

6600



350°F (177°C) High T_g Epoxy Resin System

Typical applications

Aerospace
Space
General aviation
Industrial
Sporting goods

Tack life

14 days tack at 70°F (21°C)

Out life

20 days at 70°F (21°C)

Shelf life

3 months at 40°F (4°C)

6 months at 0°F (-18°C)

Description

6600 is a 350°F (177°C) cure, toughened, high T_g, controlled flow, epoxy resin system. Highly toughened for demanding structural applications with enhanced resistance to humidity.

Benefits/features

- High dry and wet T_g
- 350°F (177°C) dry and 250°F (121°C) wet service capability
- Excellent mechanical properties
- Excellent process ability with good tack and drape
- Capable of meeting the requirements of DMS 2224 specification (not qualified to the QPL).

Application

Due to 6600's high T_g and excellent mechanical properties, typical applications for 6600 include primary and secondary aircraft structures and areas where hot/wet performance and impact resistance are important.

6600 can be supplied with most commercially available fibers (carbon, quartz, aramid, S-glass, E-glass, etc.) in both woven form (designated as NB) as well as unidirectional tape (designated as NCT).

Woven fabrics are available in standard commercial widths up to 60 inches (1.5 m). Unitape widths up to 39 inches (1 m) are available in standard fiber weights ranging from 70-300 gsm (0.014-0.060 psf).

Recommended processing conditions

6600 can be cured at 350°F (177°C) for 2 hours with no need to post cure to achieve service temperature. Medium and high pressure molding techniques may be used to cure 6600. Recommended autoclave cure cycle is 50 to 100psi (350-690kPa), 3°F (1.7°C)/min ramp to 350°F (177°C), hold for 120 minutes, cool to <140°F (60°C).

Alternate cure cycle is a 3°F (1.7°C)/min ramp to 350°F (177°C), hold for 60 minutes. Post cure for 120 minutes at 350°F (177°C).

Due to the time required for this material to gel, some applications using closed mold techniques may require lower pressure at the beginning of the cure cycle to minimize flow. Depending on the ramp rate, full pressure can be applied 4-7 minutes after the cure temperature, 350°F (177°C), is reached.



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Technical Data Sheet



Neat resin [values are average and do not constitute a specification]

Property	Value
Gel time @ 350°F (177°C), minutes	11 - 16
Specific gravity	1.31
T _g Dry (DMA, E), °F (°C)	410 (210)
T _g Wet (DMA, E), °F (°C)	329 (165)
G1c (J/m ²)	346
K1c (MPa· m ^{1/2})	1.2

Outgassing properties tested in accordance with ASTM E595

Property	Resin	34-700 70gsm 40%RC
Average value TML (Total mass loss)	0.98%	0.52%
Average value WVR (Water vapor recovered)	0.36%	0.13%
Percent CVCM (Collected volatile condensable materials)	<0.01	<0.01%

Mechanical data [values are average and do not constitute a specification]

34-700 Uni Carbon, 70gsm, 40%RC, autoclave cured, 80 psi, 120 min. at 350°F, norm. to 60%FV

Property	Test method	RT	250°F (121°C)	180°F _{wet} (82°C _{wet})	220°F _{wet} (104°C _{wet})	250°F _{wet} (121°C _{wet})
0° Tensile strength, ksi (MPa)	ASTM D3039	316 (2180)	292 (2010)	-	-	-
0° Tensile modulus, Msi (GPa)		20.7 (142)	19.0 (131)	-	-	-
0° Compressive strength, ksi (MPa)	SACMA 1R-94	234 (1610)	212 (1460)	229 (1570)	205 (1410)	189 (1300)
0° Compressive modulus, Msi (GPa)		19.7 (135)	-	19.9 (137)	-	-
0° Flexural strength, ksi (MPa)	ASTM D790	325 (2240)	244 (1680)	251 (1730)	235 (1620)	-
0° Flexural modulus, Msi (GPa)		17.5 (121)	16.9 (117)	17.9 (123)	17.5 (121)	-
Short beam shear strength, ksi (MPa)	SACMA 8R-94	20.8 (143)	14.5 (100)	13.5 (93.1)	11.8 (81.3)	10.7 (73.7)
90° Tensile strength, ksi (MPa)	ASTM D3039	9.5 (65)	-	-	-	-
90° Tensile modulus, Msi (GPa)		1.3 (8.9)	-	-	-	-
Open hole tensile strength*	ASTM D5766	41.0 (282)	-	-	-	-
Open hole tensile modulus*		5.7 (39)	-	-	-	-
Open hole compressive strength*	ASTM D6484	46.0 (317)	42.4 (292)	41.6 (286)	39.4 (271)	-

