

## CYCOM® 950-1

CYCOM® 950-1 modified epoxy resin is a 250°F (121°C) curing system with the performance of a 350°F (177°C) curing epoxy. CYCOM® 950-1 has good 300°F (150°C) dry service capability when cured at 275°F (135°C) and is formulated for autoclave or oven/vacuum bag processing.

CYCOM® 950-1 is a controlled flow, net resin content material that offers significant advantages over wet lay-up systems for structural repairs. Advantages include favorable stress-strain characteristics, product quality and consistency, speed of lay-up and vastly improved health and safety characteristics.

Typical applications for CYCOM® 950-1 include helicopter fuselage and rotor components, wing structures, field repairs and permanent repairs, and space flight applications.

### Features and Benefits

- 250°F (121°C) Cure
- Aerospace qualified
- Low outgassing. Approved for space flight
- Controlled flow material
- Improved toughness
- Autoclave or vacuum bag processing
- Mechanical properties of a 350°F (177°C) curing material when cured at 275°F (135°C)
- Retains mechanical properties up to 220°F (104°C) hot/wet conditions
- 300°F (150°C) dry service temperature when cured at 275°F (135°C)
- Conventional drying, lay-up, vacuum bagging and localized low-level heating is all that is required for most applications
- Shop life 8 weeks at 75°F (24°C)
- Co-curable with various aerospace qualified adhesive materials

## CHARACTERISTICS

**Table 1 | Physical Properties**

Property	CYCOM 7714	Test method
Cured Resin Density (g/cc)	1.27	ASTM D 792
Gel time, minutes	13 minutes at 275°F (135°C)	ASTM D 3532
Shelf Life	12 months at or below 0°F (-18°C) from date of shipment	
Shop Life	8 weeks at or below 75°F (24°C)	

**Table 2 | Product Availability**

Property	Description
Typical Roll Width	12, 34, 42, 50, 60 in (30, 86, 106, 127, 152 cm) wide rolls
Typical Roll Length	60 yds (55 m)



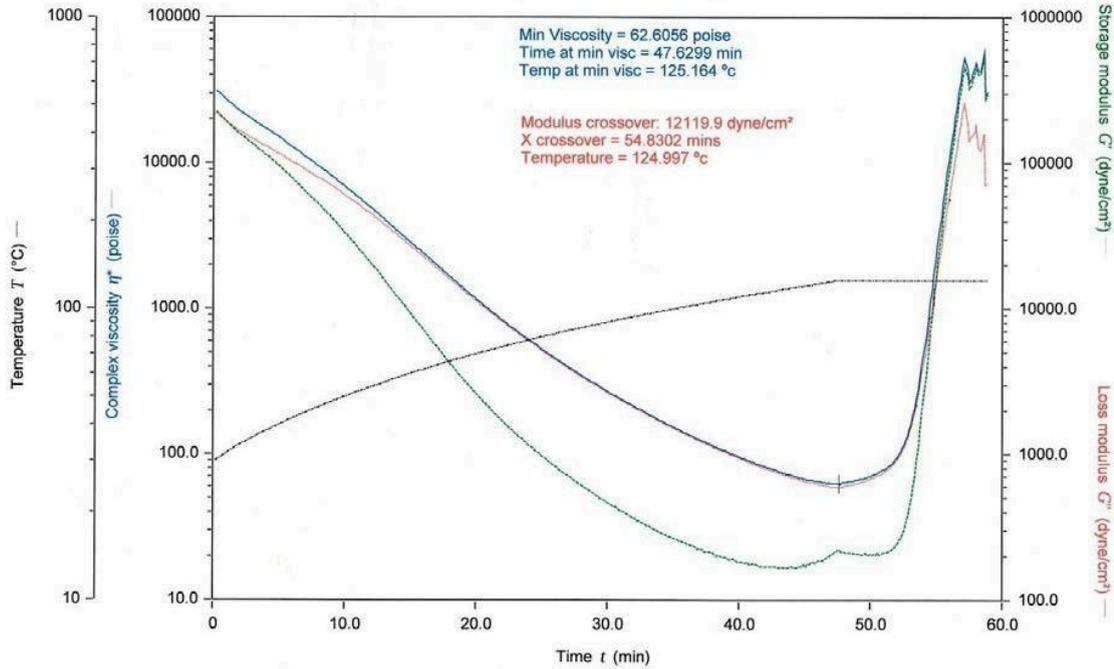


Figure 1 | Viscosity trace of CYCOM® 950-1 ramp rate of 4°F/min (2°C/min) to 250°F (121°C)

