



Safety Data Sheet

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This Safety Data Sheet has been prepared in accordance with the Malaysia Occupational Safety and Health (Chemical Classification, Labelling and Safety Data Sheets) Regulations 2013.

SECTION 1: Identification

1.1. Product identifier

3M™ Novec™ Contact Cleaner / Lubricant

Product Identification Numbers

98-0212-4887-1 98-0212-4888-9 UU-0037-2227-7

1.2. Recommended use and restrictions on use

Recommended use

Contact cleaner/Lubricant. For industrial use only. Not intended for use as a medical device or drug.

Restrictions on use

3M™ 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.

1.3. Supplier's details

ADDRESS: 3M Malaysia Sdn. Bhd., Level 8, Block F, Oasis Square, No.2, Jalan PJU 1A/7A, Ara Damansara 47301
Petaling, Jaya, Selangor
Telephone: 03-7884 2888
E Mail: 3mmyehsr@mmm.com
Website: www.3M.com.my

1.4. Emergency telephone number

+60 03-7884 2888

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

Gas Under Pressure: Liquefied gas.
Serious Eye Damage/Irritation: Category 2.
Chronic Aquatic Toxicity: Category 4.

2.2. Label elements

Signal word

Warning

Symbols

Gas cylinder | Exclamation mark |

Pictograms



Hazard Statements

H280 Contains gas under pressure; may explode if heated.
H320 Causes eye irritation.
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statements

General:

P102 Keep out of reach of children.
P101 If medical advice is needed, have product container or label at hand.

Response:

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage:

P410 + P403 Protect from sunlight. Store in a well-ventilated place.

Disposal:

P501 Dispose of contents/container in accordance with applicable local/regional/national/international regulations.

2.3. Other hazards

May cause drowsiness or dizziness.

SECTION 3: Composition/information on ingredients

This material is a mixture.

Ingredient	C.A.S. No.	% by Wt
Ethyl nonafluoroisobutyl ether	163702-06-5	25 - 40
Ethyl nonafluorobutyl ether	163702-05-4	15 - 30

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1,2-Trans-dichloroethylene	156-60-5	15 - 25
Methyl nonafluoroisobutyl ether	163702-08-7	10 - 20
Methyl nonafluorobutyl ether	163702-07-6	5 - 15
POLY(DIMETHYLSILOXANE)	63148-62-9	1 - 2

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:

Remove person to fresh air. If you feel unwell, get medical attention.

Skin Contact:

Wash with soap and water. If you feel unwell, get medical attention.

Eye Contact:

Flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. If signs/symptoms persist, get medical attention.

If Swallowed:

Rinse mouth. If you feel unwell, get medical attention.

4.2. Most important symptoms and effects, both acute and delayed

See Section 11.1. Information on toxicological effects.

4.3. Indication of any immediate medical attention and special treatment required

Not applicable.

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Use a fire fighting agent suitable for the surrounding fire.

5.2. Special hazards arising from the substance or mixture

Closed containers exposed to heat from fire may build pressure and explode. Exposure to extreme heat can give rise to thermal decomposition.

5.3. Special protective actions for fire-fighters

When fire fighting conditions are severe and total thermal decomposition of the product is possible, wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Ventilate the area with fresh air. Refer to other sections of this SDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment.

6.2. Environmental precautions

Avoid release to the environment. For larger spills, cover drains and build dikes to prevent entry into sewer systems or bodies of water.

6.3. Methods and material for containment and cleaning up

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. Contain spill. 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. Remember, adding an absorbent material does not remove a physical, health, or environmental hazard. Collect as much of the spilled material as possible. Place in a closed container approved for transportation by appropriate authorities. Clean up residue with an appropriate solvent selected by a qualified and authorized person. Ventilate the area with fresh air. Read and follow safety precautions on the solvent label and SDS. Seal the container. Dispose of collected material as soon as possible.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Do not breathe thermal decomposition products. Do not use in a confined area with minimal air exchange. Store work clothes separately from other clothing, food and tobacco products. Do not pierce or burn, even after use. Avoid breathing dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Avoid release to the environment. No smoking: Smoking while using this product can result in contamination of the tobacco and/or smoke and lead to the formation of hazardous decomposition products.

