



DuPont Electronic Materials

Flexible Circuit Materials

# Pyralux® PC 1000

FlexibleComposites

## Flexible Photoimageable Coverlay

### Description

Pyralux PC photoimageable coverlay is a flexible, dry film solder mask used to encapsulate flexible printed circuitry. Pyralux PC consists of a specially developed combination of acrylic, urethane, and imide-based material to achieve an excellent balance of properties including:

- Bend and crease performance
- Robust chemical resistance
- Excellent solder resistance

These properties, combined with the ability to photoimage the film, enable designers, fabricators, and assemblers to achieve higher resolution circuitry and surface-mount assembly in many applications such as cameras and automotive circuitry.

### Product Constructions

Pyralux PC is available in the standard constructions as listed in **Table 1**.

**Table 1**  
**Pyralux PC Standard Product Constructions**

Product Code	PC Thickness, µm (mils)	
PC1010	25	(1.0)
PC1015	38	(1.5)
PC1020	51	(2.0)
PC1025	64	(2.5)

### Properties

Pyralux PC has exceptional flexibility. This flexibility is maintained throughout typical assembly processes as well as after exposure to environmental extremes such as thermal shock and high temperature and humidity. Typical results are:

#### MIT Folding Flex Test

	MD	TD
R = 0.38 mm	100	110
R = 1.0 mm	650	750

#### Flexural Endurance Test

(50 µm film over 35 µm features)

R = 3.0 mm	175,000 cycles
R = 4.5 mm	425,000 cycles
R = 6.0 mm	1,250,000 cycles

Pyralux PC dry film coverlay is capable of resolving fine openings and features, such as solder dams, and also has the ability to tent over plated through-holes:

- Resolution (50 µm film)

	200 mj	300 mj	400mj
Line & Space, µm	90	90	90
Isolated Line, µm	90	75	50

- Tenting — Reliably tents via holes up to 0.75 mm in diameter

Note: Tents Survive IPC Class III Thermal Shock

Pyrалux® PC film provides excellent electrical and environmental protection of underlying circuitry, typically providing 18 µm of film coverage over 35 µm thick traces using 50 µm thick film (PC1020). Detailed physical and electrical properties of Pyralux PC are listed in **Table 2**. All listed properties were tested to the IPC-SM-840B Class III requirements unless otherwise specified.

## Processing

Pyrалux PC is a dry film and is applied to flexible printed circuitry using vacuum lamination. Choice of specific product construction depends on the thickness required to fully encapsulate the copper circuitry (e.g., thicker copper traces require thicker Pyralux PC coverlay). Actual performance often depends on the combination of lamination technique and the selected product construction. General selection guidelines listed in **Table 3**.

**Table 2**  
**Typical Pyralux PC Properties**

Property	Typical Result	Test Method
Visual	Pass	4.8.1
Adhesion	Pass	4.8.4.1
Tape Test	Pass	4.8.4.2
Machinability	Pass	4.8.1.2
Taber Abrasion	Pass (>50 cycles)	4.8.3.1
Pencil Hardness	3H	—
Solvents & Flux	Pass	4.8.6
Solderability	Pass	4.8.9.1
Solder Rework	Pass	20 sec. at 360°C
Resistance to Solder	Pass	4.8.9.2
Hydrolytic Stability	Pass (28-day test)	4.8.7
Dielectric Strength	Pass (2000 V/mil)	4.8.10.1
Insulation Resistance	Pass (>1 x 10 <sup>12</sup> )	4.8.10.2.1
M & IR	Pass (>1 x 10 <sup>9</sup> )	4.8.10.3.1
Electromigration	Pass (none)	4.8.10.4.1
Thermal Shock I	Pass—No Cracks/Delam.	100 cycles -65 to +125°C
Thermal Shock II	Pass—No Cracks/Delam.	1000 cycles -40 to +125°C
Surface Resistivity	3.2 x 10 <sup>16</sup> ohm	ASTM D-257
Volume Resistivity	3.4 x 10 <sup>16</sup> ohm-cm	ASTM D-257
Dielectric Constant	3.5–3.6 at 1 MHz	ASTM D-150
Aged Flexibility	Pass	250 hr at 85% RH/85°C
Thermal Conductivity	0.2 Watts/M °C	—
Elongation	>55%	—
Tg	45°C	—
CTE < Tg	130 ppm/°C	—
CTE > Tg	200 ppm/°C	—

