



A-Gas R404A

A-Gas (Singapore) PTE LTD

Chemwatch: 8531-92

Version No: 5.1.1.1

Material Safety Data Sheet according to NOHSC and ADG requirements

Chemwatch Hazard Alert Code: 2

Issue Date: 09/09/2013

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Initial Date: Not Available

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SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	A-Gas R404A
Chemical Name	Not Applicable
Synonyms	Not Available
Proper shipping name	REFRIGERANT GAS R 404A
Chemical formula	Not Applicable
Other means of identification	Not Available
CAS number	Not Applicable

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation. , Refrigerant.
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Details of the supplier of the safety data sheet

Registered company name	A-Gas (Singapore) PTE LTD
Address	360 Orchard Road, #10-05, Int'l Building 238869 Singapore
Telephone	65 6836 0065
Fax	65 6836 6521
Website	www.agas.com
Email	Not Available

Emergency telephone number

Association / Organisation	Not Available
Emergency telephone numbers	65 6836 0065
Other emergency telephone numbers	65 6836 0065

CHEMWATCH EMERGENCY RESPONSE

Primary Number	Alternative Number 1	Alternative Number 2
1800 039 008	+612 9186 1132	Not Available

Once connected and if the message is not in your preferred language then please dial 01

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

DANGEROUS GOODS. NON-HAZARDOUS SUBSTANCE. According to NOHSC Criteria, and ADG Code.

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	0	
Toxicity	2	
Body Contact	2	
Reactivity	1	
Chronic	2	

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

Poisons Schedule	None
Risk Phrases [1]	R44 Risk of explosion if heated under confinement. R04 Forms very sensitive explosive metallic compounds.

Legend: 1. Classified by Chemwatch; 2. Classification drawn from HSIS ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI

GHS Classification Not Applicable

Legend: 1. Classified by Chemwatch; 2. Classification drawn from HSIS ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI

Label elements

GHS label elements

SIGNAL WORD NOT APPLICABLE

Hazard statement(s)

AUH044 Risk of explosion if heated under confinement

Precautionary statement(s): Prevention

Not Applicable

Precautionary statement(s): Response

Not Applicable

Precautionary statement(s): Storage

Not Applicable

Precautionary statement(s): Disposal

Not Applicable

Label elements

Relevant risk statements are found in section 2

Indication(s) of danger Not Applicable

SAFETY ADVICE

S03	Keep in a cool place.
S15	Keep away from heat.
S56	Dispose of this material and its container at hazardous or special waste collection point.

Other hazards

May produce discomfort of the respiratory system and skin*.
Inhalation may produce health damage*.
Cumulative effects may result following exposure*.
Vapours potentially cause drowsiness and dizziness*.
Repeated exposure potentially causes skin dryness and cracking*.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
354-33-6	44	pentafluoroethane
811-97-2	4	tetrafluoroethane
420-46-2	52	1,1,1-trifluoroethane

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact

- ▶ If product comes in contact with eyes remove the patient from gas source or contaminated area.
 - ▶ Take the patient to the nearest eye wash, shower or other source of clean water.
 - ▶ Open the eyelid(s) wide to allow the material to evaporate.
 - ▶ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners.
 - ▶ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage.
 - ▶ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s)
 - ▶ Transport to hospital or doctor.
 - ▶ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur.
 - ▶ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage.
 - ▶ Ensure verbal communication and physical contact with the patient.
- DO NOT** allow the patient to rub the eyes
DO NOT allow the patient to tightly shut the eyes
DO NOT introduce oil or ointment into the eye(s) without medical advice

