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**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1 Product identifier****Trade name:** R-407C**Article number:** R407C**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***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:**

75-10-5 Difluoromethane	23%
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*F+ R12**Flam. Gas 1, H220**Press. Gas L, H280*

354-33-6 Pentafluoroethane	25%
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*Press. Gas L, H280*

811-97-2 1,1,1,2-Tetrafluoroethane	52%
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*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:***Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult a doctor if symptoms persist.*

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*In case of unconsciousness place patient stably in side position for transportation.*

*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:**

*Rinse with warm water.*

*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:**

*In case of fire, the following can be released:*

*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.*

*Do not allow to enter sewers/surface or ground water.*

*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.*

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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.

Danger of ignition/explosion if mixed with flammable gas.

Do not inhale the 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.

Protect against electrostatic charges.

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

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**Trade name: R-407C****Eye protection:**

Safety glasses

**Body protection: Protective work clothing****\* SECTION 9: Physical and chemical properties****9.1 Information on basic physical and chemical properties****General Information****Appearance**

**Form:** Liquefied gas  
**Colour:** Colourless  
**Odour:** Ether-like

**pH-value:**

Not applicable.

**Melting point/Melting range:**

-103 °C (Pentafluoroethane)

**Boiling point/Boiling range:**

-44 °C

**Flash point:**

Not applicable.

**Flammability (solid, gaseous):**

Product is not flammable.

**Explosion limits:**

Product does not present an explosion hazard.

**Lower explosive limit:**

Product does not present an explosion hazard.

**Upper explosive limit:**

10,35 bar

**Vapour pressure at 20 °C:**

No further information available.

**Density:**

1,17

**Relative density at 20 °C**

3,45

**Vapour density****Solubility in / Miscibility with****water:**

430 mg/l (Pentafluoroethane)

**Partition coefficient (n-octanol/water) at 20 °C:** 1,48 (Pentafluoroethane)**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:**

Fluorophosgene in contact with naked flame or red hot objects.

Hydrofluoric acid, carbonyl fluoride

**\* SECTION 11: Toxicological information****11.1 Information on toxicological effects****Acute toxicity****LD/LC50 values relevant for classification:****811-97-2 1,1,1,2-Tetrafluoroethane**

Inhalative LC50/4 h &gt;500000 ppm (Rat)

**Primary irritant effect**

Skin corrosion/irritation No further information available.

Serious eye damage/irritation No further information available.

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**Trade name: R-407C****Respiratory or skin sensitisation** Based on available data, the classification criteria are not met.**CMR effects****Germ cell mutagenicity***In vitro* tests did not show mutagenic effects.*In vivo* tests did not show mutagenic effects.**Carcinogenicity** Based on available data, the classification criteria are not met.**Reproductive toxicity** Developmental Toxicity, rat, no observed effect (1,1,1,2-Tetrafluoroethane)**STOT-single exposure** No further information available.**STOT-repeated exposure****354-33-6 Pentafluoroethane**Inhalative NOAEL  $\geq$ 50000 ppm (Rat and rabbit)**811-97-2 1,1,1,2-Tetrafluoroethane**Inhalative NOAEL  $\geq$ 50000 ppm (Rat)**75-10-5 Difluoromethane**Inhalative NOAEL 108 mg/m<sup>3</sup> (Rat)

Based on available data, the classification criteria are not met.

**Aspiration hazard** Based on available data, the classification criteria are not met.**Chronic study** No further information available.**SECTION 12: Ecological information****12.1 Toxicity****Aquatic toxicity:** No further relevant information available.**12.2 Persistence and degradability:** No further relevant information available.**Abiotic degradation:**Air, indirect photo-oxidation,  $t_{1/2}$  from 4,16-28,2 y

Conditions: sensitizer: OH radicals

Degradation products: Carbon dioxide (CO<sub>2</sub>) / hydrofluoric acid /TFA**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

Global warming potential(GWP) :0.25

**12.5 Results of PBT and vPvB assessment****PBT:** This mixture does not contain any substances that are assessed to be PBT.**vPvB:** This mixture does not contain any substances that are assessed to be 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**

UN3340

**14.2 UN proper shipping name:****ADR:**

3340 REFRIGERANT GAS R 407C

**IMDG, IATA**

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**Trade name: R-407C****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":****UN3340, REFRIGERANT GAS R 407C, 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.**Other regulations, limitations and prohibitive regulations:** 1**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:****RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)****ICAO: International Civil Aviation Organisation**

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*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*

*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 L: Gases under pressure: Liquefied gas*

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