



## Material Safety Data Sheet

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### SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** 3M™ Novec™ Contact Cleaner Plus  
**MANUFACTURER:** 3M  
**DIVISION:** Electronics Markets Materials Division  
**ADDRESS:** 3M Center, St. Paul, MN 55144-1000

**EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)**

**Issue Date:** 01/28/13  
**Supersedes Date:** 01/03/13

**Document Group:** 24-7632-3

#### Product Use:

**Intended Use:** For industrial use only; not intended for use as a medical device or drug.  
**Limitations on Use:** Novec™ Aerosols are used in a wide variety of applications, including but not limited to precision cleaning of medical devices and as lubricant deposition solvents for medical devices. When the product is used for applications where the finished device is implanted into the human body, no residual Novec solvent may remain on the parts. It is highly recommended that the supporting test results and protocol be cited during FDA registration.

3M Electronics Markets Materials Division (EMMD) will not knowingly sample, support, or sell its products for incorporation in medical and pharmaceutical products and applications in which the 3M product will be temporarily or permanently implanted into humans or animals. The customer is responsible for evaluating and determining that a 3M EMMD product is suitable and appropriate for its particular use and intended application. The conditions of evaluation, selection, and use of a 3M product can vary widely and affect the use and intended application of a 3M product. Because many of these conditions are uniquely within the user's knowledge and control, it is essential that the user evaluate and determine whether the 3M product is suitable and appropriate for a particular use and intended application, and complies with all local applicable laws, regulations, standards, and guidance.

**Specific Use:** Contact cleaner.

### SECTION 2: INGREDIENTS

<u>Ingredient</u>	<u>C.A.S. No.</u>	<u>% by Wt</u>
Ethyl nonafluorobutyl ether	163702-05-4	25 - 45

Ethyl nonafluoroisobutyl ether	163702-06-5	25 - 45
1,2-Trans-dichloroethylene	156-60-5	15 - 30
Methyl nonafluorobutyl ether	163702-07-6	1 - 10
Methyl nonafluoroisobutyl ether	163702-08-7	1 - 10
Carbon dioxide	124-38-9	1 - 5

## SECTION 3: HAZARDS IDENTIFICATION

### 3.1 EMERGENCY OVERVIEW

**Specific Physical Form:** Aerosol

**Odor, Color, Grade:** Clear, colorless with slight odor. Contents under pressure.

**General Physical Form:** Liquid

**Immediate health, physical, and environmental hazards:** Closed containers exposed to heat from fire may build pressure and explode. Aerosol container contains gas under pressure. May cause target organ effects.

### 3.2 POTENTIAL HEALTH EFFECTS

**Eye Contact:**

Moderate Eye Irritation: Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

**Skin Contact:**

Mild Skin Irritation: Signs/symptoms may include localized redness, swelling, and itching.

**Inhalation:**

Intentional concentration and inhalation may be harmful or fatal.

If thermal decomposition occurs:

May be harmful if inhaled.

Respiratory Tract Irritation: Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

May be absorbed following inhalation and cause target organ effects.

**Ingestion:**

Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

May be absorbed following ingestion and cause target organ effects.

**Target Organ Effects:**

Central Nervous System (CNS) Depression: Signs/symptoms may include headache, dizziness, drowsiness, incoordination, nausea, slowed reaction time, slurred speech, giddiness, and unconsciousness.

### 3.3 POTENTIAL ENVIRONMENTAL EFFECTS

**AQUATIC TOXICITY:**

Testing results indicate that ethyl nonafluoroisobutyl ether, ethyl nonafluorobutyl ether, methyl nonafluoroisobutyl ether and methyl nonafluorobutyl ether have insignificant toxicity to aquatic organisms at their saturation point (Lowest LC50, EC50, or IC50 > substance water solubility). 1,2-Trans-dichloroethylene is harmful to aquatic organisms (10 mg/L < Lowest LC50, EC50, or IC50 < 100 mg/L). These compounds are highly volatile and have high Henry's Law constants and are thus expected to move rapidly through vaporization from solution in an aquatic compartment or from a soil surface in a terrestrial compartment to the atmosphere.

