

Technical Datasheet

INEOS Composites

DERAKANE™ 470-36-S Epoxy Vinyl Ester Resin

DERAKANE 470-36-S epoxy vinyl ester resin is an epoxy novolac-based resin designed to provide exceptional thermal and chemical resistance properties at higher temperatures. This resin offers a high resistance to solvents and chemicals, good retention of strength and toughness at elevated temperatures, and excellent resistance to acidic oxidizing environments. The use of DERAKANE 470-36-S resin is backed by many years of successful use in heavy duty industrial applications and provides an economical alternative to exotic alloys by allowing the use of lower cost FRP over traditional materials.

Equipment fabricated with DERAKANE 470-36-S resin retains strength and toughness at elevated temperatures, enabling users to operate equipment in a variety of applications.

APPLICATIONS AND USE

Equipment fabricated with DERAKANE 470-36-S resin is suitable for such applications as high temperature flue gas desulfurization processes, industrial waste treatment facilities, metal pickling and solvent extraction processes used in mining.

DERAKANE 470-36-S resin is recommended for most FRP fabrication processes including hand lay-up, spray-up, pultrusion, infusion and resin transfer molding. Its stability makes it suitable for the formulation of special coatings like flake glass coatings. If higher viscosity is needed, DERAKANE 470-30-S or DERAKANE MOMENTUM 470-300 resins can be used. For applications where additional heat resistance is required, a DERAKANE 470HT-400 resin can be considered.

Recommendations for specific services and environments can be provided by contacting us at derakane@ineos.com.

TYPICAL LIQUID RESIN PROPERTIES

Property ⁽¹⁾ at 25°C (77°F)	Value	Unit
Dynamic Viscosity	240	mPas (cps)
Kinematic Viscosity	220	cSt
Styrene Content	36	%
Density	1.08	g/ml

(1) Properties are typical values, based on material tested in our laboratories. Results may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any

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specific lot or as specification items.

TYPICAL CURING CHARACTERISTICS

The following tables provide typical geltimes for cumene hydroperoxide (CuHP). This and other information are available at www.derakane.com.

CuHP Cure System

Typical geltimes⁽²⁾ using Cumene Hydroperoxide⁽³⁾ catalyst and Cobalt Naphthenate-6%⁽⁴⁾ (Co-nap6%), Dimethylaniline (DMA) and 2,4-Pentanedione (2,4-P).

Geltime at 15°C (59°F)	CuHP (phr) ⁽⁵⁾	Co-nap6% (phr)	DMA (phr)	-
30 +/- 10 minutes	2.00	0.30	0.20	-
50 +/- 10 minutes	2.00	0.20	0.05	-

Geltime at 20°C (68°F)	CuHP (phr)	Co-nap6% (phr)	DMA (phr)	2,4-P (phr)
15 +/- 5 minutes	1.50	0.30	0.20	-
30 +/- 10 minutes	1.50	0.20	0.05	-
50 +/- 10 minutes	1.50	0.20	0.05	0.05

Geltime at 25°C (77°F)	CuHP (phr)	Co-nap6% (phr)	DMA (phr)	2,4-P (phr)
15 +/- 5 minutes	1.20	0.30	0.05	-
30 +/- 10 minutes	1.20	0.20	0.05	-
50 +/- 10 minutes	1.50	0.10	0.05	0.10

(2) Thoroughly test any other materials in your applications before full-scale use. Geltimes may vary due to the reactive nature of these materials. Always test a small quantity before formulating large quantities.

(3) Akzo-Nobel TRIGONOX K-90, United Initiators CUHP-80, Norac ANDONOX CH additives or equivalent (CuHP). Use of other additives may result in different gel times.

(4) Use of Cobalt Naphthenate, especially in combination with 2,4-P can result in 10-20% faster gel times than Cobalt Octoate.

