CYCOM® 997 EPOXY RESIN SYSTEM

TECHNICAL DATA SHEET

DESCRIPTION

CYCOM® 997 resin is a controlled flow, 350°F (177°C) curing toughened epoxy resin with 350°F (177°C) dry and 270°F (132°C) wet service temperature capability.

CYCOM 997 is formulated for ease of processing with excellent tack and drape. These properties are retained for up to 20 days at room temperature in the prepreg form. The mold life of this material is approximately 30 days.

A standard two hour cure at 350°F (177°C) may be used in either an autoclave or press mold. No post cure is required to achieve service temperatures.

FEATURES & BENEFITS

- 350°F (177°C) cure
- Toughened epoxy using thermoplastic toughening mechanisms
- Controlled flow for ease of processing
- Used in both laminate and sandwich panels
- 350°F (177°C) dry service temperature
- 270°F (132°C) wet service temperature
- Excellent tack and out time
- Available in a broad range of fibers
- Available in a range of forms including unidirectional tape, fabric and fiber placement tape

SUGGESTED APPLICATIONS

- Primary and secondary aircraft structures
- Any application where impact resistance and excellent hot/wet performance is crucial

AECM-00013
REV: 01
19 MARCH 2012

CHARACTERISTICS

Table 1 | Typical Neat Resin Propreties

Property	Value
Compression Strength, ksi (MPa)	290 (200)
Flexural Strength, ksi (MPa)	13.1 (90.6)
Flexural Modulus, Msi (GPa)	0.60 (4.14)
G1C2 (in lb/in2)	1.52
K1C2 (ksi in1/2)	0.90
Tg, dry (°C) *	210
Tg, wet (°C) *	160

Wet conditioning: 140°F / 95% relative humidity for 30 days, 1.1% moisture pick-up

* **NOTE:** Tg data is not applicable for U.S. export control classification or licensing. For export-related information please contact us.

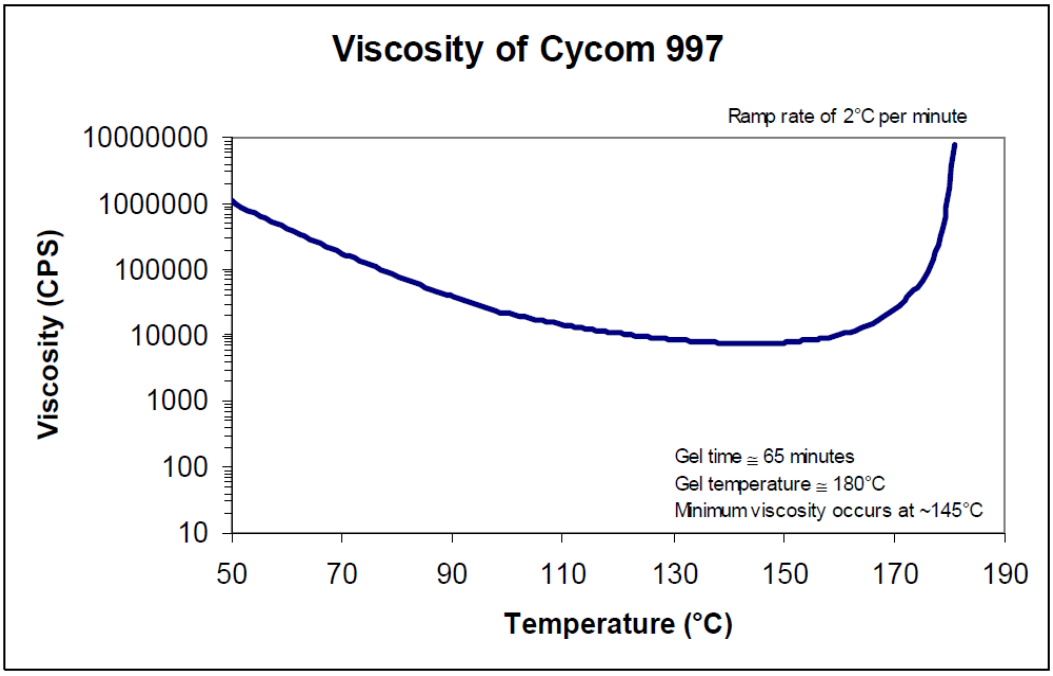

Figure 1 | CYCOM 997 Viscosity Profile versus Temperature

PROPERTIES

Table 2 | Typical Prepreg Properties: Unidirectional Tape, Standard Modulus Carbon Fiber (33Msi/228 GPa)

