The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

"FREON" 12
2022FR Revised 19-APR-2004

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

"FREON" is a registered trademark of DuPont.

Corporate MSDS Number : DU001065
Formula : CCl2F2

Tradenames and Synonyms

CC0112

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Fluoroproducts
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
*	75-71-8	
*METHANE, DICHLORODIFLUORO- ("FREON" 12)		100

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

HAZARDS IDENTIFICATION

Potential Health Effects

Skin contact with liquid may include frostbite or mild skin irritation with discomfort. Significant skin permeation, and systemic toxicity, after contact appears unlikely. The compound has been infrequently associated with skin sensitization in humans.

(HAZARDS IDENTIFICATION - Continued)

Eye contact with the liquid or high vapor concentrations may include irritation with discomfort, tearing, or blurring of vision.

Higher exposures may cause irritation of the upper respiratory passages, with coughing and discomfort; temporary nervous system depression with anaesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness; temporary alteration of the heart's electrical activity with irregular pulse, palpitations, or inadequate circulation. Gross overexposure may cause fatality.

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.

FIRST AID MEASURES

First Aid

INHALATION
If high concentrations are inhaled, immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT
In case of contact, flush skin with water. Treat for frostbite if necessary by gently warming affected area.

EYE CONTACT
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION
Ingestion is not considered a potential route of exposure.

Notes to Physicians

Because of a possible disturbance of cardiac rhythm, catecholamine drugs, such as epinephrine, should only be used with special caution in situations of emergency life support.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: Will not burn
Flammable limits in Air, % by Volume	
LEL	: Not applicable
UEL	: Not applicable
Autoignition	: >750 C (>1382 F)

Fire and Explosion Hazards:

Cylinders may rupture under fire conditions. Decomposition may occur.

Extinguishing Media

As appropriate for combustibles in area.

Fire Fighting Instructions

Use water spray or fog to cool containers. Self-contained breathing apparatus (SCBA) is required if cylinders rupture and contents are released under fire conditions. Water runoff should be contained and neutralized prior to release.

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.

HANDLING AND STORAGE

Handling (Personnel)

Use with sufficient ventilation to keep employee exposure below recommended limits.

Storage

Clean, dry area. Do not heat above 52 deg C (125 deg F).

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

Personal Protective Equipment

Impervious gloves and chemical splash goggles should be used when handling liquid. Under normal manufacturing conditions, no respiratory protection is required when using this product. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Applicable Exposure Limits
METHANE, DICHLORODIFLUORO- ("FREON" 12)

PEL (OSHA)	: 1,000 ppm, 4,950 mg/m3, 8 Hr. TWA
TLV (ACGIH)	: 1,000 ppm, 4,950 mg/m3, 8 Hr. TWA, A4
AEL * (DuPont)	: None Established

* AEL is DuPont’s Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point	: -29.8 C (-21.6 F)
Vapor Pressure	: 94.5 psia at 25 deg C (77 deg F)
Vapor Density	: 4.26 (Air = 1.0) at 25 deg C (77 deg F)
% Volatiles	: 100 WT%
Solubility in Water	: 0.028 WT% @ 25 C (77 F) at 1 atm
pH	: Neutral
Odor	: Slight ethereal
Form	: Liquified gas
Color	: Clear, colorless
Density	: 1.315 g/cc at 25 deg C (77 deg F) - Liquid

STABILITY AND REACTIVITY

Chemical Stability

Material is stable. However, avoid open flames and high temperatures.

Incompatibility with Other Materials

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

Decomposition

Decomposition products are hazardous. "Freon" 12 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.

TOXICOLOGICAL INFORMATION

Animal Data

Inhalation 30 minute LC50: 800,000 ppm in rats
Oral ALD: >1000 mg/kg in rats

No significant irritation was seen when a mixture containing CFC-12 was sprayed onto the skin and eyes of animals. This material is untested for animal sensitization.

Effects in animals from single high exposure by inhalation include anesthesia and irregular heartbeat (cardiac arrythmias) due to the heart being made more sensitive to adrenalin (cardiac sensitization). Repeated high exposures caused tremors, incoordination, reduced reflexes and altered respiratory function. Long-term studies showed no significant clinical, blood chemistry, or pathological effects following repeated or long term exposures.

Effects in animals from repeated or long-term ingestion of this material include slight alterations in blood chemistry and body weight gain. No other clinical, biochemical or pathological signs of toxicity have been observed.

Tests in animals demonstrate no carcinogenic activity and no developmental or reproductive toxicity. The compound does not produce heritable genetic damage in animals or genetic damage in bacterial and mammalian cell cultures.

ECOLOGICAL INFORMATION

Ecotoxicological Information

AQUATIC TOXICITY:

48 hour EC50 - Daphnia magna: 95 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal

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

TRANSPORTATION INFORMATION

Shipping Information

DOT/IMO
Proper Shipping Name : DICHLORODIFLUOROMETHANE
Hazard Class : 2.2
UN No. : 1028
DOT/IMO Label : NONFLAMMABLE GAS

Shipping Containers

Tank Cars.

Cylinders
Ton Tanks
Reportable Quantity : 5,000 lbs./2,270 kg.

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

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

HAZARDOUS CHEMICAL LISTS

SARA Extremely
Hazardous Substance - No

(REGULATORY INFORMATION - Continued)

CERCLA Hazardous Substance - Yes
SARA Toxic Chemical - See Components Section

Superfund reportable discharge = 5000 lb.

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating

Health	: 1
Flammability	: 0
Reactivity	: 1

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS	: MSDS Coordinator
>	: DuPont Fluoroproducts
Address	: Wilmington, DE 19898
Telephone	: (800) 441-7515

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

Material Safety Data Sheet

DuPont™ FREON® 22 Refrigerant

Version 2.3

Revision Date 10/04/2011 Ref. 130000024323

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ FREON® 22 Refrigerant
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-22
Tradename/Synonym	:	R-22 FREON® 22 CHLORODIFLUOROMETHANE HCFC-22 DYMEL® 22
MSDS Number	:	130000024323
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Rapid evaporation of the liquid may cause frostbite.

Potential Health Effects

Skin

Chlorodifluoromethane (HCFC-22)	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Eyes

Chlorodifluoromethane (HCFC-22)	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Inhalation

Chlorodifluoromethane (HCFC-22) : Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Carcinogenicity

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

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Chlorodifluoromethane (HCFC-22)	75-45-6	100 %

SECTION 4. FIRST AID MEASURES

Skin contact : Take off all contaminated clothing immediately. Flush area with lukewarm water. Do not use hot water. If frostbite has occurred, call a physician.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Inhalation : Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Call a physician.

Ingestion : Is not considered a potential route of exposure.

General advice : Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.

Notes to physician	:	Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties

Flash point	:	does not flash
Thermal decomposition	:	632 °C (1,170 °F)
Fire and Explosion Hazard	:	Cylinders are equipped with pressure and temperature relief devices, but may still 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 colour of the torch flame. 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. This substance is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxygen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example this substance should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of this substance in the presence of certain concentrations of chlorine.
Suitable extinguishing media	:	As appropriate for combustibles in area. Extinguishant for other burning material in area is sufficient to stop burning.

Firefighting Instructions	:	In the event of fire, wear self-contained breathing apparatus. Wear neoprene gloves during cleaning up work after a fire. Self-contained breathing apparatus (SCBA) is required if containers rupture and contents are released under fire conditions. Cool containers / tanks with water spray. Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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

Safeguards (Personnel)	:	Evacuate personnel to safe areas. Ventilate the area. Refer to protective measures listed in sections 7 and 8.
Spill Cleanup	:	Evaporates.
Accidental Release Measures	:	Should not be released into the environment. Ventilate area, especially low or enclosed places where heavy vapours might collect. Avoid open flames and high temperatures. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8. The product should not be mixed with air for leak testing or used with air for any other purpose above atmospheric pressure. Contact with chlorine or other strong oxidizing agents should also be avoided. Handle in accordance with good industrial hygiene and safety practice.
Handling (Physical Aspects)	:	No special protective measures against fire required.
Storage	:	Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure

(>3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.
Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.

