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**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1 Product identifier****Trade name:** R-404A**Article number:** R404A**1.2 Relevant identified uses of the substance or mixture and uses advised against:***No further relevant information available.***1.3 Details of the supplier of the safety data sheet****Manufacturer/Supplier:****DAIKIN INDUSTRIES, LTD. CHEMICALS DIVISION:***Umeda Center Bldg., 4-12, Nakazaki-Nishi 2-chome, Kita-Ku, Osaka, JAPAN**Phone: (+81) 6-6373-4345 Fax: (+81) 6-6373-4281***Further information obtainable from:** <http://www.daikin.com/>**1.4 Emergency telephone number:***Japan: +81-6-6349-7521**China: +86-512-5-232-0949, +86-21-34151689**South Korea: +82-2-568-1722**Americas: +1-256-306-5000**Europe: +49-211-179 225-0***SECTION 2: Hazard identification****2.1 Classification of the substance or mixture****Classification according to Regulation (EC) No 1272/2008***Press. Gas L H280 Contains gas under pressure; may explode if heated.***2.2 Label elements****Labelling according to Regulation (EC) No 1272/2008:***The product is classified and labelled according to the CLP regulation.***Signal word:** Warning**Preccautionary statements:***P410+P403 Protect from sunlight. Store in a well-ventilated place.***SECTION 3: Composition/information on ingredients****Information on ingredients:**

354-33-6 Pentafluoroethane	44%
Press. Gas C, H280	
420-46-2 1,1,1-Trifluoroethane	52%
F R11	
Flam. Gas 1, H220	
Press. Gas C, H280	
811-97-2 1,1,1,2-Tetrafluoroethane	4%
Press. Gas L, H280	

**Additional information:** For the wording of the listed risk phrases refer to section 16.**SECTION 4: First aid measures****4.1 Description of first aid measures****General information:** Seek immediate medical advice.**After inhalation:***Take affected persons into fresh air. Keep at rest.**Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult a doctor if symptoms persist. In case of unconsciousness place patient stably in side position for transportation.*

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*In case of emergency to rescue the victims; be sure to wear supplied-air respirator (SAR) or self-contained breathing apparatus (SCBA).*

*At high levels, cardiac arrhythmia may occur.*

**After skin contact:**

*In cases of frost bites, rinse with plenty of water. Do not remove clothing.*

*Immediately rinse with warm water and soap.*

*Consult a doctor in case of complaints.*

**After eye contact:**

*Rinse opened eye for several minutes under running water.*

*Consult an ophthalmologist in case of complaints.*

**After swallowing:** Not applicable.

#### **4.2 Most important symptoms and effects, both acute and chronic:**

**Frost bites**

*High concentrations cause asphyxiation. May cause an abnormal heart rhythm and prove suddenly fatal.*

**Information for doctor:**

*Catecholamines such as adrenaline, and other compounds having similar effects, should be reserved for emergencies and then used only with special caution.*

*The examining physician should advise workers taking medications containing catecholamines that they may be at increased risk and should avoid excessive exposure.*

#### **4.3 Indication of any immediate medical attention and special treatment needed:**

*No further relevant information available.*

### **SECTION 5: Firefighting measures**

#### **5.1 Extinguishing media**

**Suitable extinguishing agents:** Use fire extinguishing methods suitable for surrounding conditions.

#### **5.2 Special hazards arising from the substance or mixture:**

**Hydrogen fluoride (HF)**

*Formation of toxic gases is possible during heating or in case of fire.*

*Receptacle may explode when heated.*

#### **5.3 Advice for firefighters:**

*Move receptacle to a safe place immediately if possible. If not, spray water on the receptacles and surrounding equipment to cool.*

*If receptacle catches fire: cool them with plenty of water.*

*If possible, close valves of receptacles to shut off the gas supply.*

#### **Protective equipment:**

*Wear self-contained breathing apparatus and protective suit.*

*Do not inhale explosion gases or combustion gases.*

### **SECTION 6: Accidental release measures**

#### **6.1 Personal precautions, protective equipment and emergency procedures:**

*Wear appropriate protective devices (See Section 8 Exposure Controls/ Personal Protection).*

*Avoid contact with eyes and skin.*

*Do not inhale the product.*

*Ensure adequate ventilation before entering the area.*

*Stay on the windward side.*

*Keep out unauthorized persons.*

#### **6.2 Environmental precautions:**

*Suppress gases/fumes/haze with water spray.*

*Must not be emitted into the environment.*

#### **6.3 Methods and material for containment and cleaning up:** Ensure adequate ventilation.

#### **6.4 Reference to other sections:**

*See Section 8 for information on personal protection equipment.*

*See Section 13 for disposal information.*

### **SECTION 7: Handling and storage**

#### **7.1 Precautions for safe handling:**

*Waste air is to be released into the atmosphere only via suitable separators.*

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*Danger of ignition/explosion if mixed with flammable gas.*

