

**CYCOM<sup>®</sup> 381**

CYCOM<sup>®</sup> 381 is a 250°F (121°C) curing epoxy resin available with a variety of glass and carbon fabric reinforcements. CYCOM<sup>®</sup> 381 ensures high 180°F (82°C)/wet mechanical properties yet has excellent fatigue and durability necessary for primary structure applications. CYCOM<sup>®</sup> 381 offers a three-to four- fold increases in fatigue life compared to perhaps all conventional 250°F (121°C) curing epoxy prepregs. This increases the result of a 10-15% higher strain endurance limit

Typical applications include primary and secondary structural aircraft parts requiring retention of properties and/or excellent fatigue behaviour, components that require good durability and/or low processing temperatures, helicopter rotor blades, rotating or cycled components, co-cured aluminium assemblies/parts, doublers, propellers, and composite repair.

**Features and Benefits**

- Excellent 180°F (82°C)/wet properties
- Service temperature up to 220°F (104°C)
- Inherent toughness provides good durability and compression after impact performance
- Low moisture absorption
- Excellent for vacuum pressure/oven processing

**CHARACTERISTICS****Table 1 | Physical Properties**

Property	Value	Test Method
Volatiles, wt % max	1	ASTM D 3530
Gel time, minutes	6	ASTM D 3532
Laminate Tg, °F (C°)	260 (127)	ASTM D 7028
Neat Resin Tg, °F (C°)	Dry: 284 (140) Wet: 234 (112)	ASTM D 7028
Shelf Life	12 months at or below 0°F (-18°C) from date of shipment	
Shop Life	30 days at or below 75°F (24°C)	

**Table 2 | Product Availability**

Property	Description
Unidirectional Tape Roll Width	12, 16, 24, 36,40, 48 in (30.5, 40.5, 61, 91, 102, 122 cm)
Woven Fabric Roll Width	48, 50 in (122, 127 cm)
Roll Length	60 yds (55 m)

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**PROPERTIES**

**Table 3 | Mechanical Properties of CYCOM<sup>®</sup> 381 with IM7 Unidirectional Carbon Tape<sup>1</sup>**

Property	Test Condition	Value	Test Method
0° Tensile Strength ksi (MPa)	-65°F (-54°C)	368 (2537)	ASTM D 638
	75°F (24°C)	358 (2468)	
	160°F (71°C), wet	331 (2282)	
	180°F (82°C)	339 (2337)	
	220°F (104°C)	345 (2379)	
0° Tensile Modulus Msi (GPa)	-65°F (-54°C)	24.3 (168)	ASTM D 638
	75°F (24°C)	24 (165)	
	160°F (71°C), wet	24.5 (169)	
	180°F (82°C)	24 (165)	
	220°F (104°C)	23.2 (160)	
0° Tensile Strain %	-65°F (-54°C)	1.54	ASTM D 638
	75°F (24°C)	1.51	
	160°F (71°C), wet	1.35	
	180°F (82°C)	1.42	
	220°F (104°C)	1.49	
90° Tensile Strength ksi (MPa)	-65°F (-54°C)	6.3 (43)	ASTM D 638
	75°F (24°C)	5.5 (38)	
	180°F (82°C)	5.4 (37)	
90° Tensile Modulus msi (GPa)	-65°F (-54°C)	1.4 (9.65)	ASTM D 638
	75°F (24°C)	1.28 (8.83)	
	180°F (82°C)	1.12 (7.72)	
0° Compression Strength ksi (MPa)	-65°F (-54°C)	202 (1393)	ASTM D 695
	75°F (24°C)	215 (1482)	
	160°F (71°C), wet	188 (1296)	
	180°F (82°C)	207 (1427)	
	220°F (104°C)	191 (1317)	
0° Compression Modulus msi (GPa)	-65°F (-54°C)	21.4 (148)	ASTM D 695
	75°F (24°C)	21.5 (149)	
	160°F (71°C), wet	21.7 (150)	
	180°F (82°C)	21.7 (150)	
	220°F (104°C)	-	
In Plane Shear Strength ksi (MPa)	-65°F (-54°C)	19.1 (132)	ASTM D 3518
	75°F (24°C)	18.6 (128)	
	160°F (71°C), wet	13.9 (96)	
	180°F (82°C)	15.5 (107)	
	180°F (82°C), wet	11.9 (82)	
	220°F (104°C), wet	10.0 (69)	
In Plane Shear Modulus msi (GPa)	250°F (121°C)	14.3 (99)	ASTM D 3518
	-65°F (-54°C)	0.74 (5.1)	
	75°F (24°C)	0.63 (4.3)	
	160°F (71°C), wet	0.52 (3.6)	
	180°F (82°C)	0.55 (3.8)	
	180°F (82°C), wet	0.47 (3.2)	
	220°F (104°C), wet	0.27 (1.9)	
250°F (121°C)	0.49 (3.4)		

