

# SAFETY DATA SHEET

## TMC HFE-347E Engineered Fluid

### SECTION 1: IDENTIFICATION

#### 1.1. Product identifier:

**Trade name:** TMC HFE-347E Engineered Fluid  
**▼ Other names / Synonyms:** 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
**Product no.:** 2502E, 2502E-B, 2502E-2.2, 2502E-12, 2502E-50, 2502E-550  
**Other means of identification:** CAS No.: 406-78-0

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against:

**Relevant identified uses of the substance or mixture:** Solvent (for cleaning and degreasing)  
Restricted to professional users.  
**Uses advised against :** None known.

#### 1.3. Details of the supplier of the safety data sheet:

**Company and address:** TMC Industries, Inc.  
1423 Mill Lane  
Waconia, Minnesota 55387  
USA  
TF: +1 (800) 772-8179  
www.tmcindustries.com

**Contact person:** Nick Hansen  
**E-mail:** sales@tmcindustries.com  
**SDS date:** 3/10/2025  
**SDS Version:** 6.0  
**Date of previous version:** 1/10/2025 (5.0)

#### 1.4. Emergency telephone number:

VeolocityEHS 1-800-255-3924 (Contract#: MIS8157133) within the US, Canada, Puerto Rico and the U.S. Virgin Islands. If outside those areas, call 1-813-248-0585 (Contract#: MIS8157133).

### SECTION 2: HAZARD(S) IDENTIFICATION

#### OSHA/HCS status:

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

#### 2.1. Classification of the substance or mixture:

Skin Irrit. 2; H315, Causes skin irritation.  
Eye Irrit. 2; H319, Causes serious eye irritation.  
STOT SE 3; H335, May cause respiratory irritation.

#### 2.2. Label elements:

##### Hazard pictogram(s):



##### Signal word:

Warning

##### Hazard statement(s):

Causes skin irritation. (H315)  
Causes serious eye irritation. (H319)  
May cause respiratory irritation. (H335)

**Precautionary statement(s):**

- General:** -
- Prevention:** Avoid breathing mist/vapour. (P261)  
Wash hands thoroughly after handling. (P264)  
Wear eye protection/protective gloves/protective clothing. (P280)
- Response:** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. (P305+P351+P338)  
Call a POISON CENTER/doctor if you feel unwell. (P312)  
If eye irritation persists: Get medical advice/attention. (P337+P313)
- Storage:** Store in a well-ventilated place. Keep container tightly closed. (P403+P233)
- Disposal:** Dispose of contents/container in accordance with local regulation (P501)
- Additional labelling:** Not applicable.

**2.3. Other hazards:**

**SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

**3.1. ▼ Substances:**

Product/substance	Identifiers	% w/w	Classification	Note
1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether	CAS No.: 406-78-0	100%	Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 3, H335	

**3.2. Mixtures:**

Not applicable. This product is a substance.

Where the concentration of an ingredient is expressed as a range the exact concentration has been withheld as a trade secret.

See full text of H-phrases in section 16. Occupational exposure limits are listed in section 8, if these are available.

**Other information:**

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**SECTION 4: FIRST-AID MEASURES**

**4.1. Description of first aid measures:**

- General information:** If breathing is irregular, drowsiness, loss of consciousness or cramps: Call 911 and give immediate treatment (first aid).  
Contact a doctor if in doubt about the injured person's condition or if the symptoms persist. Never give an unconscious person water or other drink.
- Inhalation:** Upon breathing difficulties or irritation of the respiratory tract: Bring the person into fresh air and stay with him/her.
- Skin contact:** IF ON SKIN: Wash with plenty of water and soap.  
Remove contaminated clothing and shoes. Ensure to wash exposed skin thoroughly with water and soap. DO NOT use solvents or thinners.  
If skin irritation occurs: Get medical advice/attention.
- Eye contact:** If in eyes: Flush eyes immediately with plenty of water or isotonic water (20-30 °C) for at least 5 minutes and continue until irritation stops. Remove contact lenses. Make sure to flush under upper and lower eyelids. If irritation continues, contact a doctor. Continue

**Ingestion:** flushing during transport.  
If the person is conscious, rinse the mouth with water and stay with the person. Never give the person anything to drink.  
In case of malaise, seek medical advice immediately and bring the safety data sheet or label from the product. Do not induce vomiting, unless recommended by the doctor.  
Have the person lean forward with head down to avoid inhalation of or choking on vomited material.

**Burns:** Not applicable.

#### **4.2. Most important symptoms and effects, both acute and delayed:**

Irritation effects: This product contains substances, which may cause irritation upon exposure to skin, eyes or lungs. Exposure may result in an increased absorption potential of other hazardous substances at the area of exposure.

