



## Technical Data Sheet

# RHOPLEX™ PR-33 Ambient Crosslinking Emulsion Polymer

For Aqueous Stain Blocking Primers

## Introduction

RHOPLEX™ PR-33 Emulsion Polymer is an aqueous, all-acrylic, binder designed for exterior and interior primers and stain blocking sealers. This binder uses ambient crosslinking technology to offer improved primer performance versus conventional latex polymers. The combination of an all-acrylic backbone and ambient cure crosslinking technology contribute to the excellent balance of properties found with RHOPLEX™ PR-33 Emulsion Polymer. The excellent film formation achieved blocks stains from migrating through the dry paint film and yields stain blocking performance at high PVC. Enhanced adhesion and excellent durability are additional attributes of this technology.

RHOPLEX™ PR-33 Emulsion Polymer is a versatile vehicle that can be used in the formulation of primers to upgrade difficult substrates into sound repaint surfaces.

Primers and sealers, based on RHOPLEX™ PR-33 Emulsion Polymer, offer exceptional stain blocking and "bleed through" resistance over cedar and redwood. In addition, these primers offer a high degree of stain blocking over common interior household stains such as those left by water damage and both solvent borne and water borne markers and pens.

## Benefits

- 100% acrylic composition
- Unique ambient crosslinking technology provides:
  - Excellent tannin, marker, water, and nicotine stain blocking
  - Enhanced adhesion to a variety of repaint and new substrates
  - Wide formulation latitude provides performance at high PVC
  - Excellent flash rust and nail head rust resistance
  - Excellent exterior crack resistance over dimensionally unstable substrates and weathered wood
  - Good zinc oxide stability
  - Low VOC

## Typical Physical Properties<sup>1</sup>

Property	Typical Values
Appearance	Milky White Liquid
Solids Content, %	43
Viscosity, Brookfield, cP	50 - 1000
pH	8.5 - 9.5
Density, US lb/gal	8.85
Bulking Value, US gal/lb Dry Solids	0.1037
Minimum Film Formation Temperature, (MFFT), °C	6

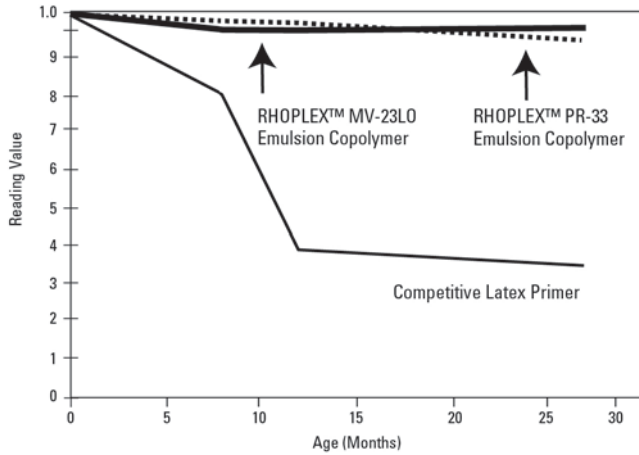
1. These properties are typical but do not constitute specifications.

**Performance Advantages**

**Exterior Durability**

With over five years of exterior exposure data, the all-acrylic composition of RHOPLEX™ PR-33 Emulsion Polymer provides excellent exterior durability in primer formulations. Figure 1 shows the outstanding crack resistance, over weathered white pine, of a primer based on RHOPLEX™ PR-33 Emulsion Polymer.

**Figure 1: Crack Resistance of Primers on 3-Month Weathered White Pine Exposed at South 45**



**Exterior Resistance Properties**

Table 1 displays the excellent exterior tannin stain blocking, rust resistance and blistering characteristics of RHOPLEX™ PR-33 Emulsion Polymer versus a competitive latex vehicle and a self-primed topcoat.

**Table 1: Exterior Performance Comparison of Partners 6 Months Exposure (00AJ)**

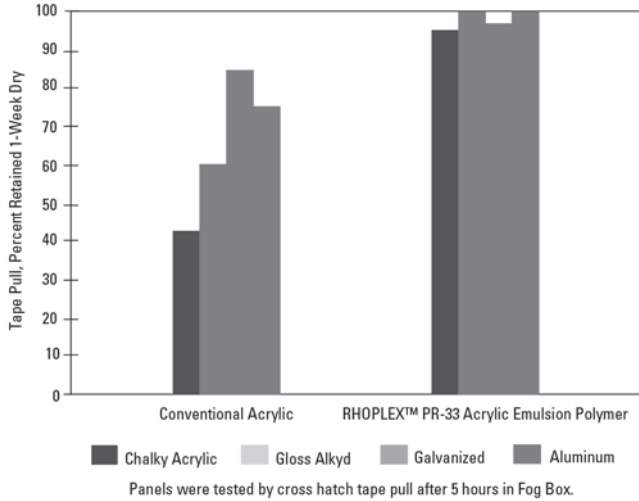
	RHOPLEX™ PR-33 Emulsion Polymer Primer 31PVC/35VS	Competitive Latex Primer 31PVC/35VS	Self Primed Topcoat
Tannin Stain Blocking	8	6	3
Nail Head Rust Resistance	9	6	4
Rust Staining Cold Rolled Steel	10	8	1
Blistering on Unspangled Galvanized	10	1	5

