

# SAFETY DATA SHEET



## Opteon™ MZ Heat Transfer Fluid

Version	Revision Date:	SDS Number:	Date of last issue: 2025/03/03
6.2	2025/04/24	2632385-00017	Date of first issue: 2018/03/20

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Chemical product name : Opteon™ MZ Heat Transfer Fluid

SDS-Identcode : 130000143003

#### Supplier's company name, address and phone number

Company name of supplier : Chemours-Mitsui Fluoroproducts Co., Ltd

Address : Kamiyacho Prime Place, 4-1-17, Toranomom, Minato-ku, Tokyo, Japan

Telephone : 050-3823-0650

Emergency telephone number : Occupational Health, Safety & Environmental Management (054-334-4827) (Holiday,Night-time 054-335-5507)

Prepared by :

#### Recommended use of the chemical and restrictions on use

Recommended use : Heat transfer fluids

Restrictions on use : Consumer use

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### 2. HAZARDS IDENTIFICATION

#### GHS classification of chemical product

Short-term (acute) aquatic hazard : Category 3

#### GHS label elements

Hazard pictograms : None

Signal word : None

Hazard statements : H402 Harmful to aquatic life.

Precautionary statements : **Prevention:**  
P273 Avoid release to the environment.  
**Disposal:**  
P501 Dispose of contents/ container to an approved waste disposal plant.

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### Other hazards which do not result in classification

Important symptoms and outlines of the emergency assumed : Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.  
Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.  
Rapid evaporation of the product may cause frostbite.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Substance name : (Z)-1,1,1,4,4,4-Hexafluoro-2-butene

CAS-No. : 692-49-9

#### Components

Chemical name	CAS-No.	Concentration (% w/w)	ENCS No.
(Z)-1,1,1,4,4,4-Hexafluoro-2-butene#	692-49-9	>= 99.5 - <= 100	2-4174

# Voluntarily-disclosed substance

### 4. FIRST AID MEASURES

If inhaled : If inhaled, remove to fresh air.  
Get medical attention if symptoms occur.

In case of skin contact : Wash with water and soap as a precaution.  
Get medical attention if symptoms occur.

In case of eye contact : Flush eyes with water as a precaution.  
Get medical attention if irritation develops and persists.

If swallowed : If swallowed, DO NOT induce vomiting.  
Get medical attention if symptoms occur.  
Rinse mouth thoroughly with water.

Most important symptoms and effects, both acute and delayed : May cause cardiac arrhythmia.  
Other symptoms potentially related to misuse or inhalation abuse are  
Cardiac sensitisation  
Anaesthetic effects  
Light-headedness  
Dizziness  
confusion  
Lack of coordination  
Drowsiness  
Unconsciousness

Protection of first-aiders : No special precautions are necessary for first aid responders.

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Notes to physician : Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

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### 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Not applicable  
Will not burn

Unsuitable extinguishing media : Not applicable  
Will not burn

Specific hazards during fire-fighting : Exposure to combustion products may be a hazard to health.

Hazardous combustion products : Hydrogen fluoride  
carbonyl fluoride  
Carbon oxides

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.  
Use water spray to cool unopened containers.  
Remove undamaged containers from fire area if it is safe to do so.  
Evacuate area.

Special protective equipment for firefighters : Wear self-contained breathing apparatus for firefighting if necessary.  
Use personal protective equipment.

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### 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

Environmental precautions : Avoid release to the environment.  
Prevent further leakage or spillage if safe to do so.  
Prevent spreading over a wide area (e.g. by containment or oil barriers).  
Retain and dispose of contaminated wash water.  
Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for : Soak up with inert absorbent material.

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containment and cleaning up

For large spills, provide dyking or other appropriate containment to keep material from spreading. If dyked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent.

Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.

Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

### 7. HANDLING AND STORAGE

#### Handling

Technical measures : See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.

Local/Total ventilation : Use only with adequate ventilation.

Advice on safe handling : Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment

Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point.

Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems.

Never attempt to lift cylinder by its cap.

Do not drag, slide or roll cylinders.

Use a suitable hand truck for cylinder movement.

Take care to prevent spills, waste and minimize release to the environment.

Avoidance of contact : None.

