



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™ 72DA Engineered Fluid

Product Identification Numbers

70-2134-0516-3 98-0212-3095-2 98-0212-3096-0 98-0212-3097-8 98-0212-3163-8
98-0212-3440-0

1.2. Recommended use and restrictions on use

Recommended use

For Industrial Use Only. See Limitations on Use for supplemental information on intended applications including Medical Device applications., Cleaning and Coating Solvent

For Industrial or Professional use only

Restrictions on use

Novec™ Engineered Fluids are used in a wide variety of applications including but not limited to precision cleaning of medical devices and as a lubricant deposition solvent 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 Materials Solutions Division (EMSD) 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 EMSD 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**

Serious Eye Damage/Irritation: Category 2.

Chronic Aquatic Toxicity: Category 3.

2.2. Label elements**Signal word**

Warning

Symbols

Exclamation mark |

Pictograms**Hazard Statements:**

H319 Causes serious eye irritation.

H412 Harmful to aquatic life with long lasting effects.

Precautionary statements**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.

Disposal:

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

2.3. Other hazards

In use, may form flammable/explosive vapour-air mixture., May cause drowsiness or dizziness.

SECTION 3: Composition/information on ingredients

This material is a mixture.

Ingredient	C.A.S. No.	% by Wt
1,2-Trans-dichloroethylene	156-60-5	66 - 70
Ethyl nonafluoroisobutyl ether	163702-06-5	10 - 19
Ethyl nonafluorobutyl ether	163702-05-4	1 - 10
Methyl Nonafluoroisobutyl Ether	163702-08-7	5 - 10
Methyl Nonafluorobutyl Ether	163702-07-6	1 - 5
Isopropyl alcohol	67-63-0	1 - 3

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:

Immediately flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. 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

Central nervous system depression (headache, dizziness, drowsiness, incoordination, nausea, slurred speech, giddiness, and unconsciousness).

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

Material displays no closed-cup flash point but may form flammable/explosive vapor air mixture.

Hazardous Decomposition or By-Products

Substance

Carbon monoxide

Carbon dioxide

Hydrogen Chloride

Hydrogen Fluoride

Condition

During Combustion

During Combustion

During Combustion

During Combustion

5.3. Special protective actions for fire-fighters

No special protective actions for fire-fighters are anticipated.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Keep away from sparks, flames, and extreme heat. Evacuate area. Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. 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

Eliminate all potential ignition sources when cleaning up spill. 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 in accordance with applicable local/regional/national/international regulations.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Contents may be under pressure, open carefully. For industrial/occupational use only. Not for consumer sale or use. Store work clothes separately from other clothing, food and tobacco products. 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. Avoid contact with oxidizing agents (eg. chlorine, chromic acid etc.) 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. Keep away from sparks, flames, and extreme heat.

7.2. Conditions for safe storage including any incompatibilities

Store in a well-ventilated place. Keep container tightly closed. Store away from heat. Store at temperatures not exceeding 38C/100F. Store away from strong bases. Store away from oxidizing agents.

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	
Ethyl nonafluorobutyl ether	163702-05-4	Manufacturer determined	TWA(as total isomers):200 ppm(2160 mg/m3)	
Ethyl nonafluoroisobutyl ether	163702-06-5	Manufacturer determined	TWA(as total isomers):200 ppm(2160 mg/m3)	
Isopropyl alcohol	67-63-0	ACGIH	TWA:200 ppm;STEL:400 ppm	A4: Not class. as human carcin
Isopropyl alcohol	67-63-0	Malaysia OELs	TWA(8 hours):983 mg/m3(400 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

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. Provide ventilation adequate to maintain vapor concentration below lower explosive concentration.

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

Chemical protective gloves are not required under normal use conditions. However, when the product is subjected to extreme heat, HF may be formed. For those cases, neoprene gloves and apron are recommended.

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:

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

Organic vapor respirators may have short service life.

