



# Novec™ Electronic Coatings For Data Storage Protection



## Introduction

As recording density increases, protecting sensitive data storage components against soils, airborne contaminants and moisture becomes more important than ever before. Any unwanted contaminant on the hard disk can cause total system failure, and moisture can slowly corrode exposed metal surfaces...leading to a gradual breakdown in performance.

Effective coatings must provide low surface energy to prevent the build-up of hydrocarbons and moisture, be durable and thermally stable to withstand drive operating conditions and be thin due to fly height and cost considerations. And, finally, coatings must meet the rigorous worldwide environmental and safety regulations of the electronics industry.

3M has two products that meet all of these demands: 3M™ Novec™ Electronic Coating EGC-1700 and 3M™ Novec™ Electronic Coating EGC-1702.



## Applications

### Anti-stiction coating

- MR recording heads
- MEMS components
- LCDs
- Actuators
- CRTs
- Ball swaging

### Anti-migration coating

- Spindle motors
- LCDs
- Lubricated electronic parts

### Anti-corrosion coating

- Head gimbal assemblies
- Suspensions
- LCDs
- DVDs
- Electronic parts sensitive to moisture

## Advantages

**3M™ Novec™ Electronic Coating EGC-1700** is a clear, low viscosity solution of a fluorochemical acrylate polymer coating carried in 3M™ Novec™ Engineered Fluid HFE-7100DL—a solvent tightly controlled for ions, metals and non-volatile residue to meet the demanding needs of the data storage industry. EGC-1700 coating dries to form a film thickness not greater than 1 micron thick to ensure adequate clearance and exceptional performance, and can be used effectively to replace 3M™ Fluorad™ FC-722 and FC-732.

**3M™ Novec™ Electronic Coating EGC-1702** is identical to EGC-1700 in every way except its lower solids content. This lower solids content allows the EGC-1702 coating to dry to an even thinner film—no more than 0.1 micron—allowing its use in sensitive electronics like MEMS, CRTs and LCDs that require protective coatings thinner than 0.1 micron.

Both EGC-1700 and EGC-1702 coatings can be applied via dip coating, mechanical droplet or spraying. Both air dry in seconds...eliminating the need for post-curing. What's more, each coating is nonflammable, has zero ozone depleting potential (ODP), low global warming potential (GWP) and low toxicity.

## 3M™ Novec™ Electronic Coatings EGC-1700 and EGC-1702 Protection

With a surface energy of 11-12 dynes/cm, Novec electronic coatings compare favorably with polyethylene and polytetrafluoroethylene coatings. This low surface energy allows non-solubilizing solvents and liquids with low surface energy to bead up and drain from surfaces coated with Novec EGC-1700 or EGC-1702 coatings while leaving the film intact.

Novec EGC-1700 and Novec EGC-1702 coatings protect against:

- Hydrocarbon oils
- Heptane
- Toluene
- Silicone oils
- Synthetic fluids
- Aqueous solutions
- Lubricating oils

In addition, the low surface tension of EGC-1700 and EGC-1702 coatings helps to prevent stiction—a direct contributor to hard drive crashes.

### Typical Physical Properties

Not for specification purposes

All properties at 25°C (77°F) and 1 atm unless otherwise noted

Properties	Novec EGC-1700	Novec EGC-1702
Appearance	Clear, colorless to light-colored liquid solution	Clear, colorless to light-colored liquid solution
Solids	2.0%	0.2%
Specific Gravity	1.5	1.5
Solvent	3M™ Novec™ Engineered Fluid HFE-7100DL	3M™ Novec™ Engineered Fluid HFE-7100DL
Boiling Point of Solvent	61°C	61°C
Flash Point	None	None
Surface Energy of Dry Film	11-12 dynes/cm	11-12 dynes/cm
Refractive Index of Dry Film	1.38	1.38
Coating Thickness (dip coated)	~1 micron	~0.1 micron

### Regulatory Status

3M™ Novec™ Engineered Fluid HFE-7100DL—the carrier solvent for both Novec EGC-1700 and EGC-1702 coatings—is included in the Significant New Alternatives Policy (SNAP) of the U.S. Environmental Protection Agency (EPA). SNAP lists Novec fluid HFE-7100DL as “acceptable without restrictions” for use in electronics deposition applications. In addition, HFE-7100DL fluid has been excluded by the U.S. EPA from the definition of a VOC because it has negligible contribution to tropospheric ozone formation.

## 3M™ Novec™ Electronic Coatings EGC-1700 and EGC-1702 Environmental Policy

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3M will continue to recognize and exercise its responsibility to: prevent pollution at the source wherever and whenever possible; develop products that will have minimal effect on the environment; conserve natural resources through the use of reclamation and other appropriate methods; assure that its facilities and products meet and sustain the regulations of all national and other official organizations engaged in environmental activities.

### Environmental Properties and Exposure Guidelines

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Properties	CFC-113	1,1,1-TCA	HFE-7100DL <sup>1</sup>
Exposure Limit, ppm (8 hr. time-weighted avg.)	1000	350	750
Exposure Ceiling, ppm	None	None	None
Acute LC <sub>50</sub> , ppm	55,000	16,000	>100,000
Ocular Irritant	No	Yes	No
Dermal Irritant	No	Yes	No
Flash Point (open or closed cup)	None	None	None
Ozone Depletion Potential (ODP)	0.8	0.1	0.00
Atmospheric Lifetime, yrs.	85	4.8	4.1
Global Warming Potential (GWP) <sup>2</sup>	6000	140	320
Hazardous Air Pollutant	No	Yes	No
VOC	No	No	No
Solubility in Water (ppmw)	170	700	12

<sup>1</sup> HFE-7100DL fluid is the solvent carrier for EGC-1700 and EGC-1702 coatings.

<sup>2</sup> CO<sub>2</sub>=1, 100 yr. integrated time horizon.

### Environmental, Health and Safety

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Before using these products, please read the current Material Safety Data Sheet (available through your 3M sales or technical service representative) and the precautionary statement on the product package. Follow all applicable precautions and directions.

## 3M™ Novec™ Electronic Coatings EGC-1700 and EGC-1702 Resources

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3M™ Novec™ Electronic Coatings are supported by global sales, technical and customer service resources, with full-staffed technical service laboratories in the U.S., Europe, Japan and Southeast Asia. Users benefit from 3M's broad technology base and continuing attention to product development, performance, safety and environmental issues.

For information, visit our web site at [www.3m.com/electronicmaterials](http://www.3m.com/electronicmaterials), or call the phone numbers listed below.

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### 3M Specialty Materials

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