# AVANSE™ 200 Resin

Waterborne Acrylic Resin for Industrial Coatings

## Description

AVANSE™ 200 Resin is an aqueous acrylic emulsion polymer based on AVANSE Acrylic Resin Technology. It is an ambient temperature self-crosslinking polymer, and offers formulators a single resin which can be formulated into corrosion-resistant primers, highly durable topcoats, and high gloss direct-to-metal (DTM) finish coats. The novel technology behind the AVANSE Acrylic Resin product line leads to new standards in corrosion control, metal adhesion, film gloss, durability, and chemical and solvent resistance. One aspect of this technology is the formation of polymer-pigment composite particles, which results in a more homogeneous pigment distribution in the dry film, and coatings with better barrier properties, enhanced corrosion resistance and greater durability. The benefits of AVANSE Acrylic Resin Technology make AVANSE 200 Resin a great match for both factory and field applied finishes for metal, concrete and masonry substrates.

## Features and Benefits

- Excellent corrosion resistance
- Excellent water and blister resistance
- High gloss
- Excellent adhesion (especially to metal substrates, such as steel, galvanized steel or untreated aluminum)
- Excellent exterior durability
- Ambient self-crosslinking offers excellent chemical and solvent resistance
- APEO-free (made without the use of APEO surfactants)

## Typical Physical Properties

These properties are typical but do not constitute specifications.

| Property | Typical Values |
|---|---|
| Appearance | White milky liquid |
| Solids | 45.0 |
| pH | 9.0 |
| Viscosity (Brookfield, #3/30rpm) | <1000 cP |
| $T_g$ | 35°C |
| Density (lbs/gal) | 8.80 |

## Potential Applications

- Industrial Maintenance Finishes for steel and concrete
- Commercial Architectural Finishes for metal
- Institutional Coatings for concrete and masonry
- DIY Metal Coatings
- Basement Waterproofers
- General Industrial Finishes for metal
- Transportation Coatings (e.g., railcar, shipping containers)

## Mechanism and Benefits of AVANSE™ Resin Technology

The benefits observed with coatings based on AVANSE 200 Resin are partly due to its unique role in the film formation process. With a conventional acrylic latex polymer, the final paint film rarely displays an optimum distribution of pigment and extender particles throughout the film. Both in the wet state and as the film is drying, pigment and extender particles can aggregate together and form larger agglomerates. Keeping the pigment particles separated in the wet state is really the function of dispersants and surfactants, which adsorb to the pigment surface and provide both steric and electrostatic stabilization. Figure 1 shows how pigment agglomeration in a conventional acrylic coating can affect the structure of the final dry film, which will ultimately impact on film properties. Pigment-pigment interfaces of agglomerates can provide pathways for water and electrolytes to migrate through a film and reduce barrier properties, while bare pigment particles protruding from the film surface will affect surface roughness and gloss.

Poorly dispersed pigment leads to lower gloss and worse barrier properties than in an optimally dispersed system. AVANSE 200 Resin solves the problem of pigment distribution in the wet and dry states by actually forming latex-pigment composites, where the latex associates with the surface of the pigment particles. This phenomenon is depicted in Figure 2, which shows a SEM micrograph of titanium dioxide particles dispersed in AVANSE 200 Resin. The latex particles have adsorbed onto the pigment surface to form a composite particle. With a conventional acrylic binder, there is little to no association of the binder with the pigment surface. The formation of latex-pigment composites is not limited to titanium dioxide, but occurs with other mineral pigments as well, including typical extenders such as calcium carbonate, nepheline syenite, and silica, and color pigments such as iron oxides. The latex-pigment composites help to keep the pigment and extender particles separated in the wet paint and provide a more optimal distribution of pigment in the dry film, because the latex particles act as spacers between pigment particles.

Figure 1. Mechanism of film formation for a pigmented coating based on a conventional acrylic latex

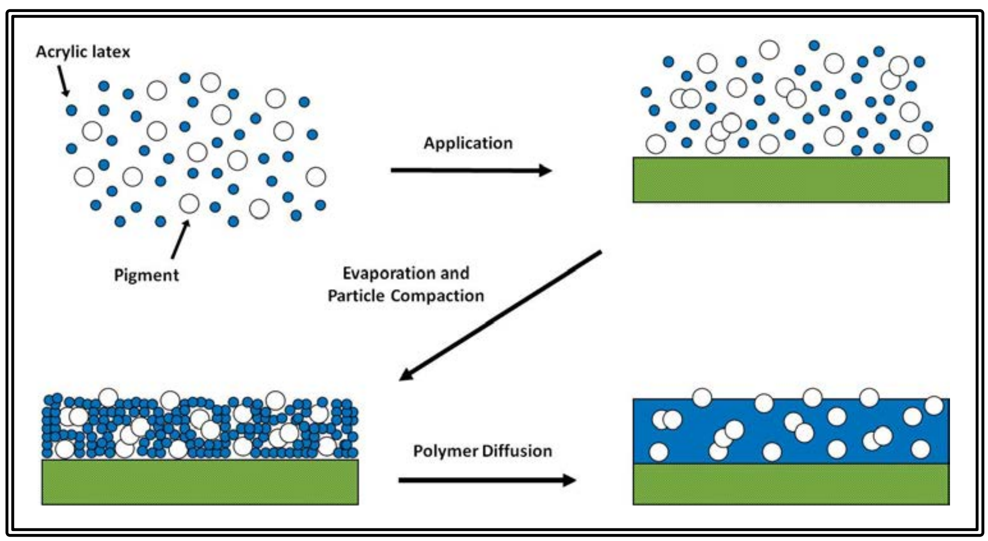
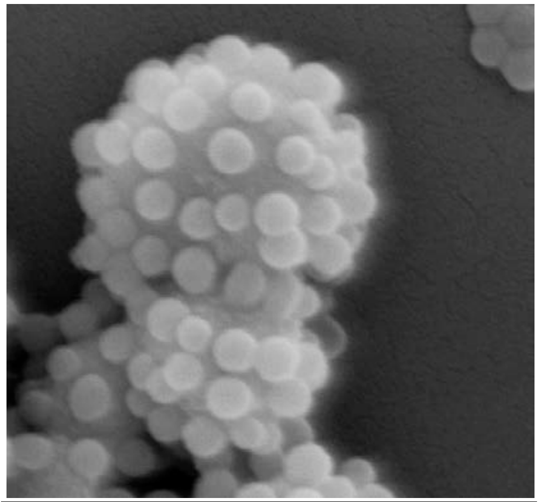