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:	Liquid
Color	Colorless
Odor	Slight Odor
Odor threshold	<i>No Data Available</i>
pH	<i>Not Applicable</i>
Melting point/Freezing point	<i>Not Applicable</i>
Boiling point/Initial boiling point/Boiling range	45 °C
Flash Point	No flash point [<i>Details:Tested according to ASTM Method D-3278-96 e-1</i>]
Evaporation rate	<i>No Data Available</i>
Flammability (solid, gas)	Not Applicable
Flammable Limits(LEL)	5.9 % volume [<i>Details:Tested according to ASTM Method E681-98 (per Annex A1)</i>]
Flammable Limits(UEL)	14.5 % volume [<i>Details:Tested according to ASTM Method E681-98 (per Annex A1)</i>]
Vapor Pressure	47,995.9 Pa [<i>@ 25 °C</i>]
Vapor Density and/or Relative Vapor Density	2.26 [<i>@ 25 °C</i>] [<i>Ref Std:AIR=1</i>]
Density	1.27 g/ml
Relative Density	1.27 [<i>Ref Std:WATER=1</i>]
Water solubility	Slight (less than 10%)
Solubility- non-water	<i>No Data Available</i>
Partition coefficient: n-octanol/ water	<i>No Data Available</i>
Autoignition temperature	408 °C
Decomposition temperature	<i>Not Applicable</i>
Viscosity/Kinematic Viscosity	0.4 mPa-s
Volatile Organic Compounds	889 g/l [<i>Test Method:South Cost Air Qual Mgmt Dist</i>]
Percent volatile	100 %
VOC Less H2O & Exempt Solvents	889 g/l [<i>Test Method:South Cost Air Qual Mgmt Dist</i>]
Molecular weight	<i>No Data Available</i>

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

Heat

Sparks and/or flames

10.5. Incompatible materials

Strong bases

Strong oxidizing agents

10.6. Hazardous decomposition products

<u>Substance</u>	<u>Condition</u>
Carbon monoxide	At Elevated Temperatures - extreme conditions of heat
Carbon dioxide	At Elevated Temperatures - extreme conditions of heat
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

Refer to section 5.2 for hazardous decomposition products during combustion.

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.

May cause additional health effects (see below).

Skin Contact:

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

Eye Contact:

Severe Eye Irritation: Signs/symptoms may include significant redness, swelling, pain, tearing, cloudy appearance of the cornea, and impaired vision.

Ingestion:

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	Dermal		No data available; calculated ATE >5,000 mg/kg
Overall product	Inhalation-Vapor(4 hr)		No data available; calculated ATE >50 mg/l
Overall product	Ingestion		No data available; calculated ATE >5,000 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
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
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
Isopropyl alcohol	Dermal	Rabbit	LD50 12,870 mg/kg
Isopropyl alcohol	Inhalation-	Rat	LC50 72.6 mg/l

	Vapor (4 hours)		
Isopropyl alcohol	Ingestion	Rat	LD50 4,710 mg/kg

ATE = acute toxicity estimate

Skin Corrosion/Irritation

Name	Species	Value
1,2-Trans-dichloroethylene	Rabbit	Minimal irritation
Ethyl nonafluoroisobutyl ether	Rabbit	No significant irritation
Ethyl nonafluorobutyl ether	Rabbit	No significant irritation
Methyl Nonafluoroisobutyl Ether	Rabbit	No significant irritation
Methyl Nonafluorobutyl Ether	Rabbit	No significant irritation
Isopropyl alcohol	Multiple animal species	No significant irritation

Serious Eye Damage/Irritation

Name	Species	Value
1,2-Trans-dichloroethylene	Rabbit	Moderate irritant
Ethyl nonafluoroisobutyl ether	Rabbit	No significant irritation
Ethyl nonafluorobutyl ether	Rabbit	No significant irritation
Methyl Nonafluoroisobutyl Ether	Rabbit	No significant irritation
Methyl Nonafluorobutyl Ether	Rabbit	No significant irritation
Isopropyl alcohol	Rabbit	Severe irritant

Sensitization:

Skin Sensitization

Name	Species	Value
Ethyl nonafluoroisobutyl ether	Guinea pig	Not classified
Ethyl nonafluorobutyl ether	Guinea pig	Not classified
Methyl Nonafluoroisobutyl Ether	Guinea pig	Not classified
Methyl Nonafluorobutyl Ether	Guinea pig	Not classified
Isopropyl alcohol	Guinea pig	Not classified

