

# > CYCOM<sup>®</sup> 5276-1 EPOXY RESIN SYSTEM

TECHNICAL DATA SHEET



## DESCRIPTION

CYCOM<sup>®</sup> 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.

## FEATURES & BENEFITS

- Excellent tack and drape
- Simple 2-hour 350°F (177°C) cure cycle
- Excellent flow control
- Available in various product forms
- Open mold life greater than 40 days
- High damage tolerance
- Co-cure capability

## SUGGESTED APPLICATIONS

Primary aircraft structures where critical load-bearing components are required.

## CHARACTERISTICS

### Other

This resin system has potential to be applied to other product types such as Nicalon and Tyranno silicon carbide fibers.

### Shelf Life and Shop Life

Shelf life in sealed containers is greater than 6 months at 0°F (-18°C) and greater than 3 months at 40°F (4°C). To prevent moisture pickup, a sealed container should not be opened until the prepreg reaches ambient temperature. Shop life is greater than 14 days at room temperature.

### Working Life

The material has demonstrated over 1000 hours working life.

# > CYCOM<sup>®</sup> 5276-1 EPOXY RESIN SYSTEM

## TECHNICAL DATA SHEET

### Handling Life

Table 1 summarizes the handling profile of different product forms. The system meets 10 day handling life requirements.

Table 1 | CYCOM 5276-1 Handling Life Profile

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

0 = None; 1 = Poor; 2 = Fair; 3 = Good; 4 = Very Good; 5 = Excellent

### Prepreg Form

The prepreg is supplied as (1) unidirectional tape up to 60 inches (152.3 cm) wide or slit to requirements on 10 inch (25.4 cm) diameter cardboard cores or; (2) woven fabric up to 60 inches (152.3 cm) wide or slit to requirements on 3 inch (7.6 cm) diameter cardboard core. All materials are shipped in sealed poly bags.

Table 2 | CYCOM 5276-1 Product Forms

Carbon		Glass
Tape	Fabric	
70 to 300 AFW	Up to 60" width	Unidirectional
Up to 60" width	Any AFW	Woven
Slit tape: 1/8" and up		Roving

### Mechanical Life

CYCOM 5276-1 shows no change in mechanical performance after storage at room temperature for 1000 hours.

# CYCOM<sup>®</sup> 5276-1 EPOXY RESIN SYSTEM

## TECHNICAL DATA SHEET

### Viscosity Profile

CYCOM 5276-1 matrix resin exhibits excellent flow control under cure conditions (2°C/min, 30% strain, 10 Rad/sec, RDS-II, 25 mm Plates 0.6 mm gap).

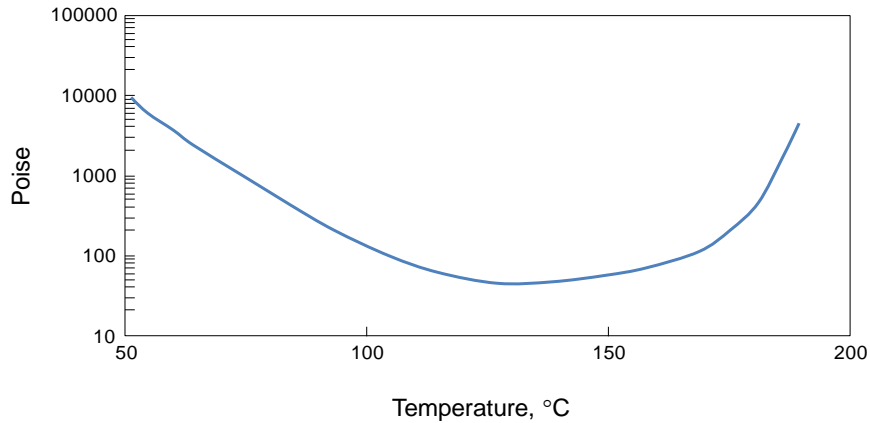


Figure 1 | CYCOM 5276-1 Viscosity Profile

### Moisture Equilibrium Content

The moisture equilibrium content of CYCOM 5276-1 is less than 1.0% for laminates (55% fiber volume) at 160°F (71°C) and 85% relative humidity.