* [+45/0/-45/90]_{ms} Wet: 14-day soak @ 160°F

TR50S Uni Carbon, 150gsm, 31%RC, autoclave cured, 80 psi, 120 min. at 350°F, norm. to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	311 (2140)
0° Tensile modulus, Msi (GPa)		19.3 (133)
0° Compressive strength, ksi (MPa)	ASTM D695mod	257 (1770)
0° Compressive modulus, Msi (GPa)		17.6 (121)
0° Flexural strength, ksi (MPa)	ASTM D790	316 (2170)
0° Flexural modulus, Msi (GPa)		18.4 (127)
Short beam shear strength, ksi (MPa)	ASTM D2344	20.1 (139)
90° Tensile strength, ksi (MPa)	ASTM D3039	15.1 (104)
90° Tensile modulus, Msi (GPa)		1.5 (10)
90° Compressive strength, ksi (MPa)	ASTM D695mod	48.7 (336)
90° Compressive modulus, Msi (GPa)		1.5 (10)
90° Flexural strength, ksi (MPa)	ASTM D790	26.4 (182)
90° Flexural modulus, Msi (GPa)		1.4 (9.8)
±45° IPS strength, ksi (MPa)	ASTM D3518	16.5 (114)
±45° IPS modulus, Msi (GPa)		0.7 (4.9)

MR60H Uni Carbon, 150gsm, 37%RC, autoclave cured, 85 psi, 120 min. at 350°F, norm. to 60%FV

Property	Test method	RT	160°F (71°C)	160°F _{wet} (71°C _{wet})	220°F _{wet} (104°F _{wet})	250°F _{wet} (121°C _{wet})
0° Tensile strength, ksi (MPa)	ASTM D3039	391 (2960)	397 (2730)	-	-	-
0° Tensile modulus, Msi (GPa)		24.0 (165)	-	-	-	-
0° Compressive strength, ksi (MPa)	ASTM D695mod	223 (1530)	206 (1420)	168 (1150)	151 (1040)	157 (1080)
0° Compressive modulus, Msi (GPa)		21.7 (149)	-	20.8 (143)	-	19.7 (135)
0° Flexural strength, ksi (MPa)	ASTM D790	270 (1860)	208 (1430)	206 (1420)	188 (1290)	-
0° Flexural modulus, Msi (GPa)		23.1 (159)	23.4 (161)	22.4 (154)	22.9 (157)	-
Short beam shear strength, ksi (MPa)	SACMA 8R-94	18.0 (124)	11.3 (77.9)	11.0 (75.8)	9.1 (62)	8.9 (61)
Open hole tensile strength* ksi (MPa)	ASTM D5766	63.0 (434)	-	-	-	-
Open hole tensile modulus* Msi (GPa)		7.4 (51)	-	-	-	-
Open hole compressive strength* ksi (MPa)	ASTM D6484	44.1 (304)	-	-	-	-
Open hole compressive modulus* Msi (GPa)		-	-	-	-	-
±45° IPS strength, ksi (MPa)	ASTM D3518	12.7 (87.5)	-	-	-	-
±45° IPS modulus, Msi (GPa)		0.5 (3.5)	-	-	-	-

* [+45/0/-45/90]_{ms} Wet: 14-day soak @ 160°F



HR40 80gsm, 33%RC, autoclave cured, 80 psi (vent @ 20 psi), 120 min. at 350°F, results as tested

Property	Test method	RT	180°F (82°)	250°F (121°C)	180°F _{wet} (82°C _{wet})
0° Tensile strength, ksi (MPa)	ASTM D3039	267 (1840)	-	-	-
0° Tensile modulus, Msi (GPa)		31.8 (219)	-	-	-
0° Compressive strength, ksi (MPa)	ASTM D695	157 (1080)	-	154 (1060)	155 (1070)
0° Compressive modulus, Msi (GPa)		31.1 (214)	-	-	29.9 (206)
0° Flexural strength, ksi (MPa)	ASTM D790	241 (1660)	-	205 (1410)	203 (1400)
0° Flexural modulus, Msi (GPa)		31.2 (215)	-	30.4 (210)	30.1 (208)
Short beam shear strength, ksi (MPa)	SACMA 8R-94	17.6 (121)	-	12.4 (85)	11.1 (77)
Open hole compressive strength* ksi (MPa)	ASTM D6484	39.9 (275)	38 (262)	-	35.3 (243)

