NB321

NEWPORT HIGH PERFORMANCE MATERIALS

MITSUBISHI RAYON CARBON FIBER & COMPOSITES

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

Typical applications
General Aviation
Aerospace
Industrial
Sporting goods

Out life
21 days at 70°F (21°C)

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

Description
NB321 is a 250°F (121°C) to 300°F (149°C) cure, toughened, high T_g, controlled flow epoxy resin system. Versatile processing, and excellent mechanical properties make NB321 suitable for general aviation, aerospace, sporting goods and industrial markets. FAA approved (AGATE) design allowable database is available for certain material combinations.

Benefits/features
- High dry and wet T_g
- Excellent mechanical properties
- B-Basis design allowable database
- Moderate tack
- Good toughness
- Controlled flow

Application
The high T_g and excellent mechanical properties make NB321 an ideal product for the UAV, general aviation, aerospace and other markets where products are required to retain their mechanical properties under demanding temperatures.

NB321 can be supplied with most commercially available fibers (carbon, quartz, aramid, S-glass, E-glass, etc.) in both woven and unidirectional tape. 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).

NB321LS includes a metal mesh reinforcement that provides suitable lightning strike protection for general aviation.

Variants
- 321-1: Increased tack
- 321LS: Metal mesh reinforced adhesive

Recommended processing conditions
NB321 can be cured at temperatures from 250°F to 300°F (121°C - 149°C) depending on part size and complexity. 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). Post curing at 325 (163°C) is possible if higher T_g is required.

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	1.22
T_g (DMA, E'), °C (°F)	150 (300)

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

34-700 Uni Carbon 36%RC, autoclave cured, 60 minutes at 275°F, 80psi, normalized to 60%FV

Property	Test Method	RT
0° Tensile strength, ksi (MPa)	ASTM D3039	304 (2090)
0° Tensile modulus, Msi (GPa)		18.7 (128)
0° Compressive strength, ksi (MPa)	ASTM D695	230 (1580)
0° Compressive modulus, Msi (GPa)		21.3 (146)
0° Flexural strength, ksi (MPa)	ASTM D790	261 (1800)
0° Flexural modulus, Msi (GPa)		18.2 (125)
Short Beam Shear strength, ksi (MPa)	ASTM D2344	15.5 (96.5)

Hexcel NAS-S 12K Uni Carbon, 150gsm, 36%RC, vacuum bag cured, 100 minutes at 270°F, normalized by CPT=0.006in (55%FV) [AGATE]

Property	Test Method	-65˚F (-53°C)	RT	175˚F (79°C) wet[1]
0° Tensile strength, ksi (MPa)	ASTM D3039	291 (2000)	296 (2040)	269 (1850)
0° Tensile modulus, Msi (GPa)		19.0 (130)	18.6 (128)	18.6 (128)
Poisson's ratio		-	0.3	-
90° Tensile strength, ksi (MPa)		7.3 (50)	7.1 (48)	4.7 (32)
90° Tensile modulus, Msi (GPa)		1.3 (8.9)	1.2 (8.2)	0.9 (6)
0° Compressive strength, ksi (MPa)	SACMA 1R-94	196 (1350)	172 (1180)	124 (855)
0° Compressive modulus, Msi (GPa)		17.0 (117)	17.9 (123)	17.7 (122)
90° Compressive strength, ksi (MPa)		40 (270)	32 (220)	24 (160)
90° Compressive modulus, Msi (GPa)		1.6 (11)	1.6 (11)	1.1 (7.5)
In-Plane Shear strength, ksi (MPa)	ASTM D5379	25 (170)	21 (140)	14 (96)
In-Plane Shear modulus, Msi (GPa)		0.7 (4)	0.6 (4)	0.5 (3)
0° Short Beam Shear strength, ksi (MPa)	SACMA 8R-94	-	13.1 (90)	-

[1]175°F, 85%RH until equilibrium

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Technical Data Sheet

Hexcel AS4C-M 3K PW, 42%RC, vacuum bag cured, 100 minutes at 270°F, normalized by CPT=0.0085in (50%FV) [AGATE]

Property	Test Method	-65°F (-53°C)	RT	175°F (79°C) wet[1]
0° Tensile strength, ksi (MPa)	ASTM D3039	81 (550)	87 (600)	74 (510)
0° Tensile modulus, Msi (GPa)		7.9 (54)	9.3 (64)	8.2 (56)
Poisson's ratio		-	0.06	-
0° Compressive strength, ksi (MPa)	SACMA 1R-94	79 (540)	71 (480)	57 (390)
0° Compressive modulus, Msi (GPa)		7.8 (53)	8.2 (56)	8.4 (57)
In-Plane Shear strength, ksi (MPa)	ASTM D5379	18 (120)	17 (110)	11 (75)
In-Plane Shear modulus, Msi (GPa)		0.7 (4)	0.6 (4)	0.4 (2)
0° Short Beam Shear strength, ksi (MPa)	SACMA 8R-94	-	8.8 (60)	-

