness of adhesive layer A} = (t_2) - (t_3)$$

8.2.3 Thickness of adhesive layer B

Release film shall be peeled off and sample of polarizer shall be measured in a condition that adhesive layer A is already measured(t_4). Then reflective film shall be peeled off and the adhesive B shall be wiped off. Then polarizer thickness(t_5) and reflective film thickness(t_6) shall be measured. Thickness of adhesive layer B must be calculated using the following equation:

$$\text{Thickness of adhesive layer B} = (t_4) - (t_5) - (t_6)$$

8.3 Axis angle

A protractor with the minimum scale of 1° shall be used to measure the angle of absorption axis from the long side.

8.4 Optical characteristics

Square 40×45mm at absorbing axis angle of 45 degree shall be cut from uncoated polarizer for a sample, then it must be measured by spectrophotometer (light source: C-light source, wavelength range: 390~700nm) and calculated based on JIS Z 8719.

8.4.1 Single polarizer transmittance, LV transmittance (380nm)

A piece of the sample cut at 8.4 will be measured.

8.4.2 Crossed polarizer transmittance

A piece of polarizer shall be put to the sample measured at 8.4.1 as absorbing axis are crossed, and measured.

8.4.3 Parallel polarizer transmittance

2 pieces of polarizers must be put as absorbing axis are parallel, and measured.

8.4.4 Polarizer efficiency

Crossed polarizer transmittance(Y_c) and parallel polarizer transmittance(Y_p) are measured, then calculated using the following equation:

$$\text{Efficiency(\%)} = \sqrt{(Y_p - Y_c) / (Y_p + Y_c)} \times 100$$

8.4.5 Hue

It is referred to as $L^*a^*b^*$ (L,a,b) based on JIS Z 8701 and JIS Z 8729.

8.4.6 Product reflectance

Square 40×45mm at absorbing axis angle of 45 degree shall be cut for a sample and laminated to a glass which is cleaned-up by alcohol and completely dried. The sample must be measured by spectrophotometer with integrating-sphere, and calculated based on JIS Z 8719.

8.5 Durability (shipping inspection)

Square 20×50mm at absorbing axis angle of 45 degree shall be cut for a sample and laminated to a glass which is cleaned-up by alcohol and completely dried. Pressure-heat treatment with a specification of 0.49MPa×50~60°C×15min must be performed to the sample and then the sample must be left for 24 hours. After protective film shall be peeled off, visual inspection should be conducted before inspection. If defects are found, those shall be marked by felt tip pen, then the sample shall be preheated for 5 minutes at about 10°C hotter than preset inspecting temperature(dry) of the humidity cabinet in which the sample will be placed next.

See Table 3 for inspection items.

8.6 Peel-strength

Square 25×240mm is cut for a sample.

8.6.1 Peel strength of release film

100mm of release film edge are peeled off first, then the polarizer is put in lower clamp and release film in upper clamp of load-cell typed anti-elongation-strength tester (peeling device) and be measured at speed of 500mm/m and angle of 180 degree. The top of curb chart is defined as average value of the peel strength.

8.6.2 Peel adhesion to a glass plate

A sample should be laminated to a glass which is cleaned-up with alcohol and completely dried using laminator. Pressure-heat treatment with a specification of 0.45Mpa×50~60℃×15min must be performed to the sample, and then the sample must be left for 24 hours. Bell type jig is installed in load cell typed anti-elongation-strength tester(peeling device), then the sample be measured at speed of 200mm/m and angle of 90degree. The top of curb chart is defined as average value of peel adhesion.

9.7 Curling

Polarizer should be upsweptly laid on a horizontal glass plate as shown in Figure 3, and measured the highest point of the edge using a metal ruler with 1mm minimum scale value. "+" indicates that the adhesive is the under side of the polarizer which is laid upsweptly, and "-" indicates, vice versa, the upper side.

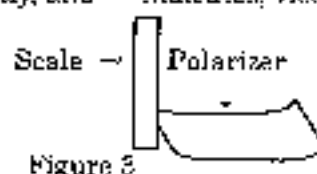


Figure 3

8.8 Appearance inspection

Table 2 Cosmetic inspection standard

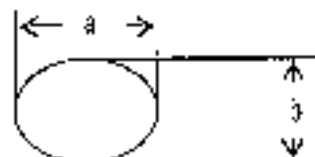
Defects	Tolerance limit	Remarks
1. Bubble, Foreign substance	Average diameter: $\leq 0.15\text{mm}$	Dust removed with release film is not considered as defect.
2. Grain, Dent, Crater	Average diameter: $\leq 0.8\text{mm}$	
3. Kunick, roughness	Minor	Boundary sample might be set if necessary
4. Streak	Minor	
5. Scratch	Width: $\leq 0.03\text{mm}$ Length: $\leq 10\text{mm}$	
6. Abrasion of protective and release film, Stain	No effects on a polarizer	Abrasion and Stain removed with release film is not considered as defect
7. Tunneling	No defects allowed	

-Calculation of counting defects

Dotted defects: Defects greater than the tolerance limits of 1,2,3 in the Table 2 shall be counted.

