SAFETY DATA SHEET

C3H2F4 5,2962 %;C3H2F4 15,132 %;C2H2F4 17,7587 %;C2HF5 18,6912 %;CH2F2 43,1219 %

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

1.1 Product identifier

Product name: C3H2F4 5,2962 %;C3H2F4 15,132 %;C2H2F4 17,7587 %;C2HF5 18,6912 %;CH2F2 43,1219 %

Trade name: R448A

Other Name: R-448A

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, Sweden

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

Signal Words: Warning

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

Precautionary Statements

Prevention: None.

Response: None.

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

Disposal: None.

Supplemental label information

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

2.3 Other hazards: Contact with evaporating liquid may cause frostbite or freezing of skin.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical name	Chemical formula	Concentration	CAS-No.	EC No.	REACH Registration No.	Notes
1,3,3,3-tetrafluoroprop-1-ene	C3H2F4	5,2962%	29118-24-9	471-480-0	01-0000019758-54	
2,3,3,3-Tetrafluoropropene	C3H2F4	15,1320%	754-12-1	468-710-7	01-0000019665-61	
Norflurane	C2H2F4	17,7587%	811-97-2	212-377-0	01-2119459374-33	#
Pentafluoroethane	C2HF5	18,6912%	354-33-6	206-557-8	01-2119485636-25	#
Difluoromethane	CH2F2	43,1219%	75-10-5	200-839-4	01-2119471312-47	

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).
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.

Classification

Chemical name	Classification		Notes
1,3,3,3-tetrafluoroprop-1-ene	CLP:	Press. Gas Liq. Gas;H280	
2,3,3,3-Tetrafluoropropene	CLP:	Flam. Gas 1;H220, Press. Gas Liquef. Gas;H280	
Norflurane	CLP:	Press. Gas Liquef. Gas;H280	
Pentafluoroethane	CLP:	Press. Gas Liquef. Gas;H280	
Difluoromethane	CLP:	Press. Gas Liquef. Gas;H280, Flam. Gas 1;H220	

CLP: Regulation No. 1272/2008.

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

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.

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: Fire or excessive heat may produce hazardous decomposition products.

Hazardous Combustion Products: If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Carbon oxides Carbonyl halides Hydrogen fluoride ; Hydrogen chloride

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.

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.

7.3 Specific end use(s):

None.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	Type	Exposure Limit Values	Source
Pentafluoroethane	NGV	500 ppm 2.500 mg/m3	Sweden. Occupational Exposure Limit Values (2015)
	KTV	750 ppm 3.750 mg/m3	Sweden. Occupational Exposure Limit Values (2015)
Norflurane	NGV	500 ppm 2.000 mg/m3	Sweden. Occupational Exposure Limit Values (2018)
	KTV	750 ppm 3.000 mg/m3	Sweden. Occupational Exposure Limit Values (2018)

DNEL-Values

Critical component	Type	Value	Remarks
1,3,3,3-tetrafluoroprop-1-ene	Worker - inhalative, long-term - systemic	3902 mg/m3	-
2,3,3,3-Tetrafluoropropene	Workers - Inhalation, Systemic, long-term	950 mg/m3	Repeated dose toxicity
	Workers - Eyes, Local effect		Low hazard (no threshold derived)
Norflurane	Workers - Inhalation, Systemic, long-term	13936 mg/m3	Repeated dose toxicity
Pentafluoroethane	Workers - Inhalation, Systemic, long-term	16444 mg/m3	Repeated dose toxicity
Difluoromethane	Workers - Inhalation, Systemic, long-term	7035 mg/m3	Repeated dose toxicity

PNEC-Values

Critical component	Type	Value	Remarks
1,3,3,3-tetrafluoroprop-1-ene	Aquatic (freshwater)	0,1 mg/l	-
	Aquatic (intermit. releases)	1 mg/l	-
2,3,3,3-Tetrafluoropropene	Aquatic (freshwater)	0,25 mg/l	-
	Aquatic (marine water)	0,025 mg/l	-
	Soil	0,72 mg/kg	-
	Sediment (marine water)	0,135 mg/kg	-
	Sediment (freshwater)	1,35 mg/kg	-
Norflurane	Aquatic (marine water)	0,01 mg/l	-
	Sewage treatment plant	73 mg/l	-
	Sediment (freshwater)	0,75 mg/kg	-
	Aquatic (freshwater)	0,1 mg/l	-
Pentafluoroethane	Aquatic (freshwater)	0,1 mg/l	-
	Sediment (freshwater)	0,6 mg/kg	-
Difluoromethane	Aquatic (freshwater)	0,142 mg/l	-
	Sediment (freshwater)	0,534 mg/kg	-

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.

