Technical Datasheet

INEOS Composites

DERAKANE™ MOMENTUM 411-350 Epoxy Vinyl Ester

DERAKANE MOMENTUM 411-350 epoxy vinyl ester resin is based on bisphenol-A epoxy resin and provides resistance to a wide range of acids, alkalis, bleaches, and organic compounds for use in many chemical processing industry applications. DERAKANE MOMENTUM resins are a new generation of resins that can be used to improve fabrication efficiency and product quality. Their lighter color makes defects easier to see and correct while the resin is still workable. The resin's improved reactivity properties often permit an increase in the lay-up thickness per session. The longer stability provides additional flexibility to fabricators in storage and handling.

- Holds up in corrosive environments, postponing the need for equipment replacement*
- Tolerates heavy design loads without causing failure due to resin damage therefore can work with large weight-bearing equipment with confidence
- Superior elongation and toughness provides FRP equipment with better impact resistance and less cracking due to cyclic temperature, pressure fluctuations, and mechanical shocks providing a safety factor against damage during process upsets or during shipping installation
- When properly formulated and cured, complies with FDA regulation 21 CFR 177.2420, covering materials intended for repeated use in contact with food

Note: Contact us before using thixotropic agents and fillers. Addition of thixotropic agents and fillers can compromise corrosion resistance.

APPLICATIONS AND USE

This resin is suitable for fabricating FRP storage tanks, vessels, ducts, and on-site maintenance projects, particularly in chemical processing and pulp and paper operations. DERAKANE MOMENTUM 411-350 resin is designed for ease of fabrication using hand lay-up, spray-up, filament winding, compression molding and resin transfer molding techniques, pultrusion and molded grating applications. An alternate viscosity, optimized for some vacuum infusion processes, is available as DERAKANE MOMENTUM 411-200 resin.

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

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TYPICAL LIQUID RESIN PROPERTIES

Property(1) at 25°C (77°F)	Value	Unit
Dynamic Viscosity	370	mPa·s (cps)
Kinematic Viscosity	350	cSt
Styrene Content	44	%
Density	1.046	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 specific lot or as specification items.

TYPICAL CURING CHARACTERISTICS

The following tables provide typical(1) geltimes for methylethylketone peroxide (MEKP). This and other information are available at www.derakane.com.

Warning: Addition levels of less than 0.05% cobalt 6% may cause undercure under certain conditions. Please contact INEOS Composites Technical Service for further details or if such low levels are envisaged.

MEKP Cure System

Typical geltimes(2) using BUTANOX(3) LPT-IN (4) catalyst (MEKP) and Cobalt-6%, Diethylaniline(6) (DEA) and PROMOTOR C (2,4-Pentanedione, 2,4-P).

Geltime at 15°C (59°F)	MEKP (5) (phr)	Co6% (phr)	DEA (6) (phr)
15 +/- 5 minutes	1.50	0.30	0.60
30 +/- 10 minutes	1.50	0.20	-
60 +/- 15 minutes	1.50	0.05	-

Geltime at 20°C (68°F)	MEKP (phr)	Co6% (phr)	2,4-P (phr)
15 +/- 5 minutes	1.50	0.30	-
30 +/- 10 minutes	1.00	0.10	-

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60 +/- 15 minutes	1.00	0.10	0.02

Geltime at 25°C (77°F)	MEKP (phr)	Co6% (phr)	2,4-P (phr)
15 +/- 5 minutes	1.00	0.20	-
30 +/- 10 minutes	1.00	0.05	-
60 +/- 15 minutes	1.00	0.05	0.015

Geltime at 30°C (86°F)	MEKP (phr)	Co6% (phr)	2,4-P (phr)
15 +/- 5 minutes	1.00	0.05	-
30 +/- 10 minutes	1.0	0.05	0.015
60 +/- 15 minutes	1.0	0.05	0.035

Geltime at 35°C (95°F)	MEKP (phr)	Co6% (phr)	2,4-P (phr)
15 +/- 5 minutes	1.00	0.05	0.01
30 +/- 10 minutes	1.00	0.05	0.03
60 +/- 15 minutes	1.00	0.05	0.06

(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) Registered trademark of AKZO NOBEL.
(4) BUTANOX LPT-IN or comparable low hydrogen peroxide content MEKP. Use of other MEKP catalysts or additives may result in different gel times.
(5) phr = parts per hundred resin molding compound
(6) For pre-acceleration for prolonged storage (e.g. formulation of lining or flooring systems) either avoid DMA or DEA, or use PROMOTOR D (DEAA DiEthyl-AcetoAcetamide). For further information, please contact INEOS Composites.

TYPICAL MECHANICAL PROPERTIES

Typical properties(1) of a cured casting(7) at 25°C (77°F).

Property of casting	Value (SI)	Method	Value (US)	Method

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Tensile Strength	86 MPa	ISO 527	12,000 psi	ASTM D638
Tensile Modulus	3200 MPa	ISO 527	4.6 x 10 5 psi	ASTM D638
Tensile Elongation at Yield	5-6%	ISO 527	5-6%	ASTM D638
Flexural Strength	150 MPa	ISO 178	22,000 psi	ASTM D790
Flexural Modulus	3400 MPa	ISO 178	4.9 x 10 5 psi	ASTM D790
Density	1.14 g/cm³	ISO 1183		ASTM D792
Volume Shrinkage	7.8%			
Heat Distortion Temperature(8)	105°C	ISO 75	220°F	ASTM D648
Glass Transition Temperature, Tg2	120°C	ISO 11357	250°F	ASTM D3418
Barcol Hardness	35	EN 59	35	ASTM D2583

(7) Cure schedule: 24 hours at room temperature and 2 hours at 120°C (250°F).
(8) Maximum stress: 1.8 MPa (264 psi)

Typical properties(1) of a postcured 6 mm (1/4") laminate(9) at 25°C (77°F).

Property of laminate	Value (SI)	Method	Value (US)	Method
Tensile Strength	150 MPa	ISO 527	22,000 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	8100 MPa	ISO 178	1200 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 6mm (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).

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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 by .
STANDARD PACKAGE	208 Liter (55 Gallon) Non-Returnable Drum Net Wt. 205 Kgs (452 Lbs.) DOT Label Required: Flammable Liquid
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). Avoid exposure to heat sources such as direct sunlight or steam pipes. 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. All things being equal, higher storage temperature will reduce product stability and lower storage temperature will extend product stability.
COMMERCIAL WARRANTY	Twelve 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

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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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