#### **4.3. Indication of any immediate medical attention and special treatment needed:**

If eye irritation persists: Get medical advice/attention.

#### **Information to medics:**

Bring this safety data sheet or the label from this product.

### **SECTION 5: FIRE-FIGHTING MEASURES**

#### **5.1. Extinguishing media:**

Suitable extinguishing media: Alcohol-resistant foam, carbon dioxide, powder, water mist.

Unsuitable extinguishing media: Waterjets should not be used, since they can spread the fire.

#### **5.2. Special hazards arising from the substance or mixture:**

Fire will result in dense smoke. Exposure to combustion products may harm your health. Closed containers, which are exposed to fire, should be cooled with water. Do not allow fire-extinguishing water to enter the sewage system and nearby surface waters.

If the product is exposed to high temperatures, e.g. in the event of fire, dangerous decomposition compounds are produced. These are:

Halogenated compounds  
Carbon oxides (CO / CO<sub>2</sub>)

#### **5.3. Advice for firefighters:**

Wear self-contained breathing apparatus and protective clothing to prevent contact. Upon direct exposure contact the Poison Help Line on 1-800-222-1222 (24/7) in order to obtain further advice.

### **SECTION 6: ACCIDENTAL RELEASE MEASURES**

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

Avoid direct contact with spilled substances.

Ensure adequate ventilation, especially in confined areas.

Avoid inhalation of vapours from spilled material.

Contaminated areas may be slippery.

#### **6.2. Environmental precautions:**

Avoid discharge to lakes, streams, sewers, etc.

Keep unauthorized persons away from the spill

#### **6.3. Methods and material for containment and cleaning up:**

Limit spillage and collect using granular absorbent or similar materials, and dispose of it in accordance with the regulations on dangerous waste.

Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations.

Wherever possible cleaning should be performed with normal cleaning agents. Avoid use of solvents.

#### 6.4. Reference to other sections:

See section 13 "Disposal considerations" on handling of waste.  
See section 8 "Exposure controls/personal protection" for protective measures.

### SECTION 7: HANDLING AND STORAGE

#### 7.1. Precautions for safe handling:

Smoking, drinking and consumption of food is not allowed in the work area.  
See section 8 "Exposure controls/personal protection" for information on personal protection.

#### 7.2. Conditions for safe storage, including any incompatibilities:

Containers that have been opened must be carefully resealed and kept upright to prevent leakage.

**Recommended storage material:** Comply with laws.  
**Storage conditions:** Keep container tightly closed  
Store in a cool, dark and well-ventilated place  
**Incompatible materials:** Strong oxidizing agents

#### 7.3. Specific end use(s):

This product should only be used for applications quoted in section 1.2.

### SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

#### 8.1. Control parameters:

No substances are listed with a permissible exposure limit (ref: 29 CFR 1910.1000 TABLE Z-1)

#### 8.2. Exposure controls:


Apply general control to prevent unnecessary exposure

**General recommendations:** Smoking, drinking and consumption of food is not allowed in the work area.  
**Exposure scenarios:** There are no exposure scenarios implemented for this product.  
**Exposure limits:** Occupational exposure limits have not been defined for the substances in this product.  
**Appropriate technical measures:** Apply standard precautions during use of the product. Avoid inhalation of vapours.  
**Hygiene measures:** Take off contaminated clothing and wash it before reuse.  
**Measures to avoid environmental exposure:** No specific requirements.


#### Individual protection measures, such as personal protective equipment:


**Generally:** Use only protective equipment with a recognized certification mark, e.g. the UL mark.

#### Respiratory Equipment:


Work situation	Type	Class	Colour	Standards	
if the situation requires.	Vapor respirator				

#### Skin protection:



Work situation	Recommended	Type/Category	Standards	
if the situation requires.	Wear appropriate protection clothing, e.g. coveralls in polypropylene or working clothes in cotton or polyester.	-	-	

Work situation	Recommended	Type/Category	Standards	
if the situation requires.	Protective boots	Protective boots		

**Hand protection:**

Work situation	Material	Glove thickness (mm)	Breakthrough time (min.)	Standards	
if the situation requires.	Chemical Resistant gloves				

**Eye protection:**

Work situation	Type	Standards	
if the situation requires.	Safety glasses	EN166	
if the situation requires.	Face shield	EN166	

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

**9.1. Information on basic physical and chemical properties:**

<b>Physical state:</b>	Liquid
<b>Color:</b>	Colorless - Very pale yellow
<b>Odor:</b>	No data available
<b>Odor threshold (ppm):</b>	No data available
<b>pH:</b>	No data available
<b>Density (g/cm<sup>3</sup>):</b>	No data available
<b>Relative density:</b>	1.487 (77 °F)
<b>Kinematic viscosity:</b>	No data available
<b>Particle characteristics:</b>	No data available

