DERAKANE 8084 Epoxy Vinyl Ester Resin

January, 2006

High Elongation Tough Epoxy Vinyl Ester Resin

DERAKANE 8084 epoxy vinyl ester resin is an elastomer modified resin designed to offer increased adhesive strength, superior resistance to abrasion and severe mechanical stress, while giving greater toughness and elongation. DERAKANE 8084 and DERAKANE 8090 resins are the only vinyl esters available that offer this exceptional combination of properties.

Typical Liquid Resin Properties

Property[1]	Value
Density, 25°C/77°F	1.02 g/mL
Dynamic Viscosity, 25°C/77°F	360 mPa·s
Kinematic Viscosity	350 cSt
Styrene Content	40%
Shelf Life[2], Dark, 25°C/77°F	6 months

(1) Typical property values only, not to be construed as specifications.
(2) Unopened drum with no additives, promoters, accelerators, etc. added. Shelf life specified from date of manufacture.

Applications and Fabrication Techniques

- DERAKANE 8084 resin is the resin of choice as a primer to prepare a substrate surface (steel or concrete) for application of a corrosion resistant lining.
- DERAKANE 8084 resin can be use for RTM, hand-lay, spray-up, filament winding and other industrial FRP applications.

Benefits

- DERAKANE 8084 resin has exhibited chemical resistance across a broad range of acids, bases and organic chemicals.
- Resin of choice as a primer to prepare a substrate surface for application of a corrosion resistant lining. It exhibits outstanding adhesive strength on different types of steel, aluminum and concrete.
- 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 and installation.
- Has exhibited superior property retention under dynamic fatigue conditions.
- Approved for use in the manufacture of ships under a DNV (Det Norske Veritas) certificate.

Gel Time Formulations

The following table provides typical gel times for MEKP. "Starting point" formulations for non-foaming MEKP alternatives and BPO peroxides are available in separate product bulletins. These and other information are available at www.derakane.com.

MEKP Gel Time Table

Typical Gel Times(3) Using NOROX(4) MEKP-925H(5) and Cobalt Naphthenate-6%(6)

Temperature	15 +/-5 Minutes	30 +/-10 Minutes	60 +/-15 Minutes
18°C/65°F	3.0 phr(7) MEKP 0.6 phr CoNap6% 0.3 phr DMA	3.0 phr MEKP 0.4 phr CoNap6% 0.2 phr DMA	2.5 phr MEKP 0.4 phr CoNap6% 0.1 phr DMA
24°C/75°F	2.0 phr MEKP 0.5 phr CoNap6% 0.3 phr DMA	2.0 phr MEKP 0.4 phr CoNap6% 0.2 phr DMA	1.5 phr MEKP 0.3 phr CoNap6% 0.05 phr DMA
30°C/85°F	2.0 phr MEKP 0.3 phr CoNap6% 0.2 phr DMA	1.5 phr MEKP 0.3 phr CoNap6% 0.05 phr DMA	1.5 phr MEKP 0.3 phr CoNap6% 0.025 phr DMA

(3) Thoroughly test any other materials in your application before full-scale use. Gel times may vary due to the reactive nature of these products. Always test a small quantity before formulating large quantities.
(4) Registered trademark of Norac Inc.
(5) Materials: NOROX MEKP-925H Methylethylketone peroxide (MEKP) or equivalent low hydrogen peroxide content MEKP, Cobalt Naphthenate-6% (CoNap6%), Dimethylaniline (DMA), and 2,4-Pentanedione (2,4-P). Use of other MEKP or other additives may result in different gel time results.
(6) Use of cobalt octoate, especially in combination with 2,4-P can result in 20-30% slower gel times.
(7) phr=parts per hundred resin molding compound

Casting Properties

Typical Properties(1) of Postcured(8) Resin Clear Casting

Property	SI	US Standard	Test Method
Tensile Strength	76 MPa	11,000 psi	ASTM D-638/ISO 527
Tensile Modulus	2.9 GPa	4.2 x 10^5 psi	ASTM D-638/ISO 527
Tensile Elongation, Yield	8-10%	8-10%	ASTM D-638/ISO 527
Flexural Strength	130 MPa	19,000 psi	ASTM D-790/ISO 178
Flexural Modulus	3.3 GPa	4.8 x 10^5 psi	ASTM D-790/ISO 178
Density	1.14 g/cm^3		ASTM D-792/ISO 1183
Volume Shrinkage	8.2%	8.2%	
Heat Distortion Temperature(9)	82°C	180°F	ASTM D-648 Method A/ISO 75
Glass Transition Temperature, Tg2	115°C	239°F	ASTM D-3419/ISO 11359-2
IZOD Impact (unnotched)	480 J/m	8.9 ft.lbf/inch	ASTM D-256
Barcol Hardness	30	30	ASTM D-2583/EN59

(1) Typical property values only, not to be construed as specifications. SI values reported to two significant figures; US standard values based on conversion.
(8) Cure schedule: 24 hours at room temperature; 2 hours at 99°C (210°F)
(9) Maximum stress: 182 MPa (264 psi)

Laminate Properties

Typical Properties(1) of Postcured(10) 6 mm (1/4") Laminate(11)

Property	SI	US Standard	Test Method
Tensile Strength	200 MPa	29,000 psi	ASTM D-3039/ISO 527
Tensile Modulus	9.8 GPa	14.0 x 10^5 psi	ASTM D-3039/ISO 527
Flexural Strength	190 MPa	28,000	ASTM D-790/ISO 178
Flexural Modulus	7.8 GPa	11.0 x 10^5 psi	ASTM D-790/ISO 178
Glass Content	40%	40%	ASTM D-2584/ISO 1172

(1) Typical property values only, not to be construed as specifications. SI values reported to two significant figures; US standard values based on conversion.
(10) Cure schedule: 24 hours at room temperature; 6 hours at 80°C (175°F)
(11) 6 mm (1/4") Construction – V/M/M/Wr/M/Wr/M
V = Continuous veil glass; M = Chopped strand mat, 450 g/m^2 (1.5 oz/ft^2);
Wr = Woven roving, 800 g/m^2 (24 oz/yd^2)

Safety and Handling Consideration

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.

