



PRIMAL™ WL-100 Emulsion

For High-Gloss Industrial Coatings With Excellent Adhesion

Regional Product Availability

- Asia-Pacific

Description

PRIMAL™ WL-100 Emulsion is an acrylic-styrene copolymer designed for high-gloss, waterborne industrial coatings where an attractive appearance and excellent dry and wet adhesion are important considerations.

The favorable colloidal stability (robustness) of PRIMAL WL-100 Emulsion accommodates a broad range of formulation types and formulation process techniques, offering the formulator with a versatile binder for a variety of applications. Robustness, along with 50% weight solids, allows the formulator to achieve volume solids above conventional waterborne binders.

Key Features

- Facilitates the formulation of high gloss, industrial coatings
- Excellent dry (including initially after bake) and wet adhesion to a variety of substrates
- Wide formulation latitude and applications
- Excellent formulation cost / performance balance
- APEO-free⁽¹⁾ and no added formaldehyde or formaldehyde generators⁽²⁾

Typical Physical Properties

(These properties are typical but do not constitute specifications)

Property	Typical Values
Appearance	Opaque, white to off-white liquid
Solids, by weight, %	50.0
Density, wet, (g/ml)	1.04
pH	8.5
Minimum Film Formation Temperature ($\pm 2^{\circ}\text{C}$)	48
Viscosity (Brookfield LV #2, 60 rpm, 25°C), cps	< 500
Storage precautions	Protect from freezing

(1) Manufactured without the use of Alkyl Phenyl Ethoxylate (APEO) surfactants.

(2) Formaldehyde is a ubiquitous material in our environment. Currently there is no accepted regulatory or industry definition of "Formaldehyde-Free." Therefore, we purposely refrain from using the term "Formaldehyde-Free." However, for PRIMAL™ WL-100 Emulsion, we do not intentionally add Formaldehyde or Formaldehyde generators.

**Formulating Guidelines**

Optimum application and dry film performance properties of a protective coating depend critically on the proper choice and level of formulation ingredients. The following formulation guidelines are intended to demonstrate the versatility of PRIMAL™ WL-100 Emulsion, as well as to offer the formulator with information to expedite the evaluation of the product.

Coalescents and Plasticisers

The MFFT of PRIMAL™ WL-100 Emulsion (~48°C) is well above most application temperatures and consequently requires the use of coalescing solvents and plasticizers to form films with optimum physical properties. The type and level of coalescing solvents and plasticizers depend on the application and end use.

Coalescing solvents found useful in formulations based on PRIMAL WL-100 Emulsion include the partially water soluble alkyl ethers of propylene and dipropylene glycols. A specific example is dipropylene n-butyl ether (DOWANOL™ DPnB Coalescent) used at about 25% (w/w) based on polymer solids (BOP) when used alone. Substantially reduced levels (<10% BOP) of DOWANOL DPnB Coalescent can be used if a non-volatile water-immiscible plasticizer (see below) is part of the coalescing package. DOWANOL DPnB Coalescent and other partially and completely water-miscible, polymer-phase, (see DB below) coalescing solvents effectively interact and swell PRIMAL WL-100 Emulsion latex particles. Latex particle swelling can provide a useful method of increasing application viscosity. Other examples of alkyl ethers of (di) propylene glycol include propylene glycol n-butyl ether (PnB) and dipropylene glycol n-propyl ether. However, due to the fast evaporation rate of PnB, inclusion of a slower evaporative coalescing solvent or non-evaporative plasticizer may be necessary for optimum film formation.