**Phase changes:**

<b>Melting point/freezing point (°F):</b>	No data available
<b>Softening point/range (°F):</b>	Does not apply to liquids.
<b>Boiling point (°F):</b>	132
<b>Boiling point (°C):</b>	56
<b>Vapor pressure:</b>	No data available
<b>Relative vapor density:</b>	No data available
<b>Decomposition temperature (°F):</b>	No data available

**Data on fire and explosion hazards:**

<b>Flash point (°F):</b>	None
<b>Flammability (°F):</b>	No data available
<b>Auto-ignition temperature (°F):</b>	No data available
<b>Explosion limits (% v/v):</b>	No data available

### Solubility:

<b>Solubility in water:</b>	No data available
<b>n-octanol/water coefficient (LogKow):</b>	No data available
<b>Solubility in fat (g/L):</b>	No data available

### 9.2. Other information:

<b>Thermal stability:</b>	Stable under normal conditions
<b>Evaporation rate (n-butylacetate = 100):</b>	No data available
<b>Other physical and chemical parameters:</b>	No data available.
<b>Molecular Weight (g/mol):</b>	200.06
<b>Oxidizing properties:</b>	No data available

## SECTION 10: STABILITY AND REACTIVITY

### 10.1. Reactivity:

No data available.

### 10.2. Chemical stability:

The product is stable under the conditions, noted in section 7 "Handling and storage".

### 10.3. Possibility of hazardous reactions, including those associated with foreseeable emergencies:

None known.

### 10.4. Conditions to avoid:

Mechanical influences (e.g. Shock, pressure, impact, friction). Fire, sparks or other ignition sources.

### 10.5. Incompatible materials:

Strong oxidizing agents

### 10.6. ▼ Hazardous decomposition products:

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on toxicological effects:

#### ▼ Acute toxicity:

Product/substance	1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether
Species:	Rat
Route of exposure:	Oral
Test:	LD50
Result:	>2000 mg/kg

Product/substance	1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether
Species:	Rat
Route of exposure:	Inhalation
Test:	LC50
Result:	>24.8 mg/L

Product/substance	1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether
Species:	Rat
Route of exposure:	Dermal
Test:	LD50

Result: >2000 mg/kg

**▼ Skin corrosion/irritation:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Species: Rabbit  
Result: No adverse effect observed (Not irritating)

Causes skin irritation.

**▼ Serious eye damage/irritation:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Species: Rabbit  
Result: Adverse effect observed (Slightly irritating)

Causes serious eye irritation.

**Respiratory sensitisation:**

Based on available data, the classification criteria are not met.

**▼ Skin sensitisation:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Species: Rat  
Result: No adverse effect observed (not sensitising)

**▼ Germ cell mutagenicity:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Conclusion: No data available or the data not sufficient for classification.

**▼ Carcinogenicity:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Conclusion: Not Classified

**▼ Reproductive toxicity:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Conclusion: No data available or the data not sufficient for classification.

**▼ STOT-single exposure:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Conclusion: No data available or the data not sufficient for classification.

May cause respiratory irritation.

**▼ STOT-repeated exposure:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Species: Rat  
Route of exposure: Inhalation  
Duration: 5 days  
Test: NOAEL  
Result: 1800 ppm  
Other information: Test Additional Information

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Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Species: Rat  
Route of exposure: Inhalation  
Duration: 90 days  
Test: NOAEL  
Result: 1000 ppm  
Conclusion: No adverse effect observed

**▼ Aspiration hazard:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Conclusion: No data available or the data is not sufficient for classification.

**Long term effects:**

Irritation effects: This product contains substances, which may cause irritation upon exposure to skin, eyes or lungs. Exposure may result in an increased absorption potential of other hazardous substances at the area of exposure.

**Other information:**

None known.

**SECTION 12: ECOLOGICAL INFORMATION**

**12.1. ▼ Toxicity:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Species: Fish, Carp  
Duration: 96 hours  
Test: LC50  
Result: >76 mg/L

**12.2. Persistence and degradability:**

Based on available data, the classification criteria are not met.

**12.3. ▼ Bioaccumulative potential:**

Product/substance 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether  
Conclusion: Not biodegradable  
Test: OCED 301 C

**12.4. Mobility in soil:**

No data available.

**12.5. Results of PBT and vPvB assessment:**

This mixture/product does not contain any substances known to fulfil the criteria for PBT and vPvB classification.

**12.6. Other adverse effects:**

None known.

**SECTION 13: DISPOSAL CONSIDERATIONS**

**Waste treatment methods:**

This material can be reclaimed by the manufacturer if required or disposed of at an approved facility according to local regulations.