(5) phr = parts per hundred resin molding compound

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TYPICAL MECHANICAL PROPERTIES Casting Properties

Property ⁽¹⁾ of clear casting ⁽⁶⁾ at 25°C (77°F)	Value (SI)	Method	Value (US)	Method
Tensile Strength	90 MPa	ISO 527	13,000 psi	ASTM D638
Tensile Modulus	3.6 GPa	ISO 527	520 kpsi	ASTM D638
Tensile Elongation at Yield	3-4%	ISO 527	3-4%	ASTM D638
Flexural Strength	160 MPa	ISO 178	23,000 psi	ASTM D790
Flexural Modulus	3.8 GPa	ISO 178	550 kpsi	ASTM D790
Heat Distortion Temperature ⁽⁷⁾	145°C	ISO 75	295°F	ASTM D648
Volume Shrinkage	8.9%		8.9%	
Barcol Hardness	40	EN 59	40	ASTM D2583
Density	1.15 g/cm ³	ISO 1183	1.15 g/cm ³	ASTM D792

(6) Cure schedule: 24 hours at room temperature and 2 hours at 155°C (310°F).

(7) Maximum stress: 1.8 MPa (264 psi). HDT is measured on fully cured resin. Full cure may be achieved in different ways. One example is listed under footnote 6. In certain cases a higher post cure temperature or an adjusted curing formulation may be required.

Laminate Properties

Property ⁽¹⁾ of 6 mm (1/4 in.) laminate at 25°C (77°F)	Value (SI)	Method	Value (US)	Method
Tensile Strength	165 MPa	ISO 527	24,000 psi	ASTM D3039
Tensile Modulus	11.4 GPa	ISO 527	1650 kpsi	ASTM D3039

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Flexural Strength	124 MPa	ISO 178	18,000 psi	ASTM D790
Flexural Modulus	8.6 GPa	ISO 178	1250 kpsi	ASTM D790
Glass Content	40%	ISO 1172	40%	ASTM D2584

(9) Cure schedule: 24 hours at room temperature and 6 hours at 80°C (175°F); laminate construction of 6 mm (1/4") is V/M/M/Wr/M/Wr/M where V=Continuous veil glass, M=Chopped strand mat 450 g/m² (1.5 oz/ft²) and Wr=Woven roving 800 g/m² (24 oz/yd²).

CERTIFICATES AND APPROVALS The manufacturing, quality control and distribution of products, by INEOS Composites, comply with one or more of the following programs or standards: ISO 9001, ISO 14001 and OHSAS 18001.

STANDARD PACKAGE Non-Returnable Drum with Net Weight of 205 Kgs (452 Lbs.)
DOT Label Required: Flammable Liquid

COMMERCIAL WARRANTY Five months from date of manufacture, when stored in accordance with the conditions stated below.

STORAGE Drums - Store at temperatures below 25°C (77°F). Storage life decreases with increasing storage temperature. Avoid exposure to heat sources such as direct sunlight or steam pipes. To avoid contamination of product with water, do not store outdoors. Keep containers sealed to prevent moisture pick-up and monomer loss. Mild mixing is recommended after prolonged storage. Rotate stock.
Bulk - See INEOS Composites's Bulk Storage and Handling Manual for Polyesters and Vinyl Esters. A copy of this may be obtained from INEOS Composites at +1.614.790.3333 or 800.523.6963. All other conditions being equal, higher storage temperatures will reduce product stability and lower storage temperature will extend product stability.

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Notice

All information presented herein is believed to be accurate and reliable, and is solely for the user's consideration, investigation and verification. The information is not to be taken as an express or implied representation or warranty for which INEOS Composites assumes legal responsibility. Any warranties, including warranties of merchantability, fitness for use or non-infringement of intellectual property rights of third parties, are herewith expressly excluded.

Since the user's product formulations, specific use applications and conditions of use are beyond the control of INEOS Composites, INEOS Composites makes no warranty or representation regarding the results which may be obtained by the user. It shall be the sole responsibility of the user to determine the suitability of any of the products mentioned for the user's specific application.

INEOS Composites requests that the user reads, understands and complies with the information contained herein and the current Material Safety Data Sheet.