**Table 3**  
**Pyralux® PC Product Construction**  
**Selection Recommendations**

Product Code	Thickness,		Circuit Heights,	
	μm	(mils)	μm	(mils)
PC1010	25	(1.0)	<18	(0.7)
PC1015	38	(1.5)	<25	(1.0)
PC1020	51	(2.0)	<35	(1.4)
PC1025	64	(2.5)	<70	(2.8)

The film can be used as a solder mask by patterning openings using conventional printed circuit exposure and development processes. Pyralux PC is a negative-working, aqueous processable resist. Its optimal exposure range is 350–450 nm. Unexposed areas can be developed off in a mild caustic solution. Following exposure and development, Pyralux PC can be thermally cured to achieve its ultimate end-use properties. Please contact your DuPont Technical Representative for further processing details.

## Packaging

Pyralux PC is available on 400 ft long rolls in widths ranging from 6–24 in by 1/8-in increments. The material is supplied on 6 in diameter cores. All packaging material is 100% recyclable. Contact your DuPont technical representative for non-standard sizes or special packaging.

## General Information

### *Quality and Traceability*

Pyralux PC photoimageable coverlay is manufactured under a quality system registered to ISO 9002 by Underwriters Laboratories. Complete material and manufacturing records, which include archive samples of finished product, are maintained by DuPont. Each lot is identified for reference and traceability. The packaging label serves as the primary tracking mechanism in the event of customer inquiry and includes the product name, batch number, size, and quantity.

### *Storage Conditions and Shelf Life*

It is recommended that Pyralux PC be stored at 4–10°C (40–50°F) and <70% relative humidity. This will minimize the potential for film edge fusion. Pyralux PC will retain its original properties for a minimum of six months from the date of manufacture if stored in its original packaging at the recommended conditions.

### *Safe Handling*

Handling precautions for Pyralux PC film are similar to those for other DuPont photopolymer films. Pyralux PC contains acrylate monomers, which historically have been shown to have the potential to cause health effects with some individuals. The most common effects are respiratory irritation, skin irritation (dermatitis), and skin sensitization. Proper exhaust and adequate personal protective equipment are essential. Please refer to technical information bulletin “Handling Procedures for DuPont Photopolymer Films” (H-43328) for detailed information.

In addition, because Pyralux PC receives a separate thermal curing step not normally required with many other photopolymer films, extra care must be taken to prevent contact with the vapors that evolve during this process step. It is essential that the oven be set up to ensure adequate exhaust and that the boards be completely cured and partially cooled prior to their removal from the oven. Please refer to the Pyralux PC Material Safety Data Sheet and to the technical information bulletin “Handling and Safety Considerations for the Pyralux PC Curing Process” (H-46862) for additional information and specific recommendations.

---

DuPont Electronic Materials · 14 T.W. Alexander Drive · Research Triangle Park, NC 27709-4425

(800) 243-2143, Ext. 3637

Come visit us on the Internet at: <http://www.dupont.com/fcm>

---

The information given herein is based on data believed to be reliable, but the DuPont Company makes no warranties express or implied as to its accuracy and assumes no liability arising out of its use by others. This publication is not to be taken as a license to operate under, or recommendation to infringe, any patent.

**Caution:** Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

Copyright © 2000 E. I. du Pont de Nemours and Company. All rights reserved.



DuPont Electronic Materials