	<p>DO NOT use hot or tepid water.</p>
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> ▶ Immediately remove all contaminated clothing, including footwear. ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation. <p>In case of cold burns (frost-bite):</p> <ul style="list-style-type: none"> ▶ Move casualty into warmth before thawing the affected part; if feet are affected carry if possible ▶ Bathe the affected area immediately in luke-warm water (not more than 35 deg C) for 10 to 15 minutes, immersing if possible and without rubbing ▶ DO NOT apply hot water or radiant heat. ▶ Apply a clean, dry, light dressing of "fluffed-up" dry gauze bandage ▶ If a limb is involved, raise and support this to reduce swelling ▶ If an adult is involved and where intense pain occurs provide pain killers such as paracetamol ▶ Transport to hospital, or doctor ▶ Subsequent blackening of the exposed tissue indicates potential of necrosis, which may require amputation.
Inhalation	<ul style="list-style-type: none"> ▶ Following exposure to gas, remove the patient from the gas source or contaminated area. ▶ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer. ▶ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures. ▶ If the patient is not breathing spontaneously, administer rescue breathing. ▶ If the patient does not have a pulse, administer CPR. ▶ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen. ▶ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction. ▶ Keep the patient warm, comfortable and at rest while awaiting medical care. ▶ MONITOR THE BREATHING AND PULSE, CONTINUOUSLY. ▶ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary.
Ingestion	<ul style="list-style-type: none"> ▶ Not considered a normal route of entry. ▶ For advice, contact a Poisons Information Centre or a doctor. ▶ Avoid giving milk or oils. ▶ Avoid giving alcohol.

Indication of any immediate medical attention and special treatment needed

	<p>for intoxication due to Freons/ Halons;</p> <p>A: Emergency and Supportive Measures</p> <ul style="list-style-type: none"> ▶ Maintain an open airway and assist ventilation if necessary ▶ Treat coma and arrhythmias if they occur. Avoid (adrenaline) epinephrine or other sympathomimetic amines that may precipitate ventricular arrhythmias. Tachyarrhythmias caused by increased myocardial sensitisation may be treated with propranolol, 1-2 mg IV or esmolol 25-100 microgm/kg/min IV. ▶ Monitor the ECG for 4-6 hours <p>B: Specific drugs and antidotes:</p> <ul style="list-style-type: none"> ▶ There is no specific antidote <p>C: Decontamination</p> <ul style="list-style-type: none"> ▶ Inhalation; remove victim from exposure, and give supplemental oxygen if available. ▶ Ingestion; (a) Prehospital: Administer activated charcoal, if available. DO NOT induce vomiting because of rapid absorption and the risk of abrupt onset CNS depression. (b) Hospital: Administer activated charcoal, although the efficacy of charcoal is unknown. Perform gastric lavage only if the ingestion was very large and recent (less than 30 minutes) <p>D: Enhanced elimination:</p> <ul style="list-style-type: none"> ▶ There is no documented efficacy for diuresis, haemodialysis, haemoperfusion, or repeat-dose charcoal. <p><i>POISONING and DRUG OVERDOSE, Californian Poison Control System Ed. Kent R Olson; 3rd Edition</i></p> <ul style="list-style-type: none"> ▶ Do not administer sympathomimetic drugs unless absolutely necessary as material may increase myocardial irritability. ▶ No specific antidote. ▶ Because rapid absorption may occur through lungs if aspirated and cause systematic effects, the decision of whether to induce vomiting or not should be made by an attending physician. ▶ If lavage is performed, suggest endotracheal and/or esophageal control. ▶ Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. ▶ Treatment based on judgment of the physician in response to reactions of the patient <p>for gas exposures:</p> <p>-----</p> <p>BASIC TREATMENT</p> <p>-----</p> <ul style="list-style-type: none"> ▶ Establish a patent airway with suction where necessary. ▶ Watch for signs of respiratory insufficiency and assist ventilation as necessary. ▶ Administer oxygen by non-rebreather mask at 10 to 15 l/min. ▶ Monitor and treat, where necessary, for pulmonary oedema . ▶ Monitor and treat, where necessary, for shock. ▶ Anticipate seizures. <p>-----</p> <p>ADVANCED TREATMENT</p> <p>-----</p> <ul style="list-style-type: none"> ▶ Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred. ▶ Positive-pressure ventilation using a bag-valve mask might be of use. ▶ Monitor and treat, where necessary, for arrhythmias. ▶ Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications. ▶ Drug therapy should be considered for pulmonary oedema. ▶ Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications. ▶ Treat seizures with diazepam. ▶ Proparacaine hydrochloride should be used to assist eye irrigation. <p><i>BRONSTEIN, A.C. and CURRANCE, P.L.</i> <i>EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994</i></p>
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SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

SMALL FIRE: Use extinguishing agent suitable for type of surrounding fire.
LARGE FIRE: Cool cylinder.

