SRF LIMITED

Issue: 03 | Rev: 14 | Revision Date: 26.10.2023

SAFETY DATA SHEET

1,1,1,2-Tetrafluoroethane (HFC134a)

(Commission Regulation (EU) 2020/878)

SECTION 1: IDENTIFICATION OF SUBSTANCE OR MIXTURE AND COMPANY

1.1	**Product Name**	:	1,1,1,2-Tetrafluoroethane
	Trade Names / Synonyms	:	Norflurane, HFC-134a-P, Refrigerant Gas R134a, HFC134a, HFC134a, F134a, Dymel®134a/P.
	CAS Number	:	811-97-2
	EC Number	:	212-377-0
	Reach number	:	01-2119459374-33-0015
1.2	**Manufacturer/supplier**	:	SRF Limited, D-2/1 GIDC Phase-II, PCPIR, Dahej, Tal. Vagra, Dist. Bharuch 392 130, Gujarat (India)
	Further information obtainable from:	:	Vikas Yadav e-mail: vikas.yadav1@srf.com Mobile no.-+91-9978445120
1.3	**Emergency Call**		
	Emergency Contact	:	Mr. Ashish Balwada +91-6357970984
	Primary Contact	:	Mr. Prabhat Kumar +91-7069057087

Relevant Identified Uses of The Substance or Mixture and Uses Advised Against

Identified Uses:	:	Refrigerant, Aerosol propellant, Medical propellant, Blowing agent, Solvent; for professional users only
Uses advised against:	:	Do not use product for anything outside of the above specified uses

SECTION 2: HAZARDS IDENTIFICATION

2.1 **Classification of the substance or mixture**:

Classification according to Regulation (EC) No 1272/2008

Physical Hazards	:	H280 Contains gas under pressure; may explode if heated
Other hazards	:	May displace oxygen and cause rapid suffocation
	:	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
Precautionary statement(s)		
Prevention	:	P202 Do not handle until all safety precautions have been read and understood.
	:	P244 Keep valves and fittings free from oil and grease.
	:	P217 Use only outdoors or in a well-ventilated area
Response	:	P308+P313 IF exposed or concerned: Get medical advice/attention.
	:	P303+P361+P353 IF ON SKIN (or hair): Take off Immediately all contaminated clothing. Rinse SKIN with water or shower.
	:	P304+P341 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
	:	P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing

	:	P371+P380+P375 In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.
Storage	:	P410+P403 Protect from sunlight. Store in a well-ventilated place.
Disposal	:	P 501 Dispose of contents/container in accordance with all local, regional, national and international regulations

Label elements

Labelling according Regulation (EC) No 1272/2008:

Pictogram :

Signal Word : Warning

Supplemental label information : EIGA-0783: Contains fluorinated greenhouse gases covered by the Kyoto protocol.
EIGA-As: Asphyxiant in high concentrations

2.2 **Other Hazard**

Results of PBT and vPvB assessment

PBT Assessment	This product is not considered in PBT
vPvB Assessment	This product is not considered in vPvB

Endocrine disrupting properties The substance/mixture has no endocrine disrupting properties.

SECTION 3: COMPOSITION & INFORMATION ON INGREDIENTS

Chemical name	Common name and synonyms	Formula	CAS No./ REACH No.	EC No.	Concentration % (w/w)
1,1,1,2-Tetrafluoroethane (HFC-134a)	Norflurane, HFC-134a, Refrigerant Gas R134a, HFC134a, HFC134a-P, F134a , Dymel®134a/P.	C2H2F4	811-97-2 / 01-2119459374-33-0015	212-377-0	>= 99.9 - <= 100

SECTION 4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice : 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.
In the case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt seek medical advice

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. Get medical attention if symptoms occur.

Skin contact : Contact with evaporating liquid may cause frostbite or freezing of skin. Treat for frostbite if necessary, by gently warming affected area. Do not rub affected area. Get medical attention immediately.

Eye contact: : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately

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

4.2 Most Important Symptoms And Effects, Both Acute And Delayed:

: Anaesthetic effects Light-headedness irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.

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

Protection of first-aiders: : If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Notes to physician : Treat symptomatically and supportively.
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. Avoid administration of adrenaline or other simpatomimeticas similar, as it can produce a cardiac arrhythmia with possible later heart failure.

SECTION 5. FIRE FIGHTING MEASURE

Fire and explosion hazards : HFC-134a is not flammable in air under ambient conditions of temperature and pressure. Under conditions of high temperature and pressure, certain HFC-134a/air mixtures were shown to be flammable. Certain mixtures of HFC-134a and chlorine may be flammable under some conditions.