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
1,2-Trans-dichloroethylene	In Vitro	Not mutagenic
1,2-Trans-dichloroethylene	In vivo	Not mutagenic
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
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
Isopropyl alcohol	In Vitro	Not mutagenic
Isopropyl alcohol	In vivo	Not mutagenic

Carcinogenicity

Name	Route	Species	Value
Isopropyl alcohol	Inhalation	Rat	Some positive data exist, but the data are not sufficient for classification

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

Name	Route	Value	Species	Test Result	Exposure Duration
1,2-Trans-dichloroethylene	Inhalation	Not classified for development	Rat	NOAEL 24 mg/l	during organogenesis
Ethyl nonafluoroisobutyl ether	Inhalation	Not classified for development	Rat	NOAEL 260 mg/l	during gestation
Ethyl nonafluorobutyl ether	Inhalation	Not classified for development	Rat	NOAEL 260 mg/l	during gestation
Methyl Nonafluoroisobutyl Ether	Inhalation	Not classified for female reproduction	Rat	NOAEL 129 mg/l	1 generation
Methyl Nonafluoroisobutyl Ether	Inhalation	Not classified for male reproduction	Rat	NOAEL 129 mg/l	1 generation
Methyl Nonafluoroisobutyl Ether	Inhalation	Not classified for development	Rat	NOAEL 307 mg/l	during gestation
Methyl Nonafluorobutyl Ether	Inhalation	Not classified for female reproduction	Rat	NOAEL 129 mg/l	1 generation
Methyl Nonafluorobutyl Ether	Inhalation	Not classified for male reproduction	Rat	NOAEL 129 mg/l	1 generation
Methyl Nonafluorobutyl Ether	Inhalation	Not classified for development	Rat	NOAEL 307 mg/l	during gestation
Isopropyl alcohol	Ingestion	Not classified for development	Rat	NOAEL 400 mg/kg/day	during organogenesis
Isopropyl alcohol	Inhalation	Not classified for development	Rat	LOAEL 9 mg/l	during gestation

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

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
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
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	Not classified	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	Not classified	Rat	NOAEL 989 mg/l	4 hours
Methyl Nonafluoroisobutyl Ether	Inhalation	nervous system	Not classified	Dog	LOAEL 913 mg/l	10 minutes
Methyl Nonafluoroisobutyl Ether	Inhalation	cardiac sensitization	Not classified	Dog	NOAEL 913 mg/l	10 minutes
Methyl Nonafluorobutyl Ether	Inhalation	nervous system	Not classified	Dog	LOAEL 913 mg/l	10 minutes
Methyl Nonafluorobutyl Ether	Inhalation	cardiac sensitization	Not classified	Dog	NOAEL 913 mg/l	10 minutes
Isopropyl alcohol	Inhalation	central nervous	May cause drowsiness or	Human	NOAEL Not	

		system depression	dizziness		available	
Isopropyl alcohol	Inhalation	respiratory irritation	Some positive data exist, but the data are not sufficient for classification	Human	NOAEL Not available	
Isopropyl alcohol	Inhalation	auditory system	Not classified	Guinea pig	NOAEL 13.4 mg/l	24 hours
Isopropyl alcohol	Ingestion	central nervous system depression	May cause drowsiness or dizziness	Human	NOAEL Not available	poisoning and/or abuse

