

3M™ Fluorosurfactants
For Paints and Coatings



Keep your products flowing

- Create smoother, more uniform coatings
- Reduce surface defects
- Improve leveling and flow control

A woman with long dark hair, wearing a light-colored long-sleeved shirt and dark jeans, is smiling and holding the hands of a young girl. The girl is wearing a pink shirt and blue jeans, and is jumping or dancing with her arms raised. They are in a bright, modern living room with a large window, a beige sofa, and a patterned rug. The floor is highly reflective, showing a clear reflection of the woman and girl. A large white lampshade is visible in the background.

From smooth walls and gleaming floors to the paint job on your car, there's more to a uniform surface finish than meets the eye.

The science of smooth.

Advanced wetting and leveling agents for smoother, defect-free finishes

Contamination, surface defects and hard-to-wet surfaces can cause all manner of problems in paints and coatings. Unsightly “orange peel,” cratering, “fish eyes” and picture framing effects are just some of the problems formulators face.

The science behind a smooth, defect-free painted or coated surface starts with the addition of surfactants, which are used to decrease the coating’s surface tension. The lower the surface tension, the more effectively a coating wets, levels and spreads – even on contaminated surfaces. And no surfactant lowers surface tension more effectively than those made with fluorochemicals – like 3M™ Fluorosurfactants.

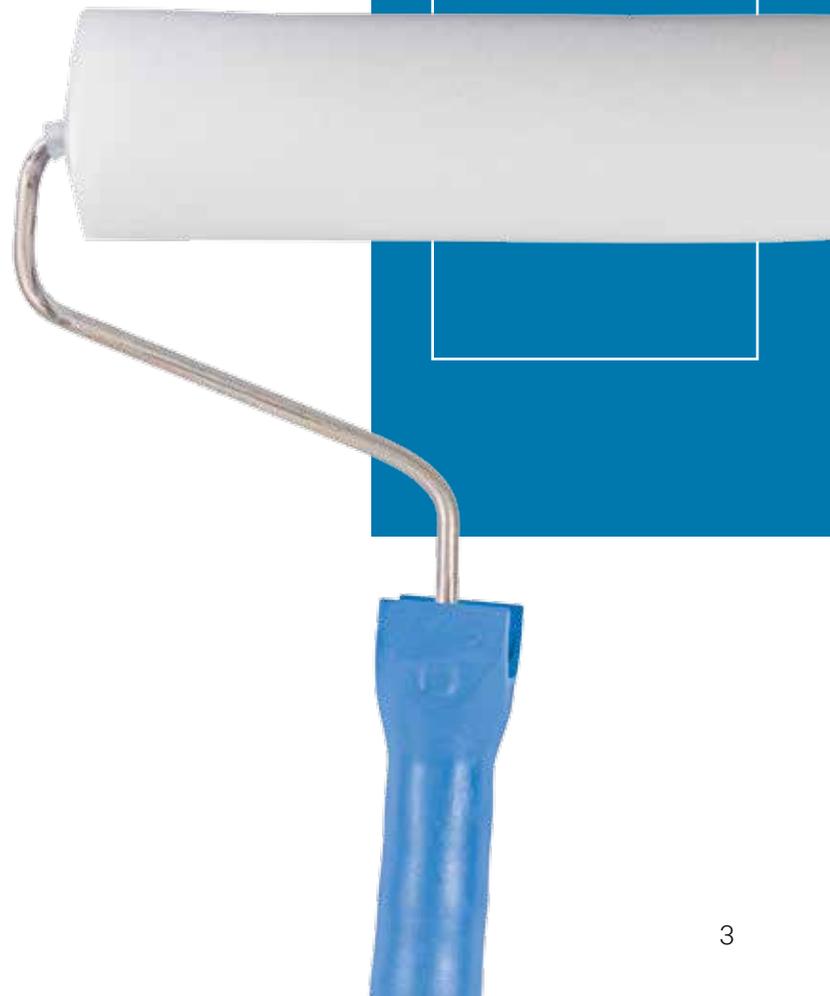
Based on our innovative C4 chemistry platform, 3M fluorosurfactants offer formulators an outstanding level of performance and control in a broad range of water- and solvent-based coatings.

3M™ Fluorosurfactants for paints and coatings

- Reduce surface tension
- Help paints and coatings overcome surface contamination
- Effective in both aqueous and solvent-borne systems
- Wetting agent
- Leveling agent
- Dirt pick up resistant
- Easy oil stain removal
- Open time improvement
- Anti block
- Low foam

Applications

- Paints
- Resins
- Adhesives
- Inks
- Clearcoats
- Floor coverings

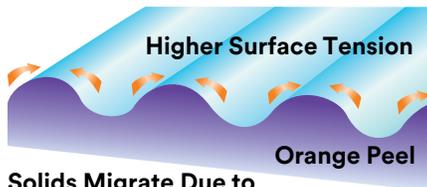


3M™ Fluorosurfactants

How does it work?