7.2. Conditions for safe storage including any incompatibilities

Store in a well-ventilated place. Keep container tightly closed. Protect from sunlight. Do not expose to temperatures exceeding 50C/122F. Store away from strong bases.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

If a component is disclosed in section 3 but does not appear in the table below, an occupational exposure limit is not available for the component.

Ingredient	C.A.S. No.	Agency	Limit type	Additional Comments
1,2-Trans-dichloroethylene	156-60-5	ACGIH	TWA:200 ppm	
Ethene, 1,2-dichloro-	156-60-5	Malaysia OELs	TWA(8 hours):793 mg/m3(200 ppm)	
Ethyl nonafluorobutyl ether	163702-05-4	Manufacturer determined	TWA(as total isomers):200 ppm	
Ethyl nonafluoroisobutyl ether	163702-06-5	Manufacturer determined	TWA(as total isomers):200 ppm	

ACGIH : American Conference of Governmental Industrial Hygienists

CMRG : Chemical Manufacturer's Recommended Guidelines

Malaysia OELs : Malaysia. Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations

TWA: Time-Weighted-Average

STEL: Short Term Exposure Limit

CEIL: Ceiling

8.2. Exposure controls

8.2.1. Engineering controls

Provide appropriate local exhaust when product is heated. Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/fume/gas/mist/vapors/spray. If ventilation is not adequate, use respiratory protection equipment.

8.2.2. Personal protective equipment (PPE)

Eye/face protection

Select and use eye/face protection to prevent contact based on the results of an exposure assessment. The following eye/face

protection(s) are recommended:
Indirect Vented Goggles

Skin/hand protection

Select and use gloves and/or protective clothing approved to relevant local standards to prevent skin contact based on the results of an exposure assessment. Selection should be based on use factors such as exposure levels, concentration of the substance or mixture, frequency and duration, physical challenges such as temperature extremes, and other use conditions. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible gloves/protective clothing.

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

If this product is used in a manner that presents a higher potential for exposure (eg. spraying, high splash potential etc.), then use of protective coveralls may be necessary. Select and use body protection to prevent contact based on the results of an exposure assessment. The following protective clothing material(s) are recommended: Apron – Nitrile

Respiratory protection

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:

During heating:

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

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

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

SECTION 9: Physical and chemical properties**9.1. Information on basic physical and chemical properties**

Physical state	Liquid
Specific Physical Form:	Aerosol
Appearance/Odor	Clear colorless liquid. Faint odor. Contents under pressure.
Odor threshold	<i>No Data Available</i>
pH	4.7 - 5.3
Melting point/Freezing point	<i>Not Applicable</i>
Boiling point/Initial boiling point/Boiling range	51.1 °C [@ 101,324.72 Pa]
Flash Point	No flash point
Evaporation rate	<i>No Data Available</i>
Flammability (solid, gas)	Not Applicable
Flammable Limits(LEL)	<i>No Data Available</i>
Flammable Limits(UEL)	<i>No Data Available</i>
Vapor Pressure	30,090.8 Pa [@ 20 °C]
Vapor Density	<i>No Data Available</i>
Density	1.3746 g/ml [@ 23 °C]
Relative Density	1.3746 g/ml
Water solubility	7 ppm [@ 23 °C]
Solubility- non-water	<i>No Data Available</i>
Partition coefficient: n-octanol/ water	<i>No Data Available</i>
Autoignition temperature	<i>No Data Available</i>
Decomposition temperature	<i>No Data Available</i>
Viscosity	0.00057 Pa-s [@ 25 °C]

SECTION 10: Stability and reactivity

10.1. Reactivity

This material may be reactive with certain agents under certain conditions - see the remaining headings in this section.

10.2. Chemical stability

Stable.

10.3. Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4. Conditions to avoid

Not determined

10.5. Incompatible materials

Al or Mg powder and high/shear temperature conditions

Strong bases

10.6. Hazardous decomposition products

<u>Substance</u>	<u>Condition</u>
Carbon monoxide	At Elevated Temperatures
Carbon dioxide	At Elevated Temperatures
Hydrogen Chloride	At Elevated Temperatures
Hydrogen Fluoride	At Elevated Temperatures
Perfluoroisobutylene (PFIB)	At Elevated Temperatures
Toxic Vapor, Gas, Particulate	At Elevated Temperatures

If the product is exposed to extreme condition of heat from misuse or equipment failure, toxic decomposition products that include hydrogen fluoride and perfluoroisobutylene can occur.