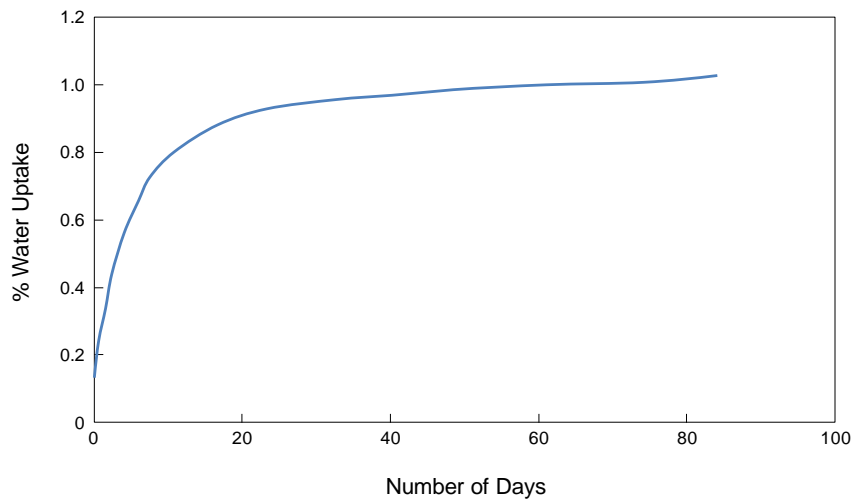


Figure 2 | CYCOM 5276-1 Moisture Equilibrium Content

# > CYCOM<sup>®</sup> 5276-1 EPOXY RESIN SYSTEM

## TECHNICAL DATA SHEET

### PROPERTIES

Table 3 | Technical Data, Neat Resins, Standard Cure + Standard Post-Cure

Property	Test Condition	G40-800 Tape	G30-500PW Fabric	Test Method
0° Tensile Strength(ksi) / Modulus(Msi)	-67°F	437 / 22.1	-	SACMA SRM-4
	75°F	437 / 22.5	134 / 9.0	
90° Tensile Strength(ksi) / Modulus(Msi)	-94°F	- / -	120 / 8.9	SACMA SRM-4
	-67°F	15.3 / -	- / -	
	75°F	13.1 / -	119 / 8.8	
	180°F Wet	- / -	120 / 8.7	
0° Compression Strength (ksi) / Modulus(Msi)	75°F	253 / 20.7	123 / 8.9	SACMA SRM-1
	180°F Wet	209 / 21.1	- / -	
90° Compression Strength(ksi) / Modulus(Msi)	-94°F	- / -	124 / 8.6	SACMA SRM-1
	75°F	- / -	114 / 8.5	
	180°F Wet	- / -	80 / 8.6	
In-plane Shear Strength(ksi) / Modulus(Msi)	-94°F	- / -	22.4 / 0.83	SACMA SRM-7
	75°F	20.2 / 0.70	18.6 / 0.68	
	180°F Wet	13.6 / 0.60	11.7 / 0.52	
	250°F	13.4 / 0.52	-	
Filled Hole Tensile Strength, ksi 35 in-lbs	75°F	79	-	SACMA SRM-5
Open Hole Compression Strength, ksi	-94°F	-	56	SACMA SRM-3 49
	75°F	-	45	
	180°F Wet	32	35	
	220°F Wet	32	-	
	250°F	34	-	
G <sub>IC</sub> (in lb/in <sup>2</sup> )	75°F	2.2	-	GE A50TF284
G <sub>IIC</sub> (in lb/in <sup>2</sup> )	75°F	14	-	GE A50TF284
Compression After Impact, ksi 1500 in lb/in	-94°F	-	43	SACMA SRM-2
	75°F	47	45	
	180°F Wet	-	32	
Dry Tg, °F *	75°F	370	-	DMA 10°C/min
Wet Tg, °F *	75°F	310	-	DMA 10°C/min

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

# > CYCOM<sup>®</sup> 5276-1 EPOXY RESIN SYSTEM

## TECHNICAL DATA SHEET

### Fluid Sensitivity

This resin system demonstrates excellent chemical resistance and retains shear strength and modulus after storage in different fluids up to 90 days.

Table 4 | G30-500PW X 3-point Flexural Strength(ksi) / Modulus(Msi) (ASTM D790) After Fluid Exposure

Test Description	Exposure Time and Temperature	Weight Gain (%)	Test Temperature	
			75°F (24°C)	180°F (82°C)
Control	-	-	153 / 8.7	112 / 8.4
Anti-freeze	30 days at 32°F	-	158 / 8.5	124 / 8.3
Hydraulic fluid	90 days at 75°F	-0.14	161 / 8.4	134 / 8.4
Lubricating fluid	90 days at 180°F	-0.14	156 / 8.5	138 / 8.4
Jet fuel	90 days at 75°F	-	146 / 8.6	132 / 8.4
Cleaning solution	7 days at 75°F	0.16	154 / 8.9	128 / 8.6
MEK	7 days at 75°F	0.15	153 / 8.7	130 / 8.5

### Working Life

This resin system demonstrates excellent chemical resistance and retains shear strength and modulus after storage in different fluids up to 90 days.