#### BIOCONCENTRATION:

Ethyl nonafluoroisobutylether, ethyl nonafluorobutylether, methyl nonafluoroisobutylether, and methyl nonafluorobutylether are highly insoluble and very volatile. Bioconcentration is therefore unlikely and not expected as they are not likely to enter aqueous waste streams from typical uses and disposal, or, in the case of a spill, remain in the aquatic or terrestrial compartments. The high potential for these components to move from aquatic or terrestrial environments to the atmosphere indicates bioconcentration is unlikely to occur as they are not expected to be bioavailable. Thus, emphasis has been placed on the atmospheric fate.

1,2-Trans-dichloroethylene has an octanol/water partition coefficient of <3 indicating it is unlikely to bioconcentrate.

#### ATMOSPHERIC FATE:

This product has Zero Ozone Depletion Potential (ODP).

Atmospheric Lifetime: approximately 6 days for 1,2-trans-dichloroethylene; approximately 4.7 years and 3.7 years for methyl nonafluoroisobutyl ether and methyl nonafluorobutyl ether, respectively; 0.8 years for the mixture of ethyl nonafluoroisobutyl ether and ethyl nonafluorobutyl ether.

Global Warming Potential (GWP): 320 (100 year ITH, WMO 1998 method) for methyl nonafluoroisobutyl ether and methyl nonafluorobutyl ether; 55 (100-yr ITH) for ethyl nonafluoroisobutyl ether and ethyl nonafluorobutyl ether using the calculation method outlined in Climate Change 2001; and essentially zero for 1,2-trans-dichloroethylene. GWP of product as formulated: approximately 43 (100-yr ITH).

Ethyl nonafluoroisobutylether, ethyl nonafluorobutylether, methyl nonafluoroisobutylether, and methyl nonafluorobutylether are exempt from the US EPA definition of a volatile organic compound (VOC).

Take precautions to prevent direct release to the environment.

## SECTION 4: FIRST AID MEASURES

### 4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

**Eye Contact:** Flush eyes with large amounts of water. If signs/symptoms persist, get medical attention.

**Skin Contact:** Wash affected area with soap and water. If signs/symptoms develop, get medical attention.

**Inhalation:** Remove person to fresh air. Get immediate medical attention.

**If Swallowed:** Do not induce vomiting unless instructed to do so by medical personnel. Give victim two glasses of water. Never give anything by mouth to an unconscious person. Get medical attention.

### 4.2 NOTE TO PHYSICIANS

Exposures resulting from intentional misuse and abuse may cause an increase in myocardial irritability. Do not administer sympathomimetic drugs unless absolutely necessary.

## SECTION 5: FIRE FIGHTING MEASURES

### 5.1 FLAMMABLE PROPERTIES

<b>Autoignition temperature</b>	396 °C
<b>Flash Point</b>	No flash point
<b>Flammable Limits(LEL)</b>	6.7 % volume

Flammable Limits(UEL)

13.7 % volume

## 5.2 EXTINGUISHING MEDIA

Use fire extinguishers with class B extinguishing agents (e.g., dry chemical, carbon dioxide).

## 5.3 PROTECTION OF FIRE FIGHTERS

**Special Fire Fighting Procedures:** Exposure to extreme heat can give rise to thermal decomposition. Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

**Unusual Fire and Explosion Hazards:** Closed containers exposed to heat from fire may build pressure and explode. Aerosol container contains gas under pressure. No unusual effects are anticipated during fire extinguishing operations. Avoid breathing the products and substances that may result from the thermal decomposition of the product or the other substances in the fire zone. Keep containers cool with water spray when exposed to fire to avoid rupture. Extreme conditions of heat (welding, open flame, misuse, or equipment failure) may produce decomposition products that include hydrogen fluoride and hydrogen chloride.

**Note: See STABILITY AND REACTIVITY (SECTION 10) for hazardous combustion and thermal decomposition information.**

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1. Personal precautions, protective equipment and emergency procedures

Ventilate the area with fresh air. If possible, seal leaking container. Place leaking containers in a well-ventilated area, preferably an operating exhaust hood, or if necessary outdoors on an impermeable surface until appropriate packaging for the leaking container or its contents is available.

### 6.2. Environmental precautions

Place depressurized can and clean up wastes in a closed container approved for transportation by appropriate authorities. Dispose of collected material as soon as possible.

### Clean-up methods

Observe precautions from other sections. Call 3M- HELPS line (1-800-364-3577) for more information on handling and managing the spill. Contain spilled material. Clean up residue. Place depressurized can and clean up wastes in a closed container approved for transportation by appropriate authorities.

