Arctic Eagle 454B, FluoroFusion R-454B

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations
Issue date: 1/10/2024 Version: 1.0

SECTION 1: Identification

1.1. Identification

Product form : Mixture
Trade name : Arctic Eagle 454B, FluoroFusion R-454B

1.2. Recommended use and restrictions on use

Recommended use : Refrigerant
Restrictions on use : All other uses not recommended above

1.3. Supplier

FluoroFusion Specialty Chemicals, Inc.
PO Box 1238
Clayton, North Carolina 27528
T 919-800-0277
info@fluorofusion.com

1.4. Emergency telephone number

Emergency number : For Hazardous Materials or Dangerous Goods Incident Spill, Leak, Fire, Exposure, or Accident
Call CHEMTREC Day or Night: 1-800-424-9300 (Toll Free, USA) / 703-527-3887 (Virgina, USA)
CCN 12519

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS US classification

Flammable gases Category 1
Gases under pressure Liquefied gas
Simple Asphyxiant
Full text of H statements : see section 16

Extremely flammable gas
Contains gas under pressure; may explode if heated
May displace oxygen and cause rapid suffocation

2.2. GHS Label elements, including precautionary statements

GHS US labeling

Hazard pictograms (GHS US) :

Signal word (GHS US) : Danger
Hazard statements (GHS US) : Extremely flammable gas
Contains gas under pressure; may explode if heated
May displace oxygen and cause rapid suffocation
Precautionary statements (GHS US) : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources if safe to do so.
Store in a well-ventilated place.
Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards which do not result in classification

Other hazards which do not result in classification : Contact with liquid may cause cold burns/frostbite.

2.4. Unknown acute toxicity (GHS US)

No additional information available

SECTION 3: Composition/Information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	GHS US classification
Difluoromethane	CAS-No.: 75-10-5	68.9	Flam. Gas 1, H220 Press. Gas (Liq.), H280 Simple Asphy, SIAS
2,3,3,3-Tetrafluoropropene	CAS-No.: 754-12-1	31.1	Flam. Gas 1, H220 Press. Gas (Liq.), H280 Simple Asphy, SIAS

Full text of hazard classes and H-statements : see section 16

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : Call a physician immediately. First aider: Pay attention to self-protection. Never give anything by mouth to an unconscious person. Give artificial respiration if necessary. Induce artificial respiration with mask fitted with one-way valve or other suitable device but not mouth-to-mouth.

First-aid measures after inhalation : If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If the victim is unconscious : Lay in a stable manner on victim's side. Induce artificial respiration with mask fitted with one-way valve or other suitable device; not mouth-to-mouth. Call a physician immediately.

First-aid measures after skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area. Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse. Immediately call a poison center or doctor/physician. Wash contaminated clothing before reuse.

First-aid measures after eye contact : Following contact with the liquefied or expanded gas, rinse the eyes only shortly under running water. Do not part lids, leave contact lenses in their place. Immediately transport the casualty to an eye doctor / hospital. Continue rinsing during the transport with isotonic saline solution, alternatively with water.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation : In high concentrations may cause asphyxiation.

Symptoms/effects after skin contact : Contact with the liquefied gas may cause frostbite.

Symptoms/effects after eye contact : Contact with the liquefied gas may cause severe ocular lesions.

Symptoms/effects after ingestion : Not expected to present a significant ingestion hazard under anticipated conditions of normal use.

Most Important Symptoms/Effects : In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. May cause frostbite on contact the liquefied gas.

4.3. Immediate medical attention and special treatment, if necessary

Treat symptomatically.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Use extinguishing agent suitable for surrounding fire. Dry powder. Water spray. Carbon dioxide.

Unsuitable extinguishing media : None known.

5.2. Specific hazards arising from the chemical

Fire hazard : Extremely flammable chemical under pressure: May explode if heated. The vapors are denser than air and may travel along the ground. Distance ignition possible.

Explosion hazard : Chemical under pressure: May explode if heated.

Reactivity in case of fire : May decompose on contact with flames or extremely hot metal surfaces to produce toxic and corrosive products.

Hazardous decomposition products in case of fire : Toxic fumes may be released. Carbon dioxide. Carbon monoxide. Carbonyl halides. Hydrofluoric Acid.

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : No action shall be taken without appropriate training or involving any personal risk. Do not enter fire area without proper protective equipment, including respiratory protection. Evacuate area. Fight fire from safe distance and protected location. Use extinguishing media appropriate for surrounding fire. Eliminate all ignition sources if safe to do so. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Only put the fire out once the leak has been stopped. Water mist should be used to reduce vapor concentrations in air.