Hygiene measures : If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place.

When using do not eat, drink or smoke.

Wash contaminated clothing before re-use.

#### Storage

Conditions for safe storage : Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.

Separate full containers from empty containers.

Do not store near combustible materials.

Avoid area where salt or other corrosive materials are present.

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Keep in properly labelled containers.  
Store in accordance with the particular national regulations.

Materials to avoid : No special restrictions on storage with other products.

Recommended storage temperature : < 40 °C

Storage period : > 10 yr

Further information on storage stability : The product has an indefinite shelf life when stored properly.

Keep away from direct sunlight.

Packaging material : Unsuitable material: None known.

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### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### Threshold limit value and permissible exposure limits for each component in the work environment

Contains no substances with occupational exposure limit values.

**Engineering measures** : Ensure adequate ventilation, especially in confined areas.  
Minimize workplace exposure concentrations.

#### Personal protective equipment

Respiratory protection : Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown.

Hand protection  
Material : Low temperature resistant gloves

Remarks : Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!

Eye protection : Wear the following personal protective equipment:  
Safety glasses

Skin and body protection : Skin should be washed after contact.

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### 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	: liquid
Colour	: clear, colourless
Odour	: odourless
Odour Threshold	: No data available
Melting point/freezing point	: No data available
Boiling point, initial boiling point and boiling range	: 33 °C
Flammability (solid, gas)	: Not applicable
Flammability (liquids)	: Will not burn
Lower explosion limit and upper explosion limit / flammability limit	
Upper explosion limit / Upper flammability limit	: Upper flammability limit Method: ASTM E681 None.
Lower explosion limit / Lower flammability limit	: Lower flammability limit Method: ASTM E681 None.
Flash point	: Method: ASTM D 56 boils before flash
Decomposition temperature	: No data available
pH	: 7.4 (20 °C)
Evaporation rate	: No data available
Auto-ignition temperature	: 492 °C
Viscosity	
Viscosity, kinematic	: No data available
Solubility(ies)	
Water solubility	: 0.7633 g/l (25 °C)
Partition coefficient: n-octanol/water	: log Pow: 2.3 (30 °C)

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Vapour pressure : 604.35 hPa (20 °C)

Density and / or relative density  
Density : 1.4 g/cm<sup>3</sup> (20 °C)  
(as liquid)

Relative vapour density : No data available

Explosive properties : Not explosive

Oxidizing properties : The substance or mixture is not classified as oxidizing.

Particle characteristics  
Particle size : Not applicable

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### 10. STABILITY AND REACTIVITY

Reactivity : Not classified as a reactivity hazard.

Chemical stability : Stable under normal conditions.

Possibility of hazardous reactions : None known.

Conditions to avoid : None known.

Incompatible materials : None.

Hazardous decomposition products : No hazardous decomposition products are known.

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### 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure : Inhalation  
Skin contact  
Ingestion  
Eye contact

#### Acute toxicity

Not classified based on available information.

#### Components:

##### **(Z)-1,1,1,4,4,4-Hexafluoro-2-butene:**

Acute inhalation toxicity : LC50 (Rat): > 690.413 mg/l  
Exposure time: 4 h  
Test atmosphere: vapour

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Method: OECD Test Guideline 403

No observed adverse effect concentration (Dog): 12500 ppm  
Test atmosphere: gas

Lowest observed adverse effect concentration (Dog): 25000 ppm  
Test atmosphere: gas

Cardiac sensitisation threshold limit (Dog): 1,677,740 mg/m<sup>3</sup>  
Test atmosphere: gas

### Skin corrosion/irritation

Not classified based on available information.

#### Components:

##### **(Z)-1,1,1,4,4,4-Hexafluoro-2-butene:**

Result : No skin irritation

### Serious eye damage/eye irritation

Not classified based on available information.

#### Components:

##### **(Z)-1,1,1,4,4,4-Hexafluoro-2-butene:**

Result : No eye irritation

### Respiratory or skin sensitisation

#### **Skin sensitisation**

Not classified based on available information.

#### **Respiratory sensitisation**

Not classified based on available information.

