

Product Information



BENEFITS

Corrosion resistance

Vipel F086 is designed for high temperature resistance. The epoxy novolac backbone provides resistance to acids and has superior resistance to many organic solvents. Vipel F086 series is generally resistant to liquids and vapors at higher temperatures than standard bisphenol-A epoxy vinyl ester resins or standard novolacs.

Refer to AOC's "Corrosion Resistant Resin Guide" for corrosion resistance information or for questions regarding suitability of a resin to any particular chemical environment contact AOC.

Mechanical Properties

The Vipel F086 series is suitable for moldings that are subjected to particularly high temperature applications.

Versatile

Suitable for various fabricating methods such as hand lay-up, filament winding, etc.

Vipel Corrosion Resistant Epoxy Novolac, Vinyl Ester Resin

TYPICAL CAST MECHANICAL PROPERTIES * (1) see back page

Test	Unit of Measure	Nominal	ISO Methods
Tensile Strength	psi/MPa	12,000/83	ASTM D 638
Tensile Modulus	psi/GPa	550,000/3.8	ASTM D 638
Tensile Elongation	%	2.8	ASTM D 638
Flexural Strength	psi/MPa	22,500/155	ASTM D 790
Flexural Modulus	psi/GPa	610,000/4.2	ASTM D 790
Heat Distortion Temp	°F/°C	330/166	ASTM D 648
Barcol Hardness, 934		41	ASTM D 2583

DESCRIPTION

The Vipel F086 series is an epoxy novolac vinyl ester resin dissolved in styrene and designed for high temperature resistance.

The Vipel F086 series is ideally suited for use in hand lay-up, spray-up, and filament winding processes where outstanding mechanical properties and resistance to chemicals, oxidation and heat are required.

TYPICAL LIQUID RESIN PROPERTIES * (2) see back page

Versions	Viscosity, cps	Thix Index	Gel Time, min	Gel to Peak, min	Peak Exotherm, °F/°C	Specific Gravity	Styrene Content %
F086-AAA-00	400 ¹	NA	25 ²	15	390/199	1.08	37
F086-HHH-00	2800 ³	NA	12 ⁴	5	367/186	1.12	25

NA- Not applicable

- 25°C Brookfield RV viscosity spindle #2 at 20 rpm
- 25°C Gel time with 0.3% Cobalt 6%, 0.05% DMA and 2.0% CHP** (90% active)
- 25°C Brookfield RV viscosity spindle #3 at 20 rpm
- 25°C Gel time with 0.25% Cobalt 6%, 0.05% DMA and 1.25% MEKP

*Typical properties are not to be construed as specifications.

** Cumyl hydroperoxide (also known as cumene hydroperoxide)

Vipel® F086 Series Novolac Vinyl Ester Resin

CHP¹ (90% ACTIVE) GEL TIMES FOR VIPEL® F086-A SERIES RESINS

Temperature, °C	10 - 20 Minutes			20 - 40 Minutes			50 - 70 Minutes		
	18	25	35	18	25	35	18	25	35
Cobalt-6%, %			0.3	0.4	0.3	0.2	0.3	0.3	0.2
DMA ²			0	0.1	0	0	0.05	0	0
2,4 - Pentanedione			0	0	0	0.055	0	0.085	0.135
CHP, %			2	2	2	1.5	1.25	2	1.5
Gel Time, minutes			14	35	27	27	55	61	61
Gel to Peak, minutes			9	16	16	15	24	30	23
Peak Temperature, °C			214	203	201	207	194	195	202

1) Cumyl hydroperoxide (also known as cumene hydroperoxide)
2) N,N-Dimethylaniline