Mechanical Properties[1]	-67°F (-55°C)	75°F (24°C)	200°F (93°C) Dry	200°F (93°C) Wet[2]
0° Tensile Properties				
Strength, ksi (MPa)	225 – 295 (1758 – 2034)	258 – 361 (1779 – 2489)	270 – 310 (1861 – 2137)	-
Modulus, Msi (GPa)	18 – 20 (255 – 295)	18 – 20 (124 – 138)	19 – 21 (131 – 145)	-
0° Compression Properties				
Strength, ksi (MPa)	-	193 – 271 (1331 – 1868)	182 – 248 (1255 – 1710)	190 – 220 (1310 – 1517)
Modulus, Msi (GPa)	-	17 – 19 (117 – 131)	17 – 19 (117 – 131)	17 – 18 (117 – 124)
0° Interlaminar Shear Properties				
Strength, ksi (MPa)	-	16 – 21 (110 – 145)	13 – 16 (90 – 110)	11 – 12 (76 – 83)
Compression Before Impact, ksi	-	80 – 90	-	-
Compression After Impact, ksi[3]	-	33 – 38	-	-
Bearing Strength, ksi	-	150 – 180	-	-

[1] Property values listed are typical for laminates with a cured ply thickness of 0.0055 inches

[2] Wet conditioning: 140°F and 95% relative humidity for 30 days

[3] Orientation [0/45/90/-45], 960 in lbs/in

Table 3 | Typical Prepreg Properties: Plain Weave Fabric, Standard Modulus Carbon Fiber (33Msi/228 GPa)

Mechanical Properties[1]	-67°F (-55°C)	75°F (24°C)	200°F (93°C) Dry	200°F (93°C) Wet[2]
0° Tensile Properties				
Strength, ksi (MPa)	95 – 110 (655 – 758)	103 – 124 (710 – 855)	115 – 130 (793 – 896)	-
Modulus, Msi (GPa)	9 – 11 (62 – 76)	9 – 11 (62 – 76)	10 – 11 (69 – 76)	-
0° Compression Properties				
Strength, ksi (MPa)	-	110 – 145 (758 – 1000)	103 – 135 (710 – 931)	80 – 110 (552 – 758)
Modulus, Msi (GPa)	-	8 – 10 (55 – 69)	8 – 10 (55 – 69)	9 – 10 (62 – 69)
0° Interlaminar Shear Properties				
Strength, ksi (MPa)	-	11 – 15 (76 – 103)	10 – 13 (69 – 90)	8 – 9 (55 – 62)
Long Beam Bending Strength, ksi	-	55 – 65	-	-
Flatwise Tensile Strength, psi	-	580 – 640	-	-
Compression Before Impact, ksi	-	70 – 80	-	-
Compression After Impact, ksi [3,4]	-	40 – 48	-	-
Bearing Strength, ksi	-	140 – 170	-	-

[1] Property values listed are typical for laminates with a cured ply thickness of 0.0075 inches

[2] Wet conditioning: 140°F and 95% relative humidity for 30 days

[3] Orientation [0/45/90/-45], 960 in lbs/in

[4] Testing performed per DMS 2224, Rev. M

Table 4 | Typical Prepreg Properties: 5 Harness Satin Fabric, Standard Modulus Carbon Fiber (33Msi/228 GPa)

