Section 1 Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name	:	R404A – KrioNext404A
SDS No.	:	GG_006
Registration-No.	:	000000009893
Product Use Description		Refrigerant

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

Relevant identified uses	:	No further relevant information available.

1.3 Details of the supplier of the safety data sheet

Company identification	:	General Gas (Zhejiang) CO., LTD Room 1802, West Tower, No. 1001, Jiangxi Road, Shangyu District, Shaoxing, Zhejiang, 312399
Phone		☎ 008613685862252
E-Mail		carter.gu@generalgas-krionext.com

Section 2 Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Form	: Liquiefied gas
Color	: Colourless
Odor	: Weak

2.2 Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :

Signal word (CLP)	:	Warning
Hazard statements (CLP)	:	Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.
Precautionary statements (CLP)	:	**Storage:** Protect from sunlight. Store in a well-ventilated place. May cause cardiac arrhythmia. May cause frostbite. May cause eye and skin irritation.

2.3 Carcinogenicity : No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

Section 3 Composition/information on ingredients

3.1 Chemical nature : Mixture

Section 4 First aid measures

4.1 Description of first aid measures

After Inhalation : Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.

After Skin contact : After contact with skin, wash immediately with plenty of water.
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. If symptoms persist, call a physician.

Eye contact : Rinse immediately with plenty of water, also under the eyelids,
for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. If symptoms persist, call a physician.

Ingestion : Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed : Frost bites
Prolonged skin contact may defat the skin and produce dermatitis.
High concentrations cause asphyxiation. May cause an abnormal heart rhythm and prove suddenly fatal.

4.3 Indication of any immediate medical attention and special treatment needed : Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions. Treat frostbitten areas as needed.

Section 5 Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media : The product is not flammable.
ASHRAE 34
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Specific hazards during firefighting : Contents under pressure. This product is not flammable at ambient temperatures and atmospheric pressure.
However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources.
Container may rupture on heating.
Cool closed containers exposed to fire with water spray.
Do not allow run-off from fire fighting to enter drains or water courses.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Fire may cause evolution of:
Hydrogen fluoride Carbon oxides Halogenated compounds Carbonyl halides
Gaseous hydrogen chloride (HCl).

5.2 Special protective equipment for firefighters : Wear full protective clothing and self-contained breathing apparatus.

5.3 Advice for firefighters

Further information : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Section 6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures : Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away.

Remove all sources of ignition.

Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area.

After release, disperses into the air.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Avoid accumulation of vapours in low areas.

Unprotected personnel should not return until air has been tested and determined safe.
Ensure that the oxygen content is >= 19.5%.

6.2 Environmental precautions : Prevent further leakage or spillage if safe to do so.
The product evapourates readily.

6.3 Methods and material for containment and cleaning up : Ventilate the area.

Section 7 Handling and storage

7.1 Precautions for safe handling

Safe use of the product : Handle with care.
Avoid inhalation of vapour or mist.
Do not get in eyes, on skin, or on clothing. Wear personal protective equipment.
Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Follow all standard safety precautions for handling and use of compressed gas cylinders.
Use authorized cylinders only.
Protect cylinders from physical damage.
Do not puncture or drop cylinders, expose them to open flame or excessive heat.
Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material.
Do not remove screw cap until immediately ready for use. Always replace cap after use.

	Advice on protection against fire and explosion	:	The product is not flammable. Can form a combustible mixture with air at pressures above atmospheric pressure.
7.2	**Conditions for safe storage, including any incompatibilities**	:	Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Keep containers tightly closed in a dry, cool and well-ventilated place. Storage rooms must be properly ventilated. Ensure adequate ventilation, especially in confined areas. Protect cylinders from physical damage.

Section 8 Exposure controls/personal protection

8.1	**Protective measures**		: Do not breathe vapour. Do not get in eyes, on skin, or on clothing. Ensure that eyewash stations and safety showers are close to the workstation location.
8.1.1	**Engineering measures**	:	General room ventilation is adequate for storage and handling. Perform filling operations only at stations with exhaust ventilation facilities.
	Eye/face protection	:	Wear as appropriate: Safety glasses with side-shields If splashes are likely to occur, wear: Goggles or face shield, giving complete protection to eyes
	Hand protection	:	Leather gloves In case of contact through splashing: Protective gloves Neoprene gloves Polyvinyl alcohol or nitrile- butyl-rubber gloves
	Skin and body protection	:	Avoid skin contact with leaking liquid (danger of frostbite). Wear cold insulating gloves/ face shield/ eye protection.
	Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment. Wear a positive-pressure supplied-air respirator. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. For rescue and maintenance work in storage tanks use self- contained breathing apparatus.
	Hygiene measures	:	Handle in accordance with good industrial hygiene and safet practice. Ensure adequate ventilation, especially in confined areas. Do not get in eyes, on skin, or on clothing. Remove and wash contaminated clothing before re-use. Keep working clothes separately.