SECTION 11: Toxicological information

The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labeling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.

11.1. Information on Toxicological effects

Signs and Symptoms of Exposure

Based on test data and/or information on the components, this material may produce the following health effects:

Inhalation:

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

Skin Contact:

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

Eye Contact:

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

3M™ Novec™ Contact Cleaner / Lubricant**Ingestion:**

May be harmful if swallowed.

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

May cause additional health effects (see below).

Additional Health Effects:**Single exposure may cause 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.

Toxicological Data

If a component is disclosed in section 3 but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

Acute Toxicity

Name	Route	Species	Value
Overall product	Ingestion		No data available; calculated ATE 2,000 - 5,000 mg/kg
Ethyl nonafluoroisobutyl ether	Dermal		LD50 estimated to be 2,000 - 5,000 mg/kg
Ethyl nonafluoroisobutyl ether	Inhalation-Vapor (4 hours)	Rat	LC50 > 989 mg/l
Ethyl nonafluoroisobutyl ether	Ingestion	Rat	LD50 > 2,000 mg/kg
Ethyl nonafluorobutyl ether	Dermal		LD50 estimated to be 2,000 - 5,000 mg/kg
Ethyl nonafluorobutyl ether	Inhalation-Vapor (4 hours)	Rat	LC50 > 989 mg/l
Ethyl nonafluorobutyl ether	Ingestion	Rat	LD50 > 2,000 mg/kg
1,2-Trans-dichloroethylene	Dermal	Rabbit	LD50 > 5,000 mg/kg
1,2-Trans-dichloroethylene	Inhalation-Vapor (4 hours)	Rat	LC50 95.6 mg/l
1,2-Trans-dichloroethylene	Ingestion	Rat	LD50 7,902 mg/kg
Methyl nonafluoroisobutyl ether	Dermal		LD50 estimated to be > 5,000 mg/kg
Methyl nonafluoroisobutyl ether	Inhalation-Vapor (4 hours)	Rat	LC50 > 1,000 mg/l
Methyl nonafluoroisobutyl ether	Ingestion	Rat	LD50 > 5,000 mg/kg
Methyl nonafluorobutyl ether	Dermal		LD50 estimated to be > 5,000 mg/kg
Methyl nonafluorobutyl ether	Inhalation-Vapor (4 hours)	Rat	LC50 > 1,000 mg/l
Methyl nonafluorobutyl ether	Ingestion	Rat	LD50 > 5,000 mg/kg
POLY(DIMETHYLSILOXANE)	Dermal	Rabbit	LD50 > 19,400 mg/kg
POLY(DIMETHYLSILOXANE)	Ingestion	Rat	LD50 > 17,000 mg/kg

ATE = acute toxicity estimate

Skin Corrosion/Irritation

Name	Species	Value
Ethyl nonafluoroisobutyl ether	Rabbit	No significant irritation
Ethyl nonafluorobutyl ether	Rabbit	No significant irritation
1,2-Trans-dichloroethylene	Rabbit	Minimal irritation
Methyl nonafluoroisobutyl ether	Rabbit	No significant irritation
Methyl nonafluorobutyl ether	Rabbit	No significant irritation
POLY(DIMETHYLSILOXANE)	Rabbit	No significant irritation

Serious Eye Damage/Irritation

Name	Species	Value
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Ethyl nonafluoroisobutyl ether	Rabbit	No significant irritation
Ethyl nonafluorobutyl ether	Rabbit	No significant irritation
1,2-Trans-dichloroethylene	Rabbit	Moderate irritant
Methyl nonafluoroisobutyl ether	Rabbit	No significant irritation
Methyl nonafluorobutyl ether	Rabbit	No significant irritation
POLY(DIMETHYLSILOXANE)	Rabbit	No significant irritation

Skin Sensitization

Name	Species	Value
Ethyl nonafluoroisobutyl ether	Guinea pig	Not sensitizing
Ethyl nonafluorobutyl ether	Guinea pig	Not sensitizing
Methyl nonafluoroisobutyl ether	Guinea pig	Not sensitizing
Methyl nonafluorobutyl ether	Guinea pig	Not sensitizing

Respiratory Sensitization

For the component/components, either no data are currently available or the data are not sufficient for classification.