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: 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:	C3H2F4: Colorless C3H2F4: Colorless C2H2F4: Colorless C2HF5: Colorless CH2F2: Colorless
Odor:	C3H2F4: Slight ether-like odor C3H2F4: Ethereal odor C2H2F4: faint ethereal C2HF5: faint ethereal CH2F2: Odorless
Odor Threshold:	Odor threshold is subjective and is inadequate to warn of over exposure.
pH:	Not applicable.
Melting Point:	No data available.
Boiling Point:	>= -45,9 °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):	Non-Flammable Gas
Flammability Limit - Upper (%):	Not applicable.
Flammability Limit - Lower (%):	Not applicable.
Vapor pressure:	1.120 kPa (21,1 °C)

Vapor density (air=1):	3,04 (calculated) (15 °C)
Relative density:	No data available.
Solubility(ies)	
Solubility in Water:	No data available.
Partition coefficient (n-octanol/water):	Not known.
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: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

Minimum ignition temperature: 628 °C

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:	Open flames and high energy ignition sources. 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. Alkali metals. Alkali earth metals. Chemically-active metals (such as calcium, powdered aluminum, zinc, and magnesium)
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 toxicological effects

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

1,3,3,3-tetrafluoroprop-1-ene	LC 50 (Rat, 4 h): > 965 mg/l
2,3,3,3-Tetrafluoropropene	LC 50 (Rat): > 405000 ppm

Repeated dose toxicity

Component Information

Norflurane	NOAEL (Rat(Male), Inhalation, 14 d): 100.000 ppm(m) Inhalation Experimental result, Supporting study
Pentafluoroethane	NOAEL (Rat(Female, Male), Inhalation, 13 Weeks): >= 50.000 ppm(m) Inhalation Experimental result, Key study
Difluoromethane	NOAEL (Rat(Female, Male), Inhalation, 28 d): 49.500 ppm(m) Inhalation Experimental result, Supporting 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
2,3,3,3-Tetrafluoropropene — Ames test in vitro: (OECD Guideline 471 (Bacterial Reverse Mutation Test)): Mutagenic

In vivo
Component Information
2,3,3,3-Tetrafluoropropene — Chromosome aberration (OECD Guideline 474 (Mammalian Erythrocyte Micronucleus Test)): 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.

Reproductive toxicity (Fertility)
Component Information
2,3,3,3-Tetrafluoropropene — Rat NOAEL - No Observable Adverse Effect Level: 50.000 ppm

Developmental toxicity (Teratogenicity)
Component Information
2,3,3,3-Tetrafluoropropene — Rat 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..

Other Relevant Toxicity Information

Difluoromethane	Cardiac sensitisation threshold limit >350000 ppm Beagle (dog)LOAEC Cardiac sensitisation threshold limit 350000 ppm Beagle (dog)NOAEC 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.
Pentafluoroethane	Cardiac sensitisation threshold limit 100000 ppm Beagle (dog)NOAEC Cardiac sensitisation threshold limit 75000 ppm Beagle (dog)LOAEC 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. May produce irregular heart beat and nervous symptoms.
Norflurane	Cardiac sensitisation threshold limit 40000 ppm Beagle (dog)NOAEC Cardiac sensitisation threshold limit 80000 ppm Beagle (dog)LOAEC 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. May produce irregular heart beat and nervous symptoms.

2,3,3,3-Tetrafluoropropene	Cardiac sensitisation threshold limit >120000 ppm Beagle (dog)LOAEC Cardiac sensitisation threshold limit 120000 ppm Beagle (dog)NOAEC
	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

12.1 Toxicity

Acute toxicity

Product

No ecological damage caused by this product.