Ashland maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers.

Our Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Ashland's products in your facilities.

Recommended Storage:
Drums - Store at temperatures below 27°C/80°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 sealed to prevent moisture pick-up and monomer loss. Rotate stock.

Bulk - See Ashland's Bulk Storage and Handling Manual for Polyesters and Vinyl Esters. A copy of this may be obtained from Composite Polymers at 1.614.790.3333.

Product Name	Product Code	Standard Package*
8084	536-004	55-Gal Drum, Net Weight 452 Lbs. 210 Liter, Net Weight 205 Kg *Non-Returnable

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NOROX® MEKP-925H

DESCRIPTION

Norox® MEKP-925H is specifically formulated to reduce gas generation in critical corrosion applications for vinyl ester resins in gel coats, barrier coatings, and corrosion resistant structures. The low hydrogen peroxide level in Norox® MEKP-925H often requires that the resin promotion system be modified for some resins to obtain reasonable gel times.

TYPICAL PROPERTIES

Active Oxygen	9.0 %, max.
Form	Liquid
Color	Water white
Specific Gravity @ 25°/4°C	1.10
Fire point	200°F, min.
Flash point (SETA C.C.)	170°F, min.
Soluble in	Oxygenated organic solvents
Slightly soluble in	Water

APPLICATION

Norox® MEKP-925H is a methyl ethyl ketone peroxide composition formulated to be an excellent cure initiator for both unsaturated polyester resins and vinyl ester resins. With most unsaturated polyesters it gives much longer gel and gel to cure times but with a higher peak exotherm than Norox® MEKP-9, particularly in thick sections. With most vinyl esters Norox® MEKP-925H gives the most complete cure of any currently available MEK peroxide.

NOROX® MEKP-925H

STORAGE

- Storage at 80°F or below is recommended. Storage below 70°F is recommended for maximum shelf life.
- Store in original containers **away** from flammables and all sources of heat, sparks, or flames; out of direct sunlight; and **away** from **cobalt naphthenate**, other promoters, accelerators, oxidizing or reducing agents and strong acids or bases.
- ***Leaking containers*** – Remove and isolate in a safe area. Re-package or dispose immediately (see **spills**).
- **Never** store in refrigerators containing food and/or beverages.
- Consult National Fire Protection Association (NFPA) Code 432 and/or local regulatory agencies.
- Rotate stock, use oldest date first.

HANDLING

- Inform all personnel of procedures for safe handling and review MSDS with them.
- Remove from storage area only the amount needed for one shift.
- Wear safety glasses or goggles and chemical resistant gloves.
- Keep away from heat, flames, and sparks.
- Avoid breathing vapors.
- Dilution is not recommended.
- **Never** add peroxides directly to promoters or vice-versa, violent decomposition can occur.
- Prevent contamination such as contact with dust, over spray, wood, and combustible material.
- Avoid contact with materials other than polyethylene, polypropylene, Teflon®, Tygon®, or similar materials, glass or glass-lined steel, and 304 or 316 stainless steel or equivalent.

FIRST AID

- EYES – Flush immediately with large amounts of fresh water and continue washing for at least 15 minutes. ***Medical attention is needed*.**
- SKIN – Wash with soap and water.
- INGESTION – Administer large amounts of milk or water and call a physician immediately. Do not induce vomiting. As an aid to the physician, suggest calling your local Poison Control Center.

SPILLS

- Clean up immediately by absorbing with inert material – vermiculite or sand.
- After absorbing, moderately wet immediately with water and place in a clean plastic bag inside a plastic pail.
- Dispose of immediately in accordance with local, state, and federal regulations.

  NOTE: Spilled peroxides, if not immediately cleaned up, can become contaminated and ignite or decompose in a hazardous, violent manner.

FIRE

- Peroxides ignite readily and burn vigorously with acceleration.
- Use water from a safe distance – preferably with a water-fog nozzle.
- For very small fires, an extinguisher with carbon dioxide, foam, or dry chemical may be effective.
- In case of fire in or near a storage area, cool stored containers with water spray.

PACKAGING, SHIPPING & AVAILABILITY

- The standard package sizes of Norox® MEKP-925H are cases of 4x8 lb. and 4x4 kg polyethylene bottles; and 40 lb. or 20 kg Hedpacks. For custom package sizes, please contact your local distributor or Syrgis Performance Initiators, Inc.
- Classification – Please refer to the specific Norox® MEKP-925H Material Safety Data Sheet under section 14, Shipping Description.
- Norox® MEKP-925H is available through a nation-wide distributor network. Call Syrgis Performance Initiators, Inc. for the name of the distributor in your area.

  NOTE: MSDS's for all our products may be requested thru the website www.syrgisperformanceinitiators.com

SYRGIS

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