



Safety Data Sheet

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Document Number: 06-7950-6
Watch manufacture date: 2023/04/11

Edition: 5.03
Previous issue date: 2021/02/07

This Safety Data Sheet has been prepared in accordance with the "Rules for Hazardous Chemicals Labeling and General Regulations".

I. Chemicals and Manufacturer Information

1.1. Chemical Name

3M™ Fluorinert™ Electronic Liquid FC-3284

Other names:None

Product Identification Number

ZF-0002-1416-1 ZF-0002-1417-9 ZF-0002-1418-7 ZF-0002-1882-4

1.2. Recommended Uses and Restricted Uses

Recommended Uses

For industrial use only; intended for use as an electronic test solution or heat transfer fluid. Not suitable for medical devices or pharmaceutical applications.

Usage Restrictions

Fluorinert™ electronic fluids are suitable for a wide range of applications, including but not limited to: precise cleaning of medical devices and solvent for lubricant removal from medical devices. When the product is used in applications involving the implantation of finished devices into the human body, no residual fluorinated solvents will remain on the components. It is strongly recommended to cite supporting test results and protocols during the FDA registration process.

1.3. Names, Addresses, and Telephone Numbers of the Manufacturer, Importer, or Supplier

Name: Taiwan Minnesota Mining & Manufacturing Co., Ltd.
Address: 115018,3rd Floor, No.198 Jingmao 2nd Road, Nangang District, Taipei City
Contact phone number: (02) 2785-9338
URL: www.3m.com.tw

1.4. Emergency Contact Number / Fax Number

Emergency contact number:886-3-4783600

Fax numbers: (03) 475-0924,475-0904)

II. Hazard Identification Data

2.1. Chemical Hazard Classification

According to the CNS 15030 classification, it is not classified as a hazardous or harmful substance.

2.2. Labeling**Warning****Statements**

Not applicable

Symbolic Symbols

Not applicable

Hazard Diagram

Not applicable

2.3. Other Hazards

Unknown

3. Three-Dimensional Resolution Data**Pure substance**

Chemical properties: See Section 9 of this SDS.

Chinese and English Names		Chemical Abstracts Service Registry Number (CAS No.)	Concentration or concentration range (component percentage)
Perfluorocarbons, C5-18 Perfluoro Compounds, C5-18	PERFLUORO COMPOUNDS, C5-18	86508-42-1	95 - 100
Perfluoromethoxyethyl, dimethylamine (C ₅ F ₁₃ NO)	PERFLUOROMETHOXYETHYL, DIMETHYL AMINE C5F13NO	No	<= 3
C5-C7 perfluorocarbons, primarily C ₆ and C ₅ compounds. C7 Perfluoroalkanes, Primarily C6	C5-C7 PERFLUOROALKANES, PRIMARILY C6	No	<= 2

Mixture is not applicable.**IV. First Aid Measures****4.1. First Aid Procedures for Different Exposure Routes****Inhalation:**

Emergency medical attention is not expected. If symptoms occur, please move the affected person to a well-ventilated area and seek medical attention.

Skin contact:

If exposed, wash thoroughly with soap and water. If any signs or symptoms occur, seek medical attention.

Eye exposure:

If exposure occurs, rinse your eyes thoroughly with plenty of water. If possible, remove your contact lenses. Continue rinsing. If any signs or symptoms appear, seek medical attention immediately.

Intake:

Do not induce vomiting. Rinse your mouth. If you experience any discomfort, please seek medical attention.

4.2. Most Important Symptoms and Adverse Effects

No severe symptoms or effects have been observed. See Section 11.1 for toxicological information.

4.3. Protective Measures for Emergency Medical Personnel

Please refer to the information in other sections of this Safety Data Sheet for information on potential hazards to the body and health, respiratory protection, ventilation, and personal protective equipment.

4.4. Tips for Physicians

Not applicable

V. Fire Suppression Measures

5.1. Applicable Fire Extinguishing Agents

Use fire extinguishing agents suitable for the surrounding fire environment.

5.2. Special Hazards That May Arise During Firefighting Operations

Under overheating conditions, thermal decomposition may occur. Please refer to the health hazard data.

Hazardous decomposition products or by-products

Substances

Carbon monoxide
Carbon dioxide

Conditions

During the combustion process
During the combustion process

5.3. Special Firefighting Procedure

Wear a full set of protective gear, including a helmet, independent breathing apparatus (positive pressure or pressure-demand type), a protective vest and trousers, arm guards, waist harnesses, leg harnesses, a face shield, and a protective cover for the head exposure area.