#### Components:

##### **(Z)-1,1,1,4,4,4-Hexafluoro-2-butene:**

Exposure routes : Skin contact  
Result : negative

### Germ cell mutagenicity

Not classified based on available information.

#### Components:

##### **(Z)-1,1,1,4,4,4-Hexafluoro-2-butene:**

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)  
Method: OECD Test Guideline 471  
Result: negative



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Test Type: Chromosome aberration test in vitro  
Method: OECD Test Guideline 473  
Result: negative

Test Type: In vitro mammalian cell gene mutation test  
Method: OECD Test Guideline 476  
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)  
Species: Rat  
Application Route: inhalation (vapour)  
Method: OECD Test Guideline 474  
Result: negative

Germ cell mutagenicity - Assessment : Weight of evidence does not support classification as a germ cell mutagen.

### Carcinogenicity

Not classified based on available information.

### Reproductive toxicity

Not classified based on available information.

### Components:

#### (Z)-1,1,1,4,4,4-Hexafluoro-2-butene:

Effects on fertility : Test Type: Two-generation reproduction toxicity study  
Species: Rat  
Application Route: inhalation (vapour)  
Method: OECD Test Guideline 416  
Result: negative

Effects on foetal development : Test Type: Embryo-foetal development  
Species: Rat  
Application Route: inhalation (vapour)  
Method: OECD Test Guideline 414  
Result: negative

Reproductive toxicity - Assessment : Weight of evidence does not support classification for reproductive toxicity, No effects on or via lactation

### STOT - single exposure

Not classified based on available information.

### STOT - repeated exposure

Not classified based on available information.

### Components:

#### (Z)-1,1,1,4,4,4-Hexafluoro-2-butene:

Exposure routes : inhalation (vapour)

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Assessment : No significant health effects observed in animals at concentrations of 1 mg/l/6h/d or less.

### Repeated dose toxicity

#### Components:

##### **(Z)-1,1,1,4,4,4-Hexafluoro-2-butene:**

Species	: Rat, male and female
NOAEL	: 33.5 mg/l
LOAEL	: 50.3 mg/l
Application Route	: inhalation (vapour)
Exposure time	: 90 d
Method	: OECD Test Guideline 413

### Aspiration toxicity

Not classified based on available information.

#### Components:

##### **(Z)-1,1,1,4,4,4-Hexafluoro-2-butene:**

No aspiration toxicity classification

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## 12. ECOLOGICAL INFORMATION

### Ecotoxicity

#### Components:

##### **(Z)-1,1,1,4,4,4-Hexafluoro-2-butene:**

Toxicity to fish	: LC50 ( <i>Oryzias latipes</i> (Japanese medaka)): 76.1 mg/l Exposure time: 96 h Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	: EC50 ( <i>Daphnia magna</i> (Water flea)): 22.5 mg/l Exposure time: 48 h Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants	: ErC50 ( <i>Pseudokirchneriella subcapitata</i> (green algae)): > 23.7 mg/l Exposure time: 72 h Method: OECD Test Guideline 201  NOEC ( <i>Pseudokirchneriella subcapitata</i> (green algae)): 6.92 mg/l Exposure time: 72 h Method: OECD Test Guideline 201
Toxicity to fish (Chronic toxicity)	: NOEC ( <i>Gobiocypris rarus</i> (rare gudgeon)): 10 mg/l Exposure time: 32 d Method: OECD Test Guideline 210

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Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 10 mg/l  
Exposure time: 21 d  
Method: OECD Test Guideline 211

### Persistence and degradability

#### Components:

##### (Z)-1,1,1,4,4,4-Hexafluoro-2-butene:

Biodegradability : Result: Not readily biodegradable.  
Method: OECD Test Guideline 302C

### Bioaccumulative potential

#### Components:

##### (Z)-1,1,1,4,4,4-Hexafluoro-2-butene:

Partition coefficient: n-octanol/water : log Pow: 2.3

### Mobility in soil

No data available

### Hazardous to the ozone layer

Not applicable

### Other adverse effects

No data available

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## 13. DISPOSAL CONSIDERATIONS

### Disposal methods

Waste from residues : Do not discharge the gas into atmosphere unnecessarily and dispose of in accordance with the following regulations: High Pressure Gas Safety Act and Act on Rational Use and Proper Management of Fluorocarbons (in case of the fluorochemical substance). When consigning for disposal, remove to a industrial waste disposer approved by the local regulations.  
Do not dispose of waste into sewer.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.  
If not otherwise specified: Dispose of as unused product.

