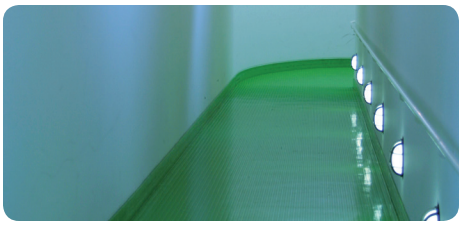
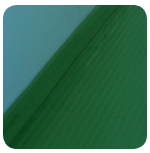
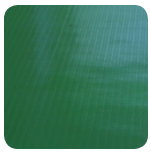
HEXION™

Application Bulletin

Civil Engineering



EPON™ Resin 233 and EPIKURE™ Curing Agent 3393 Solvent-free Epoxy System for Superior Moisture Vapor Transmission Control on Concrete






A solvent-free epoxy system has been specially-designed for use in formulating moisture vapor emission coatings. A moisture vapor suppression system (MVSS) based on EPON Resin 233 and EPIKURE Curing Agent 3393 was found by a third party testing facility to provide perm ratings of <0.10 (depending on film thickness). With this low perm rating, when properly formulated and applied to well-prepared concrete surfaces, such a system may be considered a Class I Vapor Diffusion Retarder and may be suitable for use under a variety of finished floor coverings such as vinyl tiles and sheeting, rubber-backed carpet, hardwood, and solvent-free epoxy topcoats.

Features/Benefits

- Low mix viscosity: ~700 cP at 25 °C
- 2 to 1 mix ratio (by weight)
- Adequate pot life with fast recoat times
- Low volatiles (meets German AgBB standards for interior air quality)
- Can be formulated to achieve perm ratings <0.10

Applications

The Moisture Vapor Suppression System (EPON Resin 233 / EPIKURE Curing Agent 3393) forms a solvent-free epoxy primer which may be suitable for use under a variety of finished floor coverings such as vinyl tiles and sheeting, rubber-backed carpet, hardwood, and solvent-free epoxy topcoats.

Tested Performance

According to ASTM E 96-10 and ASTM D7234 evaluations conducted by an independent testing agency, when properly formulated and applied as recommended to well-prepared concrete surfaces, EPON Resin 233 with EPIKURE Curing Agent 3393 potentially offers the performance of a Class I Vapor Diffusion Retarder.

ASTM E 96-10 Test Results* (Standard Test Method for Water Vapor Transmission of Materials)		
MVSS: EPON Resin 233 / EPIKURE Curing Agent 3393		
Concrete Cure Time	**Average Measured Permeance**	**Dry Film Thickness (DFT in Mils)**
7 days	< 0.1 perms	22
28 days	< 0.1 perms	17

ASTM D 7234-05 Test Results* (Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete)		
MVSS: EPON Resin 233 / EPIKURE Curing Agent 3393 (after 62 days of water vapor exposure)		
Concrete Cure Time	**Tensile Bond Strength**	**Failure Mode**
7 days	> 480 psi	No failure
28 days	> 480 psi	No failure

*ASTM E 96-10 and ASTM D7234 Testing conducted by CTL Group Labs, Skokie, IL

Typical Properties

System	Viscosity at 25 °C	Density at 20 °C	Equivalent Weight
Epoxy Resin: EPON Resin 233	500 – 700 cP	1.17 g/mL	160 – 168
Amine Curing Agent: EPIKURE Curing Agent 3393	800 – 1,200 cP	1.04 g/mL	82

System	Mixing Ratio, by Weight	Pit Life at 23 °C	Recoat Time
Moisture Vapor Suppression System (MVSS)	100 : 50 (epoxy / amine)	25 min.	8 – 24 hrs. (temperature dependent)

Surface Preparation

Proper substrate preparation is very important. Shot blasting is strongly recommended, however, it is the sole responsibility of the end user to identify which methods are suitable for concrete preparation given the specific conditions of the substrate and environment for application. It is incumbent upon the formulator and/or contractor to apply a test patch of the formulated system on the substrate before application. The application of a test patch to each specific area of the job site is recommended to ensure that the formulation meets the application requirements and is suitable for use in that specific area. The test patch(es) should be applied and evaluated after 30 minutes prior to commencement of application of entire job.

The suggested application conditions are summarized below:

Application Conditions for MVSS: EPON Resin 233 / EPIKURE Curing Agent 3393		
Concrete Application Temperature Range	**Maximum Atmospheric Relative Humidity**	**Minimum Concrete Curing Temperature**
50 °F (10 °C) to 90 °F (30 °C)	85 %	50 °F (10 °C)

Formulating and Application (Mixing)

EPON Resin 233 and EPIKURE Curing Agent 3393 can be incorporated at these suggested ratios. These ratios are provided solely for calculation when developing a fully- formulated product. It is incumbent upon the formulator to determine whether the MVSS system may be applied “as supplied”, or if formulation is needed to meet their customer’s requirements.

