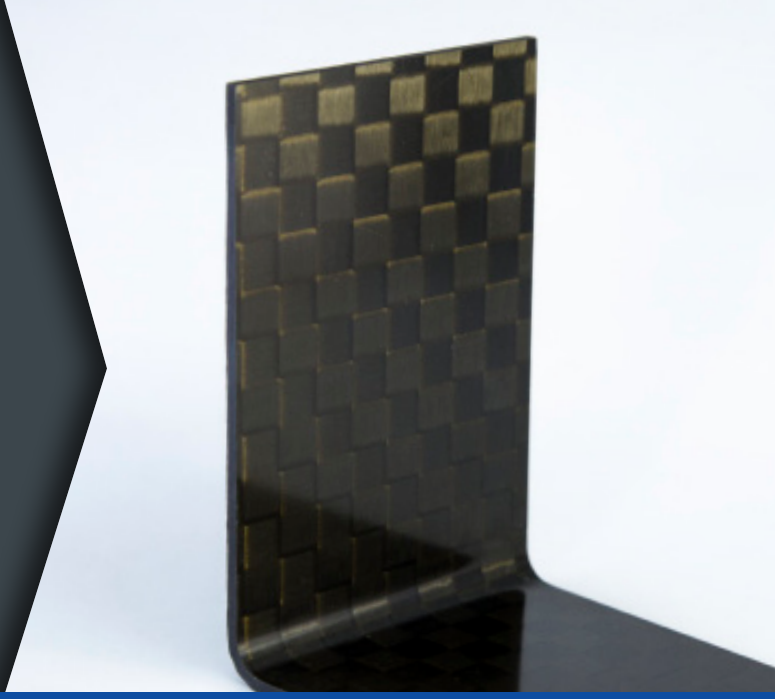
TORAY

Toray Composite Materials America, Inc.

2510 PREPREG SYSTEM

The 2510 prepreg system is specifically formulated for out-of-autoclave (OOA) processing of aerospace primary structures. This prepreg system has excellent all-around structural properties with a high wet and dry Tg while offering low-energy curing (250-270°F, 121-132°C).



Industry Material Specification
Product can be purchased to Aerospace Material Specifications 3960, 3914, and 3915.

Industry Database
FAA approved design allowable values (AGATE methodology), results in a low cost one-batch equivalency.

High Heat Tolerance
High Tg is suitable for structures exposed to elevated service temperatures.

Easy Layup
Product allows complex part layup with minimal cuts or ridge lines. It maintains a comparable class A finish through post-cure, minimizing sanding and finishing times.

Readily Available
Product is in stock and ready to ship.

Flexible Cure Methods
Curing methods include autoclave or oven cure. Product can be cured with or without using a dwell.

www.toraycma.com
253-846-1777

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2510

AVAILABLE PRODUCT FORMATS

PART NUMBER	FIBER FORMAT	FIBER TYPE/STYLE	FAW (GSM)	RC % WEIGHT	ROLL WIDTH
P707AG-15 (AMS 3960)	Unidirectional	T700G	150	35	39,36,24,12,6
F6273C-07M (AMS 3914)	Plain Weave	T700S-12K	190	42	38
FGF7781-07I (AMS 3915)	Glass Fabric	7781	294	38	38

NEAT RESIN PHYSICAL PROPERTIES

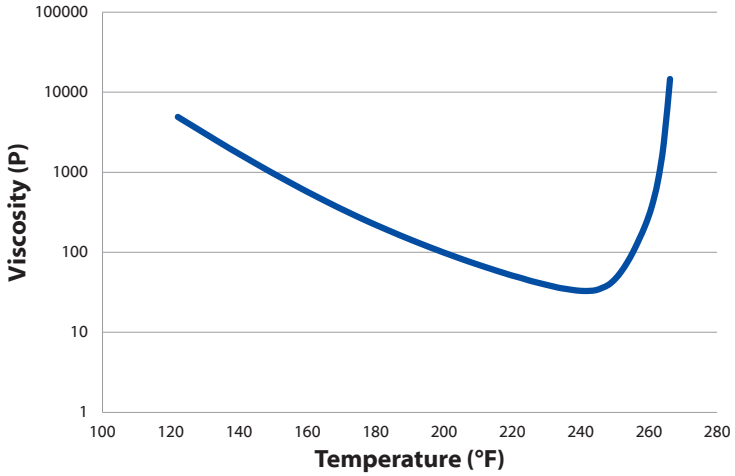
PROPERTY	METHOD	UNITS	VALUE
Density	ASTM D792	g/cc	1.267
Tg (Dry)	DMA	°F (°C)	294 (146)
Tg (Wet)	DMA	°F (°C)	267 (131)
Gel Time	ASTM 3532	Minutes @ 250F (121C)	8-13
K_{IC}	ASTM D5045	$ksi*in^{0.5}$	0.72