1. One coat of primer is applied at 350 ft<sup>2</sup>/gal, followed by 1 coat of G-08-2 exterior acrylic semigloss.

**Enhanced Adhesion**

Figure 2 shows the enhanced wet adhesion of RHOPLEX™ PR-33 Emulsion Polymer, over a variety of substrates, compared to a conventional acrylic primer. The primers were tested in a 31 PVC/35 VS formulation after one week dry at 25°C and 50% RH. The primers were placed in a streaming fog box for five hours prior to testing.

**Figure 2: Wet Adhesion of RHOPLEX™ PR-33 Emulsion Polymer**



**Interior Stain Blocking Performance**

Table 2 compares the marker and pen stain blocking performance of RHOPLEX™ PR-33 Emulsion Polymer versus a competitive latex primer vehicle and RHOPLEX™ PR-3232LO.

**Table 2: Marker and Pen Stain Blocking Performance**

	RHOPLEX™ PR-33 Emulsion Polymer Primer 31PVC/35VS With Flat PVA Topcoat	Competitive Latex Primer 31PVC/35VS With Flat PVA Topcoat	RHOPLEX™ PR-3232LO Primer 31PVC/35VS With Flat PVA Topcoat

Another area where RHOPLEX™ PR-33 Emulsion Polymer excels in stain blocking performance is over many common household stains.

Table 3 shows the comparative stain blocking performance of RHOPLEX™ PR-33 Emulsion Polymer over a variety of difficult household stains. These stains include nicotine, water, tannin, grape juice, coffee and lipstick.

**Table 3: Household Stain Blocking Performance**

Stain Type	RHOPLEX™ PR-33 Emulsion Polymer Primer 31PVC/35VS	Competitive Latex Primer 31PVC/35VS	RHOPLEX™ PR-3232LO Primer 31PVC/35VS
Nicotine Stained Vinyl Chart <sup>1</sup>	8	6	7
Water Damaged Ceiling Tile <sup>2</sup>	6	4	6
Tannin Stain Block Cedar <sup>3</sup>	8	5	6
Tannin Stain Block Redwood <sup>3</sup>	6	3	4
Grape Juice <sup>1</sup>	8	7	7
Coffee <sup>1</sup>	6	5	5
Lipstick <sup>1</sup>	9	8	7

Ratings: 10 = Best, no visible stain 0 = Complete bleed through

1. One coat of primer applied via drawdown and allowed to dry 2 hours. One application of flat PVA topcoat.
2. Two coats of respective primer and one application of flat PVA topcoat. One hour to dry between coats.
3. Primer applied at 350 ft<sup>2</sup>/gal., dry 4 hours, topcoat with G-08-2 exterior acrylic semigloss.

## Formulation Recommendations

RHOPLEX™ PR-33 Emulsion Polymer stain blocking primer vehicle offers a unique balance of durability and adhesion with superior exterior and interior stain blocking capabilities. Starting point formulations for RHOPLEX™ PR-33 Emulsion Polymer are separate from this bulletin. Note that in order to achieve the full potential of primers based on RHOPLEX™ PR-33 Emulsion Polymer, a number of formulation variables should be considered.

Primers based on RHOPLEX™ PR-33 Emulsion Polymer will exhibit improved early performance properties, and similar drying characteristics, relative to conventional acrylic primers. Due to the ambient cross-linking nature of this binder, several performance attributes will continue to improve with time. Ultimate performance will be achieved in 2-3 weeks after initial application.

Some additives and chemicals can cause pre-crosslinking of the RHOPLEX™ PR-33 Emulsion Polymer, resulting in poorly coalesced films with reduced application performance. Formaldehyde or formaldehyde-releasing preservatives will cause pre-crosslinking and are not recommended for use with this emulsion polymer. Aldehydes, from the hydrolysis of vinyl acrylic polymers, can also cause pre-crosslinking. Blends of RHOPLEX™ PR-33 Emulsion Polymer, with vinyl acrylic latices, are not recommended.

In addition, other formulation additives, such as colorants, may contain formaldehyde or formaldehyde-releasing preservatives. Though the overall formaldehyde content may be low, performance of paints containing such additives should be carefully evaluated.