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## 14. TRANSPORT INFORMATION

### International Regulations

UNRTDG

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UN number : Not applicable  
Proper shipping name : Not applicable  
Class : Not applicable  
Subsidiary risk : Not applicable  
Packing group : Not applicable  
Labels : Not applicable  
Environmentally hazardous : no

### IATA-DGR

UN/ID No. : Not applicable  
Proper shipping name : Not applicable  
Class : Not applicable  
Subsidiary risk : Not applicable  
Packing group : Not applicable  
Labels : Not applicable  
Packing instruction (cargo aircraft) : Not applicable  
Packing instruction (passenger aircraft) : Not applicable

### IMDG-Code

UN number : Not applicable  
Proper shipping name : Not applicable  
Class : Not applicable  
Subsidiary risk : Not applicable  
Packing group : Not applicable  
Labels : Not applicable  
EmS Code : Not applicable  
Marine pollutant : Not applicable

### Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

### National Regulations

Refer to section 15 for specific national regulation.

### Special precautions for user

Not applicable

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## 15. REGULATORY INFORMATION

### Related Regulations

#### Fire Service Law

Not applicable to dangerous materials / designated flammables.

#### Chemical Substance Control Law

Not applicable for Specified Chemical Substance, Monitoring Chemical Substance and Priority Assessment Chemical Substance.

#### Industrial Safety and Health Law

#### Harmful Substances Prohibited from Manufacture

Not applicable

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### **Harmful Substances Required Permission for Manufacture**

Not applicable

### **Substances Prevented From Impairment of Health**

Not applicable

### **Circular concerning Information on Chemicals having Mutagenicity - Annex 2: Information on Existing Chemicals having Mutagenicity**

Not applicable

### **Circular concerning Information on Chemicals having Mutagenicity - Annex 1: Information on Notified Substances having Mutagenicity**

Not applicable

### **Substances Subject to be Notified Names**

Not applicable

### **Substances Subject to be Indicated Names**

Not applicable

### **Skin and Eye Damage Substances (ISHL MO Art. 594-2)**

Not applicable

### **Carcinogenic Substances (Article 577-2 of the Occupational Health and Safety Regulations)**

Not applicable

### **Ordinance on Prevention of Hazards Due to Specified Chemical Substances**

Not applicable

### **Ordinance on Prevention of Lead Poisoning**

Not applicable

### **Ordinance on Prevention of Tetraalkyl Lead Poisoning**

Not applicable

### **Ordinance on Prevention of Organic Solvent Poisoning**

Not applicable

### **Enforcement Order of the Industrial Safety and Health Law - Attached table 1 (Dangerous Substances)**

Not applicable

### **Poisonous and Deleterious Substances Control Law**

Not applicable

### **Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof**

Not applicable

### **High Pressure Gas Safety Act**

Not applicable

### **Explosive Control Law**

Not applicable

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### Vessel Safety Law

Not regulated as a dangerous good

### Aviation Law

Not regulated as a dangerous good

### Marine Pollution and Sea Disaster Prevention etc Law

Bulk transportation : Not classified as noxious liquid substance

Pack transportation : Not classified as marine pollutant

### Narcotics and Psychotropics Control Act

Narcotic or Psychotropic Raw Material (Export / Import Permission)

Not applicable

Specific Narcotic or Psychotropic Raw Material (Export / Import permission)

Not applicable

### Waste Disposal and Public Cleansing Law

Industrial waste

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## 16. OTHER INFORMATION

Other information : Opteon™ and any associated logos are trademarks or copyrights of The Chemours Company FC, LLC.  
Chemours™ and the Chemours Logo are trademarks of The Chemours Company.  
Before use read Chemours safety information.  
For further information contact the local Chemours office or nominated distributors.

### Further information

Sources of key data used to compile the Safety Data Sheet : Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, <http://echa.europa.eu/>

Date format : yyyy/mm/dd

### Full text of other abbreviations

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory con-

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centration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

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