

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries. DuPont 1 Page Material Safety Data Sheet "FREON" 12 Revised 19-APR-2004 2022FR _____ CHEMICAL PRODUCT/COMPANY IDENTIFICATION Material Identification "FREON" is a registered trademark of DuPont. Corporate MSDS Number : DU001065 Formula : CC12F2 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) : 1-800-441-3637 (outside the U.S. Medical Emergency 302 - 774 - 1000)COMPOSITION/INFORMATION ON INGREDIENTS ------Components CAS Number Material % 75-71-8 100 *METHANE, DICHLORODIFLUORO- ("FREON" 12) * 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 The

systemic toxicity, after contact appears unlikely. The compound has been infrequently associated with skin sensitization in humans.

DuPont Material Safety Data Sheet

(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.

LEL UEL

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point

Autoignition

may occur.

Extinguishing Media

_____ : Will not burn Flammable limits in Air, % by Volume : Not applicable : Not applicable : >750 C (>1382 F) Fire and Explosion Hazards: Cylinders may rupture under fire conditions. Decomposition 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 (ACGIH) : 1,000 ppm, 4,950 mg/m3, 8 Hr. TWA, A4 TLV 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 pН : Neutral Odor : Slight ethereal : Liquified gas Form Color : Clear, colorless : 1.315 g/cc at 25 deg C (77 deg F) -Density 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 : 1028 : NONFLAMMABLE GAS UN No. DOT/IMO Label 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

2022FR Page 7 DuPont Material Safety Data Sheet (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 : 0 Flammability : 1 Reactivity 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 : Wilmington, DE 19898 Address : (800) 441-7515 Telephone # 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	QUPOND
DuPont [™] FREON [®] 22 Re	efrigerant
Version 2.3	
Revision Date 10/04/2011	Ref. 13000024323
This SDS adheres to the standards requirements in other countries.	and regulatory requirements of the United States and may not meet the regulatory
SECTION 1. PRODUCT AND COM	IPANY IDENTIFICATION
Product name : Product Grade/Type :	DuPont [™] FREON [®] 22 Refrigerant ASHRAE Refrigerant number designation: R-22
Tradename/Synonym :	R-22 FREON [®] 22 CHLORODIFLUOROMETHANE HCFC-22 DYMEL [®] 22
MSDS Number :	13000024323
Product Use :	Refrigerant
Manufacturer :	DuPont 1007 Market Street Wilmington, DE 19898
Product Information : Medical Emergency : Transport Emergency :	1-800-441-7515 (outside the U.S. 1-302-774-1000) 1-800-441-3637 (outside the U.S. 1-302-774-1139) CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)
SECTION 2. HAZARDS IDENTIFIC	CATION
Emergency Overview Rapid evaporation of the liqu	uid may cause frostbite.
Potential Health Effects Skin	
Chlorodifluoromet hane (HCFC-22)	: Contact with liquid or refrigerated gas can cause cold burns and frostbite.
Eyes Chlorodifluoromet hane (HCFC-22)	: Contact with liquid or refrigerated gas can cause cold burns and frostbite.
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DuPont[™] FREON[®] 22 Refrigerant Version 2.3 Revision Date 10/04/2011 Ref. 13000024323 Inhalation Chlorodifluoromet : Misuse or intentional inhalation abuse may cause death without warning hane (HCFC-22) 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. 2/10

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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 MEA	SURES
Flammable Properties Flash point	: does not flash
Thermal decomposition	: 632 ℃ (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.
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Ref. 13000024323
 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.
ASE MEASURES
AL PROTECTIVE EQUIPMENT during clean-up.
: Evacuate personnel to safe areas. Ventilate the area. Refer to protective measures listed in sections 7 and 8.
: Evaporates.
: 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.
ORAGE : 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.
: No special protective measures against fire required.

