



## VRE-5513

### DESCRIPTION:

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-lay up. This product's toughness and durability make it suitable for applications where increased mechanical performance is needed. Provides resistance to many chemical environments, even at elevated temperatures. Unpromoted formulation allows for customization for specific processes.

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.

### USES:

This resin can be used for a variety of applications including storage tanks for many industries, process pipes, flanges and fittings; infrastructure pipe construction; fume and vapor ducting; load-bearing construction members and pultruded handrail and grating applications.

### TYPICAL LIQUID PROPERTIES:

Next values are for a reference guide only. Certain batches will not conform exactly to these numbers due to: storage conditions, temperature changes, batch age, test equipment and procedures; these

variables may affect deeply the evaluation results. Products with values outside of these numbers can perform acceptably. Final suitability of product is in the end use performance.

Test	Minimum Value	Maximum Value	Test Method
Acid Number (solution)	--	5	CCP-100
Non-Volatile Content (%)	56	61	CCP-300.8
Gel Time (minutes) <sup>1</sup>	18	24	CCP-503.7
Cure Time (minutes) <sup>1</sup>	26	46	CCP-503.7
Exothermic Peak (°C) <sup>1</sup>	149	--	CCP-503.7
Appearance	Clear	Clear	Visual
Brookfield Viscosity (cps) <sup>2</sup>	250	450	CCP-400

<sup>1</sup> 0.15% Co (at 12%), 0.05% DMA, 1.5% Luperox DDM-9 @ 25°C

<sup>2</sup> LVDV-E, spindle # 3, 60 rpm @ 25°C

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### CURE:

It is recommended that gel time be tested in the customer's plant, due to age, temperature, humidity and catalyst type / amount, will produce varied gel times.

The catalyst level should not exceed 2.4% or fall below 1% for proper cure.

This product will have use difficulty when temperature fall below 16°C, due to curing may be adversely affected. All the gel and cure times are related to Luperox DDM-9 as catalyst. If any doubt, please contact our Technical Service Department.

### PHYSICAL PROPERTIES:

Vinyl ester resin 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 affect the cure. With time and / or heat, a "moderate cure" will develop into "ultimate physicals".

When the part reaches ultimate cure depends upon time, temperature and satisfactory catalyization. Too

much or too little catalyst can result in permanent under-cure, wich cannot be overcome.

Practically speaking, serviceable cure time will range from overnight to a week, and occasionally longer due to circumstances. Small and thickness laminates, properly catalyzed without exotherm or external heat can be delay months or years to get their last physical properties. Sufficient external heat can reduce the cure time to less than one day.

Test (clear casting) <sup>1</sup>	Value
Tensile Strength (MPa)	78
Tensile Modulus (MPa)	3,655
Elongation (%)	7.4
Flexural Strength (MPa)	146
Flexural Modulus (MPa)	3,350
HDT at 264 psi (°C)	101

<sup>1</sup> post-cure condition: 12 hrs at RT, 2 hrs at 80°C, 1 hr at 120°C

### CAUTIONS:

Do not use air to mix, because it is not effective and moreover can produce contamination with water and oil. Do not add any material than the recommended fillers and catalyst for this product. If any doubt, please contact our Technical Service Department.

**Warning: Avoid direct mixing of organic peroxide with metallic soaps, amines or any type of accelerator or promotor, because it can result on violent decomposition with fire or explosion.**



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### **STORAGE LIMITATIONS:**

Uncatalyzed unsaturated vinyl ester have a usage life of three months from date of manufacture when stored at 25°C or below, in a closed, factory-sealed,

opaque container and out of direct sunlight, heat sources or moisture. By each 7°C increment on temperature, usage life decrease to half.

### **SHIPPING:**

Metallic, closed and sealed drums of 200 Kg or tank-wagons.

Last Revision: Nov/22/2013

### **DISCLAIMER AND LIMITATION OF LIABILITY:**

To the best of our knowledge, the information contained herein is accurate. The products sold hereunder shall meet Seller's applicable specifications at time of shipment. Seller's specifications may be subject to change at any time without notice to Buyer. Buyer must give Seller notice in writing of any alleged defect covered by warranty (together with all identifying details, including the product code(s), description and date of purchase) within thirty (30) days of the date of shipment of the product or prior to the expiration of the shipment's quality life, whichever comes first. THE WARRANTY DESCRIBED HEREIN SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. The Buyer's sole and exclusive remedy against Seller shall be for the replacement of the product or refund of the purchase price in the event that a defective condition of the product should be found to exist by the Seller. NO OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO THE BUYER. The sole purpose of this exclusive remedy shall be provide Buyer with replacement of the product or refund of the purchase price of the product if any defect in material or workmanship is found to exist. This exclusive remedy shall not be deemed to have failed its essential purpose so long as Seller is willing and able to replace the defective products or refund the purchase price. Final determination of the suitability of the material for use contemplated, the manner of use and suggested use infringing any patents is the sole responsibility of the Buyer.