[1]175°F, 85%RH until equilibrium

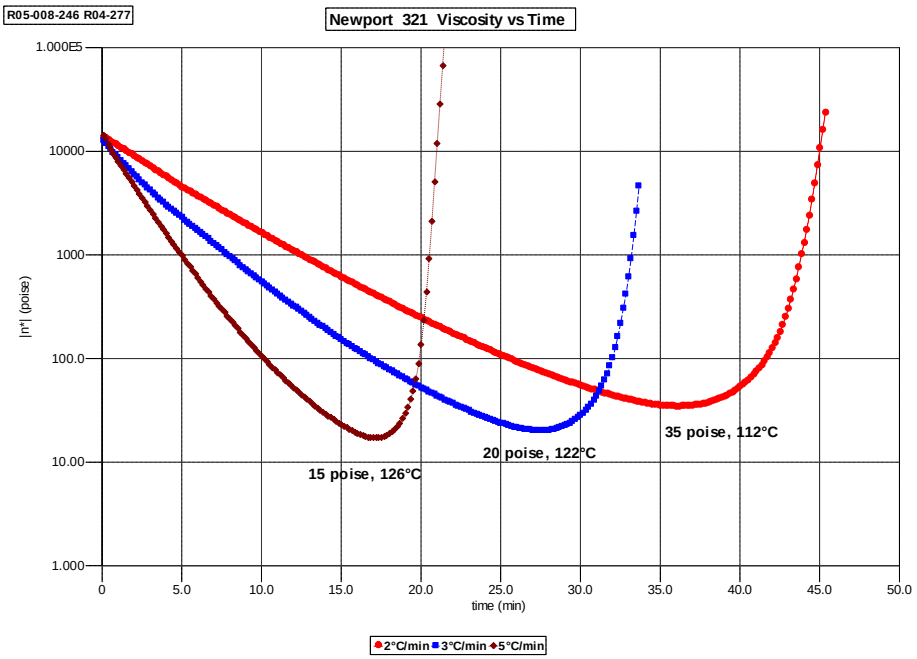
7781 E-Glass Fabric 38%RC, vacuum bag cured, 100 minutes at 270°F, normalized by CPT=0.0098in (48%FV) [AGATE]

Property	Test Method	-65°F (-53°C)	RT	175°F (79°C) wet[1]
0° Tensile strength, ksi (MPa)	ASTM D3039	65 (440)	62 (420)	42 (280)
0° Tensile modulus, Msi (GPa)		4.0 (27)	4.1 (28)	3.4 (23)
Poisson's ratio		0.16	0.14	-
0° Compressive strength, ksi (MPa)	SACMA 1R-94	97 (660)	78 (530)	56 (380)
0° Compressive modulus, Msi (GPa)		3.9 (26)	3.9 (26)	3.8 (26)
In-Plane Shear strength, ksi (MPa)	ASTM D5379	23 (150)	19 (131)	13 (89)
In-Plane Shear modulus, Msi (GPa)		0.7 (4)	0.6 (4)	0.4 (2)
0° Short Beam Shear strength, ksi (MPa)	SACMA 8R-94	-	9.4 (64)	-

[1]175°F, 85%RH until equilibrium

Viscosity Profile

TA - AR2000 parallel plate rheometer



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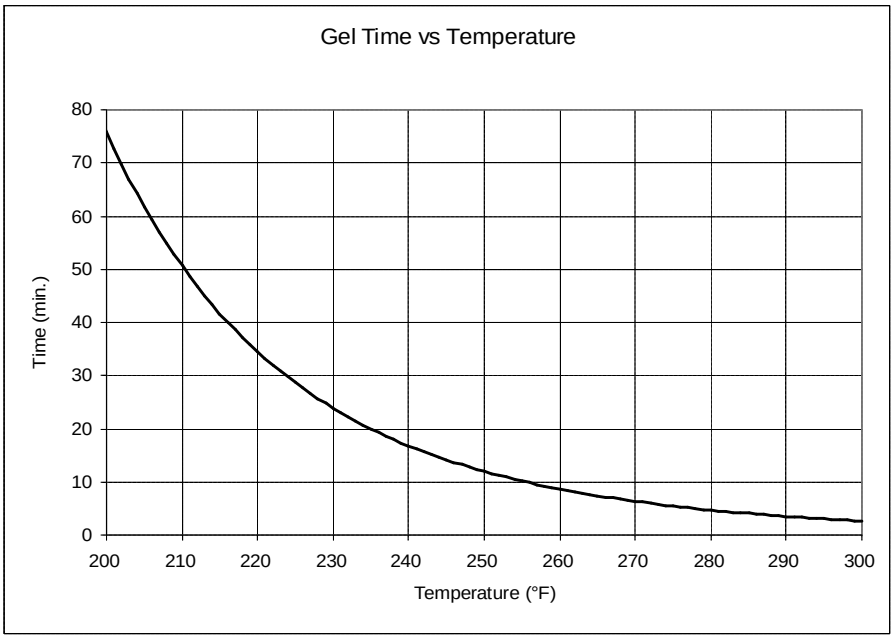
Technical Data Sheet

Gel Curve



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Technical Data Sheet

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