Figure 2. SEM micrograph (x100K) of a latex-pigment composite particle formed by AVANSE™ 200 Resin and titanium dioxide.



The effect of the AVANSE™ Resin Technology on the film formation process is shown in Figure 3. The composite particles form in the wet state, as the paint is being made. As the film dries, the adsorbed latex acts as a spacer to keep the pigment particles separated. The surface of the film is also rich in binder compared to the conventional acrylic because each pigment particle is already surrounded by a layer of latex. The result is higher gloss due to a smoother, binder rich surface, better hiding due to better spacing of the titanium dioxide, and improved barrier properties (e.g., corrosion resistance) due to fewer pigment-pigment interfaces. Improvements in exterior durability relative to conventional acrylics are also observed, and thought to be due to the improved dispersion of UV-absorbing pigments such as $TiO_2$ throughout the film. Better dispersion of such pigments in a matrix of AVANSE Resin will prevent UV light from penetrating deep into the film and directly degrading the polymer matrix via a photolytic process (Figure 4).

Figure 3. Mechanism of film formation for a pigmented coating based on an AVANSE Resin

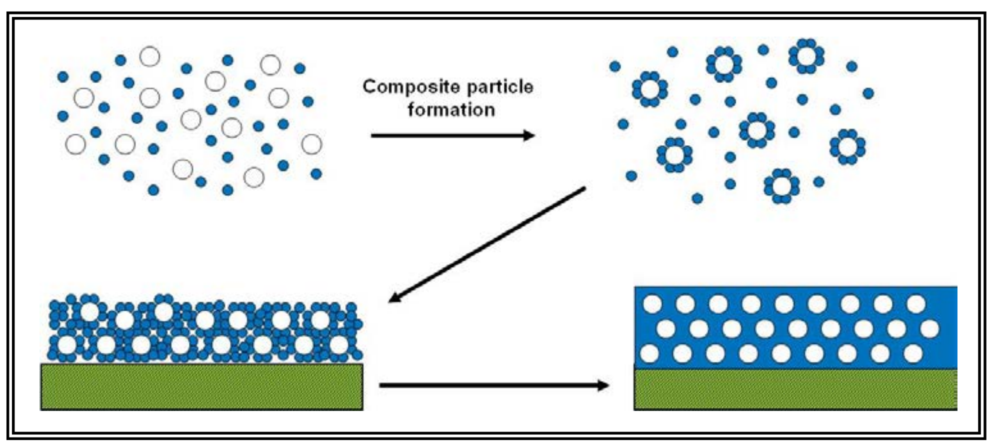
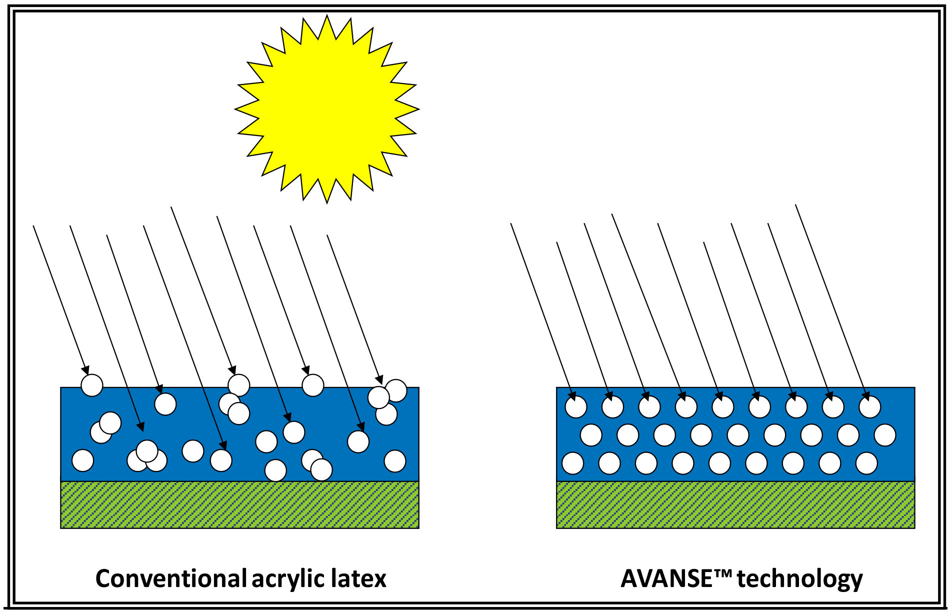


Figure 4. Proposed mechanism for improved UV light durability. Better dispersion of UV-absorbing pigments such as $TiO_2$ prevent UV light from penetrating deeply into the film.




