



SRF LIMITED

Rev: 08

Revision Date: 19.11.2018

MATERIAL SAFETY DATA SHEET

1,1,1,2-Tetrafluoroethane

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

1.1 Product Name	1,1,1,2-Tetrafluoroethane	
Trade Names / Synonyms	Norflurane, HFC-134a-P, Refrigerant Gas R134a, HFC134a, Dymel-HFC134a.	
CAS Number	811-97-2	
EC Number	212-377-0	
Reach Registration 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:	Hamid Hasan Sayyad e-mail-Hamid.Sayyad@srf.com Mobile no.-09978986664	
1.3 Emergency Call		
Emergency Contact	Mr Balwada Ashish	+91-9099002602
Primary Contact	Mr Fadadu Jignesh	+91-9687694057
SDS Contact	Mr Sharma Anil Kumar	+91-9687694067

Relevant Identified Uses Of The Substance Or Mixture And Uses Advised Against

Identified Uses: Refrigerant, for professional users only

Uses advised against: Do not use product for anything outside of the above specified uses

2. HAZARDS IDENTIFICATION

2.1-Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Skin Sens. 2	Contact with liquid or refrigerated gas can cause cold burns and frostbite. May cause skin irritation. May cause: Discomfort, itching, redness, or swelling
Eye damage-2	Contact with liquid or refrigerated gas can cause cold burns and frostbite. May cause eye irritation. May cause: tearing, Redness, Discomfort
Inhalation	Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects. Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Carcinogenicity	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.

2.2-Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram



Single word Warning

Hazard Statements (S)

H280	Contains gas under pressure: may explode if heated.
OSHA-H-01	May displace oxygen and cause rapid suffocation.
CGA-HG01	May cause frostbite



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Precautionary statement(s)

P202	Do not handle until all safety precautions have been read and understood
P262	Do not get in eyes, on skin, or on clothing
P271+P403	Use and store only outdoors or in a well-ventilated place.
CGA-PG05	Use a back flow preventive device in the piping.
CGA-PG06	Close valve after each use and when empty.
CGA-PG-02	Protect from sunlight when ambient temperature exceeds 52°C (125°F).
EIGA AS	Asphyxiant in high concentrations.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical name	Common name and synonyms	Formula	CAS No.	EC No.	Concentration
1,1,1,2-Tetrafluoroethane (HFC-134a)	Norflurane, HFC-134a-P, Refrigerant Gas R134a, HFC134a, Dymel-HFC134a	C ₂ H ₂ F ₄	811-97-2	212-377-0	100%

4. FIRST AID MEASURES

4.1-Description of first aid measures

Inhalation:	Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
Skin contact:	In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.
Eye contact:	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary
Ingestion:	Ingestion is not considered a potential route of exposure.



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General Advice : Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice

Self-protection of first aider: If potential for exposure exists refer to Section 8 for specific personal protective equipment.

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

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

No data available

5. FIRE FIGHTING MEASURES

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 temperature 2) 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.



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5.3-Advice for fire-fighters

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

5.4-Further information

Overexposure by inhalation to very high Concentrations may cause temporary alteration of the heart's electrical activity with irregular pulse, palpitations or inadequate circulation. Intentional misuse or deliberate inhalation may cause death

6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Safeguards (Personnel)	Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect.
Environmental precautions:	Should not be released into the environment. In accordance with local and national regulations.
Methods and material for containment and cleaning up:	Evaporates. Ventilate area using forced ventilation, especially low or enclosed places where heavy vapours might collect.
Accident Release Measures	Self-contained breathing apparatus (SCBA) is required if a large release occurs. Avoid open flames and high temperatures.



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7. HANDLING & STORAGE

7.1-Precautions For Safe Handling (Personal)

Use sufficient ventilation to keep employee exposure below recommended limits. For personal protection see section 8.

Handle in accordance with good industrial hygiene and safety practice.

7.2-Precautions For Safe Handling (Personal)

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.

Dust explosion class

No applicable data available

7.3-Conditions for safe storage, including any incompatibilities:

Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.

Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.

The product has an indefinite shelf life when stored properly.

7.4-Storage period: No data available

7.5-Storage temperature Store in a cool, well-ventilated area.



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8. EXPOSURE CONTROL / PERSONAL PROTECTION CONTROL PARAMETERS

8.1-Control parameters

ACGIH	Not established
USA OSHA	Not established

8.2-Exposure controls

Engineering controls	<p>Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released.</p> <p>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.</p>
Personal protective equipment Respiratory protection	<p>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.</p>
Hand protection	<p>Additional protection: Wear approved gloves that are suitable for the task and have been shown to be impervious for the duration of their use</p>
Eye protection	<p>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.</p>
Protective measures	<p>When using do not smoke. Self-contained breathing apparatus (SCBA) is required if a large release occurs.</p>
Exposure Guidelines Exposure Limit Values	<p>INGREDIENT NAME ACGIH TLV OSHA PEL OTHER LIMIT :- 1,1,1,2-Tetrafluoroethane None *1000 ppm TWA (8hr)*= Workplace Environmental Exposure Level (AIHA) OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS: Hydrogen Fluoride: ACGIH TLV: 2 ppm ceiling, 0.5 ppm TLV-TWA 1000 ppm 8 & 12 hr. TWA</p>



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9. PHYSICAL & CHEMICAL PROPERTIES

9.1-Information on basic physical and chemical properties

Appearance	Form: liquid, clear Colour: colourless
Physical state	Vapour
Form	Liquefied gas
Colour	colourless
Odour	slight, ether-like
Odour Threshold	Faint ethereal odour
pH	Neutral at 1% solution water
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	Does not flash
Evaporation rate	>1(CCl ₄ =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)
Relative density	1.21 g/cm ³ at 25 °C (77 °F)
Water solubility	Not available
Auto-ignition temperature	> 750 °C 1,013 hPa
Decomposition temperature	No data available
Viscosity	No applicable data available



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9.2-Other safety information

Relative vapour ca.2,5 at 25 °C - (Air = 1.0)

10. STABILITY & REACTIVITY

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| 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. |



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11. TOXICOLOGICAL INFORMATION

11.1-Information on toxicological effects

Inhalation 4 h LC50	> 500000 ppm , Rat
Inhalation No Observed Adverse Effect Concentration	40000 ppm , Dog 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



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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)

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.



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14. TRANSPORT INFORMATION

14.1-UN number:	ADR/RID: 3159	IMDG: 3159	IATA: 3159
14.2-UN proper shipping name:	1,1,1,2-Tetrafluoroethane	1,1,1,2-Tetrafluoroethane	1,1,1,2-Tetrafluoroethane
14.3-Transport hazard class(es)/Labelling Number	ADR/RID: 2.2	IMDG:2.2	IATA:2.2
14.4-Packaging Instruction	ADR/RID: P-200	IMDG:P-200	IATA:P-200
14.5-Environmental hazards	ADR/RID: no	IMDG: no	IATA: no
14.6-Special precautions for user	No data available		

15. REGULATORY INFORMATION

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	Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known.

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.