



RF1001 DMV

Epoxy Vinyl Ester Resin

Copyright 2007

Description

EPOVIA® RF-1001 DMV is a Bisphenol-A based vinyl ester resin designed for a wide range of end-use applications. This resin can be used in a variety of fabrication processes including pultrusion, filament winding, compression molding, RTM, and hand-layup. This product's toughness and durability make it suitable for applications where increased mechanical performance is needed. EPOVIA® RF-1001 DMV provides resistance to many chemical environments, even at elevated temperatures. Please refer to the EPOVIA® Corrosion Guide for information on specific service conditions.

Uses and Applications

- Can be used in applications that specify DERAKANE® 411-350 and other equivalent
- Bisphenol-A based vinyl ester resins
- Storage tanks for many industries
- Process pipes, flanges and fittings
- Infrastructure pipe construction
- Fume and vapor ducting
- Load-bearing construction members
- Pultruded handrail and grating applications

Features and Benefits

- Bisphenol-A based chemistry provides increased resistance to degradation from high service temperatures.
- The vinyl ester polymer backbone provides excellent corrosion resistance to large number of chemicals including acids, alkalis, and solvents.
- Lower shrinkage offers good dimensional stability for accurate design tolerances.
- Increased mechanical strength allows for larger safety factors in high stress applications.
- Unpromoted formulation allows for customization for specific processes.

Typical Liquid Properties

These values may or may not be manufacturing control criteria. They are listed for a reference guide only. Particular batches will not conform exactly to the numbers listed because storage conditions, temperature changes, age, testing equipment (type and procedure) can have a significant effect on the results. Products



RF1001 DMV - Copyright 2007

with properties outside of these readings can perform acceptably. Final suitability of this product is in the end use performance.

Test	Value
Non-volatile Matter	58.5%
Viscosity, Brookfield LVF #3 Spindle @ 60 rpm	400 cps
Weight per Gallon	9.5 lbs.
Specific Gravity @ 25°C	1.05

Cure

It is recommended that gel time be checked in the customer's plant because age, temperature, humidity and catalyst will produce varied gel times. Data provided below on gel or cure refers specifically to NOROX® MEKP-925H. Norac NOROX® MEKP-9, NOROX® MEKP-9H, Akzo Nobel CADOX D50 and Arkema DDM-9 are expected to yield similar performance. Akzo Nobel L50A, Norac NOROX® 925, Chemtura HP-90 and Arkema DHD-9 may yield slightly shorter gel and cure times. Catalyst level should not exceed 2.4% nor fall below 1.0% for proper cure. Recommended rate is 1.5% at 25°C or 77°F depending on material temperature, room temperature, humidity, air movement, and catalyst concentration. Fast curing systems have a shorter shelf life and should not be kept more than 30 days. This product should not be used when temperature conditions are below 18°C (64°F), as curing may be adversely affected.

Sample Promotion Formula for EPOVIA® RF-1001 DMV using MEKP-925H catalyst @ 1.25%

Temperature range (room temperature): 25°C (77°F)

	Fast	Medium	Slow	Extended
Gel Time	10.5 min.	20 min.	30 min.	75 min.
Promoter: 12% COBALT ¹	0.127%	0.073%	0.050%	0.033%
Co-promoter: DMA ²	0.27%	0.017%	0.015%	0.040%
Inhibitor: 2,4 pentadione	--	0.05%	0.075%	0.035%

Typical Gel Time using BPO Catalyst

	Fast	Medium	Slow
Gel Time	10.5 min.	25 min.	30 min.
Catalyst Level, Benzoyl Peroxide @ 50%	1.5%	1.0%	1.0%
Co-promoter: DMA ²	0.15%	0.08%	0.05%

¹Cobalt octoate, 12% solution.



RF1001 DMV - Copyright 2007

²Dimethyl aniline (DMA)

Physical Properties

Vinyl ester resins do not develop ultimate physicals; i.e. “cure,” right away. Time and/or heat are needed. Heat may come from internal exotherm or external sources. The amount of catalyst will influence the cure. With time and/or heat, a “moderate cure” will develop into “ultimate physicals.”

