



R410A

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	R410A
UN-Number	UN3163
Recommended Use	Refrigerant.
Supplier Address*	<p>Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC 575 Mountain Ave. Murray Hill, NJ 07974 Phone: 908-464-8100 www.lindeus.com</p> <p>Linde Gas Puerto Rico, Inc. Las Palmas Village Road No. 869, Street No. 7 Catano, Puerto Rico 00962 Phone: 787-641-7445 www.pr.lindegas.com</p> <p>Linde Canada Limited 5860 Chedworth Way Mississauga, Ontario L5R 0A2 Phone: 905-501-1700 www.lindecana.com</p> <p>* May include subsidiaries or affiliate companies/divisions.</p> <p>For additional product information contact your local customer service.</p>
Chemical Emergency Phone Number	Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

2. HAZARDS IDENTIFICATION

DANGER!		
Emergency Overview		
<p>May cause central nervous system depression Asphyxiant at high concentrations Contact with liquid may cause frostbite. Contents under pressure Keep at temperatures below 52°C / 125°F</p>		
Appearance Colorless	Physical State Compressed liquefied gas.	Odor Slight ethereal

OSHA Regulatory Status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential Health Effects

Principle Routes of Exposure	Inhalation. Skin contact.
Acute Toxicity	
Inhalation	High concentrations may cause asphyxia from lack of oxygen or act as a narcotic causing central nervous system depression. Symptoms of overexposure are dizziness, headache, tiredness, nausea, unconsciousness, cessation of breathing. Oxygen deficiency may occur in the presence of high concentrations resulting in asphyxiation. Maintain oxygen levels at or above 19.5%. Intentional misuse and deliberate inhalation may cause death without warning. Higher exposures to the vapors may cause temporary alteration of the heart's electrical activity with irregular pulse, palpitations, or inadequate circulation or fatality from gross overexposure.
Eyes	This product is a gas at room temperature. Contact with liquid may cause frostbite.
Skin	This product is a gas at room temperature. Contact with liquid may cause frostbite.
Skin Absorption Hazard	No known hazard by skin absorption.
Ingestion	Not an expected route of exposure.
Chronic Effects	Possible risks of irreversible effects.
Aggravated Medical Conditions	Central nervous system. Heart.
Environmental Hazard	See Section 12 for additional Ecological Information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Pentafluoroethane	354-33-6	50	C ₂ HF ₅
Methylene fluoride	75-10-5	50	CH ₂ F ₂

4. FIRST AID MEASURES

Eye Contact	None required for gas. If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.
Skin Contact	None required for gas. For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.
Inhalation	PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INHALATION OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and, as necessary, given artificial resuscitation and supplemental oxygen. Treatment should be symptomatic and supportive.
Ingestion	None under normal use. Get medical attention immediately if symptoms occur.
Notes to Physician	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

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Flammable Properties	Not flammable.
Suitable Extinguishing Media	Use extinguishing agent suitable for type of surrounding fire.
Hazardous Combustion Products	Hydrogen fluoride. Carbonyl fluoride.
Explosion Data	
Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	None
Specific Hazards Arising from the Chemical	Continue to cool fire exposed cylinders until flames are extinguished. Cylinders may rupture under extreme heat. Damaged cylinders should be handled only by specialists. R-410A is not flammable in air at temperatures up to 100 deg C (212 deg F) at atmospheric pressure. However, mixtures of R-410A with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of ignition sources. R-410A can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing R-410A and air, or R-410A 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-410A should not be allowed to exist with air above atmospheric pressure or high temperatures; or in an oxygen enriched environment. For example: R-410A should NOT be mixed with air under pressure for leak testing or other purposes.
Protective Equipment and Precautions for Firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Ensure adequate ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Monitor oxygen level.
Environmental Precautions	Prevent spreading of vapors through sewers, ventilation systems and confined areas.
Methods for Containment	Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Linde location.
Methods for Cleaning Up	Return cylinder to Linde or an authorized distributor.
Other Information	Ventilate the area.

7. HANDLING AND STORAGE

Handling	Avoid breathing vapors or mists. Avoid contact with skin and eyes. Ensure adequate ventilation. Contents under pressure. Use an adjustable strap wrench to remove over-tight or rusted caps. Close valve after each use and when empty. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.
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Storage Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Other Exposure Guidelines The American Industrial Hygiene Association (AIHA) has established a Workplace Environmental Exposure Level (WEEL) 8 hour Time-Weighted Average (TWA) of 1000 ppm for Pentafluoroethane (HFC 125) and Difluoromethane (HFC-32A).

Engineering Measures Ventilation systems.

Ventilation Use ventilation adequate to keep exposures below recommended exposure limits.

Personal Protective Equipment

Eye/Face Protection Goggles.

Skin and Body Protection Impervious gloves.