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DuPont [™] FREON [®] 22 F	Refrigerant
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	(>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.
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Storage temperature	: <52 ℃ (<126 ℉)
SECTION 8. EXPOSURE CONTE	ROLS/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 equipmen	ıt
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
	le Exposure Limit. Where governmentally imposed occupational exposure limits which in effect, such limits shall take precedence.
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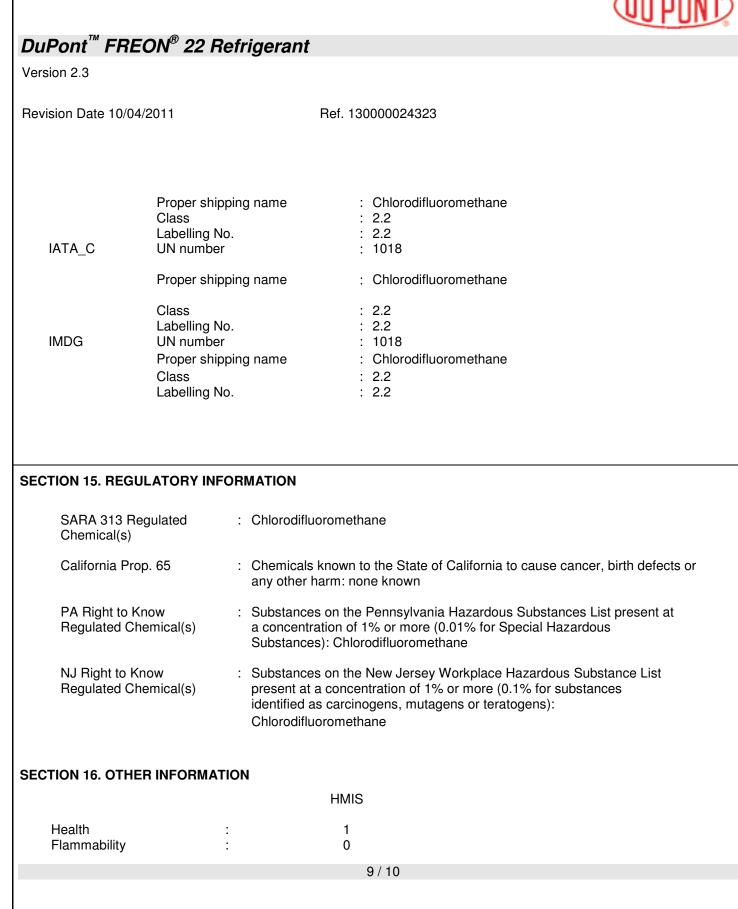
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uPont [™] FREON [®] 22 F	Refrigerant
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evision Date 10/04/2011	Ref. 13000024323
CTION 9. PHYSICAL AND CH	IEMICAL PROPERTIES
Form	: Liquefied gas
Color	: clear
Odor	: slight, ether-like
рН	: neutral
Boiling point	: -40.8 ℃ (-41.4 ℉)
% Volatile	: 100 %
Vapour Pressure	: 10,439.0 hPa at 25 ℃ (77 ℉)
Density	: 1.194 g/cm3 at 25 ℃ (77 °F)
- 511511	
Water solubility	: 2.6 g/l at 25 ℃ (77 ℉)
	: 2.6 g/l at 25 °C (77 °F) : 3.0 at 25 °C (77 °F) and 1013 hPa (Air=1.0)
Water solubility	
Water solubility Vapour density	: 3.0 at 25 °C (77 °F) and 1013 hPa (Air=1.0)
Water solubility Vapour density Evaporation rate	: 3.0 at 25°C (77°F) and 1013 hPa (Air=1.0) : > 1 (CCL4=1.0)
Water solubility Vapour density Evaporation rate CTION 10. STABILITY AND R Stability	 : 3.0 at 25 °C (77 °F) and 1013 hPa (Air=1.0) : > 1 (CCL4=1.0) REACTIVITY : Stable under recommended storage conditions.
Water solubility Vapour density Evaporation rate	: 3.0 at 25°C (77°F) and 1013 hPa (Air=1.0) : > 1 (CCL4=1.0)
Water solubility Vapour density Evaporation rate CTION 10. STABILITY AND R Stability	 3.0 at 25 °C (77 °F) and 1013 hPa (Air=1.0) > 1 (CCL4=1.0) REACTIVITY Stable under recommended storage conditions. 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.
Water solubility Vapour density Evaporation rate	 3.0 at 25 °C (77 °F) and 1013 hPa (Air=1.0) > 1 (CCL4=1.0) REACTIVITY Stable under recommended storage conditions. 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.



