

# > CYCOM<sup>®</sup> E773 EPOXY PREPREG

TECHNICAL DATA SHEET



## DESCRIPTION

CYCOM<sup>®</sup> E773/E773FR resins are controlled flow epoxy systems with a large processing window. They exhibit excellent high temperature performance up to 180°F (82°C) wet service temperature. The systems have good retention of tack and drape up to 20 days at room temperature in prepreg form. A straight two hour ramp cure in either a press or an autoclave may be used. No post-cure is requirement to achieve service temperature.

## FEATURES & BENEFITS

- 250°F (121°C) cure
- 180°F (82°C) wet service temperature
- Low exotherm profile
- Controlled flow
- Large processing window
- Available in both flame retardant (FR) and non-flame retardant grades
- Autoclave or press mold processing
- Available in unidirectional tape, fabric, roving, slit tape and cross-plyed forms
- History of performance on helicopter blades and other structural components
- Shelf life of 12 months at 0°F (-18°C), 20 days at 72°F (22°C)

## SUGGESTED APPLICATIONS

- Helicopter blades
- Other aircraft structural components

## CHARACTERISTICS

### Typical Resin Properties

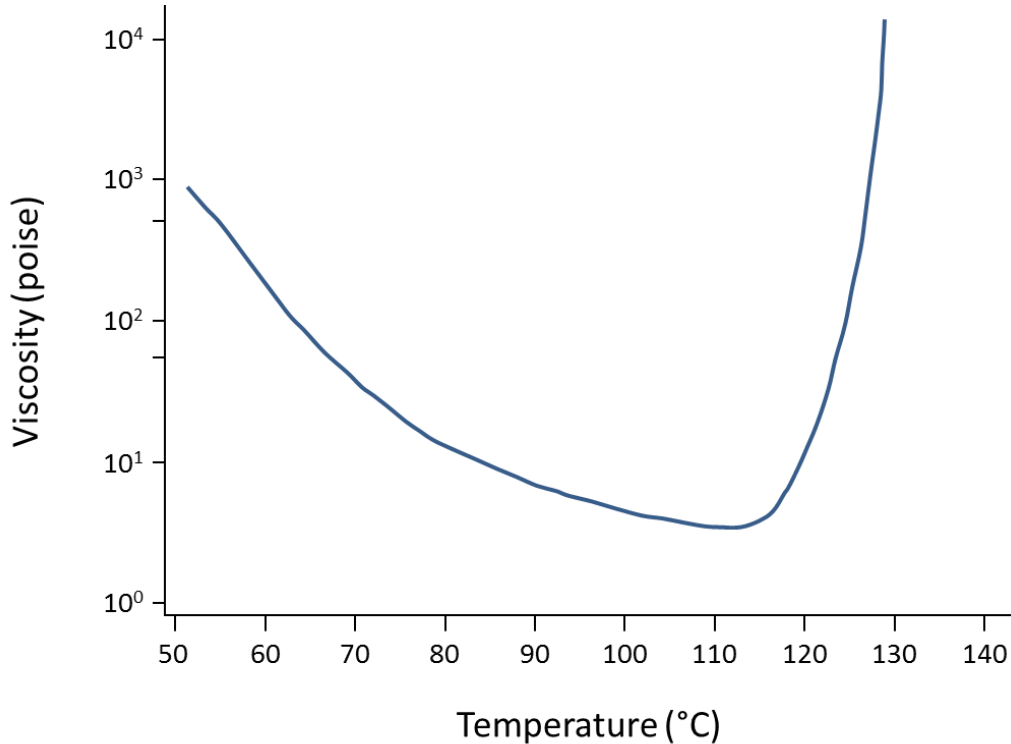


Figure 1 | CYCOM E773/E773FR Viscosity Profile (ramp of 2°C per minute)

Note the minimum viscosity for CYCOM E773/E773FR resin is approximately 5 poise and occurs at approximately 100°C

