CYCOM® 2400-1

CYCOM® 2400-1 is a highly flame retardant phenolic resin system with exceptionally low heat release and smoke release characteristics, and is formulated with no antimony trioxide. A proprietary technology enables cure to be carried out at temperatures as low as 200°F (93°C) or more rapidly at higher temperatures, while maintaining exceptionally long out-life at room temperature.

CYCOM® 2400-1 has adjustable tack, and prepregs manufactured with the resin are self-adhesive with excellent capabilities to bond to a variety of foams and honeycomb cores for sandwich applications. Standard reinforcements include Style 120 and Style 7781 woven glass fabrics, as well as T650 woven carbon fabric. CYCOM® 2400-1 prepreg is formulated for both autoclave processing and press cure, and the recommended bagging and cure cycle procedures for honeycomb core and laminates are pictured below.

Typical applications for CYCOM® 2400-1 include transport interior components requiring honeycomb sandwich panels, or other aerospace applications with requirements for low flammability characteristics.

Features and Benefits

- Extremely low heat release, smoke release, and flammability
- Meets FAR 25.853 (9.1), Amendment 25-66. Appendix F, Parts IV and V
- No antimony trioxide in resin formulation
- Shelf Life 6 months at 0°F (-18°C), 10 days at 75°F (24°C)
- Controlled Flow
- Adjustable Tack
- Self-adhesive prepreg with excellent peel strength on cores
- Recommended for bagging applications where a higher softness is required.
- Suitable for vacuum bag molding, multiple opening press, crushed core and pultrusion
- Exceptional surface finish and light color laminates

CHARACTERISITICS

Table 1 | Physical Properties of CYCOM® 2400-1 Prepreg

Property	Glass Style 120	Glass Style 7781	Carbon 3k T650 8HS	Test Method
Resin Content, %	41-46	39-44	41-46	ASTM D 3529
Resin Flow, %	3-17	14-28	16-30	ASTM D 3531
Volatiles, %	10 Max	10 Max	10 Max	ASTM D 3530
Tg[1], °F (°C)	-	~280 (138)	~250 (121)	ASTM D 7028
Shelf Life	6 months at or below 0°F (-18°C) from date of shipment			
Shop Life	10 days at or below 75°F (24°C)			

[1]Glass Transition Temperature (Onset Storage Modulus) by DMA

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Table 2 | Product Availability

Property	Description
Forms	Low Tack or Medium Tack
Roll Width	60 in (152 cm)
Roll Length	60 yds (55 m)

