



Phenolic Resins for Composites Product Information

Tel: 866-4GP-CHEM

Fax: 770-322-9973

Web Site: www.gp.com/chemical

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GP® 5236 RESI-LAM® Resin for Laminating

Description

GP® 5236 resin is a high-temperature-resistant phenolic laminating resin that meets the requirements of Military Specification Mil-R-9299C, Type II, Class 2.

Standard 1/8" glass laminates produced with GP-5236 have been found to have good performance when tested at temperatures of up to 700°F (371°C). The minimum flexural strength requirements of Mil-R-9299C, which requires only a 500°F (260°C) performance, can be met with GP-5236 after 100 hours at 600°F (315°C) or after 4 hours at 700°F (371°C). This extra margin of temperature resistance allows a greater degree of safety for many structural plastic parts subjected to severe temperature conditions.

Uses and Application

Applications for laminates made with GP-5236 include: missile and aircraft structural components and insulation; circuit board components; and custom molding compounds for rocket nozzles, automotive electrical parts located in the engine area, and specialty electrical and electronic molded parts and shapes.

Storage and Handling

GP-5236 resin should be used and stored in areas with good ventilation. Storage at temperatures below 50°F (10°C) is recommended.

Additional information on the safe handling of GP-5236 resin is in the Material Safety Data Sheet available from Georgia-Pacific.

Typical Properties

Type	phenol-formaldehyde
Appearance	reddish-brown liquid
Non-Volatiles, %	60.0 - 64.0
Viscosity, cps	
@ 77°F (25°C)	300 - 700
pH	6.5 - 7.5
Specific Gravity	
@ 77°F (25°C)	1.00 - 1.15
Hot Plate Stroke Cure time	
@ 302°F (150°C), seconds	90 - 120

Flexural Strength of Laminates - 24-hr. Immersion (ASTM D-790)

Solvent	Flexural Strength, psi		Thickness Change, %		Weight Change, %	
	Results with GP® 5236	MIL-R-9299C Specification	Results with GP® 5236	MIL-R-9299C Specification	Results with GP® 5236	MIL-R-9299C Specification
Hydraulic oil	78,000	45,000	.00	0.2 max.	.0088	2.0 max.
Isopropyl alcohol	80,000	45,000	.00	0.1 max.	.0510	2.0 max.
Ethylene glycol	80,000	45,000	.00	0.1 max.	.0355	2.0 max.
Type III hydrocarbon	80,000	45,000	.00	0.2 max.	.0058	2.0 max.

Flexural Properties (ASTM D-790)

Aging Condition	Test Condition	Flexural Strength, psi		Flexural Modulus, msi	
		Results with GP® 5236	MIL-R-9299C Specification	Results with GP® 5236	MIL-R-9299C Specification
Room Temperature	75°F	79,000	50,000	4.31	3.0
Boiling water for 2 hours	wet	78,000	45,000	4.25	2.5
160°F for 0.5 hour	160°F	74,000	50,000	3.56	3.0
500°F for 0.5 hour	500°F	56,000	40,000	3.16	3.0
500°F for 100 hours	500°F	70,000	20,000	3.47	2.5
500°F for 200 hours	500°F	51,000	not required	3.20	not required
500°F for 500 hours	500°F	29,000	not required	2.30	not required
600°F for 100 hours	600°F	21,500	not required	2.00	not required
700°F for 2 hours	700°F	41,000	not required	3.00	not required
700°F for 4 hours	700°F	30,000	not required	2.90	not required

Test specimens: 14-ply laminates prepared with 181 A-1100 hard finish glass cloth cured @ 325°F for 11 minutes under 250 psi. Laminates were post-cured as follows: 24 hours at 300°F, followed by 24 hours at 350°F, followed by 1 hour at 400°F, 1 hour at 450°F, and 1 hour at 500°F. Resin content = 31%.

Tensile and Compressive Strengths (ASTM D-638 Type 1 and ASTM D-695, respectively)

Aging Condition	Test Condition	Tensile Strength, psi		Compressive Strength (edge), psi	
		Results with GP® 5236	MIL-R-9299C Specification	Results with GP® 5236	MIL-R-9299C Specification
Room Temperature	75°F	49,000	40,000	67,000	35,000
30-day water immersion	wet	51,000	38,000	71,000	30,000
500°F for 0.5 hour	500°F	46,000	30,000	44,000	30,000

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