CYCOM® 5276-1

CYCOM® 5276-1 is a 350°F (177°C) curing toughened epoxy resin with a service temperature range of -75°F to 250°F (-59°C to 121°C). This highly toughened resin is formulated with the most advanced epoxy chemistry and is specially designed for improved handling during layup and assembly.

Typical applications include primary aircraft structures where critical load-bearing components are required.

Features and Benefits

- Excellent tack and drape
- Simple 2-hour at 350°F (177°C) Cure
- Excellent flow control
- Available in various product forms
- Open mold life greater than 40 days
- High damage tolerance
- Co-cure capability
- Can be applied to other product types such as Nicalon and Tyranno silicon carbide fibers

CHARACTERISTICS

Table 1 | Physical Properties

Property	Value	Test Method
Dry Tg, °F (°C)	370°F (188°C)	ASTM D 7028
Wet Tg, °F (°C)	310°F (154°C)	ASTM D 7028
Shelf Life	6 months at or below 0°F (-18°C) from date of shipment 3 months at or below 40°F (4°C) from date of shipment	
Shop Life	14 days at or below 75°F (24°C)	

Table 2 | Product Availability

Property	Description
Roll Width	12, 38, 42, 50, & 60 in (30, 96, 107, 127, & 152 cm)
Roll Length	60 yds (55 m)

Table 3 | Handling Life Profile[1]

