

# Tempalux® Film

(polyetherimide)

Tempalux offers high heat resistance coupled with high strength, stiffness, UV stability and broad chemical resistance. The combination of outstanding thermal, mechanical and electrical properties together with exceptional flame resistance and thermoformability, provide unprecedented performance for a wide variety of demanding new design concepts.

The following physical property information is based on typical values of the base Ultem® 1000 resin as well as test results obtained from actual film testing.



	Units	ASTM Test	Result
<b>Mechanical</b>			
Tensile Strength @yield	psi	D882	14,200
Elongation @break	%	D882	52
Tensile Modulus	psi	D882	475,000
Flexural Modulus	psi	D790	480,000
Tear Strength - prop.	g/mil	D1004	381
<b>Thermal</b>			
Continuous Use Temp.-UL	°F	—	338
Heat Deflection Temperature @264 psi	°F	D648	394
Melt Temp.-DSC	°F	—	—
Glass Transition Temp.	°F	D3418	420
<b>Flammability</b>			
UL Rating-UL94	—	—	VTM-0
L.O.I.	%	D2863	27
NBS Smoke	Dmax	E662	6
<b>Electrical</b>			
Surface Resistivity	Ohms	D257	>10 <sup>16</sup>
Dielectric Strength @.003"	V/mil	D149	3,050
Dielectric Constant	1 KHz	D150	3.15
Dissipation Factor	1 KHz	D150	0.0013
<b>Other</b>			
Specific Gravity	—	D792	1.27
Water Absorption	%/24 hr.	D570	0.25
Refractive Index	—	—	1.658
Haze	%	D1003	—
Area Factor	in <sup>2</sup> /lb/mil	—	21,888

**Applications Include:**

- Flex circuits
- High temperature labels
- Electrical insulation
- IC sockets
- Automotive sensors
- Electronic insulation
- Hot melt adhesives

**Advantages of Tempalux Film:**

- High heat deflection and continuous use temperature
- Inherent flame resistance
- Extremely low NBS smoke evolution and superior LOI
- Exceptional tensile and flexural strength
- High dielectric strength
- Low dissipation factor
- Exceptional mechanical properties
- Dimensionally stable at varying temperatures
- Inherent UV stability
- Resin FDA compliant

**Manufacturing Capabilities:**

**Thicknesses and Widths:**  
 .001" to .010" up to 27" wide  
 .011" to .029" up to 26" wide

**Finishes:**

all thicknesses available polished one side, matte the other (P/M)

\*In addition to our standard capabilities, Westlake also has the ability to process custom resins in various sizes and colors with some exceptions.



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**Adhesive Bonding:**

Tempalux film can be bonded together or to dissimilar materials by a wide variety of commercially available adhesives. Service temperatures, environment, and desired performance of the assembled unit must all be taken into consideration when selecting an adhesive because adhesive bonding involves the application of a chemically different substrate between two parts.

Good Adhesion can be affected by simple solvent wipe, but surface activation by corona discharge, flame treatment or chromic acid etch is sometimes desirable.

**Thermoforming:**

**Drying**

Tempalux film must be thoroughly dried at a recommended temperature of 300°F before processing. Failure to do so will result in bubbling of the film.

**Printing:**

Parts fabricated from Tempalux film may be easily decorated by silkscreen and pad-transfer printing techniques. Other printing methods such as flexography and offset may also be used, but are limited to parts of simple shapes.

**Outgassing:**

Tempalux meets stringent outgassing requirements and is clean room compatible.

**Permeability To Gases:**

The following permeability data indicates the rate at which gases will diffuse through Tempalux.

**Heat Sealing:**

Tempalux film is made from ULTEM, an amorphous thermoplastic resin. Because of its thermoplastic properties, Tempalux film is able to be heat sealed to many materials without the use of adhesives.

Adhesive System	Maximum Service Temp. °F	Cure Temp. Time
Scotch-Weld® 2216 B/A	350	70°F 12 hrs. 200°F 30 min.
Scotch-Weld® 1838-L	350	70°F 12 hrs. 200°F 30 min.
Scotch-Weld® 2214 Regular	350	250°F 40 min.
Scotch-Weld® 2214 Hi-Density	350	250° F 40 min.
BONDiT® B45 TH	350	Ambient 24 hr. 212° F 2 hr.

**Forming Temperatures**

Forming temperatures range from 475°F to 525°F. Due to the rapid cooling characteristics of Tempalux film, the heating and thermoforming units should be combined into one machine. Fast forming cycles are also recommended to eliminate webbing and other defects that may occur due to cool material.

Ink selection is determined by the specific printing technique employed. A variety of air-dry, plural-component and ultraviolet-radiation curing inks, available in a wide array of colors, yield excellent results when used in conjunction with Tempalux film.

Sample	Temp °C	TML	CVCM
Sheet (1.5"x6"x6")	40	0.12%	0.00%
	70	0.17%	0.00%
	85	0.18%	0.00%

Note: Three hundred mg portions of the sample were cut into 16 – 18 pieces, dried in a desiccator at 25°C for 15 hours and reweighed before outgassing at <0.04 torr vacuum. Approximately 0.39% moisture weight loss occurred during desiccation. Test conducted in accordance with ASTM method F1227 – analysis of Total Mass Loss (TML) and Collected Volatile Condensable Materials (CVCM).

Gases	cc-mils/100 in <sup>2</sup> /24 hrs-atm
CO <sub>2</sub>	171
Oxygen	25
Water Vapor	5.8 (g-mil)



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