Technical Datasheet

INEOS Composites

DERAKANE™ 470 HT-400 Epoxy Vinyl Ester Resin

DERAKANE 470HT-400 epoxy vinyl ester resin is a novolac-epoxy based resin, designed to provide maximum chemical resistance in combination with superior temperature performance. DERAKANE 470HT-400 resin shows outstanding resistance to strong acids, oxidizing media and organic solvents over a wide temperature range.

The reactivity of DERAKANE 470HT-400 resin has been optimized to allow for longer gel times compared to DERAKANE 470-300 resin. DERAKANE 470HT-400 resin has high resistance to thermal aging.

DERAKANE 470HT-400 resin contains only 33 weight percent styrene which allows fabricators to meet California's South Coast Air Quality Management District Rule 1162.

APPLICATIONS AND USE

DERAKANE 470HT-400 resin is the preferred choice for applications with high operating/upset temperatures. This resin is designed for ease of fabrication using hand lay-up, spray-up, filament winding, compression molding and resin transfer molding techniques.

DERAKANE 470HT-400 resin has a proven track record with over almost two decades successful use for chimney liners, quench vessels, and ducting where high temperature requirements are needed.

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	430	mPas (cps)
Kinematic Viscosity	400	cSt
Styrene Content	33	%
Density	1.08	g/ml

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

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lot or as specification items.

TYPICAL CURING CHARACTERISTICS

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

CHP Cure System

Typical geltimes(2) using K-90 CHP(3) and Cobalt Naphthenate-6%(4), Dimethylaniline (DMA), and 2,4-Pentanedione (2,4-P).

Geltime at 20°C (68°F)	CHP (phr)(5)	Co-nap6% (phr)	DMA (phr)	2,4-P (phr)
30 +/- 10 minutes	2.00	0.40	0.20	-
60 +/- 10 minutes	2.00	0.40	0.05	0.04

Geltime at 25°C (77°F)	CHP (phr)	Co-nap6% (phr)	DMA (phr)	2,4-P (phr)
30 +/- 10 minutes	2.00	0.30	0.05	-
60 +/- 10 minutes	2.00	0.30	-	0.07

Geltime at 30°C (86°F)	CHP (phr)	Co-nap6% (phr)	DMA (phr)	2,4-P (phr)

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15 +/- 5 minutes	1.50	0.30	0.10	-
30 +/- 10 minutes	1.50	0.20	-	0.04
60 +/- 10 minutes	1.50	0.20	-	0.12

(2) Thoroughly test any other materials in your applications before full-scale use. Gel times may vary due to the reactive nature of these materials. Always test a small quantity before formulating large quantities.
(3) Cumene Hydroperoxide K-90 (CHP or CuHP). Use of other catalysts or additives may result in different gel times.
(4) Use of cobalt octoate, especially in combination with 2,4-P, can result in 20-30% slower gel times.
(5) phr = parts per hundred resin molding compound

TYPICAL MECHANICAL PROPERTIES

Casting Properties

Property(1) of clear casting(6) at 25°C (77°F)	Value (SI)	Method	Value (US)	Method
Tensile Strength	80 MPa	ISO 527	12,000 psi	ASTM D638
Tensile Modulus	3500 MPa	ISO 527	510 kpsi	ASTM D638
Tensile Elongation at Yield	3%	ISO 527	3%	ASTM D638
Flexural Strength	150 MPa	ISO 178	22,000 psi	ASTM D790
Flexural Modulus	3500 MPa	ISO 178	510 kpsi	ASTM D790
Heat Deflection Temperature(7)	180°C	ISO 75	360°F	ASTM D648
Glass Transition Temperature, Tg^2	195°C	ISO 11357-2	380°F	ISO 11357-2

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Volume Shrinkage	8.3%		8.3%	
Barcol Hardness	40	EN 59	40	ASTM D2583
Density	1.17 g/cm^3	ISO 1183	1.17 g/cm^3	ASTM D792

(6) Cure schedule: 24 hours at room temperature and 2 hours at 120°C (300°F).
(7) Maximum stress: 1.8 MPa (264 psi). Cured with 0.3% Cobalt 6% + 2% CuHP (Andonox(TM) CHM-50). Cure Schedule: 24h RT cure, post cure for 1 week at 220°C.

Laminate Properties

Property(1) of 6 mm (1/4 in.) laminate(8) at 25°C (77°F)	Value (SI)	Method	Value (US)	Method
Tensile Strength	130 MPa	ISO 527	19,000 psi	ASTM D3039
Tensile Modulus	12,000 MPa	ISO 527	1700 kpsi	ASTM D3039
Flexural Strength	210 MPa	ISO 178	30,000 psi	ASTM D790
Flexural Modulus	8500 MPa	ISO 178	1200 kpsi	ASTM D790
Glass Content	40%	ISO 1172	40%	ASTM D2584

(8) Cure schedule: 24 hours at room temperature and 6 hours at 80°C (175°F); laminate construction of 6mm (1/4")is V/M/M/Wr/M/Wr/M where V=Continuous veil glass, M=Chopped strand mat 450 g/m^2 (1.5 oz/ft^2) and Wr=Woven roving 800 g/m^2 (24 oz/yd^2).

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

208 Liter (55 Gallon) Non-Returnable Drum
Net Wt. 205 kgs (452 Lbs.)
Dot Label Required: Flammable Liquid

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HANDLING AND STORAGE

This resin contains ingredients which could be harmful if mishandled. Contact with skin and eyes should be avoided and necessary protective equipment and clothing should be worn.

Drums - It is highly recommended that all material is stored at stable temperatures below 25°C (77°F). All things being equal, higher storage temperature will reduce product stability and lower storage temperature will extend product stability. Avoid exposure to heat sources such as direct sunlight or steam pipes. All things being equal, higher storage temperature will reduce product stability and lower storage temperature will extend product stability. To avoid contamination of product with water, do not store outdoors. Keep sealed to prevent moisture pick-up and monomer loss. 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.

COMMERCIAL WARRANTY

Seven months from date of manufacture, when stored in accordance with the conditions stated above.

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.

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