Mechanical Properties[1]	75°F (24°C)	200°F (93°C) Dry	200°F (93°C) Wet[2]
0° Tensile Properties			
Strength, ksi (MPa)	105 – 143 (724 – 986)	-	-
Modulus, Msi (GPa)	10 – 11 (69 – 73)	-	-
0° Compression Properties			
Strength, ksi (MPa)	112 – 152 (772 – 1048)	108 – 141 (745 – 972)	85 – 100 (586 – 689)
Modulus, Msi (GPa)	8 – 10 (55 – 69)	8 – 10 (55 – 69)	9 – 10 (62 – 69)
0° Interlaminar Shear Properties			
Strength, ksi (MPa)	10 – 15 (69 – 103)	9 – 13 (62 – 90)	8 – 9 (55 – 62)
Bearing Strength, ksi	140 – 170	-	-

[1] Property values listed are typical for laminates with a cured ply thickness of 0.0115 inches

[2] Wet conditioning: 140°F and 95% relative humidity for 30 days

Table 5 | Typical Prepreg Properties: 8 Harness Satin Fabric, Standard Modulus Carbon Fiber (33Msi/228 GPa)

Mechanical Properties[1]	75°F (24°C)	200°F (93°C) Dry	200°F (93°C) Wet[2]
0° Tensile Properties			
Strength, ksi (MPa)	109 – 132 (752 – 910)	-	-
Modulus, Msi (GPa)	10 – 11 (69 – 76)	-	-
0° Compression Properties			
Strength, ksi (MPa)	112 – 140 (772 – 965)	100 – 132 (689 – 910)	75 – 90 (517 – 620)
Modulus, Msi (GPa)	8 – 10 (55 – 69)	-	8 – 9 (55 – 62)
0° Interlaminar Shear Properties			
Strength, ksi (MPa)	8 – 14 (55 – 97)	7 – 13 (48 – 90)	8 – 9 (55 – 62)

[1] Property values listed are typical for laminates with a cured ply thickness of 0.0138 inches

[2] Wet conditioning: 140°F and 95% relative humidity for 30 days

Table 6 | Typical Prepreg Properties: Unidirectional Tape, Intermediate Modulus Carbon Fiber (40 Msi/276 GPa)

Mechanical Properties[1]	75°F (24°C)	250°F (121°C) Dry	250°F (121°C) Wet[2]
0° Compression Properties			
Strength, ksi (MPa)	240 – 255 (1655 – 1758)	220 – 235 (1517 – 1620)	195 – 220 (1344 – 1517)
±45° Shear Properties			
Strength, ksi (MPa)	16 – 18 (110 – 124)	14 – 16 (97 – 110)	13 – 14 (90 – 97)
Modulus, Msi (GPa)	0.6 – 0.8 (4 – 6)	0.5 – 0.7 (3 – 5)	0.5 – 0.7 (3 – 5)
0° Interlaminar Shear Properties			
Strength, ksi (MPa)	20 – 22 (138 – 152)	13 – 15 (90 – 103)	12 – 14 (83 – 97)
Open Hole Compression, ksi[3]	42 – 45	36 – 38	35 – 37
Compression After Impact, ksi[4]	28 – 30	-	-

[1] Property values listed are typical for laminates with a cured ply thickness of 0.0074 inches

[2] Wet conditioning: 48 hour water boil

[3] Layup: [+45/0/-45/90]

[4] Testing per BMS 8-276

APPLICATION NOTES

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 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.

