SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name: trans-1-Chloro-3,3,3-trifluoropropene

Trade name: R1233zd

Other Name: HCFC-1233zd(E)

Additional identification

Chemical name: trans-1-Chloro-3,3,3-trifluoropropene

Chemical formula: C3H2ClF3

INDEX No.

CAS-No.: 102687-65-0

EC No.: 700-486-0

REACH Registration No.: 01-2119855084-38

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

Identified uses: Industrial and professional. Perform risk assessment prior to use.

Uses advised against: Consumer use.

1.3 Details of the supplier of the safety data sheet

Supplier

Linde Gas GmbH
Carl-von-Linde-Platz 1
A-4651 Stadl-Paura

Telephone: +43 50 4273

E-mail: office@at.linde-gas.com

1.4 Emergency telephone number: Emergency number Linde: +43 50 4273 (during business hours), Poisoning Information Center: +43 1 406 43 43

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 as amended.

Physical Hazards

Gases under pressure

Liquefied gas

H280: Contains gas under pressure; may explode if heated.

Environmental Hazards

Chronic hazards to the aquatic environment

Category 3

H412: Harmful to aquatic life with long lasting effects.
SAFETY DATA SHEET
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2.2 Label Elements

Signal Words: Warning

Hazard Statement(s): H280: Contains gas under pressure; may explode if heated.
H412: Harmful to aquatic life with long lasting effects.

Precautionary Statements
Prevention: P273: Avoid release to the environment.
Response: None.
Storage: P403: Store in a well-ventilated place.
Disposal: None.

2.3 Other hazards: None.

SECTION 3: Composition/ information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical name</td>
<td>trans-1-Chloro-3,3,3-trifluoropropene</td>
</tr>
<tr>
<td>INDEX No.:</td>
<td>-</td>
</tr>
<tr>
<td>CAS-No.:</td>
<td>102687-65-0</td>
</tr>
<tr>
<td>EC No.:</td>
<td>700-486-0</td>
</tr>
<tr>
<td>REACH Registration No.:</td>
<td>01-2119855084-38</td>
</tr>
<tr>
<td>Purity</td>
<td>100%</td>
</tr>
<tr>
<td>Trade name:</td>
<td>R1233zd</td>
</tr>
</tbody>
</table>

The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.

SECTION 4: First aid measures

General: Adverse effects not expected from this product.

4.1 Description of first aid measures
Inhalation: Adverse effects not expected from this product.
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Eye contact: Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Skin Contact: Contact with evaporating liquid may cause frostbite or freezing of skin.

Ingestion: Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed: None.

4.3 Indication of any immediate medical attention and special treatment needed Hazards: None.

Treatment: None.

SECTION 5: Firefighting measures

General Fire Hazards: Heat may cause the containers to explode.

5.1 Extinguishing media
Suitable extinguishing media: Material will not burn. In case of fire in the surroundings: use appropriate extinguishing agent.

Unsuitable extinguishing media: None.

5.2 Special hazards arising from the substance or mixture: Supports combustion.

5.3 Advice for firefighters
Special fire fighting procedures: In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Guideline: EN 469 Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.
SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:
None.

6.2 Environmental Precautions:
Prevent further leakage or spillage if safe to do so.

6.3 Methods and material for containment and cleaning up:
Provide adequate ventilation.

6.4 Reference to other sections:
Refer to sections 8 and 13.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling:
Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Refer to supplier’s handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/ regional/ national/ international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Damaged valves should be reported immediately to the supplier Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminates particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.

7.2 Conditions for safe storage, including any incompatibilities:
Containers should not be stored in conditions likely to encourage corrosion. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material.
### Section 8: Exposure controls / personal protection

#### 8.1 Control Parameters

**Occupational Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Type</th>
<th>Exposure Limit Values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-1-Chloro-3,3,3-trifluoropropene</td>
<td>TWA</td>
<td>800 ppm</td>
<td>Manufacturer (2013)</td>
</tr>
</tbody>
</table>

**DNEL-Values**

<table>
<thead>
<tr>
<th>Critical component</th>
<th>Type</th>
<th>Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-1-Chloro-3,3,3-trifluoropropene</td>
<td>Worker - inhalative, long-term - systemic</td>
<td>1779 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

**PNEC-Values**

<table>
<thead>
<tr>
<th>Critical component</th>
<th>Type</th>
<th>Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-1-Chloro-3,3,3-trifluoropropene</td>
<td>freshwater</td>
<td>0.038 mg/l</td>
<td></td>
</tr>
<tr>
<td></td>
<td>marine water</td>
<td>0.0038 mg/l</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aquatic (intermit. releases)</td>
<td>0.38 mg/l</td>
<td></td>
</tr>
<tr>
<td></td>
<td>freshwater sediment</td>
<td>0.691 mg/l</td>
<td></td>
</tr>
<tr>
<td></td>
<td>marine sediment</td>
<td>0.0691 mg/l</td>
<td></td>
</tr>
<tr>
<td></td>
<td>soil</td>
<td>0.126 mg/l</td>
<td></td>
</tr>
</tbody>
</table>

#### 8.2 Exposure controls

**Appropriate engineering controls:**

Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (e.g. welded pipes). Do not eat, drink or smoke when using the product.