Storage temperature : < 52 °C (< 126 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls : Ensure adequate ventilation, especially in confined areas. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

Personal protective equipment
Respiratory protection : Under normal manufacturing conditions, no respiratory protection is required when using this product. For rescue and maintenance work in storage tanks use self-contained breathing apparatus.

Hand protection : Additional protection: Impervious gloves

Eye protection : Safety glasses with side-shields Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.

Protective measures : Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines
Exposure Limit Values

Chlorodifluoromethane

TLV	(ACGIH)	1,000 ppm	TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	clear
Odor	:	slight, ether-like
pH	:	neutral
Boiling point	:	-40.8 °C (-41.4 °F)
% Volatile	:	100 %
Vapour Pressure	:	10,439.0 hPa at 25 °C (77 °F)
Density	:	1.194 g/cm3 at 25 °C (77 °F)
Water solubility	:	2.6 g/l at 25 °C (77 °F)
Vapour density	:	3.0 at 25°C (77°F) and 1013 hPa (Air=1.0)
Evaporation rate	:	> 1 (CCL4=1.0)

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable under recommended storage conditions.
Conditions to avoid	:	The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions. Avoid open flames and high temperatures.
Incompatibility	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	:	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., Avoid contact with decomposition products
Hazardous reactions	:	Polymerization will not occur. Other burning materials may cause HCFC 22 to burn weakly. Chlorodifluoromethane is not flammable at ambient temperatures and atmospheric pressure. However, chlorodifluoromethane has been shown in tests to be combustible at pressures as low as 60 psig at ambient temperature when mixed with air at concentrations of 65 volume % air. Experimental data have also been reported which indicate combustibility of

HCFC 22 in the presence of certain concentrations of chlorine.

SECTION 11. TOXICOLOGICAL INFORMATION

Chlorodifluoromethane (HCFC-22)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	220000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	No skin irritation, rabbit Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, rabbit Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Did not cause sensitization on laboratory animals., guinea pig Not expected to cause sensitization based on expert review of the properties of the substance.
Repeated dose toxicity	:	Inhalation mouse No toxicologically significant effects were found.
Carcinogenicity	:	An increased incidence of tumours was observed in some laboratory animals but not in others. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Experiments showed mutagenic effects in cultured bacterial cells.

Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals.
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.
Further information	:	Cardiac sensitisation threshold limit : 175000 mg/m3

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity
Chlorodifluoromethane (HCFC-22)

96 h LC50	:	Zebra fish 777 mg/l
96 h EC50	:	Algae 250 mg/l
48 h EC50	:	Daphnia magna (Water flea) 433 mg/l

Environmental Fate
DuPont™ FREON® 22 Refrigerant

Biodegradability	:	According to the results of tests of biodegradability this product is not readily biodegradable.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal	:	Can be used after re-conditioning. Recover, reclaim by distillation, or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.
Environmental Hazards	:	Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT UN number : 1018

	Proper shipping name	: Chlorodifluoromethane
	Class	: 2.2
	Labelling No.	: 2.2
IATA_C	UN number	: 1018
	Proper shipping name	: Chlorodifluoromethane
	Class	: 2.2
	Labelling No.	: 2.2
IMDG	UN number	: 1018
	Proper shipping name	: Chlorodifluoromethane
	Class	: 2.2
	Labelling No.	: 2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	:	Chlorodifluoromethane
California Prop. 65	:	Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known
PA Right to Know Regulated Chemical(s)	:	Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Chlorodifluoromethane
NJ Right to Know Regulated Chemical(s)	:	Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): Chlorodifluoromethane

SECTION 16. OTHER INFORMATION

		HMIS
Health	:	1
Flammability	:	0

DuPont™ FREON® 22 Refrigerant

Version 2.3

Revision Date 10/04/2011 Ref. 130000024323

Reactivity/Physical hazard	:	1
PPE	:	Personal Protection rating to be supplied by user depending on use conditions.

FREON is a registered trademark of E. I. duPont de Nemours & Company, Inc.
Before use read DuPont's safety information.
For further information contact the local DuPont office or DuPont's nominated distributors.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Significant change from previous version is denoted with a double bar.

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

"FREON" 502 Refrigerant
2075FR Revised 4-MAY-2004

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

"FREON" is a registered trademark of DuPont.

Corporate MSDS Number : DU001047
Formula : CHClF2/CClF2CF3 (AZEOTROPE)

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Fluoroproducts
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
"FREON" 502	39432-81-0	100
*	76-15-3	
*ETHANE, CHLOROPENTAFLUORO- ("FREON" 115)		51.2
*METHANE, CHLORODIFLUORO- ("FREON" 22)	75-45-6	48.8

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

HAZARDS IDENTIFICATION

Potential Health Effects

Immediate effects of overexposure by inhalation may include central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness. Gross overexposure may cause irregular heart beat with a strange sensation in the chest, "heart thumping", apprehension,

(HAZARDS IDENTIFICATION - Continued)

lightheadedness, feeling of fainting, dizziness, weakness, sometimes progressing to loss of consciousness, death and suffocation, if air is displaced by vapors. Other effects include fatality from gross overexposure.

Immediate effects of overexposure by skin contact may include frostbite, if liquid or escaping vapor contacts the skin. Repeated and/or prolonged exposure may cause defatting of the skin with itching, redness or rash. Significant skin permeation, and systemic toxicity, after contact appears unlikely. There are no reports of human sensitization.

Immediate effects of overexposure may include eye irritation with tearing, pain or blurred vision.

Increased susceptibility to the effects of this material may be observed in persons with pre-existing disease of the central nervous system and cardiovascular system.

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.

FIRST AID MEASURES

First Aid

INHALATION
If large amounts are inhaled, immediately remove to fresh air. Keep persons calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT
In case of skin contact, flush with water for 15 minutes. Treat for frostbite if necessary by gently warming affected area.

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

INGESTION
Ingestion is not considered a potential route of exposure.

(FIRST AID MEASURES - Continued)

Notes to Physicians

Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution only in situations of emergency life support.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: Will not burn
Flammable limits in Air, % by Volume	
LEL	: Not applicable
UEL	: Not applicable
Autoignition	: 704 C (1299 F)

Fire and Explosion Hazards:

Cylinders are equipped with temperature and pressure relief devices but still may rupture under fire conditions. Decomposition may occur.

Extinguishing Media

As appropriate for combustibles in area.

Fire Fighting Instructions

Keep containers cool with water spray. Self-contained breathing apparatus (SCBA) is required if cylinders rupture or release under fire conditions.

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 places where heavy vapors might collect. Remove open flames. Use self-contained breathing apparatus (SCBA) for large spills. Comply with Federal, State, and local regulations for reporting releases.

HANDLING AND STORAGE

Handling (Personnel)

Avoid breathing vapors. Avoid liquid contact with skin or eyes. Use with sufficient ventilation to keep employee exposure below recommended limits.

Storage

Clean, dry area. Do not heat above 52 deg C (125 deg F).

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use with sufficient ventilation to keep employee exposure below recommended exposure limits. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

Personal Protective Equipment

Impervious gloves and chemical splash goggles should be used if contact is possible. Under normal manufacturing conditions, no respiratory protection is required when using this product. Self-contained breathing apparatus (SCBA) is required if a spill or release occurs.

