

EPALLOY™ 7200X90 for Low VOC, Fast Cure Primer Applications

EPALLOY™ 7200X90 is a Xylene modified version of CVC's novel epoxy resin EPALLOY™ 7200, designed for applications that require fast and/or low temperature cure. EPALLOY 7200X90 is a high solids resin (90% NV in Xylene) made with coatings applications in mind. Diluting with Xylene brings the viscosity of the otherwise viscous EPALLOY 7200 below 5000 cps. This allows for easier handling and incorporation into coatings formulations without the need to heat the resin prior to use.

Given the demand for high solids coatings to meet the needs of current VOC regulations, an important application for EPALLOY 7200X90 is in epoxy primers in place of standard LER as a modifier for solid resins. These applications typically use solid, high molecular weight Bisphenol A resin compositions because of their fast dry times (1-2 hours at RT in high volume solids coatings, 3-4 hours in clears). A drawback to solid epoxy resins is the requirement for substantial amounts of solvent for acceptable application characteristics.

Solids levels in such formulations are usually less than 70% and VOC contents are greater than 350 grams/liter in filled systems. The South Coast Air Quality Management District (SCAQMD) has legislated limits on the amount of VOC certain classes of coatings may have. Recently, allowable levels for primers have been reduced from 200 grams/liter to 100 grams/liter. In order to bring the solids levels up and VOC levels down, formulators have used LER in place of solid resin to bring net resin viscosity down, and allow for use of less solvent. Unfortunately, this causes longer thin film dry times and decreased chemical resistance. However, when EPALLOY 7200X90 is used, thin film dry times are actually shorter than with solid resin, chemical resistance is maintained, solids content is increased, and VOC levels are decreased.

The attached table illustrates this point with two different curing agents, Versamid 125 from Cognis and NC-541, a phenalkamine curing agent available from Cardolite. A control resin formula of (Dow) DER 661 @ 70% solids in Xylene is compared to 90% solids compositions using LER (labeled 331X90) and EPALLOY 7200X90. For each formulation the density of the mixed coating formulation (resin solution with curing agent) was measured and the VOC levels were calculated by determining the weight of solvent (in grams) present in one liter of coating solution.

For example;

For the 661X70 coating solution in the attached table, the density of mixed coating was measured at 8.83 lbs./gallon.

This converts to 1058 grams/liter.

$$(8.83\text{lbs./gallon} \times 453.6 \text{ grams/lb.} \times 1 \text{ gallon}/3.7854 \text{ liters})$$

As shown the curing agent is used at 14.3 phr and the resin solution is 30% Xylene. Therefore the solvent content in the mixed solution is 26.25%.

$$(30/114.3 \times 100)$$

Therefore the mixed coating has 278 grams of Xylene, or Volatile Organic, per liter of coating solution.

$$(26.25\% \times 1058 \text{ grams/liter})$$

As seen in the table, the 7200X90, while higher in solids than the solid resin formula, has a significantly lower viscosity as does the (Dow) DER 331 at 90% NV. Both of the 90% solids solutions provide much lower levels of VOC. However, whereby the dry time of the 331X90 formulation is significantly longer than the control at RT (19 hours vs. 6 hours), the 7200X90 formulation is shorter at RT (4 hours vs. 6 hours) and almost the same as the DER 661 control at 4°C (42 hours vs. 40 hours). In addition the 7200X90 resin solution also provides for improved chemical resistance over the control as measured by MEK Double Rubs.

