

# Aroply™ 250 Film Adhesive Zyvex Nano-Engineered Composite

Technical Data Sheet

October 2013

## Description

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Aroply™ 250 Film Adhesive is a versatile, heat curing carbon-nanotube modified epoxy structural film adhesive available in a variety of film weights on a supported knitted nylon carrier.

Cured adhesive characteristics are designated by exceptionally high shear and peel strengths on a variety of substrates. This film adhesive is designed for both solid panel and honeycomb constructions. The film adhesive was designed to meet the specifications of MMM-A132B Type I Class 2.

Aroply™ contains an optimum level of carbon nanotubes for additional toughness and enhanced mechanical properties. The carbon nanotubes use molecular dispersion technology to ensure enhancements are evenly distributed throughout the adhesive.

## Film Adhesive Availability

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Aroply™ 250 is available in a standard width of 48 inches. Virtually any other smaller widths may be made. The standard film weight is 320 g/m<sup>2</sup> (additional film weights from 150 g/m<sup>2</sup> to 400 g/m<sup>2</sup>).

## Film Adhesive Processing

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The film adhesive processes as easily as conventional film adhesives and has a long out-life for easier handling and processing. The standard curing temperature is 90 minutes at 250°F but it will cure at temperatures as low as 180°F. It has excellent retention of tack and drape with a 10 day tack-life and 30+ day out-life at 72°F (22°C), and 1 year storage shelf life at 0°F (-18°C).

## Features

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- Wide range of cure properties: 180°F-350°F (82°C-177°C) at vacuum or clamp pressure to >100 psi
- Tacky for adherence to desired location
- Long Open Time: 30+ days in standard shop conditions
- Adaptable to many processes

## Mechanical Properties

**Table 1 | General Mechanical Characteristics – Aroply 250, 2 hrs @ 250°F, Metal Clamp Pressure, 6061 T6 FPL Etched**

Property <sup>1</sup>	Room Temperature	180°F
Tensile Shear	5000 (psi)	3500 (psi)
T-Peel	41 (piw)	20 (piw)

<sup>1</sup>Weight and Carrier: Aroply™ 250 Film Adhesive 320 g/m<sup>2</sup> on nylon carrier

**Table 2 | Drum Peel Characteristics – Aroply 250, 2 hrs @ 250°F, 30 psi, 6061 T6 Abraded, 1" Nomex 3 lb core 1/8" cell**

Test <sup>1</sup>	Tool Side Up	Tool Side Down
Drum Peel, RT	19.8 (in-lb/in)	20.5 (in-lb/in)

<sup>1</sup>Weight and Carrier: Aroply™ 250 Film Adhesive 320 g/m<sup>2</sup> on nylon carrier

**Table 3 | Mechanical Characteristics – Aroply 250, Multiple Cure Cycles, FPL Acid Etched 6061-T6**

Test <sup>1</sup>	Cure Cycle	Test Method	Value	Std Dev
Tensile Shear, RT	6 hrs @ 220°F	ASTM D 1002	4459 (psi)	134
Tensile Shear, RT	1 hr @ 250°F	ASTM D 1002	4685 (psi)	9
Tensile Shear, RT	2 hrs @ 250°F	ASTM D 1002	4721 (psi)	128
Tensile Shear, 140°F	2 hrs @ 250°F	ASTM D 1002	4040 (psi)	117
Tensile Shear, 160°F	2 hrs @ 250°F	ASTM D 1002	3931 (psi)	138
Tensile Shear, 180°F	2 hrs @ 250°F	ASTM D 1002	3490 (psi)	121
Tensile Shear, RT	90 min @ 250°F	ASTM D 1002	4747 (psi)	84
Tensile Shear, RT <sup>2</sup>	90 min @ 250°F	ASTM D 1002	5123 (psi)	96