Exposure Guidelines

Applicable Exposure Limits

ETHANE, CHLOROPENTAFLUORO- ("FREON" 115)

PEL	(OSHA)	: None Established
TLV	(ACGIH)	: 1,000 ppm, 6,320 mg/m3, 8 Hr. TWA
AEL *	(DuPont)	: None Established

METHANE, CHLORODIFLUORO- ("FREON" 22)

PEL	(OSHA)	: None Established
TLV	(ACGIH)	: 1,000 ppm, 3,540 mg/m3, 8 Hr. TWA, A4
AEL *	(DuPont)	: None Established

* AEL is DuPont’s Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point	: -45.4 C (-49.7 F)
Vapor Pressure	: 169 psia at 25 deg C (77 deg F)
Vapor Density	: 3.92 at 25 deg C (77 deg F) (Air= 1)
% Volatiles	: 100 WT%
Evaporation Rate	: >1 (CCl4 = 1)
Solubility in Water	: 0.15 WT% @ 25 C (77 F)
pH	: Neutral
Odor	: Slight ethereal
Form	: Liquified gas
Color	: Clear, colorless
Density	: 1.22 g/cc at 25 deg C (77 deg F) - Liquid

STABILITY AND REACTIVITY

Chemical Stability

Material is stable. However, avoid open flames and high temperatures.

Incompatibility with Other Materials

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

Polymerization

Polymerization will not occur.

Other Hazards

Decomposition : Decomposition products are hazardous. "FREON" 502 Refrigerant can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrochloric and hydrofluoric acids, and possibly carbonyl halides.

TOXICOLOGICAL INFORMATION

Animal Data

This material has not been tested for eye irritation.

This material has not been tested for skin irritation or sensitization.

Single exposure to high doses caused altered respiratory rate, lung noise, incoordination, cardiac sensitization, a potentially fatal disturbance of heart rhythm associated

(TOXICOLOGICAL INFORMATION - Continued)

with a heightened sensitivity to the action of epinephrine.

No animal data are available to define the carcinogenicity, developmental, reproductive or mutagenic hazards of this material.

Chloropentafluoroethane (CFC-115):

Ingestion ALD, dog: >1,200 mg/kg Inhalation 4 hour, LC50, rat: > 800,000 ppm

Repeated exposure by ingestion caused diarrhea and excessive activity.

This material has not produced genetic damage in bacterial cultures.

Chlorodifluoromethane (HCFC-22):

Inhalation 4 hour, LC50, rat: 220,000 ppm

Animal testing indicates this material is a slight eye irritant.

Animal testing indicates this material is a skin irritant, but not a skin sensitizer.

Long-term exposure by ingestion caused no significant toxicological effects.

Long-term exposure by inhalation caused reduced weight gain, increased adrenals, kidney, liver, and pituitary weight.

In chronic inhalation studies, HCFC-22, at a concentration of 50,000 ppm (v/v), produced a small, but statistically significant increase of late-occurring tumors involving salivary glands in male rats, but not female rats or male or female mice. In the same studies, no increased incidence of tumors was seen in either species at concentrations of 10,000 ppm or 1000 ppm (v/v). Animal data show developmental effects only at exposure levels producing other toxic effects in the adult animal. This material is not considered a unique developmental hazard to the conceptus. Reproductive data on male animals show: No change in reproductive performance. Specific studies to evaluate the effect on female reproductive performance have not been conducted; however, limited information obtained from studies on developmental toxicity do not indicate adverse effects on female reproductive performance. This material produces genetic damage in bacterial cell cultures. In mammalian cell cultures and animals, this material has not produced genetic toxicity. In animal testing, this material has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic

(TOXICOLOGICAL INFORMATION - Continued)

damage).

ECOLOGICAL INFORMATION

Ecotoxicological Information

Aquatic Toxicity:

"Freon" 22:

48 hour EC50 - Daphnia magna: 433 mg/L

Chloropentafluoroethane (CFC-115):

96 hour LC50 - Rainbow trout: > 2.3 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal

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

TRANSPORTATION INFORMATION

Shipping Information

DOT/IMO

Proper Shipping Name	: CHLORODIFLUOROMETHANE AND CHLOROPENTAFLUOROETHANE MIXTURE
Hazard Class	: 2.2
UN No.	: 1973
DOT/IMO Label	: NONFLAMMABLE GAS

Shipping Containers

Cylinders
Ton Tanks

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : No

(REGULATORY INFORMATION - Continued)

Fire : No
Reactivity : No
Pressure : Yes

HAZARDOUS CHEMICAL LISTS

SARA Extremely Hazardous Substance: No
CERCLA Hazardous Substance : No
SARA Toxic Chemical - See Components Section

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating
Health : 1
Flammability : 0
Reactivity : 1

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : MSDS Coordinator
> : DuPont Fluoroproducts
Address : Wilmington, DE 19898
Telephone : (800) 441-7515

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

Material Safety Data Sheet

DuPont™ SUVA® 134a refrigerant

Version 2.3

Revision Date 09/12/2011 Ref. 130000000349

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ SUVA® 134a refrigerant
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-134a
Tradename/Synonym	:	HFC-134a SUVA® 134a
MSDS Number	:	130000000349
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Rapid evaporation of the liquid may cause frostbite.

Potential Health Effects

Skin

1,1,1,2-Tetrafluoroethane	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite. May cause skin irritation. May cause: Discomfort, itching, redness, or swelling.

Eyes

1,1,1,2-Tetrafluoroethane	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite. May cause eye irritation. May cause: tearing, Redness, Discomfort.

Inhalation

1,1,1,2-Tetrafluoroethane : Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Carcinogenicity

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

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
1,1,1,2-Tetrafluoroethane	811-97-2	100 %

SECTION 4. FIRST AID MEASURES

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary.

Inhalation : Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.

Ingestion	:	Is not considered a potential route of exposure.
General advice	:	Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Notes to physician	:	Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties

Flash point	:	does not flash
Ignition temperature	:	> 743 °C (> 1,369 °F) at 1,013 hPa
Lower explosion limit	:	Method : None per ASTM E681
Upper explosion limit	:	Method : None per ASTM E681
Fire and Explosion Hazard	:	Hazardous thermal decomposition products: Carbon oxides Hydrogen fluoride Carbonyl fluoride Cylinders are equipped with pressure and temperature relief devices, but may still 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 colour of the torch flame. 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.

HFC-134a is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of HFC-134a with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. HFC-134a can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing HFC-134a and air, or HFC-134a in an oxygen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, HFC-134a should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example HFC-134a should NOT be mixed with air under pressure for leak testing or other purposes.
Experimental data have also been reported which indicate combustibility of this substance in the presence of certain concentrations of chlorine.

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Firefighting Instructions : In the event of fire, wear self-contained breathing apparatus.
Cool containers / tanks with water spray. Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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

Safeguards (Personnel) : Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect.

Spill Cleanup : Evaporates.

Accidental Release Measures : Should not be released into the environment.
Self-contained breathing apparatus (SCBA) is required if a large release occurs. Avoid open flames and high temperatures.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Use sufficient ventilation to keep employee exposure below recommended limits. For personal protection see section 8. Handle in accordance with good industrial hygiene and safety practice.
Handling (Physical Aspects)	:	The product should not be mixed with air for leak testing or used with air for any other purpose above atmospheric pressure. Contact with chlorine or other strong oxidizing agents should also be avoided.
Storage	:	Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (>3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.
Storage temperature	:	< 52 °C (< 126 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls	:	Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places. Refrigerant concentration monitors may be necessary to determine vapour concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.
Personal protective equipment Respiratory protection	:	For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Hand protection	:	Additional protection: Impervious gloves

Eye protection	:	Wear safety glasses with side shields. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
Protective measures	:	Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Exposure Limit Values

1,1,1,2-Tetrafluoroethane

AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	colourless
Odor	:	slight, ether-like
Boiling point	:	-26.1 °C (-15.0 °F) at 1,013 hPa
% Volatile	:	100 %
Vapour Pressure	:	6,661 hPa at 25 °C (77 °F)
	:	13,190 hPa at 50 °C (122 °F)
Density	:	1.206 g/cm3 at 25 °C (77 °F) (as liquid)
Specific gravity	:	1.208 at 25 °C (77 °F)
Water solubility	:	1.5 g/l at 25 °C (77 °F) at 1,013 hPa
Vapour density	:	3.6 at 25 °C (77 °F) (Air = 1.0)
Evaporation rate	:	> 1 (CCL4=1.0)

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable under recommended storage conditions.