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Property	Test Condition	Value	Test Method
Open Hole Compression Strength ksi (MPa)	75°F (24°C)	44 (303)	ASTM D 6484
	180°F (82°C)	38 (262)	
	180°F (82°C), wet	32 (221)	
	220°F (104°C), wet	26 (179)	
	250°F (121°C)	33 (227)	
Compression After Impact Strength* ksi (MPa)	75°F (24°C)	34 (234)	ASTM D 7136/7137
0° Short Beam Shear Strength ksi (MPa)	-65°F (-54°C)	15.8 (109)	ASTM D 2344
	75°F (24°C)	13.3 (92)	
	160°F (71°C), wet	7.8 (54)	
	180°F (82°C)	9.6 (66)	
0° Flexural Strength ksi (MPa)	75°F (24°C)	211 (1455)	ASTM D 790
	220°F (104°C)	180 (1241)	
0° Flexural Modulus msi (GPa)	75°F (24°C)	19.7 (136)	ASTM D 790
	220°F (104°C)	21.4 (148)	
G <sub>IC</sub> in-lb/in <sup>2</sup> (nm/m <sup>2</sup> )	75°F (24°C)	2.1 (367.5)	ASTM D 5528

<sup>1</sup>: Autoclave cure cycle, Cure ply thickness = 0.0053 in (0.142 mm), 33% nominal resin content.

\*: CAI (Quasi), 1500 in-lb/in (6675 nm/m) impact.

**Table 4 | Mechanical Properties of CYCOM<sup>®</sup> 381 with AS4 Unidirectional Carbon Tape<sup>1</sup>**

Property	Test Temperature	Value	Test Method
[0°/90°] Tensile Strength ksi (MPa)	75°F (24°C)	136 (934)	ASTM D 638
[0°/90°] Tensile Modulus msi (GPa)	75°F (24°C)	10.6 (73.3)	ASTM D 638
[0°/90°] Compression Strength ksi (MPa)	75°F (24°C)	144 (933)	ASTM D 695
Compression After Impact Strength* ksi (MPa)	75°F (24°C)	32.5 (224)	ASTM D 7136/7137
In Plane Shear Strength ksi (MPa)	75°F (24°C)	18.6 (128)	ASTM D 3518
In Plane Shear Modulus msi (GPa)	75°F (24°C)	0.66 (4.6)	ASTM D 3518

<sup>1</sup>: Autoclave cure cycle, Cure ply thickness = 0.0053 in (0.142 mm), 35% nominal resin content.

\*: CAI (Quasi), 1500 in-lb/in (6675 nm/m) impact.

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**Table 5 | Mechanical Properties of CYCOM<sup>®</sup> 381 with S-2 Unidirectional Glass Tape<sup>1</sup>**