*Ensure good ventilation/exhaustion at the workplace.*

*Handle with care. Avoid jolting, friction and impact.*

*For heating receptacle, use hot compresses or lukewarm water below 40 °C.*

*Do not use heaters.*

*Stay on the windward side when working outdoors.*

*Be careful of leakage when attaching/ detaching receptacles.*

*Inhaling large quantities may cause cardiac arrhythmia or asphyxiation or both.*

*Keep away from naked flame or metal heated over 300 - 400 °C to prevent thermal decomposition that may form toxic gases.*

*Do not handle until all safety precautions have been read and understood.*

**Information about fire - and explosion protection:**

*The product is not flammable.*

*Keep ignition sources away - Do not smoke.*

*Keep respiratory protective device available.*

**7.2 Conditions for safe storage, including any incompatibilities:**

**Storage**

*Requirements to be met by storerooms and receptacles:*

*Store in a cool and dry location.*

*Keep containers tightly sealed.*

**Information about storage in one common storage facility:**

*See section 10 for information on incompatible materials.*

**Further information about storage conditions:**

*Protect from heat and direct sunlight.*

*Store containers in a well ventilated area.*

*Store locked up.*

**7.3 Specific end use(s):** *No further relevant information available.*

## **SECTION 8: Exposure controls/personal protection**

**Additional information about design of technical facilities:** *No further data; see item 7.*

**8.1 Control parameters** *No further information available.*

**Ingredients with limit values that require monitoring at the workplace:**

**811-97-2 1,1,1,2-Tetrafluoroethane**

*WEEL (USA) Long-term value: 1000 ppm*

**Additional information:** *The lists valid during the making were used as basis.*

**8.2 Exposure controls**

**Personal protective equipment**

**General protective and hygienic measures:**

*Wash hands before breaks and at the end of work.*

*Do not eat or drink while working.*

*Keep away from tobacco products.*

**Respiratory protection:** *Use respiratory protective device with organic gas cartridge.*

**Protection of hands:**



*Protective gloves*

**Material of gloves:** *Leather*

**Eye protection:**



*Safety glasses*

**Body protection:** *Protective work clothing*

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**Trade name: R-404A****SECTION 9: Physical and chemical properties****9.1 Information on basic physical and chemical properties****General Information****Appearance**

<b>Form:</b>	<i>Liquefied gas</i>
<b>Colour:</b>	<i>Colourless</i>
<b>Odour:</b>	<i>Ether-like</i>
<b>Odour threshold:</b>	<i>Not determined.</i>
<b>pH-value:</b>	<i>No further information available.</i>
<b>Melting point/Melting range:</b>	<i>-103 °C</i>
<b>Boiling point/Boiling range:</b>	<i>-46,7 °C</i>
<b>Flash point:</b>	<i>Not applicable.</i>
<b>Ignition temperature:</b>	<i>728 °C</i>
<b>Decomposition temperature:</b>	<i>&gt;700 °C</i>
<b>Lower explosive limit:</b>	<i>No further information available.</i>
<b>Upper explosive limit:</b>	<i>No further information available.</i>
<b>Vapour pressure at 20 °C:</b>	<i>10,98 bar</i>
<b>Density:</b>	<i>No further information available.</i>
<b>Relative density</b>	<i>1,05</i>
<b>Vapour density</b>	<i>&gt;3</i>
<b>Solubility in / Miscibility with water at 25 °C:</b>	<i>430 mg/l (Pentafluoroethane)</i>
<b>Partition coefficient (n-octanol/water) at 20 °C:</b>	<i>1,48 (Pentafluoroethane)</i>

**9.2 Other information:***No further relevant information available.***SECTION 10: Stability and reactivity****10.1 Reactivity** *No further relevant information available.***10.2 Chemical stability***Thermal decomposition / conditions to be avoided: To avoid thermal decomposition do not overheat.**10.3 Possibility of hazardous reactions: No dangerous reactions known under normal conditions of use.**10.4 Conditions to avoid: Keep away from heat, sparks, flame, high temperature.**10.5 Incompatible materials: Alkali or alkaline earth metals - powdered Al, Zn, Mg, etc.**10.6 Hazardous decomposition products: Hydrofluoric acid, carbonyl fluoride***\* SECTION 11: Toxicological information****11.1 Information on toxicological effects****Acute toxicity****LD/LC50 values relevant for classification:****354-33-6 Pentafluoroethane***Inhalative LC0/ 4h >800000 ppm (Rat)***Primary irritant effect***Skin corrosion/irritation* *No further information available.**Serious eye damage/irritation* *No further information available.**after inhalation:* *No further information available.**Respiratory or skin sensitisation* *No further information available.***CMR effects****Germ cell mutagenicity***In vitro tests did not show mutagenic effects.**In vivo tests did not show mutagenic effects.**Carcinogenicity* *No further information available.**Reproductive toxicity* *No further information available.*