Another key feature of AVANSE™ 200 Resin is its ability to self-crosslink at ambient temperatures and still maintain true one-package stability. The functional groups present in the resin crosslink via both oxidative and photolytic curing mechanisms. Formulations based on AVANSE 200 Resin will begin to crosslink after film formation, and may require about 2 to 4 weeks under laboratory conditions until some properties have reached their maximum performance level. Exposure to UV light will accelerate the crosslinking process. The crosslinked film provides improved dirt pickup resistance, chemical and solvent resistance, and further enhances durability.

## Performance Data

AVANSE 200 Resin has been evaluated in several types of coatings applications, including direct to metal (DTM) finish coats and anti-corrosive primers designed for metal surfaces, and concrete and masonry coatings such as basement waterproofers for below-grade interior concrete and block walls. The results described below demonstrate that AVANSE 200 Resin is a versatile binder and displays high performance in a variety of demanding applications.

The typical performance of AVANSE 200 Resin in a gloss white DTM finish is described in Table 1, where it is compared to a commercial styrene-acrylic DTM binder based on conventional acrylic technology. The conventional acrylic used in this study had a similar glass transition temperature of 35°C. Both binders were formulated into the same 16% PVC / 36% VS gloss white formula with 15% Texanol ester alcohol coalescent (% on polymer solids), to yield a calculated VOC of approximately 125 g/L (see Formulation 200-1). AVANSE 200 Resin shows the expected benefits of higher gloss potential, improved adhesion, and better gloss retention compared to the conventional binder.

In a gloss white formulation, 60° gloss values with AVANSE 200 Resin are typically in the range of 75 – 85 units, and will depend on formulation variables such as PVC and $TiO_2$

**Table 1.** Comparison of film properties for AVANSE™ 200 Resin and a conventional acrylic in a 16 PVC gloss white DTM formulation.

| | AVANSE 200™ Resin | Conventional Acrylic |
|---|---|---|
| PVC / VS | 16.0% / 36.4% | 16.0% / 36.5% |
| Stormer Viscosity (KU) | 97 | 91 |
| ICI Viscosity (poise) | 1.0 | 1.1 |
| pH | 9.4 | 8.9 |
| | | |
| Film Properties: | | |
| Gloss (20°/60°) | 50 / 75 | 29 / 66 |
| Konig hardness (2 week) | 26.6 sec | 31.1 sec |
| Pencil hardness (2 week) | HB | HB |
| Block resistance[1] | | |
| *1 day dry* | | |
| 24 hr at RT | 3 | 4 |
| 30 min at 60°C | 5 | 3 |
| *7 day dry* | | |
| 24 hr at RT | 7 | 8 |
| 30 min at 60°C | 6 | 8 |
| Adhesion (dry / wet, ASTM D3359) | | |
| Cold rolled steel | 5B / 2B | 5B / 0B |
| Galvanized steel | 5B / 5B | 5B / 0B |
| Untreated aluminum | 5B / 5B | 5B / 0B |
| Scrub resistance (ASTM D2486) | 740 | 410 |
| Gloss retention (60° gloss on UV-A exposure)[2] | | |
| Initial | 76 | 70 |
| 2 week | 73 (96%) | 52 (74%) |
| 4 week | 67 (88%) | 43 (61%) |
| | | |
| Stain removal (% removal) | | |
| Pencil | 65 | 30 |
| Blue Pen | 50 | 25 |
| Red China marker | 95 | 95 |
| Red lipstick | 85 | 100 |
| Purple crayon | 95 | 95 |
| Coffee | 100 | 100 |
| Tea | 95 | 100 |
| Grape Juice | 90 | 100 |
| Mustard | 80 | 95 |

**Notes**: 1) Block resistance rated on a 1 to 10 scale, 10 = best. Coatings were dried for either 1 or 7 days before being subjected to the room temperature or 60°C block test. 2) Weathering cycle consisted of 4 hrs UV light at 60°C and 4 hrs condensation at 50°C.

grade. However, compared to a conventional latex, gloss potential is higher due to the smoother surface resulting from the presence of the pigment-polymer composites, as described in Figure 3. The higher gloss potential is achieved without the need to lower molecular weight, a tactic often used to increase gloss but one which has a negative effect on aesthetic durability and chemical resistance. As shown in Table 1, gloss retention of AVANSE™ 200 Resin is excellent in accelerated UV-A weathering. Gloss retention of a similar 15 PVC gloss white DTM formulation is compared in Figure 5 to two commercial DTM coatings. The commercial DTM coatings are based on conventional acrylic technology, with one based on a self-crosslinking acrylic resin. The AVANSE 200 formulation performs much better than the commercial DTM coatings out to 1500 hrs UV-A exposure. As expected, the conventional self-crosslinking DTM performed better than the technology without crosslinking, but it was still not the equal of AVANSE 200. AVANSE 200 has the advantage of both a more optimal dispersion of the $TiO_2$ (Figure 4) and self-crosslinking to aid in improved durability. Results of exterior exposure corroborate the excellent durability of AVANSE 200. Figure 6 compares AVANSE 200 in an 18 PVC gloss white DTM to a conventional acrylic in the same formulation, as well as a commercial two-component solventborne polyurethane. After two years of south 45° exposure at a site in eastern Pennsylvania, the coating based on AVANSE 200 is outperforming even the two-component polyurethane, which is recommended for high performance industrial maintenance applications.