Out Time	Tape		Fabric	
	Tack	Drape	Tack	Drape
0 Days	4	4	5	5
10 Days	3	4	4	5

[1]: 0 = None, 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Excellent

Resin Viscosity

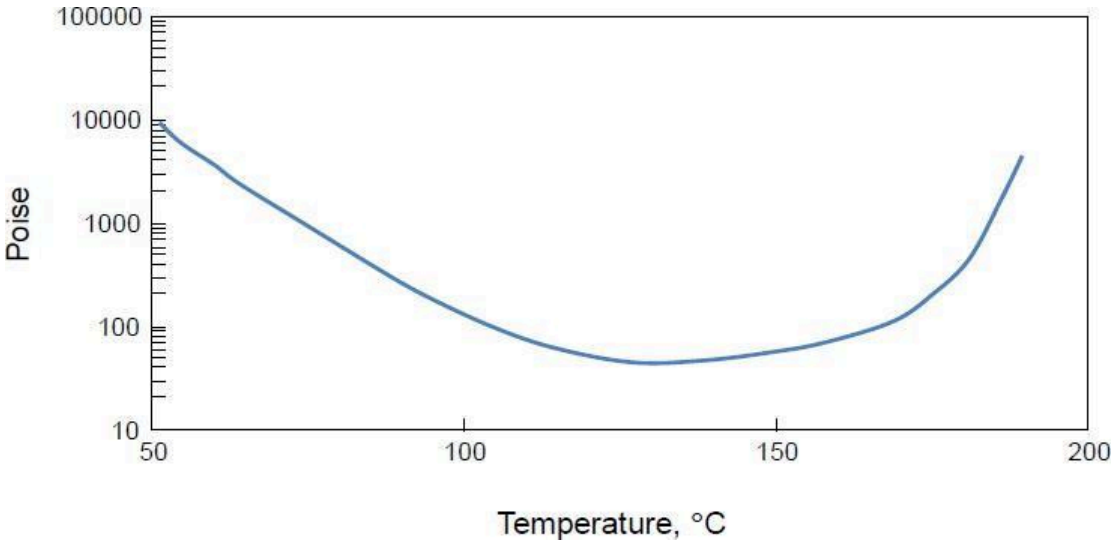

Figure 1 | CYCOM® 5276-1 Viscosity Profile

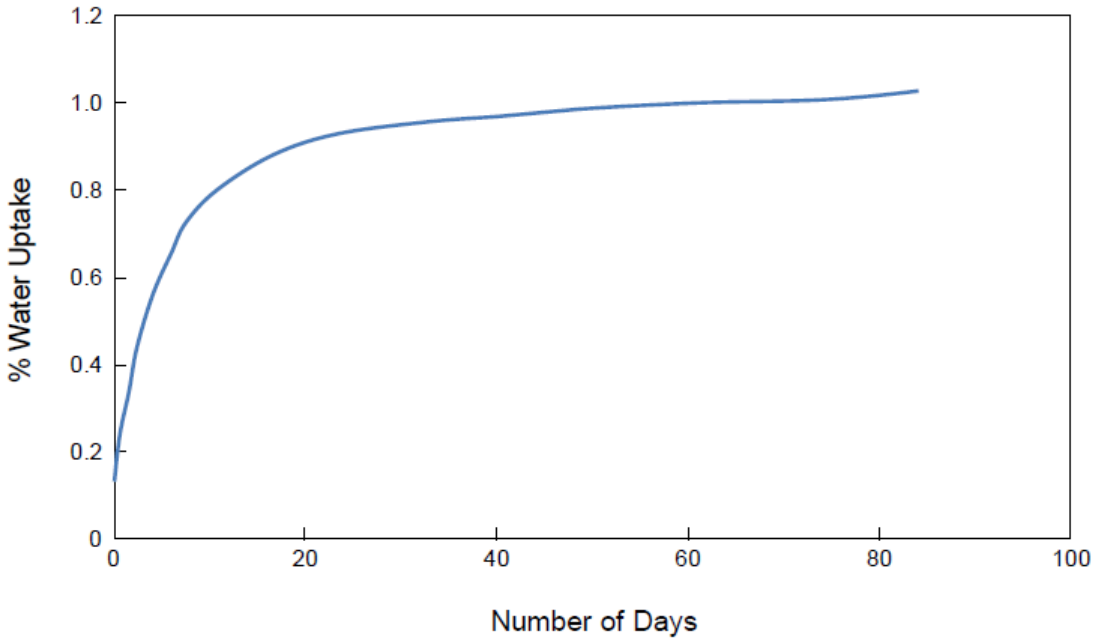

Figure 2 | CYCOM® 5276-1 Moisture Equilibrium Content

PROPERTIES

Table 3 | Mechanical Properties of CYCOM® 5276-1 Neat Resin

Property	Test Condition	G40-800 Tape	G30-500PW Fabric	Test Method
0° Tensile Strength ksi (MPa)	-67°F (-55°C) 75°F (24°C)	437 (3013) 437 (3013)	- 134 (924)	ASTM D 638
0° Tensile Modulus Msi (GPa)	-67°F (-55°C) 75°F (24°C)	22.1 (152) 22.5 (155)	- 9 (62)	ASTM D 638
90° Tensile Strength ksi (MPa)	-94°F (-70°C) -67°F (-55°C) 75°F (24°C) 180°F (82°C), wet	- 15.3 (105) 13.1 (90) -	120 (827) - 119 (820) 120 (827)	ASTM D 638
90° Tensile Modulus Msi (GPa)	-94°F (-70°C) -67°F (-55°C) 75°F (24°C) 180°F (82°C), wet	- - - -	8.9 (61) - 8.8 (60) 8.7 (59)	ASTM D 638
0° Compression Strength ksi (MPa)	75°F (24°C) 180°F (82°C), wet	253 (1744) 209 (1441)	123 (848) -	ASTM D 695
0° Compression Modulus msi (GPa)	75°F (24°C) 180°F (82°C), wet	20.7 (142) 21.1 (145)	8.9 (61) -	ASTM D 695
90° Compression Strength ksi (MPa)	-94°F (-70°C) 75°F (24°C) 180°F (82°C), wet	- - -	124 (855) 114 (786) 80 (551)	ASTM D 695
90° Compression Modulus msi (GPa)	-94°F (-70°C) 75°F (24°C) 180°F (82°C), wet	- - -	8.6 (58) 8.5 (57) 8.6 (58)	ASTM D 695
In-Plane Shear Strength ksi (MPa)	-94°F (-70°C) 75°F (24°C) 180°F (82°C), wet 250°F (121°C)	- 20.2 (139) 13.6 (93) 13.4 (92)	22.4 (154) 18.6 (128) 11.7 (81) -	ASTM D 3518
In-Plane Shear Modulus Msi (GPa)	-94°F (-70°C) 75°F (24°C) 180°F (82°C), wet 250°F (121°C)	- 0.7 (4.8) 0.6 (4.1) 0.52 (3.5)	0.83 (5.7) 0.68 (4.6) 0.52 (3.5) -	ASTM D 3518
Filled Hole Tension Strength, 35 in-lbs (4 nm) ksi (MPa)	75°F (24°C)	79 (544)	-	ASTM D 6742
Open Hole Compression Strength ksi (MPa)	-94°F (-70°C) 75°F (24°C) 180°F (82°C), wet 220°F (104°C), wet 250°F (121°C)	- - 32 (220) 32 (220) 34 (234)	56 (386) 45 (310) 35 (241) - -	ASTM D 6484
Compression after Impact ksi (MPa)	-94°F (-70°C) 75°F (24°C) 180°F (82°C), wet	- 47 (324) -	43 (296) 45 (310) 32 (220)	ASTM D 7136/7137
G_{IC} in-lb/in^2 (nm/m^2)	75°F (24°C)	2.2 (385)	-	ASTM D 5528
G_{IIC} in-lb/in^2 (nm/m^2)	75°F (24°C)	14 (2438)	-	ASTM D 5528