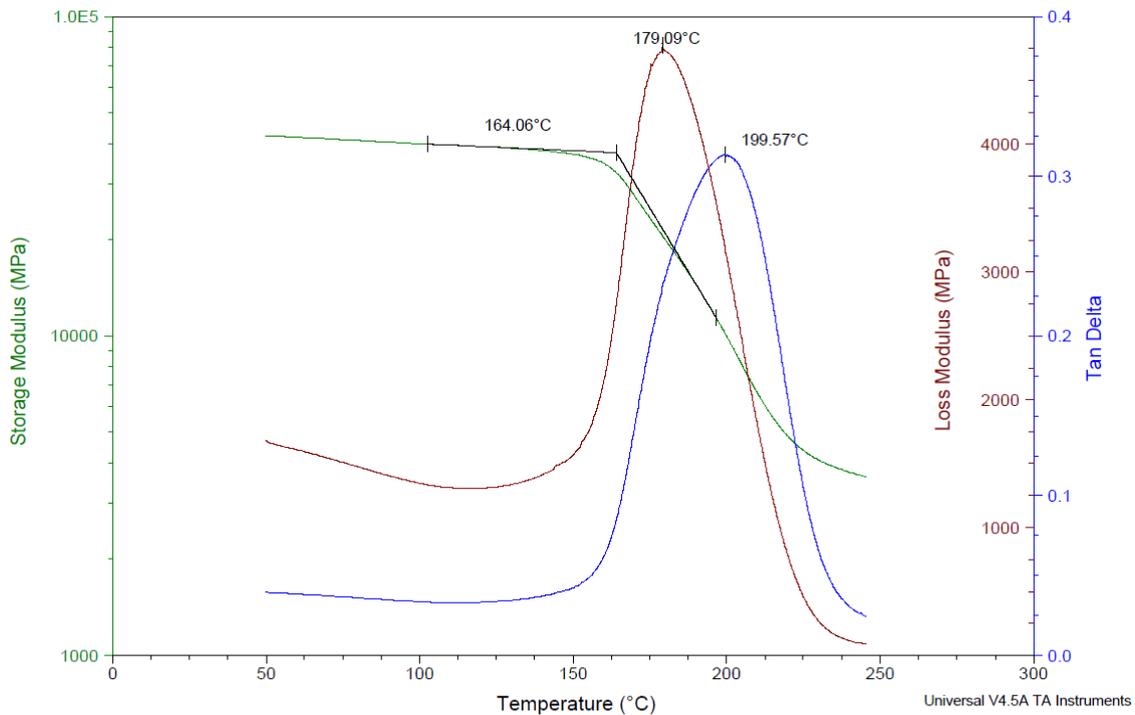


Figure 1 | DMA trace of CYCOM® 950-1-33%-M55J UD cured for 2 hours at 250°F (121°C)



**PROPERTIES**
**Table 3 | CYCOM® 950-1 Neat Resin Properties**

Property	Test Condition	Value	Test Method
0° Tensile Strength ksi (MPa)	75°F (24°C)	7.6 (52.4)	ASTM D 638
0° Tensile Modulus Msi (GPa)	75°F (24°C)	0.6 (4)	ASTM D 638
Tensile Strain to Failure, %	75°F (24°C)	1.5	ASTM D 638
Outgassing TML, %	75°F (24°C)	0.5 – 0.7	ASTM E 595
Outgassing RML, %	75°F (24°C)	0.24	ASTM E 595
Outgassing CVCM, %	75°F (24°C)	0.02 – 0.04	ASTM E 595

**Table 4 | Mechanical Properties of CYCOM® 950-1 with 36% M46J-140 gsm (.028 psf) Unidirectional Carbon Tape**

Property	Test Condition	Value	Test Method
0° Tensile Strength ksi (MPa)	75°F (24°C)	293 (2022)	ASTM D 638
	176°F (80°C)	283 (1953)	
	270°F (132°C)	299 (2062)	
0° Tensile Modulus Msi (GPa)	75°F (24°C)	36.8 (254)	ASTM D 638
	176°F (80°C)	36.5 (252)	
	270°F (132°C)	41.2 (284)	
0° Compression Strength ksi (MPa)	75°F (24°C)	134 (925)	ASTM D 695
	176°F (80°C)	-	
	270°F (132°C)	129 (889)	
0° Compression Modulus Msi (GPa)	75°F (24°C)	35.2 (243)	ASTM D 695
	176°F (80°C)	35.8 (247)	
	270°F (132°C)	34.5 (238)	
0° Interlaminar Shear Strength ksi (MPa)	75°F (24°C)	11.6 (80)	ASTM D 2344
	176°F (80°C)	10.3 (71)	
	270°F (132°C)	9.1 (63)	
0° Flexural Strength ksi (MPa)	75°F (24°C)	215 (1487)	ASTM D 790
	176°F (80°C)	195 (1343)	
	270°F (132°C)	172 (1183)	
0° Flexural Modulus Msi (GPa)	75°F (24°C)	32.6 (225)	ASTM D 790
	176°F (80°C)	33.5 (231)	
	270°F (132°C)	-	



