



## Material Safety Data Sheet

Copyright, 2008, 3M Company. All rights reserved. Copying and/or downloading of this information for the purpose of properly utilizing 3M products is allowed provided that: (1) the information is copied in full with no changes unless prior written agreement is obtained from 3M, and (2) neither the copy nor the original is resold or otherwise distributed with the intention of earning a profit thereon.

### SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** 3M(TM) Novec(TM) 649 Engineered Fluid

**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:** 03/06/2008

**Supersedes Date:** 03/30/2006

**Document Group:** 19-2786-2

**Product Use:**

Intended Use: Heat Transfer Application

### SECTION 2: INGREDIENTS

<u>Ingredient</u>	<u>C.A.S. No.</u>	<u>% by Wt</u>
1,1,1,2,2,4,5,5,5-NONAFLUORO-4-(TRIFLUOROMETHYL)-3-PENTANONE	756-13-8	> 99.9

### SECTION 3: HAZARDS IDENTIFICATION

#### 3.1 EMERGENCY OVERVIEW

**Specific Physical Form:** Liquid

**Odor, Color, Grade:** clear colorless, low odor.

**General Physical Form:** Liquid

**Immediate health, physical, and environmental hazards:**

#### 3.2 POTENTIAL HEALTH EFFECTS

**Eye Contact:**

Contact with the eyes during product use is not expected to result in significant irritation.

**Skin Contact:**

Contact with the skin during product use is not expected to result in significant irritation.

**Inhalation:**

If thermal decomposition occurs:  
May be harmful if inhaled.

**Ingestion:**

No health effects are expected.

**3.3 POTENTIAL ENVIRONMENTAL EFFECTS**

This substance has a high Henry's Law constant and therefore will be primarily found in the atmosphere where photolysis will be the dominant reaction pathway. The ultimate degradation products of the photolysis reaction are HF, CO2 and trifluoroacetic acid (TFA).

This substance does not contribute to ozone depletion; it has an atmospheric lifetime of approximately 5 days and a Global Warming Potential (GWP) of 1 ( IPCC 2001 Method).

**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:** No need for first aid is anticipated.

**Skin Contact:** No need for first aid is anticipated.

**Inhalation:** If signs/symptoms develop, remove person to fresh air. If signs/symptoms persist, get medical attention.

**If Swallowed:** No need for first aid is anticipated.

**SECTION 5: FIRE FIGHTING MEASURES**

**5.1 FLAMMABLE PROPERTIES**

<b>Autoignition temperature</b>	<i>Not Applicable</i>
<b>Flash Point</b>	<i>Not Applicable</i>
<b>Flammable Limits - LEL</b>	[Details: Nonflammable]
<b>Flammable Limits - UEL</b>	[Details: Nonflammable]

**5.2 EXTINGUISHING MEDIA**

Material will not burn.

**5.3 PROTECTION OF FIRE FIGHTERS**

**Special Fire Fighting Procedures:** Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

**Unusual Fire and Explosion Hazards:** Not applicable.

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

## SECTION 6: ACCIDENTAL RELEASE MEASURES

**Accidental Release Measures:** Observe precautions from other sections. Call 3M- HELPS line (1-800-364-3577) for more information on handling and managing the spill. Ventilate the area with fresh air. Contain spill. For larger spills, cover drains and build dikes to prevent entry into sewer systems or bodies of water. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Collect as much of the spilled material as possible. Clean up residue. Place in a metal container approved for transportation by appropriate authorities. Seal the container. Dispose of collected material as soon as possible.

**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. Contents may be under pressure, open carefully. Avoid breathing of vapors, mists or spray. Do not breathe thermal decomposition products.

### 7.2 STORAGE

Keep container in well-ventilated area. Store out of direct sunlight. Store away from heat. Store away from strong bases, amines, and alcohols.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 ENGINEERING CONTROLS

Provide appropriate local exhaust ventilation on open containers. Provide appropriate local exhaust when product is heated.

### 8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

#### 8.2.1 Eye/Face Protection

As a good industrial hygiene practice:

Avoid eye contact with vapors, mists, or spray.

#### 8.2.2 Skin Protection

Gloves are not required.

#### 8.2.3 Respiratory Protection

Under normal use conditions, airborne exposures are not expected to be significant enough to require respiratory protection.

As a good industrial hygiene practice:

Avoid breathing of vapors, mists or spray.

If thermal decomposition occurs, wear supplied air respiratory protection.

### 8.2.4 Prevention of Swallowing

Not applicable.

