3M™ Novec™ Fluorosurfactant
FC-4432

Note: Not for specification purposes

All values determined at 77°F (25°C) unless otherwise specified

Introduction

3M™ Novec™ Fluorosurfactant FC-4432 is a non-ionic polymeric fluorochemical surfactant belonging to a class of coating additives which provide low surface tensions in coating systems best served by fluorochemical surfactants. Novec fluorosurfactant FC-4432 contributes excellent wetting, spreading and leveling properties to a variety of coating systems.

Suggested Applications

Novec fluorosurfactant FC-4432 may be used as a flow and leveling agent in various applications including architectural coatings, inks, floor polishes, waxes, caulks, high solids coatings, water reducible coatings and radiation curable coatings.

Recommended use level is between 0.05% and 0.3% active surfactant. However, use level can vary depending on the application and concentration of other additives and solvents in the formulation.

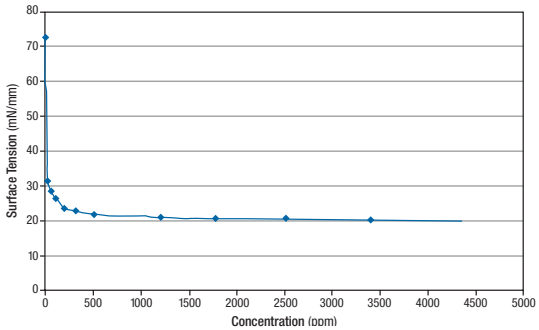
Typical Physical Properties

Properties	Typical Values
Appearance	Slightly hazy/clear, yellow viscous liquid
Specific gravity	1.21 g/cc
Flash point (Setaflash closed cup)	180°F (82°C)
pH (of 1% aqueous solution)	4.5
Vapor pressure	0.0014 psi (0.07mm Hg)
Viscosity (cP @ 25°C / 77°F)	3000-6000
Solubility in water	Slight, dispersable in all proportions
Tg	15-20°C
Type	Non-ionic
Composition	87% polymeric fluorochemical actives 7% non-fluorochemical actives 5% 1-methyl-2-pyrrolidinone
Freeze/thaw stability	Protect from freezing*

* If Novec fluorosurfactant FC-4432 freezes, warm it to >86°F (>30°C) until fluid. Freezing will not change physical properties or adversely affect performance.

Surface Tension/CMC (in water)

Novec fluorosurfactant FC-4432 is very efficient at reducing the surface tension in aqueous coating systems.



Foaming

Novec fluorosurfactant FC-4432 shows lower propensity to form foam in aqueous systems. This can translate into the ability to use less defoamer and / or a less aggressive defoamer additive in your formulation.

Product	Foam Quality (%)	Foam Stability (minutes) (t 1/2 value)
Novec FC-4432	85.58	2
Fluorad™ FC-430*	80.70	.5

* FC-430 is no longer available for sale from 3M. Data related to FC-430 are presented here for historical reference purposes only.

Solubility

Solvent	Solvent grams of FC-4432/100 grams of solvent
Butyl cellusolve	>25
Toluene	>35
Methyl ethyl ketone	>25
Dimethylformamide	>25
Isopropyl alcohol	>25
Methanol	>25
Dowanol™ PM	>25
Texanol™	>25
Proglyde™ DMM	>25
N-Methyl Pyrrolidone	>25
Mineral spirits	<1

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3M™ Novec™ Fluorosurfactant FC-4432 Static Surface Tensions in Water-Borne Resins

Resin	Control	HC Surfactant 1%	FC-4432 0.3%	Competitive FC Surfactant 0.3%	Silicone Surfactant 0.5%
NeoCryl™ A-550	36.7	27.2	22.3	26.8	24.6
NeoCryl™ A-6099	39.1	29.0	20.1	26.1	27.3
NeoRez™ R-941	43.1	29.8	19.9	24.4	23.8
NeoRez™ R-9621	47.4	33.1	20.4	24.2	22.8
Joncryl® 537	37.4	31.8	21.0	25.6	27.6
Joncryl® 1532	38.4	32.9	23.4	26.9	28.9
Joncryl® 1925	41.0	31.2	20.2	25.4	27.1
Joncryl® 1972	38.9	27.6	21.9	26.3	27.6