**Table 5 | Mechanical Properties of CYCOM® 950-1 with 42%-M46J-Plain Weave-280 gsm (.057 psf) Fabric**

Property	Test Condition	Value	Test Method
0° Tensile Strength ksi (MPa)	75°F (24°C)	100 (689)	ASTM D 638
	176°F (80°C)	100 (689)	
	270°F (132°C)	123 (849)	
0° Tensile Modulus Msi (GPa)	75°F (24°C)	18.3 (126)	ASTM D 638
	176°F (80°C)	18.4 (127)	
	270°F (132°C)	18.7 (129)	
0° Compression Strength ksi (MPa)	75°F (24°C)	59 (407)	ASTM D 695
	176°F (80°C)	62 (425)	
	270°F (132°C)	45 (309)	
0° Compression Modulus Msi (GPa)	75°F (24°C)	16.1 (111)	ASTM D 695
	176°F (80°C)	16.1 (111)	
	270°F (132°C)	15.8 (109)	
0° Interlaminar Shear Strength ksi (MPa)	75°F (24°C)	7 (48)	ASTM D 2344
	176°F (80°C)	5.5 (38)	
	270°F (132°C)	5.4 (37)	
0° Flexural Strength ksi (MPa)	75°F (24°C)	95 (658)	ASTM D 790
	176°F (80°C)	81 (559)	
	270°F (132°C)	58 (400)	
0° Flexural Modulus Msi (GPa)	75°F (24°C)	14.6 (101)	ASTM D 790
	176°F (80°C)	14.6 (101)	
	270°F (132°C)	13.6 (94)	

**Table 6 | Mechanical Properties of CYCOM® 950-1 with Aramid Woven Fabric**

Property	Test Condition	285 Kevlar	120 Kevlar	Test Method
0° Tensile Strength ksi (MPa)	75°F (24°C)	77.6 (535)	59.3 (409)	ASTM D 638
0° Tensile Modulus Msi (GPa)	75°F (24°C)	4.7 (32)	3.5 (24.1)	ASTM D 638
90° Tensile Strength ksi (MPa)	75°F (24°C)	62.9 (434)	-	ASTM D 638
90° Tensile Modulus Msi (GPa)	75°F (24°C)	4.09 (28.2)	-	ASTM D 638
0° Compression Strength ksi (MPa)	75°F (24°C)	29.7 (205)	26.4 (182)	ASTM D 695
0° Compression Modulus Msi (GPa)	75°F (24°C)	3.69 (25.4)	2.8 (19.3)	ASTM D 695



Property	Test Condition	285 Kevlar	120 Kevlar	Test Method
90° Compression Strength ksi (MPa)	75°F (24°C)	29.8 (206)	-	ASTM D 695
90° Compression Modulus Msi (GPa)	75°F (24°C)	3.66 (25.2)	-	ASTM D 695
0° Interlaminar Shear Strength ksi (MPa)	75°F (24°C)	4.42 (30.5)	-	ASTM D 2344
0° Flexural Strength ksi (MPa)	75°F (24°C)	64.1 (442)	3.28 (293)	ASTM D 790
0° Flexural Modulus Msi (GPa)	75°F (24°C)	3.36 (23.2)	1.92 (13.2)	ASTM D 790
In-Plane Shear Strength ksi (MPa)	75°F (24°C)	12.6 (87)	-	ASTM D 3518
In-Plane Shear Modulus Msi (GPa)	75°F (24°C)	0.28 (1.93)	-	ASTM D 3518