STORAGE LIFE

Out Life*	28 days @ 72 °F (22 °C)
Freezer Life	24 months @ <10 °F (-12 °C)

**Tack and drape is optimum at 72F and 65% RH*

RESIN VISCOSITY CURVE



Notes:
CTA: -65°F (-54°C), Ambient
RTA: 72°F (22°C), Ambient
ETW: 180°F (82°C), conditioned at 160°F/85% RH until equilibrium
Tension and compression values are normalized to the indicated CPT values

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LAMINA/LAMINATE MECHANICAL PROPERTIES: P707AG-15 (OVEN CURE)

PROPERTY	SYMBOL	METHOD	UNITS	CTA	RTA	ETW
0° Tensile Strength	F_{1t}	ASTM D3039	Ksi (MPa)	244 (1682)	315 (2172)	328 (2261)
90° Tensile Strength	F_{2t}	ASTM D3039	Ksi (MPa)	7.68 (52.9)	6.42 (44.3)	3.76 (25.9)
0° Tensile Modulus	E_{1t}	ASTM D3039	Msi (GPa)	18.5 (128)	18.2 (125)	17.7 (122)
90° Tensile Modulus	E_{2t}	ASTM D3039	Msi (GPa)	1.31 (9.03)	1.22 (8.41)	0.92 (6.34)
0° Compressive Strength	F_{1c}	SACMA SRM1R-94	Ksi (MPa)	203 (1400)	210 (1448)	174 (1200)
90° Compressive Strength	F_{2c}	SACMA SRM1R-94	Ksi (MPa)	41.0 (283)	28.8 (199)	16.9 (117)
0° Compressive Modulus	E_{1c}	SACMA SRM1R-94	Msi (GPa)	16.5 (114)	16.3 (112)	16.9 (117)
90° Compressive Modulus	E_{2c}	SACMA SRM1R-94	Msi (GPa)	2.04 (14.1)	1.23 (8.48)	1.15 (7.93)
In-Plane Shear Strength @ 5% or Ultimate	F_{12}	ASTM D5379	Ksi (MPa)	23.1 (159)	22.4 (154)	13.8 (95.1)
In-Plane Shear Modulus	G_{12}	ASTM D5379	Msi (GPa)	0.76 (5.22)	0.61 (4.23)	0.45 (3.12)
Short Beam Shear Strength	SBS	ASTM D2344	Ksi (MPa)	-	12.5 (86.2)	-
Poisson's Ratio	v_{12}	ASTM D3039	-	0.35	0.31	0.32
Open Hole Tension Strength (25/50/25)	OHT	ASTM D5766	Ksi (MPa)	-	50.5 (348)	64.1 (442)
Open Hole Compression Strength (25/50/25)	OHC	ASTM D6484	Ksi (MPa)	-	40.1 (276)	35.8 (247)
Compression After Impact (25/50/25)	CAI	-	Ksi (MPa)	-	19.8 (137)	-
Laminate Density	ρ	ASTM D792	g/cc	1.517		
Fiber Volume Fraction	V_f	ASTM D3171	%	54.4		
Cured Ply Thickness	CPT	-	Inches (mm)	0.0060 (0.152)		

LAMINA/LAMINATE MECHANICAL PROPERTIES: F6273C-07M (OVEN CURE)