Specific Target Organ Toxicity - repeated exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
1,2-Trans-dichloroethylene	Inhalation	endocrine system liver kidney and/or bladder respiratory system	Not classified	Rat	NOAEL 16 mg/l	90 days
1,2-Trans-dichloroethylene	Ingestion	kidney and/or bladder	Not classified	Rat	NOAEL 2,000 mg/kg/day	14 weeks
1,2-Trans-dichloroethylene	Ingestion	blood liver	Not classified	Rat	NOAEL 125 mg/kg/day	14 weeks
1,2-Trans-dichloroethylene	Ingestion	heart immune system respiratory system	Not classified	Rat	NOAEL 2,000 mg/kg/day	14 weeks
Ethyl nonafluoroisobutyl ether	Inhalation	liver kidney and/or bladder respiratory system heart endocrine system gastrointestinal tract bone marrow hematopoietic system immune system nervous system	Not classified	Rat	NOAEL 263.4 mg/l	4 weeks
Ethyl nonafluoroisobutyl ether	Ingestion	blood liver kidney and/or bladder heart endocrine system bone marrow hematopoietic system immune system nervous system respiratory system	Not classified	Rat	NOAEL 1,000 mg/kg/day	28 days
Ethyl nonafluorobutyl ether	Inhalation	liver kidney and/or bladder respiratory system heart endocrine system gastrointestinal tract bone marrow hematopoietic system immune system nervous system	Not classified	Rat	NOAEL 263.4 mg/l	4 weeks
Ethyl nonafluorobutyl ether	Ingestion	blood liver kidney and/or bladder heart endocrine system bone marrow hematopoietic system immune system nervous system respiratory system	Not classified	Rat	NOAEL 1,000 mg/kg/day	28 days
Methyl Nonafluoroisobutyl Ether	Inhalation	liver	Not classified	Rat	NOAEL 155 mg/l	13 weeks
Methyl Nonafluoroisobutyl Ether	Inhalation	bone, teeth, nails, and/or hair	Not classified	Rat	NOAEL 129 mg/l	11 weeks

Methyl Nonafluoroisobutyl Ether	Inhalation	heart skin endocrine system gastrointestinal tract hematopoietic system immune system muscles nervous system eyes kidney and/or bladder respiratory system	Not classified	Rat	NOAEL 155 mg/l	13 weeks
Methyl Nonafluoroisobutyl Ether	Ingestion	endocrine system liver heart hematopoietic system immune system nervous system eyes kidney and/or bladder respiratory system	Not classified	Rat	NOAEL 1,000 mg/kg/day	28 days
Methyl Nonafluorobutyl Ether	Inhalation	liver	Not classified	Rat	NOAEL 155 mg/l	13 weeks
Methyl Nonafluorobutyl Ether	Inhalation	bone, teeth, nails, and/or hair	Not classified	Rat	NOAEL 129 mg/l	11 weeks
Methyl Nonafluorobutyl Ether	Inhalation	heart skin endocrine system gastrointestinal tract hematopoietic system immune system muscles nervous system eyes kidney and/or bladder respiratory system	Not classified	Rat	NOAEL 155 mg/l	13 weeks
Methyl Nonafluorobutyl Ether	Ingestion	endocrine system liver heart hematopoietic system immune system nervous system eyes kidney and/or bladder respiratory system	Not classified	Rat	NOAEL 1,000 mg/kg/day	28 days
Isopropyl alcohol	Inhalation	kidney and/or bladder	Not classified	Rat	NOAEL 12.3 mg/l	24 months
Isopropyl alcohol	Inhalation	nervous system	Not classified	Rat	NOAEL 12 mg/l	13 weeks
Isopropyl alcohol	Ingestion	kidney and/or bladder	Not classified	Rat	NOAEL 400 mg/kg/day	12 weeks

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 3: Harmful to aquatic life with long lasting effects

Material	Organism	Type	Exposure	Test Endpoint	Test Result
3M™ Novec™ 72DA Engineered Fluid	Water flea	Calculated-Additive Toxicity	48 hours	EC50	>300 mg/l
3M™ Novec™ 72DA Engineered Fluid	Bluegill	Calculated-Additive Toxicity	96 hours	LC50	>190 mg/l

