

# 316



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

### Typical applications

Electrical

### 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

316 is a 250-300°F (121-149°C) cure, flame retardant, modified epoxy resin system, designed for use in electrical and electronic applications.

### Benefits/features

- Meets UL 94 V-0 flammability requirements
- Excellent mechanical properties
- Vacuum bag, press, and autoclave curable

### Application

316 is suited for use where fire retardant materials are either preferable or mandatory such as electronic and measurement devices as well as electrical enclosures. While the key feature of this material is its conformance to UL 94 V-0 requirements, this system is favored for its versatile processing, excellent mechanical properties and cost efficiency.

316 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 (1.5m). Unitape widths up to 39 inches (1m) are available in standard fiber weights ranging from 70-300gsm (0.014-0.060psf).

### Recommended processing conditions

316 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 275°F (135°C), hold for 60 minutes, cool to <140°F (60°C).



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Technical Data Sheet

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

Property	Value
Gel time @ 275°F (135°C), minutes	11 - 14
Specific gravity	1.21
T <sub>g</sub> (DMA, E'), °C (°F)	115 (239)
CTE (ppm/°C):	50 ± 10 (below T <sub>g</sub> )

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

34-700 35%RC, autoclave cured, 45psi, 60 minutes at 275°F, results as tested

Property	Test method	RT	160°F (71°C)	200°F(93°C)	RT Wet	160°F Wet
0° Tensile strength, ksi (MPa)		329 (2260)	303 (2080)	335 (2310)	279 (1920)	328 (2260)
0° Tensile modulus, Msi (GPa)		19.8 (136)	20.2 (139)	19.6 (135)	21.2 (146)	18.6 (128)
Strain, μ in/in	ASTM D3039	16000	14400	13400	13000	11100
Poisson's ratio		0.31	0.30	0.31	0.31	0.34
90° Tensile strength, ksi (MPa)		8.6 (59)	9.0 (62)	6.8 (46)	7.8 (53)	7.6 (52)
90° Tensile modulus, Msi (GPa)		1.3 (8.9)	1.2 (8.2)	1.0 (6.8)	1.2 (8.2)	0.9 (6)
Strain, μ in/in	ASTM D3039	6500	7800	6100	6400	7200
Poisson's ratio		0.016	0.012	0.043	-	-
0° Compressive strength, ksi (MPa)		171 (1170)	116 (800)	87 (600)	163 (1120)	107 (737)
0° Compressive modulus, Msi (GPa)	SACMA 1R94	20.7 (142)	18.2 (125)	18.5 (127)	20.7 (142)	19.6 (135)
Strain, μ in/in		9600	6400	4000	7900	5400
90° Compressive strength, ksi (MPa)		32 (220)	24 (160)	20 (130)	30.4 (209)	22.5 (155)
90° Compressive modulus, Msi (GPa)	SACMA 1R94	1.3 (8.9)	1.3 (8.9)	1.1 (7.5)	1.3 (8.9)	1.1 (7.5)
Strain, μ in/in		22000	16000	13000	19800	15100
0° Flexural strength, ksi (MPa)		263 (1810)	218 (1500)	167 (1150)	246 (1690)	197 (1350)
0° Flexural modulus, Msi (GPa)	ASTM D790	17.3 (119)	18.8 (129)	18.0 (124)	17.5 (120)	16.8 (115)
90° Flexural strength, ksi (MPa)		12.9 (88.9)	13.9 (95.8)	8.2 (56)	13.2 (91.0)	12.5 (86.2)
90° Flexural modulus, Msi (GPa)	ASTM D790	1.3 (8.9)	1.2 (8.2)	0.7 (4)	1.3 (8.9)	1.0 (6.8)
0° Short beam shear strength, ksi (MPa)	SACMA 8R94	14.7 (101)	9.7 (66)	7.6 (52)	13.9 (95.8)	8.6 (59)
90° Short beam shear strength, ksi (MPa)	SACMA 8R94	1.6 (11)	1.4 (9)	1.3 (8)	1.6 (11)	1.4 (9.6)

*Wet = 14-day water immersion @ 160°F*

TR30 3K 2x2 Twill 45%RC, 45psi, 90 minutes at 275°F, normalized to 60%FV

Property	Test method	RT	180°F (82°C)
0° Tensile strength, ksi (MPa)		141 (972)	140 (965)
0° Tensile modulus, Msi (GPa)	ASTM D3039	11.5 (79.3)	11.8 (81.4)
0° Compressive strength, ksi (MPa)	SACMA 1R-94	114 (786)	98.3 (678)
0° Flexural strength, ksi (MPa)		176 (1210)	130 (896)
0° Flexural modulus, Msi (GPa)	ASTM D790	10.9 (75.1)	10.6 (73.1)
0° Short beam shear strength, ksi (MPa)	SACMA 8R-94	14.1 (97.2)	11.0 (75.8)



