FASTRACK™ 3427 Polymer Emulsion for Waterborne Traffic Marking Paints

Regional Product Availability

- North America

Description

FASTRACK 3427 Polymer Emulsion is a second generation all-acrylic emulsion for fast-dry waterborne traffic marking paints with improved durability. Traffic marking paints based on FASTRACK 3427 Polymer Emulsion feature fast dry over a broad range of application conditions and excellent durability in terms of retention of glass beads for night visibility and wear properties over asphalt, concrete and old markings.

Advantages

Features and Benefits of Traffic Paints Based on FASTRACK 3427

- Improved Durability–Superior wear properties over various bituminous and concrete road surfaces
- Fast Dry–Fast dry-to-no-pickup and resistance to early rain showers under a wide range of climatic conditions
- Enhanced Retention of Glass Beads–Excellent long-term night visibility
- Environmentally Friendly–V.O.C.s as low as 80 grams/liter
- User Friendly–Non-flammable, water clean-up, reduced disposal costs, increased worker safety
- Performance Advantages

Properties

Typical Properties

(These properties are typical but do not constitute specifications).	
Density Dry (g/ml)	1.13
Class	ACRYLIC
Solids (%)	50–51
Density Dry (lb/gal)	9.43
Density Wet (g/ml)	1.05
Density Wet (lb/gal)	8.76
Part Size (Micron)	0.20
pH	10–10.5
Tg	28.0
Viscosity (cps)	<500

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Performance Advantages

Conventional waterborne films that exhibit enough surface dry to prevent the paint from being “picked-up” and tracked onto the road by traffic, may not be dry under the surface film. Waterborne traffic paints need to reach a surface dry and "dry-through" stage before they begin to withstand an early rain shower.

Drying Performance

FASTRACK™ 3427 Polymer Emulsion and its predecessor FASTRACK 2706, will dry faster to "no pick-up" and "drythrough" than conventional waterborne polymers. The faster dry is particularly evident when the drying conditions are poor (high humidities, and low air flow and temperatures). Furthermore, fast "dry-through" characteristics of waterborne traffic markings based on FASTRACK 3427 will make them much more resistant to damage from an early rain shower than those based on conventional waterborne polymers.

Dry-to-no Pick-up Time

A white paint based on FASTRACK 3427 Polymer Emulsion was compared to a commercial solventborne traffic paint on the road for Auto-No-Track Time as specified in ASTM Method D-713. The paints were applied to a 15 mil wet thickness and glass beads were dropped onto the paint at a rate of 6 lbs. per gallon for a 4-in. wide line (275 grams/sq.m. of paint). The humidity was high (84% relative humidity) and there was only a slight breeze (2–4 mph). After only 35 seconds, a car passing over the waterborne marking based on FASTRACK™ 3427 did not track paint on the road. Tracking was evident after 45 seconds with the fast-dry solventborne paint.

Dry-to-no Pick-up Road/Vehicle Test	
Road Temperature	60°F (16°C)
Relative Humdity	84%
Air Speed	2–4 mph (3–6 km/hr)
Wet Film Thickness	15 mils (375 microns)
Waterborne Acrylic FASTRACK™ 3427	**Commercial Solventborne**
No tracking after 35 seconds	Tracked for 60 feet after 45 seconds

Durability

The service life of traffic markings also depends on the marking having good wear properties. In road tests using transverse test lines to accelerate wear, waterborne markings based on FASTRACK 3427 Polymer Emulsion have shown excellent durability over both asphalt and concrete road surfaces in a variety of climates. FASTRACK 3427 has improved wear characteristics compared to FASTRACK 2706.

Glass Bead Retention

The visibility of traffic markings at night requires retention of the glass beads applied to that marking. Night visibility can be monitored with a retroreflectometer that measures the low angle reflectance of light off the beaded marking.

The following data compare the loss of retroreflectivity of white waterborne traffic markings based on FASTRACK™ 3427 with commercial solventborne markings based on alkyd resins (with and without chlorinated resin modification). Note that the waterborne fast-dry markings based on FASTRACK 3427 Polymer Emulsion retain their retroreflectance (hold onto reflective glass beads) considerably longer than the commercial solventborne traffic markings. FASTRACK 3427 also shows improved bead retention over its predecessor, FASTRACK 2706.