**Individual protection measures, such as personal protective equipment**

**General information:**

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

**Eye/face protection:**

Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Guideline: EN 166 Personal Eye Protection.
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Skin protection
Hand Protection: Wear working gloves while handling containers
Guideline: EN 388 Protective gloves against mechanical risks.

Body protection: No special precautions.

Other: Wear safety shoes while handling containers
Guideline: ISO 20345 Personal protective equipment - Safety footwear.

Respiratory Protection: Not required.

Thermal hazards: No precautionary measures are necessary.

Hygiene measures: Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

Environmental exposure controls: For waste disposal, see section 13 of the SDS.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance
Physical state: Gas
Form: Liquefied gas
Color: Colourless
Odor: No data available.
Odor Threshold: Odor threshold is subjective and is inadequate to warn of over exposure.

pH: not applicable.
Melting Point: < -90 °C
Boiling Point: 19 °C
Sublimation Point: not applicable.
Critical Temp. (°C): No data available.
Flash Point: Not applicable to gases and gas mixtures.
Evaporation Rate: Not applicable to gases and gas mixtures.
Flammability (solid, gas): This product is not flammable.
Flammability Limit - Upper (%): not applicable.
Flammability Limit - Lower (%): not applicable.
Vapor pressure: 1.065 hPa (20 °C)
Vapor density (air=1): No data available.
Relative density: No data available.
Solubility(ies)
Solubility in Water: 1.9 g/ l (20 °C)
Partition coefficient (n-octanol/water): 2.2 (25 °C)
Autoignition Temperature: not applicable.
Decomposition Temperature: Not known.
Viscosity
Kinematic viscosity: No data available.
Dynamic viscosity: No data available.
Explosive properties: Not applicable.
Oxidizing properties: not applicable.

9.2 Other information:
Molecular weight: 130.5 g/ mol (C3H2ClF3)
Bulk density: 1.27 g/ cm3
Minimum ignition temperature: 380 °C (986.8 - 1.035.9 hPa)

SECTION 10: Stability and reactivity

10.1 Reactivity: No reactivity hazard other than the effects described in sub-section below.
10.2 Chemical Stability: Stable under normal conditions.
10.3 Possibility of hazardous reactions: None.
10.4 Conditions to avoid: The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions.
10.5 Incompatible Materials: No reaction with any common materials in dry or wet conditions.
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 - Oral Product Based on available data, the classification criteria are not met.
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**Acute toxicity - Dermal Product**
Based on available data, the classification criteria are not met.

**Acute toxicity - Inhalation Product**
Based on available data, the classification criteria are not met.

trans-1-Chloro-3,3,3-trifluoropropene
**LC 50 (Rat, 4 h):** 120000 ppm

**Repeated dose toxicity**
Based on available data, the classification criteria are not met.

trans-1-Chloro-3,3,3-trifluoropropene
**LOAEL - Lowest Observable Adverse Effect Level (Rat, Inhalation, 90 d):** 4000 ppm

**Skin Corrosion/ Irritation Product**
Based on available data, the classification criteria are not met.

trans-1-Chloro-3,3,3-trifluoropropene
**OECD Guideline 404 (Acute Dermal Irritation/ Corrosion) (Rabbit, 4 h):** Not irritating

**Serious Eye Damage/ Eye Irritation Product**
Based on available data, the classification criteria are not met.

**Respiratory or Skin Sensitization Product**
Based on available data, the classification criteria are not met.

trans-1-Chloro-3,3,3-trifluoropropene
**Not a skin sensitizer.**

**Germ Cell Mutagenicity Product**
Based on available data, the classification criteria are not met.

**In vitro**
trans-1-Chloro-3,3,3-trifluoropropene
**Negative.**

**In vivo**
trans-1-Chloro-3,3,3-trifluoropropene
(Rat) **Negative.**
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trans-1-Chloro-3,3,3-trifluoropropene

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

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

Specific Target Organ Toxicity - Single Exposure
Product
Based on available data, the classification criteria are not met.

Specific Target Organ Toxicity - Repeated Exposure
Product
Based on available data, the classification criteria are not met.

Aspiration Hazard
Product
Not applicable to gases and gas mixtures.

Other Relevant Toxicity Information
trans-1-Chloro-3,3,3-trifluoropropene
Cardiac sensitisation threshold limit
25000 ppm
Dog

Light hydrocarbons like this one have been associated with cardiac sensitization in abuse situations. Hypoxia or the injection of adrenaline-like substances enhances these effects.

SECTION 12: Ecological information

General information: Avoid release to the environment. Product is not allowed to be discharged into ground water or the aquatic environment.

12.1 Toxicity

Acute toxicity
Product
Harmful to aquatic life with long lasting effects.