The excellent corrosion resistance of AVANSE 200 is demonstrated in Figures 7 and 8. Figure 7 shows panels after salt spray exposure (ASTM B117) of 192 and 504 hrs, coated with 16 PVC gloss white DTMs based on AVANSE 200 and a conventional acrylic DTM binder in Formulation 200-1. Even without corrosion inhibiting pigments, AVANSE 200 performed very well over smooth cold rolled steel after 500 hrs exposure. Figure 8 shows results of 336 hr salt spray testing for 9 PVC gloss yellow DTMs (Formulation 200-3) based on AVANSE 200 and another conventional acrylic DTM binder. In this case, the films were applied at 3 mils DFT over blasted hot rolled steel, and again the performance of AVANSE 200 was exceptional. Compared to conventional acrylics, the improved corrosion resistance

Figure 5. Gloss retention of gloss white coatings in accelerated UV weathering (UV-A bulbs), comparing AVANSE™ 200 in a 15 PVC gloss white DTM with commercial acrylic DTM coatings.

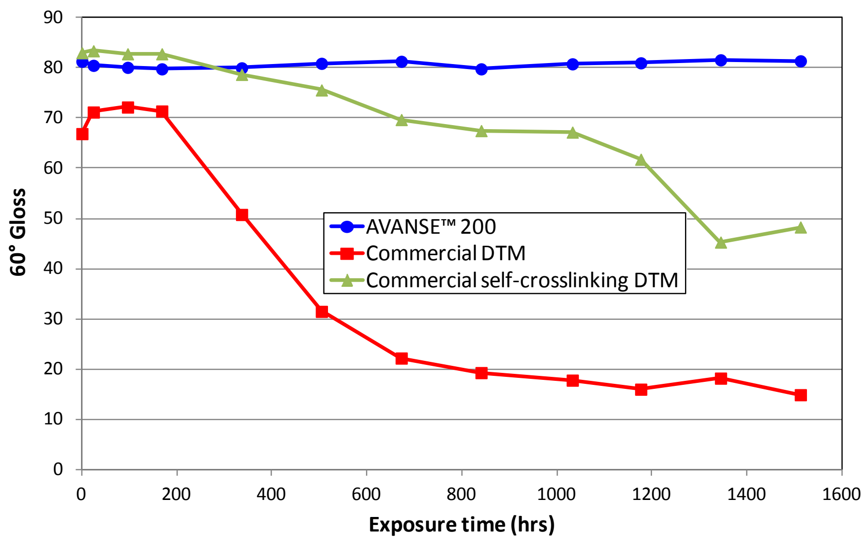


Figure 6. Gloss retention of gloss white coatings on exterior exposure (south 45°) at an eastern Pennsylvania site.