Property	Test Temperature	Value	Test Method
0° Tensile Strength ksi (MPa)	-65°F (-54°C)	266 (1834)	ASTM D 638
	75°F (24°C)	256 (1765)	
	160°F (71°C), wet	115 (793)	
	180°F (82°C)	224 (1544)	
	220°F (104°C)	216 (1489)	
0° Tensile Modulus msi (GPa)	-65°F (-54°C)	6.99 (48.2)	ASTM D 638
	75°F (24°C)	6.95 (47.9)	
	160°F (71°C), wet	6.81 (47.0)	
	180°F (82°C)	6.72 (46.3)	
	220°F (104°C)	6.63 (45.7)	
0° Tensile Strain %	-65°F (-54°C)	3.80	ASTM D 638
	75°F (24°C)	3.68	
	160°F (71°C), wet	1.69	
	180°F (82°C)	3.34	
	220°F (104°C)	3.27	
90° Tensile Strength ksi (MPa)	-65°F (-54°C)	10.3 (71)	ASTM D 638
	75°F (24°C)	8.7 (60)	
	160°F (71°C), wet	3.6 (25)	
	180°F (82°C)	6.4 (44)	
90° Tensile Modulus msi (GPa)	-65°F (-54°C)	2.16 (14.9)	ASTM D 638
	75°F (24°C)	1.84 (12.7)	
	160°F (71°C), wet	1.09 (7.51)	
	180°F (82°C)	1.56 (10.8)	
0° Compression Strength ksi (MPa)	-65°F (-54°C)	177 (1220)	ASTM D 695
	75°F (24°C)	178 (1227)	
	160°F (71°C), wet	137 (945)	
	180°F (82°C)	173 (1193)	
	220°F (104°C)	129 (889)	
0° Compression Modulus msi (GPa)	-65°F (-54°C)	6.9 (47.6)	ASTM D 695
	75°F (24°C)	7 (48.3)	
	160°F (71°C), wet	6.94 (47.9)	
	180°F (82°C)	6.95 (47.9)	
	220°F (104°C)	-	

<sup>1</sup>: Autoclave cure cycle, Cure ply thickness = 0.0053 in (0.142 mm), 33% nominal resin content.

**Table 6 | Mechanical Properties of CYCOM<sup>®</sup> 381 with E-Glass Fabric<sup>1</sup>**

Property	Test Temperature	Value	Test Method
0° Tensile Strength ksi (MPa)	-65°F (-54°C)	92.2 (636)	ASTM D 638
	75°F (24°C)	68.5 (472)	
	160°F (71°C), wet	45.4 (313)	
	220°F (104°C), wet	37.9 (261)	
	220°F (104°C)	55.9 (385)	
0° Tensile Modulus msi (GPa)	-65°F (-54°C)	4.08 (28.1)	ASTM D 638
	75°F (24°C)	3.92 (27.0)	
	160°F (71°C), wet	3.83 (26.4)	
	220°F (104°C), wet	3.17 (21.9)	
	220°F (104°C)	3.67 (25.3)	

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Property	Test Temperature	Value	Test Method
0° Tensile Strain %	-65°F (-54°C)	1.55	ASTM D 638
	75°F (24°C)	-	
	160°F (71°C), wet	-	
	220°F (104°C), wet	-	
	220°F (104°C)	1.52	
90° Tensile Strength ksi (MPa)	-65°F (-54°C)	78 (538)	ASTM D 638
	75°F (24°C)	66.3 (457)	
	180°F (82°C)	38.8 (268)	
	220°F (104°C)	33.7 (232)	
90° Tensile Modulus msi (GPa)	-65°F (-54°C)	3.92 (27)	ASTM D 638
	75°F (24°C)	3.81 (26.3)	
	180°F (82°C)	3.42 (23.6)	
	220°F (104°C)	3.13 (21.6)	
0° Compression Strength ksi (MPa)	-65°F (-54°C)	114 (786)	ASTM D 695
	75°F (24°C)	91.2 (629)	
	180°F (82°C), wet	45.3 (312)	
	220°F (104°C), wet	28.6 (197)	
	220°F (104°C)	75 (517)	
0° Compression Modulus msi (GPa)	-65°F (-54°C)	4.40 (30.3)	ASTM D 695
	75°F (24°C)	4.31 (29.4)	
	180°F (82°C), wet	4.01 (26.6)	
	220°F (104°C), wet	- (-)	
	220°F (104°C)	- (-)	
90° Compression Strength ksi (MPa)	-65°F (-54°C)	81.6 (563)	ASTM D 695
	75°F (24°C)	70 (483)	
	180°F (82°C), wet	37.7 (260)	
	220°F (104°C), wet	24.1 (166)	
90° Compression Modulus msi (GPa)	-65°F (-54°C)	4.40 (30.3)	ASTM D 695
	75°F (24°C)	4.26 (29.4)	
	180°F (82°C), wet	3.86 (3.86)	
	220°F (104°C), wet	-	
In Plane Shear Strength ksi (MPa)	-65°F (-54°C)	19 (131)	ASTM D 3518
	75°F (24°C)	14.5 (100)	
	180°F (82°C), wet	8.6 (59)	
	220°F (104°C), wet	7.6 (52)	
In Plane Shear Modulus msi (GPa)	-65°F (-54°C)	0.91 (6.3)	ASTM D 3518
	75°F (24°C)	0.73 (5)	
	180°F (82°C), wet	0.39 (2.7)	
	220°F (104°C), wet	0.22 (1.5)	
Short Beam Shear Strength ksi (MPa)	75°F (24°C)	100 (690)	ASTM D 2344
	250°F (121°C)	86 (593)	
Short Beam Shear Modulus ksi (MPa)	75°F (24°C)	3.7 (26)	ASTM D 2344
	250°F (121°C)	3.5 (24)	