Table 4 | Flexural Strength (ASTM D 790) of CYCOM® 5276-1 G30-500 PW after Fluid Exposure

Test Description	Exposure Time and Temperature	Weight Gain (%)	Test Condition	Flexural Strength ksi (MPa)	Flexural Modulus msi (GPa)	Test Method
Control	-	-	75°F (24°C) 180°F (82°C)	153 (1055) 112 (772)	8.7 (60) 8.4 (58)	ASTM D 790
Anti-Freeze	30 days at 32°F (0°C)	-	75°F (24°C) 180°F (82°C)	158 (1089) 124 (855)	8.5 (58.6) 8.3 (57)	ASTM D 790
Hydraulic Fluid	90 days at 75°F (24°C)	-0.14	75°F (24°C) 180°F (82°C)	161 (1110) 134 (923)	8.4 (58) 8.4 (58)	ASTM D 790
Lubricating Fluid	90 days at 180°F (82°C)	-0.14	75°F (24°C) 180°F (82°C)	156 (1075) 138 (951)	8.5 (58.6) 8.4 (58)	ASTM D 790
Jet Fuel	90 days at 75°F (24°C)	-	75°F (24°C) 180°F (82°C)	146 (1006) 132 (910)	8.6 (59) 8.4 (58)	ASTM D 790
Cleaning Solution	7 days at 75°F (24°C)	0.16	75°F (24°C) 180°F (82°C)	154 (1061) 128 (882)	8.9 (61) 8.6 (59)	ASTM D 790
MEK	7 days at 75°F (24°C)	0.15	75°F (24°C) 180°F (82°C)	153 (1055) 130 (896)	8.7 (60) 8.5 (58.6)	ASTM D 790

Table 5 | CYCOM® 5276-1 G40-800 Unidirectional Tape Shop Life Study

Out Time	Flow[1]	Tack	Test Temperature	Open Hole Compression Strength ksi (MPa)	Test Method
0	13.2%	Excellent	75°F (24°C)	43 (296)	ASTM D 790
7	12.5%	Good	75°F (24°C)	42.7 (294)	ASTM D 790
14	14.3%	Medium	75°F (24°C)	43.1 (297)	ASTM D 790
21	13.3%	Low	75°F (24°C)	43.1 (297)	ASTM D 790
28	11.1%	Low	75°F (24°C)	44.8 (309)	ASTM D 790
35	11.6%	Low	75°F (24°C)	43.7 (301)	ASTM D 790
40	11.2%	Low	75°F (24°C)	44.5 (306)	ASTM D 790

[1]: 4 plies, 4" x 4", 350°F (177°C)/20 minutes/100 psi (0.69 MPa)

