

CYCOM® 934 Epoxy PREPREG

DESCRIPTION

CYCOM® 934 is a high flow, 350°F (177°C) curing epoxy resin with good 200°F (93°C) wet and 350°F (177°C) dry service capability. CYCOM 934 is formulated for autoclave processing, but it has been successfully processed by press molding. Unidirectional tape and woven fabric impregnated with CYCOM 934 resin will retain good tack and drape for at least 10 days at 70°F (21°C). Standard cure is for two hours at 350°F (177°C). No post cure is required for 350°F (177°C) dry service capability.

Recommended lay-up procedure is L-3 or L-6 (Refer to Figure 3 and Figure 4). Recommended cure procedure is C-5 or C-9 (Refer to Figure 5 and Figure 6).

CYCOM 934 can be impregnated via hot melt or solution techniques on all available fibers and fabrics.

FEATURES & BENEFITS

- Available in a broad range of fibers and forms including tape, fabric and roving
- Large industry database
- Widely used in aerospace, commercial and military structural applications
- 350°F (177°C) dry and 200°F (93°C) wet service temperature
- Laminate and sandwich panel usage
- Autoclave or press-mold processing
- Shelf life of 6 months at 0°F (-18°C), 10 days at 72°F (22°C)
- Meets all NASA outgassing requirements

SUGGESTED APPLICATIONS

- Structural aircraft components
- Critical space structures

CHARACTERISTICS

Table 1 | Neat Resin Properties

Property	Test Condition		
	Room Temperature	200°F (93°C)	200°F (93°C) wet
Tensile Strength, ksi (MPa)	12 (82.7)		
Tensile Modulus, Msi (GPa)	0.6 (4.1)		
Failure Strain, %	0.7		
Flexural Strength, ksi (MPa)	10.0 (68.9)	17 (117.2)	10.0 (68.9)
Flexural Modulus, Msi (GPa)	0.60 (4.1)	0.47 (3.2)	0.40 (2.8)
Tg, °C *			
Dry	194		
Wet	160		
Density, g/cm ³	1.30		

* **NOTE:** Tg data is not applicable for U.S. export control classification or licensing.

For export-related information please contact us.

Figure 1 | CYCOM 934 Viscosity Profile: Straight Heat-Up Cure Cycle to 350°F (177°C)