: Containers may burst under intense heat. Ruptured cylinders may rocket or fragment. Heavy vapour may suffocate

5.1 **Extinguishing media Suitable extinguishing media:** : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. (Material itself is not flammable)

5.2 Special hazards arising from the substance or mixture : Cylinders are equipped with pressure and temperature relief devices but may still rupture under fire conditions. Decomposition may occur. Contact of welding or soldering torch flame with high concentrations of this substance can result in visible changes in the size and colour of the torch flame. This flame effect will only occur in concentrations of this substance well above the recommended exposure limit. Therefore, stop all work and ventilate to disperse vapours from the work area before using any open flames.
This substance is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxygen enriched atmosphere become combustible depends on the inter-

			relationship of 1) the temperature2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example, this substance should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of this substance in the presence of certain concentrations of chlorine
	Hazardous Combustion Products:	:	If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: carbon monoxide; Carbonyl difluoride; Hydrogen fluoride
	Advice for firefighters Special fire fighting procedures:	:	In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire. Exposure to decomposition products may be a hazard to health.
		:	In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguisher to contain the fire. Isolate the source of the fire or let it burn out. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.
	Special protective equipment for firefighters:	:	Fire-fighters must use standard protective equipment including flame retardant coat, helmet with face shield, Gloves, rubber boots, and in enclosed spaces, SCBA.

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.
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. Avoid open flames and high temperatures
6.4	**Reference to other sections:**	:	Refer to sections 8 and 13.

SECTION 7: HANDLING & STORAGE

7.1	**Precautions for safe handling:**	:	Only experienced and properly instructed persons should handle gases under pressure. Handle in accordance with good industrial hygiene and safety practice. 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 etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. When using do not eat, drink or smoke.

Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Never attempt to lift cylinder by its cap. 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.
The product should not be mixed with air for leak testing or used with air for any other purpose above atmospheric pressure. Contact with chlorine or other strong oxidizing agents should also be avoided.

7.2	**Conditions for safe storage, including any incompatibilities:**	:	Observe all regulations and local requirements regarding storage of containers. Protect from sunlight. Store in a well-ventilated place. 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	**Storage temperature**	:	Protect from sunlight. Store in a cool and well-ventilated place.
7.4	**Storage period:**	:	No data available

SECTION 8 : EXPOSURE CONTROL / PERSONAL PROTECTION CONTROL PARAMETERS

8.1	**Control parameters** **1,1,1,2-Tetrafluoroethane(HFC-134a)**		**Exposure limits**
	ACGIH TLV TWA	:	2.5 mg/m³, (as F) 8 hours.
	OSHA TLV TWA	:	2.5 mg/m³, (as F) 8 hours
	UK HSE WEL	:	1000 ppm (8hr TWA); 4240 mg/m3 (8 hr TWA)
	Workplace Environmental Exposure Level (AIHA)	:	1000 ppm
8.2	**Exposure controls**		
	Engineering controls	:	Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places. Concentration monitors may be necessary to determine vapour concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.

Personal protective equipment Respiratory protection	:	For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Hand protection	:	Additional protection: Wear approved gloves that are suitable for the task and have been shown to be impervious for the duration of their use
Eye protection	:	Wear safety glasses with side shields. Additionally, wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
Protective measures	:	When using do not smoke. Self-contained breathing apparatus (SCBA) is required if a large release occurs
Other exposure limits for potential decomposition prosucts	:	Hydrogen Fluoride: ACGIH TLV: 2 ppm ceiling

SECTION 9 : PHYSICAL & CHEMICAL PROPERTIES

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

Appearance	:	Clear, colourless liquified gas
Physical state	:	liquified gas
Colour	:	colourless
Odour	:	slight, ether-like
Odour Threshold	:	No data available
pH (15 aqueous solution)	:	Neutral
Melting point/freezing point	:	-92.5°C (-141.9°F) freezing point
Initial boiling point and boiling range	:	-26.2 °C (-15.16 °F) at 1,013 hPa
Flash point	:	None
Evaporation rate	:	>1(CCl4=1.0)
Flammability (solid, gas)	:	No data available
Upper/lower flammability or explosive limits	:	Does not flash
Ozone Depletion Potential	:	O (Source: as per schedule- 1 of ozone legislation, Ozone cell-Management of environment forest & climate change)
Global Warming Potential	:	1430 (Source: IPCC-AR4 Report)
Vapour pressure	:	85.8 psia @ 70 °F
Vapour density	:	3.5 at 25°C (77°F) and 1013 hPa (Air = 1.0)
SPECIFIC GRAVITY (H2O = 1):	:	1.21 g/cm3 at 25 °C (77 °F)
Water solubility	:	1.5 g/l
Auto-ignition temperature	:	> 750 °C 1,013 hPa
Decomposition temperature	:	No data available

SECTION 10: STABILITY & REACTIVITY

10.1	**Reactivity:**	:	Decomposes on heating.
10.2	**Chemical stability**	:	Stable under recommended storage conditions
10.3	**Possibility of hazardous reactions**	:	Polymerization will not occur
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:**	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
10.6	**Hazardous decomposition products:**	:	Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride., These materials are toxic and irritating, avoid contact with decomposition products.