Special hazards arising from the substrate or mixture

Fire Incompatibility

▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Advice for firefighters

Fire Fighting

GENERAL

▶ Alert Fire Brigade and tell them location and nature of hazard.

Fire/Explosion Hazard

- ▶ Containers may explode when heated - Ruptured cylinders may rocket
- ▶ Fire exposed containers may vent contents through pressure relief devices.
- ▶ High concentrations of gas may cause asphyxiation without warning.
- ▶ May decompose explosively when heated or involved in fire.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills

- ▶ Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used.
- ▶ **DO NOT enter confined spaces where gas may have accumulated.**

Major Spills

- ▶ Clear area of all unprotected personnel and move upwind.
- ▶ Alert Emergency Authority and advise them of the location and nature of hazard.
- ▶ Wear breathing apparatus and protective gloves.
- ▶ Prevent by any means available, spillage from entering drains and water-courses.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling

- ▶ Consider use in closed pressurised systems, fitted with temperature, pressure and safety relief valves which are vented for safe dispersal.
- ▶ The tubing network design connecting gas cylinders to the delivery system should include appropriate pressure indicators and vacuum or suction lines.
- ▶ Fully-welded types of pressure gauges, where the bourdon tube sensing element is welded to the gauge body, are recommended.
- ▶ Before connecting gas cylinders, ensure manifold is mechanically secure and does not contain another gas.

Other information

- ▶ Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open.
 - ▶ Such compounds should be sited and built in accordance with statutory requirements.
 - ▶ The storage compound should be kept clear and access restricted to authorised personnel only.
 - ▶ Cylinders stored in the open should be protected against rust and extremes of weather.
- [Storage temperature <52 deg.c.>

Conditions for safe storage, including any incompatibilities

Suitable container

- ▶ **DO NOT use aluminium or galvanised containers**
- ▶ Cylinder:
- ▶ Ensure the use of equipment rated for cylinder pressure.

Storage incompatibility

- ▶ Avoid reaction with oxidising agents
- Haloalkanes:
- ▶ are highly reactive:some of the more lightly substituted lower members are highly flammable; the more highly substituted may be used as fire suppressants, not always with the anticipated results.
 - ▶ may react with the lighter divalent metals to produce more reactive compounds analogous to Grignard reagents.

PACKAGE MATERIAL INCOMPATIBILITIES

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	tetrafluoroethane	1,1,1,2-Tetrafluoroethane	4240 (mg/m ³) / 1000 (ppm)	Not Available	Not Available	Not Available


EMERGENCY LIMITS

Ingredient	TEEL-0	TEEL-1	TEEL-2	TEEL-3
tetrafluoroethane	1000(ppm)	8000(ppm)	13000(ppm)	27000(ppm)

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Ingredient	Original IDLH	Revised IDLH
1,1,1-trifluoroethane	4,500(ppm)	2,000(ppm)

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk.
Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▶ Chemical goggles. ▶ Full face shield may be required for supplementary but never for primary protection of eyes ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.
Skin protection	See Hand protection below
Hand protection	<ul style="list-style-type: none"> ▶ When handling sealed and suitably insulated cylinders wear cloth or leather gloves. ▶ Insulated gloves: <p>NOTE: Insulated gloves should be loose fitting so that they may be removed quickly if liquid is spilled upon them. Insulated gloves are not made to permit hands to be placed in the liquid; they provide only short-term protection from accidental contact with the liquid.</p>
Body protection	See Other protection below
Other protection	<ul style="list-style-type: none"> ▶ Protective overalls, closely fitted at neck and wrist. ▶ Eye-wash unit. ▶ Ensure availability of lifeline in confined spaces. ▶ Staff should be trained in all aspects of rescue work.
Thermal hazards	

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the A-Gas R404A Not Available

Material	CPI

* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

Respiratory protection

Type AX Filter of sufficient capacity

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face Respirator
up to 10	1000	AX-AUS / Class1 P3	-
up to 50	1000	-	AX-AUS / Class 1 P3
up to 50	5000	Airline *	-
up to 100	5000	-	AX-2 P3
up to 100	10000	-	AX-3 P3
100+			Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Colourless liquefied gas with slight ethereal odour; does not mix with water.		
Physical state	Liquefied Gas	Relative density (Water = 1)	1.05 @ 25 deg.C
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Applicable
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	-46.7	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Applicable	Taste	Not Available
Evaporation rate	>1 (CL4=1)	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available