**In the event of a release of this material, the user should determine if the release qualifies as reportable according to local, state, and federal regulations.**

## SECTION 7: HANDLING AND STORAGE

### 7.1 HANDLING

For industrial or professional use only. Avoid breathing of vapors, mists or spray. Do not breathe thermal decomposition products. Avoid eye contact with vapors, mists, or spray. Avoid skin contact with hot material. No smoking: Smoking while using this product can result in contamination of the tobacco and/or smoke and lead to the formation of the hazardous decomposition products mentioned in the Reactivity Data section of this MSDS. Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Store work clothes separately from other clothing, food and tobacco products. Contents may be under pressure, open carefully. Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below Occupational Exposure Limits. If ventilation is not adequate, use respiratory protection equipment. Avoid continuous exposure of the material to extreme conditions of heat, i.e., above 150C (welding, open flame, misuse or equipment failure). Avoid exceeding a watt density of 50 watts/inch<sup>2</sup> from a heater surface. Continuous exposure to 150C results in very slight decomposition of this product and, therefore, is a very conservative use temperature threshold. For additional information about applications involving exposure of the fluid to

temperatures exceeding 150C, please contact 3M Technical Service.

## 7.2 STORAGE

Keep container in well-ventilated area. Keep container tightly closed. Store away from heat. Store away from strong bases. Contents may be under pressure if stored/shipped under elevated temperature. Open closure slowly to vent pressure.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 ENGINEERING CONTROLS

Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below Occupational Exposure Limits and/or control mist, vapor, or spray. If ventilation is not adequate, use respiratory protection equipment. Provide appropriate local exhaust when product is heated. Provide appropriate local exhaust ventilation on open containers. Do not remain in area where available oxygen may be reduced. For those situations where the material might be exposed to extreme overheating due to misuse or equipment failure, use with appropriate local exhaust ventilation sufficient to maintain levels of thermal decomposition products below their exposure guidelines.

### 8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

#### 8.2.1 Eye/Face Protection

Avoid eye contact with vapors, mists, or spray.

The following eye protection(s) are recommended: Indirect Vented Goggles

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#### 8.2.2 Skin Protection

Avoid prolonged or repeated skin contact. Avoid skin contact with hot material. Wear heat insulating gloves when handling this material to prevent thermal burns.

Select and use gloves and/or protective clothing to prevent skin contact based on the results of an exposure assessment. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible materials.

Gloves made from the following material(s) are recommended: Fluoroelastomer

Polymer laminate

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#### 8.2.3 Respiratory Protection

Avoid breathing of vapors, mists or spray. Under normal use conditions, airborne exposures are not expected to be significant enough to require respiratory protection.

During heating:

Use a positive pressure supplied-air respirator if there is a potential for exposure from an uncontrolled release, exposure levels are not known, or under any other circumstances where air-purifying respirators may not provide adequate protection. Avoid breathing of vapors.

An exposure assessment may be needed to decide if a respirator is required. If a respirator is needed, use respirators as part of a full respiratory protection program. Based on the results of the exposure assessment, select from the following respirator type(s) to reduce inhalation exposure:

Half facepiece or full facepiece air-purifying respirator suitable for organic vapors and particulates

Half facepiece or full facepiece supplied-air respirator

For questions about suitability for a specific application, consult with your respirator manufacturer.

#### 8.2.4 Prevention of Swallowing

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water.

### 8.3 EXPOSURE GUIDELINES

<u>Ingredient</u>	<u>Authority</u>	<u>Type</u>	<u>Limit</u>	<u>Additional Information</u>
1,2-Trans-dichloroethylene	ACGIH	TWA	200 ppm	
Methyl nonafluorobutyl ether	AIHA	TWA	750 ppm	
Carbon dioxide	ACGIH	TWA	5000 ppm	
Carbon dioxide	ACGIH	STEL	30000 ppm	
Carbon dioxide	OSHA	TWA	9000 mg/m <sup>3</sup>	
Ethene, 1,2-dichloro-	ACGIH	TWA	200 ppm	
Ethene, 1,2-dichloro-	OSHA	TWA	790 mg/m <sup>3</sup>	
Ethyl nonafluorobutyl ether	Manufacturer determined	TWA, as total isomers	200 ppm	
Ethyl nonafluoroisobutyl ether	Manufacturer determined	TWA, as total isomers	200 ppm	
Methyl nonafluoroisobutyl ether	AIHA	TWA	750 ppm	

