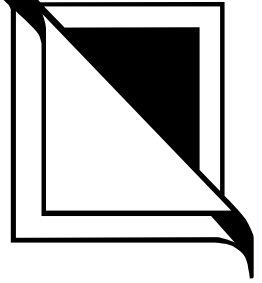


OptiGrafix™

Circular Polarizer Films

Winter 2006



For high performance suppression of internal reflection from external ambient light, OptiGrafix Circular Polarizer Films are the answer!

OptiGrafix Circular Polarizer Films (CPF) are a combination of Linear Polarizer and our QW or QWEP quarter wave retardation films. Our CPF are used to improve display visibility through contrast enhancement and glare reduction. Allowing a range of different type of displays to be used in bright ambient light settings. OptiGrafix CPF is ideal for improving the viewability for Liquid Crystal, Electro Luminescent, Plasma, Field Emissive Displays, Cathode Ray Tubes and Light Emitting Diode display technologies.

Grafix Plastics is a manufacturer of high quality quarter wave retarder film. We do not manufacture linear polarizer. Our CPFs are produced by laminating our retarder film to other manufacturers' linear polarizer. Therefore Grafix Plastics can offer a range of products and services related to circular polarizers:

Product Features

- ⇒ Commercially Available
- ⇒ Meets or Exceeds HNCP37
- ⇒ High Double Pass Extinction
- ⇒ Uniform Retarder Layer
- ⇒ Variety of Configurations
- ⇒ Panels Kept In Stock
- ⇒ Minimal Hard Defect Count

See inside for more details!

Important Notice: Grafix makes no warranties, express or implied, including but not limited to any implied warranty of merchantability of fitness for a particular purpose. The user is responsible for determining whether the Grafix product is fit for a particular purpose and suitable for the user's method of application. Please remember that many factors can affect the use and performance of an OptiGrafix optical film product in a particular application. Given the variety of factors that can affect the use and performance of a Grafix product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the Grafix product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

Limitation of Remedies and Liability: If the Grafix product is proven to be defective, THE EXCLUSIVE REMEDY, AT GRAFIX'S OPTION, SHALL BE TO REFUND THE PURCHASE PRICE OF OR TO REPAIR OR REPLACE THE DEFECTIVE GRAFIX PRODUCT. Grafix shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including, but not limited to, contract, negligence, warranty or strict liability.

GRAFIX® Plastics

A Division of GRAFIX, Inc.

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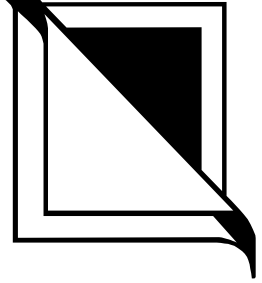
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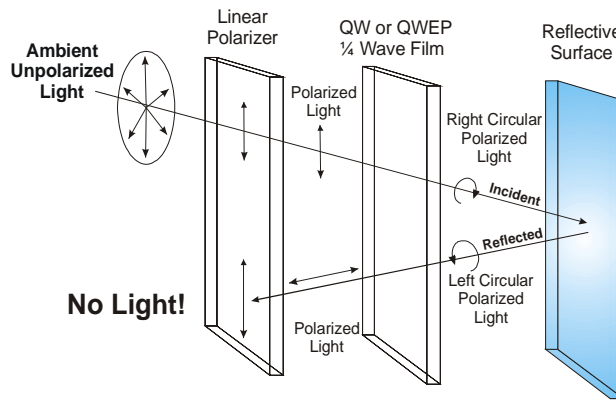
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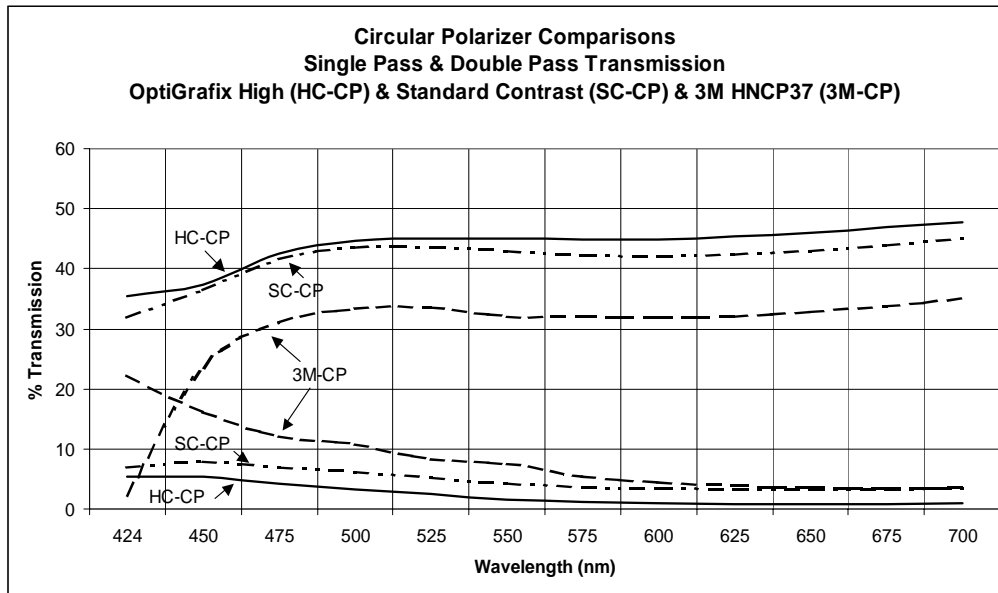