DuPont [™] FREON [®] 22 Refri	gerant
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	HCFC 22 in the presence of certain concentrations of chlorine.
SECTION 11. TOXICOLOGICAL INFO	RMATION
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.
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DuPont [™] FREON [®] 22 Refrige	erant
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Reproductive toxicity	: Evidence suggests the substance is not a reproductive toxin in
Teratogenicity	 animals. 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 INFORMAT	
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 CONSIDERAT	IONS
to	n be used after re-conditioning. Recover, reclaim by distillation, or remove a permitted waste disposal facility. Comply with applicable Federal, ate/Provincial and Local Regulations.
Environmental Hazards : En	npty pressure vessels should be returned to the supplier.
SECTION 14. TRANSPORT INFORMATI	ON
DOT UN number	: 1018
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DuPont [™] FREON [®] 22 Re	frigerant	
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Reactivity/Physical hazard : PPE :	1 Personal Protection rating to be supplied by user depending on use conditions.	
Before use read DuPont's safety	rk of E. I. duPont de Nemours & Company, Inc. y information. he local DuPont office or DuPont's nominated distributors	
the date of its publication. The i storage, transportation, disposa information relates only to the s	Safety Data Sheet is correct to the best of our knowledge nformation given is designed only as a guidance for safe I and release and is not to be considered a warranty or qu pecific material designated and may not be valid for such by process, unless specified in the text.	handling, use, processing, uality specification. The
Significant change from previou	s version is denoted with a double bar.	
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The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries. DuPont 1 Page Material Safety Data Sheet "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 : CHClF2/CClF2CF3 Formula (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) : 1-800-441-3637 (outside the U.S. Medical Emergency 302 - 774 - 1000)COMPOSITION/INFORMATION ON INGREDIENTS _____ Components CAS Number Material % "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,

DuPont Material Safety Data Sheet

(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.

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(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.

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FIRE FIGHTING MEASURES
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Flammable Properties

Flash Point: Will not burnFlammable limits in Air, % by VolumeLEL: Not applicableUEL: Not applicableAutoignition: 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. 3

_____ 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 EstablishedTLV(ACGIH): 1,000 ppm, 6,320 : 1,000 ppm, 6,320 mg/m3, 8 Hr. TWA AEL * (DuPont) : None Established METHANE, CHLORODIFLUORO- ("FREON" 22) PEL (OSHA) : None Established (ACGIH) TLV : 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: 100 WT% % Volatiles Evaporation Rate Solubility in Water : >1 (CC14 = 1): 0.15 WT% @ 25 C (77 F) : Neutral pН Odor : Slight ethereal Form : Liquified gas Color : Clear, colorless : 1.22 g/cc at 25 deg C (77 deg F) - Liquid Density _____ 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

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(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

6

(TOXICOLOGICAL INFORMATION - Continued)

damage).

