



## RHOPLEX™ MULTILOBE™ 400 Emulsion Polymer

For Architectural Coating Applications, (APEO-Free, Low-VOC, Exterior Flat & Satin Paints)

### Regional Product Availability

North America

### Description

RHOPLEX MULTILOBE 400 Emulsion Polymer represents The Dow Chemical Company's progress in design of an APEO (alkyl phenol ethoxylate) surfactant free binder for low-VOC exterior flat and satin paints, providing excellent durability, color retention, and dirt pick-up resistance.

RHOPLEX MULTILOBE 400 Emulsion Polymer is the latest addition to the MULTILOBE product family which utilizes a combination of technologies from Dow. First and foremost, MULTILOBE technology enhances film-build performance and reduces thickener demand. Also, polymer composition has been modified to a slightly lower Tg relative to MULTILOBE™ 200 in order to optimize the balance of properties with lower co-solvent levels.

### Typical Physical Properties

(The following properties are typical but should not be regarded as specifications)

Property	Typical Values
Solids content, %	53.0–54.0
pH	8.5–9.2
Viscosity (cP)	300–1,500
Gel Content, g/qt	
100 Mesh	0.05 max
325 Mesh	0.10 max
Polymer Dry Density, lb/gal	9.4
Tg, DSC, onset, °C	8

### Summary of Features and Benefits

Features	Manufacturer Benefit†	User Benefit
Increased film build	Minimized level and cost of thickener.	Best applied hiding, uniformity of appearance, and durability.
Chalk-adhesion	No alkyd modification required.	Resistance to blistering and related ultimate flaking. Elimination of alkyd modification means better mildew resistance, tint retention and color compatibility, and easier brush clean-up.
Wet adhesion	Tolerates rheology modifiers; suitability for variety of substrates.	Resistance to cracking, flaking, and peeling over wood and repaint surfaces.
All-acrylic binder	Proven performance over a broad formulating range.	Confidence in quality of paint.
Chalk resistance / dirt resistance	Formulating latitude: Flat and satin paints; use of different extender types.	Long-term tint retention and appearance.
Minimized level of surfactant for color acceptance	Ease of color acceptance; reduced foaming, surfactant leaching, and water sensitivity; reduced raw material costs.	Good appearance; minimized foaming.

† Manufacturer benefits are those in addition to minimized failures and maximized customer satisfaction.

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RHOPLEX™ MULTILOBE™ 400 Emulsion Polymer / Dow Coating Materials

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## Formulating Guidelines

In the past, Dow typically recommended a single coalescent level for each of its products. Our recommendation with this low VOC polymer, however, is different, because the use of coalescent and co-solvent levels are severely restricted by the 50 g/L VOC limit.

PVC can have a strong impact on the LTFF of a paint, and this will affect the minimum level of coalescent required. Generally, higher PVC paints require a higher percentage of coalescent based on polymer solids to achieve equivalent LTFF. We typically recommend a level of 2% coalescent with RHOPLEX™ MULTILOBE™ 400 Emulsion Polymer to achieve good film formation.

Freeze/thaw stability can also be affected in low VOC formulations. Minimizing coalescent levels can improve freeze/thaw stability in two ways. First, the reduction of strong coalescent, such as Texanol™, reduces coalescent induced polymer swelling, thus improving colloidal stability. Second, using lower levels of coalescent allows the use of higher levels of freeze/thaw aids, such as propylene glycol, within the 50 g/L VOC limit, thus improving freeze/thaw stability directly.

Zinc oxide and other additives can also impact both LTFF and freeze/thaw stability. The best practice for choosing the appropriate coalescent/glycol balance in a given formulation is by testing the paints at various levels of coalescent/glycol, measuring the resulting LTFF/freeze/thaw balance, and choosing a level that is most appropriate for the needs of the end user.

