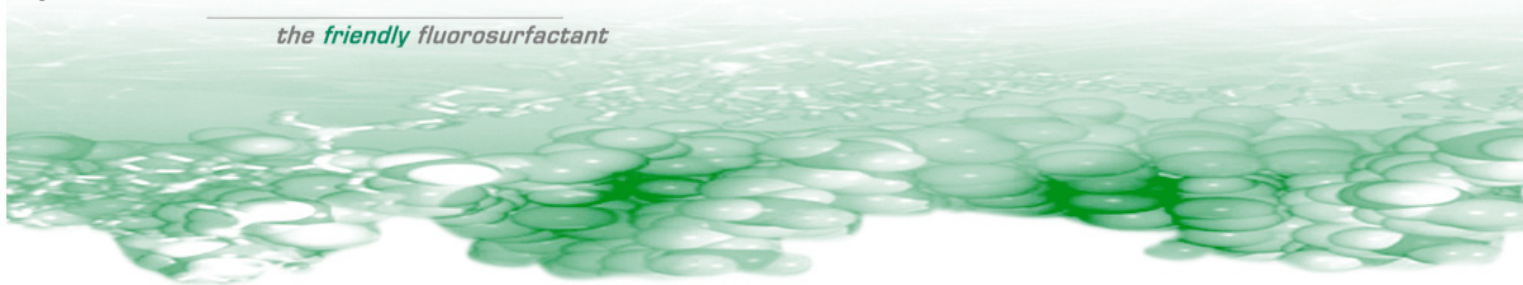




# POLYFOX™

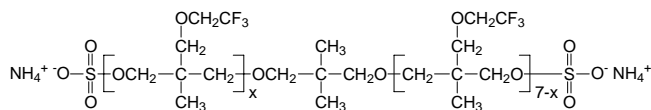
the friendly fluorosurfactant



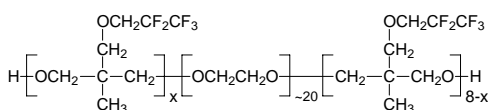
PolyFox™ PF-136A  
PolyFox™ PF-156A  
PolyFox™ PF-151N

## Fluorosurfactants for Improved Flow, Leveling and Surface Appearance in Aqueous Coatings

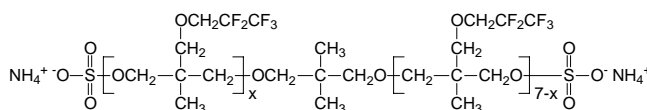
### Generic Structures



PolyFox PF-136A



PolyFox PF-151N



PolyFox PF-156A

### GENERAL INFORMATION:

PolyFox PF-136A, PF-156A, and PF-151N fluorosurfactants are **environmentally preferred**, water dispersible fluorosurfactants based on OMNOVA Solutions' platform of poly(oxetane) polymers. PolyFox fluorosurfactants are used in water-based coatings to improve flow, leveling, and surface appearance. These PolyFox fluorosurfactants are particularly effective at reducing air entrapment and entrainment while improving surface appearance in aqueous coatings. When properly formulated, PolyFox fluorosurfactants may be used to replace telomer- based and other conventional fluorosurfactants such as FC-129 from 3M Company. Use of PolyFox fluorosurfactants results in greatly reduced foam, air entrapment, and air entrainment compared to conventional fluorosurfactant technology.

