

CYCOM® 977-6

CYCOM® 977-6 is the industry benchmark for tough lower temperature curing modified epoxy resins. It is a versatile curing toughened epoxy resin which can be cured from 135°C to 177°C, depending on service temperature requirements. Following a 180°C cure, 977-6 has a 158°C dry and a 126°C wet Tg.

CYCOM® 977-6 is formulated for lower temperature autoclave or press mould processing.

Typical applications for CYCOM® 977-6 include high performance automotive, aircraft primary and secondary structure, space structure, and any application where impact resistance and lightweight as well as versatile cure conditions are required.

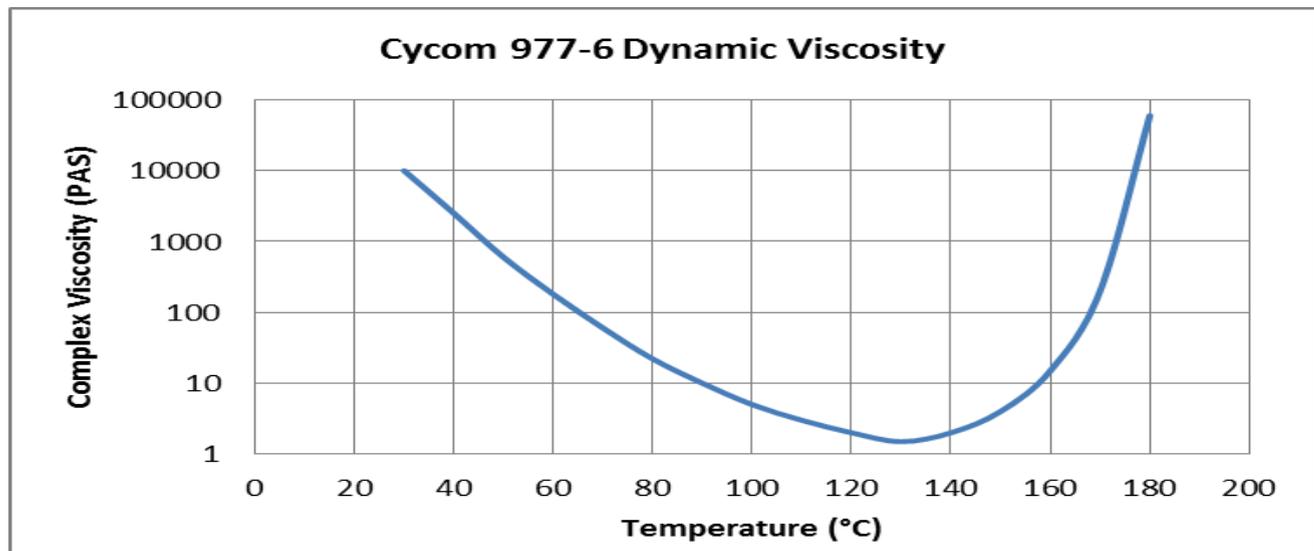
Features and Benefits

- Very high impact resistance [CSAI up to 275 MPa]
- Toughened using Syensqo's proprietary "co-continuous" morphology
- Can be cured between 135°C and 180°C
- Tg of 143°C following 3hr @ 135°C [DMA E']
- Excellent cure surface finish
- Controlled flow

PHYSICAL PROPERTIES

Property	Method	Units	Result
Colour			Yellow
Cured Resin Density	ASTM D792	g/cm ³	1.31
DMA E' onset Tg			
Std Cure	3 hrs @ 135°C (275°F)	°C (°F)	143 (289)
Post Cure	2 hrs @ 180°C (356°F)		158 (316)
Gel Time @ 135°C (275°F)	ASTM D3532	Mins	48
Resin Flow	ASTM D3531	%	9

Viscosity Curve



PRODUCT AVAILABILITY

CYCOM[®] 977-6 is available on a wide range of reinforcements including both woven and unidirectional carbon, glass and aramid fibre.

