

117-1



250-300°F (121-149°C) Cure Epoxy Resin System

Typical applications

General aviation
Aerospace
Industrial

Out life

30 days at 70°F (21°C)

Shelf life

3 months at 40°F (4°C)
6 months at 0°F (-18°C)

Description

117-1 is a 250°F (121°C) to 300°F (149°C) cure, flame retardant, modified epoxy resin system designed for use in applications requiring high toughness. 117-1 meets the requirements of FAR 25.853 appendix F, part I, and NASA requirements for out-gassing.

Benefits/features

- Flame retardant
- High toughness
- Excellent mechanical properties
- Meets FAR 25.853 appendix F, part I flammability requirements
- Meets NASA out-gassing requirements for space applications

Variant

- 117 – Reduced tack

Application

117-1 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

Autoclave or PCM Cure Cycle

117-1 can be cured at temperatures from 250-300°F (121-149°C), depending on part size and complexity. Low, medium, and high pressure molding techniques may be used for curing. Recommended cure cycle is 45 psi (310 kPa), 3°F (1.7°C)/min ramp to 260°F (127°C), hold for 90 minutes, cool to <140°F (60°C).

OOA Cure Cycle

117-1 can be cured out-of-autoclave with a vacuum bag and the following cure cycle. Ramp at 3°F (1.7°C)/min from RT to 265°F (130°C), hold for 90min at 265°F (130°C), cool below 140°F (70°C).



MITSUBISHI CHEMICAL
CARBON FIBER AND COMPOSITES

Technical Data Sheet

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

Property	Value
Gel time @ 275°F (135°C), minutes	5 – 7
Specific gravity	1.33
Dry T _g (DMA, E'), °F (°C)	257 (125)
Wet T _g (DMA, E'), °F (°C)*	194 (90)
*14 day, 160°F water immersion	

Outgassing properties tested in accordance with ASTM E595

Property	34-700 150gsm
Average value TML (Total mass loss)	0.36%
Average value WVR (Water vapor recovered)	< 0.01%
Percent CVCM (Collected volatile condensable materials)	0.07%

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

34-700 Uni carbon, 150gsm, 40%RC, autoclave cured, 45psi, 90 minutes at 260°F, normalized to 60%FV

Property	Test method	RT	160°F	160°F _{wet} * (71°C _{wet})
0° Tensile strength, ksi (MPa)	ASTM D3039	341 (2350)	328 (2260)	-
0° Tensile modulus, Msi (GPa)		20.1 (139)	20 (138)	-
0° Compressive strength, ksi (MPa)	ASTM D695mod	214 (1480)	196 (1350)	178 (1230)
0° Compressive modulus, Msi (GPa)		18.6 (128)	18.9 (130)	18 (124)
0° Flexural strength, ksi (MPa)	ASTM D790	231 (1600)	193 (1330)	150 (1030)
0° Flexural modulus, Msi (GPa)		18.3 (126)	18.4 (127)	18.2 (126)
Short beam shear strength, ksi (MPa)	SACMA 8R-94	14.1 (97.2)	10.5 (72.4)	7.7 (53)

*14 day, 160°F water immersion

3K70P Carbon fabric, 42%RC, autoclave cured, 45psi, 90 minutes at 260°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	130 (896)
0° Tensile modulus, Msi (GPa)		10.4 (71.7)
Poisson's ratio		0.031
0° Compressive strength, ksi (MPa)	ASTM D695mod	110 (758)
0° Compressive modulus, Msi (GPa)		9.8 (67.6)
0° Flexural strength, ksi (MPa)	ASTM D790	143 (986)
0° Flexural modulus, Msi (GPa)		9.3 (64.1)
Short beam shear strength, ksi (MPa)	ASTM D2344	9.7 (66.9)