Table 5 | G40-800 Tape Prepreg Shop Life Study

Days	Flow*	Tack	Open Hole Compression Strength at 75°F (ksi)
0	13.2%	Excellent	43.0
7	12.5%	Good	42.7
14	14.3%	Medium	43.1
21	13.3%	Low	43.1
28	11.1%	Low	44.8
35	11.6%	Low	43.7
40	11.2%	Low	44.5

\*4 plies, 4" x 4", 350°F/20 minutes/100psi

### Co-Curability

Superior flow control enables CYCOM 5276-1 to co-cure with honeycomb core providing void free sandwich panels. Flatwise tensile test on panels made with no film adhesive results in core failures according to CMS 532-19. This suggests potential self-adhesive capability.

Table 6 | Flatwise Tensile G30-500-3K-8HS, 4 ply facing on 3PCF, 1/8" Cell, 3.0 Density Nomex<sup>®</sup> Honeycomb

FM 300-2 Film Adhesive	No Adhesive
327 ksi	320 ksi

# CYCOM<sup>®</sup> 5276-1 EPOXY RESIN SYSTEM

## TECHNICAL DATA SHEET

### 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.

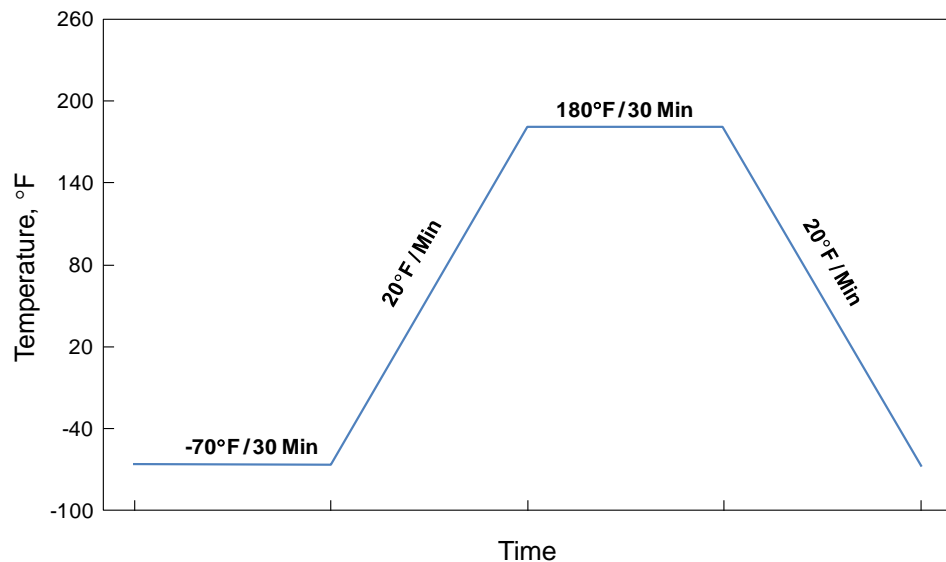


Figure 3 | Thermal Cycle – Cured Panel Thickness = 1.75 in (4.4 cm), Ply Stacking Sequence = [0<sub>5</sub>/90<sub>1</sub>]<sub>10</sub>s, 210 Plies Total

### Fatigue

The most effective resin/fiber interaction of CYCOM 5276-1 is further illustrated by 0° Short Beam Fatigue testing. Fiberglass (S2) reinforced specimens proved no failure up to 10 million cycles under 5 ksi (34.47 MPa) constant mean stress and 3 ksi (20.68 MPa) oscillatory stress at 15 Hz.

## APPLICATION NOTES

### 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 T<sub>g</sub> (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)] as specified in BMS 8-276C.

### Cure Procedure

1. Apply full vacuum
2. Apply 85 psi (586 KPa) pressure for lamination
3. Vent vacuum bag to atmosphere at 20 psi (138 KPa)
4. Heat up at 1 – 5°F/minute to 350°C (0.5 – 3°C/minute to 177°C)
5. Hold at 350°F (177°C) for 2 hours
6. Cool down at 5°F/minute to 160°F (3°C/minute to 72°C)

# > CYCOM<sup>®</sup> 5276-1 EPOXY RESIN SYSTEM

## TECHNICAL DATA SHEET

### 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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