Interfacial Surface Tensions

Surfactant	Interfacial Tension Light Phase: Heptane (dynes/cm)			Interfacial Tension Light Phase: Cyclohexane (dynes/cm)		
	200 ppm	0.5%	1.0%	200 ppm	0.5%	1.0%
Control		43.7			51.2	
FC-4432	4.2	2.6		4.2	2.1	
FC-129	7.3	7.2		10.5	7.6	
FC-430[1]	3.5	2.4		4	2.1	
SDS[2]	15.4	6.1	5.8	12.9	5	4.9
SDBS[3]	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

[1] FC-430 is no longer available for sale from 3M. Data related to FC-430 are presented here for historical reference purposes only.
[2] Sodium Dodecyl Sulfate
[3] Sodium Dodecyl Benzene Sulfonate

Static Surface Tensions in Organic Solvents/Systems

Solvent	Weight % Novec FC-4432			
	0.0	0.1	0.2	0.5
Distilled water	72	23	21	20
Methyl alcohol	23	23	23	23
Cellosolve acetate	29	27	26	25
Butyl cellosolve	28	27	27	27
Butyl carbitol	30	29	29	29
Methyl ethyl ketone	25	24	24	24
Toluene	28	28	28	28
Dimethylformamide	33	33	33	32
Polyethylene Triol LG-56	33	23	22	22
Cycloaliphatic epoxy resin	46	35	35	27
Epon™ Resin 828-RS	45	22	19	18

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Thermal Stability

The active ingredient in 3M™ Novec™ Fluorosurfactant FC-4432 exhibits good thermal stability when used in thermal processing applications.

TGA data for Novec FC-4432

This data shows the excellent thermal stability of Novec fluorosurfactant FC-4432 if used in a thermal processing application.

	FC-4432 Specified % Weight Loss					
	5%	10%	50%	80%	90%	95%
Temperature (°C)	195	255	305	330	355	405

(10 mg sample heated at 5°C / min. in air). Temperatures (°C) at which specified % wt. loss occur.

Regulatory Summary

- The PFBS-based surfactants produced by 3M have been reviewed by the U.S. EPA and placed on the TSCA inventory. There is a testing consent order in place which only applies to 3M, not 3M customers. The products are REACH compliant in Europe. The products are available for purchase in China, Korea, New Zealand, the Philippines and on a limited basis in Australia, Canada and Japan.
- PFBS and PFBS-based surfactants are not included in the U.S. EPA's PFAS Final Significant New Use Rule (SNUR) (67 Fed. Reg. 72854).

Packaging

Novec fluorosurfactant FC-4432 is currently available in:

- 8 lb. pails
- 40 lb. pails
- 250 lb. drums

Product Safety and Handling

Novec fluorosurfactant FC-4432 is intended for use in non-dispersive applications.

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

It is the user's responsibility to determine whether a coating containing this product 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 Material Safety Data Sheet.

For additional product safety and handling information, please read the product label and Material Safety Data Sheet before using this product.

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.

The 3M™ Novec™ Brand Family

The Novec brand is the hallmark for a variety of proprietary 3M products. Although each has its own unique formula and performance properties, all Novec products are designed in common to address the need for safe, effective, sustainable solutions in industry-specific applications. These include precision and electronics cleaning, heat transfer, fire protection, lubricant deposition and several specialty chemical applications.

3M™ Novec™ Surfactants ▪ 3M™ Novec™ Engineered Fluids ▪ 3M™ Novec™ Aerosol Cleaners ▪ 3M™ Novec™ 1230 Fire Protection Fluid ▪ 3M™ Novec™ Electronic Coatings

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