



# Opteon™ SF05

## Specialty Fluid

### Removes Fine Particulate and Ionic Soils

## Technical Information

### Introduction

Opteon™ SF05 is a proprietary specialty solvent blend based on Opteon™ hydrofluoroolefin (HFO) and ethanol. It is intended for use in removal of fine particulate and ionic soils from component parts. It offers improved solvency for polar soils, while maintaining excellent compatibility with most plastic, ceramic, and metal components. Typical applications include sub-micron size complementary metal-oxide-semiconductor (CMOS) particle removal, precision cleaning, and removal of light soils from metal, plastic, and glass substrates. Opteon™ SF05 is a safe, nonflammable, and environmentally friendly solvent with low global warming potential (GWP) (<10) and does not contain any fluorinated greenhouse gases (as listed in Annex 1 of the EU regulations 517/2014). Opteon™ SF05 is intended to replace high global warming hydrofluorocarbon (HFC)- and hydrofluoroether (HFE)-based cleaning solvents, as well as high ozone depletion potential (ODP) CFC-113, HCFC-141b, HCFC-225, and 1,1,1-trichloroethane solvents in many industrial applications.

### Features and Benefits

- Nonflammable
- Enhanced cleaning performance for polar soils and sub-micron particulate removal
- Fast drying with an optimum boiling point (39 °C [102.2 °F]), allows cleaned parts to be processed and used immediately
- High soil loading capacity boosts productivity by reducing equipment downtime associated with solvent change-outs
- No surfactants needed: Removes extra washing steps to achieve residue-free cleaning
- Low odor and toxicity
- Excellent environmental profile: Low GWP (<10), EU 517/2014 compliant

### Typical Applications

- Sub-micron CMOS particle removal and sensor cleaning
- Light oil and grease removal
- Precision cleaning
- Cold cleaning solvent
- Rinsing and drying media
- Heat transfer fluid
- 3D printing cleaning fluid

**Table 1.** Physical Properties\*

Molecular Weight	131
Boiling Point, °C (°F)	39 (102.2)
Liquid Density, g/mL	1.27
Vapor Pressure, kPa	60
Surface Tension, mN/m	15.7
Freezing Point, °C (°F)	<-80 (<-112)
Latent Heat, J/g	263
Heat Capacity, kJ/kg·°C	1.77
Viscosity, MPa·sec	0.67
Flash Point	
Closed Cup <sup>(1)</sup>	None
Open Cup <sup>(2)</sup>	None

\*Values reported are at 25 °C (77 °F), unless otherwise specified.

<sup>(1)</sup>ASTM D56 <sup>(2)</sup>ASTM D1310



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## Sub-Micron Particulate Removal

Opteon™ SF05 is ideally suited for cleaning fine particulate matter (sub-micron range) for metal and nonmetal substrates. Contaminants, such as dust particles, skin flakes, fibers, and other process contaminants, tend to bond with the surfaces of the substrate by electrostatic forces and a mechanical entrapment due to the surface geometry of the substrate. Removal of these contaminants requires a solvent that can reduce the laminar boundary layer thickness to allow particles to be washed away by the liquid solvent flow-through.

A thin boundary layer and higher liquid flow-through momentum can be accomplished with a cleaning fluid, such as Opteon™ SF05, which has a high density, low viscosity, and low surface tension, so that fine particles can be de-bonded efficiently. Typical applications include cleaning of CMOS image sensors, disk media, head stack assemblies, and lenses for sensitive optical devices. The versatility of Opteon™ SF05 also allows it to be used in other industries with other precision cleaning and heat transfer applications.

## Plastic and Elastomer Compatibility

Most plastics and elastomers can be safely cleaned in Opteon™ SF05. **Tables 2** and **3** summarize test results on short-term exposure of unstressed plastics and elastomers, simulating a typical cleaning cycle.

**Table 2.** Plastic Compatibility Immersion: 15 Min at Room Temperature\*

Compatible	
Polyethylene	ABS
Polypropylene	Acetal
Polystyrene	Acrylic
Polyester, PET, PBT	Epoxy
Polyphenylene Oxide (PPO)	Ionomer
Polyimide, PI, PEI, PAI	Liquid Crystal Polymer
Polyetherketone (PEK)	Phenolic
Polyaryletherketone (PEEK)	PVC, CPVC
Polysulfone	PTFE, ETFE
Polyarylsulfone	Cellulosic
Polyphenylene Sulfide (PPS)	
Incompatible	
None Tested	

\*Material composition varies depending upon compounding agents, plasticizers, processing, etc. Specific materials should be tested for compatibility with solvent.

**Table 3.** Elastomer Compatibility Immersion: 15 Min at Room Temperature\*

Compatible	
Buna N, NBR, Nitrile	Buna S, SBR, GRS
Butyl Rubber, IIR	Chlorosulfonated PE
EPM, EPDM, Nordel	Polysulfide
Natural Rubber, Isoprene	Neoprene
Urethane	Viton™ B
Silicone	
Incompatible	
None Tested	

\*Elastomer material composition varies depending upon compounding agents, plasticizers, processing, etc. Specific materials should be tested for compatibility with solvent. Elastomer swelling and shrinking will, in most cases, revert to within a few percent of original size after air drying. Swell, shrinkage, and extractables are strongly affected by the compounding agents, plasticizers, and curing used in the manufacture of plastics and elastomers. Therefore, prior in-use testing is particularly important.

## Metals and Other Compatibility

Opteon™ SF05 was found compatible with zinc, stainless steel, aluminum, and copper. Large amounts of water may extract alcohol and affect cleaning performance. Contact with highly basic process materials, pH 10 or above, is not recommended.

## Safety, Toxicity, and Environmental

Opteon™ SF05 exhibits no closed or open cup flash point and is classified as a nonflammable liquid by NFPA and DOT. Safety, toxicity, and environmental properties are shown in **Table 4**.

**Table 4.** Safety, Toxicity, and Environmental Properties

Property	Units	Opteon™ SF05
Flash Point, CC, ASTM D56	°C (°F)	None
Flash Point, OC, ASTM D1310	°C (°F)	None
Ozone Depletion Potential	-	0
Global Warming Potential	-	<1.0
Occupational Exposure Limit	ppm	636
Volatile Organic Compounds (VOCs)	g/L	508

## Storage and Handling

Opteon™ SF05 is thermally stable and does not oxidize or degrade during storage. It is recommended to store containers in a clean and dry area, and protect them from freezing and excessive temperatures of 46 °C (115 °F). When stored properly, an unopened package has an indefinite shelf life. Package sizes for Opteon™ SF05 are 19 L (5 gal) pails and 208 L (55 gal) drums.

For additional information on Opteon™ SF05 or other specialty fluids products by Chemours, please visit [opteon.com](http://opteon.com) or call 800-969-4758.

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