

# DuPont™ Pyralux® FR Sheet Adhesive

## Flexible Composites

### Description

Pyralux® FR sheet adhesive is a proprietary, flame-retardant, B-staged modified acrylic adhesive. Sheet adhesive is used primarily to bond flexible inner layers of multilayers, as well as to bond stiffeners and heat sinks to flexible circuits and rigid boards.

### Construction

Pyralux® FR sheet adhesive is coated on release paper and is available in a variety of adhesive thicknesses; see Table 1.

The product code must be used when ordering sheet adhesive from DuPont.

### Packaging

Sheet adhesive is supplied on 24 in (610 mm) wide by 250 ft (76 m) long rolls, on nominal 3 in (76 mm) cores. Narrower widths or cut sheets are also available by special order.

### Typical Data

Each manufactured lot of sheet adhesive is certified to IPC specifications and tested according to IPC Test Method TM-650. See Table 2.

A Certificate of Conformance is available with every batch. Complete material and manufacturing records for each lot, with samples of finished product, are retained for reference purpose. The roll labels contain the lot number, DuPont order number, customer order number, IPC specification, customer specification, and customer part number; save these labels for reference in case of inquiries.

Table 1  
Sheet Adhesive Product Codes

Product Code	Adhesive mil (µm)	IPC Certification*
FR0100	1 (25)	Yes
FR0200	2 (51)	Yes
FR0300	3 (76)	Yes
FR0400	4 (102)	Yes
FR1500	1/2 (13)	Yes
FR1700	.7 (18)	Yes

\* Certified to IPC-4203/18: "Adhesive Coated Dielectric Films for Use as Cover Sheets for Flexible Printed Circuits and Flexible Adhesive Bonding Film"

Exception: The DuPont flow requirement per IPC-TM-650, Method 2.3.17.1 is 10.0 mils/mil of adhesive thickness.

Table 2  
Pyralux® FR Sheet Adhesive Properties

Property	Typical Sheet Adhesive Value	Test Method
Flammability*	VTM-0	UL94
Peel Strength†	—	IPC-TM-650, No. 2.4.9
After lamination	1.6 N/mm (9 lb/in)	Method B
After soldering	1.6 N/mm (9 lb/in)	Method D
Solder Float Resistance		IPC-TM-650, No. 2.4.13
10 sec at 288°C (550°F)	Pass	Method B
Adhesive Flow, µm/µm (mil/mil)	4.0	IPC-TM-650, No. 2.3.17.1
Thickness Tolerance	±10%	IPC-TM-650, No. 4.6.2
Dielectric Constant (at 1 MHz)	3.5	IPC-TM-650, No. 2.5.5.3
Dissipation Factor (at 1 MHz)	0.02	IPC-TM-650, No. 2.5.5.3
Dielectric Strength	118 kV/mm (3000 V/mil)	ASTM D-149
Insulation Resistance (at ambient)	10 <sup>6</sup> megohms	IPC-TM-650, No. 2.6.3.2
Volume Resistivity (at ambient)	10 <sup>9</sup> megohm-cm	ASTM D-257
Surface Resistance (at ambient)	10 <sup>7</sup> megohms	ASTM D-257

\* Pyralux® FR0200 and FR0300 meet UL 94 VTM-0 criteria.

† Laminating Conditions: 14 kg/cm<sup>2</sup> (200 psi), 182°C (360°F), 1 hour to treated side of 1 oz RA copper foil.

The values in Table 2 represent a typical 1 oz. RA copper foil, 1 mil adhesive and 1 mil Kapton® construction.

## Processing

Laminating conditions for Pyralux® flexible composites are typically in the following ranges:

Part Temperature: 182–199°C (360–390°F)  
Pressure: 14–28 kg/cm<sup>2</sup> (200–400 psi)  
Time: 1–2 hours, at temperature

Pyralux® FR can be processed like Pyralux® LF. Refer to publication "Pyralux® Flexible Composites Technical Manual" for further processing details.

## Storage

Pyralux® flexible composites will retain their original properties for a minimum of one year when stored in the original packaging at temperatures of 4–29°C (40–85°F) and below 70% humidity. The products do not need refrigeration and should not be frozen. Keep the material clean and well protected.

Sheet adhesive should not be automatically discarded if storage conditions have deviated from these limits. We recommend that material which has been stored outside these conditions be examined in a practical test run before being committed to production.

## Safe Handling

Pyralux® FR coverlay, sheet adhesive, and bond ply contain a B-staged adhesive. Since B-staged adhesive contains trace quantities (parts per million) of unreacted monomers, operators should take care to minimize contact.

Pyralux® FR copper-clad laminates contain fully cured (C-staged) adhesive.

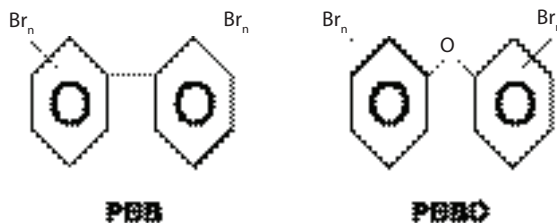
Although DuPont is not aware of anyone developing contact dermatitis when using Pyralux® FR products, some individuals may be more sensitive than others. Anyone handling Pyralux® FR copper-clad laminates should wash their hands with soap before eating, smoking, or using restroom facilities. Gloves, finger cots, and finger pads should be changed daily. Clothes should be washed frequently.

The unreacted acrylic monomer in the adhesive may impart a mild odor when the release film or paper is removed. We recommend that areas where B-staged materials are used, as well as lay-up and lamination areas, be well ventilated with a fresh air supply.

Pyralux® adhesive is cured during lamination. The curing reaction does not produce any vapors, although impurities may volatilize. When drilling or routing parts made with Pyralux® FR flexible composites, provide adequate vacuum around the drill head to minimize worker exposure to adhesive dust.

Thin copper-clad laminates can have sharp metal edges. People handling these materials should be cautioned and provided with suitable gloves to prevent cuts.

Pyralux® FR flexible composites DO NOT contain polybrominated biphenyls (PBBs), polybrominated biphenyl oxides (PBBOs), or polybrominated diphenyl ethers (PBDEs).



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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>

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