Germ Cell Mutagenicity

Name	Route	Value
Ethyl nonafluoroisobutyl ether	In Vitro	Not mutagenic
Ethyl nonafluoroisobutyl ether	In vivo	Not mutagenic
Ethyl nonafluorobutyl ether	In Vitro	Not mutagenic
Ethyl nonafluorobutyl ether	In vivo	Not mutagenic
1,2-Trans-dichloroethylene	In Vitro	Not mutagenic
1,2-Trans-dichloroethylene	In vivo	Not mutagenic
Methyl nonafluoroisobutyl ether	In Vitro	Not mutagenic
Methyl nonafluoroisobutyl ether	In vivo	Not mutagenic
Methyl nonafluorobutyl ether	In Vitro	Not mutagenic
Methyl nonafluorobutyl ether	In vivo	Not mutagenic

Carcinogenicity

For the component/components, either no data are currently available or the data are not sufficient for classification.

Reproductive Toxicity**Reproductive and/or Developmental Effects**

Name	Route	Value	Species	Test Result	Exposure Duration
Ethyl nonafluoroisobutyl ether	Inhalation	Some positive developmental data exist, but the data are not sufficient for classification	Rat	NOAEL 260 mg/l	during gestation
Ethyl nonafluorobutyl ether	Inhalation	Some positive developmental data exist, but the data are not sufficient for classification	Rat	NOAEL 260 mg/l	during gestation
1,2-Trans-dichloroethylene	Inhalation	Some positive developmental data exist, but the data are not sufficient for classification	Rat	NOAEL 24 mg/l	during organogenesis
Methyl nonafluoroisobutyl ether	Inhalation	Not toxic to female reproduction	Rat	NOAEL 129 mg/l	1 generation
Methyl nonafluoroisobutyl ether	Inhalation	Not toxic to male reproduction	Rat	NOAEL 129 mg/l	1 generation
Methyl nonafluoroisobutyl ether	Inhalation	Some positive developmental data exist, but the data are not sufficient for classification	Rat	NOAEL 307 mg/l	during gestation
Methyl nonafluorobutyl ether	Inhalation	Not toxic to female reproduction	Rat	NOAEL 129 mg/l	1 generation

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Methyl nonafluorobutyl ether	Inhalation	Not toxic to male reproduction	Rat	NOAEL 129 mg/l	1 generation
Methyl nonafluorobutyl ether	Inhalation	Some positive developmental data exist, but the data are not sufficient for classification	Rat	NOAEL 307 mg/l	during gestation

Target Organ(s)
Specific Target Organ Toxicity - single exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
Ethyl nonafluoroisobutyl ether	Inhalation	cardiac sensitization	Some positive data exist, but the data are not sufficient for classification	Dog	NOAEL 204 mg/l	17 minutes
Ethyl nonafluoroisobutyl ether	Inhalation	respiratory irritation	All data are negative	Rat	NOAEL 989 mg/l	4 hours
Ethyl nonafluorobutyl ether	Inhalation	cardiac sensitization	Some positive data exist, but the data are not sufficient for classification	Dog	NOAEL 204 mg/l	17 minutes
Ethyl nonafluorobutyl ether	Inhalation	respiratory irritation	All data are negative	Rat	NOAEL 989 mg/l	4 hours
1,2-Trans-dichloroethylene	Inhalation	central nervous system depression	Some positive data exist, but the data are not sufficient for classification	Human	NOAEL Not available	occupational exposure
1,2-Trans-dichloroethylene	Inhalation	respiratory irritation	Some positive data exist, but the data are not sufficient for classification		NOAEL Not available	
1,2-Trans-dichloroethylene	Ingestion	central nervous system depression	May cause drowsiness or dizziness	Rat	LOAEL 4,500 mg/kg	not applicable
Methyl nonafluoroisobutyl ether	Inhalation	nervous system	Some positive data exist, but the data are not sufficient for classification	Dog	LOAEL 913 mg/l	10 minutes
Methyl nonafluoroisobutyl ether	Inhalation	cardiac sensitization	All data are negative	Dog	NOAEL 913 mg/l	10 minutes
Methyl nonafluorobutyl ether	Inhalation	nervous system	Some positive data exist, but the data are not sufficient for classification	Dog	LOAEL 913 mg/l	10 minutes
Methyl nonafluorobutyl ether	Inhalation	cardiac sensitization	All data are negative	Dog	NOAEL 913 mg/l	10 minutes