Table 1 | Typical Resin Properties

Property	Room Temp. Dry	Wet <sup>2</sup>
Tensile Strength, ksi (MPa)	9.3 (64)	-
Tensile Modulus, Msi (GPa)	0.50 (3.5)	-
Flexural Strength, ksi (MPa)	13.6 (94)	-
Flexural Modulus, Msi (GPa)	0.55 (3.8)	-
Specific Gravity	1.28	-
Tg, °C <sup>1</sup> *	155	115

<sup>1</sup> Via RDS – G"

<sup>2</sup> Wet conditioning: 90 hour water soak at 160°F (71°C)

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

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### PROPERTIES

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

Typical Cytec Engineered Materials Product Codes: HYE E773FR/AS4 12K 145, CYCOM E773FR/AS4 12 K 145

Mechanical Properties <sup>1</sup>	-65°F (-54°C) dry	Room Temp.	Room Temp. wet <sup>2</sup>	180°F (82°C) wet <sup>2</sup>
<b>0° Tensile Properties</b>				
Strength, ksi (MPa)	290 – 330 (1999 – 2275)	295 – 310 (2034 – 2137)	285 – 310 (1964 – 2137)	270 – 290 (1861 – 1999)
Modulus, Msi (GPa)	19 – 21 (131 – 145)	19 – 21 (131 – 145)	19 – 21 (131 – 145)	18 – 20 (124 – 138)
<b>0° Compressive Properties</b>				
Strength, ksi (MPa)	195 – 225 (1344 – 1551)	175 – 195 (1206 – 1344)	170 – 190 (1172 – 1310)	125 – 150 (862 – 1034)
Modulus, Msi (GPa)	19 – 21 (131 – 145)	19 – 21 (131 – 145)	19 – 21 (131 – 145)	17 – 19 (117 – 131)
<b>0° Interlaminar Shear Properties</b>				
Strength, ksi (MPa)	12 – 15 (83 – 103)	10 – 13 (69 – 90)	8 – 10 (55 – 69)	6 – 8 (41 – 55)
<b>± 45 In-plane Shear Strength Properties</b>				
Strength, ksi (MPa)	12 – 14 (83 – 97)	14 – 16 (97 – 110)	9 – 11 (62 – 76)	7 – 9 (48 – 62)

1 Property values listed are typical for laminates with cured ply thickness of 0.0056 inches

2 Wet conditioning: 160°F (71°C) and 90% RH to 1% moisture absorption

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

Typical Cytec Engineered Materials Product Codes: HMF E773FR/PW T300 3K 195

Mechanical Properties	Room Temp.	180°F (82°C) dry
<b>0° Tensile Properties</b>		
Strength, ksi (MPa)	90 – 110 (620 – 758)	90 – 110 (620 – 758)
Modulus, Msi (GPa)	8 – 10 (55 – 69)	9 – 11 (62 – 76)
<b>0° Compressive Properties</b>		
Strength, ksi (MPa)	85 – 95 (586 – 655)	75 – 90 (517 – 620)
Modulus, Msi (GPa)	9 – 10 (62 – 69)	9 – 10 (62 – 69)
<b>0° Interlaminar Shear Properties</b>		
Strength, ksi (MPa)	9 – 11 (62 – 76)	8 – 10 (55 – 69)

Property values listed are typical for laminates with 58% fiber volume

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**Table 4 | Typical Prepreg Properties: 8 Harness Satin (8HS) Fabric, E-glass Fiber Reinforcement**

Typical Cytec Engineered Materials Product Codes: MXB E773FR/7781, MXB E773FR/76281

Mechanical Properties <sup>1</sup>	Room Temp.	180°F (82°C) dry
<b>0° Tensile Properties</b> Strength, ksi (MPa) Modulus, Msi (GPa)	60 – 80 (413 – 552) 3 – 4 (21 – 28)	35 – 45 (241 – 310) 3 – 4 (21 – 28)
<b>0° Compressive Properties</b> Strength, ksi (MPa) Modulus, Msi (GPa)	75 – 95 (517 – 655) 3 – 4 (21 – 28)	40 – 50 (276 – 345) 3 – 4 (21 – 28)
<b>± 45° In-plane Shear Properties</b> Strength, ksi (MPa) Modulus, Msi (GPa)	13 – 15 (90 – 103) 1 – 2 (7 – 14)	9 – 11 (62 – 76) 1 – 2 (7 – 14)