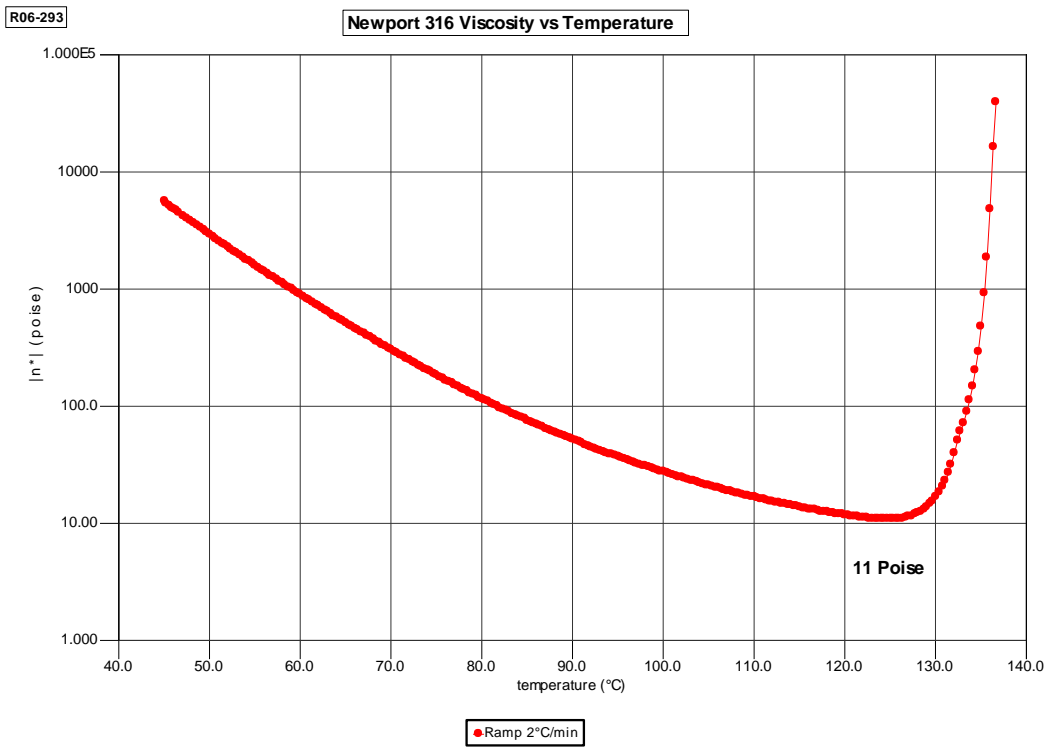
# Flame retardance data [values are average and do not constitute a specification]

UL 94 V-0, 3K 2x2 Twill, 45%RC

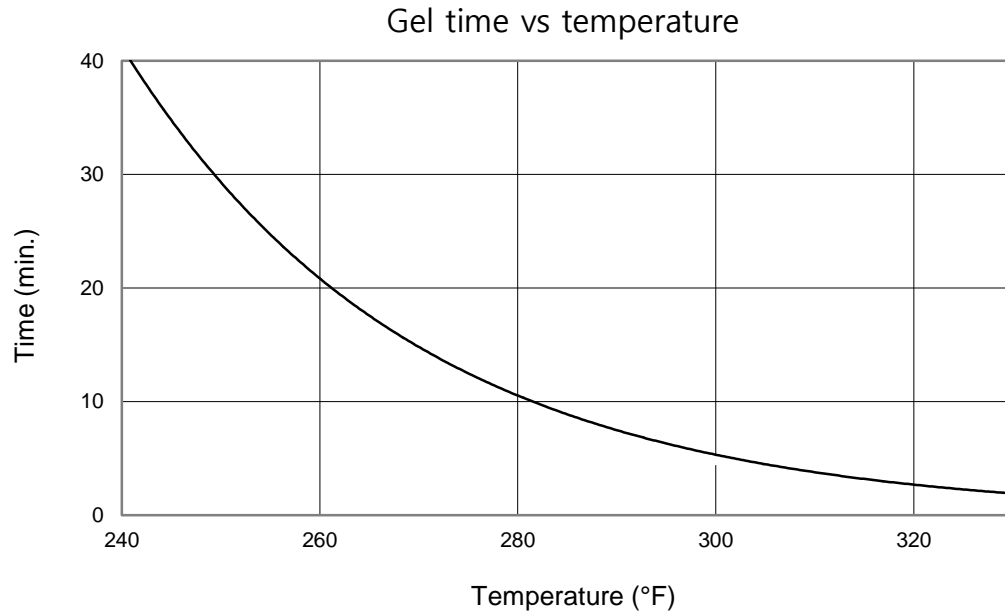
Part I a1i and a2iii		
Criteria conditions	Requirements	Results
Afterflame time for each specimen	≤ 10 seconds	7.5 seconds
Afterflame total time	< 50 seconds	21.5 seconds
Afterflame + afterglow time	< 30 seconds	1.5 seconds
Afterflame/afterglow of any specimen up to the holding clamp?	No = pass	No
Cotton indicator ignition?	No = pass	No

## Viscosity profile

TA - AR2000 parallel plate rheometer



## Gel curve



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 suggestion for use or material supplied shall be considered a recommendation or inducement to violate any law or infringe any patent.

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