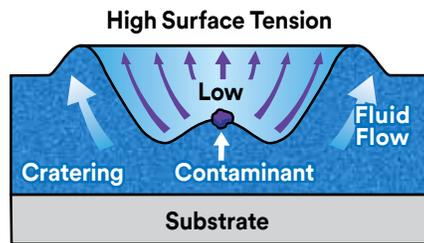
3M fluorosurfactants concentrate at the liquid surface, lowering the surface tension of the liquid. This allows the liquid to wet and spread more evenly, and reduces the possibility of surface defects.

Take a look at some of the common problems that can be reduced or eliminated by adding 3M fluorosurfactants.



Solids Migrate Due to Surface Tension Gradient

If a coating contains components of different surface tensions, the solids will tend to migrate, resulting in an “orange peel” effect.



Contaminants can cause surface tension gradients, resulting in a “cratering” or “fish eye” effect.

Improved wetting

For a liquid to wet a surface, its surface tension must be lower than the surface energy of the substrate and all the contaminants on the substrate.

3M™ Fluorosurfactants aid in the wetting of a coating applied to a variety of materials, including hard-to-wet surfaces such as plastics and oily metals. They can even help overcome contamination from roller grease, condensation drip, dust, gel particles or silicones. Lowering surface tension during application helps to prevent surface defects, including cratering, picture framing, fish eyes and de-wetting. What’s more, 3M fluorosurfactants help to maintain low surface tension throughout the entire drying process. This helps to create smoother, higher gloss coatings.

Better leveling

When a liquid contains components of different surface tensions and areas of different evaporation rates, there is the possibility that surface tension gradients could form defects at the liquid/air interface. These defects are in the form of a surface roughness often referred to as “orange peel.” 3M fluorosurfactants improve leveling by reducing or even eliminating these gradients during the coating dry down phase—resulting in a smoother, more uniform surface.

Improved stain resistance and reduced dirt pick-up

Driven by the demand for low VOC* paints, major architectural decorative paint manufacturers are seeking ways to improve the dirt pick-up resistance of exterior decorative paint formulations, and to improve the stain resistant and easy-to-clean properties for interior paints. 3M fluorosurfactants can improve stain resistance and dirt pick-up properties, especially in high PVC VAE binder paints. These surfactants also provide good wetting performance, anti-block and improvement in open time. The additive level generally ranges from 0.1–0.2% based on the level of solids.

*Low VOC has no standard global definition. In the U.S., the EPA defines low as less than 250 g/l of volatile organic compounds. Green Seal defines low as less than 50 g/l.



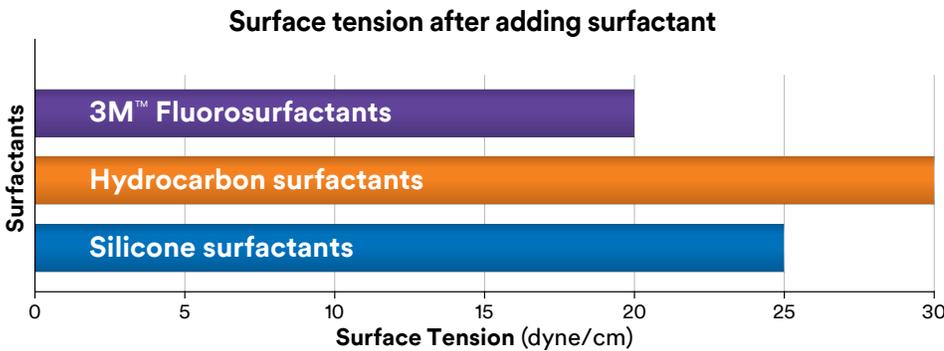
Fluorosurfactants vs. hydrocarbon and silicone surfactants

Based on an innovative fluorochemical building block, 3M™ Fluorosurfactants are polymers that show the same performance benefits that have long differentiated fluorochemicals from competing surfactant technologies, such as silicones and hydrocarbons.

With 3M fluorosurfactants, very little product is necessary to achieve a significant surface tension reduction of a formulation, which for customers means low use levels. Hydrocarbons, in contrast, often require an order of magnitude more product to significantly reduce surface tensions, and the surface tension levels reached do not approach those possible with 3M fluorosurfactants. Intercoat and second coat adhesion can often be adversely affected when using silicone or other fluorochemical surfactants. However, in formulations using 3M fluorosurfactants this problem has not been observed, even at higher loading levels.

See how they compare

Compared to other surfactant technologies, 3M fluorosurfactants are more effective at reducing the level of surface tension in both aqueous and non-aqueous systems.



Fluorinated Surfactant



Hydrocarbon Surfactant



3M™ Fluorosurfactants

With 3M fluorosurfactants, you get consistent, reliable product performance – with supplies available in production quantities.

3M has been a leader in fluorochemistry for over 60 years, and has been supplying C4 chemistry to the industry since 2001. We have the experience – and the expertise – to meet your needs.