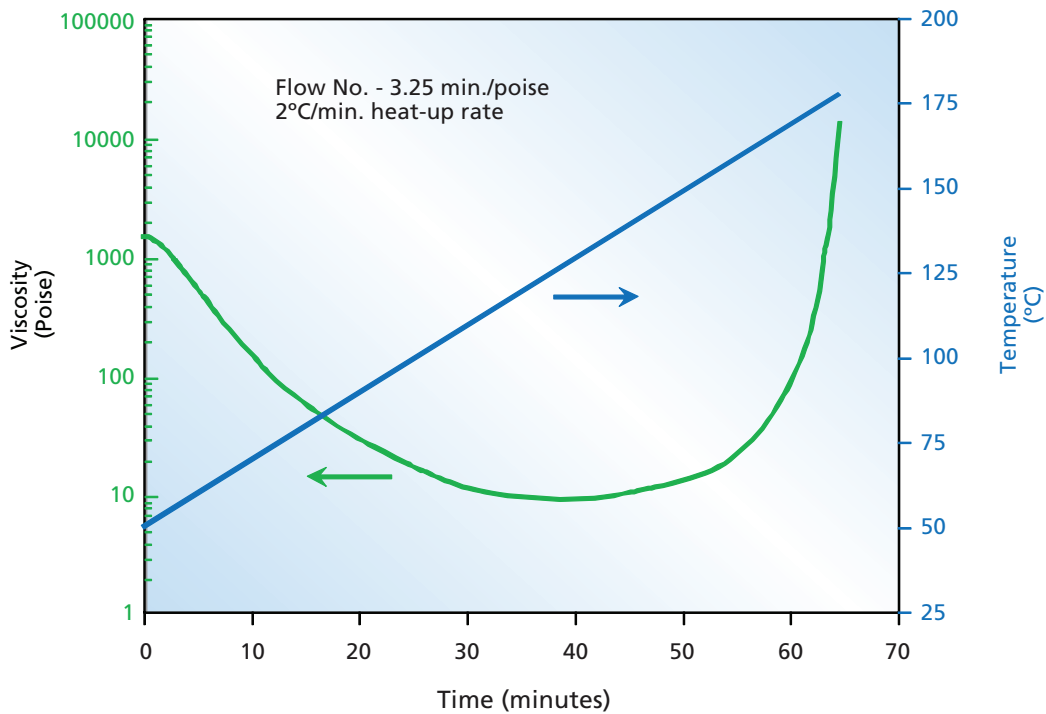
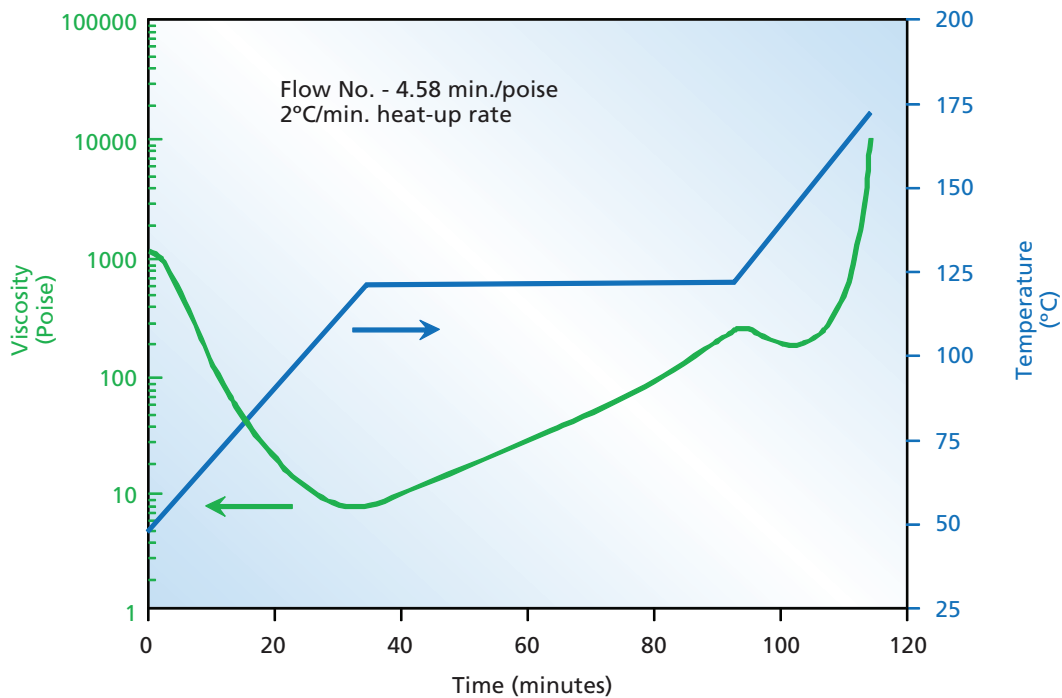


Figure 2 | CYCOM 934 Viscosity Profile: Stepped Cure Cycle – Heat up to 250°F (121°C), hold for 60 minutes, heat up to 350°F (177°C)



PROPERTIES

Table 2 | Typical Properties of CYCOM 934 Composite Laminates: Standard Modulus (33 Msi/228 GPa Class)
Carbon Fiber Reinforced Unidirectional Tape and Roving - CEM Product Codes Hy-E 1034K, Hy-E 3034K, Hy-E 1334G