<sup>1</sup>: Autoclave cure cycle, Cure ply thickness = 0.0053 in (0.142 mm), 33% nominal resin content.

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**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.

**Recommended Cure Cycle**

**Autoclave Cure Cycle**

Apply full vacuum, 24 in Hg (0.081 MPa) minimum.  
 Heat from 75°F (24°C) to 260°F ± 10°F (127°C ± 5°C) at 5°F (3°C)/minute.  
 Apply 50 psi (0.35 MPa) positive pressure, vent vacuum at 45 psi (0.12 MPa).  
 Hold at 260°F (127°C) for 100 +10/-0 minutes.  
 Cool under pressure to below 150°F (66°C) at 5°F (3°C)/minute.

**Vacuum Cure Cycle**

Apply full vacuum, 24 in Hg (0.081 MPa) minimum.  
 Heat from 75°F (24°C) to 260°F ± 10°F (127°C ± 5°C) at 5°F (3°C)/minute.  
 Hold at 260°F (127°C) for 100 +10/-0 minutes.  
 Cool under pressure to below 150°F (66°C) at 5°F (3°C)/minute.

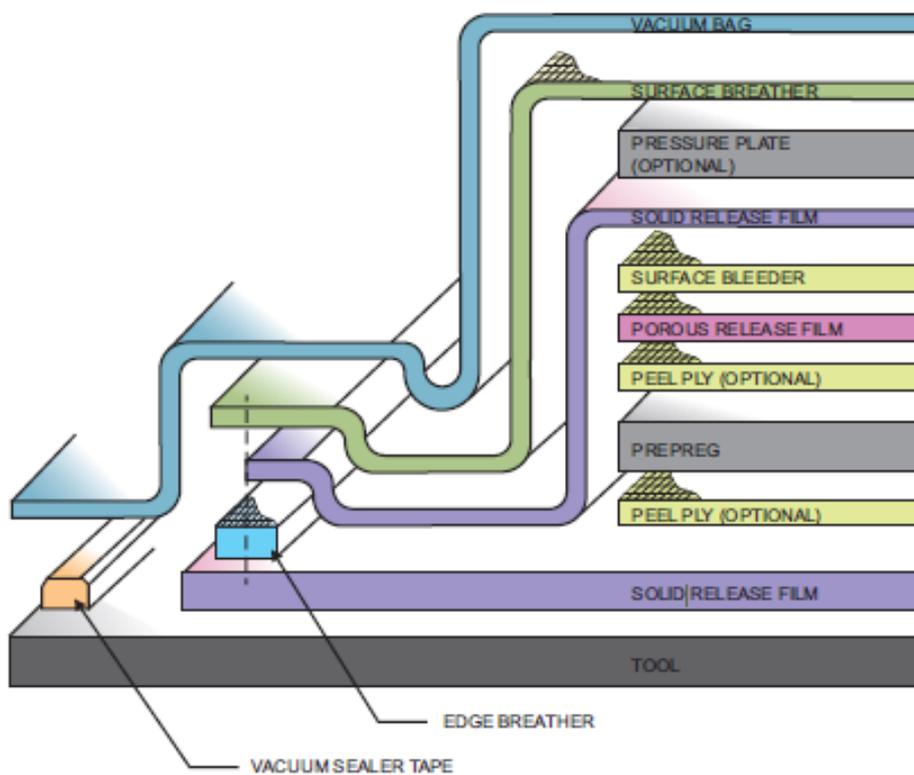


Figure 1 | Recommended Lay-up



**Recommended Consumables**

Table 7 below provides a list of Solvay's consumable processing materials recommended for use with CYCOM<sup>®</sup> 381.

**Table 7 | Solvay's 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