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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
                 : 2.2
   Hazard Class
                  : 1973
   UN No.
   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
```

DuPont Material Safety Data Sheet

(REGULATORY INFORMATION - Continued)

: No Fire 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 : 1 Health : 0 Flammability 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

DuPont[™] SUVA[®] 134a refrigerant

Version 2.3

Revision Date 09/12/2011

Ref. 13000000349

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

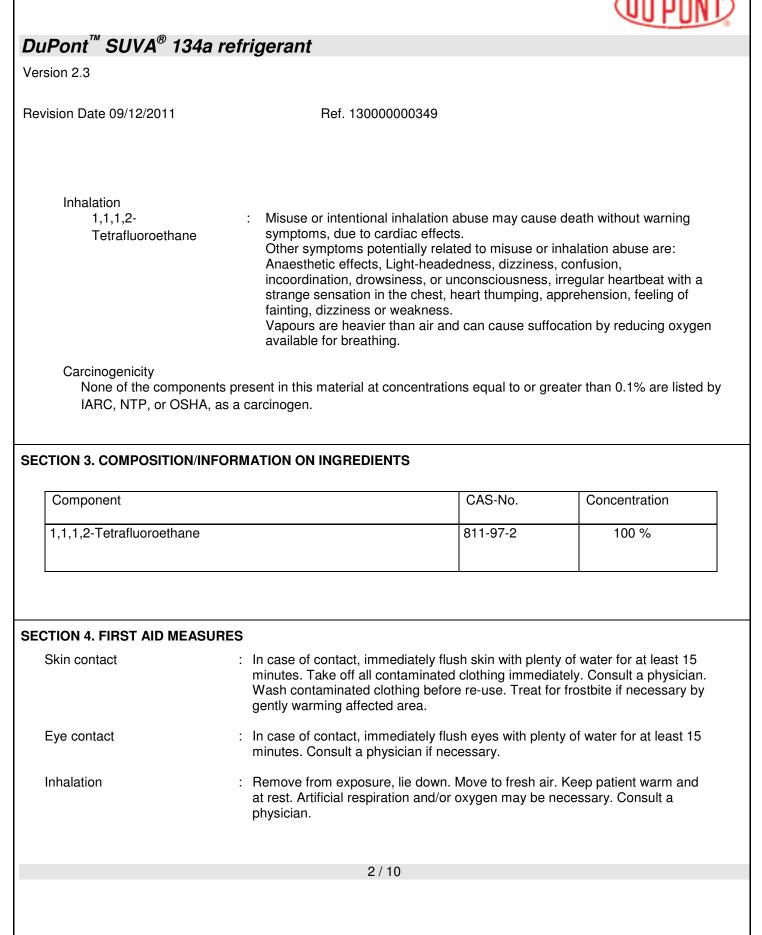
Product name Product Grade/Type	:	DuPont [™] SUVA [®] 134a refrigerant ASHRAE Refrigerant number designation: R-134a
Tradename/Synonym	:	HFC-134a SUVA [®] 134a
MSDS Number	:	13000000349
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information Medical Emergency Transport Emergency	:	1-800-441-7515 (outside the U.S. 1-302-774-1000) 1-800-441-3637 (outside the U.S. 1-302-774-1139) 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-	: Contact with liquid or refrigerated gas can cause cold burns and frostbite.
Tetrafluoroethane	May cause eye irritation. May cause: tearing, Redness, Discomfort.
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DuPont [™] SUVA [®] 134a	refrigerant
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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 ME	ASURES
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.

DuPont [™] SUVA [®] 134a r	refrigerant
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	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.
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 cleanup. 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.
	4 / 10

וPont [™] SUVA [®] 134a r	errigerant
sion 2.3	
vision Date 09/12/2011	Ref. 13000000349
CTION 7. HANDLING AND STO	DRAGE
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 ℃ (<126 °F)
CTION 8. EXPOSURE CONTRO	DLS/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
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0uPont [™] SUVA® 134a	a refrigerant
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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-Tetrafluoroethar	
AEL *	(DUPONT) 1,000 ppm 8 & 12 hr. TWA
	able Exposure Limit. Where governmentally imposed occupational exposure limits which e in effect, such limits shall take precedence.