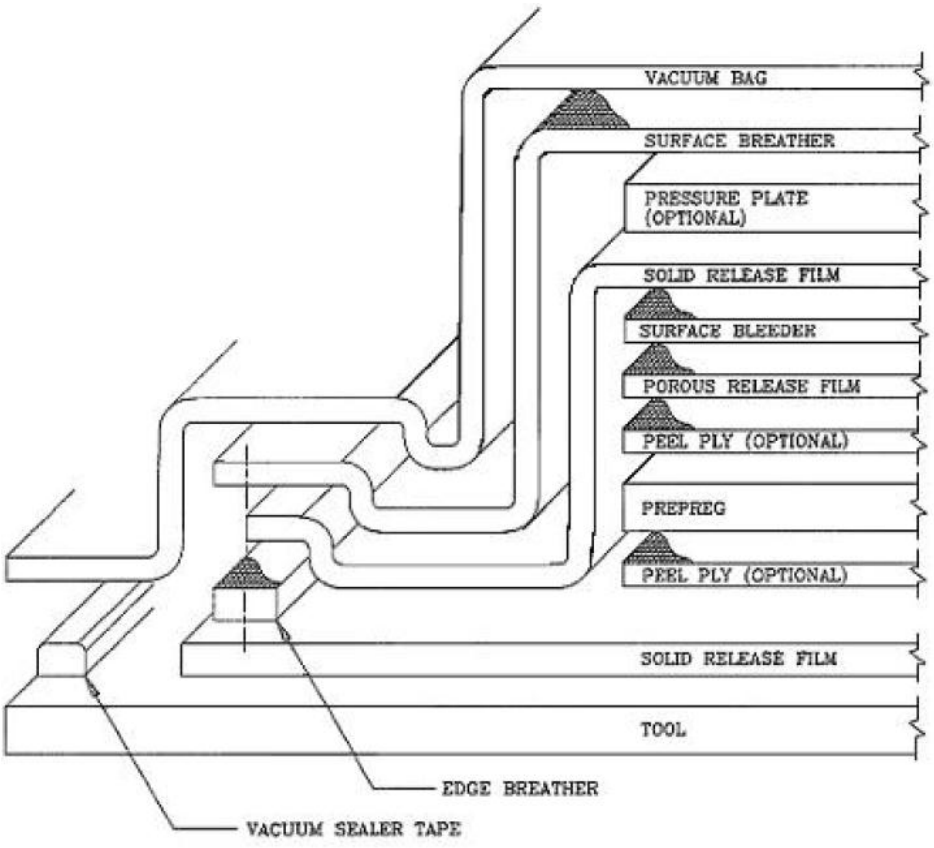

Figure 2 | Recommended bagging for CYCOM 997

Recommended Cure Cycles

The following figures show the recommended cure cycles for CYCOM 997 resin system. Depending on thickness and laminate configuration, cure cycle parameters may need to be altered.