When will the part reach ultimate cure? It depends upon time, temperature, and satisfactory catalyzation. Too much or too little catalyst can result in permanent undercure, which cannot be overcome. Practically speaking, serviceable cure time will range from overnight to a week and occasionally longer due to circumstances. Sufficient external heat can reduce the cure time to less than a day.

Properties on 1/8” Clear Casting Resin¹

Test	Value	Test Method
Barcol Hardness (934-1)	40	
Tensile Strength	12,000 psi	ASTMD-638
Tensile Modulus	054 x 10 ⁶ psi	ASTMD-638
Elongation at Break	7.5%	
Flexural Strength	22,000	ASTMD-790
Flexural Modulus	0.5 x 10 ⁶ psi	ASTMD-790
Heat Distortion	108°C/226°F	ASTMD-648

Properties on Standard Laminating Application^{1,2}

Test	Value	Test Method
Barcol Hardness (934-1)	52	
Tensile Strength	18,000 psi	ASTMD-638
Tensile Modulus	1.3 x 10 ⁶ psi	ASTMD-638
Elongation at Break	1.8%	
Flexural Strength	29,000 psi	ASTMD-790
Flexural Modulus	1.2 x 10 ⁶ psi	ASTMD-790

¹Postcure : 80°C for two hours, then two hours @ 120°C

²Laminate construction :

- 1 surface layer (10% glass)

RF1001 DMV - Copyright 2007

- 1 chopped strand mat (20 – 30% glass)
- 1 chopped strand plus roving and reinforcement (30 – 40% glass)

Caution

Do not over-mix. Over-mixing can break down a resin, increasing its tendency to sag. Material should be mixed once a day for 10 minutes. The resin should be mixing to the sides of the container with the least amount of turbulence possible. Air bubbling should not be used for mixing. It is not effective and only serves as a potential for water or oil contamination. Do not add any material, other than the recommended methyl ethyl ketone peroxide, to this product without the advice of a representative of CCP Composites US.

Storage

EPOVIA® RF-1001 DMV has a usage life of 6 months from date of shipment from CCP when stored at 73°F or below in a closed, factory-sealed, opaque container, and out of direct sunlight. The usage life is cut in half for every 20°F over 73°F.

Data Sheets/MSDS:

CCP data sheets and MSDS's are available in printable format at www.ccpcompositesus.com.



RF1001 DMV - Copyright 2007

CCP COMPOSITES US**WARRANTIES, DISCLAIMERS AND LIMITATION OF LIABILITY (Rev. 10/11)**

Seller warrants that: (i) Buyer shall obtain good title to the product sold hereunder, (ii) at Shipment such product shall conform to Seller's specifications; and (iii) the sale or use of such product will not infringe the claims of any U.S. patent covering the product itself, but Seller does not warrant against infringement which might arise by the use of said product in any combination with other products or arising in the operation of any process. **SELLER MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, EVEN IF THAT PURPOSE IS KNOWN TO SELLER. ANY APPLICATION INFORMATION OR ASSISTANCE WHICH SELLER MAY FURNISH TO BUYER IS GRATUITOUS AND SHALL IN NO WAY BE DEEMED PART OF THE SALE OF PRODUCT HEREUNDER OR A WARRANTY OF THE RESULTS OBTAINED THROUGH THE USE OF SUCH PRODUCT.**

Without limiting the generality of the foregoing, if any product fails to meet warranties mentioned above, Seller shall at Seller's option either replace the nonconforming product at no cost to Buyer or refund the Buyer the purchase price thereof. The foregoing is Buyer's sole and exclusive remedy for failure of Seller to deliver or supply product that meets the foregoing warranties. Seller's liability with respect to this contract and the product purchased under it shall not exceed the purchase price of the portion of such product as to which such liability arises. Seller shall not be liable for any injury, loss or damage, resulting from the handling or use of the product shipped hereunder whether in the manufacturing process or otherwise. In no event shall Seller be liable for special, incidental or consequential damages, including without limitations loss of profits, capital or business opportunity, downtime costs, or claims of customers or employees of Buyer. Failure to give Seller notice of any claim within thirty (30) days of shipment of the product concerned shall constitute a waiver of such claim by Buyer. Any product credit received by Buyer hereunder, if not used, shall automatically expire one (1) year from the date the credit was granted. Notwithstanding any applicable statute of limitations to the contrary, any action by Buyer relation to a claim hereunder must be instituted no later than two (2) years after the occurrence of the event upon which the claim is based. All the foregoing limitations shall apply irrespective of whether Buyer's claim is based upon breach of contract, breach of warranty, negligence, strict liability, or any other legal theory.