Specific Target Organ Toxicity - repeated exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
Ethyl nonafluoroisobutyl ether	Inhalation	liver kidney and/or bladder respiratory system	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 263.4 mg/l	4 weeks
Ethyl nonafluoroisobutyl ether	Inhalation	heart endocrine system bone marrow hematopoietic system immune system nervous system	All data are negative	Rat	NOAEL 263.4 mg/l	4 weeks
Ethyl nonafluoroisobutyl ether	Ingestion	blood liver kidney and/or bladder	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 1,000 mg/kg/day	28 days
Ethyl nonafluoroisobutyl ether	Ingestion	heart endocrine system bone marrow hematopoietic system immune system nervous system respiratory system	All data are negative	Rat	NOAEL 1,000 mg/kg/day	28 days
Ethyl nonafluorobutyl ether	Inhalation	liver kidney and/or bladder respiratory system	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 263.4 mg/l	4 weeks

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Ethyl nonafluorobutyl ether	Inhalation	heart endocrine system bone marrow hematopoietic system immune system nervous system	All data are negative	Rat	NOAEL 263.4 mg/l	4 weeks
Ethyl nonafluorobutyl ether	Ingestion	blood liver kidney and/or bladder	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 1,000 mg/kg/day	28 days
Ethyl nonafluorobutyl ether	Ingestion	heart endocrine system bone marrow hematopoietic system immune system nervous system respiratory system	All data are negative	Rat	NOAEL 1,000 mg/kg/day	28 days
1,2-Trans-dichloroethylene	Inhalation	endocrine system liver kidney and/or bladder respiratory system	All data are negative	Rat	NOAEL 16 mg/l	90 days
1,2-Trans-dichloroethylene	Ingestion	kidney and/or bladder	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 2,000 mg/kg/day	14 weeks
1,2-Trans-dichloroethylene	Ingestion	blood liver	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 125 mg/kg/day	14 weeks
1,2-Trans-dichloroethylene	Ingestion	heart immune system respiratory system	All data are negative	Rat	NOAEL 2,000 mg/kg/day	14 weeks
Methyl nonafluoroisobutyl ether	Inhalation	liver	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 155 mg/l	13 weeks
Methyl nonafluoroisobutyl ether	Inhalation	bone, teeth, nails, and/or hair	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 129 mg/l	11 weeks
Methyl nonafluoroisobutyl ether	Inhalation	heart skin endocrine system hematopoietic system immune system muscles nervous system eyes kidney and/or bladder respiratory system	All data are negative	Rat	NOAEL 155 mg/l	13 weeks
Methyl nonafluoroisobutyl ether	Ingestion	endocrine system liver	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 1,000 mg/kg/day	28 days
Methyl nonafluoroisobutyl ether	Ingestion	heart hematopoietic system immune system nervous system eyes kidney and/or bladder respiratory system	All data are negative	Rat	NOAEL 1,000 mg/kg/day	28 days
Methyl nonafluorobutyl ether	Inhalation	liver	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 155 mg/l	13 weeks
Methyl nonafluorobutyl ether	Inhalation	bone, teeth, nails, and/or hair	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 129 mg/l	11 weeks
Methyl nonafluorobutyl ether	Inhalation	heart skin endocrine system hematopoietic system immune system muscles nervous system	All data are negative	Rat	NOAEL 155 mg/l	13 weeks

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		eyes kidney and/or bladder respiratory system				
Methyl nonafluorobutyl ether	Ingestion	endocrine system liver	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 1,000 mg/kg/day	28 days
Methyl nonafluorobutyl ether	Ingestion	heart hematopoietic system immune system nervous system eyes kidney and/or bladder respiratory system	All data are negative	Rat	NOAEL 1,000 mg/kg/day	28 days

Aspiration Hazard

For the component/components, either no data are currently available or the data are not sufficient for classification.