Average diameter is calculated using the following equation:

$$\text{Average diameter} = (a+b)/2$$



Linear defects: Defects greater than tolerance limits of 4,5 in the Table2 shall be counted. Each 1cm of defect is counted as 1 defect

Planar defects: Defects of 6 in the Table 2 shall be counted. Each 1cm² of defect is counted as 1 defect

Total number of defects: Number of defects (3-5mm in diameter of marking on released film) greater than tolerance limits of the Table 2 shall be totalized. Specification for number of defects is defined by each product item.

9. REPORTING INSPECTION RESULTS

A name of product, lot, quantity, appearance, peel-strength, adhesion, durability(shipping inspection) and optical characteristics shall be entered in inspection sheet, and in principle, a single copy of an inspection sheet shall be attached to every shipment.

10. PACKING AND LABELLING

- | | | |
|------|---------------|--|
| 10.1 | Inner package | A quantity of products packed in 1 aluminum bag : 10 sheets
Products should be packaged in containers and taped |
| 10.2 | Outer package | A quantity of containers packed in 1 carton box: 5 containers
A quantity of products packed in 1 carton box: 50 sheets |
| 10.3 | Label | Both inner and outer packages should be identified with a label indicating a name of product, size, quantity, lot number and the name of Polatechno.
To attach the Green Label next to product label on package box.
(Inner and outer package boxes for exports) |

11. GUARANTEE PERIOD

If a sealed product is stored in a condition of room temperature 15~25°C and room humidity 50~80%, it is guaranteed for 6 months after delivery

12. DELIVERY

Delivery destination, delivery method, delivery date are separately determined.

1.3. HANDLING

Due to the nature of polarizer which is soft, easily affected by temperature and humidity, easily cracked, and easily shows dirt, products should be carefully handled as follows:

- 13.1 Sealed and stored in a condition of 15~25°C and 50~80%RH.
- 13.2 Not be stored as many sheets are piled up.
- 13.3 Not be bent acutely.
- 13.4 Refrain from shocks such as wiping firmly and hitting.
- 13.5 Do not apply a point pressure to a polarizer such as using pen tip.
- 13.6 Do not touch with bare hands, or not be salivated.
- 13.7 Avoid wet cleaning and immersing in water.
- 13.8 Cleaner shall be tested before using it in order to avoid a case that wiped-marks are left on a product by wiping with solvent.

1.4. SUPPLEMENTARY ITEM

- 14.1 Changes to conditions of important items such as material, manufacturing process will be approved by both parties prior to being implemented.
- 14.2 Any questions relating to the contents of this Specification, or to matters not stipulated herein, both parties shall discuss and redetermine.
- 14.3 Any disputes over industrial property rights relating to polarizer between the parties and a third party shall be settled by Polatechno under its company's liability.
- 14.4 Polarizer shall be disposed as industrial waste.
- 14.5 This Specification shall be effective as temporary specification from the submitted date.
- 14.6 This Specification shall be approved and effective as formal Specification if any objections are not raised after the lapse of 2 months after we sent it out.

Table 3 : SPECIFICATION

Item		Unit	NHC-125R 45RU
Dimension	Width(Y) × Length(X)	mm	620 ⁺³⁰ ₋₀ × 884 ⁺³⁰
	Absorbing axis θ	"	35.0 ± 2.0
Thickness	Polarizing film	μm	190 ± 20
	Reflective film		68 ± 7
	Adhesive A B		25 ± 5
			25 ± 5
	Effective part Release film		305 ± 30
38 ± 4			
Optical characteristics			
Original polarizer			
Single transmittance (Ys)		%	40.0 ± 2.0
	Polarizing efficiency (Py)		More than 99.5
Hue	L*(L)		69.3 ± 2.0 (68.0 ± 2.0)
	a*(a)		-1.1 ± 2.0 (-1.0 ± 2.0)
	b*(b)		4.1 ± 2.0 (3.5 ± 2.0)
Reflectance of product (Yr)		%	30.0 ± 3.0
Durability			
Heat resistance (105°C × 500h)			Deterioration of Reflectance(ΔYr) shall be ±7points (Heat resistance), ±5points (others) from initial value. No bubble, delamination, and corrosion shall be generated.
Humidity resistance(80°C × 90%RH × 500h)			
Cold resistance(-40°C × 1000h)			
Shipping inspection	105°C × 48h		No visible bubble and delamination shall be generated.
	80°C × 90%RH × 48h		
Peel strength			
Adhesive force to detach from glass plate	N/25mm		More than 3.00
Force required to detach release film	N/25mm		Less than 0.50
Curving	mm		0 ± 30
Total number of defects	N/sheet		MAX=12
Remarks			
*There will be one or two splices per sheet.			