Conditions to avoid	:	The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions.
Incompatibility	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	:	Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride., These materials are toxic and irritating., Avoid contact with decomposition products
Hazardous reactions	:	Polymerization will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

DuPont™ SUVA® 134a refrigerant

Further information	:	Cardiac sensitisation threshold limit : 312975 mg/m3 Anaesthetic effects threshold limit : 834600 mg/m3 Did not show carcinogenic or teratogenic effects in animal experiments.Inhalation of decomposition products in high concentration may cause shortness of breath (lung oedema).Rapid evaporation of the liquid may cause frostbite.

1,1,1,2-Tetrafluoroethane

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	567000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	slight irritation, rabbit Not expected to cause skin irritation based on expert review of the properties of the substance. No skin irritation, human

Eye irritation	:	slight irritation, rabbit Not expected to cause eye irritation based on expert review of the properties of the substance. No eye irritation, human
Skin sensitization	:	Did not cause sensitization on laboratory animals., guinea pig Not expected to cause sensitization based on expert review of the properties of the substance. Did not cause sensitization on laboratory animals. There are no reports of human respiratory sensitization.
Repeated dose toxicity	:	Inhalation rat No toxicologically significant effects were found.
Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic. An increased incidence of benign tumours was observed in laboratory animals.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity	:	Animal testing showed no reproductive toxicity.
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

1,1,1,2-Tetrafluoroethane

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) 450 mg/l
72 h EC50	:	Algae > 118 mg/l Information given is based on data obtained from similar substances.

48 h EC50 : Daphnia magna (Water flea) 980 mg/l

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal : Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.

Environmental Hazards : Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	: 3159
	Proper shipping name	: 1,1,1,2-Tetrafluoroethane
	Class	: 2.2
	Labelling No.	: 2.2
IATA_C	UN number	: 3159
	Proper shipping name	: 1,1,1,2-Tetrafluoroethane
	Class	: 2.2
	Labelling No.	: 2.2
IMDG	UN number	: 3159
	Proper shipping name	: 1,1,1,2-Tetrafluoroethane
	Class	: 2.2
	Labelling No.	: 2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s) : SARA 313: 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.

DuPont™ SUVA® 134a refrigerant

Version 2.3

Revision Date 09/12/2011 Ref. 130000000349

California Prop. 65	:	Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known

SECTION 16. OTHER INFORMATION

		HMIS
Health	:	1
Flammability	:	0
Reactivity/Physical hazard	:	1

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Before use read DuPont's safety information.
For further information contact the local DuPont office or DuPont's nominated distributors.
® DuPont's registered trademark

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Significant change from previous version is denoted with a double bar.

Material Safety Data Sheet

DuPont™ SUVA® MP39 Refrigerant

Version 2.5

Revision Date 06/06/2012 Ref. 130000050993

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ SUVA® MP39 Refrigerant
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-401A
MSDS Number	:	130000050993
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Misuse or intentional inhalation abuse may lead to death without warning.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Rapid evaporation of the liquid may cause frostbite.

Potential Health Effects

Skin	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.
Eyes	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Inhalation : Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Carcinogenicity

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

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Chlorodifluoromethane (HCFC-22)	75-45-6	53 %
1-Chloro-1,2,2,2-tetrafluoroethane (HCFC-124)	2837-89-0	34 %
1,1-Difluoroethane (HFC-152a)	75-37-6	13 %

SECTION 4. FIRST AID MEASURES

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.

Eye contact	:	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary.
Inhalation	:	Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
Ingestion	:	Is not considered a potential route of exposure.
General advice	:	Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Notes to physician	:	Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties

Flash point	:	does not flash
Ignition temperature	:	681 °C (1,258 °F)
Lower explosion limit	:	Method : None per ASTM E681
Upper explosion limit	:	Method : None per ASTM E681

Fire and Explosion Hazard	:	Cylinders are equipped with pressure and temperature relief devices, but may still 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 colour of the torch flame. 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. This substance is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxygen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example this substance should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of this substance in the presence of certain concentrations of chlorine.
Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Firefighting Instructions	:	Cool containers / tanks with water spray. Self-contained breathing apparatus (SCBA) is required if containers rupture and contents are released under fire conditions. Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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

Safeguards (Personnel)	:	Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect.
Accidental Release Measures	:	Avoid open flames and high temperatures. Self-contained breathing

apparatus (SCBA) is required if a large release occurs.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.
Handling (Physical Aspects)	:	The product should not be mixed with air for leak testing or used with air for any other purpose above atmospheric pressure. Contact with chlorine or other strong oxidizing agents should also be avoided.
Storage	:	Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (>3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.
Storage temperature	:	< 52 °C (< 126 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls	:	Use sufficient ventilation to keep employee exposure below recommended limits. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places. Refrigerant Concentration monitors may be necessary to determine vapor concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.
Personal protective equipment Respiratory protection	:	Under normal manufacturing conditions, no respiratory protection is required when using this product.

Hand protection	:	Additional protection: Impervious gloves
Eye protection	:	Wear safety glasses with side shields. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
Protective measures	:	Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Exposure Limit Values

Chlorodifluoromethane			
TLV	(ACGIH)	1,000 ppm	TWA
1-Chloro-1,2,2,2-tetrafluoroethane			
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA
1,1-Difluoroethane			
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	colourless
Odor	:	slight, ether-like
pH	:	neutral
Boiling point	:	-32.9 °C (-27.2 °F)
% Volatile	:	100 %
Vapour Pressure	:	7,765 hPa at 25 °C (77 °F)
Specific gravity	:	1.19 at 25 °C (77 °F)
Water solubility	:	1.0 g/l at 25 °C (77 °F) at 1,013 hPa
Vapour density	:	3.3 at 25°C (77°F) and 1013 hPa (Air=1.0)
Evaporation rate	:	> 1 (CCL4=1.0)

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable at normal temperatures and storage conditions.
Conditions to avoid	:	Avoid open flames and high temperatures.
Incompatibility	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	:	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., Avoid contact with decomposition products
Hazardous reactions	:	Polymerization will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Chlorodifluoromethane (HCFC-22)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	220000 ppm , rat
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	:	50000 ppm , dog Cardiac sensitization
Skin irritation	:	No skin irritation, rabbit Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, rabbit Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Did not cause sensitization on laboratory animals., guinea pig

Not expected to cause sensitization based on expert review of the properties of the substance.

Repeated dose toxicity	:	Inhalation mouse No toxicologically significant effects were found.
Carcinogenicity	:	An increased incidence of tumours was observed in some laboratory animals but not in others. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Experiments showed mutagenic effects in cultured bacterial cells.
Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals.
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.
Further information	:	Cardiac sensitisation threshold limit : 175000 mg/m3

1-Chloro-1,2,2,2-tetrafluoroethane (HCFC-124)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 230000 ppm , rat Anaesthetic effects Central nervous system effects
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	:	25000 ppm , dog Cardiac sensitization
Skin irritation	:	No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the

properties of the substance.

Skin sensitization	:	Does not cause skin sensitization., Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance. There are no reports of human respiratory sensitization.
Repeated dose toxicity	:	Inhalation multiple species No toxicologically significant effects were found.
Carcinogenicity	:	Animal testing did not show any carcinogenic effects.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Teratogenicity	:	Animal testing showed no developmental toxicity.
Further information	:	Cardiac sensitisation threshold limit : 140000 mg/m3

1,1-Difluoroethane (HFC-152a)

Inhalation 4 h LC50	:	> 437500 ppm , rat
Inhalation 4 h No Observed Adverse Effect Concentration (NOAEC)	:	66400 ppm , rat
Inhalation 4 h Low Observed Adverse Effect Concentration (LOAEC)	:	175200 ppm , rat Respiratory effects Anaesthetic effects Central nervous system depression Narcosis
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	:	150000 ppm , dog Cardiac sensitization
Inhalation No Observed Adverse Effect Concentration (NOAEC)	:	50000 ppm , dog Cardiac sensitization
Skin irritation	:	No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the

properties of the substance.

