

## Material Safety Data Sheet

Date: 3rd January 2022

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### SECTION I – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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**Product Name in English:** Refrigerants Gas R600a

**Chemical name:** R600a, Isobutane

**Synonyms:** 2-Methylpropane, Trimethylmethane, R600a, HC-600a

**Formula:** C<sub>4</sub>H<sub>10</sub>, (CH<sub>3</sub>)<sub>2</sub>CHCH<sub>3</sub>

**Supplier:** Global Refrigerants (S) Pte Ltd

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### SECTION II- COMPOSITION/ INFORMATION ON INGREDIENTS

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INGREDIENT NAME	CAS NUMBER	Concentration %
Isobutane	75-28-5	>=99.95%

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### SECTION III – HAZARDS IDENTIFICATION

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**Hazardous Classification:** Class 2.1 Compressed Gas and Liquefied Gas: Combustible Gas.

**Primary Routes of Entry:** Inhalation

**Emergency Overview:** DANGER! Flammable liquid and gas under pressure. Can form explosive mixtures with air. May cause frostbite. May cause dizziness and downiness.

#### **Potential Health Effects**

**Skin:** Skin contact may cause frostbite from exposure to the liquid.

**Eyes:** Irritant. Liquid contact will irritate and may cause conjunctivitis.

**Inhalation:** Inhalation of vapour may produce anesthetic effects and feeling of euphoria. Prolonged overexposure can cause rapid breathing, headache, dizziness, narcosis, unconsciousness, and death from asphyxiation depending on concentration and time of exposure.

**Ingestion:** This product is a gas at normal temperature and pressure, but frostbite of the lips and mouth may result from contact with the liquid.

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### SECTION IV – FIRST AID MEASURES

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

**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.

**Inhalation:** Prompt medical attention is mandatory in all cases of overexposure to product. Rescue personnel should be equipped with self-contained breathing apparatus. Conscious person should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious person should be moved to an uncontaminated area. Given assisted (artificial) respiration and supplemental oxygen.

**Ingestion:** DO NOT induce vomiting unless instructed to do so by a physician.

**Advice to Physician or First-Aiders:** If unconscious place in recovery position and seek medical advice. Never give anything by mouth to an unconscious person. If breathing is irregular or stopped, administer artificial respiration. If symptoms persist, call a physician.

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### SECTION V – FIRE FIGHTING MEASURES

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**Fire and Explosion Hazards:** : Isobutane is heavier than air and may travel along the ground or may be moved by ventilation systems and ignited by pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge, or other ignition sources at locations distant from material handling point.

**Fire Fighting Instructions:** Move container from the fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area. Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or ant discoloration of tanks due to fire. For tan, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately..

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### SECTION VI – ACCIDENTAL RELEASE MEASURES

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**Personal Precautions:** Immediately contact emergency personnel. Use suitable protective equipment. Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

**Environmental Precautions:** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

**Methods for Cleaning-up:** Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Stop leak if possible without personal risk. Reduce vapours with water spray. Keep unnecessary people away. Isolate hazard area and deny entry. Remove sources of ignition. Ventilate closed spaces before entering.

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**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.

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### SECTION VII – HANDLING AND STORAGE

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**Handling:** Always wear recommended personal protective equipment. Avoid breathing vapours 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. Follow standard safety precautions for handling and use of compressed gas cylinders

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 51.7°C .

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### SECTION VIII – EXPOSURE CONTROLS / PERSONAL PROTECTION

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**Authorized Limit Values: Isobutane**

USA TVL-TWA = 1000 ppm

800 ppm (1900 mg/m<sup>3</sup>) NIOSH recommended TWA 10 hours(s)

**Engineering Controls:** Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits.

**Respiratory Protection:** Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use. Any supplied-air respirator with a full face piece that is operated in pressure-demand or other positive pressure mode.

**Hand protection:** Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

**Eye Protection:** For the gas: Eye protection is not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**Skin Protection:** For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.

**Additional Recommendations:** Handle in accordance with good industrial hygiene and safety practice. No smoking in the working area. Avoid long-time contact.

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### SECTION IX – PHYSICAL & CHEMICAL PROPERTIES

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**Appearance:** Gas

**Colour:** Colourless

**Odour:** Faintly sweet odor

**Molecular Weight:** 58.14

**Boiling Point (1,013 hPa):** -11.8°C

**pH:** Neutral

**Vapour Pressure:** 840 kPa (20°C)

**Vapour Density (air=1):** 2.01

**Freezing Point:** -159.6°C

**Solubility:** Water 0.008 % (25°C)

**Density (Water=1):** 0.56 g/cm<sup>3</sup> (25°C)

**Autoginition Temperature:** 475.85°C

**Application:** Refrigerant for CFC-12 substitute

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### SECTION X – Stability AND REACTIVITY

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**Stability:** Stable under normal conditions of handling and use. Avoid heat, flames, sparks and other sources of ignition. Minimize contact with material. Containers may rupture or explode if exposed to heat.

**Incompatibility With other Materials:** Oxidizing agents.

**Hazardous Decomposition Products:** Carbon monoxide (CO), Carbon dioxide (CO<sub>2</sub>)

**Hazardous Polymerization:** Will not occur.

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### SECTION XI - - - - - TOXICOLOGICAL INFORMATION

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**Toxicity Data:** Inhalation 15 minute LC<sub>50</sub>: 570,000 ppm in rats.

Toxic effects noted in animals from exposure by inhalation include cardiac sensitization, central nervous system effects, anesthetic effects, and respiratory effects. No animal test reports are available to define carcinogenic, embryotoxic, or reproductive hazards. Tests in bacterial or mammalian cell cultures demonstrate no mutagenic activity.

**Target Organs:** Central nervous system.

**Additional Data:** Stimulants such as epinephrine may include ventricular fibrillation.

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### SECTION XII – ECOLOGICAL INFORMATION

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**General:** No adverse ecological effects are expected. Isobutane does not contain any Class I or Class II Ozone depleting chemicals. Propane is not listed as a marine pollutant by DOT.

**Toxicity of the products of biodegradation:** The product itself and its products of degradation (carbon oxides (CO, CO<sub>2</sub>) and water) are not toxic.

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### SECTION XIII – DISPOSAL CONSIDERATIONS

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**Waste Treatment:** Waste from residues / unused products: Can be used after re-conditioning.

Contaminated packaging. Product removed from the cylinder must be disposed of in accordance with appropriate National and local regulation. Return cylinders with residual product to the supplier.

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### SECTION XIV – TRANSPORT INFORMATION

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**Classification Code:** 21012

**UN-No.:** 1969.

**Marking:** 4

**Primary label:** Combustible Gas.

**Packing group:** II.

**Packing Method:** Steel cylinders

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### SECTION XV – REGULATORY INFORMATION

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\*Common dangerous chemical classification and labelling (GB13690-92).

\*Regulations on the Control over Safety of Dangerous Chemicals (State Council Decree 344 [2002]).

\*Regulations on Labour Protection in workplaces with Toxic Substances (State Council Decree 352 [2002]).

\*Regulations on the Safety Use of Chemicals in workplaces (Department of Labor, Reg 423 [1996], are enacted to control the safe use, production, storage, transport, operation, trade and disposal of dangerous chemicals.

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