Protection during firefighting : Do not attempt to take action without suitable protective equipment. Wear fire/flame resistant/retardant clothing. Use self-contained breathing apparatus and chemically protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Do not take actions involving personal risks. Before entering an area, especially a confined area, check the atmosphere with an appropriate device. In a fire or if heated, a pressure increase will occur, and the container may burst, with the risk of a subsequent explosion. Avoid all personal contact including breathing in the gas. Remove ignition sources. Isolate from fire, if possible, without unnecessary risk. Stop leak if safe to do so. Proper grounding procedures to avoid static electricity should be followed. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.1.1. For non-emergency personnel

Protective equipment : Wear self-contained breathing apparatus and protective suit (see section 8).

Emergency procedures : Evacuate the danger area. If outdoors, move to an area upwind of the danger area. If possible without taking personal risks, remove ignition sources, ventilate area. Do not breathe gas. Do not get in eyes, on skin, or on clothing. No open flames, no sparks, and no smoking. Prevent other non-emergency personnel from entering the danger area.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. Total impervious protective suits, gloves, and boots must be worn to prevent any contact with the product. Use self-contained breathing apparatus. For further information refer to section 8: "Exposure controls/personal protection".

Emergency procedures : Evacuate personnel to a safe area. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ventilate spillage area. Stop leak if safe to do so. Remove all sources of ignition. Use grounded electrical/mechanical equipment. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.2. Environmental precautions

Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

For containment : Stop leak, if possible without risk. If the leak cannot be stopped, allow the gas to release in place or remove to a safe, well-ventilated area and allow the release.

Methods for cleaning up : Ventilate spillage area. Use non-sparking tools. Use grounded electrical/mechanical equipment. Do not touch or walk on the spilled product.

6.4. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection". For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Wear personal protective equipment. Do not breathe gas. Do not get in eyes, on skin, or on clothing. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharge. When transferring the product, ground/bond container and receiving equipment before transfer to prevent fire/explosion due to electrostatic discharges. Pressurized container. Only experienced and properly instructed persons should handle gases under pressure.

Hygiene measures : Do not eat, drink or smoke when using this product. Always wash hands after handling the product. Contaminated work clothing should not be allowed out of the workplace.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Proper grounding procedures to avoid static electricity should be followed. Observe all federal, state and local regulations and National Fire Protection Association (NFPA) Codes which pertain to the specific local conditions of storage and use, including OSHA 29 CFR 1910.106 and NFPA 30, 70, 77, and 497.

Storage conditions : Always keep container in upright position. Keep away from heat, sparks and flame. Keep container closed when not in use. Protect from sunlight. Store in a well-ventilated place. Store full and empty containers separately.

Incompatible products : Alkali metals. Metals. Strong acids. Strong bases. Strong reducing agents. Oxidizing agents.

Storage temperature : Do not store cylinder in direct sun or expose it to heat above 113 ° F (45 °C)

Packaging materials : Store always product in container of same material as original container.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Arctic Eagle 454B, FluoroFusion R-454B

No additional information available

Difluoromethane (75-10-5)

No additional information available

2,3,3,3-Tetrafluoropropene (754-12-1)

No additional information available

8.2. Appropriate engineering controls

Appropriate engineering controls : Ensure good ventilation of the work station. Alarm detectors should be used when toxic gases may be released. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Environmental exposure controls : Avoid release to the environment.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Personal protective equipment should be chosen according to national standards and in discussion with the supplier of the protective equipment.

Materials for protective clothing:

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138

Hand protection:

Chemically impervious gloves as described by OSHA's hand protection regulations in 29 CFR 1910.138 . Wear cold insulating gloves.