**Table 7 | Mechanical Properties of CYCOM® 950-1 with 7781 E-Glass Woven Fabric**

Property	Test Condition	Value	Test Method
0° Tensile Strength ksi (MPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	79.6 (549) 67 (462) 50 (345) 46.4 (320)	ASTM D 638
0° Tensile Modulus Msi (GPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	3.74 (25.8) 3.39 (23.4) 2.97 (20.5) 1.82 (12.5)	ASTM D 638
90° Tensile Strength ksi (MPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	69.1 (477) 54.5 (376) 40.5 (279) 34.4 (237)	ASTM D 638
90° Tensile Modulus Msi (GPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	3.27 (22.6) 3 (20.6) 2.41 (16.6) 2.11 (14.6)	ASTM D 638
0° Compression Strength ksi (MPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	91.4 (630) 72.5 (500) 51 (352) 33.6 (232)	ASTM D 695



Property	Test Condition	Value	Test Method
90° Compression Strength ksi (MPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	73.9 (510) 62.1 (428) 39.7 (274) 33.8 (233)	ASTM D 695
0° Interlaminar Shear Strength ksi (MPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	9.7 (66.9) 9.8 (67.6) 4.4 (30.3) 3 (20.7)	ASTM D 2344
0° Flexural Strength ksi (MPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	125.5 (866) 94 (648) 52.9 (365) 38.8 (268)	ASTM D 790
0° Flexural Modulus Msi (GPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	3 (20.8) 3.24 (22.3) 2.9 (20) 2.35 (16.2)	ASTM D 790
In-Plane Shear Strength ksi (MPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	38.6 (266) 27.7 (191) 17 (117) 14 (96)	ASTM D 3518
In-Plane Shear Modulus Msi (GPa)	-65°F (-55°C) 75°F (24°C) 200°F (93°C) 250°F (121°C)	2.34 (16.1) 1.67 (11.9) 0.73 (5) 0.3 (2.1)	ASTM D 3518



## PROCESSING

### Guidelines for Thawing Out

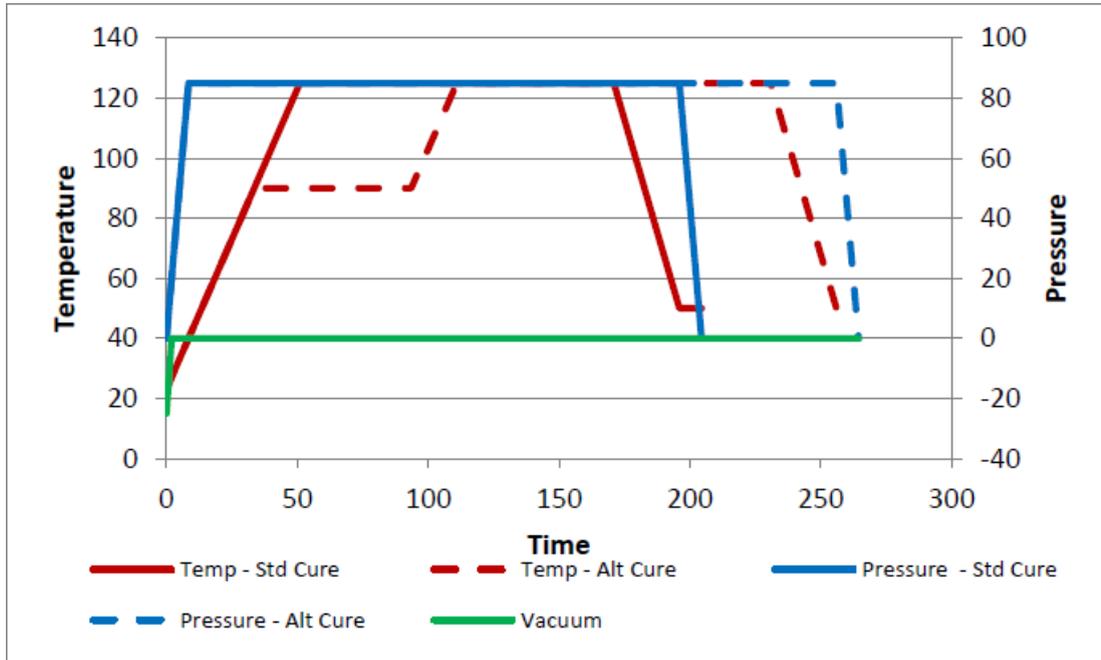
On removal of sealed prepreg from 0°F (-18°C) storage, ensure that the material is allowed to thaw fully to room temperature prior to unsealing. This avoids condensation. Typically a 60 yd (55m) roll of prepreg requires about 8-12 hours to thaw.