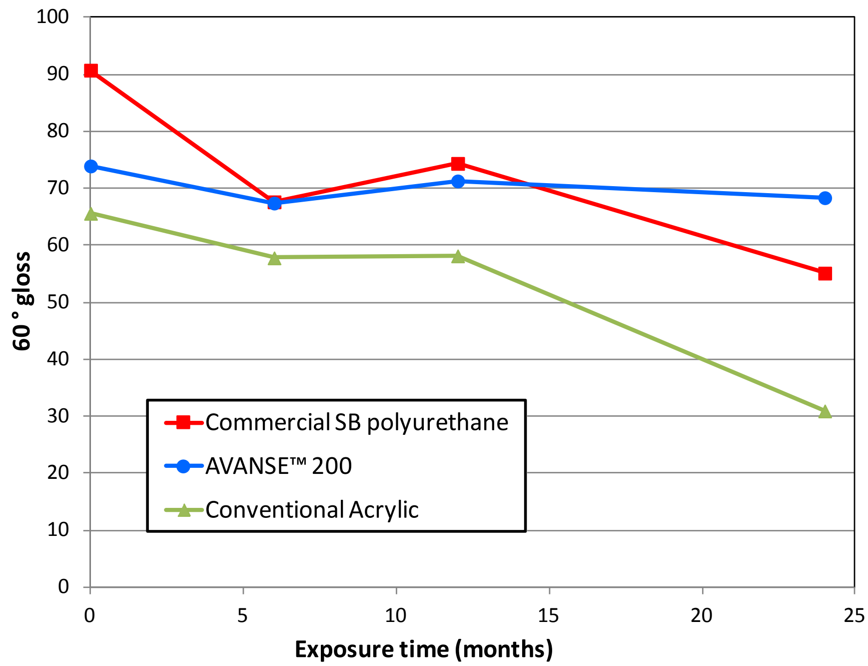
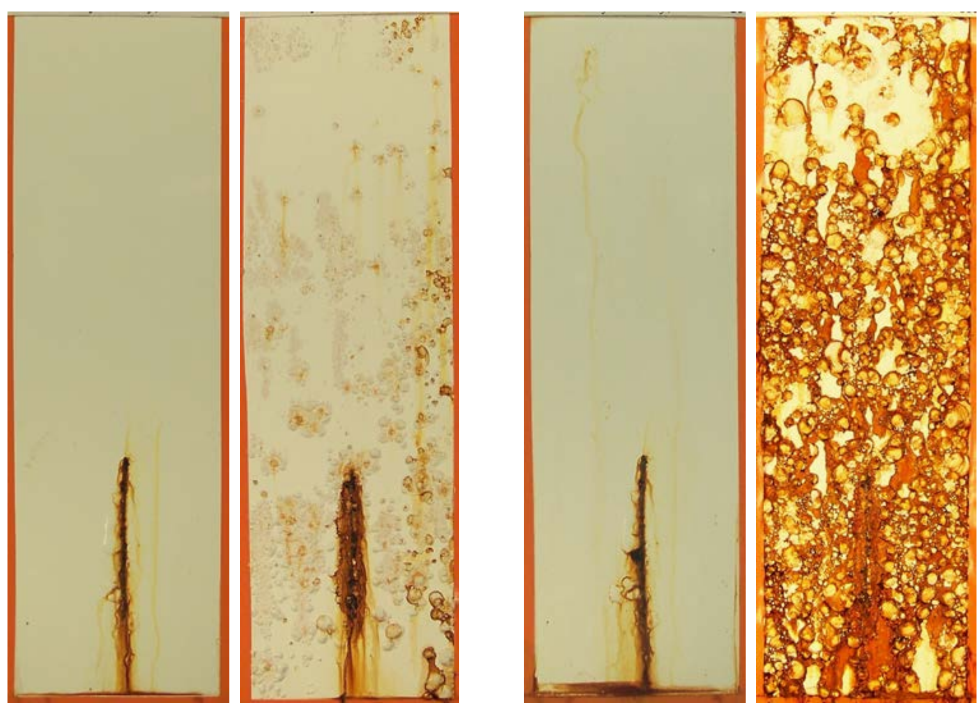



Figure 7. Salt spray resistance at 192 and 504 hrs exposure for 16 PVC gloss white DTM formulations applied at 2.2 mils DFT on cold rolled steel.

192 hrs | 504 hrs



AVANSE™ 200 Resin | Conventional acrylic | AVANSE 200 Resin | Conventional acrylic

**Figure 8.** Salt spray resistance at 336 hrs exposure for 9 PVC gloss yellow DTM formulations applied at 3.0 mils DFT on blasted hot rolled steel.

AVANSE™ 200 Resin Conventional acrylic

of AVANSE™ Resins is due in part to the better dispersion of pigments in the dry film which provides a film with better barrier properties, and likely also due in part to better adhesion over metal. The adhesion of AVANSE 200 is described in Table 1, which shows a key benefit of the technology over difficult substrates such as galvanized steel and untreated aluminum.

In addition to its excellent performance over metal, AVANSE 200 has been shown to be very suitable for use over concrete and masonry substrates. Due to its hydrophobic composition and small particle size, it displays very good water resistance. It has been evaluated in a 46 PVC masonry waterproofer formulation (Formulation 200-5) and compared to a commercial acrylic waterproofer for resistance to hydrostatic pressure (ASTM D7088) on concrete blocks. Results of this study are detailed in Table 2. The commercial waterproofer failed at 4 psi, whereas the coating based on AVANSE 200 passed at 10 psi. Formulation 200-5 is designed for use in masonry and concrete applications, including below-grade interior basement waterproofers

## Formulating Guidelines

### General Considerations when formulating with AVANSE Resins

Formulations containing AVANSE Resins can generally be prepared using similar techniques as with conventional acrylics. However, because the latex particles have an affinity for and adsorb to inorganic pigment surfaces, there are some procedures that should be followed to avoid possible stability problems and formation of grit or gel during manufacture. In general, slow addition of the pigment dispersion to the latex should be done during the letdown in order to avoid high concentrations of “bare” pigment. This procedure helps avoid bridging of pigment particles by adsorbing latex, which could result in

Table 2. Film properties of AVANSE™ 200 Resin in a below grade masonry waterproofer formulation, and comparison with a commercial waterborne acrylic waterproofer.

| | AVANSE™ 200 Resin | Commercial Waterproofer |
|---|---|---|
| PVC / VS | 46.4% / 40.1% | unknown |
| Stormer Viscosity (KU) | 132 | 137 |
| pH | 8.8 | 8.5 |
| | | |
| Film Properties: | | |
| Gloss (60°/85°) | 3.6 / 0.7 | 2.3 / 0.2 |
| Resistance to Hydrostatic Pressure (ASTM D7088) | | |
| 4 psi | Pass | Fail |
| 10 psi | Pass | Not tested |

viscosity instability and grit, and leads to more optimal formation of the composite particles. Good agitation is also essential during the letdown procedure to avoid areas of high pigment concentration and "dead zones" within a tank where material undergoes poor mixing. Tank and mixing blade configuration can also contribute to poor mixing, and should be considered before moving to full scale manufacturing. Dilution of the pigment dispersion with free water or co-solvent before addition can also aid in lowering the localized pigment concentration. Because composite particle formation can take varying amounts of time depending on formulation ingredients, it is recommended that pigmented coatings are mixed for approximately 30 to 60 minutes after the final ingredients have been added.