RF1001 DMV - Copyright 2007

**COMPOSITES SAFETY INFORMATION
(October 2011)**

All sales of products manufactured by CCP Composites US (CCP), and described herein, are made solely on condition that CCP's customers comply with applicable health and safety laws, regulations and orders relating to the handling of our products in the workplace. Before using, read the following information, and both the product label, and Material Safety Data Sheet pertaining to each product.

Most products contain styrene. Styrene can cause eye, skin and respiratory tract irritation. Avoid contact with eyes, skin and clothing. Impermeable gloves, safety eyewear and protective clothing should be worn during use to avoid skin and eye contact. Wash thoroughly after use.

Styrene is a solvent and may be harmful if inhaled. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Extended exposure to styrene at concentrations above the recommended exposure limits may cause central nervous system depression causing dizziness, headaches or nausea and, if overexposure is continued indefinitely, loss of consciousness, liver and kidney damage.

Do not ingest or breathe vapor, spray mists or dusts caused by applying, sanding, grinding and sawing products. Wear an appropriate NIOSH/MSHA approved and properly fitted respirator during application and use of these products until vapors, mists and dusts are exhausted, unless air monitoring demonstrates vapors, mists and dusts are below applicable exposure limits. Follow respirator manufacturer's directions for respirator use.

The International Agency for Research on Cancer (IARC) reclassified styrene as Group 2B, "possibly carcinogenic to humans." This revised classification was not based on new health data relating to either humans or animals, but on a change in the IARC classification system. The Styrene Information and Research Center does not agree with the reclassification and published the following statement: Recently published studies tracing 50,000 workers exposed to high occupational levels of styrene over a period of 45 years showed no association between styrene and cancer, no increase in cancer among styrene workers (as opposed to the average among all workers), and no increase in mortality related to styrene.

Styrene is classified by OSHA and the Department of Transportation as a flammable liquid. Flammable products should be kept away from heat, sparks, and flame. Lighting and other electrical systems in the work place should be vapor-proof and protected from breakage.

Vapors from styrene may cause flash fire. Styrene vapors are heavier than air and may concentrate in the lower levels of molds and the work area. General clean air dilution or local exhaust ventilation should be provided in volume and pattern to keep vapors well below the lower explosion limit and all air contaminants (vapor, mists and dusts) below the current permissible exposure limits in the mixing, application, curing and repair areas.

Some products may contain additional hazardous ingredients. To determine the hazardous ingredients present, their applicable exposure limits and other safety information, read the Material Safety Data Sheet for each product (identified by product number) before using. If unavailable, these can be obtained, free of charge, from your CCP representative or from: CCP Composites US, P.O. Box 419389, Kansas City, MO 64141-6389; 816-391-6053.

FIRST AID: In case of eye contact, flush immediately with plenty of water for at least 15 minutes and get medical attention; for skin, wash thoroughly with soap and water. If affected by inhalation of vapors or spray mist, remove to fresh air. If swallowed, get medical attention.

Those products have at least two components that must be mixed before use. Any mixture of components will have hazards of all components. Before opening the packages read all warning labels. Observe all precautions.

Keep containers closed when not in use. In case of spillage, absorb with inert material and dispose of in accordance with applicable regulations. Emptied containers may retain hazardous residue. Do not cut, puncture or weld on or near these containers. Follow container label warnings until containers are thoroughly cleaned or destroyed.

FOR INDUSTRIAL USE AND PROFESSIONAL APPLICATION ONLY. KEEP OUT OF REACH OF CHILDREN.