Eye protection:

Chemical goggles or safety glasses. Do not wear contact lenses

Skin and body protection:

Tyvek® Gown/Coveralls. Wear suitable protective clothing. Lab coat

Respiratory protection:

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed and a NIOSH/MSHA or European Standard EN 149 approved respirator must be used if any of the following situations occur: workplace conditions warrant respirator use, or exposure limits are exceeded or if irritation or other symptoms are experienced. Use breathing equipment (SCBA)

Personal protective equipment symbol(s):

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Gas.
Appearance	:	Colorless gas or liquefied gas.
Color	:	Colorless
Odor	:	Slight ether
Odor threshold	:	No data available
pH	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	-50.9 °C / 60.9 °F
Flash point	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available

Flammability (solid, gas)	:	Extremely flammable gas.
Vapor pressure	:	1411 kPa 21 °C/ 70 °F
Relative vapor density at 20°C	:	No data available
Relative density	:	2.2
Solubility	:	No data available
Partition coefficient n-octanol/water (Log Pow)	:	No data available
Auto-ignition temperature	:	496 °C 924.8 °F
Decomposition temperature	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosion limits	:	Lower explosion limit: 11.25 vol % Upper explosion limit: 22 vol %
Explosive properties	:	No data available
Oxidizing properties	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Extremely flammable gas.

10.2. Chemical stability

Stable under normal conditions of use.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid

Avoid contact with hot surfaces. Heat. No flames, no sparks. Eliminate all sources of ignition. Incompatible materials.

10.5. Incompatible materials

Alkali metals. Metals. Oxidizing agents. Strong acids. Strong bases. Strong reducing agents.

10.6. Hazardous decomposition products

May liberate toxic gases. Carbonyl fluoride. Carbon dioxide. Carbon monoxide. Hydrofluoric Acid.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral)	:	Not classified
Acute toxicity (dermal)	:	Not classified
Acute toxicity (inhalation)	:	

Arctic Eagle 454B, FluoroFusion R-454B	
ATE US (gases)	50000 ppmV/4h

Difluoromethane	
LC50 Inhalation - Rat [ppm]	100000 ppm/1h

2,3,3,3-Tetrafluoropropene	
LC50 Inhalation - Rat [ppm]	> 405800 ppm/4h

Skin corrosion/irritation	:	Not classified
Serious eye damage/irritation	:	Not classified
Respiratory or skin sensitization	:	Not classified
Germ cell mutagenicity	:	Not classified
Carcinogenicity	:	Not classified
Reproductive toxicity	:	Not classified
STOT-single exposure	:	Not classified
STOT-repeated exposure	:	Not classified
Aspiration hazard	:	Not applicable
Viscosity, kinematic	:	No data available
Symptoms/effects after inhalation	:	In high concentrations may cause asphyxiation.
Symptoms/effects after skin contact	:	Contact with the liquefied gas may cause frostbite.
Symptoms/effects after eye contact	:	Contact with the liquefied gas may cause severe ocular lesions.
Symptoms/effects after ingestion	:	Not expected to present a significant ingestion hazard under anticipated conditions of normal use.
Most Important Symptoms/Effects	:	In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. May cause frostbite on contact the liquefied gas.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

Difluoromethane	
LC50 - Fish [1]	> 81.8 mg/l
EC50 - Crustacea [1]	> 97.9 mg/l
EC50 72h - Algae [1]	> 118 mg/l
EC50 72h - Algae [2]	> 114 mg/l

2,3,3,3-Tetrafluoropropene	
LC50 - Fish [1]	> 197 mg/l
EC50 - Crustacea [1]	> 100 mg/l
LC50 - Fish [2]	33 mg/l
EC50 - Crustacea [2]	65 mg/l
EC50 72h - Algae [1]	> 100 mg/l
EC50 72h - Algae [2]	> 2.5 mg/l
LOEC (chronic)	> 15.2 mg/l
NOEC (chronic)	15.2 mg/l
NOEC chronic fish	2.7 mg/l

12.2. Persistence and degradability

Difluoromethane	
Persistence and degradability	Not readily biodegradable. 5% % biodegradation 28 days.

12.3. Bioaccumulative potential

Difluoromethane	
Partition coefficient n-octanol/water (Log Pow)	0.2177 25 °C / 77 °F
Bioaccumulative potential	Bioaccumulation unlikely.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on global warming : No known effects from this product.

SECTION 13: Disposal considerations

13.1. Disposal methods

Regional waste regulation : Disposal must be done according to official regulations. Must be recovered and disposed of by an EPA-certified reclaimer; cannot be vented to atmosphere.

Waste treatment methods : Dispose of contents/container in accordance with licensed collector's sorting instructions.

Sewage disposal recommendations : Disposal must be done according to official regulations.

Product/Packaging disposal recommendations : Dispose of this material and its container at hazardous or special waste collection point. Refer to all applicable national, international and local regulations or provisions.

Additional information : Flammable vapors may accumulate in the container. Empty containers to be re-used must only be prepared by qualified and trained personnel.