Mechanical Properties	Test Condition	
	Room Temperature	160°F (71 °C)
0° Tensile Properties		
Strength, ksi (MPa)	230 – 260 (1586 – 1792)	230 – 260 (1586 – 1792)
Modulus, Msi (GPa)	18 – 20 (124 – 138)	18 – 20 (124 – 138)
Failure Strain, %	1.0 – 1.2	1.0 – 1.3
0° Compressive Properties		
Strength, ksi (MPa)	220 – 250 (1517 – 1724)	190 – 220 (1310 – 1517)
Modulus, Msi (GPa)	17 – 20 (117 – 138)	17 – 20 (117 – 138)
0° Flexural Properties		
Strength, ksi (MPa)	250 – 300 (1724 – 2068)	240 – 270 (1655 – 1861)
Modulus, Msi (GPa)	18 – 21 (124 – 145)	18 – 21 (124 – 145)
Interlaminar Shear Properties		
Strength, ksi (MPa)	17 – 20 (117 – 138)	12 – 14 (83 – 97)

Property values listed are typical for laminates with 57 to 63% fiber volume

Table 3 | Typical Properties of CYCOM 934 Composite Laminates: Standard Modulus (33 Msi/228 GPa Class)
Carbon Fiber Reinforced Plain Weave Fabric - CEM Product Codes HMF 322/34, HMF 322D/34

Mechanical Properties	Test Condition			
	-65°F (-55°C)	Room Temp.	160°F (71 °C)	180°F (82 °C) Wet
0° Tensile Properties				
Strength, ksi (MPa)	75 – 100 (517 – 689)	85 – 100 (586 – 689)	85 – 100 (586 – 689)	50 – 75 (345 – 517)
Modulus, Msi (GPa)	8 – 10 (55 – 69)	9 – 11 (62 – 76)	8 – 10 (55 – 69)	6 – 8 (41 – 55)
Failure Strain, %	0.8 – 1.0	–	–	–
0° Compressive Properties				
Strength, ksi (MPa)	–	85 – 100 (586 – 689)	85 – 100 (586 – 689)	75 – 90 (517 – 612)
Modulus, Msi (GPa)	7 – 9 (48 – 62)	7 – 9 (48 – 62)	–	–
0° Flexural Properties				
Strength, ksi (MPa)	–	110 – 130 (758 – 896)	–	50 – 75 (345 – 517)
Modulus, Msi (GPa)	–	8 – 10 (55 – 59)	–	6 – 8 (41 – 55)
Interlaminar Shear Properties				
Strength, ksi (MPa)	10 – 13 (69 – 90)	8 – 12 (55 – 83)	8 – 10 (55 – 69)	8 – 10 (55 – 69)

Property values listed are typical for laminates with 55 to 60% fiber volume

Wet = 7 day water immersion at 165°F (74°C)

Table 4 | Typical Properties of CYCOM 934 Composite Laminates: Standard Modulus (33 Msi/228 GPa Class) Carbon Fiber Reinforced 8 Harness Satin Fabric - CEM Product Code HMF 133/34

Mechanical Properties	Test Condition	
	Room Temperature	160°F (71°C)
0° Tensile Properties Strength, ksi (MPa) Modulus, Msi (GPa)	85 – 105 (586 – 724) 9 – 12 (62 – 83)	85 – 105 (586 – 724) 9 – 11 (62 – 76)
0° Compressive Properties Strength, ksi (MPa) Modulus, Msi (GPa)	80 – 100 (552 – 589) 9 – 12 (62 – 83)	65 – 90 (448 – 620) 8 – 10 (55 – 69)
0° Flexural Properties Strength, ksi (MPa) Modulus, Msi (GPa)	120 – 150 (827 – 1034) 8 – 11 (55 – 76)	85 – 100 (586 – 689) 6 – 8 (41 – 55)

Property values listed are typical for laminates with 55 to 60% fiber volume

Table 5 | Typical Properties of CYCOM 934 Composite Laminates: High Strength (>500 ksi/>3447 MPa), Standard Modulus (33 Msi/228 GPa Class) Carbon Fiber Reinforced Unidirectional Tape and Roving - CEM Product Codes Hy-E 1034G, Hy-E 1334H, Hy-E 3334P, Hy-E 1634N