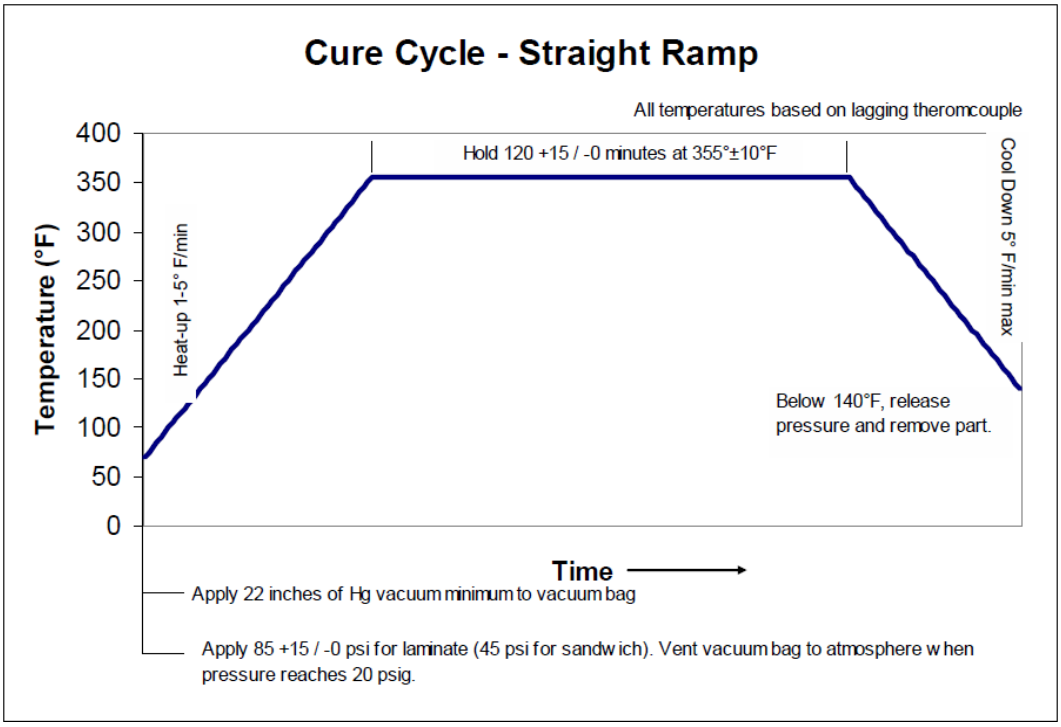

Figure 3 | Recommended Cure Cycle for CYCOM 997 – Straight Ramp

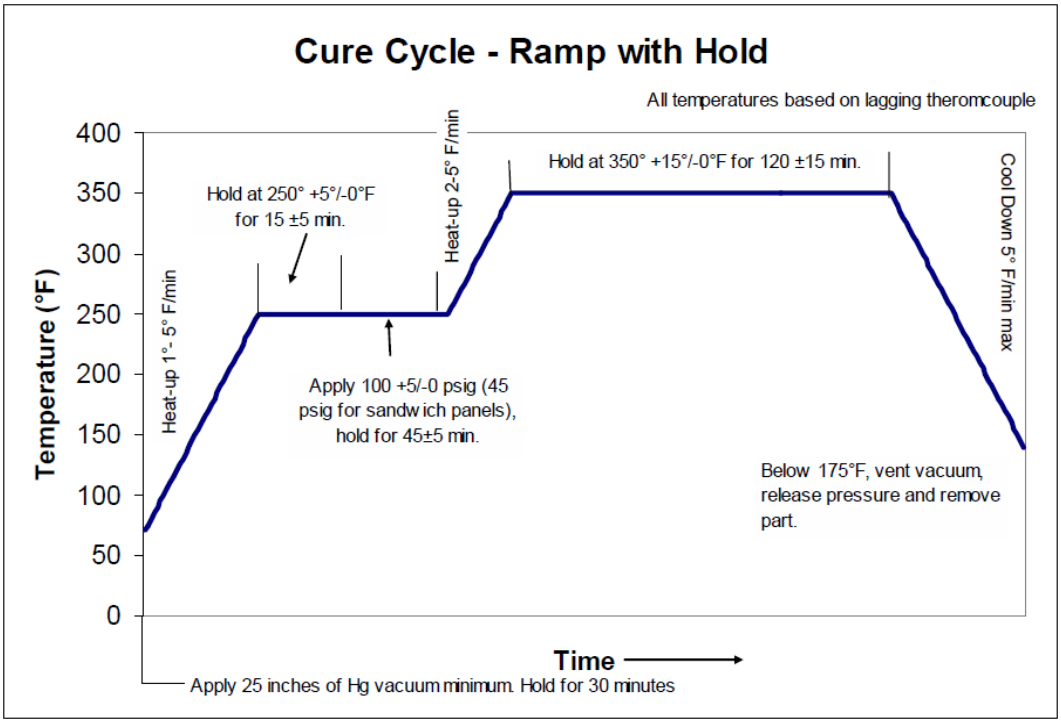

Figure 4 | Recommended Cure Cycle for CYCOM 997 – Ramp with Hold

PRODUCT HANDLING AND SAFETY

Cytec Engineered Materials recommends wearing clean, impervious gloves when working with epoxy resin systems to reduce skin contact and to avoid contamination of the product.

Materials Safety Data Sheets (MSDS) and product labels are available upon request and can be obtained from any Cytec Engineered Materials Office.

DISPOSAL OF SCRAP MATERIAL

Disposal of scrap material should be in accordance with local, state, and federal regulations.

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