AVANSE™ 200 Resin can be formulated with common additives available for waterborne coatings. However, because of the crosslinking technology used in this emulsion, additives that contain or release formaldehyde are not recommended in combination with AVANSE 200. In addition, application of coatings based on AVANSE 200 should not be made to substrates that release formaldehyde. The use of such materials or substrates may cause slight yellowing of the film and potential degradation of film properties.

## Coalescents

Depending on drying conditions and application methods, the proper selection of a coalescent package is critical to obtaining optimum properties for coatings based on AVANSE 200. Texanol ester alcohol at approximately 15% on polymer solids is a good starting point for coalescent choice. Optifilm 400 Film Enhancer can be utilized as a non-volatile coalescent in order to lower VOC. Faster coalescents such as DOWANOL™ DPM Glycol Ether and Butyl CELLOSOLVE™ Glycol Ether can be used to provide faster hardness development, but are less efficient at lowering MFFT compared to Texanol. Care should be taken in adding coalescents to the letdown to avoid shocking the latex. Add coalescents slowly to avoid the formation of grit or gel, particularly when at lower pH values. Dilution of water-miscible coalescents and inclusion of coalescents in the pigment dispersion are two methods that can also be used to avoid grit formation.

## Dispersants

Because AVANSE 200 resin interacts closely with the pigment and extender particles, the choice of pigment dispersant is critical. Copolymer dispersants such as TAMOL™ 165A and TAMOL 681, or the low VOC alternative TAMOL 2002, at 1 to 2% solids on pigment solids are recommended as starting points. Surfynol CT-111 has also been used successfully as a co-dispersant. In general, polyacrylic acid and polymethacrylic acid dispersants are not good choices, as they can reduce corrosion resistance, as well as inhibit composite particle formation. High levels of dispersant should also be avoided, as that can also inhibit composite particle formation, as well as increase water sensitivity and lower corrosion resistance.

### Titanium Dioxide

Both dry and slurry grades of titanium dioxide have been used successfully with AVANSE™ 200 Resin. Highly durable grades such as Ti-Pure R-706 and Ti-Pure R-746 are recommended for best gloss and exterior durability in topcoats and DTMs. For white and grey primers, a less durable grade such as Ti-Pure R-900 can be used. AVANSE 200 Resin will interact in a slightly different manner depending on $TiO_2$ grade and surface chemistry, so laboratory testing should be carried out to ensure good stability and performance.

### Other Pigments and Extenders

AVANSE 200 Resin will interact and form composite particles with a variety of common inorganic pigments and extenders, such as iron oxides, calcium carbonates, silicas, talcs, and nepheline syenite. When formulating with AVANSE 200, one needs to take into account the total amount of pigment surface area onto which the latex could adsorb. If there is not enough latex to cover all available pigment surfaces, bridging between pigment particles could occur, and result in viscosity instability and grit. Extender pigments tend to have large particle size and low surface areas compared to color pigments such as $TiO_2$, so instability is not common except at high PVC levels. In general, stability should be monitored when developing formulations at PVC levels above approximately 35 – 40%.

### Defoamers

Foam is a major concern in waterborne coating formulation design. Defoamers are needed to eliminate foam during manufacture and film application. Suitable defoamers for AVANSE 200 include Tego Foamex 1488, Drewplus L-493, BYK-022 and Foamaster 111. Tego Airex 902W at 0.5 – 1.0% by weight as supplied on total formulation has been found to assist in reduction of microfoam during spray application.

### Wetting and Mar Aids

The addition of a wetting surfactant such as Surfynol 104DPM or TRITON™ CF-10 provides good surface wetting and reduces the tendency for formulations based on AVANSE 200 Resin to crater or picture frame. The addition of BYK 333 and Tego Glide 410 offer excellent mar and slip resistance at levels of approximately 0.5–1% on polymer solids.

### Viscosity Control

Nonionic HEUR rheology modifiers, such as ACRYSOL™ RM-8W, ACRYSOL RM-12W and ACRYSOL RM-2020NPR Rheology Modifiers are key to formulating a high quality, corrosion-resistant coating. The use of cellulosics or alkali-soluble thickeners can significantly degrade corrosion resistance when formulating waterborne coatings for metal substrates. The expected method of application is an important parameter to consider when selecting rheology control agents. Brushing formulations require higher viscosity under high shear conditions for the best brush drag and film build, and suitable rheology modifiers include ACRYSOL RM-5000 and ACRYSOL RM-2020NPR. To increase the Stormer viscosity of a coating, ACRYSOL RM-8W, ACRYSOL RM-825 and ACRYSOL SCT-275 are efficient thickeners. Low shear viscosity, which affects sag resistance, can be increased using ACRYSOL RM-12W or ACRYSOL RM-995. Often a coating is used with various application methods such as airless spray and brush. Having a coating that provides optimum rheology for both brush and spray application can be difficult, and having a rheology profile of approximately 90 KU / 1.0 poise is a starting point for a compromise of low shear and high shear viscosity. To attain this rheology, it may be necessary to utilize more than one of the above thickeners.