Mechanical Properties	Test Condition		
	Room Temperature	200°F (93°C)	200°F (93°C) Wet
0° Tensile Properties Strength, ksi (MPa) Modulus, Msi (GPa)	280 – 310 (1930 – 2137) 20 – 22 (38 – 152)	280 – 310 (1930 – 2137) 20 – 22 (38 – 152)	240 – 270 (1655 – 1861) 20 – 22 (38 – 152)
0° Compressive Properties Strength, ksi (MPa) Modulus, Msi (GPa)	200 – 250 (1379 – 1723) 18 – 20 (124 – 138)	200 – 250 (1379 – 1723) 18 – 20 (124 – 138)	140 – 170 (965 – 1172) 18 – 19 (124 – 131)
0° Flexural Properties Strength, ksi (MPa) Modulus, Msi (GPa)	280 – 360 (1930 – 2482) 18 – 20 (124 – 138)	230 – 310 (1586 – 2137) 18 – 20 (124 – 138)	180 – 260 (1241 – 1792) 18 – 19 (124 – 131)
Interlaminar Shear Properties Strength, ksi (MPa)	18 – 20 (124 – 138)	16 – 18 (110 – 124)	8 – 10 (55 – 69)

Property values listed are typical for laminates with 57 to 63% fiber volume
 Wet = 7 day water immersion at 165°F (74°C)

Table 6 | Typical Properties of CYCOM 934 Composite Laminates: High Strength (>500 ksi/>3447 MPa), Standard Modulus (33 Msi/228 GPa Class) Carbon Fiber Reinforced Plain Weave Fabric - CEM Product Codes HMF 2405/34, HMF 422/34, HMF 2461D/34

Mechanical Properties	Test Condition		
	Room Temperature	200°F (93°C)	200°F (93°C) Wet
0° Tensile Properties			
Strength, ksi (MPa)	100 – 130 (689 – 896)	100 – 130 (689 – 896)	–
Modulus, Msi (GPa)	9 – 11 (62 – 76)	9 – 11 (62 – 76)	–
0° Compressive Properties			
Strength, ksi (MPa)	110 – 130 (758 – 896)	110 – 120 (758 – 827)	60 – 80 (414 – 552)
Modulus, Msi (GPa)	9 – 11 (62 – 76)	9 – 11 (62 – 76)	9 – 10 (62 – 69)
Interlaminar Shear Properties			
Strength, ksi (MPa)	11 – 12 (76 – 83)	–	6 – 7 (41 – 48)

Property values listed are typical for laminates with 57 to 63% fiber volume
Wet = 7 day water immersion at 165°F (74°C)

Table 7 | Typical Properties of CYCOM 934 Composite Laminates: High Strength (>500 ksi/>3447 MPa), Standard Modulus (33 Msi/228 GPa Class) Carbon Fiber Reinforced 5 Harness Satin Fabric - CEM Product Codes HMF 398/34, HMF 2323/34, HMF 2454/34

Mechanical Properties	Test Condition		
	Room Temperature	250°F (121°C)	250°F (121°C) Wet
0° Tensile Properties			
Strength, ksi (MPa)	110 – 130 (758 – 896)	110 – 130 (758 – 896)	90 – 100 (620 – 689)
Modulus, Msi (GPa)	11 (76)	11 (76)	8 – 10 (55 – 69)
0° Compressive Properties			
Strength, ksi (MPa)	110 – 120 (758 – 827)	90 – 100 (620 – 689)	60 – 70 (414 – 483)
Modulus, Msi (GPa)	9 – 10 (62 – 69)	9 – 10 (62 – 69)	
0° Flexural Properties			
Strength, ksi (MPa)	160 – 190 (1103 – 1310)	130 – 150 (896 – 1034)	–
Modulus, Msi (GPa)	10 (69)	10 (69)	–
Interlaminar Shear Properties			
Strength, ksi (MPa)	10 – 13 (69 – 90)	8 – 9 (55 – 62)	4 – 5 (28 – 35)

