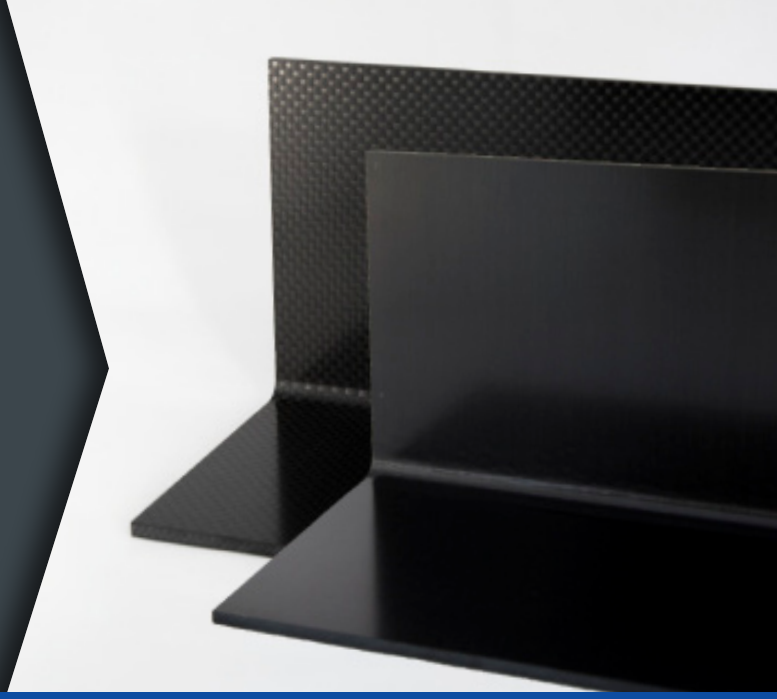
TORAY

Toray Composite Materials America, Inc.

3900 PREPREG SYSTEM

3900-series prepregs are highly-toughened 350°F (177°C) cure systems. It is available in a variety of configurations, including unidirectional tape for manual or automated tape laying applications, slit-tape-tow for automated fiber placement applications, and plain-weave carbon and glass fabrics.



Mechanically Stable
Mechanical working life of product is over 40 days, allowing for lay-up of large parts.

Readily Available
AMS products, marked with this icon, are kept in stock and ready to ship.

Highly Toughened
High strength fiber is combined with particulate interlayer toughening to reduce delamination and increase fracture toughness, impact resistance, and environmental resistance.

Proven Technology
Products have been used successfully in multiple applications, including aircraft primary structures, for over 25 years.

Consistency
Uniform resin content and a no-bleed resin system allows for predictable thicknesses and parts.

Customizable Forms
Compatible with multiple applications, including AFP, ATL, and hand layup. Multiple widths and roll configurations available.

www.toraycma.com
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3900

AVAILABLE PRODUCT FORMATS

3900 resin is available with numerous types of unidirectional carbon fibers and woven and glass fabrics with Fiber Areal Weight (FAW) ranging from 70 g/m2 to 300 g/m2 and Resin Content, (RC%) by weight percent, ranging from 34% to 44%.

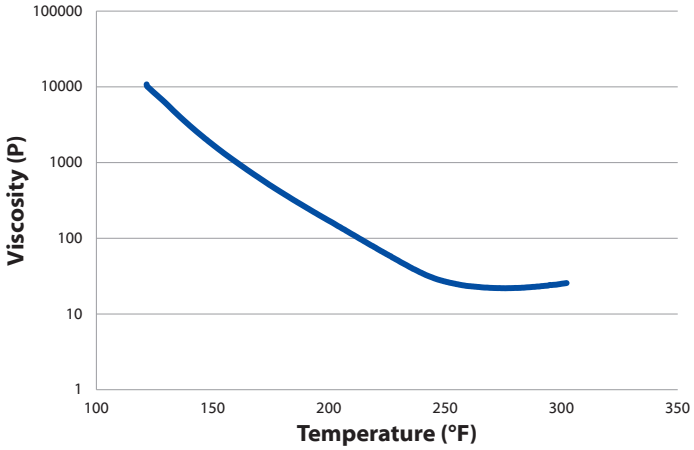
Unidirectional products can be slit to widths between 1/8" and 60", and fabric products to widths above 6". Common product formats include: 1/4", 1/2", 1", and 1.5" AFP spools (UD only); 6", 500mm, 9", and 12" ATL rolls; and 24" to full width rolls for hand layup. Product widths of less than 3" require additional lead time.