Surface Tension Reduction Potential of 3M™ Fluorosurfactants

The following table shows the surface tension reduction potential (in dynes/cm) of 3M™ Fluorosurfactants FC-4430, FC-4432 and FC-4434 in some commonly available water-borne resins in comparison to competitive hydrocarbon and silicone surfactants.

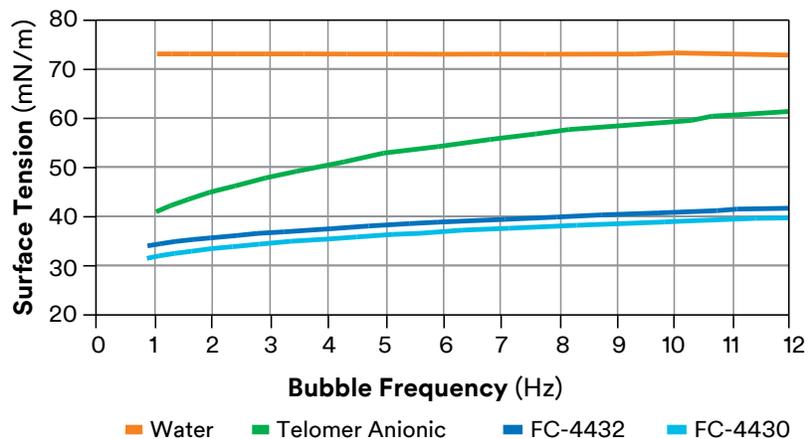
Surface Tension/CMC (in water)

Resin	No Surfactant	HC Surfactants 1.00%	FC-4430 0.3%	FC-4432 0.3%	Competitive FC Surfactant 0.3%	Silicone Surfactant 0.5%
NeoCryl™	39.1	29.0	24.3	20.1	26.1	27.3
NeoRez™ R-941	43.1	29.8	21.2	19.9	24.4	23.8
NeoRez™ R-9621	47.4	33.1	21.2	20.4	24.2	22.8
Joncryl® 537	37.4	31.8	19.7	21.0	25.6	27.6
Joncryl® 1532	38.4	32.9	21.2	23.4	26.9	28.9
Joncryl® 1925	41.0	31.2	19.7	20.2	25.4	27.1
Joncryl® 1972	38.9	27.6	22.4	21.9	26.3	27.6

Low Dynamic Surface Tensions

Dynamic surface tension data describe the ability of a surfactant to move and organize in a solution. Low dynamic surface tensions or rapid surfactant migration can be important in high-speed coating processes or low viscosity systems. 3M fluorosurfactants can reduce dynamic surface tensions to lower levels than other fluorosurfactants as illustrated in this chart.

Fluorosurfactant Surface Tension vs Bubble Frequency in Water



Low Interfacial Surface Tensions at Low Concentrations

The ability to obtain lower interfacial surface tension is a key requirement for the stabilization of pigments and polymer resins in an aqueous formulation. 3M™ Fluorosurfactants can provide low interfacial surface tensions as indicated by the following table.

Surfactant	Interfacial Tension Light Phase: Heptane (dynes/cm)			Interfacial Tension Light Phase: Cyclohexane (dynes/cm)		
	200ppm	0.5%	1.0%	200 ppm	0.5%	1.0%
Control	43.7			51.2		
FC-4430	3.5	2.2	–	2.5	1.5	–
FC-4432	4.2	2.6	–	4.2	2.1	–
SDS ¹	15.4	6.1	5.8	12.9	5.0	4.9
SDS-10 ²	15.9	4.1	3.7	13.5	2.9	2.6
Silicone Dispersant	14.4	10.9	10.5	11.7	8.8	8.8

¹Sodium dodecyl sulfate

²Sodium dodecyl benzene sulfonate

Product Safety and Handling

3M fluorosurfactants FC-4430, FC-4432 and FC-4434 are intended for use in non-dispersive applications.

3M does not recommend these products for use in applications involving repeated exposure through skin contact, inhalation, or ingestion. They are not intended for food, cosmetic, medical or pharmaceutical usage. Neither 3M nor the U.S. Food and Drug Administration has evaluated or reviewed these products for food, cosmetic, medical or pharmaceutical applications.

It is the user's responsibility to determine whether a coating containing these products is durable and properly cured for the end use. Any used or unused material for disposal should be incinerated in an industrial or commercial facility in the presence of a combustible material. Combustion products will include HF. Facility must be capable of handling halogenated materials. As a disposal alternative, dispose of waste product in a facility permitted to accept chemical waste. For additional disposal information, see the product's Safety Data Sheet.

For additional product safety and handling information, please read the product labels and Safety Data Sheets before using these products.



3M™ Fluorosurfactant
FC-4430



Competitor



No Surfactant

3M™ Fluorosurfactants

3M Resources

To request a sample, place an order or request additional information, please contact your local 3M representative, an authorized 3M distributor or call 1-800-367-8905.

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