



Product Information

Vipel Fire Retardant Bisphenol A, Epoxy Vinyl Ester Resin

TYPICAL CAST MECHANICAL PROPERTIES of Vipel K022 AC, CC & CD (1) SEE BACK PAGE

Test	K022-AC Series	K022-CC Series	K022-CD Series
Tensile strength, psi/Mpa	12,500/86	12,000/83	12,000/83
Tensile modulus, psi/Gpa	520,000/3.6	520,000/3.6	520,000/3.6
Tensile Elongation, %	4.7	5.4	4.6
Flexural strength, psi/Mpa	21,300/147	20,700/143	20,700/143
Flexural modulus, psi/Gpa	530,000/3.7	530,000/3.7	530,000/3.7
Heat Distortion Temperature °F/°C at 264 psi	241/116	234/112	234/112
Barcol Hardness	39	40	40

TYPICAL CAST MECHANICAL PROPERTIES of Vipel K022 CN, E, AAA & PT (1) SEE BACK PAGE

Test	K022-CN Series	K022-E Series	K022-AAA & K022-PT Series
Tensile strength, psi/Mpa	11,000/76	12,500/86	11,600/80
Tensile modulus, psi/Gpa	530,000/3.7	510,000/3.5	490,000/3.4
Tensile Elongation, %	3	4.5	4
Flexural strength, psi/Mpa	20,100/138	21,500/149	21,300/147
Flexural modulus, psi/Gpa	560,000/3.9	540,000/3.7	550,000/3.8
Heat Distortion Temperature °F/°C at 264 psi	237/114	237/114	246/119
Barcol Hardness	34	39	41

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, %
K022-ACA-00	450 ¹	NA	21 ²	13	340/171	1.15	39
K022-CCG-00	450 ¹	NA	22 ²	12	330/166	1.15	39
K022-CCK-18	500 ³	2.0 ⁴	18 ⁵	14	350/177	1.11	44
K022-CCL-00	500 ³	2.0 ⁴	25 ⁵	15	365/185	1.11	44
K022-CDC-00	350 ¹	NA	22 ²	12	335/168	1.13	42
K022-CNC-00	450 ¹	NA	35 ²	13	350/177	1.16	39
K022-CND-00	350 ¹	NA	22 ²	12	335/168	1.13	41
K022-CNP-25	450 ¹	NA	25 ⁵	14	350/177	1.16	39
K022-EAA-40	225 ³	NA	40 ⁵	13	226/130	1.12	43
K022-EBB-00	225 ³	NA	25 ²	12	350/177	1.12	43
K022-AAA-00	400 ¹	NA	15 ⁶	12	350/177	1.25	38
K022-PTA-20	500 ¹	1.8 ⁷	20 ⁵	18	300/149	1.25	38

NA-Not applicable

- 1) 77°F/25°F Brookfield RV viscosity spindle 2 at 20 rpm
- 2) 77°F/25°F Gel time with 0.3% cobalt 6%, 0.05% DMA and 1.25% MEKP
- 3) 77°F/25°F Brookfield LV viscosity spindle 3 at 60 rpm
- 4) 6/60 rpm Thix Index
- 5) 77°F/25°F Gel time with 1.25% MEKP
- 6) 77°F/25°F Gel time with 0.2% cobalt 6%, 0.03% DMA and 1.25% MEKP
- 7) 2/20 rpm Thix Index
- 8) 77°F/25°F Gel time with 0.4% cobalt 6%, 0.05% DMA and 1.25% MEKP



DESCRIPTION

AOC's Vipel K022 series is a brominated bisphenol A epoxy vinyl ester resin dissolved in styrene. Vipel K022 series is ideally suited for use in hand lay-up, spray-up, filament winding and pultrusion processes where outstanding mechanical properties and excellent resistance to chemicals and heat are required.

Vipel K022-CN series contains antimony products.

BENEFITS
Fire Retardant

Some Vipel K022 versions do not require antimony trioxide to meet ASTM E 84 Class I flame spread and smoke requirements.

Mechanical Properties

Vipel K022 is suitable for moldings that are subjected to particularly high static or dynamic loads. Vinyl ester resins have excellent resistance to sustained heat.

Versatile

Wide formulating capabilities allow for use in many processes and for optimization of cost/performance.

Corrosion Resistance

Vipel K022 is highly resistant to a number of chemical environments. 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.