Eye irritation	:	No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Does not cause skin sensitization., Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance.
Repeated dose toxicity	:	Inhalation rat No toxicologically significant effects were found.
Carcinogenicity	:	Animal testing did not show any carcinogenic effects.
Mutagenicity	:	Did not cause genetic damage in animals. Genetic damage in cultured mammalian cells was observed in some laboratory tests but not in others. Did not cause genetic damage in cultured bacterial cells.
Teratogenicity	:	Evidence suggests the substance is not a developmental toxin in animals.
Further information	:	Cardiac sensitisation threshold limit : 405215 mg/m3

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

Chlorodifluoromethane (HCFC-22)

96 h LC50	:	Zebra fish 777 mg/l
96 h EC50	:	Algae 250 mg/l
48 h EC50	:	Daphnia magna (Water flea) 433 mg/l

1,1-Difluoroethane (HFC-152a)

96 h LC50	:	Fish (unspecified species) 295.783 mg/l

96 h EC50	:	Algae 47.755 mg/l (calculated)
48 h EC50	:	Daphnia 146.695 mg/l

Environmental Fate

Chlorodifluoromethane (HCFC-22)

Biodegradability	:	According to the results of tests of biodegradability this product is not readily biodegradable.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal	:	Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.
Environmental Hazards	:	Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	:	3163
	Proper shipping name	:	Liquefied gas, n.o.s. (Chlorodifluoromethane, 2-Chloro-1,1,1,2-Tetrafluoroethane)
	Class	:	2.2
	Labelling No.	:	2.2
IATA_C	UN number	:	3163
	Proper shipping name	:	Liquefied gas, n.o.s. (Chlorodifluoromethane, 2-Chloro-1,1,1,2-Tetrafluoroethane)
	Class	:	2.2
	Labelling No.	:	2.2
IMDG	UN number	:	3163
	Proper shipping name	:	Liquefied gas, n.o.s. (Chlorodifluoromethane, 2-Chloro-1,1,1,2-Tetrafluoroethane)
	Class	:	2.2
	Labelling No.	:	2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	:	1-Chloro-1,2,2,2-tetrafluoroethane , Chlorodifluoromethane
California Prop. 65	:	Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known
PA Right to Know Regulated Chemical(s)	:	Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Chlorodifluoromethane
NJ Right to Know Regulated Chemical(s)	:	Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): 1-Chloro-1,2,2,2-tetrafluoroethane , 1,1-Difluoroethane , Chlorodifluoromethane

SECTION 16. OTHER INFORMATION

		HMIS
Health	:	1
Flammability	:	0
Reactivity/Physical hazard	:	1
PPE	:	Personal Protection rating to be supplied by user depending on use conditions.

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For further information contact the local DuPont office or DuPont's nominated distributors.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing,

storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Significant change from previous version is denoted with a double bar.

Material Safety Data Sheet

DuPont™ SUVA® 404A refrigerant

Version 2.4

Revision Date 06/06/2012 Ref. 130000000494

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ SUVA® 404A refrigerant
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-404A
Tradename/Synonym	:	HP62 404A
MSDS Number	:	130000000494
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Misuse or intentional inhalation abuse may lead to death without warning.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Rapid evaporation of the liquid may cause frostbite.

Potential Health Effects

Skin	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite. May cause skin irritation. May cause: Discomfort, itching, redness, or swelling.
Eyes	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite. May cause eye irritation. May cause: tearing, Redness, Discomfort.

Inhalation : Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Carcinogenicity

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

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
1,1,1-Trifluoroethane (HFC-143a)	420-46-2	52 %
Pentafluoroethane (HFC-125)	354-33-6	44 %
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	4 %

SECTION 4. FIRST AID MEASURES

Skin contact : Flush area with lukewarm water. Do not use hot water. If frostbite has occurred, call a physician.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Inhalation	:	Remove from exposure, lie down. Artificial respiration and/or oxygen may be necessary. Call a physician.
Ingestion	:	Is not considered a potential route of exposure.
General advice	:	Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Notes to physician	:	Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties		
Flash point	:	does not flash
Lower explosion limit	:	Method : None per ASTM E681
Upper explosion limit	:	Method : None per ASTM E681
Fire and Explosion Hazard	:	Cylinders are equipped with pressure and temperature relief devices, but may still 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 colour of the torch flame. 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.

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

Suitable extinguishing media : As appropriate for combustibles in area. Extinguishant for other burning material in area is sufficient to stop burning.

Firefighting Instructions : Use water spray or fog to protect the fire fighters and to cool container. Self-contained breathing apparatus (SCBA) is required if containers rupture and contents are released under fire conditions.
Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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

Safeguards (Personnel) : Ventilate area, especially low or enclosed places where heavy vapours might collect.

Accidental Release Measures : Avoid open flames and high temperatures. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8. Handle in accordance with good industrial hygiene and safety practice.
Storage	:	Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (>3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls	:	Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places. Refrigerant Concentration monitors may be necessary to determine vapor concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.
Personal protective equipment		
Respiratory protection	:	Under normal manufacturing conditions, no respiratory protection is required when using this product.
Hand protection	:	Material: Impervious gloves
Eye protection	:	Wear safety glasses with side shields. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
Protective measures	:	Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Exposure Limit Values

1,1,1-Trifluoroethane			
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA
Pentafluoroethane			
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA
1,1,1,2-Tetrafluoroethane			
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	colourless
Odor	:	slight, ether-like
Melting point	:	Not available for this mixture.
Boiling point	:	-46.2 °C (-51.2 °F)
% Volatile	:	100 %
Vapour Pressure	:	12,546 hPa at 25 °C (77 °F)
Specific gravity	:	1.05 at 25 °C (77 °F)
Water solubility	:	not determined
Vapour density	:	3.4 at 25°C (77°F) and 1013 hPa (Air=1.0)
Evaporation rate	:	> 1 (CCL4=1.0)

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable at normal temperatures and storage conditions.
Conditions to avoid	:	Avoid open flames and high temperatures.

Incompatibility	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	:	Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride., These materials are toxic and irritating., Avoid contact with decomposition products
Hazardous reactions	:	Polymerization will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

1,1,1-Trifluoroethane (HFC-143a)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 540000 ppm , rat Anaesthetic effects
Inhalation 4 h LC50	:	591000 ppm , rat
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	:	300000 ppm , dog Cardiac sensitization
Skin irritation	:	No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance. There are no reports of human respiratory sensitization.
Repeated dose toxicity	:	Inhalation rat

No toxicologically significant effects were found.

Carcinogenicity	:	Animal testing did not show any carcinogenic effects.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Teratogenicity	:	Animal testing showed no developmental toxicity.
Further information	:	Cardiac sensitisation threshold limit : 1040000 mg/m3

Pentafluoroethane (HFC-125)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 800000 ppm , rat
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	:	100000 ppm , dog Cardiac sensitization
Skin irritation	:	No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Does not cause skin sensitization., Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance.

There are no reports of human respiratory sensitization.

Repeated dose toxicity	:	Inhalation rat

No toxicologically significant effects were found.

Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic.

Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals. Information given is based on data obtained from similar substances.
Teratogenicity	:	Animal testing showed no developmental toxicity.
Further information	:	Cardiac sensitisation threshold limit : 490000 mg/m3

1,1,1,2-Tetrafluoroethane (HFC-134a)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	567000 ppm , rat
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	:	75000 ppm , dog Cardiac sensitization
Skin irritation	:	slight irritation, rabbit Not expected to cause skin irritation based on expert review of the properties of the substance. No skin irritation, human
Eye irritation	:	slight irritation, rabbit Not expected to cause eye irritation based on expert review of the properties of the substance. No eye irritation, human
Skin sensitization	:	Did not cause sensitization on laboratory animals., guinea pig Not expected to cause sensitization based on expert review of the properties of the substance. Did not cause sensitization on laboratory animals. There are no reports of human respiratory sensitization.
Repeated dose toxicity	:	Inhalation

rat

No toxicologically significant effects were found.

Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic. An increased incidence of benign tumours was observed in laboratory animals.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity	:	Animal testing showed no reproductive toxicity.
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.
Further information	:	Cardiac sensitisation threshold limit : 312975 mg/m3

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

1,1,1-Trifluoroethane (HFC-143a)

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) > 100 mg/l
	:	not applicable
48 h EC50	:	Daphnia 300 mg/l

Pentafluoroethane (HFC-125)

96 h LC50	:	Danio rerio (zebra fish) > 200 mg/l Information given is based on data obtained from similar substances.
96 h LC50	:	Oncorhynchus mykiss (rainbow trout) 450 mg/l Information given is based on data obtained from similar substances.
96 h EC50	:	Algae 142 mg/l Information given is based on data obtained from similar substances.

48 h EC50	:	Daphnia magna (Water flea) > 200 mg/l Information given is based on data obtained from similar substances.

1,1,1,2-Tetrafluoroethane (HFC-134a)

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) 450 mg/l
72 h EC50	:	Algae > 118 mg/l Information given is based on data obtained from similar substances.
48 h EC50	:	Daphnia magna (Water flea) 980 mg/l

Environmental Fate

1,1,1-Trifluoroethane (HFC-143a)

Biodegradability	:	Not readily biodegradable.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal	:	Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.
Environmental Hazards	:	Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	:	3337
	Proper shipping name	:	Refrigerant gas R 404A
	Class	:	2.2
	Labelling No.	:	2.2
IATA_C	UN number	:	3337
	Proper shipping name	:	Refrigerant gas R 404A
	Class	:	2.2
	Labelling No.	:	2.2
IMDG	UN number	:	3337

DuPont™ SUVA® 404A refrigerant

Version 2.4

Revision Date 06/06/2012 Ref. 130000000494

Proper shipping name	:	Refrigerant gas R 404A
Class	:	2.2
Labelling No.	:	2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	:	SARA 313: 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.
California Prop. 65	:	Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known

SECTION 16. OTHER INFORMATION

		HMIS
Health	:	1
Flammability	:	0
Reactivity/Physical hazard	:	1
PPE	:	Personal Protection rating to be supplied by user depending on use conditions.

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DuPont™ SUVA® 404A refrigerant

Version 2.4

Revision Date 06/06/2012 Ref. 130000000494

Material Safety Data Sheet

DuPont™ SUVA® 410A Refrigerant

Version 2.3

Revision Date 09/12/2011 Ref. 130000050990

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ SUVA® 410A Refrigerant
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-410A
Tradename/Synonym	:	SUVA® 9100 R-410A Suva® R-410A 410A HFC 410A
MSDS Number	:	130000050990
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Misuse or intentional inhalation abuse may lead to death without warning.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Rapid evaporation of the liquid may cause frostbite.

Potential Health Effects

Skin	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.
Eyes	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Inhalation : Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Carcinogenicity

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

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Pentafluoroethane (HFC-125)	354-33-6	50 %
Difluoromethane (R-32)	75-10-5	50 %

SECTION 4. FIRST AID MEASURES

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary.

Inhalation	:	Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
Ingestion	:	Is not considered a potential route of exposure.
General advice	:	Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Notes to physician	:	Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties

Flash point	:	does not flash
Lower explosion limit	:	Method : None per ASTM E681
Upper explosion limit	:	Method : None per ASTM E681

Fire and Explosion Hazard	:	Cylinders are equipped with pressure and temperature relief devices, but may still 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 colour of the torch flame. 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. This substance is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxygen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example this substance should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of this substance in the presence of certain concentrations of chlorine.
Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Firefighting Instructions	:	Cool containers / tanks with water spray. Self-contained breathing apparatus (SCBA) is required if containers rupture and contents are released under fire conditions. Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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

Safeguards (Personnel)	:	Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect.
Accidental Release Measures	:	Avoid open flames and high temperatures. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.
Handling (Physical Aspects)	:	The product should not be mixed with air for leak testing or used with air for any other purpose above atmospheric pressure. Contact with chlorine or other strong oxidizing agents should also be avoided.
Storage	:	Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (>3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.
Storage temperature	:	< 52 °C (< 126 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls	:	Refrigerant concentration monitors may be necessary to determine vapour concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas. Use sufficient ventilation to keep employee exposure below recommended limits. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.
Personal protective equipment Respiratory protection	:	Under normal manufacturing conditions, no respiratory protection is required when using this product.

Hand protection	:	Additional protection: Impervious gloves
Eye protection	:	Wear safety glasses with side shields. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
Protective measures	:	Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Exposure Limit Values

Pentafluoroethane

AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA

Difluoromethane

AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	colourless
Odor	:	slight, ether-like
pH	:	neutral
Boiling point	:	-51.4 °C (-60.5 °F)
% Volatile	:	100 %
Vapour Pressure	:	16,574 hPa at 25 °C (77 °F)
Specific gravity	:	1.06 at 25 °C (77 °F)
Water solubility	:	not determined
Vapour density	:	2.5 at 25°C (77°F) and 1013 hPa (Air=1.0)
Evaporation rate	:	> 1 (CCL4=1.0)

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable at normal temperatures and storage conditions.
Conditions to avoid	:	Avoid open flames and high temperatures.
Incompatibility	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	:	Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride., These materials are toxic and irritating., Avoid contact with decomposition products
Hazardous reactions	:	Polymerization will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Pentafluoroethane (HFC-125)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 800000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Does not cause skin sensitization., Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance.

There are no reports of human respiratory sensitization.

Repeated dose toxicity	:	Inhalation rat No toxicologically significant effects were found.
Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals. Information given is based on data obtained from similar substances.
Teratogenicity	:	Animal testing showed no developmental toxicity.
Further information	:	Cardiac sensitisation threshold limit : 490000 mg/m3

Difluoromethane (R-32)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 520000 ppm , rat
Inhalation	:	dog Not a cardiac sensitizer.
Skin irritation	:	No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance.

There are no reports of human respiratory sensitization.

Repeated dose toxicity	:	Inhalation rat No toxicologically significant effects were found.
Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity	:	Animal testing showed no reproductive toxicity. Information given is based on data obtained from similar substances.
Teratogenicity	:	Animal testing showed no developmental toxicity.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

Pentafluoroethane (HFC-125)

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) > 81.8 mg/l Information given is based on data obtained from similar substances.
96 h LC50	:	Danio rerio (zebra fish) > 200 mg/l Information given is based on data obtained from similar substances.
96 h LC50	:	Oncorhynchus mykiss (rainbow trout) 450 mg/l Information given is based on data obtained from similar substances.
72 h EC50	:	Pseudokirchneriella subcapitata (green algae) > 118 mg/l Information given is based on data obtained from similar substances.
72 h EC50	:	Pseudokirchneriella subcapitata (green algae) > 114 mg/l Information given is based on data obtained from similar substances.
96 h EC50	:	Algae 142 mg/l

Information given is based on data obtained from similar substances.

48 h EC50 : Daphnia magna (Water flea) > 200 mg/l
Information given is based on data obtained from similar substances.

48 h EC50 : Daphnia magna (Water flea) > 97.9 mg/l
Information given is based on data obtained from similar substances.

Difluoromethane (R-32)

96 h LC50 : Fish 1,507 mg/l

96 h EC50 : Algae 142 mg/l

48 h EC50 : Daphnia 652 mg/l

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal : Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.