PART NUMBER	FIBER FORMAT	FIBER TYPE/STYLE	FAW (GSM)	RC % WEIGHT	ROLL WIDTH (IN)
P2362W-19L (AMS 6891/1)	Unidirectional	T800S	192	35.5	60
P2362W-145	Unidirectional	T800S	145	35	36
FM6673G-37KL (AMS 6891/2)	Plain Weave	T830H-6K	196	40.0	38
FJ6361F-30HT	Plain Weave	T400H-3K	193	37.0	38
FGF108-29ML	Glass Fabric	108	47.5	42.0	39
FGF7781-29E	Glass Fabric	7781	294	34.0	38

NEAT RESIN PHYSICAL PROPERTIES

PROPERTY	METHOD	UNITS	VALUE
Density	ASTM D792	g/cc	1.22-1.25
Tg (Dry)	DMA	°F(°C)	400F (204C)
Tg (Wet)	DMA	°F(°C)	330F (166C)
K_{1C}	ASTM D5045	ksi*in$^{0.5}$ (MPa*m$^{0.5}$)	1.54 (1.69)
Minimum Viscosity	ASTM D4440	Poise	21.9
		°F (°C)	275 (135)

RESIN VISCOSITY CURVE



STORAGE LIFE

Out Life*	42 days @ 75 °F (24 °C)
Freezer Life	24 months @ <10 °F (-12 °C)

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

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: P2362W-19L (T800S-24K UD)

PROPERTY	SYMBOL	METHOD	UNITS	CTA	RTA	ETW
0° Tensile Strength	F_{1t}	ASTM D3039	Ksi (MPa)	411 (2834)	436 (3006)	441 (3041)
90° Tensile Strength	F_{2t}	ASTM D3039	Ksi (MPa)	8.19 (56.5)	8.82 (60.8)	3.84 (26.5)
0° Tensile Modulus	E_{1t}	ASTM D3039	Msi (GPa)	21.6 (149)	21.5 (148)	22.2 (153)
90° Tensile Modulus	E_{2t}	ASTM D3039	Msi (GPa)	1.24 (8.5)	1.47 (10.1)	1.17 (8.1)
0° Compressive Strength	F_{1c}	ASTM D6641	Ksi (MPa)	282 (1944)	258 (1779)	231 (1593)
90° Compressive Strength	F_{2c}	ASTM D6641	Ksi (MPa)	44.5 (307)	31.3 (216)	19.3 (133)
0° Compressive Modulus	E_{1c}	ASTM D6641	Msi (GPa)	18.8 (130)	18.9 (130)	20.2 (139)
90° Compressive Modulus	E_{2c}	ASTM D6641	Msi (GPa)	1.37 (9.4)	1.24 (8.5)	1.15 (7.9)
In-Plane Shear Strength @ 5%	F_{12}	ASTM D5329	Ksi (MPa)	13.1 (90.3)	10.0 (68.9)	6.70 (46.2)
In-Plane Shear Modulus	G_{12}	ASTM D5379	Msi (GPa)	0.741 (5.11)	0.571 (3.94)	0.436 (3.01)
Short Beam Shear Strength	SBS	ASTM D2344	Ksi (MPa)	20.7 (143)	14.0 (96.5)	9.29 (64.1)
Open Hole Compression Strength (QI: 25/50/25)	OHC	ASTM D6484	Ksi (MPa)	-	42.5 (293)	37 (255)
Compression After Impact @ 1500 in-lb/in (QI: 25/50/25)	CAI	ASTM D7137	Ksi (MPa)	-	41 (283)	-
Laminate Density	ρ	ASTM D792	g/cc		1.54	
Cured Ply Thickness	CPT	-	Inches (mm)		0.0075 (0.191)	