**RCRA Hazardous waste ("P" and "U" list) (40 CFR 261):**

None of the components are listed

**Specific labelling:**

**Contaminated packing:**

Packaging containing residues of the product must be disposed of similarly to the product.

**SECTION 14: TRANSPORT INFORMATION**



	14.1 UN / ID	14.2 UN proper shipping name	14.3 Hazard class(es)	14.4 PG*	14.5 Env**	Other informatio n:
DOT	-	-	-	-	-	-
IMDG	-	-	-	-	-	-
IATA	-	-	-	-	-	-

\* Packing group

\*\* Environmental hazards

#### Additional information:

Not dangerous goods according to DOT, IATA and IMDG.

#### 14.6. Special precautions for user:

Not applicable.

#### 14.7. Transport in bulk according to IMO instruments:

No data available.

### SECTION 15: REGULATORY INFORMATION

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

#### 15.2. U.S. Federal regulations:

**TSCA (the non-confidential portion):** 1,1,2,2-Tetrafluoroethyl-2,2,2-trifluoroethyl ether is listed

**Clean Air Act:** None of the components are listed

**EPCRA Section 302:** None of the components are listed

**EPCRA Section 304:** None of the components are listed

**EPCRA section 313:** None of the components are listed

**CERCLA:** None of the components are listed

**Hazardous chemical inventory reporting:** This product is subject to Tier II reporting.

#### State regulations:

**California / Prop. 65:** None of the components are listed

**Massachusetts / Right To Know Act:** None of the components are listed

**New Jersey / Right To Know Act:** None of the components are listed

**New York / Right To Know Act:** None of the components are listed

**Pennsylvania / Right To Know Act:** None of the components are listed

#### 15.4. Restrictions for application:

Restricted to professional users.

#### 15.5. Demands for specific education:

No specific requirements.

#### 15.6. Additional information:

Not applicable.

#### 15.7. Chemical safety assessment:

No

### 15.8. Sources:

OSHA Hazard Communication Standard (29 CFR 1910.1200)

## SECTION 16: OTHER INFORMATION

### Full text of H-phrases as mentioned in section 3:

H315, Causes skin irritation.

H319, Causes serious eye irritation.

H335, May cause respiratory irritation.

### The full text of identified uses as mentioned in section 1:

None known.

### Abbreviations and acronyms:

ACGIH = American Conference of Governmental Industrial Hygienists

ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway

ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road

ATE = Acute Toxicity Estimate

BCF = Bioconcentration Factor

CAS = Chemical Abstracts Service

CERCLA = Comprehensive Environmental Response Compensation and Liability Act

DOT = Department of Transportation

EINECS = European Inventory of Existing Commercial chemical Substances

EPCRA = Emergency Planning and Community Right-To-Know Act

GHS = Globally Harmonized System of Classification and Labelling of Chemicals

HCIS = Hazardous Chemical Information System

HNOC = Hazards Not Otherwise Classified

IARC = International Agency for Research on Cancer

IATA = International Air Transport Association

IMDG = International Maritime Dangerous Goods

LogPow = logarithm of the octanol/water partition coefficient

MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978.

("Marpol" = marine pollution)

NFPA = National Fire Protection Association

NIOSH = National Institute for Occupational Safety and Health

OECD = Organisation for Economic Co-operation and Development

OSHA = Occupational Safety and Health Administration

PBT = Persistent, Bioaccumulative and Toxic

RCRA = Resource Conservation and Recovery Act

RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail

RRN = REACH Registration Number

SARA = Superfund Amendments and Reauthorization Act

SCL = A specific concentration limit.

STEL = Short-term exposure limits

STOT-RE = Specific Target Organ Toxicity - Repeated Exposure

STOT-SE = Specific Target Organ Toxicity - Single Exposure

TSCA = The Toxic Substances Control Act

TWA = Time weighted average

UN = United Nations

UVBC = Unknown or variable composition, complex reaction products or of biological materials

VOC = Volatile Organic Compound

vPvB = Very Persistent and Very Bioaccumulative

### Additional information:

The classification of the mixture in regard of health hazards is in accordance with the calculation methods given by HCS (29 CFR 1910.1200).

**The safety data sheet is validated by:**

TMC Industries - QC Department

**Other:**

A change (in proportion to the last essential change (first cipher in SDS version, see section 1)) is marked with a triangle. The information in this safety data sheet applies only to this specific product (mentioned in section 1) and is not necessarily correct for use with other chemicals/products.

It is recommended to hand over this safety data sheet to the actual user of the product. Information in this safety data sheet cannot be used as a product specification.

Country-language: US-en