Environmental Hazards : Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	: 3163
	Proper shipping name	: Liquefied gas, n.o.s. (Pentafluoroethane, Difluoromethane)
	Class	: 2.2
	Labelling No.	: 2.2
IATA_C	UN number	: 3163
	Proper shipping name	: Liquefied gas, n.o.s. (Pentafluoroethane, Difluoromethane)
	Class	: 2.2
	Labelling No.	: 2.2
IMDG	UN number	: 3163

DuPont™ SUVA® 410A Refrigerant

Version 2.3

Revision Date 09/12/2011 Ref. 130000050990

Proper shipping name	:	Liquefied gas, n.o.s. (Pentafluoroethane, Difluoromethane)
Class	:	2.2
Labelling No.	:	2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	:	SARA 313: 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.
California Prop. 65	:	Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known
PA Right to Know Regulated Chemical(s)	:	Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Difluoromethane
NJ Right to Know Regulated Chemical(s)	:	Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): Difluoromethane

SECTION 16. OTHER INFORMATION

		HMIS
Health	:	1
Flammability	:	0
Reactivity/Physical hazard	:	1
PPE	:	Personal Protection rating to be supplied by user depending on use conditions.

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DuPont™ SUVA® 410A Refrigerant

Version 2.3

Revision Date 09/12/2011 Ref. 130000050990

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Significant change from previous version is denoted with a double bar.

Material Safety Data Sheet

DuPont™ SUVA® HP80 Refrigerant

Version 2.1

Revision Date 08/02/2011 Ref. 130000050991

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ SUVA® HP80 Refrigerant
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-402A
MSDS Number	:	130000050991
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Misuse or intentional inhalation abuse may lead to death without warning.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Rapid evaporation of the liquid may cause frostbite.

Potential Health Effects

Skin	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.
Eyes	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Inhalation : Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

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

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Pentafluoroethane (HFC-125)	354-33-6	60 %
Chlorodifluoromethane (HCFC-22)	75-45-6	38 %
Propane	74-98-6	2 %

SECTION 4. FIRST AID MEASURES

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary.

Inhalation	:	Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
Ingestion	:	Is not considered a potential route of exposure.
General advice	:	Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Notes to physician	:	Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties

Flash point	:	does not flash
Lower explosion limit	:	Method : None per ASTM E681
Upper explosion limit	:	Method : None per ASTM E681
Fire and Explosion Hazard	:	Cylinders are equipped with pressure and temperature relief devices, but may still 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 colour of the torch flame. 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.

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

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Firefighting Instructions : Use water spray or fog to protect the fire fighters and to cool container. Self-contained breathing apparatus (SCBA) is required if containers rupture and contents are released under fire conditions.
Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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 vapours might collect. Self-contained breathing apparatus (SCBA) is required if a large release occurs. Avoid open flames and high temperatures.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel) : Avoid breathing vapours or mist. Avoid skin or eye contact with liquid. Use sufficient ventilation to keep employee exposure below recommended limits. Wash hands thoroughly after handling.

Storage : Store in a clean, dry place. Do not heat above 52º C (125º F).

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls : Refrigerant concentration monitors may be necessary to determine vapour concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas. Use sufficient ventilation to keep employee exposure below recommended limits. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

Personal protective equipment

Respiratory protection : Under normal manufacturing conditions, no respiratory protection is required when using this product.

Hand protection : Additional protection: Impervious gloves

Eye protection : Wear safety glasses with side shields. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.

Protective measures : Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Exposure Limit Values

Pentafluoroethane				
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA	
Chlorodifluoromethane				
TLV	(ACGIH)	1,000 ppm	TWA	
Propane				
PEL:	(OSHA)	1,000 ppm	1,800 mg/m3	8 hr. TWA
TLV	(ACGIH)	1,000 ppm	TWA	

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	clear, colourless
Odor	:	slight, ether-like
pH	:	neutral
Boiling point	:	-48.9 °C (-56.0 °F)
% Volatile	:	100 %
Vapour Pressure	:	13,499 hPa at 25 °C (77 °F)
Specific gravity	:	1.15 at 25 °C (77 °F)
Water solubility	:	not determined
Vapour density	:	3.6 at 25°C (77°F) and 1013 hPa (Air = 1.0)
Evaporation rate	:	> 1 (CCL4=1.0)

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable at normal temperatures and storage conditions.
Conditions to avoid	:	Avoid open flames and high temperatures.
Incompatibility	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	:	Decomposition products are hazardous., The exact nature of the decomposition products will depend upon exposure conditions - temperature, access to oxygen, high temperatures (open flames, glowing metal surfaces, etc.) forming hydrochloric and hydrofluoric acids, and possibly carbonyl halides., These materials are toxic and irritating., Avoid contact with decomposition products
Hazardous reactions	:	Polymerization will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Pentafluoroethane (HFC-125)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 800000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Does not cause skin sensitization., Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance. There are no reports of human respiratory sensitization.
Repeated dose toxicity	:	Inhalation rat No toxicologically significant effects were found.
Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals. Information given is based on data obtained from similar substances.
Teratogenicity	:	Animal testing showed no developmental toxicity.

Further information	:	Cardiac sensitisation threshold limit : 490000 mg/m3

Chlorodifluoromethane (HCFC-22)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	220000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	No skin irritation, rabbit Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, rabbit Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Did not cause sensitization on laboratory animals., guinea pig Not expected to cause sensitization based on expert review of the properties of the substance.
Repeated dose toxicity	:	Inhalation mouse No toxicologically significant effects were found.
Carcinogenicity	:	An increased incidence of tumours was observed in some laboratory animals but not in others. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Experiments showed mutagenic effects in cultured bacterial cells.
Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals.
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.

Further information	:	Cardiac sensitisation threshold limit : 175000 mg/m3

Propane

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 200000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	not applicable
Eye irritation	:	not applicable
Skin sensitization	:	not applicable
Repeated dose toxicity	:	Inhalation rat No toxicologically significant effects were found.
Mutagenicity	:	Did not cause genetic damage in cultured bacterial cells.
Further information	:	Cardiac sensitisation threshold limit : 180369 mg/m3

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

Pentafluoroethane (HFC-125)

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) > 81.8 mg/l Information given is based on data obtained from similar substances.
96 h LC50	:	Danio rerio (zebra fish) > 200 mg/l Information given is based on data obtained from similar substances.
96 h LC50	:	Oncorhynchus mykiss (rainbow trout) 450 mg/l Information given is based on data obtained from similar substances.
72 h EC50	:	Pseudokirchneriella subcapitata (green algae) > 118 mg/l

Information given is based on data obtained from similar substances.

72 h EC50 : Pseudokirchneriella subcapitata (green algae) > 114 mg/l
Information given is based on data obtained from similar substances.

96 h EC50 : Algae 142 mg/l
Information given is based on data obtained from similar substances.

48 h EC50 : Daphnia magna (Water flea) > 200 mg/l
Information given is based on data obtained from similar substances.

48 h EC50 : Daphnia magna (Water flea) > 97.9 mg/l
Information given is based on data obtained from similar substances.

Chlorodifluoromethane (HCFC-22)

96 h LC50 : Zebra fish 777 mg/l

96 h EC50 : Algae 250 mg/l

48 h EC50 : Daphnia magna (Water flea) 433 mg/l

Environmental Fate

Chlorodifluoromethane (HCFC-22)

Biodegradability : According to the results of tests of biodegradability this product is not readily biodegradable.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal : Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.

Environmental Hazards : Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT UN number : 3163

	Proper shipping name	:	Liquefied gas, n.o.s. (Chlorodifluoromethane, Pentafluoroethane)
	Class	:	2.2
	Labelling No.	:	2.2
IATA_C	UN number	:	3163
	Proper shipping name	:	Liquefied gas, n.o.s. (Chlorodifluoromethane, Pentafluoroethane)
	Class	:	2.2
	Labelling No.	:	2.2
IMDG	UN number	:	3163
	Proper shipping name	:	Liquefied gas, n.o.s. (Chlorodifluoromethane, Pentafluoroethane)
	Class	:	2.2
	Labelling No.	:	2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	:	Chlorodifluoromethane
California Prop. 65	:	Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known
PA Right to Know Regulated Chemical(s)	:	Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Propane , Chlorodifluoromethane
NJ Right to Know Regulated Chemical(s)	:	Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): Propane , Chlorodifluoromethane

SECTION 16. OTHER INFORMATION

HMIS

DuPont™ SUVA® HP80 Refrigerant

Version 2.1

Revision Date 08/02/2011 Ref. 130000050991

Health	:	1
Flammability	:	0
Reactivity/Physical hazard	:	1
PPE	:	Personal Protection rating to be supplied by user depending on use conditions.