LAMINA/LAMINATE MECHANICAL PROPERTIES: FM6673G-37KL (T830H-6K PW)

PROPERTY	SYMBOL	METHOD	UNITS	CTA	RTA	ETW
0° Tensile Strength	F_{1t}	ASTM D3039	Ksi (MPa)	134 (924)	150 (1034)	135 (931)
90° Tensile Strength	F_{2t}	ASTM D3039	Ksi (MPa)	127 (876)	134 (924)	125 (862)
0° Tensile Modulus	E_{1t}	ASTM D3039	Msi (GPa)	10.3 (71.0)	10.0 (69.0)	10.8 (74.5)
90° Tensile Modulus	E_{2t}	ASTM D3039	Msi (GPa)	9.9 (67.9)	9.9 (68.0)	10.2 (70.3)
0° Compressive Strength	F_{1c}	ASTM D6641	Ksi (MPa)	111 (765)	97 (668)	80 (551)
90° Compressive Strength	F_{2c}	ASTM D6641	Ksi (MPa)	98 (676)	88 (603)	71 (486)
0° Compressive Modulus	E_{1c}	ASTM D6641	Msi (GPa)	9.1 (62.8)	9.2 (63.6)	9.4 (64.8)
90° Compressive Modulus	E_{2c}	ASTM D6641	Msi (GPa)	9.0 (62.1)	8.9 (61.5)	9.0 (62.2)
In-Plane Shear Strength @ 5%	F_{12}	ASTM D5329	Ksi (MPa)	17.4 (120.0)	11.5 (79.3)	8.2 (56.5)
In-Plane Shear Modulus	G_{12}	ASTM D5379	Msi (GPa)	0.66 (4.6)	0.52 (3.6)	0.43 (3.0)
Short Beam Shear Strength	SBS	ASTM D2344	Ksi (MPa)	15.3 (105)	10.8 (74)	7.0 (49)
Open Hole Compression Strength (QI: 25/50/25)	OHC	ASTM D6484	Ksi (MPa)	-	40.2 (277)	32.2 (22)
Compression After Impact @ 1500 in-lb/in (QI: 25/50/25)	CAI	ASTM D7137	Ksi (MPa)		43.2 (298)	
Laminate Density	ρ	ASTM D792	g/cc		1.51	
Cured Ply Thickness	CPT	-	Inches (mm)		0.0086 (0.218)	

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LAMINA/LAMINATE MECHANICAL PROPERTIES: FJ6361F-30HT (T400-3K PW)

PROPERTY	SYMBOL	METHOD	UNITS	RTA	ETW
90° Tensile Strength	F_{2t}	ASTM D3039	Ksi (MPa)	123 (848)	-
90° Tensile Modulus	E_{2t}	ASTM D3039	Msi (GPa)	9.89 (68.2)	-
90° Compressive Strength	F_{2c}	ASTM D6641	Ksi (MPa)	96.1 (663)	-
90° Compressive Modulus	E_{2c}	ASTM D6641	Msi (GPa)	8.82 (60.8)	-
In-Plane Shear Strength @ 5%	F_{12}	ASTM D5329	Ksi (MPa)	16.3 (112)	8.14 (56.1)
In-Plane Shear Modulus	G_{12}	ASTM D5379	Msi (GPa)	0.51 (3.52)	0.42 (2.9)
Short Beam Shear Strength	SBS	ASTM D2344	Ksi (MPa)	8.91 (61.4)	
Open Hole Compression Strength (QI: 25/50/25)	OHC	ASTM D6484	Ksi (MPa)	39.9 (275)	34.8 (240)
Laminate Density	ρ	ASTM D792	g/cc	1.51	
Fiber Volume Fraction	V_f	ASTM D3171	%	49	
Cured Ply Thickness	CPT	-	Inches (mm)	0.0089 (0.226)	

