# 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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|---|---|
| UK : | +44 (0)1293 528844 |
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| Germany : | +(49) 6420-82-410 |
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| 24 h Emergency telephone number: |
|---|
| Chemtrec: 1-800-424-9300 |

## 2. 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.

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

Skin Effects: Liquid contact or rapid evaporation of the liquid can cause frostbite. Liquid or mist may cause irritation.

Ingestion/Oral Effects: Ingestion is unlikely because of the low boiling point. If ingestion occurs, this may result in discomfort in the gastrointestinal tract. 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.

# PRODUCT NAME : REFRIGERANT - EDWARDS CHILLER

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known.

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

## 3. 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 No 1272/2008 (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”.

## 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. Treat frost-bitten areas as needed.

# PRODUCT NAME : REFRIGERANT - EDWARDS CHILLER

## 5. Fire Fighting Measures

| | |
|---|---|
| Extinguishing Media: | Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. |
| Fire and Explosion Hazard: | Cylinders may rupture under fire conditions. Cool cylinders with water spray or fog.<br>This product is not flammable at ambient temperatures and atmospheric pressure. However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources.<br>Decomposition products are hazardous. The material can be decomposed by high temperatures (>250 °C) and produce Hydrogen Fluoride, Carbon Monoxide, Carbon Dioxide and 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 ie make sure that the oxygen content is more than 19.5%. Avoid contact of spilled material and runoff with soil and surface waterways.
Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste.

## 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.<br>Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Follow all standard safety precautions for handling and use of compressed gas cylinders. Handle containers carefully. Do not drop or puncture cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not remove screw cap until immediately ready for use. Always replace cap after use. |
| Storage: | Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.<br>Keep containers tightly closed in a dry, cool and well-ventilated place. Storage rooms must be properly ventilated. Ensure adequate ventilation, especially in confined areas. Protect cylinders from physical damage. |

# PRODUCT NAME : REFRIGERANT - EDWARDS CHILLER

## 8. Exposure Controls/Personal Protection

### Exposure Limits:

| Ingredient | ACGIH - TLV - | OSHA - PEL | Occupational Exposure Limits EH40 (UK) |
|---|---|---|---|
| Pentafluoroethane (HFC 125) | 4900 mg/m$^3$ (8 hr TWA) | No data available | 4900 mg/m$^3$ (8 hr TWA) |
| Ethane 1,1,1 - Trifluoro HFC143a) | 3400 mg/m$^3$ (8 hr TWA) | No data available | 3400 mg/m$^3$ (8 hr TWA) |
| Ethane 1,1,1,2 Tetrafluoro (HFC134a) | 4240 mg/m$^3$ (8 hr TWA) | No data available | 4240 mg/m$^3$ (8 hr TWA) |

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: General room ventilation is adequate for storage and handling. Perform filling operations only at stations with exhaust ventilation facilities.

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.
In case of insufficient ventilation wear suitable respiratory equipment. Wear a positive-pressure supplied-air respirator. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. For rescue and maintenance work in storage tanks use self-contained breathing apparatus.

Hand/Skin Protection: Avoid liquid contact with skin (Danger of frostbite). Wear general work clothing and leather gloves for normal protection.
If 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.

# PRODUCT NAME : REFRIGERANT - EDWARDS CHILLER

## 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 | Very slightly soluble in cold and hot water | 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<br>25.6 @ 54 °C | Vapour Pressure (Torr) | 9458 @ 70 °F<br>19179 @ 130 °F | |

## 10. Stability and Reactivity

Stability: Stable if used as directed.

Material/Conditions to Avoid: Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
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 (>250 °C) can result in decomposition products including Hydrogen Fluoride, Carbon Monoxide, Carbon Dioxide and 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 2 Hazards Identification.

### Animal data:

LD50 value: No data available.

LC50 value: HFC-134a (1,1,1,2-tetrafluoroethane) : 4h value:>500,000ppm (rat).

# PRODUCT NAME : REFRIGERANT - EDWARDS CHILLER

Additional advice:

Acute health hazard
HFC-125 (Ethane, pentafluoro-): cardiac sensitization threshold : >75,000 ppm (dog).
HFC-143a (1,1,1-trifluoroethane): cardiac sensitization threshold : >250,000 ppm (dog).
HFC-134a (1,1,1,2-tetrafluoroethane): cardiac sensitization threshold : >80,000 ppm (dog).

**Carcinogenicity:**

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

## 12. Ecological Information

This product contains greenhouse gases that may contribute to global warming.

## 13. Disposal Considerations

Do NOT vent to atmosphere. Any gases to be removed from a system must be recovered, to comply with clean air regulations.
Reclaim by distillation or remove to a permitted waste disposal facility. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Comply with all local and national regulations.

## 14. Transport Information

This product is 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 |

## 15. Regulatory Information

### European Regulatory Information

This product has been classified in accordance with EU Regulation No 1272/2008 (as amended) on the Classification, Labelling and Packaging of Substances and Mixtures.

Classified as dangerous to supply :No.

Risk Phrases : Not applicable.

Safety Phrases : Not applicable.

Symbols : None.

MATERIAL SAFETY DATA SHEET

# PRODUCT NAME : REFRIGERANT - EDWARDS CHILLER

### United States Regulatory Information

All ingredients contained in this product are included on the EPA TSCA Chemical Substance Inventory.

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

This product does not contain toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA of 1986 and 40 CFR Part 372.

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.

## 16. Other Information

This MSDS is compiled in accordance with ANSI Z400.1 and Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Sources of information for this data sheet:

- Honeywell "Genetron 404A" Material Safety Data Sheet. Revision date: 16th November 2007.

### 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); **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:

Oct 2010 - Data Sheet updated to reflect the latest regulatory and supplier safety information.

Dec 2010 - Data Sheet updated to revise statements in Section 14.

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