Please contact the address or phone number listed on the first page of the SDS for additional toxicological information on this material and/or its components.

SECTION 12: Ecological information

The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. Additional information leading to material classification in Section 2 is available upon request. In addition, environmental fate and effects data on ingredients may not be reflected in this section because an ingredient is present below the threshold for labeling, an ingredient is not expected to be available for exposure, or the data is considered not relevant to the material as a whole.

12.1. Toxicity

Acute aquatic hazard:

GHS Acute 3: Harmful to aquatic life.

Chronic aquatic hazard:

GHS Chronic 4: May cause long lasting harmful effects to aquatic organisms

No product test data available

Material	Cas #	Organism	Type	Exposure	Test Endpoint	Test Result
1,2-Trans-dichloroethylene	156-60-5	Water flea	Experimental	48 hours	Effect Concentration 50%	220 mg/l
1,2-Trans-dichloroethylene	156-60-5	Bluegill	Estimated	96 hours	Lethal Concentration 50%	140 mg/l
Methyl nonafluorobutyl ether	163702-07-6	Water flea	Experimental	48 hours	Effect Concentration 50%	>10 mg/l
Methyl nonafluorobutyl ether	163702-07-6	Fathead Minnow	Experimental	96 hours	Lethal Concentration 50%	>7.9 mg/l
Methyl nonafluorobutyl ether	163702-07-6	Green Algae	Experimental	96 hours	Effect Concentration 50%	>8.9 mg/l
Ethyl nonafluorobutyl ether	163702-05-4	Water flea	Experimental	48 hours	Effect Concentration 50%	>100 mg/l

Ethyl nonafluorobutyl ether	163702-05-4	Fathead Minnow	Experimental	96 hours	Lethal Concentration 50%	>100 mg/l
Ethyl nonafluorobutyl ether	163702-05-4	Green Algae	Experimental	96 hours	Effect Concentration 50%	>100 mg/l
Ethyl nonafluoroisobutyl ether	163702-06-5	Green Algae	Experimental	96 hours	Effect Concentration 50%	>100 mg/l
Ethyl nonafluoroisobutyl ether	163702-06-5	Water flea	Experimental	48 hours	Effect Concentration 50%	>100 mg/l
Ethyl nonafluoroisobutyl ether	163702-06-5	Fathead Minnow	Experimental	96 hours	Lethal Concentration 50%	>100 mg/l
Methyl nonafluoroisobutyl ether	163702-08-7	Green Algae	Experimental	96 hours	Effect Concentration 50%	>8.9 mg/l
Methyl nonafluoroisobutyl ether	163702-08-7	Fathead Minnow	Experimental	96 hours	Lethal Concentration 50%	>7.9 mg/l
Methyl nonafluoroisobutyl ether	163702-08-7	Water flea	Experimental	48 hours	Effect Concentration 50%	>10 mg/l
Methyl nonafluorobutyl ether	163702-07-6	Green Algae	Experimental	96 hours	No obs Effect Conc	>8.9 mg/l
Methyl nonafluoroisobutyl ether	163702-08-7	Green Algae	Experimental	96 hours	No obs Effect Conc	>8.9 mg/l

12.2. Persistence and degradability

Material	CAS No.	Test Type	Duration	Study Type	Test Result	Protocol
1,2-Trans-dichloroethylene	156-60-5	Experimental Photolysis		Photolytic half-life (in air)	13 days (t 1/2)	Other methods
Ethyl nonafluoroisobutyl ether	163702-06-5	Estimated Hydrolysis		Hydrolytic half-life	648 days (t 1/2)	Other methods
Ethyl nonafluoroisobutyl ether	163702-06-5	Experimental Biodegradation	28 days	Biological Oxygen Demand	0 % weight	OECD 301D - Closed Bottle Test
Ethyl nonafluorobutyl ether	163702-05-4	Estimated Hydrolysis		Hydrolytic half-life	648 days (t 1/2)	Other methods
Methyl nonafluorobutyl ether	163702-07-6	Experimental Biodegradation	28 days	Biological Oxygen Demand	22 % weight	OECD 301D - Closed Bottle Test
Methyl nonafluoroisobutyl ether	163702-08-7	Experimental Biodegradation	28 days	Biological Oxygen Demand	22 % weight	OECD 301D - Closed Bottle Test
1,2-Trans-dichloroethylene	156-60-5	Experimental Biodegradation	28 days	Biological Oxygen Demand	8 % weight	OECD 301D - Closed Bottle Test