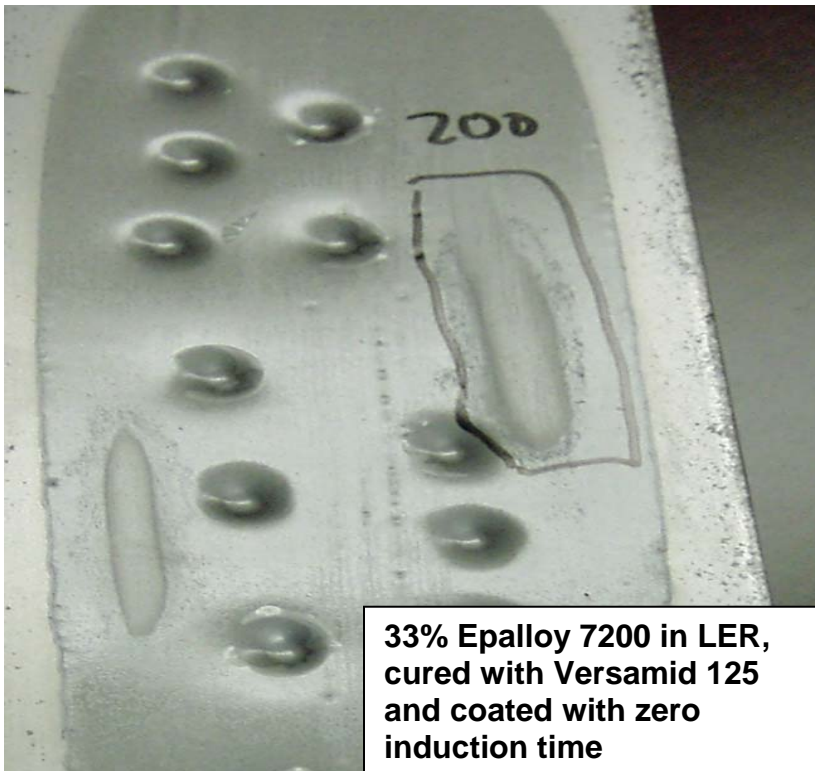
Another attractive feature the EPALLOY 7200 brings to coatings formulations cured with Polyamides, is the elimination of induction times. The attached photographs illustrate this point nicely. In the first photo, we see a picture of a coating made of standard LER, cured with Versamid 125, and coated with no induction time. As expected, the film appears matte and mottled due to incompatibility of the polyamide in the epoxy. The second photo shows a coating made from LER modified with 33% EPALLOY 7200, cured with Versamid 125, and coated with no induction time. Here we see a clear, glossy film, which is a result of the EPALLOY 7200 increasing the cure speed, and hence the initial compatibility of the curing agent in the resin.

This data suggests that EPALLOY 7200X90 can be used a modifier for solid resin primer compositions to;

- **Yield lower VOC**
- **Improve or maintain the dry time of solid resin compositions**
- **Provide advantages in chemical resistance.**
- **Eliminate induction times in polyamide cured coatings.**

If you have questions about this product or application, please contact Charles Zarnitz, Technical Service Manager - Epoxies for CVC at 856-533-3022 or email: charles.zarnitz@emeraldmaterials.com.

Samples of EPALLOY 7200X90 are available from CVC Thermoset Specialties. To order, please call 856-533-3000 or make your request through our website at www.cvc.emeraldmaterials.com.





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Solid resin v. 331 and 7200 in solvent with V-125 and NC541								
		Versamid 125			NC 541 Phenalkamine			
		661X70	331X90	7200X90	661X70	331X90	7200X90	
<u>Resin Viscosity (cps)</u>		6,420	725	4,170	6,420	725	4,170	
<u>Cut Resin Density (lbs./gal)</u>		8.94	9.37	9.51	8.94	9.37	9.51	
<u>EEW (grams/equiv.)</u>		721.4	210	221.1	721.4	210	221.1	
<u>Resin Solids (%)</u>		70	90	90	70	90	90	
<u>Curing agent (phr)</u>		14.3	49	46.6	18	61.9	58.8	
<u>Curing Agent Density (lbs./gal)</u>		8.1	8.1	8.1	8.25	8.25	8.25	
<u>Density of Mixed System (lbs./gal)</u>		8.83	8.91	9.01	8.83	8.91	9.00	
<u>VOC (grams/liter)</u>		278	72	74	269	66	68	
<u>Dry Time (hours)</u>	RTC	6	19	4	4	16	1.5	
	4°C Cure	40	88	42	34	48	19	
<u>MEK Double Rubs</u>	RTC	300 sd	v. poor	300 sd	fail -100	fail	300 d	
	4°C Cure	300 d	v. poor	300 d	fail - 75	fail	300 d	
<u>Gardener Impact (inch-lbs.)</u>	RTC	37.5	12	10	25	13.5	6	
	4°C Cure	19	x	7	9	x	6	
d = dulled; sd = slightly dulled								