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For further information contact the local DuPont office or DuPont's nominated distributors.
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Significant change from previous version is denoted with a double bar.

Material Safety Data Sheet

DuPont™ SUVA® HP81 Refrigerant

Version 2.2

Revision Date 09/12/2011 Ref. 130000050992

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ SUVA® HP81 Refrigerant
Product Grade/Type	:	ASHRAE Refrigerant number designation: R-402B
MSDS Number	:	130000050992
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Misuse or intentional inhalation abuse may lead to death without warning.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Rapid evaporation of the liquid may cause frostbite.

Potential Health Effects

Skin	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.
Eyes	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Inhalation : Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

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

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Chlorodifluoromethane (HCFC-22)	75-45-6	60 %
Pentafluoroethane (HFC-125)	354-33-6	38 %
Propane	74-98-6	2 %

SECTION 4. FIRST AID MEASURES

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Consult a physician if necessary.

Inhalation	:	Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
Ingestion	:	Is not considered a potential route of exposure.
General advice	:	Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
Notes to physician	:	Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties

Flash point	:	does not flash
Lower explosion limit	:	Method : None per ASTM E681
Upper explosion limit	:	Method : None per ASTM E681
Fire and Explosion Hazard	:	Cylinders are equipped with pressure and temperature relief devices, but may still 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 colour of the torch flame. 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.

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

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Firefighting Instructions : Use water spray or fog to protect the fire fighters and to cool container. Self-contained breathing apparatus (SCBA) is required if containers rupture and contents are released under fire conditions.
Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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 vapours might collect. Self-contained breathing apparatus (SCBA) is required if a large release occurs. Avoid open flames and high temperatures.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel) : Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.

Storage : Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (>3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.
Separate full containers from empty containers. Keep at temperature not exceeding 52°C. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls : Refrigerant concentration monitors may be necessary to determine vapour concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas. Use sufficient ventilation to keep employee exposure below recommended limits. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

Personal protective equipment

Respiratory protection : Under normal manufacturing conditions, no respiratory protection is required when using this product.

Hand protection : Additional protection: Impervious gloves

Eye protection : Wear safety glasses with side shields. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.

Protective measures : Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Exposure Limit Values

Chlorodifluoromethane

TLV	(ACGIH)	1,000 ppm	TWA

Pentafluoroethane				
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA	
Propane				
PEL:	(OSHA)	1,000 ppm	1,800 mg/m3	8 hr. TWA
TLV	(ACGIH)	1,000 ppm	TWA	

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	clear, colourless
Odor	:	slight, ether-like
pH	:	neutral
Boiling point	:	-47.0 °C (-52.6 °F)
% Volatile	:	100 %
Vapour Pressure	:	12,591 hPa at 25 °C (77 °F)
Specific gravity	:	1.15 at 25 °C (77 °F)
Water solubility	:	not determined
Vapour density	:	3.3 at 25°C (77°F) and 1013 hPa (Air=1.0)
Evaporation rate	:	> 1 (CCL4=1.0)

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable at normal temperatures and storage conditions.
Conditions to avoid	:	Avoid open flames and high temperatures.
Incompatibility	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	:	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., Avoid contact with decomposition products

Hazardous reactions : Polymerization will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Chlorodifluoromethane (HCFC-22)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	220000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	No skin irritation, rabbit Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, rabbit Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Did not cause sensitization on laboratory animals., guinea pig Not expected to cause sensitization based on expert review of the properties of the substance.
Repeated dose toxicity	:	Inhalation mouse No toxicologically significant effects were found.
Carcinogenicity	:	An increased incidence of tumours was observed in some laboratory animals but not in others. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Experiments showed mutagenic effects in cultured bacterial cells.

Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals.
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.
Further information	:	Cardiac sensitisation threshold limit : 175000 mg/m3

Pentafluoroethane (HFC-125)

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 800000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	No skin irritation, Not tested on animals Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	No eye irritation, Not tested on animals Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Does not cause skin sensitization., Not tested on animals Not expected to cause sensitization based on expert review of the properties of the substance. There are no reports of human respiratory sensitization.
Repeated dose toxicity	:	Inhalation rat No toxicologically significant effects were found.
Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Did not cause genetic damage in animals. Did not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.

Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals. Information given is based on data obtained from similar substances.
Teratogenicity	:	Animal testing showed no developmental toxicity.
Further information	:	Cardiac sensitisation threshold limit : 490000 mg/m3

Propane

Dermal	:	not applicable
Oral	:	not applicable
Inhalation 4 h LC50	:	> 200000 ppm , rat
Inhalation	:	dog Cardiac sensitization
Skin irritation	:	not applicable
Eye irritation	:	not applicable
Skin sensitization	:	not applicable
Repeated dose toxicity	:	Inhalation rat No toxicologically significant effects were found.
Mutagenicity	:	Did not cause genetic damage in cultured bacterial cells.
Further information	:	Cardiac sensitisation threshold limit : 180369 mg/m3

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

Chlorodifluoromethane (HCFC-22)

96 h LC50	:	Zebra fish 777 mg/l

96 h EC50	:	Algae 250 mg/l
48 h EC50	:	Daphnia magna (Water flea) 433 mg/l

Pentafluoroethane (HFC-125)

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) > 81.8 mg/l Information given is based on data obtained from similar substances.
96 h LC50	:	Danio rerio (zebra fish) > 200 mg/l Information given is based on data obtained from similar substances.
96 h LC50	:	Oncorhynchus mykiss (rainbow trout) 450 mg/l Information given is based on data obtained from similar substances.
72 h EC50	:	Pseudokirchneriella subcapitata (green algae) > 118 mg/l Information given is based on data obtained from similar substances.
72 h EC50	:	Pseudokirchneriella subcapitata (green algae) > 114 mg/l Information given is based on data obtained from similar substances.
96 h EC50	:	Algae 142 mg/l Information given is based on data obtained from similar substances.
48 h EC50	:	Daphnia magna (Water flea) > 200 mg/l Information given is based on data obtained from similar substances.
48 h EC50	:	Daphnia magna (Water flea) > 97.9 mg/l Information given is based on data obtained from similar substances.

Environmental Fate

Chlorodifluoromethane (HCFC-22)

Biodegradability	:	According to the results of tests of biodegradability this product is not readily biodegradable.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal	:	Can be used after re-conditioning. Recover by distillation or remove to a permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.

Environmental Hazards : Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	: 3163
	Proper shipping name	: Liquefied gas, n.o.s. (Chlorodifluoromethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2
IATA_C	UN number	: 3163
	Proper shipping name	: Liquefied gas, n.o.s. (Chlorodifluoromethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2
IMDG	UN number	: 3163
	Proper shipping name	: Liquefied gas, n.o.s. (Chlorodifluoromethane, Pentafluoroethane)
	Class	: 2.2
	Labelling No.	: 2.2

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s) : Chlorodifluoromethane

California Prop. 65 : Chemicals known to the State of California to cause cancer, birth defects or any other harm: none known

PA Right to Know Regulated Chemical(s) : Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Propane , Chlorodifluoromethane

NJ Right to Know Regulated Chemical(s) : Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances

identified as carcinogens, mutagens or teratogens): Propane , Chlorodifluoromethane

SECTION 16. OTHER INFORMATION

HMIS

Health	:	1
Flammability	:	0
Reactivity/Physical hazard	:	1
PPE	:	Personal Protection rating to be supplied by user depending on use conditions.

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