### KEY FEATURES AND BENEFITS:

- **Environmentally Preferred** – Compared to certain telomer-based and other conventional fluorosurfactants, PolyFox fluorosurfactants have been found to not bioaccumulate, resulting in very **low environmental impact**.
- **Low Foaming Characteristics** – Use of PolyFox fluorosurfactant results in significantly less foam development than other available fluorosurfactant technologies. The small amount of foam developed is short lived.
- **Improved Surface Appearance** – Incorporation of PolyFox fluorosurfactants into coating formulations can result in **improved coating appearance** due to reduced surface defects. In spray applied coatings, PolyFox fluorosurfactants can result in reduced pock marks and cratering, while in roll coat applications their use may result in reduced surface waviness.
- **Outstanding Air Release and De-Aeration** – Incorporation of PolyFox fluorosurfactants in coating formulations results in dramatically reduced air entrainment, thereby dramatically **reducing surface defects** such as pin holes, air trapping and cratering. Elimination of surface defects such as pin holes and air trapping can also result in improved coating durability.
- **Near Water White Color** – Compared to traditional telomer-based and other conventional fluorosurfactant technology, PolyFox fluorosurfactants are **clear and uniform in appearance**. Use of PolyFox fluorosurfactants will not result in increased color in clear formulations.

- **Excellent Water Dispersability**– PolyFox PF-136A, PF-156A, and PF-151N fluorosurfactants are dispersible in water. They may also be premixed with co-solvents to speed system equilibration times.
- **Formulation Versatility**– PolyFox fluorosurfactants offer formulators an environmentally preferred alternative to telomer-based and other conventional fluorosurfactant technology without the typical air entrainment problems associated with those technologies, while resulting in improved surface appearance. PolyFox fluorosurfactants’ unique surface activities result in their ability to **perform both as a de-aerator and as a flow and leveling agent**. Proper coating formulation with PolyFox fluorosurfactants can result in decreased numbers of additives in formulations.

**Table 1. Typical Aqueous PolyFox Fluorosurfactant Physical Properties\***

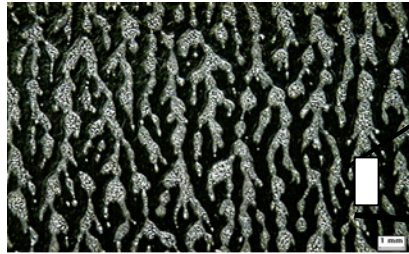
Property	PolyFox PF-136A	PolyFox PF-156A	PolyFox PF-151N
Appearance	Clear low viscosity liquid	Clear low viscosity liquid	Clear
Viscosity @77°F (cps)	50	50	700
Color	Colorless to light straw	Colorless to light straw	Colorless to light straw
% Non volatile (Wt)	30	30	50
Type	Anionic Fluorinated polyether di(ammonium sulfate) salt	Anionic Fluorinated polyether di(ammonium sulfate) salt	Nonionic Fluorinated polyether
Solvent and percent	Water/Butyl Carbitol 50/50	Water/Butyl Carbitol 50/50	Water/Butyl Carbitol 80/20
Ionic character	Anionic	Anionic	Non-ionic
pH	8.5 – 9.8	8.5 – 9.8	4.5
Specific Gravity	8.46 lbs./gal	8.55 lbs./gal	9.3 lbs./gal
Flash Point (Pensky Martens Closed Cup)	>200°F	>200°F	>200°F
Surface Tension (mN/m) (in pH 7 buffered water)	28 (pure material @1600 ppm)	28 (pure material @1300 ppm)	24 (pure material @1000 ppm)
Ross-Miles Foam Test (Foam height in mm) ASTM D1173-53 (49°C @ 1000 ppm in distilled water)	Initial: 95 After 5 minutes: 82	Initial: 75 After 5 minutes: 65	Initial: 0 After 5 minutes: 0
Solubility in water	Dispersible in all proportions	Dispersible in all proportions	Dispersible

\*Not actual product specifications

Traditional fluorosurfactant technology used in water-based coatings can promote or result in foaming, air entrapment, and pin holes, thereby resulting in surface defects and decreased coating performance. However, use of OMNOVA’s environmentally preferred fluorosurfactant technology results in **significantly reduced foaming** and air entrainment resulting in **improved surface appearance**.

Figure 1 below compares PolyFox PF-136A to a commercial fluorosurfactant in a clear coating applied by roll application. PolyFox PF-136A results in significantly less foam development even after increased dwell times and results in improved surface appearance.