5.4. Special Protective Equipment for Firefighters

No available information

VI. Leak Handling Procedures

6.1. Important Notes for Individuals

Ensure proper ventilation. In cases of large-scale spills or spills occurring in enclosed spaces, install mechanical exhaust systems in accordance with good industrial hygiene practices to disperse or remove the vapors. Please adhere to the preventive measures outlined in other sections.

6.2. Environmental Precautions

Avoid emissions into the environment.

6.3. Cleaning Method

Collect the leaked material in a container. From the overflow edge, cover the area inward with bentonite, vermiculite, or commercially available inorganic absorbent materials. Mix sufficient absorbent material until dry. Please note that adding additional absorbent material will not eliminate its potential physical, health, or environmental hazards. Collect the spilled material and place it in a sealed container approved by the competent authority. Qualified personnel shall use a dedicated solvent to remove the residual material, ventilate the area with fresh air, and dispose of the material in accordance with the solvent's label and the Safety Data Sheet (SDS). Seal the container tightly. Dispose of the collected waste material as soon as possible, in compliance with applicable local, regional, national, or international regulations.

7. Safety Handling and Storage Methods

7.1. Disposal

Do not inhale thermal decomposition products. For industrial and occupational use only; not suitable for consumer sale or use. Workwear must be stored separately from other clothing, food, and tobacco products; avoid discharge into the environment. Smoking is prohibited: smoking while using this product may result in tobacco-and/or smoke-related pollution and lead to the generation of hazardous decomposition products.

7.2. Storage

Store away from high-temperature areas.

8. Exposure Prevention Measures

8.1. Control Parameters

8-hour time-weighted average permissible concentration / Short-term time-weighted average permissible concentration / Maximum permissible concentration

None of the components listed in Section 3 of this Safety Data Sheet have occupational exposure limits.

Biological indicators

None of the components listed in Section 3 of this Safety Data Sheet have biological indicator values.

8.2. Exposure Control

8.2.1. Engineering Control

If overheating due to improper use or instrument malfunction leads to thermal decomposition, ensure adequate local ventilation to reduce the concentration of the thermal decomposition products below the exposure limit.

8.2.2. Personal Protective Equipment (PPE)

Eye/Facial Protection

No request was made.

Skin and Body/Hand Protection

Under normal operating conditions, chemical-resistant gloves are not required. However, when the product is exposed to extreme heat, HF may form; in such cases, it is recommended to use chloroprene rubber gloves and a protective apron.

Respiratory Protection

In cases where materials may be exposed to extreme overheating due to misuse or equipment failure, use a positive-pressure breathing apparatus.

8.3. Hygiene Measures

Section 7.1: Safety Handling Precautions

9. Physical and Chemical Properties

9.1. Basic Physical and Chemical Properties Data

Physical state	Liquid
Specific physical morphology:	Liquid
Color	Colorless
Odor	Flavorless
Olfactory threshold	<i>No available data</i>
pH value	<i>Not applicable</i>
Melting point/Freezing point	<i>Not applicable</i>

Boiling point / Initial boiling point / Boiling range	47 -57°C
Flash point	No flash point
Evaporation rate	> 1 The unit cannot be obtained or is not applicable [Reference standard:BUOAC=1]
Flammability (solid, gas)	Not applicable
Lower Explosive Limit (LEL)	Not detected
Explosion Limit (UEL)	Not detected
Vapor pressure	35,197 Pa [@20°C]
Vapor density and/or relative vapor density	10.3 [@20°C] [Reference standard:Air = 1]
Density	1.71 mg/mL
Relative density	1.71 [Reference standard:Water = 1]
Solubility	Zero
Solubility – Non-aqueous media	No available data
Octanol/water partition coefficient (log Kow)	No available data
Self-ignition temperature	No available data
Decomposition temperature	No available data
Viscosity/Dynamic Viscosity	0.4 Square millimeters per second
Volatile Organic Compounds	No available data
Volatile fraction	100 %
Volatile Organic Compounds (VOCs), no water required, and no solvents needed.	No available data
Molecular weight	Not applicable

Section 10: Stability and Reactivity

10.1. Reactivity

This raw material may react with certain reagents under specific conditions; for details on the remaining points, please refer to the explanation in this section.

10.2. Stability

Stable.

10.3. Potential Adverse Reactions Under Special Circumstances

No hazardous polymerization reactions will occur.

10.4. Conditions to Avoid

Hot

10.5. Substances to Avoid

Fine active metals

Alkali metals and alkaline earth metals

10.6. Hazardous Decomposition Products

Substances

Hydrogen fluoride

Perfluoroisobutylene (PFIB)

Conditions

At high temperatures – greater than 200°C

At high temperatures – greater than 200°C

For information regarding the hazardous decomposition products generated during the combustion process, please refer to Section 5.2.