### Flash Rust Inhibitors

In waterborne coatings designed for steel substrates, the aqueous phase should contain flash rust inhibitors to prevent the rapid rusting (flash rust) that can occur as the coating is drying. The recommended additive is sodium nitrite ($NaNO_2$), which is effective at low use levels of 1 to 2 lbs/ 100 gallons. Addition in a diluted form (15% aqueous solution) is recommended to prevent stability problems and grit formation. Commercial flash rust inhibitors are also available, such as Halox Flash-X 150, Halox 570 or Raybo 60, and are also suitable for use with AVANSE™ 200.

### Anti-corrosive Pigments

Anti-corrosive pigments, also known as reactive or inhibitive pigments, are often used in primer formulations to improve corrosion resistance. The level and type of these pigments can have a strong effect on paint stability due to their partial solubility and the presence of multivalent ions such as $Zn^{+2}$, so these pigments should be thoroughly evaluated for compatibility. Halox SZP-391 and Heucophos ZCPP have been successfully used with AVANSE 200 at levels of approximately 50 lbs/ 100 gallons. Lower levels of anti-corrosive pigments are sometimes used in DTM finishes, but can have a negative impact on gloss levels due to the particle size of the inhibitive pigment.

## Starting Point Formulation 200-1

### Gloss white DTM finish based on AVANSE™ 200 Resin

| Material Name | Pounds | Gallons |
|---|---|---|
| Grind | | |
| Water | 50.00 | 5.98 |
| Ammonia (28%) | 1.00 | 0.13 |
| TAMOL™ 681 Dispersant | 8.36 | 0.92 |
| TRITON™ CF-10 Surfactant | 1.50 | 0.17 |
| Tego Foamex 1488 defoamer | 1.00 | 0.12 |
| Ti-Pure R-706 titanium dioxide | 195.00 | 5.84 |
| Grind Subtotal | 256.86 | 13.17 |
| Letdown | | |
| AVANSE™ 200 | 641.00 | 72.84 |
| Water | 43.50 | 5.20 |
| Ammonia (15%) | 4.00 | 0.51 |
| *Add grind from above with good agitation* | | |
| Texanol ester alcohol | 43.27 | 5.46 |
| Tego Foamex 1488 defoamer | 1.00 | 0.12 |
| Sodium nitrite (15%) | 9.00 | 0.99 |
| ACRYSOL™ RM-5000 Rheology Modifier | 15.00 | 1.72 |
| Totals | 1013.62 | 100.00 |
| | | |
| Levels without Additives: | Volume Solids: | 36.4% |
| | Weight Solids: | 47.7% |
| | PVC: | 16.0% |
| | Density (lb/gal): | 10.1 |
| | VOC (g/L): | 126 |
| | | |
| Levels with Additives: | Volume Solids: | 37.3% |
| | Weight Solids: | 48.6% |

## Starting Point Formulation 200-2

### Gloss white DTM finish based on AVANSE™ 200 Resin

| Material Name | Pounds | Gallons |
|---|---|---|
| Grind | | |
| Water | 50.08 | 6.00 |
| Ammonia (28%) | 2.00 | 0.27 |
| TAMOL™ 2002 Dispersant | 7.15 | 0.81 |
| Surfynol CT-111 surfactant | 2.00 | 0.25 |
| BYK-022 defoamer | 1.00 | 0.12 |
| Colortrend 888-9907B lampblack colorant | 0.30 | 0.03 |
| Ti-Pure R-706 titanium dioxide | 200.00 | 5.99 |
| Grind Subtotal | 262.54 | 13.46 |
| Letdown | | |
| AVANSE™ 200 | 578.00 | 65.68 |
| Water | 112.84 | 13.52 |
| *Add grind from above with good agitation* | | |
| Texanol ester alcohol | 39.00 | 4.92 |
| Sodium nitrite (15%) | 9.00 | 0.99 |
| ACRYSOL™ RM-2020NPR Rheology Modifier | 12.00 | 1.43 |
| Totals | 1013.38 | 100.00 |
| | | |
| Levels without Additives: | Volume Solids: | 33.6% |
| | Weight Solids: | 45.4% |
| | PVC: | 17.9% |
| | Density (lb/gal): | 10.1 |
| | VOC (g/L): | 118 |
| | | |
| Levels with Additives: | Volume Solids: | 34.6% |
| | Weight Solids: | 46.4% |