Acute toxicity - Fish

Component Information

1,3,3,3-tetrafluoroprop-1-ene	NOEC (Carp (Cyprinus carpio), 96 h): > 117 mg/l
2,3,3,3-Tetrafluoropropene	LC 50 (Carp (Cyprinus carpio), 96 h): > 197 mg/l
Norflurane	LC 50 (Oncorhynchus mykiss, 96 h): 450 mg/l (semi-static) Remarks: Experimental result, Key study
Pentafluoroethane	LC 50 (Oncorhynchus mykiss, 96 h): 450 mg/l (semi-static) Remarks: Read-across from supporting substance (structural analogue or surrogate), Weight of Evidence study
Difluoromethane	LC 50 (Pimephales promelas, 96 h): 1.405 mg/l Remarks: QSAR QSAR, Supporting study

Acute toxicity - Aquatic Invertebrates

Component Information

1,3,3,3-tetrafluoroprop-1-ene	LC 50 (Water flea (Daphnia magna), 48 h): > 160 mg/l
2,3,3,3-Tetrafluoropropene	EC 50 (Water flea (Daphnia magna), 48 h): > 100 mg/l
Norflurane	EC 50 (Daphnia magna, 24 h): 960 mg/l (Static) Remarks: Experimental result, Key study

Pentafluoroethane	EC 50 (Daphnia magna, 48 h): > 200 mg/l (Static) Remarks: Read-across from supporting substance (structural analogue or surrogate), Weight of Evidence study
Difluoromethane	EC 50 (Daphnia magna, 48 h): 1.573 mg/l Remarks: QSAR QSAR, Supporting study

Chronic Toxicity - Aquatic Invertebrates

Component Information

Pentafluoroethane	EC 50 (16 d): 12 mg/l

Toxicity to Aquatic Plants

Component Information

1,3,3,3-tetrafluoroprop-1-ene	NOEC (Green algae (Selenastrum capricornutum), 72 h): > 170 mg/l
2,3,3,3-Tetrafluoropropene	NOEC (Algae (Pseudokirchneriella subcapitata), 72 h): > 75 mg/l (OECD Guideline 201 (Freshwater Alga and Cyanobacteria, Growth Inhibition Test))
Pentafluoroethane	EC 50 (Green Algae, 72 h): 142 mg/l
Difluoromethane	EC 50 (Alga, 96 h): 142 mg/l

12.2 Persistence and Degradability

Product Not applicable to gases and gas mixtures..

Component Information

1,3,3,3-tetrafluoroprop-1-ene	Not readily biodegradable. Inorganic compound.

Biodegradation

Component Information

2,3,3,3-Tetrafluoropropene	< 5 % (28 d, OECD 301F/ ISO 9408/ EEC 92/69/V, C.4-D)
Norflurane	3 % (28 d) Detected in water. Experimental result, Key study
Pentafluoroethane	5 % (28 d) Detected in water. Experimental result, Key study
Difluoromethane	5 % (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.

12.4 Mobility in soil

Product

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

Component Information

Norflurane	Henry's Law Constant: 8.580 MPa (25 °C)

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: 1.387,2
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

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
2,3,3,3-Tetrafluoropropene	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 4 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
Pentafluoroethane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 3500 Annex 1: Fluorinated greenhouse gases referred to in Point 1 of Article 2; Section 1:Hydrofluorocarbons (HFCs) and its mixtures
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

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: Avoid discharges to atmosphere. Do not discharge into any place where its accumulation could be dangerous. Refer to manufacturer or supplier for information on recovery or recycling.

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.

European Waste Codes
Container: 14 06 01*: chlorofluorocarbons, HCFC, HFC

SECTION 14: Transport information

ADR

14.1 UN Number:	UN 3163
14.2 UN Proper Shipping Name:	LIQUEFIED GAS, N.O.S.(Difluoromethane, Pentafluoroethane)
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.(Difluoromethane, Pentafluoroethane)
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.(Difluoromethane, Pentafluoroethane)
14.3 Transport Hazard Class(es)	
Class:	2.2
Label(s):	2.2
EmS No.:	F-C, S-V
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

IATA

14.1 UN Number:	UN 3163
14.2 Proper Shipping Name:	Liquefied gas, n.o.s.(Difluoromethane, Pentafluoroethane)
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:

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, as amended.: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 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.

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.
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.

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:

25.03.2020

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.