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**Trade name: R-404A****STOT-single exposure** No further information available.**STOT-repeated exposure** No further information available.**Aspiration hazard** No further information available.**\* SECTION 12: Ecological information****12.1 Toxicity****Aquatic toxicity:****420-46-2 1,1,1-Trifluoroethane**

EC50/48 h 300 mg/l (Daphnia)

EC50/72 h 71 mg/l (Alga)

LC50/96 h 109 mg/l (Fish)

**354-33-6 Pentafluoroethane**

EC50/48 h &gt;200 mg/l (Daphnia)

LC50/48 h 100 mg/l (Daphnia)

LC50/96 h &gt;200 mg/l (Fish) (semi-static fresh water)

NOEC 13,2 mg/l (Alga)

72h

≥6 g/m<sup>3</sup> (Terrestrial plants)

200 mg/l (Daphnia)

**12.2 Persistence and degradability:** Not easily biodegradable**Other information:** The product is slightly biodegradable.**Abiotic degradation**

Air, indirect photo-oxidation

Conditions: sensitizer: OH radicals

Degradation products: Carbon dioxide (CO<sub>2</sub>)/hydrofluoroc acid

Water: non-significant hydrolysis

**12.3 Bioaccumulative potential:**

Due to the distribution coefficient n-octanol/water an accumulation in organisms is not expected.

**12.4 Mobility in soil:** No further relevant information available.**Additional ecological information:****General notes:**

Ozone depletion potential(ODP) : 0(Pentafluoroethane)

Global warming potential(GWP) :0.94

**12.5 Results of PBT and vPvB assessment**

PBT: According to the results of its assessment, this substance is not PBT.

vPvB: According to the results of its assessment, this substance is not vPvB.

**12.6 Other adverse effects:** No further relevant information available.**SECTION 13: Disposal considerations****13.1 Waste treatment methods****Recommendation:** Disposal must be made according to official regulations.**Uncleaned packaging****Recommendation:** Disposal must be made according to official regulations.**SECTION 14: Transport information****14.1 UN-Number:**

ADR, IMDG, IATA

UN3337

**14.2 UN proper shipping name:**

ADR:

3337 REFRIGERANT GAS R 404A

IMDG, IATA

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**Trade name: R-404A****14.3 Transport hazard class(es):****ADR, IMDG, IATA****Class:**

2.2

**14.4 Packing group:****ADR, IMDG, IATA***Not applicable***14.5 Environmental hazards:****Marine pollutant:***No***14.6 Special precautions for user:***Not applicable.***EMS Number:***F-C,S-V***14.7 Transport in bulk according to Annex II of****MARPOL73/78 and the IBC Code:***Not applicable.***Transport/Additional information:***Avoid direct sunlight. Make sure of no damage, corrosion, leaks on the receptacles.**Take necessary measures for preventing cargo shift.***ADR****Limited quantities (LQ):**

120 ml

**Excepted quantities (EQ)**

Code: E1

*Maximum net quantity per inner packaging: 30 ml**Maximum net quantity per outer packaging: 1000 ml***IMDG****Limited quantities (LQ)**

120 ml

**Excepted quantities (EQ)**

Code: E1

*Maximum net quantity per inner packaging: 30 ml**Maximum net quantity per outer packaging: 1000 ml***UN "Model Regulation":***UN3337, REFRIGERANT GAS R 404A, 2.2***SECTION 15: Regulatory information****15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****Labelling according to Regulation (EC) No 1272/2008****The product is classified and labelled according to the CLP regulation.****Hazard pictograms**

GHS04

**Signal word** Warning**Hazard statements****H280** Contains gas under pressure; may explode if heated.**Precautionary statements****P410+P403** Protect from sunlight. Store in a well-ventilated place.**National regulations** No further information available.**SECTION 16: Other information**

The product is for the industrial use only. We do not guarantee the safety in case the product is used for the other purposes. When using the product for health-care application or food/feed application, consult us in advance.

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

**Department issuing SDS: EHS Department****Contact:** <http://www.daikin.com/>**Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

IMDG: International Maritime Code for Dangerous Goods

IATA: International Air Transport Association

GHS: Globally Harmonised System of Classification and Labelling of Chemicals

LC50: Lethal concentration, 50 percent

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*LD50: Lethal dose, 50 percent*

*PBT: Persistent, Bioaccumulative and Toxic*

*vPvB: very Persistent and very Bioaccumulative*

*Flam. Gas 1: Flammable gases, Hazard Category 1*

*Press. Gas C: Gases under pressure: Compressed gas*

*Press. Gas L: Gases under pressure: Liquefied gas*

**\* Data compared to the previous version altered.**