7781 E-glass fabric, 40%RC, autoclave cured, 45psi, 90 minutes at 260°F, normalized to 50%FV

Property	Test method	RT	160°F (71°C)	200°F (93°C)	160°F _{wet} * (71°C _{wet})
0° Tensile strength, ksi (MPa)	ASTM D638	77 (530)	64 (440)	60 (410)	35 (240)
0° Tensile modulus, Msi (GPa)	Type II	3.7 (25)	3.7 (25)	3.6 (24)	3.6 (24)
0° Compressive strength, ksi (MPa)	SACMA	78 (530)	62 (420)	59 (400)	52 (350)
0° Compressive modulus, Msi (GPa)	1R-94	3.8 (26)	3.5 (24)	3.7 (25)	3.5 (24)
0° Flexural strength, ksi (MPa)	ASTM D790	101 (690)	87 (600)	77 (530)	50 (344)
0° Flexural modulus, Msi (GPa)		3.6 (24)	3.5 (24)	3.4 (23)	3.8 (26)
Short beam shear strength, ksi (MPa)	SACMA 8R-94	10.2 (70.3)	7.8 (53)	7.0 (48)	5.9 (40)

*14 day, 160°F water immersion

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

FAR 25.853 Appendix F, TR30S 3K PW Carbon fabric, 40%RC, autoclave cured, 90min at 260°F, 45psi.

Part I a1i and a2iii		
60-Second vertical flame test (7-ply laminate)	Requirements	Results
Self-extinguish, time after flame removal	8 sec. max	2.4 sec.
Average burn length	4" max	1.8"
Self-extinguish drip time	1 sec. max	0 sec.
45° Flame test	Requirements	Results
Self-extinguish, time after flame removal	8 sec. max	1.2 sec.
Average afterglow time	3 sec. max	0 sec.
Flame penetration	none	none

FAR 25.853 Appendix F, 7781 E-glass fabric, 40%RC, autoclave cured, 90min at 260°F, 45psi.

Part I a1i and a2iii		
60-Second vertical flame test (3-ply laminate)	Requirements	Results
Self-extinguish, time after flame removal	15 sec. max	<1 sec.
Average burn length	6" max	3.75"
Self-extinguish drip time	3 sec. max	0 sec.
45° Flame test	Requirements	Results
Self-extinguish, time after flame removal	15 sec. max	<1 sec.
Average afterglow time	10 sec. max	0 sec.
Flame penetration	none	none

FAR 25.853 Appendix F, 3K70P Carbon fabric, 40%RC, autoclave cured, 90min at 260°F, 45psi.

Part I a1i and a2iii		
Vertical burn test	Requirements	Results
Max burn time	15 sec. max	0 sec.
Max burn length	6" max	3.7"
Max longest burning particle	3 sec. max	None
45° Burn test	Requirements	Results
Max burn time	15 sec. max	0 sec.
Max glow time	10 sec. max	0 sec.
Penetration	none	none



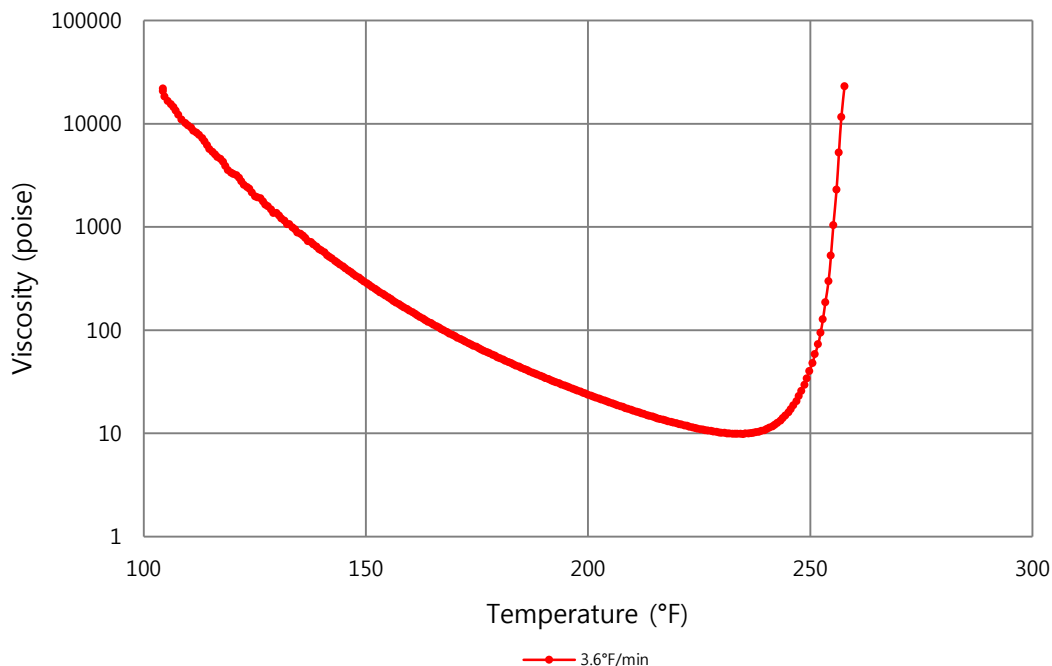
MITSUBISHI CHEMICAL
CARBON FIBER AND COMPOSITES