LAMINA/LAMINATE MECHANICAL PROPERTIES: FGF7781-29E (7781 Glass 8HS)

PROPERTY	SYMBOL	METHOD	UNITS	RTA	ETW
90° Tensile Strength	F_{2t}	ASTM D3039	Ksi (MPa)	59 (409)	45.7 (315)
90° Tensile Modulus	E_{2t}	ASTM D3039	Msi (GPa)	3.6 (25)	3.2 (22)
90° Compressive Strength	F_{2c}	SACMA SRM1R-94	Ksi (MPa)	75.9 (524)	53.5 (369)
In-Plane Shear Strength	F_{12}	ASTM D5329	Ksi (MPa)	16.5 (114)	-
In-Plane Shear Modulus	G_{12}	ASTM D5379	Msi (GPa)	0.64 (4.4)	-
Cured Ply Thickness	CPT	-	Inches (mm)	0.0091 (0.231)	

LAMINA/LAMINATE MECHANICAL PROPERTIES: FGF108-29ML (108 Glass PW)

PROPERTY	SYMBOL	METHOD	UNITS	RTA	ETW
Laminate Density	ρ	ASTM D792	g/cc	1.85	
Fiber Volume Fraction	V_f	ASTM D3171	%	43.7	
Cured Ply Thickness	CPT	-	Inches (mm)	0.0018 (0.0457)	

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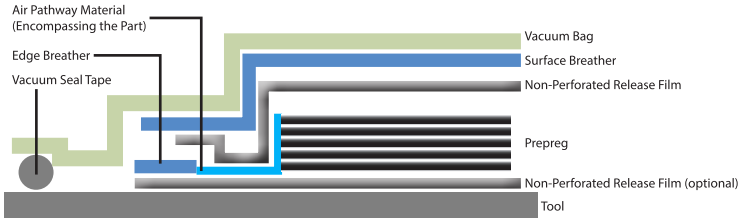
BAGGING PROCEDURE



Notes:

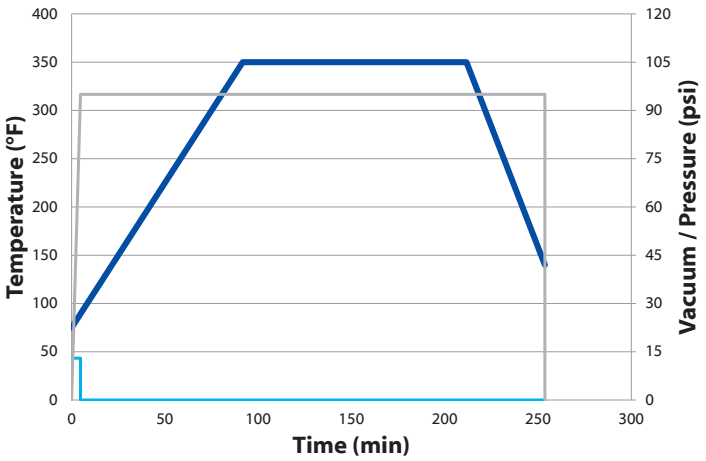
1. During layup, debulk after the first ply and then every 4 plies or as needed
2. The vacuum should be checked for leaks before beginning the cure cycle. The leak rate shall be less than 2.0 inches of Hg (7 kPa) over 5 minutes.

Please refer to the SDS for handling and disposal.

CURE CYCLE - AUTOCLAVE

1. Apply full vacuum* to the part.
2. Apply 95 ± 0 psi (655 kPa) autoclave pressure to the laminate.
3. Vent the vacuum bag when the autoclave pressure reaches 20psi (138 kPa)
4. Ramp to 350 ± 10°F (177 ± 5°C) at rate of 3.0 ± 2.0 °F (1.7 ± 1.1°C) per minute.
5. Hold for 120 - 180 minutes at 350 ± 10°F (177 ± 5°C).
6. Cool vessel to 140°F (60°C) or lower at a maximum rate of 5°F (2.78°C) per minute before releasing autoclave pressure.

** 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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