Resin Viscosity

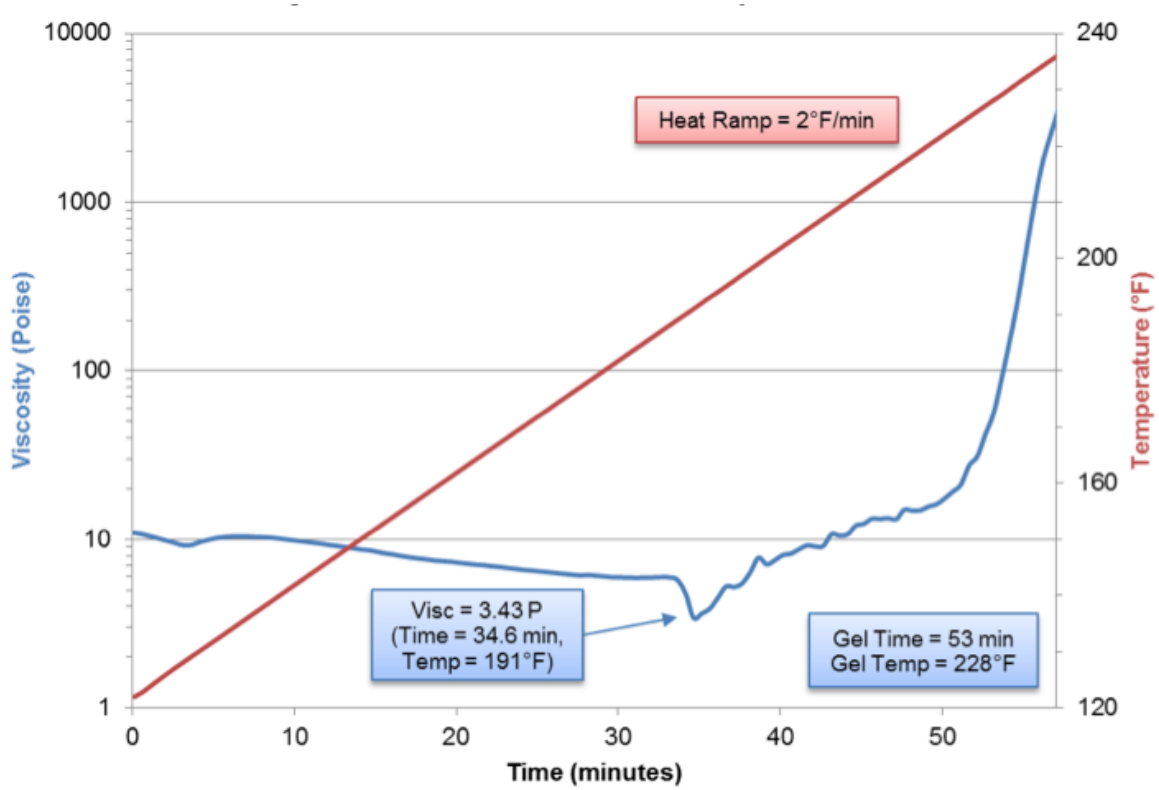

Figure 1 | CYCOM® 2400-1 Neat Resin Viscosity Curve

Flammability Properties

Table 3 | Nominal Flammability Properties of CYCOM® 2400-1 Cured Laminate

Test	Property	Glass	Carbon	Test Method
60-Second Vertical Burn	Self-Extinguish Time, seconds	<1	<1	FAR 25.853
	Burn Length, inches (cm)	<1 (2.5)	<1 (2.5)	
	Resin Drips	0	0	
OSU Heat Release	Peak Heat Release Rate, kW/m^2	30	47	FAR 25.853
	2-Min Total Heat Release Rate, $kW\text{-}min/m^2$	9	9	
Specific Optical Density	Smoke Density, $^4D_{max}$	14	14	FAR 25.853

Similar test can be run by ASTM E 906.

PROPERTIES

Table 4 | Mechanical Properties of CYCOM® 2400-1 Autoclave Cured Laminate

Property	Glass Style 7781	Carbon 3K T650 8HS	Test Method[1]
0° Tension Strength ksi (MPa)	64 (441)	134 (924)	ASTM D 638 / ASTM D 3039
0° Tension Modulus Msi (GPa)	3.6 (24.8)	9.3 (64.1)	ASTM D 638 / ASTM D 3039
90° Tension Strength ksi (MPa)	56 (386)	114 (786)	ASTM D 638 / ASTM D 3039
90° Tension Modulus Msi (GPa)	3.4 (23.4)	9.0 (62.1)	ASTM D 638 / ASTM D 3039
0° Compression Strength ksi (MPa)	76 (524)	104 (717)	ASTM D 695 / ASTM D 6641
0° Compression Modulus Msi (GPa)	4.1 (28.3)	8.9 (61.4)	ASTM D 695 / ASTM D 6641
90° Compression Strength ksi (MPa)	68 (469)	98 (676)	ASTM D 695 / ASTM D 6641
90° Compression Modulus Msi (GPa)	4.0 (27.6)	8.6 (59.3)	ASTM D 695 / ASTM D 6641
90° Flexural Strength ksi (MPa)	68 (469)	122 (841)	ASTM D 790
90° Flexural Modulus Msi (GPa)	2.6 (17.9)	8.4 (57.9)	ASTM D 790
90° Short Beam Shear Strength ksi (MPa)	6.0 (41.4)	7.5 (51.7)	ASTM D 2344
In-Plane Shear Strength ksi (MPa)	7.5 (51.7)	8.6 (59.3)	ASTM D 3518
0° Open-Hole Compression Strength ksi (MPa)	32 (221)	43 (296)	ASTM D 6484
0° Open-Hole Compression Modulus Msi (GPa)	3.1 (21.4)	6.5 (44.8)	ASTM D 6484
Climbing Drum Peel Torque[2] in-lbf/3 in (Nm/m)	10.7 (47.6)	10.4 (46.3)	ASTM D 1781
Flatwise Tensile Strength[2] psi (MPa)	335 (2.31)	323 (2.23)	ASTM C 297