## Performance Properties

### Properties of Quality Flat Paints Formulated with RHOPLEX™ MULTILOBE™ 400 at 50 g/L VOC and RHOPLEX™ MULTILOBE™ 200 at 50 and 183 g/L VOC‡

Quality Flat Paint Formulation	RHOPLEX MULTILOBE 400 50 g/L VOC	RHOPLEX MULTILOBE 200 50 g/L VOC	RHOPLEX MULTILOBE 200 183 g/L VOC
Equilibrated Stormer Viscosity <sup>1)</sup> , KU	89	92	92
Equilibrated ICI Viscosity, P	0.9	1.0	1.1
Thickener Demand, HEC lb/100 gal	4.58	4.43	4.42
Film Build, g/ft <sup>2</sup> )	8.1	7.6	8.9
60° Gloss, drawdown	3.4	3.4	3.1
85° Sheen, drawdown	4.3	4.0	3.7
Blistering <sup>2)</sup> , Gloss Alkyd Substrate	10	10	10
Blistering <sup>2)</sup> , Chalky Latex Substrate	4M	4M-D	8M-D
LTFF 50°F/70% RH 4-24 Sag Bar drawdown	Good	Good	Good
Freeze-Thaw Stability, 5 cycles	Good	Fail	Good
Total PVC, VS	49PVC, 39VS	49PVC, 39VS	46PVC, 37VS

1) Hand stirred/sheared.

2) After 1 day in a fog box.

Blistering Key: Size 1=Large, 9=Extremely Small; Density F=Few, M=Medium, D=Dense

‡ Note: The 183 g/L VOC quality flat paint formulation is based on Formulation W-200-5 (see formulation in this brochure) using Ti-Pure™ R-706, ROPAQUE™ Ultra Opaque Polymer, and American Zinc Oxide. The 50 g/L VOC quality flat paint formulation is based on Formulation W-400-1 (see formulation in this brochure).

**Properties of Quality Flat Paints Formulated with RHOPLEX™  
MULTILOBE™ 400 Emulsion Polymer and RHOPLEX™  
MULTILOBE™ 200 Emulsion Polymer in a 100 g/L VOC‡**

Quality Flat Paint Formulation	RHOPLEX MULTILOBE 400 50 g/L VOC	RHOPLEX MULTILOBE 200 50 g/L VOC	RHOPLEX MULTILOBE 200 183 g/L VOC
Equilibrated Stormer Viscosity <sup>1</sup> , KU	95	92	95
Equilibrated ICI Viscosity, P	1.1	1.0	1.0
Thickener Demand, HEC lb/100 gal	4.06	4.18	4.63
% Texanol,	6.0	2.0	2.0
60° Gloss, drawdown	3.4	3.5	3.7
85° Sheen, drawdown	5.1	5.0	4.9
Blistering <sup>2</sup> , Gloss Alkyd Substrate	10	10	10
Blistering <sup>2</sup> , Chalky Latex Substrate	9VF	9VF	9VF
LTF 50°F/70% RH 4-24 Sag Bar drawdown	Good	Good	Good
Freeze-Thaw Stability, 5 cycles	Good	Excellent	Good
Total PVC, VS	49PVC, 39VS	49PVC, 39VS	49PVC, 39VS

<sup>1</sup> Hand stirred/sheared.

<sup>2</sup> After 1 day in a fog box.

Blistering Key: Size 1=Large, 9=Extremely Small; Density F=Few, M=Medium, D=Dense

‡ Note: The 183 g/L VOC quality flat paint formulation is based on Formulation W-200-5 (see formulation in this brochure) using Ti-Pure™ R-706, ROPAQUE™ Ultra opaque polymer, and American Zinc Oxide. The 50 g/L VOC quality flat paint formulation is based on Formulation W-400-1 (see formulation in this brochure).

**Exterior Durability  
Information**

RHOPLEX™ MULTILOBE™ 400 Emulsion Polymer is an APEO free version of RHOPLEX™ MULTILOBE™ 300 Emulsion Polymer. The earliest exterior exposures of prototypes of RHOPLEX MULTILOBE 300 emulsion polymer were initiated in February 2003. We have high confidence that RHOPLEX™ MULTILOBE™ 400 Emulsion Polymer will have a similar property balance to that of RHOPLEX™ MULTILOBE™ 200 Emulsion Polymer because it was developed from the technical approaches used in other successful exterior flat and satin products and prototypes.

**Formulation  
W-400-1**

A high-quality, 49% PVC/39% volume solids exterior flat architectural paint based on RHOPLEX MULTILOBE 400 Emulsion Polymer.