Upper Explosive Limit (%)	Not Applicable	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Applicable	Volatile Component (%vol)	100
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution(1%)	Not Applicable
Vapour density (Air = 1)	Not Available	VOC g/L	

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▶ Presence of incompatible materials. ▶ Product is considered stable. ▶ Hazardous polymerisation will not occur. ▶ Extremely high temperatures.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	<p>Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.</p> <p>Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.</p> <p>Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation.</p>
Ingestion	<p>Overexposure is unlikely in this form.</p> <p>Not normally a hazard due to physical form of product.</p> <p>Considered an unlikely route of entry in commercial/industrial environments</p>
Skin Contact	<p>Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.</p>
Eye	<p>Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).</p> <p>Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, even through normal gloves. Frozen skin tissues are painless and appear waxy and yellow. Signs and symptoms of frost-bite may include "pins and needles", paleness followed by numbness, a hardening a stiffening of the skin, a progression of colour changes in the affected area, (first white, then mottled and blue and eventually black; on recovery, red, hot, painful and blistered).</p>
Chronic	<p>Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.</p> <p>Principal route of occupational exposure to the gas is by inhalation.</p> <p>It is generally accepted that the fluorocarbons are less toxic than the corresponding halogenated aliphatic based on chlorine. Repeated inhalation exposure to the fluorocarbon FC-11 does not produce pathologic lesions of the liver and other visceral organs in experimental animals.</p>

	TOXICITY	IRRITATION
A-Gas R404A	Not Available	Not Available
pentafluoroethane	Inhalation (rat) LC50: >709000 ppm/4h *	Nil reported * [
	Inhalation (Rat) LC50: 800000 ppm/4h*	
	Not Available	Not Available
tetrafluoroethane	Inhalation (Mouse) LC50: 1700000 mg/m ³ /2h	
	Inhalation (Rat) LC50: >60% vol 4 h *	
	Inhalation (Rat) LC50: >80% vol 15 mins *	
	Inhalation (Rat) LC50: 1500000 mg/m ³ /4h	
	Not Available	Not Available

1,1,1-trifluoroethane	TOXICITY	IRRITATION
	Inhalation (rat) LC50: >540000 ppm/4h *	*[DuPont]
	Not Available	Not Available

Not available. Refer to individual constituents.

PENTAFLUOROETHANE	Cardiac sensitisation threshold limit >245400 mg/m3 Anaesthetic effects threshold limit 490800 mg/m3 * DuPont SDS
TETRAFLUOROETHANE	* with added oxygen - ZhongHao New Chemical Materials MSDS Excessive concentration can have a narcotic effect; inhalation of high concentrations of decomposition products can cause lung oedema.
1,1,1-TRIFLUOROETHANE	NOTE: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

Acute Toxicity	☹	Carcinogenicity	☹
Skin Irritation/Corrosion	☹	Reproductivity	☹
Serious Eye Damage/Irritation	☹	STOT - Single Exposure	☹
Respiratory or Skin sensitisation	☹	STOT - Repeated Exposure	☹
Mutagenicity	☹	Aspiration Hazard	☹

CMR STATUS

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
Not Available	Not Available	Not Available

Bioaccumulative potential

Ingredient	Bioaccumulation
Not Available	Not Available

Mobility in soil

Ingredient	Mobility
Not Available	Not Available

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> ▶ Evaporate residue at an approved site. ▶ Return empty containers to supplier. If containers are marked non-returnable establish means of disposal with manufacturer prior to purchase. ▶ Ensure damaged or non-returnable cylinders are gas-free before disposal.
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SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	2TE

Land transport (ADG)

UN number	3337
Packing group	Not Available
UN proper shipping name	REFRIGERANT GAS R 404A
Environmental hazard	No relevant data

Transport hazard class(es)	Class	2.2
	Subrisk	
Special precautions for user	Special provisions	
	limited quantity	120 ml

