SPECIFICATION

PRODUCT NAME : ORAFON HFC -407C

PACKING SIZE : 11.3 KGS/DAC and 45 KGS/CYLINDER

The above product conforms to the following specifications:

TEST ITEM	REPORTING UNITS	SPECIFICATION
Appearance	-	Colorless, not turbid
Odor	-	No strange stench
Purity	% by weight	≥ 99.9
Moisture	% by weight	≤ 0.001
Acidity (as HCl)	% by weight	≤ 0.00001
Evaporation Residue	% by weight	≤ 0.01
Chlorides (Cl)	% by weight	≤ 0.0003
No Condensable gas	% (v/v)	≤ 1.5

ORANOSS CO., LTD.

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ORANOSS CO., LTD.

ORAFON R 407C

1. PRODUCT AND COMPANY INDENTIFICATION

Product Name: Refrigerant Gas (R407C)
Synonyms: HFC-407C

Supplier: ORANOSS CO.,LTD.
Address: 127/24 Panjathani Tower, 19th Floor. Non-si Rd., Chong non-si, Yannawa, Bangkok 10120 Thailand.

Emergency Phone: Tel: +66 (0) 2105-0499 Fax : +66 (0) 2105-0490 (Office hours)

Chemical Name: Pentafluoroethane , 1,1,1,2-tetrafluoroethane , Difluoromethane
Chemical Family: Hydrofluorocarbons
Chemical Formula: $CHF_2CF_3/CH_2FCF_3/ CH_2F_2$

2. COMPOSITION/INFROMATION ON INGREDIENTS

COMPONENTS

Material	CAS Number	Weight %
Pentafluoroethane (HFC125)	354-33-6	25%
1,1,1,2-tetrafluoroethane (HFC-134a)	811-97-2	52%
Difluoromethane (HFC-32)	75-10-5	23%

3. HAZARDS IDENTIFICATION

Potential Health Effects
Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness or death. Intentional misuse or deliberate inhalation may cause death without warning. Vapor reduces oxygen available for breathing and is heavier than air. Liquid contact can cause frostbite.

HUMAN HEALTH EFFECTS:
Overexposure to the vapors by inhalation may include temporary nervous system depression with anesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness. Higher exposures to the vapors may cause temporary alteration of the heart's electrical activity with irregular pulse, palpitations, or inadequate circulation. Gross overexposure may be fatal. Skin contact with the liquid may cause frostbite.

Individuals with preexisting diseases of the central nervous or cardiovascular system may have increased susceptibility to the toxicity of increased exposures.

Carcinogenicity Information
None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

4. FIRST AID MEASURES

SKIN CONTACT
In case of contact, flush with lukewarm water. Do not use hot water. If frostbite has occurred, call a physician.

EYES CONTACT
In case of liquid contact, immediately flush eyes with plenty of water for 15 minutes. Call a physician.

INHALATION
Immediately remove to fresh air. Keep person calm. Call a physician. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION
Not a probable route. However, in case of accidental ingestion, call a physician.

ADVICE TO PHYSICIAN
THIS MATERIAL MAY MAKE THE HEART MORE SUSCEPTIBLE TO ARRHYTHMIAS. Catecholamine such as adrenaline, and other compounds having similar effects, should be reserved for emergencies and then used only with special caution.

5. FIRE-FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: No flash point

Flammable Limits in air, % by Volume:

LEL:	None per ASTM E681
UEL:	None per ASTM E681
Autoignition:	Not determined

Fire and Explosion Hazards:
Cylinders may rupture under fire conditions. Decomposition may occur.
Contact of welding or soldering torch flame with high concentrations of refrigerant can result in visible changes in the size and color of torch flames. This flame effect will only occur in concentrations of product well above the recommended exposure limit, therefore stop all work and ventilate to disperse refrigerant vapors from the work area before using any open flames.

R-407C is not flammable in air at temperatures up to 100 deg C (212 deg F) at atmospheric pressure. However, mixtures of R-407C with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. R-407C can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing R-407C and air, or R-407C in an oxygen enriched atmosphere becomes combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, R-407C should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example: R-407C should NOT be mixed with air under pressure for leak testing or other purposes.

Experimental data have also been reported which indicate combustibility of HFC-134a, a component in this blend, in the presence of chlorine.

EXTINGUISHING MEDIA
Use media appropriate for surrounding material.

FIRE FIGHTING INSTRUCTIONS
Cool tank/container with water spray. Self-contained breathing apparatus (SCBA) is required if drums rupture and contents are spilled under fire conditions. Water runoff should be contained and neutralized prior to release.

6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)
NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Accidental Release Measures
Ventilate area, especially low or enclosed places where heavy vapors might collect. Remove open flames. Use self-contained breathing apparatus (SCBA) for large spills or releases.

7. HANDLING AND STORAGE

HANDLING (PERSONNEL)

Avoid breathing vapor. Avoid liquid contact with eyes and skin. Use with sufficient ventilation to keep employee exposure below recommended limits. Contact with chlorine or other strong oxidizing agents should also be avoided. See Fire and Explosion Data section.

STORAGE

Store in a clean, dry place. Do not heat above 52 deg C to avoid over pressurizing the container.

8. EXOPSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Avoid breathing vapors. Avoid contact with skin or eyes. Use with sufficient ventilation to keep employee exposure below the recommended exposure limit. Local exhaust should be used if large amounts are released. Mechanical ventilation should be used in low or enclosed places.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point:	-43.9 C (-47 F) Average
Vapor Pressure:	171.8 psia at 25 C (77 F)
% Volatiles:	100 WT%
Evaporation Rate :	>1 (CCl4=1.0)
Solubility in Water:	Not determined
Odor:	Slight ethereal
Form:	Liquefied gas
Color:	Clear, colorless
Specific Gravity:	1.136 @ 25 C (77 F)

10. STABILITY AND REACTIVITY

Chemical Stability

Stable

Conditions to Avoid

Avoid open flames and high temperatures.

Incompatibility with Other Materials

Incompatible with active metals, alkali or alkaline earth metals - powdered Al, Zn, Be, etc.

Decomposition

Decomposition products are hazardous. This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrochloric and hydrofluoric acids and possibly carbonyl halides. These materials are toxic and irritating. Contact should be avoided.

Polymerization

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Animal Data

The blend is untested.

HFC-125

Inhalation 4 hour ALC: > 709,000 ppm in rats

Single, high inhalation exposures caused lethargy, decreased activity, labored breathing and weight loss. Weak cardiac sensitization effect, a potentially fatal disturbance of heart rhythm caused by a heightened sensitivity to the action of epinephrine. Lowest-Observed-Adverse-Effect-Level for cardiac sensitization: 100,000 ppm. Repeated exposure caused: No significant toxicological effects. No-Observed-Adverse-Effect Level (NOAEL): 50,000 ppm

No animal data are available to define carcinogenic, developmental or reproductive hazards. In animal testing this material has not caused developmental toxicity. HFC-125 does not produce genetic damage in bacterial or mammalian cell cultures or when tested in animals (not tested for heritable genetic damage).

HFC-134a

Inhalation 4-hour LC50: 567,000 ppm in rats

Single exposure caused: Cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of epinephrine. Lowest-Observed-Adverse-Effect-Level for cardiac sensitization: 75,000 ppm. Single exposure caused: Lethargy. Narcosis. Increased respiratory rates. These effects were temporary. Single exposure to near lethal doses caused: Pulmonary edema. Repeated exposure caused: Increased adrenals, liver, spleen weight. Decreased uterine, prostate weight. Repeated dosing of higher concentrations caused: the following temporary effects - Tremors. Incoordination.

CARCINOGENIC, DEVELOPMENTAL, REPRODUCTIVE,MUTAGENIC EFFECTS:

In a two-year inhalation study, HFC-134a, at a concentration of 50,000 ppm, produced an increase in late-occurring benign testicular tumors, testicular hyperplasia and testicular weight. The no-effect-level for this study was 10,000 ppm. Animal data show slight fetotoxicity but only at exposure levels producing other toxic effects in the adult animal. Reproductive data on male mice show: No change in reproductive performance. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. In animal testing, this material has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic damage).

HFC-32

Inhalation: 4 hour-ALC: > 520,000 ppm in rats Single exposure caused:

Lethargy. Spasms. Loss of mobility in the hind limbs. Other effects include weak cardiac sensitization, a potentially fatal disturbance of heart rhythm caused by a heightened sensitivity to the action of epinephrine. 250,000 ppm.

Repeated exposure caused pathological changes of the lungs, liver, spleen, kidneys. In more recent studies repeated exposure caused: No significant toxicological effects. No-Observed-Effect-Level (NOEL): 49,100 ppm. No animal data are available to define the following effects of this material: carcinogenicity, reproductive toxicity. Animal data show slight fetotoxicity but only at exposure levels producing other toxic effects in the adult animal. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. This material has not been tested for its ability to cause permanent genetic damage in reproductive cells of mammals (not tested for heritable genetic damage).

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

HFC-134a

48-hour EC50, Daphnia magna: 980 mg/L

96-hour LC50, Rainbow trout: 450 mg/L

13. DISPOSAL CONSIDERATIONS

Waste Disposal

Comply with Federal, State, and local regulations. Reclaim by distillation or remove to a permitted waste disposal facility.

14. TRANSPORT INFORMATION

Shipping Information

DOT/IMO/IATA
Proper Shipping Name: Refrigerant Gas R407C Hazard Class: 2.2
UN No.: 3340
Label(s): Nonflammable Gas

Shipping Containers

Cylinders
Ton Tanks
Tank Trucks

15. REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status: Reported/Included.
TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute:	Yes
Chronic:	Yes
Fire:	No
Reactivity:	No
Pressure:	Yes

HAZARDOUS CHEMICAL LISTS

SARA Extremely Hazardous Substance	- No
CERCLA Hazardous Substance	- No
SARA Toxic Chemical	- No

16. OTHER INFORMATION

The information given corresponds to the current state of our knowledge and experience of the product, and is not exhaustive. This applies to product that confirms to the specification, unless otherwise stated. In the case of combinations and mixtures one must make sure that no new dangers can arise. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and protection of human welfare and environment.

ORANOSS CO., LTD.

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