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Ethyl nonafluorobutyl ether	163702-05-4	Experimental Biodegradation	28 days	Biological Oxygen Demand	0 % weight	OECD 301D - Closed Bottle Test
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12.3. Bioaccumulative potential

Material	CAS No.	Test Type	Duration	Study Type	Test Result	Protocol
Ethyl nonafluoroisobutyl ether	163702-06-5	Experimental BCF-Carp	56 days	Bioaccumulation Factor	919	OECD 305E-Bioaccum FI-thru fis
Ethyl nonafluorobutyl ether	163702-05-4	Experimental BCF-Carp	56 days	Bioaccumulation Factor	919	OECD 305E-Bioaccum FI-thru fis
Methyl nonafluorobutyl ether	163702-07-6	Experimental Bioconcentration		Log of Octanol/H ₂ O part. coeff	3.54	Other methods
Methyl nonafluoroisobutyl ether	163702-08-7	Experimental Bioconcentration		Log of Octanol/H ₂ O part. coeff	3.54	Other methods
1,2-Trans-dichloroethylene	156-60-5	Experimental Bioconcentration		Log of Octanol/H ₂ O part. coeff	2.09	Other methods

12.4. Mobility in soil

Please contact manufacturer for more details

12.5 Other adverse effects

Material	CAS No.	Ozone Depletion Potential	Global Warming Potential
1,2-trans-dichloroethylene	156-60-5	0	
ethyl nonafluorobutyl ether	163702-05-4	0	
ethyl nonafluoroisobutyl ether	163702-06-5	0	
methyl nonafluorobutyl ether	163702-07-6	0	
methyl nonafluoroisobutyl ether	163702-08-7	0	

SECTION 13: Disposal considerations**13.1. Disposal methods**

According to the Environmental Quality (Scheduled Wastes) Regulations 2005, scheduled waste has to be sent to a prescribed premise for recycling, treatment or disposal. Please approach Kualiti Alam for proper schedule waste classification and disposal.

SECTION 14: Transport Information**Marine Transport (IMDG)**

UN Number: UN1950

Proper Shipping Name: AEROSOLS, FLAMMABLE

Technical Name: None assigned.

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Hazard Class/Division: 2.2

Subsidiary Risk: None assigned.

Packing Group: None assigned.

Limited Quantity: Yes

Marine Pollutant: None assigned.

Marine Pollutant Technical Name: None assigned.

Other Dangerous Goods Descriptions:

None assigned.

Air Transport (IATA)

UN Number: UN1950

Proper Shipping Name: AEROSOLS, FLAMMABLE

Technical Name: None assigned.

Hazard Class/Division: 2.2

Subsidiary Risk: None assigned.

Packing Group: None assigned.

Limited Quantity: None assigned.

Marine Pollutant: None assigned.

Marine Pollutant Technical Name: None assigned.

Other Dangerous Goods Descriptions:

None assigned.

Transportation classifications are provided as a customer service. As for shipping, YOU remain responsible for complying with all applicable laws and regulations, including proper transportation classification and packaging. 3M's transportation classifications are based on product formulation, packaging, 3M policies and 3M's understanding of applicable current regulations. 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 above information is only for reference. If you are shipping by air or ocean, YOU are advised to check & meet applicable regulatory requirements.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Global inventory status

Contact 3M for more information.

SECTION 16: Other information

DISCLAIMER: The information on this Safety Data Sheet is based on our experience and is correct to the best of our knowledge at the date of publication, but we do not accept any liability for any loss, damage or injury resulting from its use (except as required by law). The information may not be valid for any use not referred to in this Data Sheet or use of the product in combination with other materials. For these reasons, it is important that customers carry out their own test to satisfy themselves as to the suitability of the product for their own intended applications.

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