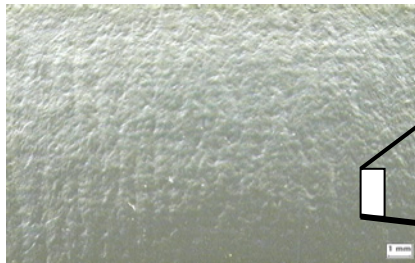
Figure 1: PolyFox Fluorosurfactant Performance Enhancement in Aqueous, Roll Applied Acrylic Coating



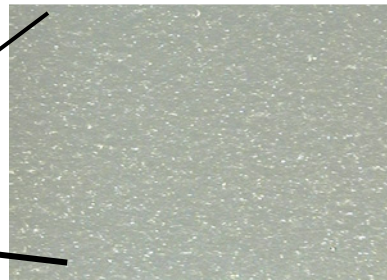
Aqueous Acrylic Clear With  
514 ppm FC-129



Aqueous Acrylic Clear With 514 ppm FC-129  
100X Magnification



Aqueous Acrylic Clear With  
488 ppm PolyFox PF-136A

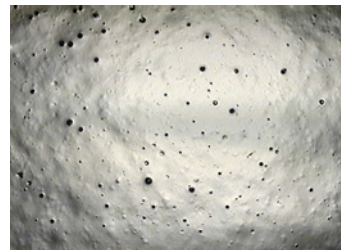


Aqueous Acrylic Clear With 488 ppm  
PolyFox PF-136A  
100X Magnification

Figure 2: PolyFox Fluorosurfactant Performance Enhanced in Aqueous, Low Co-Solvent, Spray Applied Acrylic Coatings



Aqueous Acrylic Coating  
**521 ppm FC-129**  
2 Passes



Aqueous Acrylic Coating  
**1028 ppm Zonyl FSO**  
2 Passes



Aqueous Acrylic Coating  
**978 ppm PolyFox PF-151N**  
2 Passes



Aqueous Acrylic Coating  
**981 ppm PolyFox PF-156A**  
2 Passes

PolyFox fluorosurfactants are environmentally preferred compared to conventional fluorosurfactants. Additional benefits of PolyFox fluorosurfactants are good water dispersibility, excellent color and clarity, and significantly improved de-aeration and air release. These characteristics result in improved coating appearance and performance.

Table 1. Clear Roller Coater Applied Aqueous Coating

Item	Weight %	Supplier
Joncryl™ 538	59.51	Johnson Polymer
Tap Water	20.38	
Eastman® EB	9.38	Eastman Chemical
RM2020	10.68	Rohm and Haas
PolyFox PF-136A	0.049	
<b>TOTALS</b>	<b>100</b>	
Viscosity, #2Zahn	21.80	
pH	8.76	

Products (items) listed in the chart above are the trademarks or registered trademarks of the supplier indicated.

Table 2. Spray Applied Aqueous Acrylic Coating

Item	Weight %	Supplier
Tap Water	36.02	
Diethylene Glycol Butyl Ether	1.48	
Alberdingk™ AC 2538	61.66	Alberdingk Boley
RM2020	0.74	Rohm and Haas
PolyFox PF-156A	0.098	
<b>Total</b>	<b>100</b>	
Viscosity, #2Zahn, 78F	14.49 sec	
pH	8.03	

Products (items) listed in the chart above are the trademarks or registered trademarks of the supplier indicated.

### Learn More:

Find out how PolyFox fluorosurfactants can improve appearance and performance in your coatings. Call Eric Rall at (714) 273-9182 or email [eric.rall@omnova.com](mailto:eric.rall@omnova.com) for samples, literature, or technical assistance, or visit our website at [www.omnova.com](http://www.omnova.com).

### NOTE:

Although data supplied above are believed to be accurate, each user is advised to make his or her own determination as to whether the described product(s) is/are appropriate for a particular use or application, whether such a use will comply with all applicable laws or regulations, or whether such a use will not infringe the intellectual property rights of third parties.