* $[+45/0/-45/90]_{ms}$ Wet: 14-day soak @ 160°F

7781 E-Glass fabric, 38%RC, autoclave cured, 80 psi, 120 min. at 350°F, norm. to 60%FV

Property	Test method	RT	180°F (82°C)	250°F (121°C)	180°F _{wet} (82°C _{wet})	220°F _{wet} (104°C _{wet})
0° Tensile strength, ksi (MPa)	ASTM D3039	64 (441)	-	58 (404)	49 (335)	-
0° Tensile modulus, Msi (GPa)		4.7 (32)	-	4.5 (31)	4.4 (30)	-
0° Compressive strength, ksi (MPa)	ASTM D695mod	123 (848)	-	97 (669)	98 (675)	85 (585)
0° Compressive modulus, Msi (GPa)		4.9 (33)	-	4.8 (33)	4.7 (32)	-
0° Flexural strength, ksi (MPa)	ASTM D790	100 (689)	-	86 (591)	79 (546)	-
0° Flexural modulus, Msi (GPa)		4.9 (33)	-	4.5 (31)	4.4 (30)	-
Short beam shear strength, ksi (MPa)	SACMA 8R-94	10.7 (74)	-	7.3 (50)	6.0 (41)	5.3 (36)
Open hole tensile strength** ksi (MPa)	ASTM D5766	22.8 (157)	-	-	-	-
Open hole tensile modulus** Msi (GPa)		1.3 (8.9)	-	-	-	-
Open hole compressive strength** ksi (MPa)	ASTM D6484	41.0 (282)	36.2 (249)	36.2 (249)	30.4 (209)	-
±45° IPS strength, ksi (MPa)	ASTM D3518	12.2 (84)	-	5.5 (37)	5.5 (37)	-
±45° IPS modulus, Msi (GPa)		0.6 (4.1)	-	-	0.4 (2.7)	-

** $[+/-45,0/90]_{ms}$ Wet: 14-day soak @ 160°F



TR30S 3K fabric, 40%RC, autoclave cured, 80 psi, 120 min. at 350°F, norm. to 60%FV

Property	Test method	RT	250°F (121°C)	180°F _{wet} (82°C _{wet})	220°F _{wet} (104°C _{wet})	250°F _{wet} (121°C _{wet})
0° Tensile strength, ksi (MPa)	ASTM D3039	10.7 (73)	113 (779)	-	-	-
0° Tensile modulus, Msi (GPa)		128 (882)	-	-	-	-
0° Compressive strength, ksi (MPa)	ASTM D695mod	110 (758)	94 (645)	99 (680)	83 (572)	69 (475)
0° Compressive modulus, Msi (GPa)		9.5 (65)	-	9.4 (64)	-	8.9 (61)
0° Flexural strength, ksi (MPa)	ASTM D790	150 (1030)	133 (917)	136 (937)	118 (813)	-
0° Flexural modulus, Msi (GPa)		9.3 (64)	9.2 (63)	9.1 (62)	8.8 (60)	-
Short beam shear strength, ksi (MPa)	SACMA 8R-94	11.8 (81)	9.1 (62)	9.2 (63)	7.8 (54)	6.7 (46)
Open hole tensile strength** ksi (MPa)	ASTM D5766	44.0 (303)	-	-	-	-
Open hole tensile modulus** Msi (GPa)		5.6 (39)	-	-	-	-
Open hole compressive strength** ksi (MPa)	ASTM D6484	42.6 (293)	42.2 (291)	34.4 (237)	36.7 (253)	-
±45° IPS strength, ksi (MPa)	ASTM D3518	14.5 (100)	-	-	-	-
±45° IPS modulus, Msi (GPa)		0.5 (3.6)	-	-	-	-