**SOURCE OF EXPOSURE LIMIT DATA:**

ACGIH: American Conference of Governmental Industrial Hygienists  
 CMRG: Chemical Manufacturer Recommended Guideline  
 OSHA: Occupational Safety and Health Administration  
 AIHA: American Industrial Hygiene Association Workplace Environmental Exposure Level (WEEL)

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

<b>Specific Physical Form:</b>	Aerosol
<b>Odor, Color, Grade:</b>	Clear, colorless with slight odor. Contents under pressure.
<b>General Physical Form:</b>	Liquid
<b>Autoignition temperature</b>	396 °C
<b>Flash Point</b>	No flash point
<b>Flammable Limits(LEL)</b>	6.7 % volume
<b>Flammable Limits(UEL)</b>	13.7 % volume
<b>Boiling Point</b>	43 °C
<b>Density</b>	1.4 g/ml
<b>Vapor Density</b>	<i>No Data Available</i>
<b>Vapor Pressure</b>	330 mmHg [ <i>@ 25 °C</i> ] [ <i>Details: Internal pressure for aerosol can is approximately 70 psig @ 70F (21C)</i> ]
<b>Specific Gravity</b>	1.4 [ <i>Ref Std: WATER=1</i> ]
<b>pH</b>	<i>Not Applicable</i>
<b>Melting point</b>	<i>Not Applicable</i>
<b>Solubility in Water</b>	Negligible
<b>Evaporation rate</b>	<i>No Data Available</i>
<b>Kow - Oct/Water partition coef</b>	<i>No Data Available</i>
<b>Percent volatile</b>	100 %
<b>Viscosity</b>	0.6 centipoise

**SECTION 10: STABILITY AND REACTIVITY**

**Stability:** Stable.

**Materials and Conditions to Avoid:**

**10.1 Conditions to avoid**

Not determined

### 10.2 Materials to avoid

Al or Mg powder and high/shear temperature conditions

**Hazardous Polymerization:** Hazardous polymerization will not occur.

### Hazardous Decomposition or By-Products

<u>Substance</u>	<u>Condition</u>
Hydrogen Chloride	At Elevated Temperatures - Extreme conditions of heat
Hydrogen Fluoride	At Elevated Temperatures - Extreme conditions of heat
Perfluoroisobutylene (PFIB)	At Elevated Temperatures - Extreme conditions of heat
Toxic Vapor, Gas, Particulate	At Elevated Temperatures - Extreme conditions of heat

**Hazardous Decomposition:** Perfluorinated Acid Fluorides

Hydrogen Fluoride has an ACGIH Threshold Limit Value of 3 parts per million (as fluoride) as a Ceiling Limit and an OSHA PEL of 3 ppm of fluoride as an eight hour Time-Weighted Average and 6 ppm of fluoride as a Short Term Exposure Limit. The odor threshold for HF is 0.04 ppm, providing good warning properties for exposure.

Decomposition of this product at temperatures above 300 degrees C can form perfluoroisobutylene (PFIB), but PFIB will only accumulate with continuous exposure to excessive heat in a sealed vessel. The formation rate for PFIB is about 1000 times less than the rate for primary thermal decomposition products such as HF. During normal use conditions, no health hazard is associated with the use of this material due to PFIB exposure.

## SECTION 11: TOXICOLOGICAL INFORMATION

### Component-Based Toxicology Information:

For a mixture of ethyl nonafluorobutyl ether and its isomer, a single positive response for cardiac sensitization was observed at an exposure level of 49,000 ppm. No adverse health effects are anticipated from normal handling and use.

## SECTION 12: ECOLOGICAL INFORMATION

### ECOTOXICOLOGICAL INFORMATION

See Section 3.3 : Potential Environmental Effects

### CHEMICAL FATE INFORMATION

See Section 3.3 : Potential Environmental Effects

## SECTION 13: DISPOSAL CONSIDERATIONS

**Waste Disposal Method:** Reclaim if feasible. To reclaim or return, contact your 3M sales representative. Incinerate in an industrial or commercial facility in the presence of a combustible material. As a disposal alternative, dispose of waste product in a facility permitted to accept chemical waste. Facility must be capable of handling aerosol cans. Combustion products will include HF and HCl. Facility must be capable of handling halogenated materials.

To reclaim or return, check product label for contact.

EPA Hazardous Waste Number (RCRA): Not regulated

Since regulations vary, consult applicable regulations or authorities before disposal.