By weight:
2 parts EPON™ Resin 233 / 1 part EPIKURE™ Curing Agent 3393

By volume:
1.72 parts EPON™ Resin 233 / 1 part EPIKURE™ Curing Agent 3393

Formulators working with EPON™ Resin 233 and EPIKURE™ Curing Agent 3393 may determine that additives are needed. The following additives have been evaluated and may be suitable for various substrate conditions and application methods.

Flow/Leveling	Supplier	Product Name	Wt% in EPON 233
	Troy Corporation	Troysol S367	0.05 – 0.50
	Evonik	Twin 4100	0.05 – 0.50
	BYK	BYK 320	0.05 – 0.50
	Evonik	Wet 270	0.05 – 0.15
	Evonik	Glide B 1484	0.05 – 0.15
Defoamers	BYK	BYK A-530	0.5 – 2.0
	BYK	BYK 141	0.5 – 2.0
	Evonik	Airex 900	0.5 – 2.0

Mix the fully-formulated epoxy and curing agent portions and blend to a homogeneous state with appropriate mixing equipment. Avoid entraining excessive air into the blend during high speed agitation. Thorough mixing is recommended by agitating at low or moderate speeds for a minimum of 3 to 5 minutes.

Due to its working pot life, this system should be applied immediately after thorough mixing.

Do not apply to surfaces with visible moisture. The surface to be coated must be dry and free of dust, dirt, grease or concrete laitance to obtain the best results possible given concrete and environmental conditions.

A uniform coating can be applied with a squeegee and paint roller combination method, for example.

Coverage rates depend on application technique, substrate porosity and required perms.

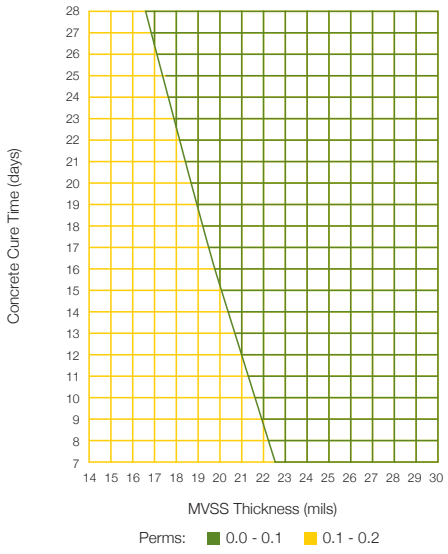
Cure time is temperature dependent. At room temperature, recoat can be accomplished in approximately 8 hours; lower temperatures may require up to 24 hours.

Moisture Vapor Transmission Rates

An independent third party test service was used to determine the moisture vapor transmission rate of this system at various concrete cure times and coating film thicknesses. Regression analysis was performed on the resulting test data, and surface response curves were calculated using a statistical software package.

The resulting plot shows the area (in green) where the regression curve model predicts a moisture vapor transmission rate below 0.10 perms. Actual transmission values may differ depending on the manufacturer's formulation and on specific variables such as concrete strength, chemistry, laitance, etc.

Moisture Vapor Transmission as a Function of Concrete Cure Time and MVSS Thickness (Tested over 100% relative humidity concrete test panels)



Green indicates Class I Vapor Diffusion Retarder capability as predicted by the test model. Minimum coating film thickness for obtaining the Class I rating depends on the specific field application conditions.

Testing Procedures

- ASTM E 96-10 Standard Test Method for Water Vapor Transmission of Materials

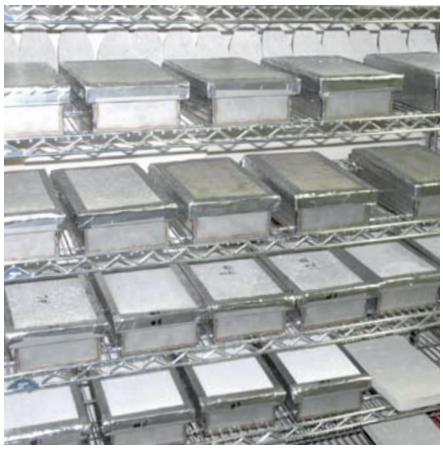
  This test determines the performance of a coating in conditions that simulate real-world applications on concrete. Materials directly adhering to concrete may exhibit significantly different rates of moisture transmission than the same coating that has been cast and tested as only a free film.

- ASTM D 7234 Pull-Off Adhesion Strength of Coatings on Concrete

  This test method is used to evaluate the pull-off adhesion strength of a coating that has been applied directly to concrete. The test measures the greatest perpendicular force (in tension) that a surface area can bear before a plug of material is detached. Failure will occur along the weakest plane within the system comprised of the test fixture, adhesive, coating system and substrate, and is exposed by the fractured surface.

Test results presume proper substrate cleaning and preparation by the applicator. It is the sole responsibility of the formulator, coating manufacturer, distributor and applicator to ensure that suitable industry-accepted floor preparation methods are employed prior to application. It is also the sole responsibility of these parties to independently test this Moisture Vapor Suppression system to verify that it meets the customer's performance requirements.

ASTM E 96-10 and ASTM D7234 Testing conducted by CTL Group Labs, Skokie, IL



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