Material	Cas #	Organism	Type	Exposure	Test Endpoint	Test Result
1,2-Trans-dichloroethylene	156-60-5	Anaerobic sludge	Experimental	96 hours	IC50	48 mg/l
Ethyl nonafluoroisobutyl ether	163702-06-5	Green algae	Estimated	72 hours	EC10	2.37 mg/l
Ethyl nonafluorobutyl ether	163702-05-4	Green algae	Estimated	72 hours	EC10	2.37 mg/l
Methyl Nonafluoroisobutyl Ether	163702-08-7	Green algae	Estimated	72 hours	NOEC	100 mg/l
Methyl Nonafluorobutyl Ether	163702-07-6	Green algae	Estimated	72 hours	NOEC	100 mg/l
Isopropyl alcohol	67-63-0	Green algae	Experimental	72 hours	NOEC	1,000 mg/l
Isopropyl alcohol	67-63-0	Water flea	Experimental	21 days	NOEC	100 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)	
1,2-Trans-dichloroethylene	156-60-5	Experimental Biodegradation	28 days	Percent degraded	8 %BOD/ThBOD	OECD 301D - Closed Bottle Test
Ethyl nonafluoroisobutyl ether	163702-06-5	Estimated Biodegradation	28 days	Biological Oxygen Demand	0 %BOD/ThBOD	OECD 301D - Closed Bottle Test
Ethyl nonafluorobutyl ether	163702-05-4	Estimated Biodegradation	28 days	Biological Oxygen Demand	0 %BOD/ThBOD	OECD 301D - Closed Bottle Test
Methyl Nonafluoroisobutyl Ether	163702-08-7	Estimated Biodegradation	28 days	Biological Oxygen Demand	22 %BOD/ThBOD	OECD 301D - Closed Bottle Test

Methyl Nonafluorobutyl Ether	163702-07-6	Estimated Biodegradation	28 days	Biological Oxygen Demand	22 %BOD/ThB OD	OECD 301D - Closed Bottle Test
Isopropyl alcohol	67-63-0	Experimental Biodegradation	14 days	Biological Oxygen Demand	86 %BOD/ThB OD	OECD 301C - MITI (I)

12.3. Bioaccumulative potential

Material	CAS No.	Test Type	Duration	Study Type	Test Result	Protocol
1,2-Trans-dichloroethylene	156-60-5	Experimental Bioconcentration		Log of Octanol/H ₂ O part. coeff	2.06	
Methyl Nonafluoroisobutyl Ether	163702-08-7	Estimated Bioconcentration		Log of Octanol/H ₂ O part. coeff	4.0	Non-standard method
Methyl Nonafluorobutyl Ether	163702-07-6	Estimated Bioconcentration		Log of Octanol/H ₂ O part. coeff	4.0	Non-standard method
Isopropyl alcohol	67-63-0	Experimental Bioconcentration		Log of Octanol/H ₂ O part. coeff	0.05	Non-standard method

12.4. Mobility in soil

Please contact manufacturer for more details

12.5 Other adverse effects

No information available

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

Not hazardous for transportation.

Marine Transport (IMDG)

UN Number:None assigned.

Proper Shipping Name:None assigned.

Technical Name:None assigned.

Hazard Class/Division:None assigned.

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.

Air Transport (IATA)

UN Number:None assigned.

Proper Shipping Name:None assigned.

Technical Name:None assigned.

Hazard Class/Division:None assigned.

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. The components of this material are in compliance with the provisions of the Korea Chemical Control Act. Certain restrictions may apply. Contact the selling division for additional information. The components of this material are in compliance with the provisions of Japan Chemical Substance Control Law. Certain restrictions may apply. Contact the selling division for additional information. The components of this product are in compliance with the new substance notification requirements of CEPA. This product complies with Measures on Environmental Management of New Chemical Substances. All ingredients are listed on or exempt from on China IECSC inventory. The components of this product are in compliance with the chemical notification requirements of TSCA. All required components of this product are listed on the active portion of the TSCA Inventory.

SECTION 16: Other information

DISCLAIMER: The information in this Safety Data Sheet (SDS) 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 SDS or use of the product in combination with other materials. For these reasons, it is important that customers carry out their own evaluation to satisfy themselves as to the suitability of the product for their own intended applications. In addition, this SDS is being provided to convey health and safety information. If you are the importer of record of this product into Malaysia, you are responsible for all applicable regulatory requirements, including, but not limited to, product registrations/notifications, substance volume tracking, and potential substance registration/notification.

3M Malaysia SDSs are available at www.3M.com.my