3M™ Novec™ 2704 Electronic Grade Coating

Introduction

3M™ Novec™ 2704 Electronic Grade Coating is a fluorinated polymer solution carried in a hydrofluoroether solvent. Designed for moisture and corrosion protection of printed circuit boards and electronic components, the polymer coating dries to a thin, transparent film with excellent hydrophobic and oleophobic properties. It does not need curing and is easy to apply, remove and repair. Both the solution and polymer are low in toxicity, non-ozone depleting and RoHS compliant. The coating contains a yellow-orange dye that is designed to fluoresce under UV light to aid the inspection of the coating and quality control of the coating process.

Construction

Solids	Solvent	Color	Container Size
4 wt% fluorinated polymer	3M™ Novec™ 7200 Engineered Fluid	Yellow/Orange	3.5 gal (33lb/15.0kg), 1 gal (11lb/5.0kg)

Typical Physical Properties

Not for specification purposes. All values @ 25°C unless otherwise specified.

Property	Coating Solution
Appearance	Transparent, yellow/orange, liquid solution
Solids	4 wt% fluorinated polymer
Solvent	3M™ Novec™ 7200 Engineered Fluid
Density	1.41 g/mL
Boiling Point of Solvent	78°C (172°F)
Flash Point	None (per closed cup method)
Environmental	Low in toxicity, non-ozone depleting, nonflammable, low-VOC, RoHS compliant, contains no chlorine or bromine
System	One part homogeneous solution

Property	Fluoropolymer Coating
Appearance	Transparent, light yellow to orange (depending on thickness)
Coating Thickness	Typically 0.2 to 1 micron (depending on application method)
Solvent and Chemical Resistance	Yes (resists aqueous, hydrocarbon and alcohol based fluids)
T_g (glass transition temperature)	46.8°C (116°F)
Thermal Stability of Dry Film	Can withstand 175°C for 24 hours and maintain repellency
Contact Angles (static, dip coated/dried on glass substrate)	105° (water), 65° (hexadecane)
Refractive Index	1.3778
Shelf Life	1 year in the original unopened package
Solder-Through Repairability	Yes

Features

- Easy application and processing – dries in seconds without the need for post-application curing
- Can be easily removed for rework and repair using 3M™ Novec™ Engineered Fluids
- Is UV detectable for easy identification of coating and quality control
- Allows solder-through repairability
- Contains a low level of volatile organic compounds (VOCs) and has low global warming potential
- Is thermally and electrically stable with good dielectric properties
- Adheres to a variety of materials (metals, glass, ceramics, polymers, composites, laminates)
- Provides excellent repellency, anti-wetting and anti-sticking properties against liquids – water, hydrocarbons, silicones, and photoresists
- Is insoluble in solvents such as heptanes, toluene & water
- The polymer can endure up to 175°C for 24 hours and maintain repellency
- Has low surface energy which allows lubricating oils, silicones, photoresist solutions, etc. to bead and drain freely from coated surfaces
- Has excellent surface wetting, especially under low standoff SMT components
- Protects against corrosive gases and vapors in addition to liquids

Application Ideas

- Provides excellent moisture, chemical and corrosion protection to printed circuit boards and their components
- Provides protection of display and touch panel components
- Is an easy and cost-effective alternative to conformal coatings
- Provides excellent anti-wetting, anti-stiction, anti-migration and anti-corrosion properties in many diverse applications
- Can serve as
  - an anti-stiction coating for liquid crystal displays, micromotors or MEMS (Micro Electronic Mechanical Systems) components
  - an anti-migration coating for displays, spindle motors or lubricated electronic parts
  - an anti-corrosion coating for a variety of materials and components

Application Techniques

Can be dipped, sprayed or selectively deposited. Surfaces to be coated should be clean and dry before application. Masking may not be required for many larger connector types but testing is always suggested. The solvent will evaporate quickly and the fluorochemical polymer film will dry in minutes.

Application Options	Dipping (preferred), spray or syringe dispense
Dilution	Can be diluted with 3M™ Novec™ 7200 Engineered Fluid
Drying/Curing	Dries at room temperature; can be handled in under two minutes
Removability	Removable with a variety of 3M Novec Engineered Fluids

For Additional Information

To request additional product information or sales assistance, contact 3M Customer Service at one of the numbers below or visit www.3M.com/Novec. For other 3M global offices or information on other 3M products for electronics, visit our website at 3M.com/electronics.

Safety, Handling, Storage, Shelf Life

To avoid thermal decomposition, the coating solution should not be heated above 150°C (302°F) and the dried fluorochemical polymer film should not be heated to temperatures above 250°C (482°F). When stored under conditions of 16-27°C (60-80°F) and less than 60% R.H. in the original, unopened container, the shelf life is certified for 1 year from the date of manufacture. Before using this product, please read the current product Material Safety Data Sheet (available through your 3M sales or technical service representative or at www.3M.com/Novec) and the precautionary statement on the product package. Follow all applicable precautions and directions. Always practice smart and safe industrial hygiene practices.

Coating Inspection

This polymer contains a visible (yellow/orange) and UV fluorescent dye to aid in the identification and quality control of the coating process. The dye is reacted into the backbone of the polymer. It will not migrate or off-gas from the polymer film. Inspection of the polymer under a range of UV frequencies can be accomplished with commercially available UV lamps designed for industrial use. The dye fluoresces brightest under higher frequency UV (254 nm) but will also fluoresce at other common UV frequencies (i.e. 310, 365 nm). Please follow the UV lamp manufacturer's recommendations on safe handling of UV radiation. Fluorescence of the polymer will depend on several factors including coating thickness; substrate type and color; UV source frequency, intensity and distance from the coating surface.

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

United States
3M Electronics Markets Materials Division
800 810 8513

China
3M China Ltd.
86 21 6275 3535

Europe
3M Belgium N.V.
32 3 250 7521

Japan
Sumitomo 3M Limited
813 3709 8250

Korea
3M Korea Limited
82 2 3771 4114

Singapore
3M Singapore Pte. Ltd.
65 64508888

Taiwan
3M Taiwan Ltd.
866 2 2704 9011

Product Use: All statements, technical information and recommendations contained in this document are based on tests or experience that 3M believes are reliable. However, many factors beyond 3M's control can affect the use and performance of a 3M product in a particular application, including conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. Since these factors are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

Warranty and Limited Remedy: Unless stated otherwise in 3M's product literature, packaging inserts or product packaging for individual products, 3M warrants that each 3M product meets the applicable specifications at the time 3M ships the product. Individual products may have additional or different warranties as stated on product literature, package inserts or product packages. 3M MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's application. If the 3M product is defective within the warranty period, your exclusive remedy and 3M's and seller's sole obligation will be, at 3M's option, to replace the product or refund the purchase price.

Limitation of Liability: Except where prohibited by law, 3M and seller will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental, or consequential regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

Electronics Markets Materials Division
3M Center, Building 224-3N-11
St. Paul, MN 55144-1000
www.3M.com/novec
1-800-810-8513

Please recycle. Printed in USA.
© 3M 2012. All rights reserved.
Issued: 8/12 8769HB
60-5002-0579-8

3M and Novec are trademarks of 3M Company.
Used under license by 3M subsidiaries and affiliates.