Table 1: Retroreflectance Retention of Traffic Markings based on FASTRACK™ 3427 vs. Solventborne Alkyds

Retroreflectance in Millicandelas / m^2 / lux with Mirolux 12	3 Months	15 Months	26 Months
Transverse Lines on a 6,000 ADT (average daily traffic) asphalt road:			
FASTRACK 3427	240	190	170
Solventborne Fast Dry Alkyd	280	110	70
		7 Months	**16 Months**
Transverse Lines on a 20,000 ADT concrete road:			
FASTRACK 3427		301	211
Solventborne Chlorinated Polyolefin Modified Alkyd		189	148
		12 Months	**27 Months**
Skip Lines on a 20,000 ADT asphalt road:			
FASTRACK 3427		267	167
Solventborne Fast Dry Alkyd		155	100

Formulating and Manufacturing Paints with FASTRACK™ 3427

Formulating and manufacturing principles associated with FASTRACK 3427 Polymer Emulsion are generally the same as with FASTRACK 2706. The fast drying characteristics of FASTRACK 3427 require careful consideration when formulating to ensure delivery of maximum benefits from the technology.

Paint Manufacture

In contrast to the manufacture of conventional latex paints, there is no grinding or high-speed dispersion operation in the manufacture of traffic paints. What is typically required is a low speed, low shear operation with a slight vortex. This procedure is necessary to avoid excessive heat build-up in the paint during the mixing stage, which otherwise may result in skinning of the paint due to the heat and loss of ammonia. Due to the nature of the application and the high applied film thickness, the pigment and extender dispersion fineness does not need to be above 3 on the Hegman gauge (i.e., below 60-70 microns).

Other Considerations

- Maintain the paint pH at not less than 9.8. This should be checked at the end of the "grind" stage and again at the end of manufacture.
- Add the alcohol before the Texanol into the vortex and mix thoroughly. Do not pre-mix the alcohol and Texanol.
- Add the Texanol slowly into the vortex to avoid polymer flocculation. Pre-emulsification of the Texanol (separately under higher shear) may be beneficial to ensure homogeneous incorporation.

Formulation: Volume Solids

It is important to formulate fast-dry waterborne traffic paints at maximum volume solids, within the constraints of viscosity and stability, in order to minimize the dry-to-no pick-up time. Starting point formulations for white and yellow paints follow.

Fast-Dry White Traffic Paint Formulation TP-27-1

Materials	Pounds	Gallons	Notes
Order of Addition:			1
FASTRACK™ 3427	455.5	51.46	
TAMOL™ 901 (30%)	5.0	0.47	2
Surfynol CT-136	2.8	0.32	
Drew L-493	3.0	0.42	
Ti-Pure R-900	100.0	2.92	
Omyacarb-5	760.6	33.69	
Mix the above at a sufficient speed to pull a slight vortex (about 1000 to 1500 rpm) for about 15 minutes, then add:			
Methanol	30.0	4.50	
Texanol	22.7	2.86	3
Drew L-493	2.5	0.35	
Natrosol 250HR (2%) aqueous	12.0	1.44	4
Water	13.3	1.57	
TOTALS	**1407.4**	**100.00**	
Initial KU/pH	79/9.8		
Equilibriated KU/pH	84/9.8		
By Volume			
% PVC	60.0		
% Volume Solids	61.0		
By Weight			
% Total Solids	77.5		
% Pigment Solids	61.1		
% Non-Volatile Vehicle	42.0		
VOC (grams/liter)	84		
Density (lbs/gallon)	14.1		

Formulation Notes:

1) Materials should be added in this order of addition.
2) Tamol 901 is the preferred dispersant for optimum dry.
3) Texanol should be added slowly into a good vortex to avoid polymer flocculation.
4) The use of more efficient non-ionic associative thickeners like ACRYSOL™ RM-825 products will allow for more water in this formulation.