Improper use or equipment damage that exposes the product to high-temperature environments may lead to the formation of toxic decomposition products, including hydrogen fluoride (HF) and perfluoroisobutylene.

XI. Toxic Data

The following information may not align with the material classification specified in Section 2, particularly when the classification of a specific component is authorized by the competent authority. Additionally, toxicological data for a component may not be reflected in the hazard and/or exposure indicators for the material, if the concentration of a particular component is below the required labeling threshold, or if no exposure may occur for that component, or if this information may not be relevant to the overall material.

11.1. Toxicological Impact-Related Data

Exposure routes/Symptoms

Based on test data and/or information regarding its composition, it is known that this material may have the following effects on health:

Inhalation:

No known health effects have been identified.

Skin contact:

During use, the product will not cause significant irritation to the skin.

Eye exposure:

During use, contact with the eyes will not cause significant irritation.

Swallowing:

No known health effects have been identified.

Chronic toxicity or long-term toxicity

Toxicological Data

If a component is listed in Section 3 but does not appear in the table below, this indicates that no data are available at this stage or that the available data are insufficient for classification.

Acute toxicity

Name	Exposure routes	Types	Numerical values
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ATE = Acute Toxicity Estimate

Skin corrosion/irritation

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Severe eye injury/irritation

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Allergenic:

Skin sensitization

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Respiratory allergy

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Reproductive cell mutagenicity

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Carcinogenicity

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Reproductive toxicity

Effects on reproduction and/or growth and development

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Target organ

Specific target organ toxicity – single exposure

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Specific target organ toxicity – repeated exposure

Regarding the composition, there are currently no data or available data sufficient to perform classification.

Inhalation-hazardous substances

Regarding the composition, there are currently no data or available data sufficient to perform classification.

For other toxicological data regarding this material and/or its components, please contact the address or telephone number listed on the first page of the Safety Data Sheet.

12. Ecological Data

The information provided below may not align with the material classification specified in Section 2; however, if the classification of a particular component is authorized by the competent authority, other information pertaining to the material classification in Section 2 may be provided upon request. Additionally, environmental effects and impact data for specific components may not be reflected in this section, where the concentration of one component is below the required labeling value, or where such component may not pose an exposure risk, or where the relevant data may not be relevant to the overall material.

12.1. Ecotoxicity

Acute aquatic organism hazards:

According to the GHS standard, there is no acute toxicity to aquatic organisms.

Chronic aquatic hazards:

According to the GHS standards, there is no chronic toxicity to aquatic organisms.

No available product test data

12.2. Persistence and Biodegradability

No available test data

12.3. Bioaccumulative Property

No available test data

12.4. Soil Mobility

For more detailed information, please contact the manufacturer.

12.5. Other Adverse Effects

No available data.

13. Disposal Methods

13.1. Waste Disposal Methods

Handle inner contents or containers in accordance with local, regional, national, or international regulations.

Prior to disposal, consult all applicable government regulations to ensure proper classification. Process waste products at licensed industrial waste treatment facilities. If the waste is a discardable substitute, incinerate it at a licensed waste incinerator. Appropriate destruction may require the use of additional fuel during the incineration process. The combustion products include hydrogen fluoride. The facility must be capable of handling halogenated substances. Empty and clean product containers may be treated as non-hazardous waste. Please consult your specific local regulations and service providers to determine the available options and requirements.

14. Shipping Documentation

14.1. International Regulations

Transportation does not pose any hazards.

United Nations Number:Not applicable

United Nations Transport Classification:Not applicable

Transportation Hazards Classification (IMO):Not Applicable

Transportation Hazards Classification (IATA):Not applicable

Packaging category:Not applicable

Marine pollutants (Yes/No):Not applicable

Special transportation methods and precautions:Not applicable

15. Regulatory Information

15.1. Regulations or Laws Specifically Governing the Safety, Health, and Environment of the Substance or Mixture.

Applicable Regulations:

Methods for the storage, removal, and treatment of industrial waste, and corresponding facility standards

Occupational Safety and Health Act

15.2. Global Product Registration Status

Australia's Chemicals List: Yes

Canadian domestic supply list: Yes

China's Current List of Chemical Substances (IECSC): Yes

Existing and newly classified chemical substances (ENCS) in Japan: Limited

Current list of chemicals in South Korea: Yes

New Zealand. Hazardous Substances Control (NZIoC): Yes

Philippine List of Chemicals and Chemical Substances: Yes

Taiwan's existing list of chemical substances: Yes

U.S. Toxic Substances Control Act: Currently in effect

16. Other Information

16.1. References

Watchmaking Unit

Name: Taiwan Minnesota Mining & Manufacturing Co., Ltd.
Address: 115018,3rd Floor, No.198 Jingmao 2nd Road, Nangang District, Taipei City
Phone: 886 3 478 3600 #388

Watchmaker

Professional Title: Senior Product Support Engineer
Name: Zhang Jianwen

Watch manufacture date

2023/04/11

Version Information:

Information on non-hazardous chemical components has been deleted.

