

MATERIAL SAFETY DATA SHEET

PRODUCT NAME : REFRIGERANT - EDWARDS CHILLER

1. Product and Company Identification

Product name: Edwards chiller refrigerant
Synonyms: R-404A, R404A refrigerant, Genetron 404A
Item Numbers: P53286100

European Contact Details

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West Sussex, RH10 9LW, England

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Wilmington, MA 01887

General enquiries

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Toll Free: 1-800-848-9800

24 h Emergency telephone number:

Chemtrec: 1-800-424-9300

2. Composition/Information on Ingredients

Ingredient	% Weight	CAS No	Hazard class*	Risk phrase*
Pentafluoroethane (HFC 125)	44	354-33-6	Not applicable	Not applicable
Ethane 1,1,1 - Trifluoro (HFC143a)	52	420-46-2	Not applicable	Not applicable
Ethane 1,1,1,2 Tetrafluoro (HFC-134a)	4	811-97-2	Not applicable	Not applicable

*Hazard class & Risk phrase. These columns are only completed for ingredients which are classified as hazardous under EU Directive (67/548/EEC, as amended) and are present in sufficient concentration to make the overall substance hazardous. In all other situations, the column will be completed as "Not applicable".

3. Hazards Identification

EMERGENCY OVERVIEW

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of liquid may cause frostbite. Inhalation of high vapour concentrations may cause heart irregularities, short-term narcotic effects (including dizziness, headaches and confusion), unconsciousness or death. Contents under pressure. High temperature decomposition products may include hydrofluoric acid and carbonyl halides

For short and long term exposure effects see Section 11 Toxicological data.

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

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

Ingestion/Oral Effects: Ingestion is unlikely because of the product's low boiling point. If ingestion occurs, this may result in discomfort in the gastrointestinal tract due to rapid evaporation and consequent evolution of gas. Some effects of skin exposure and inhalation would also be expected.

Inhalation Effects: When the product causes oxygen levels in air to be reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. For high concentrations, see Emergency Overview above.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known.

NFPA Hazard codes		HMIS Hazard codes		Rating System
Health	1	Health	1	0 = No Hazard
Flammability	0	Flammability	0	1 = Slight Hazard
Instability	1	Reactivity	1	2 = Moderate Hazard
				3 = Serious Hazard
				4 = Severe Hazard

4. First Aid Measures

Eyes: In case of contact, immediately flush the eye with plenty of water for at least 15 minutes lifting eyelids occasionally to aid irrigation. (In case of frostbite, use lukewarm not hot water.) If symptoms persist, seek medical attention.

Skin: Flush with water until all of the product 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. If symptoms persist, seek medical attention.

Ingestion/Oral: Ingestion is unlikely due to the product's physical properties, and is not expected to be hazardous. Do not induce vomiting unless instructed to do so by a medical practitioner.

Inhalation: Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Qualified persons may give oxygen as required. Seek medical attention. Do not administer epinephrine (adrenaline).

Other Information: NOTE TO PHYSICIANS : Because of 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.

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5. Fire Fighting Measures

Extinguishing Media:	Any.
Fire and Explosion Hazard:	Cylinders may rupture under fire conditions. Cool cylinders with water spray or fog. The material is not flammable at temperatures up to 80 °C/176 °F and at atmospheric pressure. Data is not available for higher temperatures and pressures. However, one of the components, HFC-143a is flammable. Another, HFC-134a, has been shown in tests to be combustible at pressures as low as 60psig at ambient temperature when mixed with air at concentrations of 65% by volume. Decomposition products are hazardous. The material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc) forming hydrochloric and hydrofluoric acids, and possibly carbonyl halides.
Special Protective Equipment for Fire Fighters:	Fire fighters should wear a self-contained breathing apparatus (SCBA) which meets appropriate standards operated in positive pressure mode, and full turn out gear.

For Flammability Properties - see Section 9

6. Accidental Release Measures

The product readily evaporates if spilt/released. Take note of the information in Section 5 (Fire Fighting Measures) and Section 7 (Handling and Storage) before proceeding with clean-up. Use appropriate Personal Protective Equipment during clean-up.

In the event of an accidental release, evacuate unprotected personnel and ventilate the area (especially low lying or enclosed places where vapours might collect). Protected personnel using self-contained breathing apparatus should then remove open flames and other ignition sources, and shut off the source of the release (if applicable). Where possible, recover the vapours and prevent release to local atmosphere. Do not allow unprotected personnel to return to the area of the release until the air has been tested and is deemed safe.