SECTION 11 : TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Inhalation 4 h LC50	:	> 500000 ppm, Rat
Inhalation No Observed	:	40000 ppm, Dog
Adverse Effect Concentration	:	Cardiac sensitization
Inhalation Low Observed	:	80000 ppm, Dog
Adverse Effect Concentration (LOAEC)	:	Cardiac sensitization
Skin irritation	:	No skin irritation, Rabbit
Eye irritation	:	No eye irritation, Rabbit
Skin sensitization	:	Does not cause skin sensitisation., Guinea pig. Does not cause respiratory sensitisation., Rat
Repeated dose toxicity	:	Inhalation Rat-gas NOAEL: 50000, No toxicologically significant effects were found
Carcinogenicity	:	Not classifiable as a human carcinogen. Overall weight of evidence indicates that the substance is not carcinogenic
Mutagenicity	:	Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects
Reproductive toxicity	:	No toxicity to reproduction No effects on or via lactation Animal testing showed no reproductive toxicity
Teratogenicity	:	Animal testing showed no developmental toxicity
Further information	:	Cardiac sensitisation threshold limit: 334000 mg/m3
Endocrine disrupting properties	:	The substance/mixture has no endocrine disrupting properties.

Carcinogenicity:

The carcinogenicity classifications for this product and/or its ingredients have been determined according to HazCom 2012, Appendix A.6. The classifications may differ than those listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or those found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition).

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen

12. ECOLOGICAL INFORMATION

12.1 Toxicity

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) 450 mg/l
96 h ErC 50	:	Algae 142 mg/l Information given is based on data obtained from similar substances.

	72 h NOEC	:	Pseudokirchneriella subcapitata (green algae) 13.2 mg/l Information given is based on data obtained from similar substances.
	48h EC50	:	Daphnia magna (Water flea) 980 mg/l
12.2	**In the water Degradability (BOD)**	:	R-134a gas at room temperature, therefore it is unlikely to remain in water.
12.3	**In the air**	:	
	ODP (R-11=1)	:	=0 (Ozone Depleting Potential)
	GWP {w.r.t. CO2 (time horizon 100 years)}	:	=1430 (Greenhouse Effect Potential)
12.4	**Results of PBT and vPvB assessment**		
	PBT Assessment		This product is not considered in PBT
	vPvB Assessment		This product is not considered in vPvB
12.5	**Information on other hazards**		
	Endocrine disrupting properties		The substance/mixture has no endocrine disrupting properties.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1	**Waste Treatment Methods**		
	Product	:	Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations
	Contaminated packaging	:	Empty pressure vessels should be returned to the supplier.

SECTION 14: TRANSPORT INFORMATION

ITEM	**ADR**	**IMDG**	**IATA**
UN number	3159	3159	3159
Proper shipping name	1,1,1,2-Tetrafluoroethane	1,1,1,2-Tetrafluoroethane	1,1,1,2-Tetrafluoroethane
Transport hazard class(es)/ Labelling Number			
	2.2	2.2	2.2
Packaging Instruction	P 200 `	P 200	P 200
Environmental hazards	No	No	No
Special precautions for user	No data is available on this product.		

15. REGULATORY INFORMATION

15.1	**Safety, health and environment regulations/legislation specific for the substance or mixture**		
	EU REGULATION No 1907/2006		
	Annexure XIV List of substances subjected to authorization	:	None of the components listed
	Annexure XVII Restriction on manufacture, placing in the market and use of certain	:	Not Applicable

	dangerous substances, mixtures and articles		
	Other EU Regulations		
	Industrial Emissions (Integrated Pollution Prevention and control) Air	**:**	Not listed
	Ozone Depleting Substances (1005/2009/EU)	**:**	Not listed
	Special labelling of certain mixtures:	**:**	Contains fluorinated greenhouse gases covered by the Kyoto Protocol.
	Special restrictions	**:**	R134a having green house effect must be supplied in retornbles (Cans/ cylinders). Do not vent to the atmosphere. EC No 842/2006 of EU on certain fluorinated green house gases
	TSCA	**:**	On the inventory, or in compliance with the inventory
	SARA 313 Regulated Chemical(s)	**:**	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimise) reporting levels established by SARA Title III, Section 313
	California Prop. 65	**:**	This product does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive hazards
15.2	**Chemical Safety Assessment**	:	No

SECTION 16: OTHER INFORMATION

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. SRF Limited-Chemical business shall not be held liable for any damage resulting from handling or from contact with the above product