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

**Table 5 | Typical Prepreg Properties: S-2 Glass Fiber Reinforced Roving**

Typical Cytec Engineered Materials Product Codes: FX E773/S-2 Glass

Mechanical Properties <sup>1</sup>	-75°F (-59°C) dry	Room Temp.	160°F (71°C) dry
<b>0° Tensile Properties</b> Strength, ksi (MPa) Modulus, Msi (GPa)	270 – 295 (1861 – 2034) 8 – 9 (55 – 62)	250 – 280 (1724 – 1930) 7 – 9 (48 – 62)	240 – 260 (1655 – 1792) 8 – 9 (55 – 62)
<b>90° Tensile Properties</b> Strength, ksi (MPa) Modulus, Msi (GPa)	6 – 9 (41 – 62) 2 – 3 (14 – 21)	7 – 10 (48 – 69) 1 – 2 (7 – 14)	5 – 7 (34 – 48) 1 – 2 (7 – 14)
<b>0° Compressive Properties</b> Strength, ksi (MPa) Modulus, Msi (GPa)	180 – 200 (1241 – 1379) 7 – 9 (48 – 62)	170 – 190 (1172 – 1310) 7 – 9 (48 – 62)	140 – 150 (965 – 1034) 7 – 9 (48 – 62)
<b>Interlaminar Shear Properties</b> Strength, ksi (MPa)	13 – 15 (90 – 103)	10 – 13 (69 – 90)	7 – 9 (48 – 62)

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

## 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.

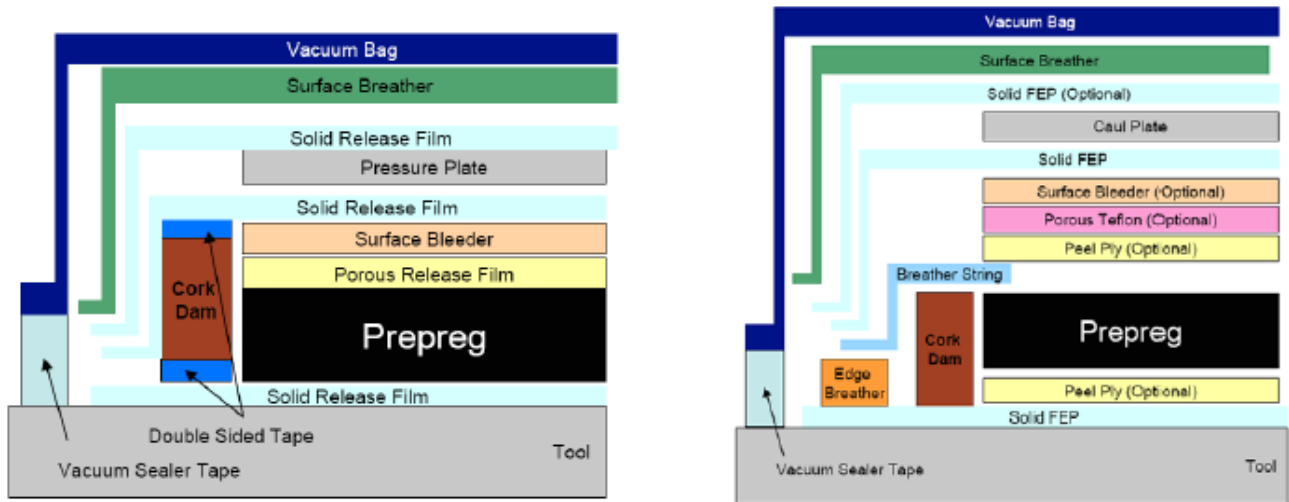
To eliminate porosity, keep the resin under pressure during cure with the use of compressible dam. Use permeable fluorocarbon-coated fabric to facilitate resin bleed. This material should be placed directly on the lay-up with sufficient layers of dry glass fabric (bleeder plies) to absorb the excess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

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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 shows recommended lay-ups for CYCOM E773/E773FR.