Table 6 | CYCOM® 5276-1 G30-500-3K-8HS Flatwise Tensile Strength

Property	Test Temperature	FM 300-2 Film Adhesive	No Adhesive	Substrate	Test Method
Flatwise Tensile Strength ksi (MPa)	75°F (24°C)	327 (2254)	320 (2206)	4 Ply Facing, 3PCF, 1/8" Cell, 3.0 Density Nomex® Honeycomb	ASTM C 297

Resistance to Micro-Cracking

The excellent toughness of CYCOM® 5276-1 matrix resin and its optimized resin/fiber interface characteristics offer the cured laminates the ability to withstand temperature change from -70°F to 180°F (-57°C to 82°C) during thermal cycling. Panels made from G40-800 pass 100 thermal cycle conditioning with no micro-cracks evident under 50X magnification.

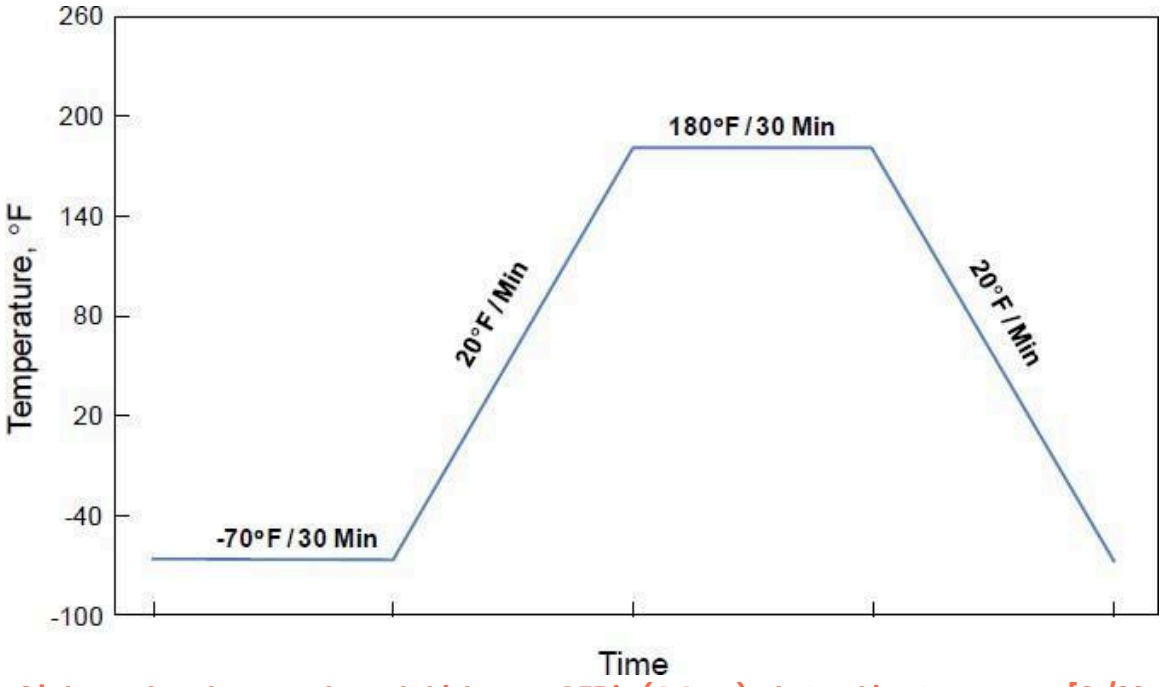

Figure 3 | Thermal Cycle – Cured Panel Thickness = 1.75 in (4.4 cm), Ply Stacking Sequence = [0_5/90_{1y10}]s, 210 plies total

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.

Cure Cycle and Thermal Sensitivity

No special bagging materials or techniques are required during the processing of CYCOM 5276-1. The resin exhibits a stable cure state after 2 hours at 350°F (177°C). The test results of Tg (dry and wet) and mechanical properties show that CYCOM® 5276-1 is insensitive to changes in heat-up rate [from 1 – 5°F/minute (0.5 – 3°C/minute)] and holding temperatures [from 345 – 365°F (174 – 185°C)].