## SECTION 14: TRANSPORT INFORMATION

### ID Number(s):

98-0212-3450-9, 98-0212-3463-2

For Transport Information, please visit <http://3M.com/Transportinfo> or call 1-800-364-3577 or 651-737-6501.

## SECTION 15: REGULATORY INFORMATION

### US FEDERAL REGULATIONS

Contact 3M for more information.

### 311/312 Hazard Categories:

Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No Immediate Hazard - Yes Delayed Hazard - No

Section 313 Toxic Chemicals subject to the reporting requirements of that section and 40 CFR part 372 (EPCRA):

<u>Ingredient</u>	<u>C.A.S. No</u>	<u>% by Wt</u>
1,2-Trans-dichloroethylene (Ethene, 1,2-dichloro-)	156-60-5	15 - 30

### STATE REGULATIONS

Contact 3M for more information.

### CHEMICAL INVENTORIES

The components of this product are in compliance with the chemical notification requirements of TSCA.

The components of this product are listed on the Canadian Domestic Substances List.

One or more of the components of this product have been notified to NICNAS (National Industrial Chemical Notification and Assessment Scheme) of Australia. Certain restrictions apply. Contact the selling division for additional information. The components of this product are listed on Japan's Chemical Substance Control Law List (also known as the Existing and New Chemical Substances List.)

The components of this material are in compliance with the new chemical notification requirements for the Korean Existing Chemicals Inventory.

All the components of this product are listed on China's Inventory of Chemical Substances.

Contact 3M for more information.

### INTERNATIONAL REGULATIONS

Contact 3M for more information.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

## SECTION 16: OTHER INFORMATION



**NFPA Hazard Classification**

**Health:** 3 **Flammability:** 1 **Reactivity:** 0 **Special Hazards:** None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

**HMIS Hazard Classification**

**Health:** 2 **Flammability:** 1 **Reactivity:** 0 **Protection:** X - See PPE section.

Hazardous Material Identification System (HMIS®) hazard ratings are designed to inform employees of chemical hazards in the workplace. These ratings are based on the inherent properties of the material under expected conditions of normal use and are not intended for use in emergency situations. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint and Coatings Association (NPCA).

Revision Changes:

Section 1: Product use information was modified.

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**3M USA MSDSs are available at [www.3M.com](http://www.3M.com)**



# Transport Information Document

**Date:** April 08, 2010

**3M ID Number:** 98-0212-3450-9

**Product Description:** 3M(TM) Novec(TM) Contact Cleaner Plus, 11 oz can, 6 cans per case

**Transport Protective Service:** PROTECTIVE SERVICE NOT REQUIRED

**NMFC Item:** 048580

**NMFC Sub:** 03

**NMFC Class:** 055.0

**Flash Point (Closed-cup):** No Flash Point

## UNITED STATES DEPARTMENT OF TRANSPORTATION - GROUND (U.S. DOT, 49 CFR)

CONSUMER COMMODITY, ORM-D

## UNITED STATES DEPARTMENT OF TRANSPORTATION - VESSEL (U.S. DOT, 49 CFR)

CONSUMER COMMODITY, ORM-D

## INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

UN1950, AEROSOLS, NON-FLAMMABLE, 2.2

## INTERNATIONAL MARITIME ORGANIZATION (IMO)

UN1950, AEROSOLS, 2.2, LIMITED QUANTITY

The classification is authorized by the Competent Authority of the United States of America and may not meet the requirements of other competent authorities.

These transportation classifications are provided as a customer service. AS THE SHIPPER YOU REMAIN RESPONSIBLE FOR COMPLYING WITH ALL THE APPLICABLE LAWS AND REGULATIONS, INCLUDING PROPER TRANSPORTATION CLASSIFICATION AND PACKAGING. 3M's transportation classifications are based on product formulations, packaging, 3M policies and 3M's understanding of applicable current regulations and is valid for the original 3M package only. 3M does not guarantee the accuracy of this classification information. This information applies only to transportation classification and NOT THE PACKAGING, LABELING, OR MARKING REQUIREMENTS. The original 3M package is certified for U.S. ground shipment only. If you are shipping by air or ocean, the package may not meet applicable regulatory requirements.

For Transport Information, please visit [3M.com/Transportinfo](http://3M.com/Transportinfo)

or call 1-800-364-3577 or 651-737-6501 for assistance.