PROPERTY	SYMBOL	METHOD	UNITS	CTA	RTA	ETW
0° Tensile Strength	F_{1t}	ASTM D3039	Ksi (MPa)	116 (803)	132 (912)	152 (1049)
90° Tensile Strength	F_{2t}	ASTM D3039	Ksi (MPa)	105 (722)	112 (772)	129 (892)
0° Tensile Modulus	E_{1t}	ASTM D3039	Msi (GPa)	8.29 (57.1)	8.09 (55.8)	8.40 (57.9)
90° Tensile Modulus	E_{2t}	ASTM D3039	Msi (GPa)	8.17 (56.4)	8.12 (56.0)	7.87 (54.2)
0° Compressive Strength	F_{1c}	SACMA SRM1R-94	Ksi (MPa)	109 (750)	103 (709)	68.7 (474)
90° Compressive Strength	F_{2c}	SACMA SRM1R-94	Ksi (MPa)	108 (742)	101 (698)	69.4 (479)
0° Compressive Modulus	E_{1c}	SACMA SRM1R-94	Msi (GPa)	7.94 (54.8)	7.97 (54.9)	7.94 (54.7)
90° Compressive Modulus	E_{2c}	SACMA SRM1R-94	Msi (GPa)	7.07 (48.7)	7.74 (53.4)	7.93 (54.7)
In-Plane Shear Strength @ 5% or Ultimate	F_{12}	ASTM D5379	Ksi (MPa)	22.5 (155)	19.2 (133)	10.8 (74.6)
In-Plane Shear Modulus	G_{12}	ASTM D5379	Msi (GPa)	0.62 (4.30)	0.61 (4.21)	0.46 (3.17)
Short Beam Shear Strength	SBS	ASTM D2344	Ksi (MPa)		8.7 (60)	
Poisson's Ratio	v_{12}	ASTM D3039	-	0.09	0.04	0.03
Open Hole Tension Strength (25/50/25)	OHT	ASTM D5766	Ksi (MPa)	-	49.3 (340)	57.5 (396)
Open Hole Compression Strength (25/50/25)	OHC	ASTM D6484	Ksi (MPa)	-	38.7 (267)	32.9 (227)
Compression After Impact (25/50/25)	CAI	-	Ksi (MPa)	-	26.9 (185)	-
Laminate Density	ρ	ASTM D792	g/cc	1.502		
Fiber Volume Fraction	V_f	ASTM D3171	%	49.6		
Cured Ply Thickness	CPT	-	Inches (mm)	0.0086 (0.218)		

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LAMINA/LAMINATE MECHANICAL PROPERTIES: FGF7781-07I

PROPERTY	SYMBOL	METHOD	UNITS	CTA	RTA	ETW
0° Tensile Strength	F_{1t}	ASTM D3039	Ksi (MPa)	81.1 (559)	64.1 (442)	49.3 (340)
90° Tensile Strength	F_{2t}	ASTM D3039	Ksi (MPa)	62.8 (433)	50.4 (347)	42.4 (292)
0° Tensile Modulus	E_{1t}	ASTM D3039	Msi (GPa)	3.696 (25.5)	3.424 (23.6)	3.149 (21.7)
90° Tensile Modulus	E_{2t}	ASTM D3039	Msi (GPa)	3.52 (24.2)	3.30 (22.7)	2.93 (20.2)
0° Compressive Strength	F_{1c}	SACMA SRM1R-94	Ksi (MPa)	88.4 (609)	76.2 (526)	50.9 (351)
90° Compressive Strength	F_{2c}	SACMA SRM1R-94	Ksi (MPa)	78.8 (543)	65.4 (451)	43.1 (297)
0° Compressive Modulus	E_{1c}	SACMA SRM1R-94	Msi (GPa)	3.87 (26.7)	3.82 (26.4)	3.52 (24.3)
90° Compressive Modulus	E_{2c}	SACMA SRM1R-94	Msi (GPa)	3.69 (25.4)	3.61 (24.9)	3.37 (23.2)
In-Plane Shear Strength @ 5% or Ultimate	F_{12}	ASTM D5379	Ksi (MPa)	23.7 (164)	18.4 (127)	11.6 (80.3)
In-Plane Shear Modulus	G_{12}	ASTM D5379	Msi (GPa)	0.72 (4.96)	0.63 (4.37)	0.46 (3.15)
Short Beam Shear Strength	SBS	ASTM D2344	Ksi (MPa)	-	8.7 (60)	-
Poisson's Ratio	ν_{12}	ASTM D3039	-	0.16	0.14	0.12
Open Hole Tension Strength (25/50/25)	OHT	ASTM D5766	Ksi (MPa)	-	24.8 (171)	20.7 (143)
Open Hole Compression Strength (25/50/25)	OHC	ASTM D6484	Ksi (MPa)	-	36.3 (250)	27.9 (192)
Laminate Density	ρ	ASTM D792	g/cc	1.805		
Fiber Volume Fraction	V_f	ASTM D3171	%	44.9		
Cured Ply Thickness	CPT	-	Inches (mm)	0.0104 (0.264)		