## Starting Point Formulation 200-3

## Gloss yellow DTM finish based on AVANSE™ 200 Resin

| Material Name | Pounds | Gallons |
|---|---|---|
| Grind | | |
| Water | 31.06 | 3.72 |
| DOWANOL™ DPM Glycol Ether | 20.04 | 2.52 |
| Ammonia (28%) | 1.00 | 0.13 |
| TAMOL™ 681 Dispersant | 6.01 | 0.66 |
| TRITON™ CF-10 Surfactant | 2.00 | 0.23 |
| BYK-022 defoamer | 2.00 | 0.24 |
| Bayferrox 1420M yellow iron oxide | 61.61 | 1.76 |
| Ti-Pure R-706 titanium dioxide | 51.59 | 1.55 |
| Grind Subtotal | 175.32 | 10.81 |
| Letdown | | |
| AVANSE™ 200 | 701.67 | 79.73 |
| Ammonia (15%) | 2.51 | 0.32 |
| *Add grind from above with good agitation* | | |
| BYK-024 | 2.00 | 0.24 |
| Tego Airex 902W | 5.01 | 0.59 |
| Texanol ester alcohol | 31.57 | 3.98 |
| Butyl CARBITOL™ Glycol Ether | 15.79 | 1.98 |
| Sodium nitrite (15%) | 10.02 | 1.10 |
| Ammonia (15%) | 0.84 | 0.11 |
| Water | 4.51 | 0.54 |
| ACRYSOL™ RM-12W Rheology Modifier | 4.27 | 0.49 |
| ACRYSOL RM-8W | 0.89 | 0.10 |
| Totals | 954.39 | 100.00 |
| | | |
| Levels without Additives: | Volume Solids: | 36.8% |
| | Weight Solids: | 45.0% |
| | PVC: | 9.0% |
| | Density (lb/gal): | 9.5 |
| | VOC (g/L): | 177 |
| | | |
| Levels with Additives: | Volume Solids: | 38.0% |
| | Weight Solids: | 46.2% |

## Starting Point Formulation 200-4

### Light grey anti-corrosive primer based on AVANSE™ 200 Resin

| Material Name | Pounds | Gallons |
|---|---|---|
| Grind | | |
| Water | 136.52 | 16.36 |
| Methyl CARBITOL™ Glycol Ether | 22.42 | 2.63 |
| TAMOL™ 165A Dispersant | 25.34 | 2.87 |
| Surfynol 104DPM surfactant | 2.01 | 0.24 |
| Tego Foamex 1488 defoamer | 0.48 | 0.06 |
| Ammonia (28%) | 0.98 | 0.13 |
| Ti-Pure R-900 titanium dioxide | 58.51 | 1.75 |
| Imsil A-10 silica | 78.01 | 3.53 |
| Talcron MP30-36 talc | 78.01 | 3.44 |
| Halox SZP-391 | 48.76 | 1.94 |
| ACRYSOL™ RM-5000 Rheology Modifier | 2.77 | 0.32 |
| Cab-O-Sil M-5 fumed silica | 2.35 | 0.13 |
| Grind Subtotal | 456.17 | 33.39 |
| Letdown | | |
| AVANSE™ 200 | 514.86 | 58.51 |
| Tego Foamex 1488 defoamer | 0.48 | 0.06 |
| *Add grind from above with good agitation* | | |
| Texanol ester alcohol | 41.81 | 5.27 |
| Water | 9.64 | 1.16 |
| Sodium nitrite (15%) | 9.04 | 1.00 |
| UCD 1625E lampblack colorant | 1.00 | 0.10 |
| ACRYSOL™ RM-8W | 2.25 | 0.26 |
| ACRYSOL RM-5000 | 2.29 | 0.26 |
| Totals | 1037.55 | 100.00 |
| | | |
| Levels without Additives: | Volume Solids: | 35.4% |
| | Weight Solids: | 48.0% |
| | PVC: | 30.6% |
| | Density (lb/gal): | 10.4 |
| | VOC (g/L): | 176 |
| | | |
| Levels with Additives: | Volume Solids: | 36.2% |
| | Weight Solids: | 48.9% |

## Starting Point Formulation 200-5

### Below Grade Masonry Waterproofer based on AVANSE™ 200 Resin

| Material Name | Pounds | Gallons |
|---|---|---|
| Grind | | |
| Water | 166.67 | 19.97 |
| Ethylene glycol | 10.00 | 1.07 |
| Natrosol 250 MHR | 2.00 | 0.18 |
| TAMOL™ 681 Dispersant | 12.00 | 1.32 |
| Foamaster 111 defoamer | 1.00 | |
| TRITON™ CF-10 Surfactant | 2.00 | 0.23 |
| Ti-Pure R-931 titanium dioxide | 50.00 | 1.65 |
| Minex 4 extender | 150.00 | 6.89 |
| Mistron 353 talc | 50.00 | 2.15 |
| Sand | 175.00 | 7.91 |
| Grind Subtotal | 618.67 | |
| Letdown | | |
| AVANSE™ 200 | 450.00 | 51.14 |
| Optifilm 400 Film Enhancer | 6.07 | 0.75 |
| *Add grind from above with good agitation* | | |
| Texanol ester alcohol | 24.30 | 3.06 |
| Foamaster 111 defoamer | 2.00 | |
| Ammonia (28%) | 1.10 | 0.15 |
| ACRYSOL™ RM-5000 Rheology Modifier | 12.00 | 1.38 |
| Water | 14.66 | 1.76 |
| Totals | 1128.80 | |
| | | |
| Levels without Additives: | Volume Solids: | 40.1% |
| | Weight Solids: | 55.6% |
| | PVC: | 46.4% |
| | Density (lb/gal): | 11.3 |
| | VOC (g/L): | 96 |
| | | |
| Levels with Additives: | Volume Solids: | 42.2% |
| | Weight Solids: | 57.3% |

## 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 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 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 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.

## 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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