301

NEWPORT HIGH PERFORMANCE MATERIALS

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

Typical applications
Sporting goods
Marine
Medical
Industrial manufacturing

Out life
30 days at 70°F (21°C)

Shelf life
6 months at 40°F (4°C)
12 months at 0°F (-18°C)

Description
301 is a 250°F (121°C) to 300°F (149°C) cure, toughened, controlled flow epoxy resin system that has been the industry standard for over 25 years. Versatile processing, excellent mechanical properties, and long out time make 301 suitable for a variety of applications, including large scale structures where layup requirements can take days or weeks.

Benefits/features
- Excellent mechanical properties
- Moderate tack
- Good toughness
- Controlled flow
- Flexible processing

Variants
- 301-1: Increased tack
- 301-D: Decreased tack
- 301-5: Snap cure (3 min. at 300°F, 10 min. at 275°F)
- 301-T: Clearer aesthetics

Application
301 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
301 is typically cured at 250°F - 300°F (121°C - 149°C) depending on part size and complexity. With extended cure times, larger scale structures can be cured as low as 195°F-220°F (90°C-104°C). Low, medium and high pressure molding techniques may be used for curing. Recommended cure cycle is 50 psi (345 kPa); 3°F (1.7°C)/min ramp to 275°F (135°C); hold for 60 minutes, cool to <140°F (60°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	3 – 5
Specific gravity	1.22
T_g (DMA, E'), °C (°F)	120 (248)
CTE, ppm/°C	70 ± 10 (below T_g)
Tensile strength, ksi (MPa)	8.3 (57)
Tensile modulus, Msi (GPa)	0.46 (3.1)
Flexural strength, ksi (MPa)	14.6 (100)
Flexural modulus, Msi (GPa)	0.50 (3.4)

Outgassing properties tested in accordance with ASTM E595

Property	Resin	NCT301 LT 145gsm 35%RC
Average value TML (Total mass loss)	0.49%	0.19%
Average value WVR (Water vapor recovered)	0.38%	0.12%
Percent CVCM (Collected volatile condensable materials)	<0.01	<0.01%

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

3K70P Carbon fabric, 38%RC, autoclave cured, 60psi, 90 minutes at 275°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	158 (1090)
0° Tensile modulus, Msi (GPa)		12.3 (84.8)
Poison's ratio		.035
0° Compressive strength, ksi (MPa)	ASTM D695mod	124 (855)
0° Compressive modulus, Msi (GPa)		11.4 (78.6)
0° Flexural strength, ksi (MPa)	ASTM D790	189 (1300)
0° Flexural modulus, Msi (GPa)		11.6 (80.0)
Short beam shear strength, ksi (MPa)	ASTM D2344	10.0 (69)

TR30S 3k 2x2 Twill, carbon fabric, 42%RC, autoclave cured, 58psi (vent at 20psi), 90 minutes at 275°F, results as tested

Property	Test method	RT	RT_{wet}*
0° Tensile strength, ksi (MPa)	ASTM D638 Type I	103 (710)	77 (530)
0° Tensile modulus, Msi (GPa)		9.9 (68)	8.7 (60)
0° Compressive strength, ksi (MPa)	SACMA 1R-94	89 (610)	50 (350)
0° Flexural strength, ksi (MPa)	ASTM D790	121 (830)	59 (410)
0° Flexural modulus, Msi (GPa)		7.3 (50)	6.6 (46)
Short beam shear strength, ksi (MPa)	SACMA 8R-94	10.6 (73)	4.1 (28)

*Wet conditioning = 14-day water immersion @ 160°F (71°C)

MITSUBISHI CHEMICAL CARBON FIBER AND COMPOSITES

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34-700 Uni carbon, 35%RC, autoclave cured, 60psi, 90 minutes at 275°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	344 (2370)
0° Tensile modulus, Msi (GPa)		19.4 (133)
Poison's ratio		0.289
0° Compressive strength, ksi (MPa)	SACMA 1R-94	244 (1680)
0° Compressive modulus, Msi (GPa)		19.5 (134)
0° Flexural strength, ksi (MPa)	ASTM D790	249 (1710)
0° Flexural modulus, Msi (GPa)		19.8 (136)
Short beam shear strength, ksi (MPa)	SACMA 8R-94	14.0 (96.5)

37-800 Uni carbon, 34%RC, autoclave cured, 60psi, 90 minutes at 275°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	408 (2810)
0° Tensile modulus, Msi (GPa)		21.2 (146)
0° Compressive strength, ksi (MPa)	ASTM D695mod	217 (1500)
0° Compressive modulus, Msi (GPa)		19.1 (131)
0° Flexural strength, ksi (MPa)	ASTM D790	226 (1560)
0° Flexural modulus, Msi (GPa)		18.2 (125)
Short beam shear strength, ksi (MPa)	ASTM D2344	13.9 (95)

