SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

CH2F2 11,6964 %;C3H2F4 43,5753 %;C2H2F4 44,7283 %

Issue Date: Revision Date: Last revised date :	14.12.2023 18.12.2023 -	Version: 1.0	SDS No.: 000010075640 1/24

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

1.1 Product identifier

Product name: CH2F2 11,6964 %;C3H2F4 43,5753 %;C2H2F4 44,7283 %

Other Name: R456A
HFC-1234ze 49 % (w/w); HFC-134a 45 % (w/w); HFC-32 6 % (w/w)

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.
Refrigerant.

Uses advised against Consumer use.

1.3 Details of the supplier of the safety data sheet

Supplier

Linde Gas AB
Rättarvägen 3
169 68 Solna

Telephone: +46 8 7069500

E-mail: sds.ren@linde.com

1.4 Emergency telephone number: Poison center: 020-99 60 00 (24 h). Emergency number: 112

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.

2.2 Label Elements

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Signal Word: Warning

Hazard Statement(s): H280: Contains gas under pressure; may explode if heated.

Precautionary Statements

General None.

Prevention: None.

Response: None.

Storage: P403: Store in a well-ventilated place.

Disposal None.

Supplemental information

EIGA-0783: Contains fluorinated greenhouse gases
EIGA-As: Asphyxiant in high concentrations.

Unknown toxicity - Health

Acute toxicity, inhalation, gas	56,42 %

Unknown toxicity - Environment

Acute hazards to the aquatic environment	43,58 %
Chronic hazards to the aquatic environment	0 %

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2.3 Other hazards

Contact with evaporating liquid may cause frostbite or freezing of skin.
Endocrine disrupting properties-Toxicity
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Endocrine disrupting properties-Ecotoxicity
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical name	Chemical formula	Concentration	CAS-No.	EC No.	REACH Registration No.	M-Factor:	Notes
Difluoromethane	CH2F2	11,6964%	75-10-5	200-839-4	01-2119471312-47	-	
1,3,3,3-tetrafluoroprop-1-ene	C3H2F4	43,5753%	29118-24-9	471-480-0	01-0000019758-54	-	
Norflurane	C2H2F4	44,7283%	811-97-2	212-377-0	01-2119459374-33	-	#

The concentrations of the components in the SDS header, product name on page one and in section 3.2 are in mol due to regulatory requirements.
All concentrations are nominal.
This substance has workplace exposure limit(s).
This substance is listed as SVHC.PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.

Classification

Chemical name	Classification		Notes
Difluoromethane	CLP:	Classification: Flam. Gas: 1B: H220; Press. Gas: Liquef. Gas: H280; Supplemental label information: EIGA0783; Specific concentration limit: None known. Acute toxicity, oral: None known. Acute toxicity, inhalation: LC 0: > 520000 ppm Acute toxicity, dermal: None known.	
1,3,3,3-tetrafluoroprop-1-ene	CLP:	Classification: Press. Gas: Liq. Gas: H280; Supplemental label information: None known. Specific concentration limit: None known. Acute toxicity, oral: None known. Acute toxicity, inhalation: LC 50: > 207000 ppm Acute toxicity, dermal: None known.	
Norflurane	CLP:	Classification: Press. Gas: Liquef. Gas: H280; Supplemental label information: EIGA0357, EIGA0783; Specific concentration limit: None known. Acute toxicity, oral: None known. Acute toxicity, inhalation: None known. Acute toxicity, dermal: None known.	

CLP: Regulation No. 1272/2008.

The full text for all H-statements is displayed in section 16.

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SECTION 4: First aid measures

General: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

4.1 Description of first aid measures

Inhalation: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

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: Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Treatment: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

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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: No data available.

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: Evacuate area. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

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

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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.

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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.

7.3 Specific end use(s): None.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	Type	Form of exposure	Exposure Limit Values		Source
Norflurane	NGV		500 ppm	2.000 mg/m3	Sweden. Occupational Exposure Limit Values, as amended (2018)
	KTV		750 ppm	3.000 mg/m3	Sweden. Occupational Exposure Limit Values, as amended (2018)

Please refer to the latest edition of the appropriate source text and consult an industrial hygienist or similar professional, or local agencies, for further information.