ECTION 9. PHYSICAL AND C	HEMICAL PROPERTIES
Form	: Liquefied gas
Color	: colourless
Odor	: slight, ether-like
Boiling point	: -26.1 ℃ (-15.0 °F) at 1,013 hPa
% Volatile	: 100 %
Vapour Pressure	: 6,661 hPa at 25 ℃ (77 °F)
	: 13,190 hPa at 50 ℃ (122 °F)
Density	: 1.206 g/cm3 at 25 °C (77 °F) (as liquid)
Specific gravity	: 1.208 at 25 ℃ (77 °F)
Water solubility	: 1.5 g/l at 25 $^{\circ}$ C (77 $^{\circ}$ F) at 1,013 hPa
Vapour density	: 3.6 at 25 ℃ (77 °F)
1	(Air = 1.0)
Evaporation rate	: >1
	(CCL4=1.0)
ECTION 10. STABILITY AND	REACTIVITY
Stability	: Stable under recommended storage conditions.
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DuPont[™] SUVA[®] 134a refrigerant

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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
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DuPont [™] SUVA [®] 134a refrigerant		
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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.	
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48 h	EC50 : D	aphnia magna (Water flea) 980 mg/l		
CTION 13. DIS	SPOSAL CONSIDERATIONS			
Waste Dispos	permittee	used after re-conditioning. Recover by distillation or remove to a d waste disposal facility. Comply with applicable Federal, pvincial and Local Regulations.		
Environmenta	al Hazards : Empty pr	: Empty pressure vessels should be returned to the supplier.		
CTION 14. TR	ANSPORT INFORMATION			
DOT	UN number	: 3159		
	Proper shipping name Class	: 1,1,1,2-Tetrafluoroethane : 2.2		
IATA C	Class Labelling No.	: 2.2 : 2.2		
IATA_C	Class Labelling No. UN number	: 2.2 : 2.2 : 3159		
IATA_C	Class Labelling No. UN number Proper shipping name	: 2.2 : 2.2 : 3159 : 1,1,1,2-Tetrafluoroethane		
_	Class Labelling No. UN number Proper shipping name Class Labelling No.	: 2.2 : 2.2 : 3159 : 1,1,1,2-Tetrafluoroethane : 2.2 : 2.2		
IATA_C IMDG	Class Labelling No. UN number Proper shipping name Class	: 2.2 : 2.2 : 3159 : 1,1,1,2-Tetrafluoroethane : 2.2		
_	Class Labelling No. UN number Proper shipping name Class Labelling No. UN number	: 2.2 : 2.2 : 3159 : 1,1,1,2-Tetrafluoroethane : 2.2 : 2.2 : 3159		
IMDG	Class Labelling No. UN number Proper shipping name Class Labelling No. UN number Proper shipping name Class	: 2.2 : 2.2 : 3159 : 1,1,1,2-Tetrafluoroethane : 2.2 : 2.2 : 3159 : 1,1,1,2-Tetrafluoroethane : 2.2		



DuPont [™] SUVA [®] 134	refrigerant
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California Prop. 65	: Chemicals known to the State of California to cause cancer, birth defects or