** [(+/-45),(0/90)]_{ms}

Wet: 14-day soak @ 160°F



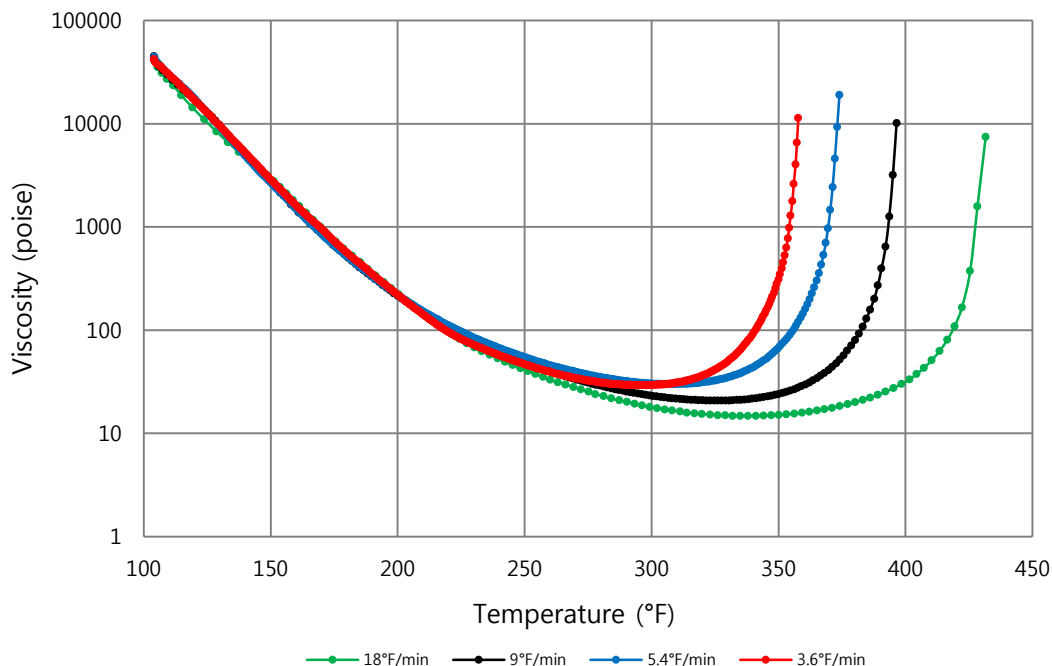
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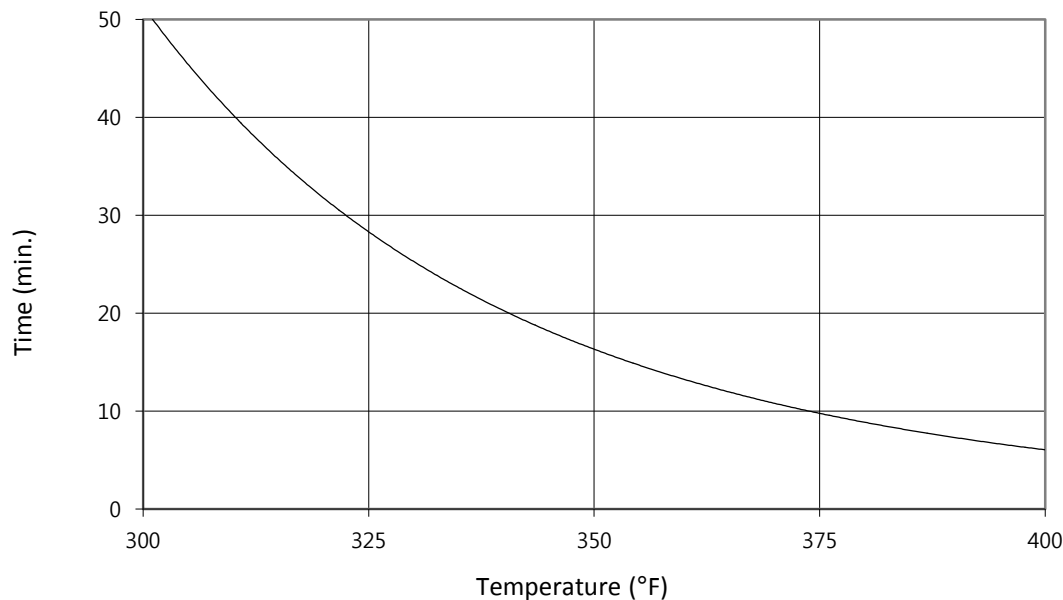


6600 Viscosity vs. temperature

TA - AR2000 parallel plate rheometer



Gel time vs. temperature



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