HR40 Uni carbon, 31%RC, autoclave cured, 85psi, 30 minutes at 170°F, then 120 minutes at 255°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	371 (2550)
0° Tensile modulus, Msi (GPa)		34.1 (235)
0° Compressive strength, ksi (MPa)	SACMA 1R-94	159 (1090)
0° Flexural strength, ksi (MPa)	ASTM D790	226 (1550)
0° Flexural modulus, Msi (GPa)		30.4 (209)
Short beam shear strength, ksi (MPa)	SACMA 8R-94	12.7 (87.5)

TRH50 Uni carbon, 35%RC, autoclave cured, 80psi, 90 minutes at 275°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	442 (3040)
0° Tensile modulus, Msi (GPa)		21.7 (149)
0° Compressive strength, ksi (MPa)	ASTM D695mod	240 (1650)
0° Flexural strength, ksi (MPa)	ASTM D790	250 (1720)
0° Flexural modulus, Msi (GPa)		21.1 (145)
90° Flexural strength, ksi (MPa)	ASTM D790	19.8 (136)
Short beam shear strength, ksi (MPa)	ASTM D2344	13.3 (91.7)

TR50S Uni carbon, 34%RC, autoclave cured, 60psi, 90 minutes at 275°F, normalized to 60%FV

Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	373 (2570)
0° Tensile modulus, Msi (GPa)		20.4 (140)
90° Tensile strength, ksi (MPa)		9.19 (63.7)
90° Tensile modulus, Msi (GPa)		1.26 (8.68)
0° Compressive strength, ksi (MPa)	ASTM D695mod	228 (1570)
0° Compressive modulus, Msi (GPa)		20.7 (142)
90° Compressive strength, ksi (MPa)		38.6 (266)
90° Compressive modulus, Msi (GPa)		1.45 (10.0)
0° Flexural strength, ksi (MPa)	ASTM D790	244 (1680)
0° Flexural modulus, Msi (GPa)		18.1 (124)
90° Flexural strength, ksi (MPa)		22.7 (156)
Short beam shear strength, ksi (MPa)	ASTM D2344	13.9 (95)
±45° IPS Strength @5% Strain, ksi (MPa)	ASTM D3518	7.1 (48)
±45° IPS Modulus, Msi (GPa)		0.53 (3.6)

7781 E-glass fabric, 39%RC, autoclave cured, 30psi, 90 minutes at 260°F, normalized to 60%FV

Property	Test method	RT	RT_{wet}*
0° Tensile strength, ksi (MPa)	ASTM D638 Type II	91.9 (633)	74.0 (510)
0° Tensile modulus, Msi (GPa)		4.6 (31)	5.0 (34)
0° Compressive strength, ksi (MPa)	ASTM D695mod	84.2 (580)	77.9 (537)
0° Compressive modulus, Msi (GPa)		4.5 (31)	4.5 (31)
0° Flexural strength, ksi (MPa)	ASTM D790	137 (944)	108 (774)
0° Flexural modulus, Msi (GPa)		5.4 (37)	4.9 (33)
Short beam shear strength, ksi (MPa)	SACMA 8R-94	10.3 (71.0)	8.3 (57)

*Wet conditioning = 2 hour water boil, weight gain = 0.25%

Uni E-glass, 300gsm, 36%RC, autoclave cured, 60psi, 90 minutes at 275°F, normalized to 60%FV