Section 9 Physical and chemical properties

9.1 **Information on basic physical and chemical properties**

Colour	:	Colourless.

	Odour	:	Weak
	Odor threshold	:	Note: no data available
	pH	:	Note: neutral
	Freezing point	:	Note: no data available
	Boiling point/boiling range	:	-47.8 °C
	Flash point	:	Note: Not applicable
	Upper explosive limit	:	29.9 Vol %
	Flash point	:	Not applicable.
	Evaporation rate	:	> 1 Method: Compared to CCl4.
	Lower explosion limit	:	Note: None
	Upper explosion limit	:	Note: None
	Vapor pressure	:	12,610 hPa at 21.1 °C(70.0 °F) 25,572 hPa at 54.4 °C(129.9 °F)
	Relative density at 25 ° C		
	Vapor density	:	3.43 Note: (Air = 1.0)
	Density	:	1.08 g/cm3 at 21.1 °C
	Water solubility	:	Note: Very slightly soluble in cold water, hot water.
	Partition coefficient: n-octanol/water	:	log Pow: 1.06 Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)
	Ignition temperature	:	< 750 °C
	Decomposition temperature		> 250 °C
	Viscosity, dynamic		Note: no data available
	Viscosity, kinematic		Note: no data available

Section 10 Stability and reactivity

10.1	**Reactivity**	:	Not classified as a reactivity hazard.Risk of explosion if heated under confinement.
10.2	**Chemical stability**	:	Stable under normal conditions.
10.3	**Possibility of hazardous reactions**	:	Hazardous polymerisation does not occur.
10.4	**Conditions to avoid**	:	Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Decomposes under high temperature. Some risk may be expected of corrosive and toxic decomposition products. Can form a combustible mixture with air at pressures above atmospheric pressure. Do not mix with oxygen or air above atmospheric pressure.
10.5	**Incompatible materials**	:	Oxidizing agents Finely divided metal powders such as aluminum, magnesium, or zinc.
10.6	**Hazardous decomposition products**	:	Halogenated compounds - Hydrogen fluoride - Carbonyl halides Carbon - oxides Gaseous - hydrogen chloride (HCl).

Section 11 Toxicological information

11.1 Information on toxicological effects

Acute toxicity	:
1,1,1-Trifluoroethane	LC50: > 540000 ppm Exposure time: 4 h Species: Rat LC50: > 106 mg/l Exposure time: 4 h Species: Rat
Pentafluoroethane	> 769000 ppm Exposure time: 4 h Species: Rat
1,1,1,2-Tetrafluoroethane	LC50: > 500000 ppm Exposure time: 4 h Species: Rat
Sensitisation	
1,1,1-Trifluoroethane	Cardiac sensitization Species: dogs Note: 1,1,1,2-tetrafluoroethane (HFC-134a): Cardiac sensitisation threshold (dog): 80000 ppm.
Pentafluoroethane	Cardiac sensitization Species: dogs Note: No-observed-effect level 75 000 ppm Lowest observed effect level 100 000 ppm
1,1,1,2-Tetrafluoroethane	Cardiac sensitization Species: dogs Note: No-observed-effect level 50 000 ppm Lowest observed effect level 75 000 ppm
Repeated dose toxicity	
1,1,1-Trifluoroethane	Species: Rat Application Route: Inhalation Exposure time: (90 d) NOEL: 40000 ppm Subchronic toxicity
Pentafluoroethane	Species: Rat