7. Handling and Storage

Handling:	Avoid breathing vapour. Avoid liquid contact with eyes, skin and clothing. Use in sufficiently ventilated areas to keep employee exposure below recommended limits. Do not drop or puncture cylinders. Use authorized cylinders only. Tightly close cylinder valves after use and when empty. Follow the standard procedures for the handling and use of compressed gas cylinders.
Storage:	Store in a cool, well ventilated area of low fire risk and out of direct sunlight. Keep away from sources of ignition. Protect cylinders and fittings from physical damage. Avoid storage in sub-surface locations.

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8. Exposure Controls/Personal Protection

Exposure Limits:

Ingredient	ACGIH - TLV -	OSHA - PEL	Occupational Exposure Limits EH40 (UK)
Pentafluoroethane (HFC 125)	No data available	No data available	No data available
Ethane 1,1,1 - Trifluoro HFC143a)	No data available	No data available	No data available
Ethane 1,1,1,2 Tetrafluoro (HFC134a)	No data available	No data available	No data available

Note: Honeywell's AEL (Acceptable Exposure Limit) for each of the above ingredients is 1000 ppm/8h TWA. Where government imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

Personal Protection:

- Engineering Measures:** Provide local ventilation at filling areas and areas where leaks or accidental releases are possible, sufficient to keep employee exposure below recommended limits. Mechanical (general) ventilation may be adequate for other operating and storage areas.
- Respiratory Protection:** Avoid breathing vapour. Under normal manufacturing conditions, no respiratory protection is required when using the product. Self-contained breathing apparatus is required if an accidental release occurs.
- Hand/Skin Protection:** Avoid liquid contact with skin. Wear general work clothing and leather gloves for normal protection. If prolonged contact with liquid or gas product is anticipated, wear impervious boots and clothing, and insulated PVA, neoprene or butyl rubber gloves.
- Eye/Face Protection:** Avoid liquid contact with eyes. Wear safety glasses or, where there is the possibility of contact with liquid product, chemical splash goggles.
- Hygiene Measures:** Employ good workplace hygiene at all times. No smoking. Promptly remove and wash contaminated clothing before reuse.
- Other/General Protection:** Provide eyewash stations and quick-drench shower facilities at suitable locations.

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9. Physical and Chemical Properties

Appearance and Odour	Clear, colourless liquefied gas. Faint odour of ether	Boiling point	-47.8 / -54	°C/°F
pH (as supplied)	Neutral	Freezing Point	No data available	°C/°F
Solubility in Water	No information available	Auto Ignition	No data available	°C/°F
Volatile Content by Volume	100%	Flash Point	Not applicable	°C/°F
Specific Gravity	1.08 @ 21 °C / 70 °F			
Vapour Pressure (mbar)	12.6 @ 21 °C 25.6 @ 54 °C	Vapour Pressure (Torr)	9458 @ 70 °F 19179 @ 130 °F	

10. Stability and Reactivity

Stability:	Stable if used as directed.
Material/Conditions to Avoid:	Do not mix with air or oxygen above atmospheric pressure. Avoid sources of high temperature which may yield hazardous decomposition products (see below). Incompatible with chemically active metals such as potassium, calcium, powdered aluminium, magnesium and zinc. Avoid contact with freshly abraded aluminium surfaces under conditions of very high temperatures and/or pressures.
Hazardous Decomposition:	Exposure to high temperatures can result in decomposition products including halogens, halogen acids, hydrofluoric acids, and possibly carbonyl halides.
Hazardous Polymerisation:	Will not occur.

11. Toxicological Information

For a comprehensive description for the various toxicological (health) effects which may arise if the user comes into contact with the substance or preparation refer to Section 3 Hazards Identification.

Animal data:

LD50 value:	No data available.
LC50 value:	HFC-125 : 4h value:>800,000 ppm (rat); cardiac sensitization threshold : >75,000 ppm (dog) HFC-143a : 4h value:>540,000ppm (rat); cardiac sensitization threshold : >250,000 ppm (dog) HFC-134a : 4h value:>500,000ppm (rat); cardiac sensitization threshold : >80,000 ppm (dog)

Carcinogenicity:

Material did not show carcinogenic, teratogenic or mutagenic effects in animal experiments.