Biological Limit Values

No biological exposure limits noted for the ingredient(s).

DNEL-Values

Critical component	Type	Value	Remarks
Difluoromethane	Workers - Inhalation, Systemic, long-term	7035 mg/m3	Repeated dose toxicity
1,3,3,3-tetrafluoroprop-1-ene	Worker - inhalative, long-term - systemic	3902 mg/m3	-
Norflurane	Workers - Inhalation, Systemic, long-term	13936 mg/m3	Repeated dose toxicity

PNEC-Values

Critical component	Type	Value	Remarks

Difluoromethane	Aquatic (freshwater)	0,313 mg/l	-
Difluoromethane	Sediment (freshwater)	1,807 mg/kg	-
1,3,3,3-tetrafluoroprop-1-ene	Aquatic (freshwater)	0,117 mg/l	-
1,3,3,3-tetrafluoroprop-1-ene	Aquatic (intermit. releases)	1,17 mg/l	-
Norflurane	Aquatic (marine water)	0,01 mg/l	-
Norflurane	Sewage treatment plant	73 mg/l	-
Norflurane	Sediment (freshwater)	0,75 mg/kg	-
Norflurane	Aquatic (freshwater)	0,1 mg/l	-

8.2 Exposure controls

Appropriate engineering controls:

Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Oxygen detectors should be used when asphyxiating gases may be released. 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 (eg. 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. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

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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.
Skin protection	
Hand Protection:	Guideline: EN 388 Protective gloves against mechanical risks. Additional Information: Wear working gloves while handling containers
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:	CH2F2: Colorless C3H2F4: Colorless C2H2F4: Colorless
Odor:	CH2F2: Odorless C3H2F4: Slight ether-like odor C2H2F4: faint ethereal
Odor Threshold:	Odor threshold is subjective and is inadequate to warn of over exposure.
Melting Point:	No data available.

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Boiling Point:	No data available.
Flammability:	Non-Flammable Gas
Upper/lower limit on flammability or explosive limits	
Explosive limit - upper:	Not applicable
Explosive limit - lower:	(Calculated value) 119,69 %(V)
Flash Point:	Not applicable to gases and gas mixtures.
Autoignition Temperature:	Not applicable.
Decomposition Temperature:	Not known.
pH:	Not applicable
Viscosity	
Dynamic viscosity:	No data available.
Kinematic viscosity:	No data available.
Solubility(ies)	
Solubility in Water:	No data available.
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	Not known.
Dispersion Stability:	No data available.
Vapor pressure:	No reliable data available.
Relative density:	No data available.
Density:	No data available.
Relative vapor density:	3,57 (calculated) 59 °F/15 °C
Particle characteristics:	Not applicable

9.2 Other information

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: None.

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

General information: None.

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

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

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.

Component Information

Difluoromethane	LC 0 (Wistar rat, Female, Male, 4 h): > 520000 ppm (OECD Guideline 403 (Acute Inhalation Toxicity)) Remarks: Inhalation; vapor Experimental result, Key study
1,3,3,3-tetrafluoroprop-1-ene	LC 50 (Rat, 4 h): > 207000 ppm

Repeated dose toxicity
Component Information

Difluoromethane	NOAEL (Wistar-derived rat(Female, Male), Inhalation, 28 d): 49.500 ppm(m) Inhalation Experimental result, Supporting study

	NOAEL (Wistar-derived rat(Female, Male), Inhalation, 13 Weeks): 49.100 ppm(m) Inhalation Experimental result, Key study
Norflurane	NOAEL (Rat(Female, Male), Inhalation, 2 yr): 50.000 ppm(m) Inhalation Experimental result, Key study

Skin Corrosion/Irritation

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

Component Information

1,3,3,3-tetrafluoroprop-1-ene	(Rabbit): Not classified as an irritant.

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.