STORAGE

Outlife @ 21°C (70°F) 14 days

Storage life @ -18°C (0°F) 12 months from date of manufacture

RECOMMENDED CURE CYCLE

Autoclave Cure

Segment	Recommendation
Vacuum	Apply minimum of 950 mbar (28"Hg)*
Pressure	Apply min 80psi (0.55MPa) and maintain vacuum
Heating Rate	Ramp @ 2°C/min (3.6°F/min) to 135°C (375°F)
Dwell @ Cure	Hold @ 135°C (275°F) for minimum of 180 mins
Cool Down	Cool to below 60°C (140°F) @ 2°C/min (3.6°F/min)

* This is the ideal vacuum level, however it is recognised that this is not always possible to attain. If in doubt, please contact Technical support staff for advice

Alternative Cure Cycles

Cure	Tg E' °C (°F)	Tg Peak tan d °C (°F)
2 hrs @ 180°C (356°F)	158 (316)	174 (345)

RECOMMENDED POST CURE CYCLE

Segment	Recommendation
Ramp Rate	Ramp @ 0.3°C/min (3.6°F/min) to 180°C (356°F)
Hold at Temperature	Hold @ 180°C (356°F) for minimum of 120 mins
Cool Down	Cool to below 60°C (140°F) @ 2°C/min (3.6°F/min)



MECHANICAL PROPERTIES

CYCOM[±] 977-6-38%-HTA40-145gsm UD Tape

Test	Method	Units	Test Conditions		
			23°C (73°F) Dry*	100°C (212°F) Dry*	120°C (248°F) Wet**
0° Tensile Strength	ASTM D3039	MPa (ksi)	1745 (253)	1517 (220)	
0° Tensile Modulus	ASTM D3039	GPa (msi)	114 (16.5)	118 (17.1)	
0° Compressive Strength	ASTM D695	MPa (ksi)	1341 (194)	1143 (166)	358 (51.9)
0° Compressive Modulus	ASTM D695	GPa (msi)	123 (17.8)	127 (18.4)	131 (19.0)
In-Plane Shear Strength (IPSS)	ASTM D3518	MPa (ksi)	173 (25.1)	135 (19.6)	
In-Plane Shear Modulus (IPSM)	ASTM D3518	GPa (msi)	3.54 (0.5)		
0° Interlaminar Shear Strength	ASTM D2344	MPa (ksi)	125 (18.1)	91 (13.2)	54 (7.8)
0° G _{IC} Fracture Toughness	ASTM D5528	J/M ²	301		
0° G _{IC} Fracture Toughness		J/M ²	1212		
Compression After Impact		MPa (ksi)	252 (36.6)		

Notes: Data normalised to 60%Vf except for IPSS, IPSM & ILSS

* Cured 3 hours @ 135°C (275°F)

** 14 day water immersion @ 71°C (160°F)

CYCOM[±] 977-6-36%-140gsm UD Tape

Test	Method	Units	Test Conditions			
			IM7	T1000	M46J	M55J
			23°C (73°F) Dry*	23°C (73°F) Dry*	23°C (73°F) Dry*	23°C (73°F) Dry*
0° Tensile Strength	ASTM D3039	MPa (ksi)	2618 (380)	3293 (477)	2172 (315)	2159 (313)
0° Tensile Modulus	ASTM D3039	GPa (msi)	165 (23.9)	172 (24.9)	273 (39.6)	338 (49.0)
90° Tensile Strength	ASTM D3039	MPa (ksi)			58 (8.4)	36 (5.2)
90° Tensile Modulus	ASTM D3039	GPa (msi)			7.4 (1.1)	6.3 (0.9)
0° Compressive Strength	ASTM D695	MPa (ksi)	1689 (245)	1555 (225)	1083 (157)	1048 (152)
0° Compressive Modulus	ASTM D695	GPa (msi)		146 (21.2)	239 (34.7)	298 (43.2)
0° Flexural Strength	ASTM D790	MPa (ksi)	1741 (252)		1372 (199)	1186 (172)
0° Flexural Modulus	ASTM D790	GPa (msi)	154 (22.3)		228 (33.1)	296 (42.9)
0° Interlaminar Shear Strength	ASTM D2344	MPa (ksi)	121 (17.5)	112 (16.2)	112 (16.2)	81 (11.7)
0° G _{IC} Fracture Toughness	ASTM D5528	J/m ²	333			
0° G _{IC} Fracture Toughness		J/m ²	1138			
Compression After Impact		MPa (ksi)	276 (40.0)			

