

## Material Safety Data Sheet

### R-422D

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

Product Name: R-422D  
Supplier: Star House, Turbine Industrial Park,  
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Birkenhead,  
Wirral,  
CH41 9BA, United Kingdom  
Telephone: +44 (0) 1244 504 500  
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Email: enquiries@star-international.co.uk

#### 2. COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Pentafluoroethane (HFC-125)	354-33-6	65.1
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	31.5
Isobutane (R-600a)	75-28-5	3.4

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

#### 3. HAZARDS IDENTIFICATION

Eye: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

Skin: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

Ingestion: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

Inhalation: R-422D is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

Delayed Effects: None Known

Ingredients found on one of OSHA's designated lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
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No ingredients listed in this section

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**EMERGENCY OVERVIEW:** Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250 deg. C) decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.

### 4. FIRST AID MEASURES

**Skin:** Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms persist.

**Eyes:** Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

**Inhalation:** Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention. Do not give epinephrine (adrenaline).

**Ingestion:** Ingestion is unlikely because of the physical properties and is not expected to be hazardous. Do not induce vomiting unless instructed to do so by a physician.

**Advice To Physician:** Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

### 5. FIRE-FIGHTING MEASURES

**Flash Point:** Gas, not applicable per DOT regulations.

**Flash Point Method:** NA

**Upper Flame Limit (volume % in air):** NONE (per ASHRAE) Standard 34 with match ignition.

**Lower Flame Limit (volume % in air):** NONE (per ASHRAE) Standard 34 with match ignition.

**Autoignition Temperature:** Unknown for mixture.

**Flame Propagation Rate (solids):** NA

**Osha Flammability Class:** NA

#### EXTINGUISHING MEDIA:

Use any standard agent—choose the one most appropriate for type of surrounding fire (material itself is not flammable)

#### UNUSUAL FIRE AND EXPLOSION HAZARDS:

R-422D is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources. Contact with certain reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and /or appropriate pressures).

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### SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool.

### 6. ACCIDENTAL RELEASE MEASURES

**IN CASE OF SPILL OR OTHER RELEASE:** (Always wear recommended personal protective equipment)

Evacuate unprotected personnel. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return until air has been tested and determined safe, including low-lying areas.

**Spill and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.**

### 7. HANDLING AND STORAGE

**Normal Handling:** Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.

R-422D should not be mixed with air above atmospheric pressure for leak testing or any other purpose.

**Storage Recommendations:** Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

### 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering Controls:** Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operation and storage areas.

**Skin Protection:** Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

**Eye Protection:** For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

**Respiratory Protection:** None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH approved breathing apparatus or supplied air respirator. For escape, use the former or a NIOSH approved gas mask with organic vapor canister.

**Additional Recommendations:** Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29CFR 1910.133.

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### EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMITS
Pentafluoroethane	None	None	*1000 ppm TWA (8hr)
1,1,1,2-Tetrafluoroethane	None	None	*1000 ppm TWA (8hr)
Isobutane	1000 ppm TWA (8hr)	None	None

\* = Workplace Environmental Exposure Level (AIHA).

### 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Gas at ambient temperatures
Appearance:	Clear, colorless liquid and vapor
Molecular Weight:	Mixture
Chemical Formula:	CF <sub>3</sub> CHF <sub>2</sub> , CH <sub>2</sub> FCF <sub>3</sub> CH <sub>2</sub> F
Oder:	Slight ethereal odor
Solubility in water:	Not determined
pH:	Neutral
Boiling Point/Boiling Range:	-43deg.C (-46F)
Freezing Point/Melting Range:	Not determined
Vapor Pressure:	147.24 psia @ 70 deg F 334.9 psia @ 130 deg. F
Vapor Pressure (air = 1.0):	3.0
Liquid Desity @ 1 atm:	86.95 lb/ft <sup>3</sup>
Evaporation Rate:	>1 COMPARED TO: CCl <sub>4</sub> =1
Specific Gravity (water = 1.0):	1.15 @ 25 deg. C (77deg.F)
% Volatiles:	100
Flash Point:	NA

### 10. STABILITY AND REACTIVITY

Conditions to Avoid:	Product is stable. Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.
Incompatibilities:	(Under specific conditions: e.g. very high temperatures and/or appropriate pressure)—Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically active metals: potassium, calcium, and powdered aluminum, magnesium and zinc.
Hazardous Decomposition:	Halogens, halogen acids and possibly carbonyl halides.
Hazardous Polymerisation:	Will not occur.