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12. Ecological Information

HFC-143a, HFC-125 and HFC-134a are greenhouse gases that may contribute to global warming.

HFC 143a : 96-hour LC50, rainbow trout > 40mg/l.

HFC-125 : Global warming potential : HGWP = 0.84 -(R11=1)
Ozone depletion potential : ODP = 0 -(R11=1)

HFC-134a : Global warming potential : HGWP = 0.28-(11=1)
Ozone depletion potential : ODP = 0 -(R11=1)

HFC-143a : Global warming potential : HGWP = 1.1-(R11=1)
Ozone depletion potential : ODP = 0 -(R11=1)

13. Disposal Considerations

Do not vent to atmosphere. Reclaim by distillation or remove to a permitted waste disposal facility. Any gases to be removed from a system must be recovered. Comply with all federal, state and local regulations.

14. Transport Information

This product is not classified as dangerous under transport regulations.

PARAMETER	EUROPEAN	CANADIAN TDG	UNITED STATES DOT
Proper Shipping Name	Liquefied Gas, N.O.S (contains Pentafluoroethane and tetrafluoroethane)	Liquefied Gas, n.o.s.	Refrigerant gas R 404A
Hazard Class	2.2	2.2	2.2
Identification Number	3163	3163	UN3337
Shipping Label	Non-flammable compressed gas	Non-flammable gas	Non-flammable gas



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15. Regulatory Information

European Regulatory Information

This product has been classified in accordance with the Dangerous Substances Directive (67/548/EEC, as amended) and the Preparations Directive (88/379/EEC, as amended), implemented in the UK as the Chemical (Hazard Information and Packing) Regulations 1994 (CHIP, as amended).

Classified as dangerous to supply : No

Risk Phrases : Not applicable

Safety Phrases : Not applicable

Symbols : None

United States Regulatory Information

TSCA Inventory Status : reported/included.

HFC125 and HFC143a are TSCA listed and are controlled by a TSCA Section 5 Consent Order.

Title III Hazard Classifications : Sections 311, 312.

Acute : No

Chronic : No

Fire : No

Reactivity : No

Pressure : Yes

Lists :

SARA Extremely Hazardous Substance : No

CERCLA Hazardous Material : No

SARA Toxic Chemicals : No

California Proposition 65: This product does not contain chemicals known to the State of California to cause cancer or reproductive toxicity.

Canadian Regulatory Information

WHMIS Classification: A

All ingredients in this product are included in the Canadian DSL.

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16. Other Information

This MSDS is compiled in accordance with ANSI Z400.1 and the EU Safety Data Sheet Directive 91/155/EEC.

Sources of information for this data sheet:

- Honeywell "Genetron 404A" Material Safety Data Sheet. MSDS Number: GTRN-0002. Current Issue Date: December 2005.

Glossary:

ACGIH - American Conference of Governmental Industrial Hygienists; **ANSI** - American National Standards Institute; **Canadian TDG** - Canadian Transportation of Dangerous Goods; **CAS** - Chemical Abstracts Service; **CERCLA** - Comprehensive Environmental Response, Compensation, and Liability Act; **Chemtrec** - Chemical Transportation Emergency Center (US); **CHIP** - Chemical (Hazard Information and Packing); **DSL** - Domestic Substances List; **EH40 (UK)** - HSE Guidance Note EH40 Occupational exposure limits; **HMIS** - Hazardous Material Information Service; **LC** - Lethal Concentration; **LD** - Lethal Dose; **NFPA** - National Fire Protection Association; **OSHA** - Occupational Safety and Health Administration, US department of Labour; **PEL** - Permissible exposure limit; **SARA (Title III)** - Superfund Amendments and Reauthorization Act; **SARA 313** - Superfund Amendments and Reauthorization Act, Section 313; **TLV** - threshold limit value; **TSCA** - Toxic Substances Control Act Public Law 94-469; **US DOT** - US Department of Transportation; **WHMIS** - Workplace Hazardous Materials Information System.

Revisions:

Nov 2007 - Data Sheet updated to reflect the latest supplier safety information.

Although the information and recommendations in this data sheet are to the best of our knowledge correct, it is recommended that you make your own determination of the material's suitability for your purpose before you use it. The information contained in this data sheet has been reproduced from the manufacturers data; the accuracy of this information is the responsibility of the manufacturer. Edwards accept no responsibility for damage of any nature resulting from the use of, or the reliance upon, this data sheet.