### Bleed Lay-ups



### No Bleed Lay-ups

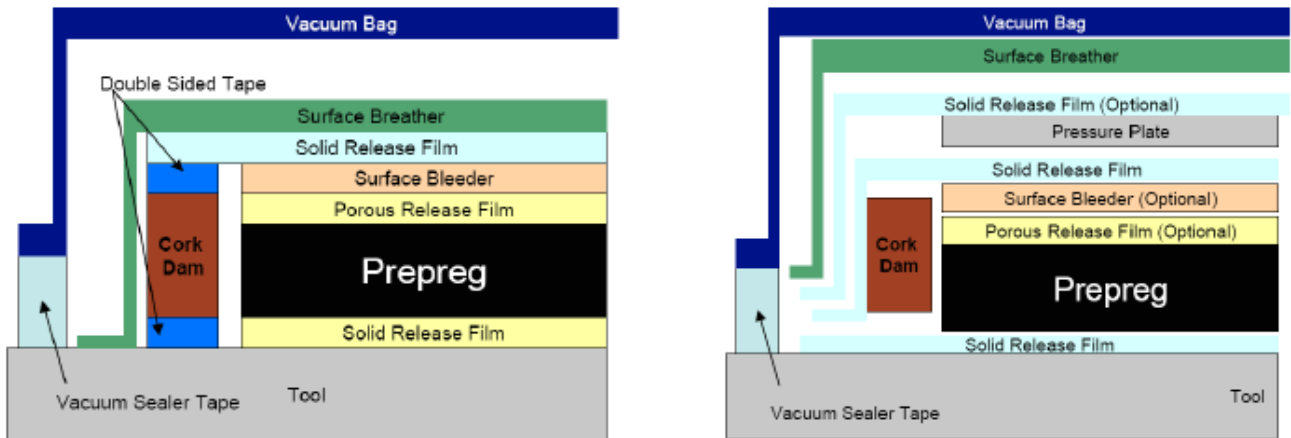


Figure 2 | Recommended lay-ups for CYCOM E773/E773FR materials

### Recommended Cure Cycles

Two cure cycles are recommended for molding CYCOM E773/E773FR materials (Figure 3 and Figure 4). Cure cycles should be tailored based on application.

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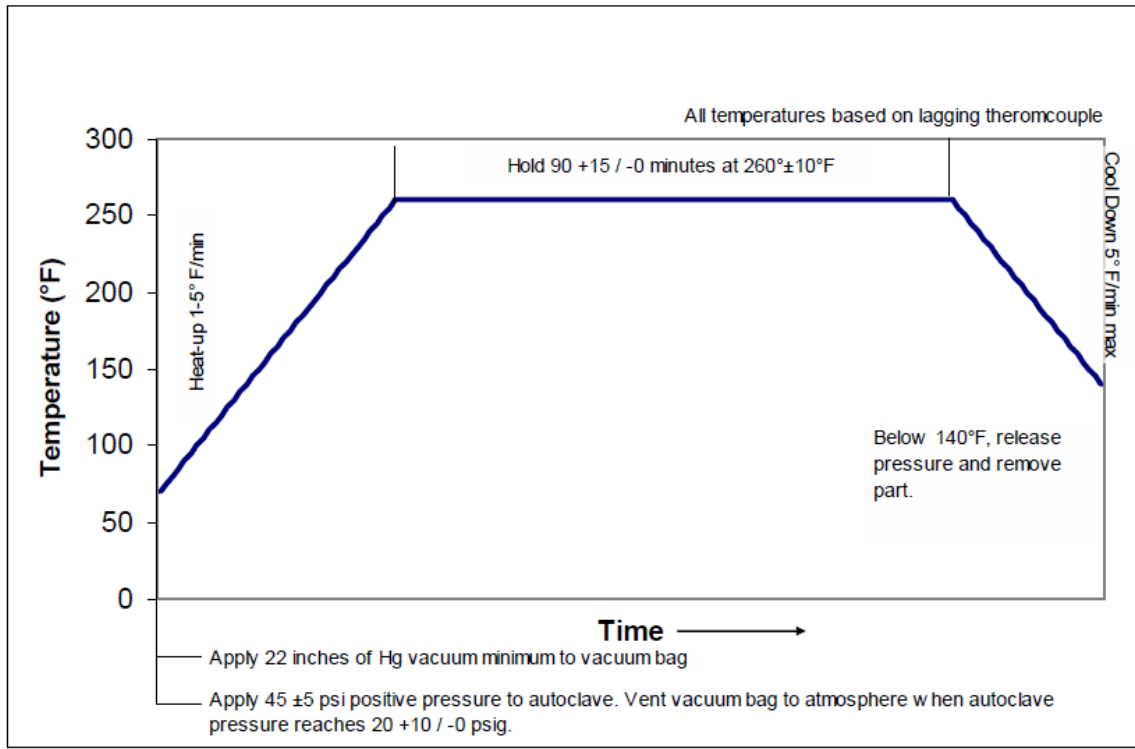