Respiratory Protection

General Use If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

Emergency Use Use positive pressure air line respirator or self-contained breathing apparatus for exposure over exposure limits or emergency use. For exposures above IDLH, an additional escape bottle is required.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless.	Odor	Slight ethereal.
Odor Threshold	No information available.	Physical State	Compressed liquefied gas
Flash Point	No information available.	Autoignition Temperature	No information available.
Decomposition Temperature	No information available.	Boiling Point/Boiling Range	-51.6°C / -60.8°F
Freezing Point	No information available	Molecular Weight	No data available
Water Solubility	No information available	Evaporation Rate	>1 (CL4 = 1)
Vapor Pressure	239.7 PSIA @ 25°C	Vapor Density	No data available
VOC Content (%)	Not applicable.	Flammability Limits in Air	
		Upper	Not applicable
		Lower	Not applicable

Note: Specific Gravity : 1.066 @ 25°C (77°F)

10. STABILITY AND REACTIVITY

Stability	Stable.
Incompatible Products	Incompatible with active metals, alkali or alkaline earth metals - powdered Al, Zn, Be etc.
Conditions to Avoid	Heat, flames and sparks.
Hazardous Decomposition Products	Hydrofluoric acid. Carbonyl fluoride.
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

LD50 Oral: No information available.

LD50 Dermal: No information available.

LC50 Inhalation: No information available.

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

Single, high inhalation exposure 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.

Methylene fluoride
Inhalation 4 hour ALC: >520,000 ppm in rats.
Single exposure caused lethargy and 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 which occurred at 250,000 ppm.

Repeated Dose Toxicity
Repeated exposure to methylene fluoride caused pathological changes of the lungs, liver, spleen, and kidneys. In more recent studies of repeated exposure caused no significant toxicological effects. No-Observed-Effect-Level (NOEL): 49,100 ppm.

Chronic Toxicity

Chronic Toxicity
Possible risks of irreversible effects.

Carcinogenicity
Contains no ingredient listed as a carcinogen.

Irritation
No information available.

Sensitization
No information available.

Reproductive Toxicity
No information available.

Developmental Toxicity
No information available.

Synergistic Materials
None known.

Target Organ Effects None known.

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal.

Contaminated Packaging Do not re-use empty containers.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Liquefied gas, n.o.s.
Hazard Class	2.2
Subsidiary Class	None
UN-Number	UN3163
Description	UN3163,Liquefied gas, n.o.s. (Pentafluoroethane, Difluoromethane),2.2,PG None
Emergency Response Guide Number	126

TDG

Proper Shipping Name	Liquefied gas, n.o.s.
Hazard Class	2.2
UN-Number	UN3163
Description	UN3163,LIQUEFIED GAS, N.O.S.(Pentafluoroethane, Difluoromethane),2.2

MEX

Proper Shipping Name	Liquefied gas, n.o.s.
Hazard Class	2.2
UN-Number	UN3163
Description	UN3163 Liquefied gas, n.o.s.(Pentafluoroethane, Difluoromethane),2.2

IATA

UN-Number	UN3163
Proper Shipping Name	Liquefied gas, n.o.s.
Hazard Class	2.2
ERG Code	2L
Description	UN3163,Liquefied gas, n.o.s.(Pentafluoroethane, Difluoromethane),2.2
Maximum Quantity for Passenger	75 kg
Maximum Quantity for Cargo Only	150 kg
Limited Quantity	Forbidden

IMDG/IMO

Proper Shipping Name	Liquefied gas, n.o.s.
Hazard Class	2.2
UN-Number	UN3163
EmS No.	F-C, S-V
Description	UN3163, Liquefied gas, n.o.s.(Pentafluoroethane, Difluoromethane),2.2

ADR

Proper Shipping Name	Liquefied gas, n.o.s.
Hazard Class	2.2
UN-Number	UN3163
Classification Code	2A
Description	UN3163 Liquefied gas, n.o.s.(Pentafluoroethane, Difluoromethane),2.2,

15. REGULATORY INFORMATIONInternational Inventories

TSCA	Complies
DSL	Complies
EINECS/ELINCS	Complies

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
 DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
 EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

U.S. Federal RegulationsSARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	Yes
Reactive Hazard	No

Clean Water Act

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Methylene fluoride		X		

Risk and Process Safety Management Programs

This material, as supplied, does not contain any regulated substances with specified thresholds under 40 CFR Part 68.
 This product does not contain any substances regulated as Highly Hazardous Chemicals pursuant to the 29 CFR Part 1910.110.

Chemical Name	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Toxic Substances	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Flammable Substances	U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals
Methylene fluoride		10,000 lbs	

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA/SARA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

This product does not contain any substances regulated by state right-to-know regulations.

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methylene fluoride			X		

International Regulations**Canada**

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class

A Compressed gases

**16. OTHER INFORMATION**

Prepared By Product Stewardship
 23 British American Blvd.
 Latham, NY 12110
 1-800-572-6501

Issuing Date 14-Feb-2011

Revision Date

Revision Number 0

Revision Note Initial Release.

<u>NFPA</u>	Health Hazard 1	Flammability 0	Stability 1	Physical and Chemical Hazards -
<u>HMIS</u>	Health Hazard 1	Flammability 0	Physical Hazard 2	Personal Protection -

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

General Disclaimer

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Linde LLC, Linde Merchant Production, Inc. or Linde Gas North America LLC (or any of their affiliates and subsidiaries) and the purchaser.

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End of Safety Data Sheet