Recommended Cure Cycle

Cure Cycle	Apply full vacuum, 24 in Hg (0.081 MPa) minimum. Apply 85 psi (0.58 MPa) positive pressure, vent vacuum at 20 psi (0.14 MPa). Heat from 75°F (24°C) to 350°F (177°C) at 1 - 5°F (0.5 - 3°C)/minute. Hold at 350°F (177°C) for 2 hours. Cool under pressure to below 160°F (72°C) at 5°F (3°C)/minute.

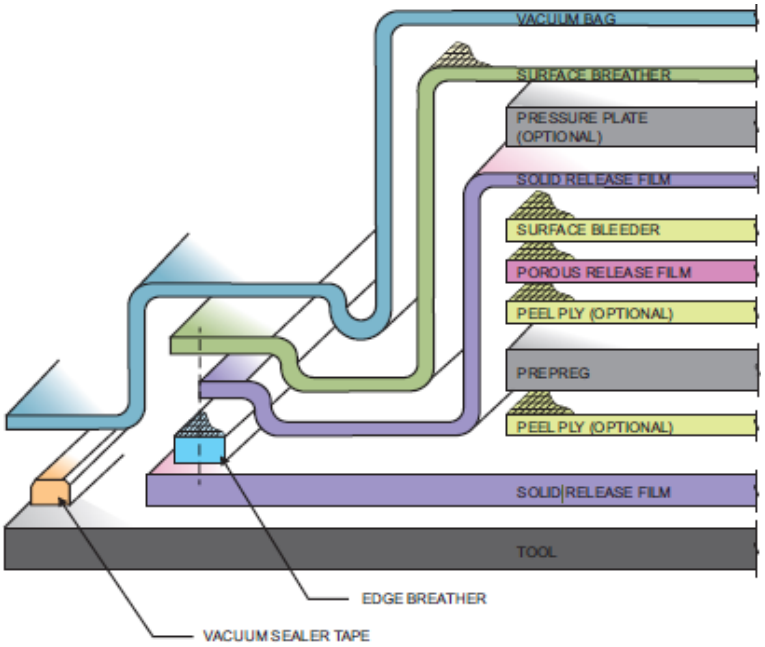

Figure 4 | Bleed Lay-up

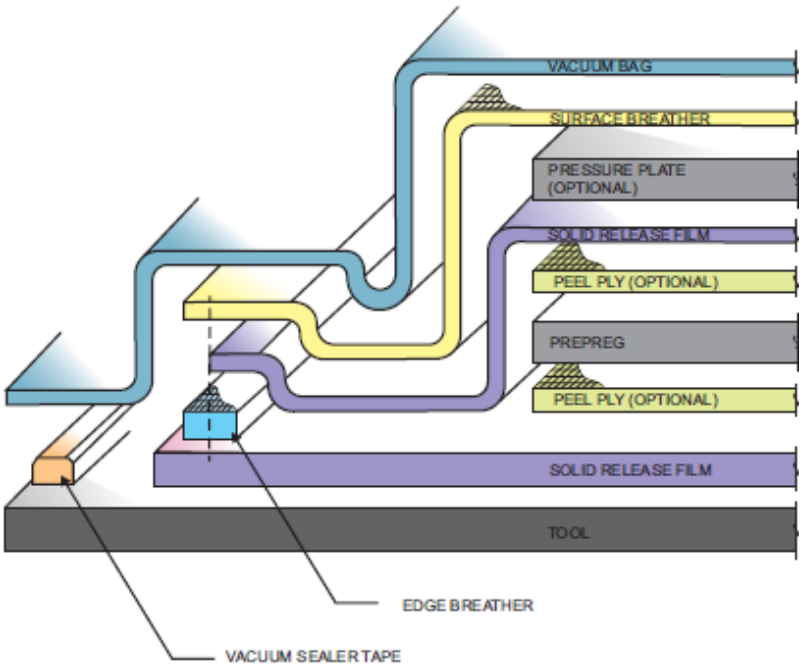

Figure 5 | No Bleed Lay-up

Recommended Consumables

Table 7 below provides a list of consumable processing materials recommended for use with CYCOM® 5276-1.

Table 7 I Processing Materials

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.