[1] Respective test methods for glass/carbon

[2] Aramid fiber / phenolic resin honeycomb core (1/8" (0.3175 cm) cell size, 3.0 pcf (0.048 g/cc) density, 0.50" (1.27 cm) thick)

Table 5 | Mechanical Properties of CYCOM® 2400-1 Pressed Cured Laminate

Property	Glass Style 7781	Test Method
Tension Strength ksi (MPa)	66 (455)	ASTM D 638
Tension Modulus Msi (GPa)	3.3 (22.8)	ASTM D 638
Interlaminar Shear Strength ksi (MPa)	3.2 (22.1)	ASTM D 2344
Long Beam Flex Strength[1] ksi (MPa)	25.9 (179)	ASTM C 393
Climbing Drum Peel Torque[1] in-lbf/3 in (Nm/m)	13.0 (57.8)	ASTM D 1781
Flatwise Tensile Strength[1] psi (MPa)	273 (1.88)	ASTM C 297

[1] Aramid fiber / phenolic resin honeycomb core (3/16" (0.47625 cm) cell size, 3.0 pcf (0.048 g/cc) density, 0.50" (1.27 cm) thick)

PROCESSING

Cure Cycles

Autoclave Cure 1

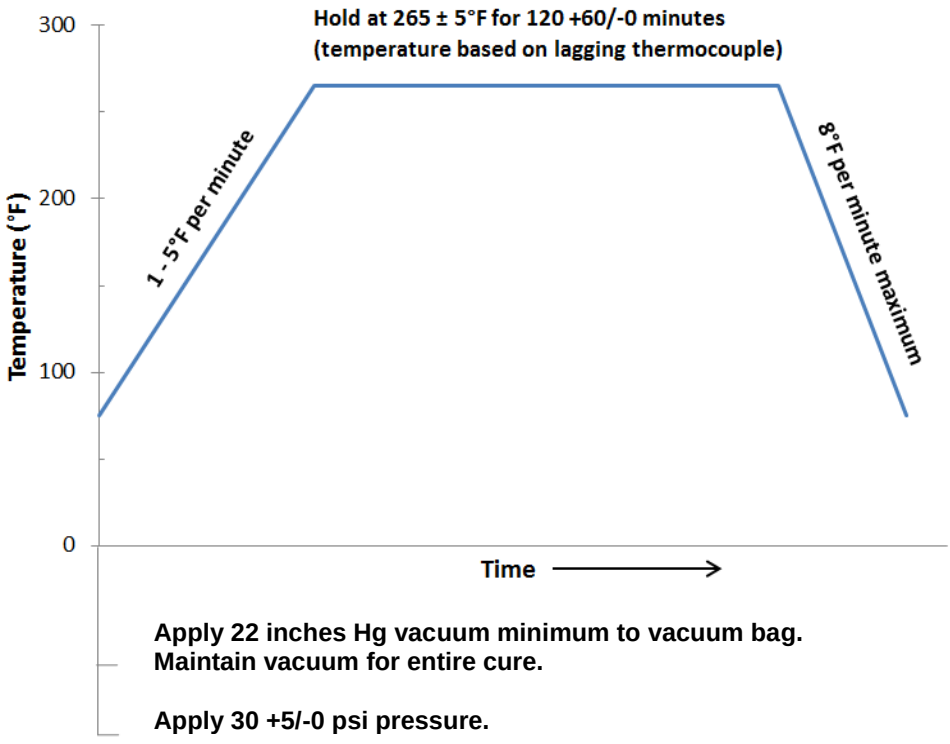

Figure 2 | CYCOM® 2400-1 Typical Autoclave Cure Cycle

Autoclave Cure 2

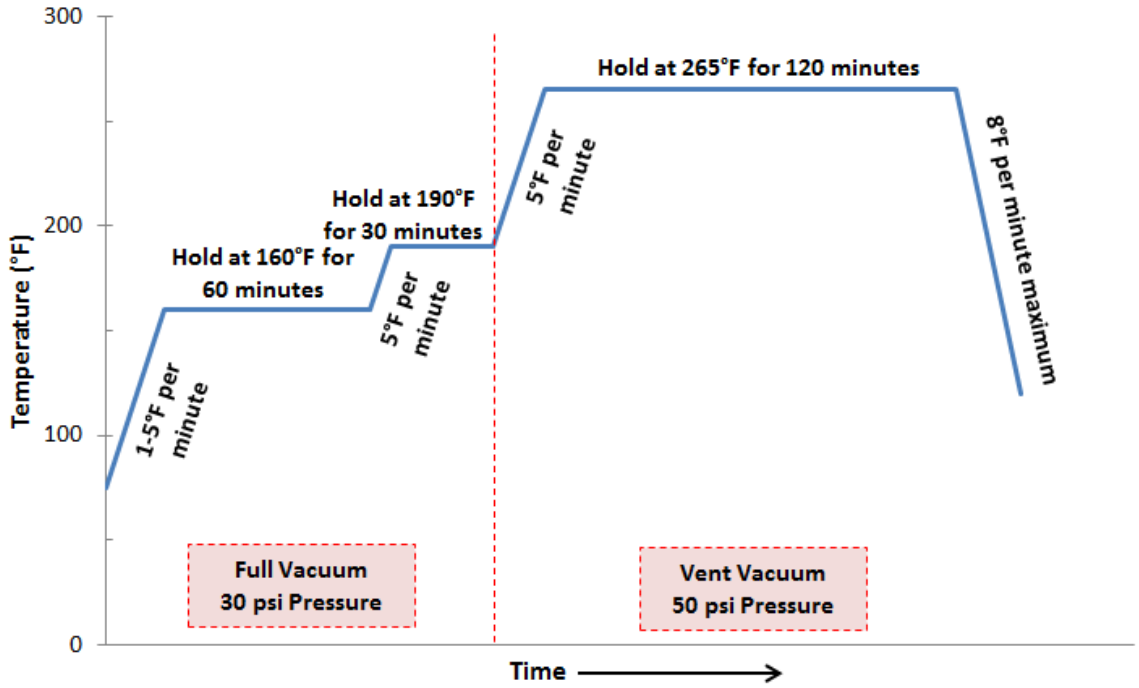

Figure 3 | CYCOM® 2400-1 Autoclave Cure Cycle for Reduced Porosity

Alternative Cure Cycle: Press Cure

Press Cure	Place laminate in a press preheated to 260ºF +15/-10ºF (127ºC +8ºC/-5.5ºC). Close the press and immediately apply 50 psi (0.34 MPa) pressure, minimum. Cure the panel under these conditions for 60 +10/-0 minutes. Cool under pressure below 140°F (60°C) at 2-5°F (1-3°C)/minute.

Lay-Up/ Bagging

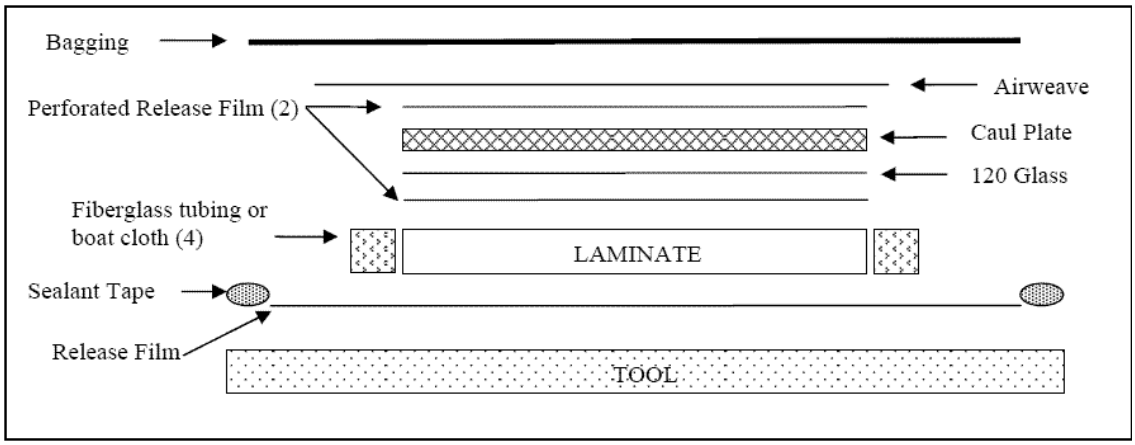

Figure 4 | CYCOM® 2400-1 Typical bagging scheme

HEALTH & SAFETY

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