HIGH TEMPERATURE TENSILE PROPERTIES

Temperature, °F/°C	CAST PROPERTIES(1)		ASME RTP-1 LAMINATE PROPERTIES	
	Tensile Strength, psi/MPa	Tensile Modulus, psi/GPa	Tensile Strength, psi/MPa	Tensile Modulus, psi/GPa
77/25	12,300/85	550,000/3.8	22,600/156	1,780,000/12.3
150/65.6	10,000/69	460,000/3.2	21,000/145	1,600,000/11
200/93	8,100/56	400,000/2.8	20,000/138	1,760,000/12.1
250/121	6,000/41	360,000/2.5	20,000/138	1,480,000/10.2
275/135	4,000/28	260,000/1.8	19,000/131	1,340,000/9.2
300/149	2,600/17	177,000/1.2	21,000/145	1,300,000/9.0
325/163	1,700/12	34,000/0.23	19,000/131	1,100,000/7.6
350/177	900/6.2	12,600/0.09	15,000/103	1,000,000/6.9

ASME RTP-1 Laminate construction: VMM MRMRM V-glass veil, M -chopped strand glass mat 1.5 oz per square foot (450 grams per square meter) R-Woven Roving 24 oz per square yard (814 grams per square meter). Laminates were 0.250 inches (6.4 mm) thick and post cured at 350°F/149°C for 2 hours. Glass content is 38.2%

PERFORMANCE GUIDELINES

A. Keep full strength catalyst levels between 1.0% - 2.0% of the total resin weight.

B. Maintain shop temperatures between 65°F/18°C and 90°F/32°C and humidity between 40% and 90%. Consistent shop conditions contribute to consistent gel times and will help the fabricator make a high quality part.

C. Cumyl hydroperoxide is suggested as a catalyst because Vipel F086 is a reactive resin. Finished part surfaces that have been cured at room temperature in contact with air should be relatively tack free. They may not, however, be fully cured and are thus not as resistant to chemicals as a fully cured part. If no further laminating is planned, a 10% solution of 5% paraffin wax solution (MP 115-118°F/46-48°C) in styrene may be added to the last resin layer to provide a tack free surface.

D. The use of cumene hydroperoxide catalyst is suggested since the resin cures quickly. If the composite is thin, high dimer MEKP catalysts can be used.

E. Optimum cure and performance may be obtained by post curing room temperature cured laminates for two hours at 158-212°F/70-100°C.

APPLICATION GUIDELINES

Due to the excellent curing characteristics of Vipel F086 resin, complete all secondary bonding as soon as possible. Exposing the laminate to sunlight will result in severe secondary bonding problems. After 48 hours of cure, it may be necessary to abrade the laminate with 16-24 grit to insure good secondary bonding, especially if the surface of the laminate is resin rich. Avoid low fiberglass content and resin puddling.

STORAGE STABILITY

This product is stable for six months from the date of manufacture when stored in the original containers, away from direct sunlight or other UV light sources and at or below 77°F/25°C.

After extended storage, some drift may occur in the product viscosity and gel time.

TYPICAL PROPERTIES OF CURED RESIN* PROCESSING

Finished part surfaces that have been cured at room temperature in contact with air should be relatively tack free. They may not, however, be fully cured and are thus not as resistant to chemicals as a fully cured part. If no further laminating is planned, a 10% solution of 5% paraffin wax solution (MP 46-48°C) in styrene may be added to the last resin layer to assure a tack free surface. Optimum cure and performance may be obtained by post curing room-temperature cured laminates for three to six hours at 194-212°F/90-100°C.

SAFETY

See appropriate Material Safety Data Sheet for guidelines.

ISO 9001:2000 CERTIFIED

The Quality Management Systems at every AOC manufacturing facility have been certified as meeting ISO 9001:2000 standards. This certification recognizes that each AOC facility has an internationally accepted model in place for managing and assuring quality. We follow the practices set forth in this model to add value to the resins we make for our customers.

FOOTNOTES

(1)

Based on tests of Vipel F086-AAA-00 at 77°F/25°C and 50% relative humidity. All thixotropic resins should be mixed well prior to use. The use of thixotropy degrades the corrosion performance of a resin in some chemical environments such as sodium chloride. All tests on unreinforced cured resin. Castings were post cured.

(2)

The gel times shown are typical but may be affected by catalyst, promoter, inhibitor concentration, resin, mold, and shop temperature. Variations in gelling characteristics can be expected between different lots of catalysts and at extremely high humidities. Pigment and/or filler can retard or accelerate gelation. It is recommended that the fabricator check the gelling characteristics of a small quantity of resin under actual operating conditions prior to use.

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