**Quality Exterior Flat Paint Based on RHOPLEX  
MULTILOBE 400 Emulsion Polymer**

Materials	Pounds	Gallons
Natrosol™ 250 MHR (2.5%)	100.0	11.86
TAMOL™ 850 (30.0%)	10.6	1.06
KTPP	1.5	0.07
Surfactant <sup>1)</sup>	2.5	0.29
Colloid™ 643	1.0	0.14
SKANE™ M-8	2.0	0.23
Ti-Pure R-706	175.0	5.24
Eagle Zinc 417W	25.0	0.53
Minex™ 4	170.0	7.80
Icecap™ K	50.0	2.28
Attigel™ 50	5.0	0.25
<b>Grind the above at high speed for 20 minutes; then let down with the following:</b>		
RHOPLEX MULTILOBE 400 (54.0%)	344.0	38.82
ROPAQUE Ultra (30.0%)	50.0	5.85
Colloid 643	3.0	0.42
Texanol	4.0	0.51
Propylene Glycol	11.3	1.30
Natrosol 250 MHR (2.5%)	83.1	9.86
Water	12.6	1.51
<b>Total</b>	<b>1,150.7</b>	<b>100.00</b>
<b>Properties</b>		
	<b>Typical Values</b>	
PVC, %	49.10	
Volume Solids, %	39.0	
Weight Solids, %	54.4	
pH	8.8–9.0	
Stormer Viscosity, equilibrated, KU	89.0	
ICI Viscosity, equilibrated, P	1.0	
VOC, gm/L	50.0	

1) Note: This formulation originally contained Triton CF-10. To date, we have also tested BYK-348 and have found no issues.

**Formulation  
W-200-5**

**Quality Exterior Flat Paint based on RHOPLEX  
MULTILOBE 200**

Materials	Pounds	Gallons
Natrosol™ 250 MHR (2.5%)	3.0	0.26
Ethylene Glycol	25.0	2.68
Water	120.0	14.40
TAMOL 850 (30%)	9.5	0.96
KTPP	1.5	0.07
Triton CF-10	2.5	0.28
Colloid 643	1.0	0.13
Propylene Glycol	34.0	3.93
Ti-Pure R-902	225.0	6.75
Zinc Oxide, AZO 66LP	25.0	0.53
Minex 4	150.0	6.91
Icecap	50.0	2.28
Attagel 50	5.0	0.25
<b>Grind the above at high speed for 20 minutes; then let down with the following:</b>		
RHOPLEX MULTILOBE 200 (53.5%)	345.0	38.88
Colloid 643	3.0	0.39
Texanol	9.2	1.16
SKANE M-8	2.0	0.23
Ammonia, 28%	0.2	0.03
Natrosol 250 MHR (2.5%)	94.0	11.28
Water	71.6	8.60
<b>Total</b>	<b>1,176.5</b>	<b>100.00</b>
<b>Properties</b>		
	<b>Typical Values</b>	
PVC, %	45.9	
Volume Solids, %	36.5	
Weight Solids, %	54.4	
pH	8.8–9.0	
Stormer Viscosity, equilibrated, KU	100.0	
ICI Viscosity, equilibrated, P	1.2	
VOC, gm/L	179.0	

Note: 1. For preservation, Dow recommends KATHON™ LX 1.5% microbicide. 2. This formulation passed heat-age (10 days @ 140°F) and extended low shear (10 days, roller) stability tests. However, the formulator should determine suitability with the particular raw materials to be used.

**Dow Additives for Use in Exterior Paints Based on RHOPLEX  
MULTILOBE 400 Emulsion Polymer**

Trade name	Product Type	Comments
ROPAQUE Ultra	Hiding Agent	Opaque polymer providing greater economic value than ROPAQUE OP-96.
SKANE M-8	Midewcide	A mildewcide that provides excellent resistance to mildew growth without the use of lead- or mercury-containing compounds and without causing discoloration, cracking, or chalking. Most effective when used in formulations containing zinc oxide.
TAMOL 850	Dispersant	A low-foaming dispersant that contributes significantly to the stability of architectural latex flat and satin paints containing zinc oxide. Effective across a wide pH range.

**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**

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. The Dow Chemical Company 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**

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.

**Customer Notice**

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

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