Vipel®
K022 Series
Vinyl Ester Resin



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FLAMMABILITY PROPERTIES ASTM E-84 TUNNEL TEST**

ASTM E 84			
Versions	% Antimony Trioxide	Flame Spread	Smoke Developed
K022-AC Series		25	500
K022-CC Series		30	563
K022-CNC and CNP Series		10	650
K022-CND-00		15	900
K022-CD Series		40	765
	1.5	10	800
K022-EAA Series		25	800
K022-AA Series		20	450
K022-PT Series		20	450

** Laminate Construction

2 plies of 2.0 ounce per square foot (600 grams per square meter) fiber glass chopped strand mat Fiberglass content - 30% Laminates were post cured at 212°F/100°C for 3 hours.

VIPEL® K022-AC, C and E SERIES TENSILE PROPERTY TESTING AT VARIOUS TEMPERATURES

Temperature, °F/°C	Physical Property	Casting	Chopped Mat***	RTP-1 Laminate****
Ambient	Tensile strength,psi/MPa	12,000/83	15,000/103	21,500/148
	Tensile modulus, psi/GPa	520,000/3.6	1,400,000/9.6	1,770,000/12
		4.6	1.6	1.7
150/66	Tensile strength,psi/MPa	9,900/68	16,500/114	21,500/148
	Tensile modulus, psi/GPa	436,000/3.0	1,200,000/8.3	1,650,000/11
	Elongation,%	5.1	2	1.8
200/93	Tensile strength,psi/MPa	7,200/50	13,000/90	21,000/145
	Tensile modulus, psi/GPa	415,000/2.8	1,000,000/6.9	1,480,000/10
	Elongation,%	6.1	2.1	1.7
250/121	Tensile strength,psi/MPa	1,200/8	7,900/54	13,000/90
	Tensile modulus, psi/GPa	128,000/0.9	490,000/3.4	800,000/5.5
	Elongation,%	>10	2.2	2
275/135	Tensile strength,psi/MPa	210/1.5	6,000/42	9,500/66
	Tensile modulus, psi/GPa	1,900/0.01	420,000/2.9	850,000/5.9
	Elongation,%	11.5	4.4	1.3
300/149	Tensile strength,psi/MPa		4,200/29	7,100/49
	Tensile modulus, psi/GPa		420,000/2.9	630,000/4.3
	Elongation,%		2.3	1.2
	Glass Content,%		29	37

*** Laminates made with 3 plies of 1.5 oz (450 grams/m²) chopped strand mat

****Laminates made with veil/5plies of 1.5 oz mat(450 grams/m²), 24 oz (814 grams/m²) woven roving. (veil/3M/R/M/R/M)

Vipel® K022 Series Vinyl Ester Resin



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PERFORMANCE GUIDELINES

A. Keep full strength catalyst levels between 1.0% - 2.5% of the total resin weight.

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

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

E. Room temperature curing by means of cobalt acceleration should be completed with low hydrogen peroxide content MEKP catalyst to minimize foaming.

STORAGE STABILITY

Vipel K022-ACT-25, K022-CCK-18, K022-CNP-25, K022-EAA-40, and K022-PTA-20 are stable for 3 months from the date of manufacture when stored in original containers, away from direct sunlight or other UV light sources and at or below 77°F (25°C). All other Vipel K022 products are stable for 6 months from the date of manufacture when stored in original containers, away from direct sunlight or other UV light sources and at or below 77°F (25°C).

Storage stability of two months or less should be anticipated if the storage temperature exceeds 86°F (30°C).

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

SAFETY

See appropriate Material Safety Data Sheet for guidelines.

ISO 9001:2008 CERTIFIED

The Quality Management Systems at every AOC manufacturing facility have been certified as meeting ISO 9001:2008 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 K022 at 77°F/25°C and 50% relative humidity. All tests performed on unreinforced cured resin castings. Thixotropic components, if applicable, are excluded from casting samples. 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 fillers 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.



North America
northamerica@aoc-resins.com
Toll Free: +1 (866) 319-8827
www.aoc-resins.com

Global Contacts

Australia australia@aoc-resins.com	Africa africa@aoc-resins.com
Middle East middleeast@aoc-resins.com	Asia asia@aoc-resins.com
Latin America latinamerica@aoc-resins.com	Europe europe@aoc-resins.com

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