Figure 3 | Recommended Cure Cycle #1 for CYCOM E773/E773FR

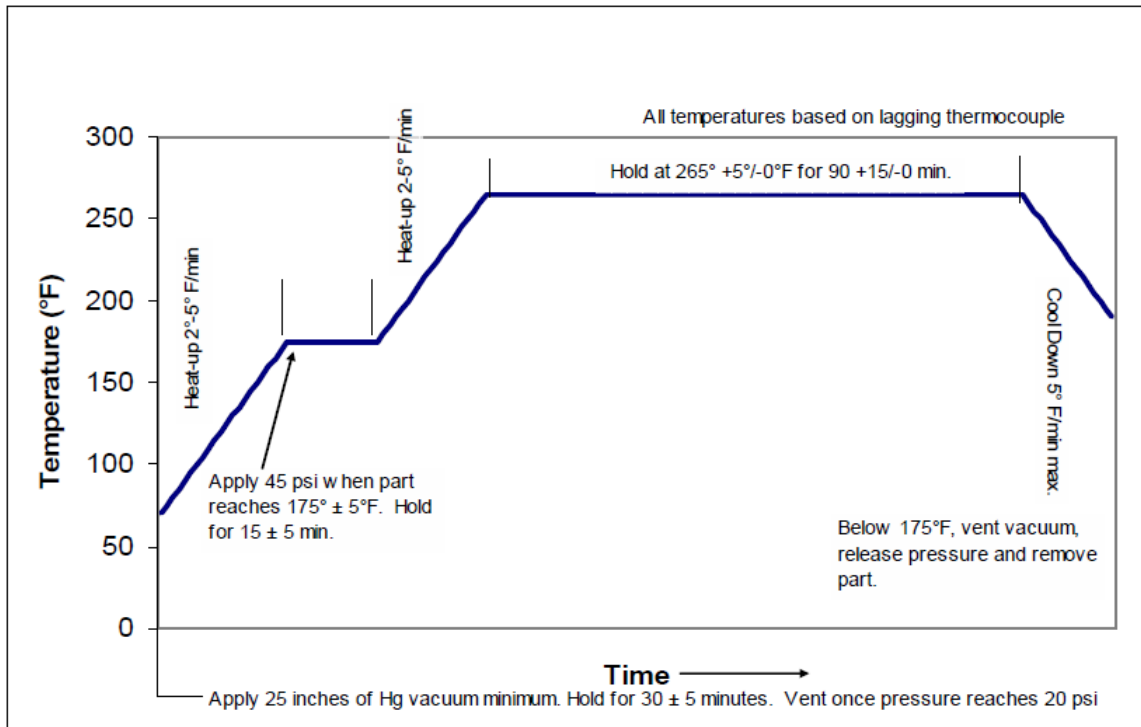


Figure 4 | Recommended Cure Cycle #2 for CYCOM E773/E773FR

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### 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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