Property values listed are typical for laminates with 55 to 60% fiber volume
Wet = 7 day water immersion at 165°F (74°C)

**Table 8 | Typical Properties of CYCOM 934 Composite Laminates: High Modulus (50 Msi/345 GPa Class)
Carbon Fiber Reinforced Unidirectional Tape - CEM Product Codes Hy-E 2134A, Hy-E 2134B**

Mechanical Properties	Test Condition	
	Room Temperature	
0° Tensile Properties		
Strength, ksi (MPa)	155 – 170 (1069 – 1172)	
Modulus, Msi (GPa)	32 – 35 (221 – 241)	
Failure Strain, %	0.48 – 0.50	
0° Compressive Properties		
Strength, ksi (MPa)	130 – 150 (896 – 1034)	
Modulus, Msi (GPa)	29 – 33 (200 – 228)	
0° Flexural Properties		
Strength, ksi (MPa)	175 – 195 (1207 – 1344)	
Modulus, Msi (GPa)	30 – 33 (207 – 228)	
Interlaminar Shear Properties		
Strength, ksi (MPa)	8 – 12 (55 – 83)	

Property values listed are typical for laminates with 57 to 63% fiber volume

**Table 9 | Typical Properties of CYCOM 934 Composite Laminates: High Modulus (70 Msi/483 GPa Class)
Carbon Fiber Reinforced Unidirectional Tape - CEM Product Codes HMF 398/34, HMF 2323/34, HMF 2454/34**

Mechanical Properties	Test Condition	
	Room Temperature	350°F (177°C)
0° Tensile Properties		
Strength, ksi (MPa)	100 – 115 (680 – 793)	95 – 110 (655 – 758)
Modulus, Msi (GPa)	42 – 46 (290 – 317)	40 – 44 (276 – 304)
Failure Strain, %	0.24 – 0.25	–
0° Compressive Properties		
Strength, ksi (MPa)	55 – 70 (379 – 483)	50 – 65 (345 – 448)
Modulus, Msi (GPa)	35 – 38 (241 – 262)	34 – 39 (234 – 269)
0° Flexural Properties		
Strength, ksi (MPa)	110 – 125 (758 – 862)	105 – 120 (724 – 827)
Modulus, Msi (GPa)	36 – 40 (248 – 276)	35 – 39 (241 – 269)
Interlaminar Shear Properties		
Strength, ksi, MPa	9 – 11 (62 – 76)	9 – 11 (62 – 76)

Property values listed are typical for laminates with 57 to 63% fiber volume

Table 10 | Typical Properties of CYCOM 934 Composite Laminates: Pitch High Modulus (75 Msi/517 GPa Class) Carbon Fiber Reinforced Unidirectional Tape - CEM Product Code Hy-E 2034D

Mechanical Properties	Test Condition
	Room Temperature
0° Tensile Properties Strength, ksi (MPa) Modulus, Msi (GPa)	120 – 135 (827 – 931) 38 – 44 (262 – 304)
0° Compressive Properties Strength, ksi (MPa) Modulus, Msi (GPa)	50 – 60 (345 – 414) 30 – 35 (207 – 241)
0° Flexural Properties Strength, ksi (MPa) Modulus, Msi (GPa)	95 – 110 (655 – 758) 35 – 40 (241 – 276)
Interlaminar Shear Properties Strength, ksi (MPa)	7 – 10 (48– 69)

Property values listed are typical for laminates with 57 to 63% fiber volume

Table 11 | Typical Properties of CYCOM 934 Composite Laminates: E-Glass Fiber Reinforced Unidirectional Tape and Roving - CEM Product Codes Hy-E 9034C, Hy-E 9034E, Hy-E 9034F