Air transport (ICAO-IATA / DGR)

UN number	3337	
Packing group	Not Available	
UN proper shipping name	Refrigerant gas R 404A	
Environmental hazard	No relevant data	
Transport hazard class(es)	ICAO/IATA Class	2.2
	ICAO / IATA Subrisk	
	ERG Code	2L
Special precautions for user	Special provisions	
	Cargo Only Packing Instructions	200
	Cargo Only Maximum Qty / Pack	150 kg
	Passenger and Cargo Packing Instructions	200
	Passenger and Cargo Maximum Qty / Pack	75 kg
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	3337	
Packing group	Not Available	
UN proper shipping name	REFRIGERANT GAS R 404A	
Environmental hazard	No relevant data	
Transport hazard class(es)	IMDG Class	2.2
	IMDG Subrisk	
Special precautions for user	EMS Number	F-C,S-V
	Special provisions	
	Limited Quantities	120 ml

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

pentafluoroethane(354-33-6) is found on the following regulatory lists	"International Council of Chemical Associations (ICCA) - High Production Volume List", "International Maritime Dangerous Goods Requirements (IMDG Code)", "International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index", "Australia Dangerous Goods Code (ADG Code) - List of Emergency Action Codes", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (English)", "OECD List of High Production Volume (HPV) Chemicals", "Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)", "Australia Customs (Prohibited Exports) Regulations 1958 - Schedule 15 Ozone depleting substances - Part 9 HFCs", "Australia Dangerous Goods Code (ADG Code) - Packing Instruction - Liquefied and Dissolved Gases", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (Spanish)", "International Air Transport Association (IATA) Dangerous Goods Regulations", "Regulations concerning the International Carriage of Dangerous Goods by Rail - Table A: Dangerous Goods List - RID 2013 (English)", "Australia Dangerous Goods Code (ADG Code) - Dangerous Goods List", "Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - non-pesticide anthropogenic organics)"
tetrafluoroethane(811-97-2) is found on the following regulatory lists	"International Maritime Dangerous Goods Requirements (IMDG Code)", "International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index", "Australia Exposure Standards", "Australia Dangerous Goods Code (ADG Code) - List of Emergency Action Codes", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (English)", "OECD List of High Production Volume (HPV) Chemicals", "Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)", "Australia Customs (Prohibited Exports) Regulations 1958 - Schedule 15 Ozone depleting substances - Part 9 HFCs", "Sigma-Aldrich Transport Information", "Australia Dangerous Goods Code (ADG Code) - Packing Instruction - Liquefied and Dissolved Gases", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (Spanish)", "Australia High Volume Industrial Chemical List (HVICL)", "International Air Transport Association (IATA) Dangerous Goods Regulations", "Australia Hazardous Substances Information System - Consolidated Lists", "Regulations concerning the International Carriage of Dangerous Goods by Rail - Table A: Dangerous Goods List - RID 2013 (English)", "Australia Dangerous Goods Code (ADG Code) - Dangerous Goods List", "Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - non-pesticide anthropogenic organics)"
1,1,1-trifluoroethane(420-46-2) is found on the following regulatory lists	"International Maritime Dangerous Goods Requirements (IMDG Code)", "Australia - Victoria Occupational Health and Safety Regulations - Schedule 9: Materials at Major Hazard Facilities (And Their Threshold Quantity) Table 2", "International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index", "Australia Dangerous Goods Code (ADG Code) - List of Emergency Action Codes", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (English)", "OECD List of High Production Volume (HPV)

Chemicals", "International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List Passenger and Cargo Aircraft", "Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)", "Australia Customs (Prohibited Exports) Regulations 1958 - Schedule 15 Ozone depleting substances - Part 9 HFCs", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (Spanish)", "Australia Dangerous Goods Code (ADG Code) - Packing Instruction - Liquefied and Dissolved Gases", "International Air Transport Association (IATA) Dangerous Goods Regulations", "Regulations concerning the International Carriage of Dangerous Goods by Rail - Table A: Dangerous Goods List - RID 2013 (English)", "Australia Dangerous Goods Code (ADG Code) - Dangerous Goods List", "Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - non-pesticide anthropogenic organics)"

SECTION 16 OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net/references

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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