6600

NEWPORT HIGH PERFORMANCE MATERIALS

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

Typical applications
Aerospace
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. 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.

Benefits/features
- High dry and wet T_g
- 350°F (177°C) dry and 250°F (121°C) wet service capability
- Excellent mechanical properties
- Out of autoclave cure capable
- Excellent processability with good tack and drape
- Capable of meeting the requirements of DMS 2224 specification (not qualified to the QPL).

Application
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 is reached.

6600 can be out-of-autoclave cured. Please contact your account manager or MCCFC technical support to discuss specific applications.

MITSUBISHI CHEMICAL CARBON FIBER AND COMPOSITES

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/m2)	346
K1c (MPa· m1/2)	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 CARBON UNITAPE

40%RC, autoclave cured, 80 psi, 120 minutes at 350°F, normalized 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*

MITSUBISHI CHEMICAL CARBON FIBER AND COMPOSITES

Technical Data Sheet

TR50S CARBON UNITAPE

31%RC, autoclave cured, 80 psi, 120 minutes at 350°F, normalized 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 D695 mod	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 D695 mod	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 CARBON UNITAPE

37%RC, autoclave cured, 85 psi, 120 minutes at 350°F, normalized 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 D695 mod	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*

MITSUBISHI CHEMICAL CARBON FIBER AND COMPOSITES

Technical Data Sheet

HR40 CARBON UNITAPE

40%RC, 80 gsm, autoclave cured, 80 psi (vent @ 20 psi), 120 minutes 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 minutes at 350°F, normalized 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 D695 mod	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*

MITSUBISHI CHEMICAL CARBON FIBER AND COMPOSITES

Technical Data Sheet

TR30S 3K 2x2 TWILL CARBON FABRIC

40%RC, autoclave cured, 80 psi, 120 minutes at 350°F, normalized 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	128 (882)	113 (779)	-	-	-
0° Tensile modulus, Msi (GPa)		10.7 (73)	-	-	-	-
0° Compressive strength, ksi (MPa)	ASTM D695 mod	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)	-	-	-	-

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

BIMAX-L™ ±45° BIAXIAL CARBON FABRIC

42%RC, autoclave cured, 80 psi, 120 minutes at 350°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	117 (807)
0° Tensile modulus, Msi (GPa)		11 (72)
0° Compressive strength, ksi (MPa)	ASTM D6641	112 (772)
0° Compressive modulus, Msi (GPa)		8.8 (61)
0° Flexural strength, ksi (MPa)	ASTM D790	36 (248)
0° Flexural modulus, Msi (GPa)		2.1 (14)
45° Longitudinal Tensile strength, ksi (MPa)	ASTM D3039	35 (241)
45° Transverse Tensile strength, ksi (MPa)		35 (241)
45° Compressive strength, ksi (MPa)	ASTM D6641	39 (269)
Short beam shear strength, ksi (MPa)	ASTM D2344	8.2 (57)

BIMAX™ is a trademark of A&P Technology, Inc.

MITSUBISHI CHEMICAL CARBON FIBER AND COMPOSITES

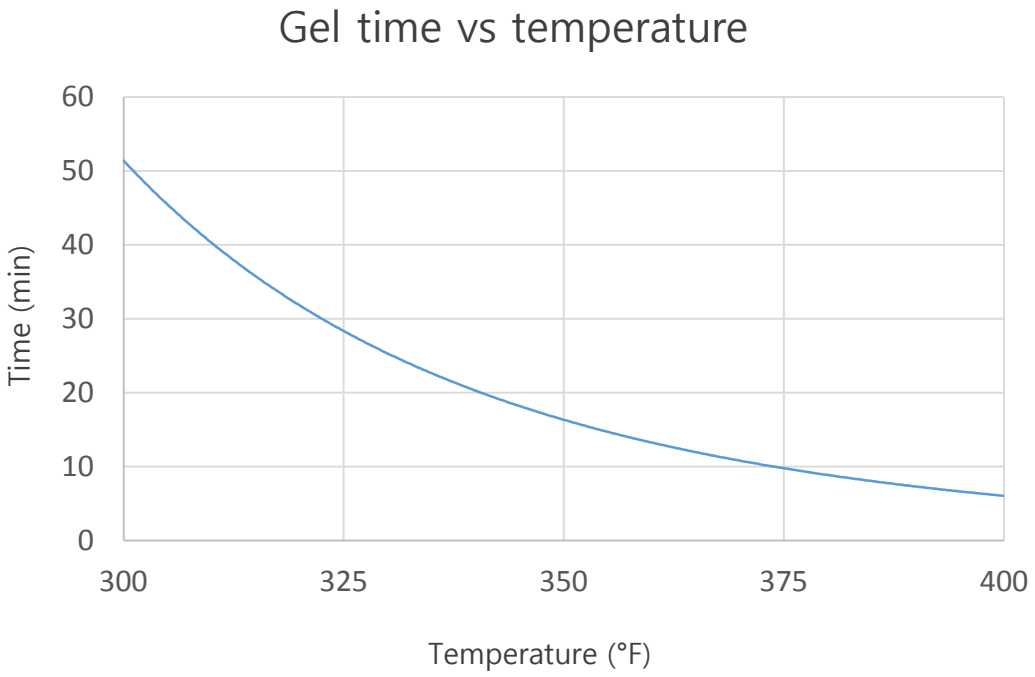
Technical Data Sheet

QISO-L™ ±60° TRIAXIAL CARBON FABRIC

42%RC, autoclave cured, 80 psi, 120 minutes at 350°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (Mpa)	ASTM D3039	100 (689)
0° Flexural strength, ksi (MPa)	ASTM D790	107 (738)
0° Flexural modulus, Msi (GPa)		5.8 (40)
0° Open hole tensile strength, ksi (Mpa)	ASTM D5766	59 (407)
0° Open hole compressive strength, ksi (Mpa)	ASTM D6484	68 (469)
0° Compressive strength, ksi (MPa)	ASTM D6641	109 (752)
90° Compressive strength, ksi (MPa)		78 (538)
90° Tensile strength, ksi (Mpa)	ASTM D3039 mod	96 (662)
Short beam shear strength, ksi (MPa)	ASTM D2344	12 (83)

QISO-L™ is a trademark of A&P Technology, Inc.



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MITSUBISHI CHEMICAL CARBON FIBER AND COMPOSITES

Technical Data Sheet