Mechanical Properties	Test Condition
	Room Temperature
0° Tensile Properties Strength, ksi (MPa) Modulus, Msi (GPa) Poisson's Ratio	150 – 170 (1034 – 1172) 6 – 8 (41 – 55) 0.28 – 0.32
0° Compressive Properties Strength, ksi (MPa) Modulus, Msi (GPa)	70 – 90 (483 – 620) 6 – 8 (41 – 55)
0° Flexural Properties Strength, ksi (MPa) Modulus, Msi (GPa)	190 – 210 (1310 – 1448) 6 – 8 (41 – 55)
Interlaminar Shear Properties Strength, ksi (MPa)	13 – 17 (90– 117)

Property values listed are typical for laminates with 50 to 55% fiber volume

Table 12 | Typical Properties of CYCOM 934 Composite Laminates: S2-Glass Fiber Reinforced Unidirectional Tape and Roving - CEM Product Codes Hy-E 9134A, Hy-E 9134B, Hy-E 9134C, Hy-E 9134D

Mechanical Properties	Test Condition
	Room Temperature
0° Tensile Properties	
Strength, ksi (MPa)	180 – 200 (1241 – 1379)
Modulus, Msi (GPa)	7 – 9 (48 – 62)
Poisson's Ratio	0.28 – 0.32
0° Compressive Properties	
Strength, ksi (MPa)	80 – 100 (552 – 690)
Modulus, Msi (GPa)	6 – 8 (41 – 55)
0° Flexural Properties	
Strength, ksi (MPa)	220 – 240 (1517 – 1655)
Modulus, Msi (GPa)	6 – 8 (41 – 55)
Interlaminar Shear Properties	
Strength, ksi (MPa)	11 – 13 (76– 90)