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### 11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:	HFC-125:	LC50 : 4 hr. (rat) - > 800,000 ppm Cardiac Sensitization threshold (dog) 75,000 ppm.
	HFC-134a:	LC50 : 4 hr. (rat) - > 500,000 ppm Cardiac Sensitization threshold (dog) 80,000 ppm.
	R-600a:	LC50 : 15 min. (rat) - 570,000 ppm
DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:	HFC-125:	Teratogenic NOEL (rat and rabbit) – 50,000 ppm Subchronic inhalation (rat) NOEL - >50,000 ppm Chronic NOEL – 10,000 ppm
	HFC-134a:	Teratogenic NOEL (rat and rabbit) – 40,000 ppm Subchronic inhalation (rat) NOEL - 50,000 ppm Chronic NOEL – 10,000 ppm
	R-600a:	Subchronic inhalation (rat) NOAEL - 4,489 ppm
OTHER DATA:	HFC–125, HFC–134a:	Not active in four genetic studies
	R-600a:	Negative Ames test with and without activation

### 12. ECOLOGICAL INFORMATION

Degradability (BOD): R-422D is a gas at room temperature; therefore, it is unlikely to remain in water.

Octanol Water Partition Coefficient: Unknown for mixture

### 13. DISPOSAL CONSIDERATIONS

RCRA Is the unused product a RCRA hazardous waste if discarded? Not a hazardous waste  
If yes, the RCRA ID number is: NA

Other Disposal Considerations: Disposal must comply with federal, state, and local disposal or discharge laws. R-422D is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

### 14. TRANSPORT INFORMATION

US Dot Proper Shipping Name: Liquefied gas, n.o.s., (1,1,1,2-tetrafluoroethane, Pentafluoroethane, Isobutane)

US Dot Hazard Class: 2.2

US Dot Packing Group: Not applicable

US Dot ID Number: UN3163



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### 15. REGULATORY INFORMATION

TSCA Inventory Status: Components listed on the TSCA inventory

Other TSCA Issues: Subject to Section 12(b) export notification. May contain 0-10 ppm Ethane, 2-chloro- 1,1,1-trifluoro, CAS# 75-88-7

Sara Title III / Cercla: "Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA / CERCLA RQ (lb.)	SARA EHS TPQ (lb.)
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No ingredients listed in this section

Spills or releases resulting in the loss of any ingredient at or above its RQ, requires immediate notification to the National Response Center (800) 424-8802 and to your Local Emergency Planning Committee.

Section 311 Hazard Class: IMMEDIATE, PRESSURE

Sara 313 Toxic Chemicals: The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

Ingredient Name: No ingredients listed in this section.

State Right To Know: In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

Ingredient: No ingredients listed in this section.

Additional Regulatory Information: R-422D is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part

Whmis Classification (Canada): 82. **WARNING:** Contains pentafluoroethane (HFC-125), tetrafluoroethane, and isobutane; greenhouse gases which may contribute to global warming

**Do not vent** to atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered.

Foreign Inventory Status:	Australia	New Zealand	Canada	Japan
	Europe	China	Korea	Philippines

### 16. ADDITIONAL INFORMATION

Current Issue Date: December, 2008

Previous Issue Date: August, 2007

Other Information: Regulatory Standards:

1. OSHA regulations for compressed gases: 29 CFR 1910.101
2. DOT classification per 49 CFR 172.101
3. ANSI /ASHRAE 34 Safety Group – A1

Toxicity information per PAFT Testing, RTECS, HSDB, IUCLID

### 17. DISCLAIMER

The above information is based on the present state of our knowledge at the time of publication. It is given in good faith, no warranty is implied with respect to quality or specification of product. The user must satisfy himself that the product is entirely suitable.