### Recommended Cure Cycle

Autoclave Cure Cycle	Apply a minimum of 24 in Hg (0.081 MPa) vacuum. Apply 85 ± 5 psi (0.59 ± 0.03 MPa) of pressure; vent vacuum at 10 psi (0.07 MPa). Heat from 75°F (24°C) to 194°F ± 10°F (90°C ± 5°C) at 3-5°F (1-2°C)/minute. For laminates in excess of 0.125 inches (3 mm) thick, a 60 minute dwell is recommended at 194°F ± 10°F (90°C ± 5°C). Heat up from 194°F ± 10°F (90°C ± 5°C) to 275°F (135°C) at 1-3°F (0.5-1°C)/minute. Hold at 275°F (135°C) for 2 hours. Cool under pressure to below 122°F (50°C) at 5°F (3°C)/minute.
Vacuum Bag/Oven Cure Cycle	Apply a minimum of 24 in Hg (0.081 MPa) vacuum. Heat from 75°F (24°C) to 194°F ± 10°F (90°C ± 5°C) at 3-5°F (1-2°C)/minute <sup>1</sup> . Hold at 194°F ± 10°F (90°C ± 5°C) for 1 hour. Heat up from 194°F ± 10°F (90°C ± 5°C) to 275°F (135°C) at 1-3°F (0.5-1°C)/minute. Hold at 275°F (135°C) for 2 hours. Cool to below 122°F (50°C) at 5°F (3°C)/minute before releasing vacuum.

<sup>1</sup>:if large or thick structures are being molded, reduce heat up rate to 1-3°F (0.5-1°C)/minute





**Figure 1 | CYCOM® 950-1 Recommended Cure Cycles**

### Preparation for Laminate Curing

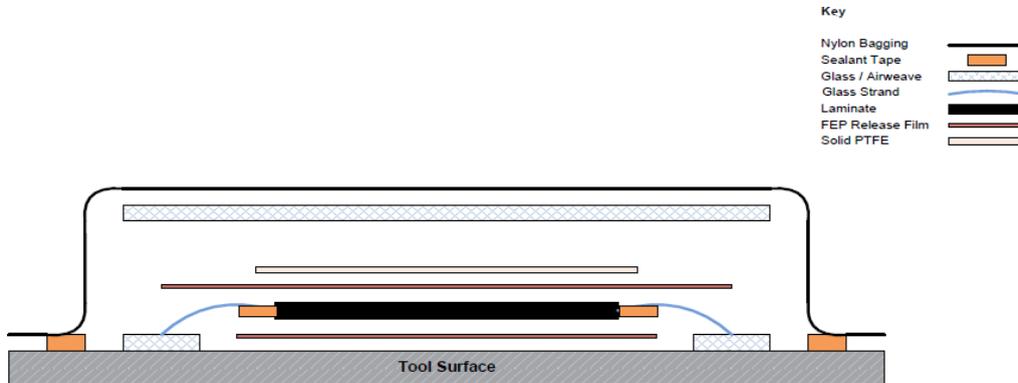
Treat surfaces that lay-up will touch with a release agent. As each ply of material is positioned, work out any wrinkles or entrapped air with a paddle or roller before removing the backing. Take care not to distort the material during lay-up. Insert a thermocouple into the lay-up near the center ply of the thickest edge section, outside the net trim line.

To eliminate porosity, keep the resin under pressure during cure with the use of a compressible dam. Use permeable fluorocarbon coated fabric to facilitate resin bleed. This material should be placed directly on the lay-up with sufficient layers of dry glass fabric (bleeder plies) to absorb the excess resin. Non-permeable fluorocarbon coated fabric should be placed over bleeder plies to protect the bag system in vacuum or autoclave cures.

Install a vacuum bag by standard techniques. Insert at least two vacuum ports through the bag, connecting one to a vacuum source and the other, at a point furthest away from the source, to a calibrated vacuum gage. Position part in oven or autoclave and draw vacuum to check for bag or system leaks.



The following figures show the recommended lay-ups for CYCOM® 950-1 materials:



**Figure 3 | Bagging Schematic**

### Recommended Consumables

The table below provides a list of processing materials recommended for use with CYCOM® 7714

Sealant Tape	SM5142BY, SM 5127, SM5126
Release Film	A6200, A5000
Release Fabric	200 TFP, 200 TFNP
Breather/Bleeder Fabric	RC3000-10, A3000-4
Peel Ply	60001, 60002, 51789
Bagging Film	HS 8171, SV3000
Adhesive Tape	Flashtape 1, Flashtape 2

### HEALTH & SAFETY

Please refer to the product SDS for safe handling, personal protective equipment recommendations and disposal considerations.

