

DuPont™ Pyralux® PC 1000

flexible circuit materials

Technical Data Sheet

Description

DuPont™ Pyralux® PC 1000 flexible circuit materials is a photoimageable coverlay and a flexible, dry film solder mask used to encapsulate flexible printed circuitry. DuPont™ Pyralux® PC flexible circuit materials 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

DuPont™ Pyralux® PC flexible circuit materials is available in the standard constructions as listed in **Table 1**.

Table 1
DuPont™ 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

DuPont™ Pyralux® PC flexible circuit materials 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

DuPont™ Pyralux® PC flexible circuit materials 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	400 mj
Line & Space, µm	90	90	90
Isolated Line, µm	90	75	90
- Tenting—Reliably tents via holes up to 0.75 mm in diameter

Note: Tents survive IPC class III Thermal Shock



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DuPont™ Pyralux® PC flexible circuit materials 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 DuPont™ Pyralux® PC flexible circuit materials are listed in **Table 2**. All listed properties were tested to the IPC-SM-840B Class III requirements unless otherwise specified.

Processing

DuPont™ Pyralux® PC flexible circuit materials 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 DuPont™ 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 ¹²)	4.8.10.2.1
M & IR	Pass (>1 x 10 ⁹)	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 ¹⁶ ohm	ASTM D-257
Volume Resistivity	3.4 x 10 ¹⁶ 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
DuPont™ 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

ally 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 DuPont™ Pyralux® PC flexible circuit materials 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.

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

Packaging

DuPont™ Pyralux® PC flexible circuit materials 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.

Quality and Traceability

DuPont™ Pyralux® PC flexible circuit materials 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 DuPont™ Pyralux® PC flexible circuit materials be stored at 4–10°C (40–50°F) and <70% relative humidity. This will minimize the potential for film edge fusion. DuPont™ Pyralux® PC flexible circuit materials 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 DuPont™ Pyralux® PC flexible circuit materials are similar to those for other DuPont photopolymer films. DuPont™ Pyralux® PC flexible circuit materials contain 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 DuPont™ Pyralux® PC flexible circuit materials receive a separate thermal curing step not nor-

For more information on DuPont™ Pyralux® flexible circuit materials, please contact your local representative, or visit our website:

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