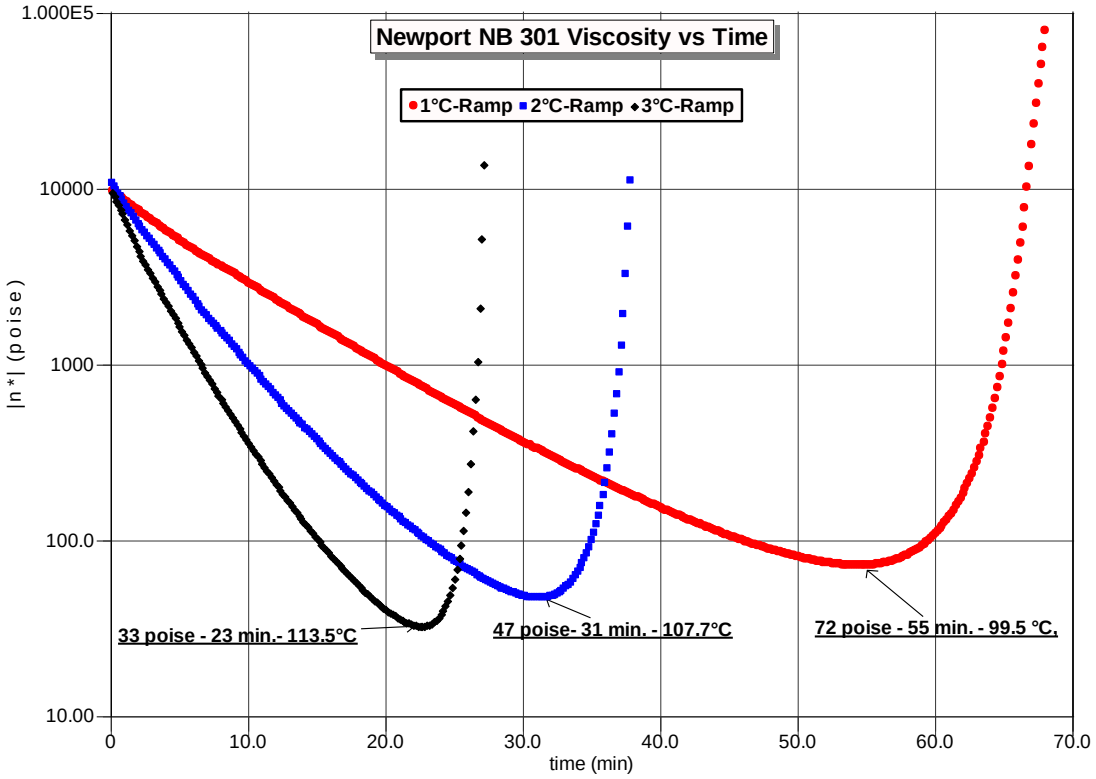
Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	179 (1230)
0° Tensile modulus, Msi (GPa)		7.2 (49.6)
0° Compressive strength, ksi (MPa)	ASTM D695mod	234 (1610)
0° Compressive modulus, Msi (GPa)		7.4 (51.0)
0° Flexural strength, ksi (MPa)	ASTM D790	196 (1350)
0° Flexural modulus, Msi (GPa)		7.1 (49.0)
Short beam shear strength, ksi (MPa)	ASTM D2344	13.3 (92)

Innegra™S 2x2 Twill, 50%RC, autoclave cured, 58psi, 90 minutes at 275°F, normalized to 60%FV

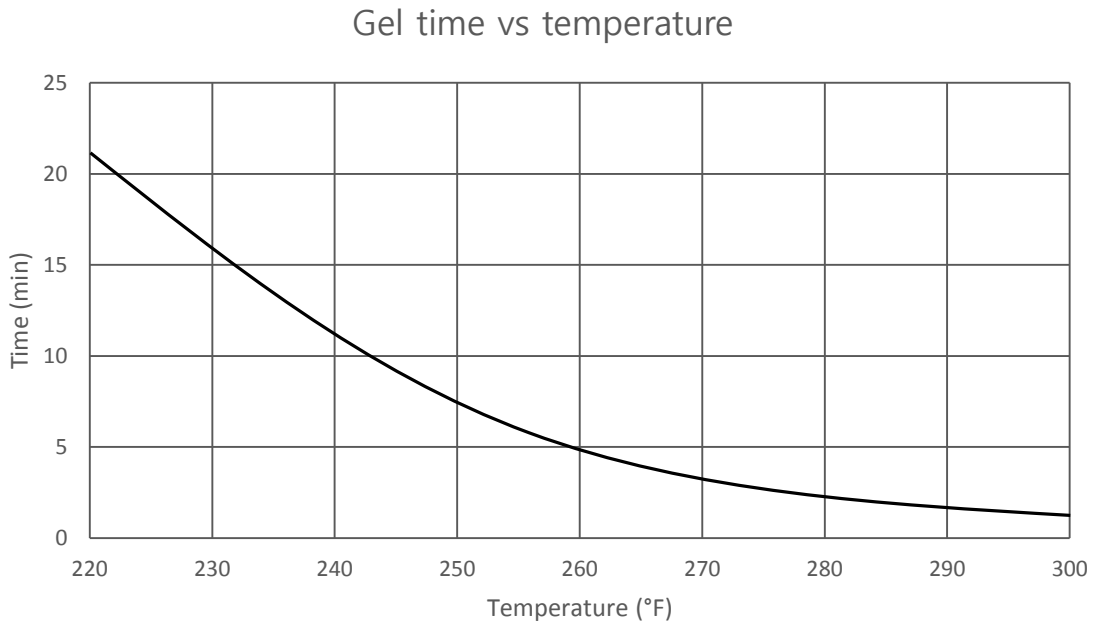
Property	Test method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	24.3 (167)
0° Tensile modulus, Msi (GPa)		0.529 (3.64)
0° Compressive strength, ksi (MPa)	ASTM D695mod	2.94 (20.2)
0° Flexural strength, ksi (MPa)	ASTM D790	6.26 (43.1)
0° Flexural modulus, Msi (GPa)		0.464 (3.20)
90° Flexural strength, ksi (MPa)	ASTM D790	5.29 (36.4)
Short beam shear strength, ksi (MPa)	SACMA 8R-94	0.63 (4.34)

Viscosity profile

TA - AR2000 parallel plate rheometer



Gel curve



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