Notes: Data normalised to 60%Vf except for IPSS, IPSM & ILSS

* Cured 3 hours @ 135°C (275°F)



CYCOM[±] 977-6-42%-Woven Fabric

Test	Method	Units	Test Conditions		
			T800 2x2T 200gsm	T1000 2x2T 200 gsm	T1000 5H 280 gsm
			23°C (73°F) Dry*	23°C (73°F) Dry*	23°C (73°F) Dry*
0° Tensile Strength	ASTM D3039	MPa (ksi)	1035 (150)	1291 (187)	1200 (174)
0° Tensile Modulus	ASTM D3039	GPa (msi)	77.1 (11.2)	79.1 (11.5)	78.6 (11.4)
90° Tensile Strength	ASTM D3039	MPa (ksi)	1041 (151)	1402 (203)	1145 (166)
90° Tensile Modulus	ASTM D3039	GPa (msi)	77.1 (11.2)	80.4 (11.7)	72.4 (10.5)
0° Compressive Strength	ASTM D695	MPa (ksi)	840 (122)	890 (129)	857 (124)
0° Compressive Modulus	ASTM D695	GPa (msi)	73.9 (10.7)	80.9 (11.7)	74.4 (10.8)
90° Compressive Strength	ASTM D695	MPa (ksi)	827 (120)	890 (129)	788 (114)
90° Compressive Modulus	ASTM D695	GPa (msi)	72.8 (10.6)	80.7 (11.7)	65.1 (9.4)
In-Plane Shear Strength (IPSS)	ASTM D3518	MPa (ksi)	145 (21.0)	183 (26.5)	154 (22.3)
In-Plane Shear Modulus (IPSM)	ASTM D3518	GPa (msi)	4.4 (0.6)	3.9 (0.6)	4.8 (0.7)
0° Interlaminar Shear Strength	ASTM D2344	MPa (ksi)	96 (13.9)	94 (13.6)	79 (11.5)
0° Flexural Strength	ASTM D790	MPa (ksi)	1472 (213)	1334 (193)	1299 (188)
0° Flexural Modulus	ASTM D790	GPa (msi)	78.1 (11.3)	80.5 (11.7)	82.7 (12.0)
±45 Poisson's Ratio	-	-	0.78	0.77	0.81

Notes: Data normalised to 55%Vf except for IPSS, IPSM & ILSS

* Cured 3 hours @ 135°C (275°F)

EXOTHERM

CYCOM[®] 977-6 prepregs are reactive formulations which can undergo severe exothermic heat up during the initial curing process if incorrect curing procedures are followed.

Great care must be taken to ensure that safe heating rates, dwell temperatures and lay-up/bagging procedures are adhered to, especially when moulding solid laminates in excess of 10mm (0.4in) thickness. The risk of exotherm increases with lay-up thickness and increasing cure temperature. It is strongly recommended that trials, representative of all the relevant circumstances, are carried out by the user to allow a safe cure cycle to be specified. It is also important to recognise that the model or tool material and its thermal mass, combined with the insulating effect of breather/bagging materials can affect the risk of exotherm in particular cases.

HEALTH & SAFETY

Please refer to the product SDS for safe handling, personal protective equipment recommendations and disposal considerations.