Fast-Dry Yellow Traffic Paint Formulation TP-27-2

Materials	Pounds	Gallons	Notes
Order of Addition:			1
FASTRACK™ 3427	455.5	51.46	
TAMOL™ 901 (30%)	7.0	0.66	2
Surfynol CT-136	2.8	0.32	3
Drew L-493	3.0	0.42	
Ti-Pure R-900	20.0	0.58	
Omyacarb-5	750.0	33.25	
Organic Yellow	32.0	2.70	4
Mix the above at a sufficient speed to pull a slight vortex (about 1000 to 1500 rpm) for about 15 minutes, then add:			
Methanol	30.0	4.50	
Texanol	22.7	2.86	5
Drew L-493	2.5	0.35	
Water/Thickener	24.4	2.90	6
TOTALS	**1349.9**	**100.00**	
Initial KU/pH	78/9.8		
Equilibriated KU/pH	84/9.8		
By Volume			
% PVC	60.0		
% Volume Solids	60.9		
By Weight			
% Total Solids	76.5		
% Pigment Solids	59.4		
% Non-Volatile Vehicle	42.0		
VOC (grams/liter)	84		
Density (lbs/gallon)	13.5		

Formulation Notes:

1) Materials should be added in this order of addition.
2) Tamol 901 is the preferred dispersant for optimum dry.
3) Surfynol CT-136 is the preferred wetting aid for organic yellow formulations.
4) Organic "Hansa" Yellows should be Yellow 75 or Yellow 65 (redder shade) easy dispersing grades. Small amounts of yellow oxide pigments may be added to meet specific color requirements.
5) Texanol should be added slowly into a good vortex to avoid polymer flocculation.
6) Can use cellulosic solutions like 2% Natrosol 250HR or non-ionic associative thickeners like ACRYSOL™ RM-825 products for final viscosity adjustment.

Pennyslvania Asphalt Test Deck

Transverse Line Accelerated Wear

Applied: 10/91. Photographed: 2/93. 15 Months. 20,000 ADT

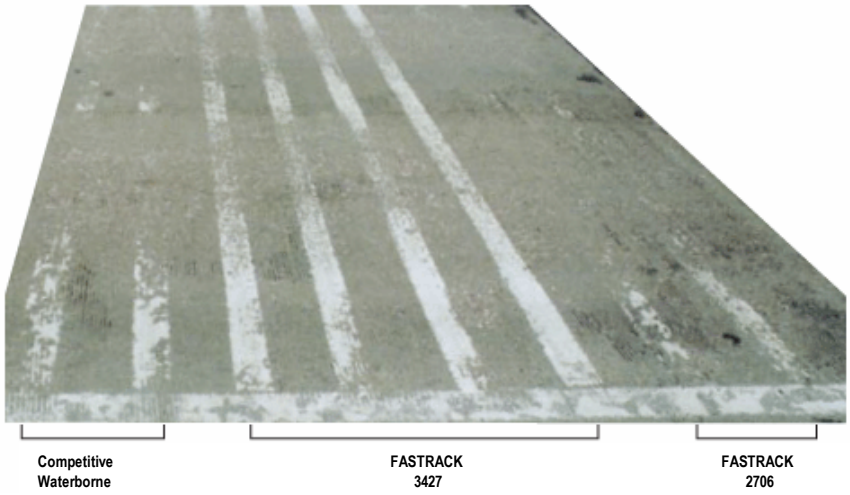
Waterborne Traffic Paint Technology

Mid 1980's	Early 1990's	Today
RHOPLEX™ TP-257	FASTRACK™ 2706	FASTRACK 3427

Wyoming D.O.T.

Concrete Deck

Applied: 8/10/95. Photographed: 5/2/96. Transverse Lines.



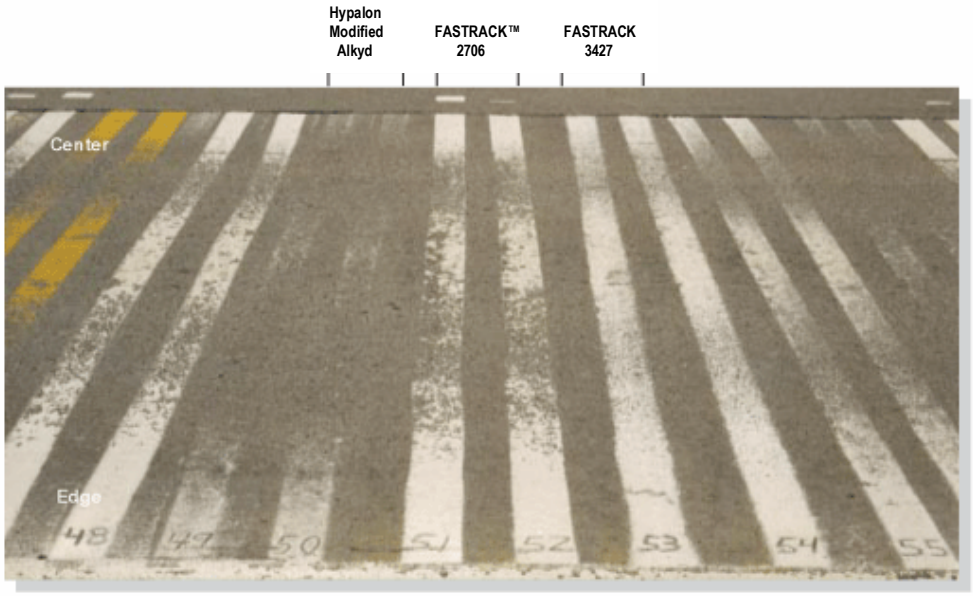
Retroreflectance at skip (center) line	FASTRACK™ 3427	FASTRACK 2706	Competitive
Initial	425	462	435
9 months	227	worn off	worn off
(% retention)	(54%)	(-)	(-)