Ecological information : Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT / IMDG / IATA

DOT	IMDG	IATA
14.1. UN number		
3252	3252	3252
14.2. Proper Shipping Name		
Difluoromethane (MIXTURE)	DIFLUOROMETHANE (REFRIGERANT GAS R 32) (MIXTURE)	Difluoromethane (MIXTURE)
14.3. Transport hazard class(es)		
2.1	2.1	2.1

DOT	IMDG	IATA
		
14.4. Packing group		
Not applicable	Not applicable	Not applicable
14.5. Environmental hazards		
Dangerous for the environment: No	Dangerous for the environment: No Marine pollutant: No	Dangerous for the environment: No
No supplementary information available		

14.6. Special precautions for user

DOT

UN-No.(DOT)	:	UN3252
DOT Packaging Exceptions (49 CFR 173.xxx)	:	306
DOT Packaging Non Bulk (49 CFR 173.xxx)	:	304
DOT Packaging Bulk (49 CFR 173.xxx)	:	314, 315
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	Forbidden
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	:	150 kg
DOT Vessel Stowage Location	:	D - The material must be stowed ‘‘on deck only’’ on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded.
DOT Vessel Stowage Other	:	40 - Stow ‘‘clear of living quarters’’

IMDG

Limited quantities (IMDG)	:	0
Excepted quantities (IMDG)	:	E0
Packing instructions (IMDG)	:	P200
Tank instructions (IMDG)	:	T50
EmS-No. (Fire)	:	F-D - FIRE SCHEDULE Delta - FLAMMABLE GASES
EmS-No. (Spillage)	:	S-U - SPILLAGE SCHEDULE Uniform - GASES (FLAMMABLE, TOXIC OR CORROSIVE)
Stowage category (IMDG)	:	D
Stowage and handling (IMDG)	:	SW2
Properties and observations (IMDG)	:	Flammable colourless gas. Heavier than air (1.8).

IATA

PCA Excepted quantities (IATA)	:	E0
PCA Limited quantities (IATA)	:	Forbidden
PCA limited quantity max net quantity (IATA)	:	Forbidden
PCA packing instructions (IATA)	:	Forbidden
PCA max net quantity (IATA)	:	Forbidden
CAO packing instructions (IATA)	:	200
CAO max net quantity (IATA)	:	150kg
ERG code (IATA)	:	10L

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. US Federal regulations

All components of this product are present and listed as Active on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

Contains chemical(s) subject to TSCA 12b export notification if product is shipped outside the U.S

2,3,3,3-Tetrafluoropropene	CAS-No. 754-12-1	31.1%

This product or mixture is not known to contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

15.2. International regulations

CANADA

Arctic Eagle 454B, FluoroFusion R-454B

Listed on the Canadian DSL (Domestic Substances List)

Difluoromethane (75-10-5)

Listed on the Canadian DSL (Domestic Substances List)

2,3,3,3-Tetrafluoropropene (754-12-1)

Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

No additional information available

National regulations

Arctic Eagle 454B, FluoroFusion R-454B

Listed on INSQ (Mexican National Inventory of Chemical Substances)

Difluoromethane (75-10-5)

Listed on INSQ (Mexican National Inventory of Chemical Substances)

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

SECTION 16: Other information

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Full text of H-phrases	
H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated

Abbreviations and acronyms	
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	Acute Toxicity Estimate
BCF	Bioconcentration factor
BLV	Biological limit value
BOD	Biochemical oxygen demand (BOD)
COD	Chemical oxygen demand (COD)
DMEL	Derived Minimal Effect level
DNEL	Derived-No Effect Level
EC-No.	European Community number
EC50	Median effective concentration
EN	European Standard
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
LC50	Median lethal concentration
LD50	Median lethal dose
LOAEL	Lowest Observed Adverse Effect Level
NOAEC	No-Observed Adverse Effect Concentration
NOAEL	No-Observed Adverse Effect Level
NOEC	No-Observed Effect Concentration
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational Exposure Limit
PBT	Persistent Bioaccumulative Toxic
PNEC	Predicted No-Effect Concentration
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SDS	Safety Data Sheet
STP	Sewage treatment plant
ThOD	Theoretical oxygen demand (ThOD)
TLM	Median Tolerance Limit
VOC	Volatile Organic Compounds
CAS-No.	Chemical Abstract Service number

Abbreviations and acronyms	
N.O.S.	Not Otherwise Specified
vPvB	Very Persistent and Very Bioaccumulative
ED	Endocrine disrupting properties

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.