	Application Route: Inhalation Exposure time: (4 Weeks) NOEL: 50000 ppm Subchronic toxicity
1,1,1,2-Tetrafluoroethane	Species: Rat NOEL: 40000 ppm
Genotoxicity in vitro 1,1,1-Trifluoroethane	Test Method: Ames test Result: negative
Pentafluoroethane	Test Method: Ames test Result: negative
1,1,1,2-Tetrafluoroethane	Note: In vitro tests did not show mutagenic effects.
	Cell type: Human lymphocytes Result: negative
	Cell type: Human lymphocytes Result: negative
	Cell type: Chinese Hamster Ovary Cells Result: negative
Genotoxicity in vivo 1,1,1-Trifluoroethane	Species: Mouse Cell type: Bone marrow Application Route: Inhalation Result: negative
Teratogenicity 1,1,1-Trifluoroethane	Species: Rat Application Route: Inhalation exposure NOAEL,Teratog: 40,000 ppm NOAEL,Maternal: 40,000 ppm Note: Did not show teratogenic effects in animal experiments.
	Species: Rabbit Application Route: Inhalation exposure NOAEL,Teratog: 40,000 ppm NOAEL,Maternal: 40,000 ppm Note: Did not show teratogenic effects in animal experiments.
Pentafluoroethane	Species: Rabbit Application Route: Inhalation exposure

NOAEL,Teratog: 50,000 ppm
NOAEL,Maternal: 50,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Species: Rat
Application Route: Inhalation exposure
NOAEL,Teratog: 50,000 ppm
NOAEL,Maternal: 50,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Further information : Note: Acute Health Hazard Ethane, pentafluoro- (HFC-125):
Cardiac sensitisation threshold (dog): 75000 ppm. 1,1,1- trifluoroethane (HFC-143a): Cardiac sensitisation threshold (dog): >250000 ppm. 1,1,1,2-tetrafluoroethane (HFC-134a): Cardiac sensitisation threshold (dog): 80000 ppm. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Irritating to eyes and skin.
Rapid evaporation of the liquid may cause frostbite. Avoid skin contact with leaking liquid (danger of frostbite). May cause cardiac arrhythmia. Chronic Health Hazard 1,1,1- trifluoroethane (HFC-143a): Not mutagenic in AMES Test.

Section 12 Ecological information

12.1 Biodegradability

Pentafluoroethane : Result: Not readily biodegradable.
Value: 5 %
Method: OECD 301 D

12.2 Further information on ecology

Additional ecological information : This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82.
This product contains greenhouse gases which may contribute to global warming. Do NOT vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered.

Section 13 Disposal considerations

13.1 Disposal methods : Observe all Federal, State, and Local Environmental regulations.

Note : This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part
82 regarding refrigerant recycling.

Section 14 Transport information

14.1 DOT

UN/ID No.	:	UN 3337
Proper shipping name		REFRIGERANT GAS R 404A
Class		2.2
Packing group		
Hazard Labels		2.2

14.2 IATA

UN/ID No. : UN 3337

Description of the goods		REFRIGERANT GAS R 404A
Class		2.2
Hazard Labels		2.2
Packing instruction (cargo aircraft)	:	200
Packing instruction (passenger aircraft)		200

14.4 IMDG

UN/ID No.	:	UN 3337
Description of the goods	:	REFRIGERANT GAS R 404A
Class	:	2.2
Hazard Labels		2.2
EmS Number		F-C, S-V
Marine pollutant		no

Section 15 Regulatory information

15.1 Inventories

US. Toxic Substances Control Act	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	On the inventory, or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	All components of this product are on the Canadian DSL
Japan. Kashin-Hou Law List	On the inventory, or in compliance with the inventory
Korea. Existing Chemicals Inventory (KECI)	On the inventory, or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	On the inventory, or in compliance with the inventory
China. Inventory of Existing Chemical Substances	On the inventory, or in compliance with the inventory
NZIOC - New Zealand	On the inventory, or in compliance with the inventory

15.2 : A CSA does not need to be carried out for this product.

National regulatory information

SARA 302 Components	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards	Acute Health Hazard Sudden Release of Pressure Hazard

California Prop. 65	This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.	
New Jersey RTK	1,1,1-Trifluoroethane	420-46-2

Section 16 Other information

		HMIS III	NFPA
Health hazard		**1**	**2**
Flammability	:	1	1
Physical Hazard		0	
Instability			0

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

This Safety Data Sheet has been compiled in accordance with the applicable European Directives and is applicable to all countries that have translated the Directives within their national legislation.
The information contained in this sheet is based on the knowledge available to us at the date of the last version. The user must ensure the suitability and completeness of the information in relation to the specific use of the product. You should not interpret this document as a guarantee for any specific property of the product. Because the use of the product does not fall under our direct control, it is the user's duty to observe the laws and regulations in force regarding hygiene and safety under its own responsibility. They are not responsible for improper use.

End of Document