Acute toxicity - Aquatic Invertebrates
trans-1-Chloro-3,3,3-trifluoropropene
EC 50 (Water flea (Daphnia magna), 48 h): 82 mg/ l

Chronic Toxicity - Fish
trans-1-Chloro-3,3,3-trifluoropropene
LC 50 (Rainbow trout (Oncorhynchus mykiss), 96 h): 38 mg/ l

Toxicity to Aquatic Plants
trans-1-Chloro-3,3,3-trifluoropropene
EC 50 (Algae (Pseudokirchneriella subcapitata), 72 h): 106,7 mg/ l (OECD Guideline 201 (Freshwater Alga and Cyanobacteria, Growth Inhibition Test))
NOEC (Algae (Pseudokirchneriella subcapitata), 72 h): 115 mg/ l (OECD Guideline 201 (Freshwater Alga and Cyanobacteria, Growth Inhibition Test))
12.2 Persistence and Degradability

**Product**

Not applicable to gases and gas mixtures.

**Biodegradation**

Inorganic

The product is not readily biodegradable.

12.3 Bioaccumulative potential

**Product**

The substance has no potential for bioaccumulation.

12.4 Mobility in soil

**Product**

The substance has low mobility in soil.

12.5 Results of PBT and vPvB assessment

**Product**

Not classified as PBT or vPvB.

12.6 Other adverse effects:

**Global Warming Potential**

Global warming potential: 4.5

When discharged in large quantities may contribute to the greenhouse effect. For GWP value of mixture and quantities, refer to container label.

**trans-1-Chloro-3,3,3-trifluoropropene**

EU. F-Gasses Subject to Emission Limits/ Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs

- Global warming potential: 4.5

Annex 2: Other fluorinated greenhouse gases subject to reporting in accordance with Article 19; Section 1: Unsaturated hydro(chloro)fluorocarbons

**Other Ecological Information**

May cause pH changes in aqueous ecological systems. Depending on local conditions and existing concentrations, disturbances in the biodegradation process of activated sludge are possible.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

**General information:**

Vent to atmosphere in a well ventilated place.

**Disposal methods:**

Dispose of container via supplier only.

**European Waste Codes**

**Container:**

16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.
SECTION 14: Transport information

ADR

14.1 UN Number: UN 3163
14.2 UN Proper Shipping Name: LIQUEFIED GAS, N.O.S.(trans-1-Chloro-3,3,3-trifluoropropene)
14.3 Transport Hazard Class(es)
   Class: 2
   Label(s): 2.2
   Hazard No. (ADR): 20
   Tunnel restriction code: (C/ E)
14.4 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -

RID

14.1 UN Number: UN 3163
14.2 UN Proper Shipping Name: LIQUEFIED GAS, N.O.S.(trans-1-Chloro-3,3,3-trifluoropropene)
14.3 Transport Hazard Class(es)
   Class: 2
   Label(s): 2.2
14.4 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -

IMDG

14.1 UN Number: UN 3163
14.2 UN Proper Shipping Name: LIQUEFIED GAS, N.O.S.(trans-1-Chloro-3,3,3-trifluoropropene)
14.3 Transport Hazard Class(es)
   Class: 2.2
   Label(s): 2.2
   EmS No.: F-C, S-V
14.3 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -
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IATA

14.1 UN Number: UN 3163
14.2 Proper Shipping Name: Liquefied gas, n.o.s.(trans-1-Chloro-3,3,3-trifluoropropene)
14.3 Transport Hazard Class(es):
   Class: 2.2
   Label(s): 2.2
14.4 Packing Group: –
14.5 Environmental hazards: not applicable
14.6 Special precautions for user:
   Other information
   Passenger and cargo aircraft: Allowed.
   Cargo aircraft only: Allowed.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: not applicable

Additional identification: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

SECTION 15: Regulatory information

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

National Regulations

Council Directive 89/ 391/ EEC on the introduction of measures to encourage improvements in the safety and health of workers at work Directive 89/ 686/ EEC on personal protective equipment Only products that comply with the food regulations (EC) No. 1333/ 2008 and (EU) No. 231/ 2012 and are labelled as such may be used as food additives.
This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/ 830.

15.2 Chemical safety assessment: No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Revision Information: Not relevant.
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Key literature references and sources for data:
Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:
- Agency for Toxic Substances and Diseases Registry (ATSDR) (http://www.atsdr.cdc.gov/).
- European Industrial Gases Association (EIGA) Doc. 169 Classification and Labelling guide.
- International Programme on Chemical Safety (http://www.inchem.org/)
- ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
- The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (http://ecb.jrc.ec.europa.eu/esis/).
- The European Chemical Industry Council (CEFIC) ERICards.
- Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
- Substance specific information from suppliers.
- Details given in this document are believed to be correct at the time of publication.

Wording of the H-statements in section 2 and 3
H280 Contains gas under pressure; may explode if heated.
H412 Harmful to aquatic life with long lasting effects.

Training information:
Ensure operators understand the hazards.

Classification according to Regulation (EC) No 1272/2008 as amended.
Press. Gas Liq. Gas, H280
Aquatic Chronic 3, H412

Other information:
Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Last revised date: 27.06.2017
Disclaimer: This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.