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<b>T-Peel, RT</b>	6 hrs @ 220°F	ASTM D 1876	30.8 (pli)	1.9
<b>T-Peel, RT</b>	1 hr @ 250°F	ASTM D 1876	30.4 (pli)	1.6
<b>T-Peel, RT</b>	90 min @ 250°F	ASTM D 1876	35.8 (pli)	2.3
<b>T-Peel, RT</b>	90 min @ 250°F	ASTM D 1876	38.9 (pli)	3.1
<b>T-Peel, RT</b>	2 hrs @ 250°F	ASTM D 1876	40.5 (pli)	3.4

<sup>1</sup>**Weight and Carrier:** Aroply™ 250 Film Adhesive 320 g/m<sup>2</sup> on nylon carrier

<sup>2</sup>Film adhesive open in shop for two weeks before lay-up and cure

**Table 4 | Mechanical Characteristics – Aroply 250, Multiple Cure Cycles, Abraded Arovex® Carbon Prepreg Laminate**

<b>Test<sup>1</sup></b>	<b>Cure Cycle</b>	<b>Test Method</b>	<b>Value</b>	<b>Std Dev</b>
<b>Tensile Shear, RT</b>	1 hr @ 250°F	ASTM D 1002	3523 (psi)	456
<b>Tensile Shear, RT</b>	2 hrs @ 250°F	ASTM D 1002	3270 (psi)	470

<sup>1</sup>**Weight and Carrier:** Aroply™ 250 Film Adhesive 320 g/m<sup>2</sup> on nylon carrier

**Table 5 | Mechanical Characteristics – Aroply 250, Multiple Cure Cycles, Abraded FRP G10 FR4**

<b>Test<sup>1</sup></b>	<b>Cure Cycle</b>	<b>Test Method</b>	<b>Value</b>	<b>Std Dev</b>
<b>Tensile Shear, RT</b>	2 hrs @ 250°F	ASTM D 1002	4056 (psi)	218
<b>Tensile Shear, 140°F</b>	2 hrs @ 250°F	ASTM D 1002	2855 (psi)	64
<b>Tensile Shear, 180°F</b>	2 hrs @ 250°F	ASTM D 1002	2195 (psi)	94
<b>Tensile Shear, RT</b>	4 hrs @ 220°F	ASTM D 1002	4082 (psi)	128
<b>Tensile Shear, 140°F</b>	4 hrs @ 220°F	ASTM D 1002	3131 (psi)	72

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<b>Tensile Shear, 180°F</b>	4 hrs @ 220°F	ASTM D 1002	2485 (psi)	132
<b>Tensile Shear, RT</b>	6 hrs @ 200°F	ASTM D 1002	4010 (psi)	109
<b>Tensile Shear, 140°F</b>	6 hrs @ 200°F	ASTM D 1002	3379 (psi)	100
<b>Tensile Shear, 180°F</b>	6 hrs @ 200°F	ASTM D 1002	3555 (psi)	150
<b>Tensile Shear, RT</b>	8 hrs @ 180°F	ASTM D 1002	3256 (psi)	502
<b>Tensile Shear, 140°F</b>	8 hrs @ 180°F	ASTM D 1002	3248 (psi)	144
<b>Tensile Shear, 180°F</b>	8 hrs @ 180°F	ASTM D 1002	2513 (psi)	158

<sup>1</sup>**Weight and Carrier:** Aroply™ 250 Film Adhesive 320 g/m<sup>2</sup> on nylon carrier

## Industry Comparison Properties

Table 6 | Comparison Mechanical Characteristics – Aroply 250 vs. 3M AF 163, 6 hrs @ 220°F, Vacuum Bag

Test <sup>1</sup>	Aroply 250 Film Adhesive	3M AF 163 Film Adhesive
Load to Failure, 5 lb Core	606 (lbf)	593 (lbf)
Flexural Strength, 5 lb Core	6.7 (ksi)	6.5 (ksi)
Flexural Modulus, 5 lb Core	913 (ksi)	885 (ksi)
Load to Failure, 8 lb Core	669 (lbf)	605 (lbf)
Flexural Strength, 8 lb Core	7.1 (ksi)	6.2 (ksi)
Flexural Modulus, 8 lb Core	980 (ksi)	925 (ksi)