Component Information

Germ Cell Mutagenicity

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

In vitro

Component Information

Difluoromethane	Ames test in vitro: (OECD Guideline 471 (Bacterial Reverse Mutation Test)): Negative. Chromosome aberration (OECD Guideline 473 (In Vitro Mammalian Chromosome Aberration Test)): Negative. In vitro gene mutations test on mammalian cells:: Negative.

In vivo

Component Information

Difluoromethane	Micronucleus test in vivo mouse: (OECD Guideline 474 (Mammalian Erythrocyte Micronucleus Test)) (Mouse): Negative.

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.

Developmental toxicity (Teratogenicity)
Component Information
Difluoromethane — Rabbit (Female) Inhalation (OECD Guideline 414 (Prenatal Developmental Toxicity Study))

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..

11.2 Information on other hazards

Endocrine disrupting properties
Product: — The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.;

Components:
Difluoromethane — The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.;
1,3,3,3-tetrafluoroprop-1-ene — The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.;
Norflurane — The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.;

Other information

Product: No data available.

SECTION 12: Ecological information

General information: Not applicable

12.1 Toxicity

Acute toxicity

Product No ecological damage caused by this product.

Acute toxicity - Fish

Component Information

Difluoromethane	LC 50 (Fish (freshwater), 96 h): 1.731 mg/l Remarks: QSAR, Key study 2 = reliable with restrictions
1,3,3,3-tetrafluoroprop-1-ene	NOEC (Carp (Cyprinus carpio), 96 h): > 117 mg/l
Norflurane	LC 50 (Oncorhynchus mykiss, 96 h): 450 mg/l (semi-static) Remarks: Experimental result, Key study

Acute toxicity - Aquatic Invertebrates

Component Information

Difluoromethane	EC 50 (Daphnid, 48 h): 652 mg/l Remarks: QSAR, Key study 2 = reliable with restrictions LC 50 (Daphnid, 48 h): 833 mg/l Remarks: QSAR, Key study 2 = reliable with restrictions
1,3,3,3-tetrafluoroprop-1-ene	LC 50 (Water flea (Daphnia magna), 48 h): > 160 mg/l
Norflurane	EC 50 (Daphnia magna, 24 h): 960 mg/l (Static) Remarks: Experimental result, Key study

Toxicity to microorganisms

Component Information

Difluoromethane	Static EC 50 (Algae (Pseudokirchneriella subcapitata), 72 h): > 118 mg/l (OECD Guideline 201 (Freshwater Alga and Cyanobacteria, Growth Inhibition Test)) EC 50 (Alga, 96 h): 313 mg/l (estimated)

Chronic Toxicity - Fish

Component Information

Difluoromethane	NOEC (Danio rerio; Pimephales promelas, 30 d): 169 mg/l QSAR, Supporting study 4 = not assignable

Toxicity to Aquatic Plants

Component Information

Difluoromethane	EC 50 (Alga, 96 h): 142 mg/l
1,3,3,3-tetrafluoroprop-1-ene	NOEC (Green algae (Selenastrum capricornutum), 72 h): > 170 mg/l

12.2 Persistence and Degradability

Product Not applicable to gases and gas mixtures..

Biodegradation

Component Information

Difluoromethane	5 % (28 d) Detected in water. Experimental result, Key study
1,3,3,3-tetrafluoroprop-1-ene	0 % (28 d) Not readily degradable.
Norflurane	3 % (28 d) Detected in water. Experimental result, Key study

12.3 Bioaccumulative potential

Product The subject product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

Log Kow
Component Information

12.4 Mobility in soil

Product: Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5 Results of PBT and vPvB assessment

Product: Not classified as PBT or vPvB.

Global Warming Potential

Global warming potential: 687,4
Contains fluorinated greenhouse gases When discharged in large quantities may contribute to the greenhouse effect. For GWP value of mixture and quantities, refer to container label.