Section 1: Address – Data has been updated.

Section 1: Emergency Contact Numbers – Data has been updated.

Section 1: Product Name – Data has been modified.

Section 2: Classification of Chemical Hazards – Information has been deleted.

Section 2: Hazard Diagram – Information has been deleted.

Section 2: Classification of Chemical Hazards – Information has been added.

Section 2: The hazard diagram is not applicable; information has been added.

Section 3: Ingredients – Concentration or Concentration Range (Ingredient Percentage); Title: Information has been added.

Section 3: Composition – Chemical Abstracts Service Registry Number (CAS No.), Title – Information has been added.

Section 3: Facial Recognition Data – Information has been deleted.

Section 4: First Aid for Eye Exposure – Information has been updated.

Section 4: First Aid Intake (Swallowing) Information – Data has been modified.

Section 4: First Aid Inhalation Information – Data has been updated.

Section 4: Information on First Aid for Skin Contact – Data has been updated.

Section 4: Toxicological Information – The information has been deleted.

Section 5: Flames – Firefighting Personnel Information; Data has been updated.

Section 7: Safety Precautions – The documentation has been updated.

Section 8: Appropriate Engineering Control Information – Data has been modified.

Section 8: Personal Protection – Respiratory Protection Information; Data has been updated.

Section 8: Personal Protection – Skin/Bodily Information; this information has been deleted.

Section 8: Personal Protection – Skin/Hand Information; Data has been modified.

Section 8: Personal Protection – Heat Stress Information; this information has been deleted.

Section 8: Skin Protection – Protective Clothing Information; information has been deleted.

Section 8: Skin Protection – Recommended Gloves; Information has been deleted.

Section 8: Skin Protection – Recommended Gloves; Information has been deleted.

Section 9: Flammability (solid, gas) information – Information has been added.

Section 9: Volatility Percentage – Information has been added.

Section 9: The attribute description is a selective characteristic; the information has been added.

Section 9: The attribute description specifies a selective characteristic; the information has been deleted.

Section 9: Steam density value – Information has been added.

Section 9: Steam density value – Information has been deleted.

Section 9: Viscosity Information – The information has been deleted.

Section 9: Viscosity – Information has been added.

Section 9: Information on H₂O without VOCs and exempt solvents has been added.

Section 9: Volatile Organic Compounds – Information has been added.
Section 11: Acute Toxicity Table – Information has been deleted.
Section 11: Reproductive Cell Mutagenicity Table – Information has been deleted.
Section 11: Mutagenicity of Reproductive Cells – This article has been added to the information database.
Section 11: Effects on reproduction and/or growth and development – Information has been deleted.
Section 11: Reproductive Toxicity Table – Information has been deleted.
Section 11: Severe Eye Injury/Stimulation Table – Information has been deleted.
Section 11: Severe ocular injury/stimulation – This information has been added.
Section 11: Skin Corrosion/ irritation Table – Information has been deleted.
Section 11: Skin Corrosion/ irritation – This article has been added to the information database.
Section 11: Skin Allergy Table – Information has been deleted.
Section 11: Skin Allergies – Information has been added.
Article 11: Specific Target Organ Toxicity – Repeated Exposure; this information has been added.
Article 11: Specific Target Organ Toxicity – Single Exposure Data; information has been added.
Section 11: Specific Target Organ Toxicity – Repeated Exposure Table; information has been deleted.
Section 11: Specific Target Organ Toxicity – Single Exposure Table; information has been deleted.
Section 12: Chemical Ecotoxicity – Information has been deleted.
If there is no data on potential bioaccumulation, the data will not be printed; the information has been added.
If there is no data on persistence or biodegradability, no data will be printed; the information has been added.
Section 12: Persistence and Degradability – Information has been deleted.
Section 12: Bioaccumulation Information has been deleted.
Section 15: Global Product Registration Status – Data has been updated.
Section 15: Methods and Facilities Standards – Data has been modified.
Section 3: Ingredients list has been added.
Section 3: Non-mixed substance – information has been added.
Section 3: Pure substance information has been added.

Disclaimer: The information contained in this Safety Data Sheet is based on our experience and is accurate as of the date of publication; however, we shall not be liable for any loss, injury, or damage arising from its use (except as otherwise provided by law). This data sheet does not apply to any other uses not mentioned herein, nor to any applications involving the combination of this product with other materials. For these reasons, it is highly recommended that customers conduct their own tests to ensure that the product is suitable for their specific application requirements.

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