Form No. 884-00362-1113-NAR-EN-CDP,
Rev. 0 February 2010

Pennsylvania D.O.T.

Concrete Deck

Applied: 7/92. Photographed: 4/93. Transverse Lines

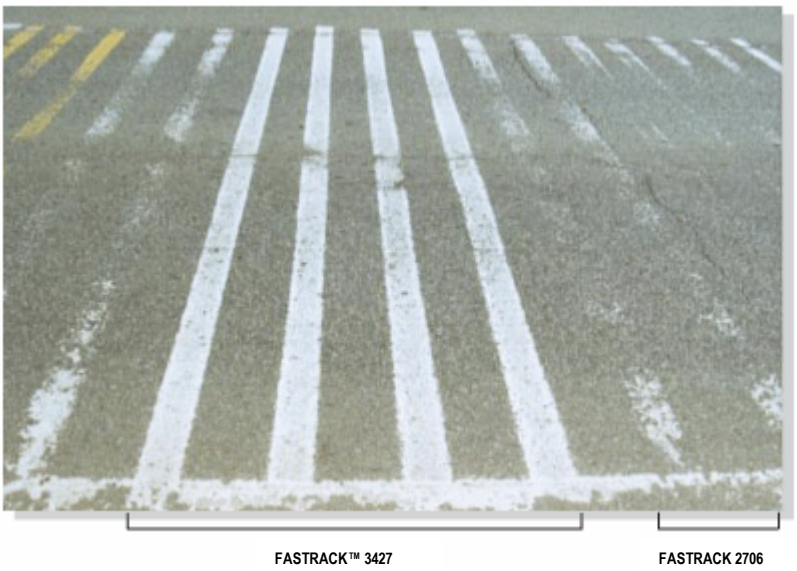


Retroreflectance	FASTRACK 2706	FASTRACK 3427
Initial 8/92	460	456
8 months, 4/93	83 (center) 112 (edge)	113 (center) 176 (edge)

Kansas D.O.T.

Applied: 8/25/93. Photographed: 3/4/96. Wyoming

Asphalt Deck



Retroreflectance	FASTRACK 3427	FASTRACK 2706
Initial 8/93	374	361
30 months, 3/96	276	worn off

Wyoming D.O.T.

Skip Lines on Concrete

Applied: 9/22/92. Photographed: 5/13/93. Skip Lines

Note: The top line in each picture is an existing skip line.

Retroreflectance at skip (center) line	FASTRACK 2706	FASTRACK 3427
Initial	409	388
8 months	271	272

Applications, Conditions and Handling

FASTRACK™ 3427 Polymer Emulsion can be applied with airless or conventional air-spray equipment to asphalt, concrete, or existing roadmarkings that are adhering well to the pavement surface. Air and surface temperature should be above 50°F and at least 5°F above the dew point during application. Paints will require longer drying times when the relative humidity exceeds 80% with minimal air flow.

Clean-up is accomplished with clean or soapy water to remove wet paint from equipment. Stainless steel equipment should be used, and typical paint solvents can assist if removal of dried paint from tools and equipment is necessary. All solvents and solventborne paint should be removed from tanks and spray equipment prior to handling waterborne paints to avoid contamination, and equipment should be cleaned after each use. An ammonia solution can be floated on the surface of stored paint to prevent skinning.

Safe Handling Information

Dow 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.

Dow Company sends MSDS for all its products, whether or not they are considered OSHA-hazards, to 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.

Dow Company is a member of the American Chemistry Council (ACC) and is committed to ACC's Responsible Care® Program.

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