Property values listed are typical for laminates with 50 to 55% fiber volume

APPLICATION NOTES

Figure 3 | Recommended Lay-up Procedure L3

LAY-UP PROCEDURE L-3

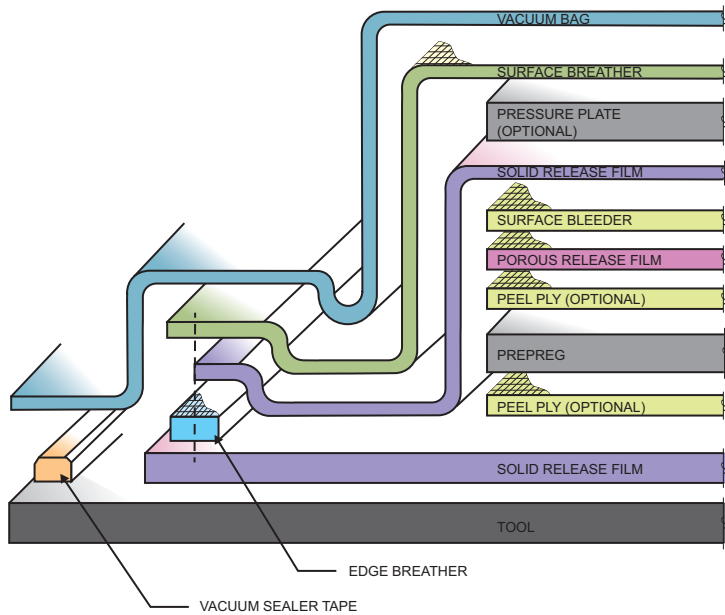


Figure 4 | Recommended Lay-up Procedure L-6

LAY-UP PROCEDURE L-6