To a much lesser degree, the completely water-soluble alkyl ethers of (di)ethylene glycol (e.g., DOWANOL DB and EB Coalescents) offer adequate film formation and require much higher (> 25% BOP) use levels for good film formation. In general DB (or EB) should be used as part of a coalescing package rather than alone. Other coalescing solvents found useful for coatings based on PRIMAL™ WL-100 Emulsion include the alkyl acetates (n-alkyl or branched) and Texanol. Although very effective coalescing solvents for PRIMAL WL-100 Emulsion, the nearly complete water immiscibility of Exxates 800 (and higher alkyl members of the Exxate family) and Texanol do not cause the same extent of latex particle swelling as DOWANOL DPnB Coalescent. The use of a "permanent" plasticizer(s) has been found to offer beneficial properties to coatings based on PRIMAL WL-100 Emulsion. These include enhanced impact resistance, flexibility, and reduced surface dry time. Reduced surface dry time can be important in applications involving recoat and gloss and film clarity retention after exposure to water. Permanent plasticizers found useful in formulations based on PRIMAL WL-100 Emulsion include Santicizer 160, dibutyl phthalate, and KP-140 plasticisers.

**Pigments,
Dispersants,
Wetting Aids**

The choice and level of pigments, dispersants, and wetting aids can have a profound effect on the appearance and barrier properties of cured films. PRIMAL™ WL-100 Emulsion can be formulated into coatings with a wide range of pigment levels (PVC) and types, including both inert and reactive pigments. The stability of PRIMAL WL-100 Emulsion to shear allows the formulator, in some cases, to prepare pigment dispersions in the presence of resin. This potential advantage allows for paints with increased volume solids.

OROTAN™ 681 and OROTAN 165A Dispersants at levels of approximately 0.75% to 2% on pigment solids have been found to produce coatings with a good balance of high gloss and good barrier properties. Pigment wetting, non-ionic, low-foaming surfactants, such as TRITON™ CF-10, Igepal CTA-639W, and Surfynol 104A Surfactants, have been used successfully to prepare pigment dispersions at levels of approximately 0.1 to 0.6 g/ml of formulation.

Defoamers

Various surface active ingredients used in waterborne paint formulations, such as dispersants, wetting aids, latex surfactants, and some coalescents may generate or stabilize foam during the manufacture or application of paint. In general, a defoamer should be evaluated for its effectiveness and long-term efficacy in each formulation, since the type and level of the surface-active ingredients will vary. Examples of defoaming agents found useful in formulations based on PRIMAL™ WL-100 Emulsion are Byk-002, Byk-024, Tego Foamex 1488, and Dehydran 1620 defoamers.

**Viscosity Control
and Thickening
Agents**

In some cases, paints based on PRIMAL™ WL-100 Emulsion may not require the use of an external thickener. As mentioned previously, glycol ethers such as DOWANOL™ DPnB and DB Coalescents swell PRIMAL™ WL-100 Emulsion latex particles, increasing their effective volume and increasing paint viscosity. This self-thickening is highly dependent on formulation volume solids with higher volume solids showing the greatest response. The use of ammonia or other amines can further increase viscosity. However amines that evaporate slower than ammonia can reduce dry time and prolong or increase film water sensitivity.

High molecular weight HEUR thickeners, such as ACRY SOL™ RM-12W Rheology Modifier are recommended for thick film applications to control sagging and mud cracking. Depending on other formulation ingredients, the rheology modifier level can vary from 0.1 to 2.0 g/ml of paint with high levels of coalescent and surfactants requiring higher levels of thickener. Other HEUR thickeners found useful in formulations based on PRIMAL™ WL-100 Emulsion include ACRY SOL RM-2020NPR Rheology Modifier for increasing viscosity at high shear and ACRY SOL RM-8W Rheology Modifier for increasing viscosity at medium shear rates.

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.

Storage

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

Disposal

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 treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Coating Materials Technical Representative for more information.

Chemical Registration

Many countries within the Asia-Pacific require the registration of chemicals, either imported or produced locally, prior to their commercial use. Violation of these regulations may lead to substantial penalties imposed upon the user, the importer or manufacturer, and/or cessation of supply. It is in your interests to ensure that all chemicals used by you are registered. Dow does not supply unregistered products unless permitted under limited sampling procedures as a precursor to registration.

Note on Asia-Pacific Product Line

Product availability and grades vary throughout the countries in Asia-Pacific. Please contact your local Dow Coating Materials representative for further information and samples.

Product Stewardship

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