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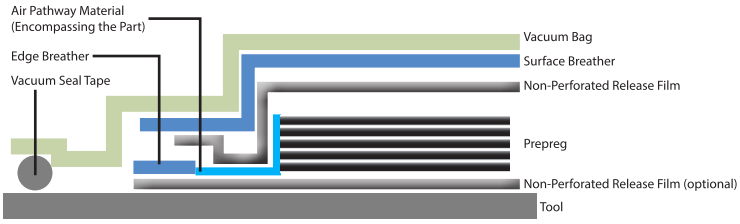
BAGGING PROCEDURE



Notes:

1. Debulk every four plies, or as needed, when laying up material
2. It is recommended that panels have a pre-cure vacuum hold depending on size: for small panels 1 hour, for medium sized panels (>1ft^2) for 3 hours, and for complex layups (ply drops, >2ft^2) for 16+ hours.
3. The vacuum should be checked for leaks before beginning the cure cycle. The leak rate shall be less than 2.0 inches of Hg (7 kPa) over 5 minutes.

Please refer to the SDS for handling and disposal.

RECOMMENDED OVEN CURE CYCLE

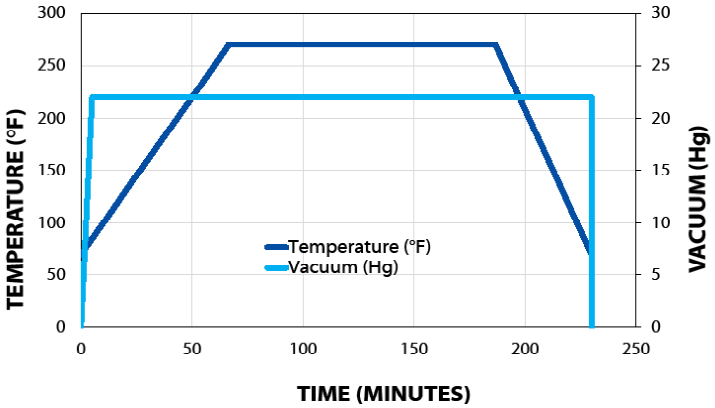
1. Apply full vacuum* to the part. Higher vacuum levels will yield better results.
2. Maintaining vacuum for at least three hours prior to beginning cure cycle is recommended for optimal part quality. This promotes the extraction of trapped air and gases, producing a lower void content.
3. Ramp to 270 ± 10°F at 1-5°F/min (132 ± 5°C at 0.6-2.8°C/min) and hold for 120 minutes.
4. Cool temperature down to 130°F at max rate of 5°F/min (54°C at 2.8°C/min).

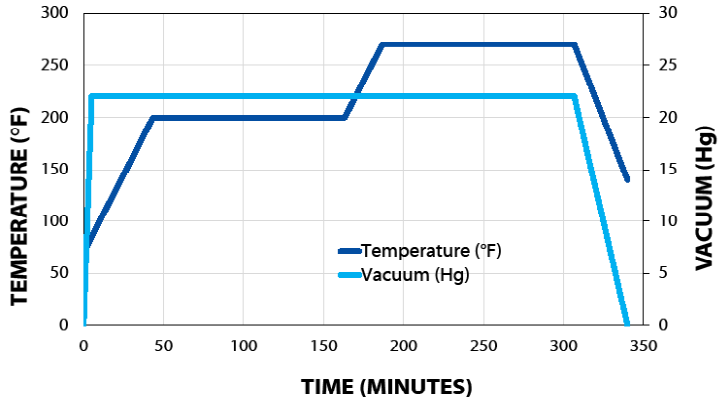
ALTERNATIVE OVEN CURE CYCLE

Recommended for thick laminates, to reduce the risk of interlaminar voids and exothermic reactions during cure.

1. Apply full vacuum*. For optimum results, keep the part under vacuum for 16+ hours before the oven cure.
2. Ramp to 200 ± 10°F at 1-5°F/min (88 ± 5°C at 0.6-2.8°C/min) and hold for 90 minutes.
3. Ramp to 270 ± 10°F at 1-5°F/min (132 ± 5°C at 0.6-2.8°C/min) and hold for 120 minutes.
4. Cool temperature down to 130°F at max rate of 5°F/min (54°C at 2.8°C/min).

** Required vacuum level varies depending on elevation. 28" Hg (95 kPa) is the recommended minimum at sea level under average conditions.*





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