How Circular Polarizer Film Works

Improved viewing and contrast is achieved through the CPF cancelling out bright ambient light that is reflected off the surface of the display. The CPF achieves this effect through its multilayer construction. Bright unpolarized ambient light passes through the linear polarizer layer, thus turning into horizontal oriented light. As this light passes through the quarter wave layer, it becomes circularly polarized, spinning into the display surface. As the light is reflected off the surface of the display it is now spinning in the opposite direction. This reverse spinning light becomes linearly polarized again but its orientation is now 90 degrees different than the transmission axis of the linear polarizer. Because of its orientation the linear polarizer absorbs this reflected light, and cancels it out so it is not observed by the view.



Comparative Performance Curves



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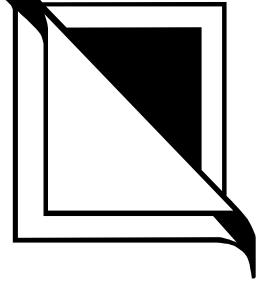
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Circular Polarizer Films

Product Configuration Options



Standard Contrast Circular Polarizer - Options			
Orientation - Retarder Layer			
Left Hand			
Right Hand			
Orientation - Absorbtion Axis			
Horizontal			
45 Degrees			
Finish Options	Thicknesses Available		Note:
Gloss/Gloss	.011"/275um	.013"/325um	Stock Item
Gloss/PSA	.012"/300um	.014"/350um	Stock Item
Anti-Glare/Gloss	.015"/375um		Custum
Anti-Glare/PSA	.016"/400um		Custum
Anti-Reflective/Gloss	.015"/375um		Custum
Anti-Reflective/PSA	.016"/400um		Custum
AR & AG/Gloss	.015"/375um		In Development
AR & AG/PSA	.016"/400um		In Development

High Contrast Circular Polarizer Options			
Orientation - Retarder Layer			
Left Hand			
Right Hand			
Orientation - Absorbtion Axis			
Horizontal			
45 Degrees			
Finish Options	Thicknesses Available		Note:
Gloss/Gloss	.011"/275um	.013"/325um	Stock Item
Gloss/PSA	.012"/300um	.014"/350um	Stock Item
Anti-Glare/Gloss	.011"/275um	.013"/325um	Stock Item
Anti-Glare/PSA	.012"/300um	.014"/350um	Stock Item
Anti-Reflective/Gloss	.015"/375um		Custum
Anti-Reflective/PSA	.016"/400um		Custum
AR & AG/Gloss	.015"/375um		In Development
AR & AG/PSA	.016"/400um		In Development

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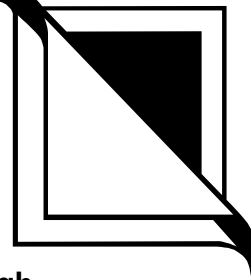


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Product Technical Specifications

Winter 2006



	Unit	Standard Contrast Value	High Contrast Value
Optical Properties			
Single Pass Transmission @ 560nm	%	0.37	0.42
Double Pass Transmission @ 560nm	%	< 5%	< 5%
Hue - L		66 +/- 5	64 +/- 2
Hue - a		-0.55 +/- 2	- 1.97 +/- 2
Hue - b		-1.45 +/- 2.5	3 +/- 2
Retardation Layer	nm	138nm +/- 5	138nm +/- 5
Durability			
Heat Resistance - Dry @ 240 Hrs	C	70	70
Cold Resistance - Dry @ 240 Hrs	C	-20	-20
Humidity (40C @ 90RH, 240 Hrs)		No Change	No Change
Light Safe - 400W Mercury Lamp - 240 Hrs		No Change	No Change

Defect Specification

Defect Description	Specification	Limit	Method
Stains	Dia. < .3mm	Ignore	Eye Loop
Foreign Object (Width x 600mm)/2	Dia. < .2mm	Ignore	Eye Loop
	Dia. .2-.3mm	3 defects	Eye Loop
	Dia. > .6mm	1 defect	Eye Loop
Scratch	W <.05mm, L < 5mm	Ignore	Eye Loop
	W <.05mm, L 5-15mm	3 defects	Eye Loop
	W >.05mm, L < 15mm	Not allowed	Eye Loop
Dimples, Pimples or Digs	None allowed that causes deformation or distortions		
Creases		Not allowed	Visual
Chatter		Not allowed	Visual
Flow Lines		Not allowed	Visual
Gauges Bands	< +/- 10% of Thickness	Reject > 10%	Micrometer

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