Component Information

Difluoromethane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 675 Annex 1: Fluorinated greenhouse gases referred to in Point 1 of Article 2; Section 1:Hydrofluorocarbons (HFCs) and its mixtures
1,3,3,3-tetrafluoroprop-1-ene	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 7 Annex 2: Other fluorinated greenhouse gases subject to reporting in accordance with Article 19; Section 1: Unsaturated hydro(chloro)fluorocarbons
Norflurane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 1430 Annex 1: Fluorinated greenhouse gases referred to in Point 1 of Article 2; Section 1:Hydrofluorocarbons (HFCs) and its mixtures

12.6 Endocrine disrupting properties:

Product: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Components:

Difluoromethane	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
1,3,3,3-tetrafluoroprop-1-ene	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
Norflurane	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects:

Other hazards

Product: No data available.

Other effects:

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well ventilated place.

Disposal methods: Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

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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 or ID number:	UN 3163
14.2 UN Proper Shipping Name:	LIQUEFIED GAS, N.O.S.(1,1,1,2-Tetrafluoroethane, trans-1,3,3,3-Tetrafluoropropylene)
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:	–
Limited quantity	None.
Excepted quantity	None.
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

RID

14.1 UN number or ID number:	UN 3163
14.2 UN Proper Shipping Name	LIQUEFIED GAS, N.O.S.(1,1,1,2-Tetrafluoroethane, trans-1,3,3,3-Tetrafluoropropylene)
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.2
14.4 Packing Group:	–
Limited quantity	None.
Excepted quantity	None.
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

SAFETY DATA SHEET

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IMDG

14.1 UN number or ID number:	UN 3163
14.2 UN Proper Shipping Name:	LIQUEFIED GAS, N.O.S.(1,1,1,2-Tetrafluoroethane, trans-1,3,3,3-Tetrafluoropropylene)
14.3 Transport Hazard Class(es)	
Class:	2.2
Label(s):	2.2
EmS No.:	F-C, S-V
14.4 Packing Group:	–
Limited quantity	None.
Excepted quantity	None.
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

IATA

14.1 UN number or ID number:	UN 3163
14.2 Proper Shipping Name:	Liquefied gas, n.o.s.(1,1,1,2-Tetrafluoroethane, trans-1,3,3,3-Tetrafluoropropylene)
14.3 Transport Hazard Class(es):	
Class:	2.2
Label(s):	2.2
14.4 Packing Group:	–
Limited quantity	None.
Excepted quantity	None.
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 Maritime transport in bulk according to IMO instruments

Not applicable for product as supplied.

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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:

EU Regulations

EU. REACH Annex XIV, Substances Subject to Authorization as amended: None present or none present in regulated quantities.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended: None present or none present in regulated quantities.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended: None present or none present in regulated quantities.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended: None present or none present in regulated quantities.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended: None present or none present in regulated quantities.

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, Annex I: Not applicable

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 2016/425/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.

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This Safety Data Sheet has been produced to comply with Regulation (EU) 2020/878.

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

SECTION 16: Other information

Revision Information: Not relevant.

Abbreviations and acronyms:

SWO:	Sweden. Occupational Exposure Limit Values, as amended
SWO / KTV:	Short Term Exposure Limit (STEL):
SWO / NGV:	Time Weighted Average (TWA):

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; EIGA - European Industrial Gases Association; 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; 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 concentration; 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; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; 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; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - substance of very high concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

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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 Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
European Chemical Agency: Information on Registered Substances http://apps.echa.europa.eu/registered/registered-sub.aspx#search
European Industrial Gases Association (EIGA) Doc. 169 "Classification and Labelling guide", as amended.
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.
Matheson Gas Data Book, 7th Edition.
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.
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.
United States of America's National Library of Medicine's toxicology data network TOXNET (http://toxnet.nlm.nih.gov/index.html)
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.

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]

Classification according to Regulation (EC) No 1272/2008 as amended.	Classification procedure
Gases under pressure, Liquefied gas	On basis of test data

Wording of the H-statements in section 2 and 3

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.

Training information:

Users of breathing apparatus must be trained. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Ensure operators understand the hazards.

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

Press. Gas Liq. Gas, H280

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:

18.12.2023

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.