<sup>1</sup>**Mechanical Test:** Long Beam Flexural Strength ASTM D 7249, tested in the W direction

<sup>2</sup>**Lay-Up:** 3K/12K/FA/Core/FA/12K/3K

**3K Material:** Arovex® 250 3K 2X2 Twill prepreg, resin content 44%

**12K Material:** Arovex® 250 12K 2X2 Twill prepreg, resin content 44%

**Aroply™ Material:** Zyvex Technologies™ Aroply™ 250 Film Adhesive, 320 g/m<sup>2</sup> supported

**3M™ Material:** 3M™ Scotch-Weld™ Structural Adhesive Film AF 163, 120 g/m<sup>2</sup> supported

**Core Material:** DuPont™ Nomex® Honeycomb, 1/8" cell, 5 lb or 8 lb

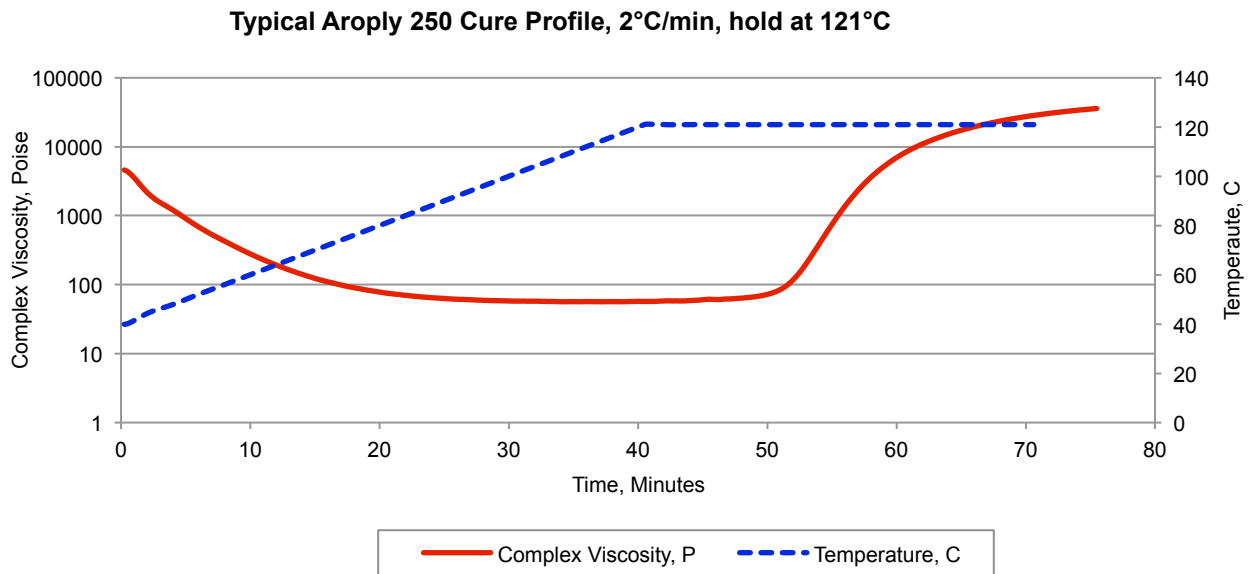
## Cure Timing

(Recommended)

Aroply Film Adhesive processes at a variety of cure cycles from 180°F-350°F (82°C-177°C).

Contact Zyvex for further information on specific cure cycles.

Figure 1 | Cure Profile



## Safety Handling

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Zyvex Technologies provides its customers with a product specific Material Safety Data Sheet (MSDS) to cover potential health effects, safe handling and use information.

Zyvex encourages its customers to review all relevant MSDS prior to use.

## Disclaimer

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Zyvex Technologies believes that the technical data provided is accurate as of the published date. Performance values are considered representative but are not intended as a specification.

## Contact Zyvex

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For United States quotes, orders and product information call toll free 877.Go.Zyvex (877.469.9839).

For international quotes, orders and product information call 614.481.2222.

For Sales & Technical Services call 614.481.2207.

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