## 8.3 EXPOSURE GUIDELINES

<u>Ingredient</u>	<u>Authority</u>	<u>Type</u>	<u>Limit</u>	<u>Additional Information</u>
1,1,1,2,2,4,5,5,5-NOXAFLURO-4-(TRIFLUOROMETHYL)-3-PENTANONE	3M	TWA	150 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>	Liquid
<b>Odor, Color, Grade:</b>	clear colorless, low odor.
<b>General Physical Form:</b>	Liquid
<b>Autoignition temperature</b>	<i>Not Applicable</i>
<b>Flash Point</b>	<i>Not Applicable</i>
<b>Flammable Limits - LEL</b>	[ <i>Details: Nonflammable</i> ]
<b>Flammable Limits - UEL</b>	[ <i>Details: Nonflammable</i> ]
<b>Boiling point</b>	49 °C
<b>Vapor Density</b>	11.6 [ <i>Ref Std: AIR=1</i> ]
<b>Vapor Pressure</b>	244 mmHg [ <i>@ 20 °C</i> ]
<b>Specific Gravity</b>	1.6 [ <i>Ref Std: WATER=1</i> ]
<b>pH</b>	<i>Not Applicable</i>
<b>Melting point</b>	-108 °C
<b>Solubility in Water</b>	Nil
<b>Evaporation rate</b>	> 1 [ <i>Ref Std: BUOAC=1</i> ]
<b>Volatile Organic Compounds</b>	1600 g/l [ <i>Test Method: calculated SCAQMD rule 443.1</i> ]
<b>Percent volatile</b>	100 %
<b>VOC Less H2O &amp; Exempt Solvents</b>	1600 g/l [ <i>Test Method: calculated SCAQMD rule 443.1</i> ]
<b>Viscosity</b>	0.6 centipoise [ <i>@ 25 °C</i> ]

## SECTION 10: STABILITY AND REACTIVITY

**Stability:** Stable.

**Materials and Conditions to Avoid:** Strong bases; Amines; Alcohols Additional Information: Avoid direct sunlight and ultraviolet light

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

### Hazardous Decomposition or By-Products

<u>Substance</u>	<u>Condition</u>
Carbon monoxide	During Combustion
Carbon dioxide	During Combustion
Hydrogen Fluoride	During Combustion

**Hazardous Decomposition:** 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.

## SECTION 11: TOXICOLOGICAL INFORMATION

Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

## SECTION 12: ECOLOGICAL INFORMATION

### ECOTOXICOLOGICAL INFORMATION

Please refer to existing literature on TFA.

### CHEMICAL FATE INFORMATION

Photolytic half-life: 3-5 days.

Photolytic degradation products may include Trifluoroacetic acid (TFA)

NOTE: Hydrolysis is not expected to be a significant degradation pathway. Product is highly insoluble in water and volatile, and use as a clean extinguishing agent would not typically result in releases to aquatic environments.

## SECTION 13: DISPOSAL CONSIDERATIONS

**Waste Disposal Method:** Incinerate 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. Reclaim if feasible. For information on product return, contact your distributor.

**EPA Hazardous Waste Number (RCRA):** Not regulated

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

## SECTION 14: TRANSPORT INFORMATION

**ID Number(s):**

98-0212-3239-6, 98-0212-3240-4, 98-0212-3352-7, 98-0212-3448-3

Please contact the emergency numbers listed on the first page of the MSDS for Transportation Information for this material.

## 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 - No Delayed Hazard - No

### STATE REGULATIONS

Contact 3M for more information.

### CHEMICAL INVENTORIES

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

One or more of the components of this product have been notified to ELINCS (European List of Notified or New Chemical Substances). Certain restrictions apply. Contact the selling division for additional information.

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

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

Contact 3M for more information.

**Additional Information:** The components of this product are in compliance with the chemical notification requirements of the National Industrial Chemical Notification and Assessment Scheme (NICNAS) of Australia, the Canadian Environmental Protection Act (CEPA) and the Ministry of Economy, Trade and Industry of Japan.

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

Hazardous Material Identification System (HMIS(r)) 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(r) ratings are to be used with a fully implemented HMIS(r) program. HMIS(r) is a registered mark of the National Paint and Coatings Association (NPCA).

**Revision Changes:**

Section 1: Product use information was modified.

Copyright was modified.

Section 14: ID Number Heading Template 1 was added.

Section 14: ID Number(s) Template 1 was added.

Section 2: Ingredient table was added.

Section 8: Exposure guidelines ingredient information was added.

Section 8: Exposure guidelines data source legend was added.

**DISCLAIMER:** The information in this Material Safety Data Sheet (MSDS) is believed to be correct as of the date issued. 3M MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF PERFORMANCE OR USAGE OF TRADE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of use or application. Given the variety of factors that can affect the use and application of a 3M product, some of which 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 user's method of use or application.

3M provides information in electronic form as a service to its customers. Due to the remote possibility that electronic transfer may have resulted in errors, omissions or alterations in this information, 3M makes no representations as to its completeness or accuracy. In addition, information obtained from a database may not be as current as the information in the MSDS available directly from 3M.

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