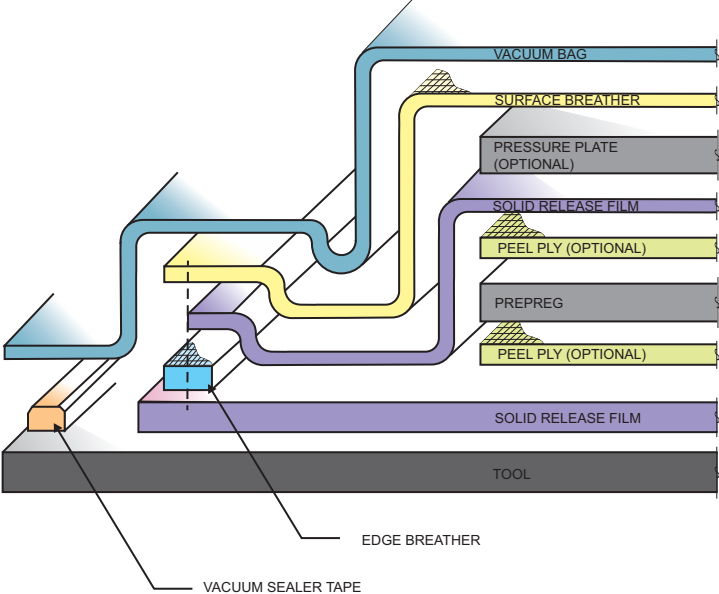


Figure 5 | Recommended Cure Cycle C-5

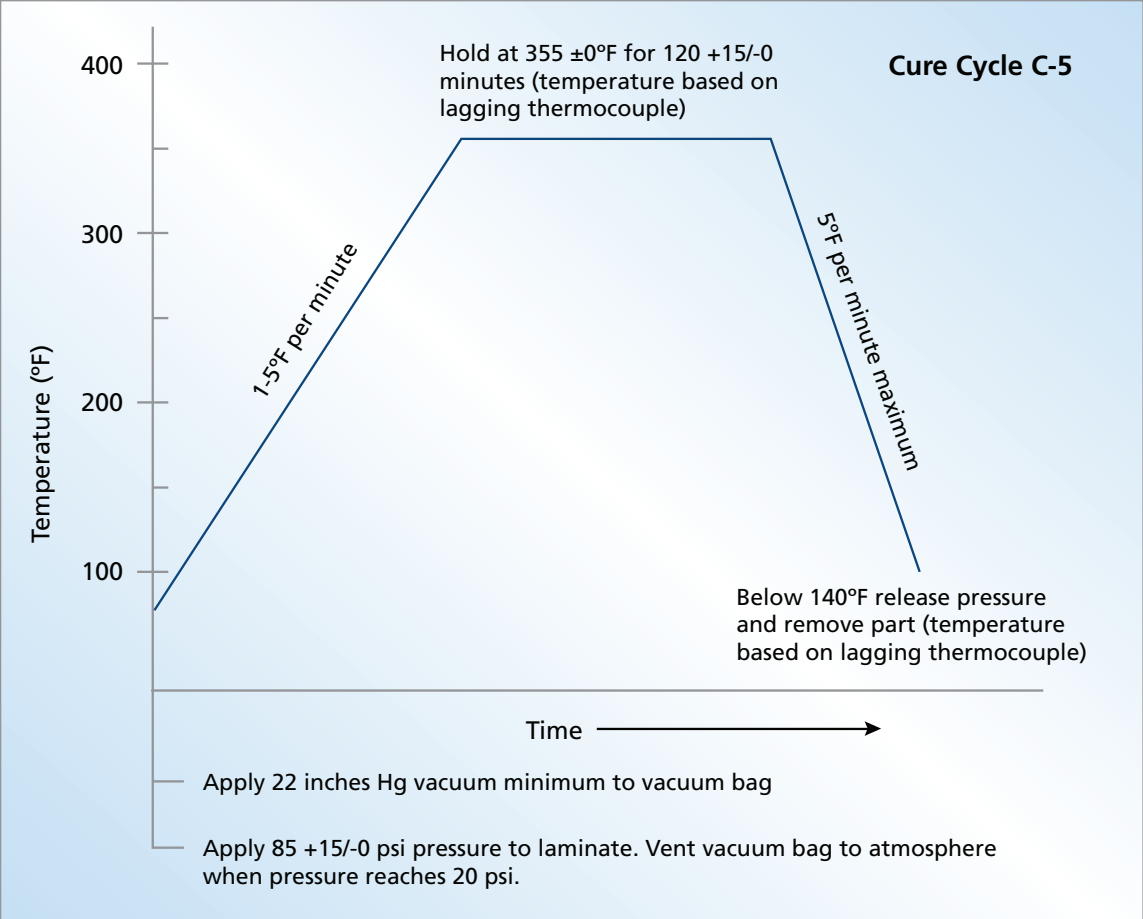
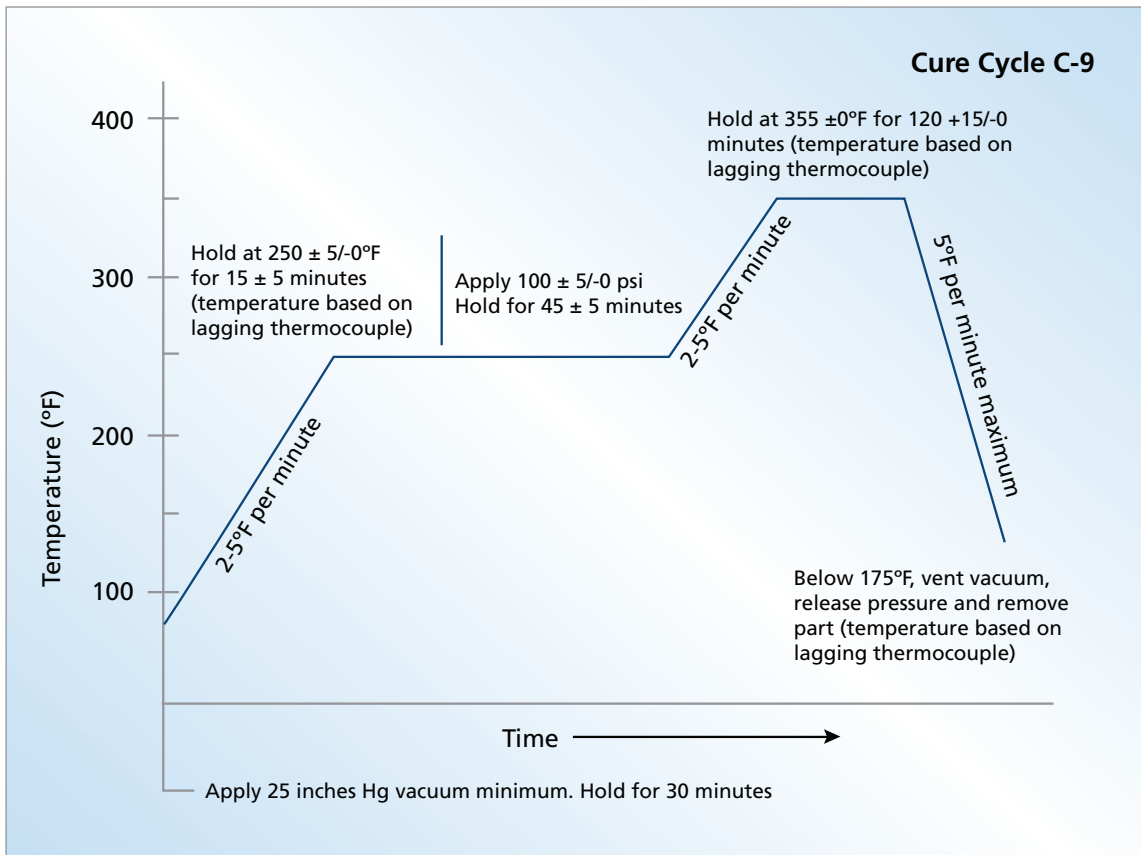


Figure 6 | Recommended Cure Cycle C-9



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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