Technical Data Sheet

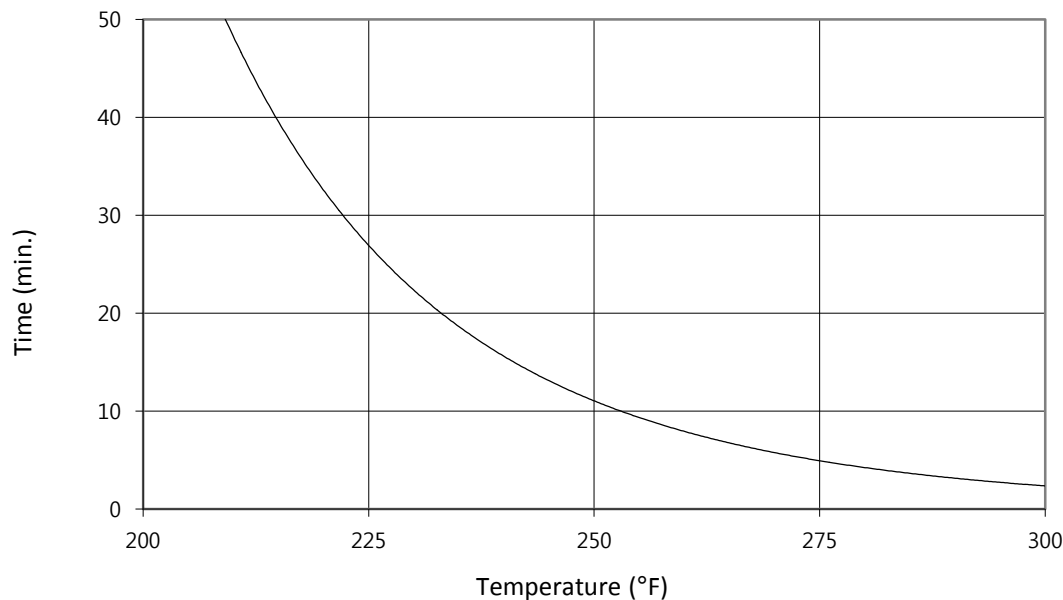


117-1 Viscosity vs. temperature

TA - AR2000 parallel plate rheometer



Gel time vs. temperature



The information contained herein has been obtained under controlled laboratory conditions and are typical or average values and do not constitute a specification, guarantee, or warranty. Results may vary under different processing conditions or in combination with other materials. The data is believed to be reliable but all suggestions or recommendations for use are made without guarantee. You should thoroughly and independently evaluate materials for your planned application and determine suitability under your own processing conditions before commercialization. Furthermore, no suggestions for use or material supplied shall be considered a recommendation or inducement to violate any law or infringe any patent.

CORPORATE OFFICE
Composite Materials Division
1822 Reynolds Avenue
Irvine, CA 92614

Tel: (949) 253-5680
Fax: (949) 253-5692
www.mccfc.com
compositesales@mccfc.com

THE KAITOKI COMPANY

Mitsubishi Chemical Holdings Group