### **Rheology Modifiers**

A combination ACRY SOL™ RM-2020NPR and ACRY SOL™ RM-8W Thickeners, with low levels of attapulgite clay and HEC in the pigment grind, is recommended for use with RHOPLEX™ PR-33 Emulsion Polymer to achieve the desired balance between low- and high-shear viscosity, pigment settling and stability while maintaining excellent stain blocking performance. Note that our studies have shown that high levels of conventional HEC thickeners can hurt hydrophilic stain suppression.

### **Dispersants**

For optimum stain blocking performance in formulas which contain HEUR thickeners, TAMOL™ 2002 or TAMOL™ 681 Dispersant is recommended. Low levels of TAMOL™ 165 Dispersant can be used to prevent syneresis if necessary.

### **Extender Pigments**

Low oil absorption extender pigments such as Nepheline Syenite are recommended as extenders with RHOPLEX™ PR-33 Emulsion Polymer. Primers made with calcium carbonate extender pigments can occasionally cause frosting on dark colored topcoats. Platy extender pigments, such as mica, may give slightly improved stain blocking performance.

### **Zinc Oxide**

Although RHOPLEX™ PR-33 Emulsion Polymer has good stain blocking over interior marker stains in formulas without zinc oxide, zinc oxide is necessary for optimum tannin stain blocking with RHOPLEX™ PR-33 Emulsion Polymer. French process Zinc Oxide at a level of 10 - 12 lbs will give optimum tannin stain blocking performance.

### **Coalescents**

A low-volatility coalescent, such as Texanol ester alcohol is recommended to ensure the formation of a tight film needed for toughness and stain blocking with RHOPLEX™ PR-33 Emulsion Polymer. A Texanol ester alcohol level of 5%, on RHOPLEX™ PR-33 Emulsion Polymer binder solids, is recommended for good low temperature film formation.

### **Flash Rust Inhibitor**

RHOPLEX™ PR-33 Emulsion Polymer can yield primers with excellent flash rust resistance. No flash rust additive is necessary when using the recommended RHOPLEX™ PR-33 Emulsion Polymer primer formulations.

### **Opaque Polymer**

ROPAQUE™ Ultra Opaque Polymer can improve performance of pigmented primers and reduce cost. This non-film forming organic pigment is designed to optimize hiding.

### **Cosolvent**

The use of glycols are necessary to obtain freeze thaw stability of the final primer formulation. However, the use of glycols should be minimized in order to maximize the tannin stain resistance of the primer.

### **Mildewcides and Preservatives**

A combination of zinc oxide and SKANE™ M-8 Mildewcide is recommended to provide mildew protection to primers formulated with RHOPLEX™ PR-33 Emulsion Polymer.

Formaldehyde and formaldehyde-releasing preservatives should not be used in primers formulated with RHOPLEX™ PR-33 Emulsion Polymer. Preservatives such as KATHON™ LX 1.5% Preservative are recommended for use with RHOPLEX™ PR-33 Emulsion Polymer. Preservative efficacy should be evaluated once a final formulation has been chosen.

### **Safe Handling Information**

Based on similar materials, this product is not expected to be toxic via single acute oral or dermal exposure. It may be a mild to moderate skin and eye irritant.

### **Material Safety Data Sheets**

The Dow Chemical Company Material Safety Data Sheets (MSDS) contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products.

Under the OSHA Hazard Communication Standard, workers must have access to and understand MSDS on all hazardous substances to which they are exposed. Thus, it is important that you provide appropriate training and information to your employees and make sure they have available to them MSDS on any hazardous products in their workplace.

The Dow Chemical Company sends MSDS for all its products, whether or not they are considered OSHA-hazardous, to both the "bill to" and/or "ship to" locations of all its customers upon initial shipment, including samples. If you do not have access to one of these MSDS, please contact your local Dow representative for an additional copy. Updated MSDS are sent upon revision to all customers of record. In addition, MSDS are sent annually to all customers receiving products deemed hazardous under the Superfund Amendments and Reauthorization Act.

MSDS should be obtained from your suppliers of other materials recommended in this bulletin.

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## Handling Precautions

Before using this product, consult the Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on product hazards, recommended handling precautions and product storage.

**CAUTION!** Keep combustible and/or flammable products and their vapors away from heat, sparks, flames and other sources of ignition including static discharge. Processing or operating at temperatures near or above product flashpoint may pose a fire hazard. Use appropriate grounding and bonding techniques to manage static discharge hazards.

**CAUTION!** Failure to maintain proper volume level when using immersion heaters can expose tank and solution to excessive heat resulting in a possible combustion hazard, particularly when plastic tanks are used.

## Storage

Store products in tightly closed original containers at temperatures recommended on the product label.

## Disposal Considerations

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that trea™ent and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Technical Representative for more information.

## Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products  from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

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