,	any other harm: none known
SECTION 16. OTHER INFOR	ΑΤΙΟΝ
SECTION 10. OTHER INFOR	
	HMIS
Health	: 1
Flammability	: 0
Reactivity/Physical hazar	: 1
	emark of E. I. du Pont de Nemours and Company
Before use read DuPont's	
[®] DuPont's registered trac	act the local DuPont office or DuPont's nominated distributors.
Dur ont's registered trac	
	this Safety Data Sheet is correct to the best of our knowledge, information and belief at
	The information given is designed only as a guidance for safe handling, use, processing,
	posal and release and is not to be considered a warranty or quality specification. The the specific material designated and may not be valid for such material used in combinatic
	in any process, unless specified in the text.
Significant change from r	evious version is denoted with a double bar.
Significant change from p	
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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 Product Grade/Type	:	DuPont [™] SUVA [®] MP39 Refrigerant ASHRAE Refrigerant number designation: R-401A
MSDS Number	:	13000050993
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information Medical Emergency Transport Emergency	:	1-800-441-7515 (outside the U.S. 1-302-774-1000) 1-800-441-3637 (outside the U.S. 1-302-774-1139) 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.



DuPont[™] SUVA[®] MP39 Refrigerant

Version 2.5

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Inhalation	symptoms, due to cardi Other symptoms potent Anaesthetic effects, Lig incoordination, drowsin strange sensation in the fainting, dizziness or we	tially related to misuse or in ht-headedness, dizziness, ess, or unconsciousness, i e chest, heart thumping, ap eakness.	nhalation abuse are: confusion, irregular heartbeat with a
Carcinogenicity None of the components pres NTP, or OSHA, as a carcinog	ent in this material at concentr en.	ations equal to or greater t	han 0.1% are listed by IARC,
SECTION 3. COMPOSITION/INFO	ORMATION ON INGREDIENT	S	
Component		CAS-No.	Concentration
Chlorodifluoromethane (HCF	C-22)	75-45-6	53 %
1-Chloro-1,2,2,2-tetrafluoroet	hane (HCFC-124)	2837-89-0	34 %
1,1-Difluoroethane (HFC-152	a)	75-37-6	13 %
SECTION 4. FIRST AID MEASUR	RES		
Skin contact		aminated clothing immedia ing before re-use. Treat fo	ately. Consult a physician.



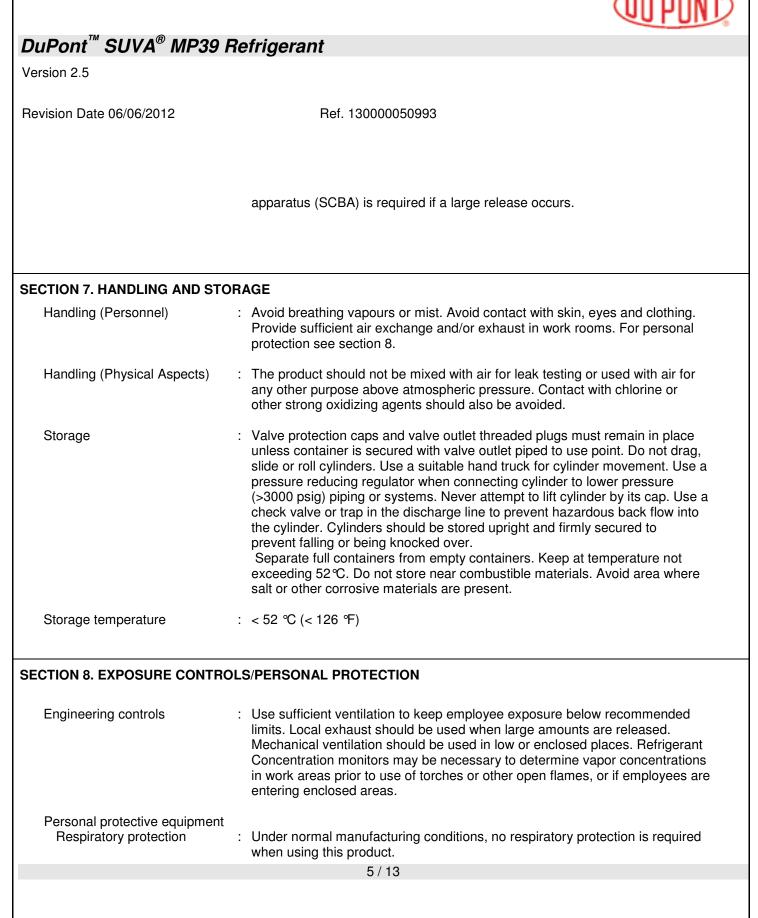
DuPont[™] SUVA[®] MP39 Refrigerant

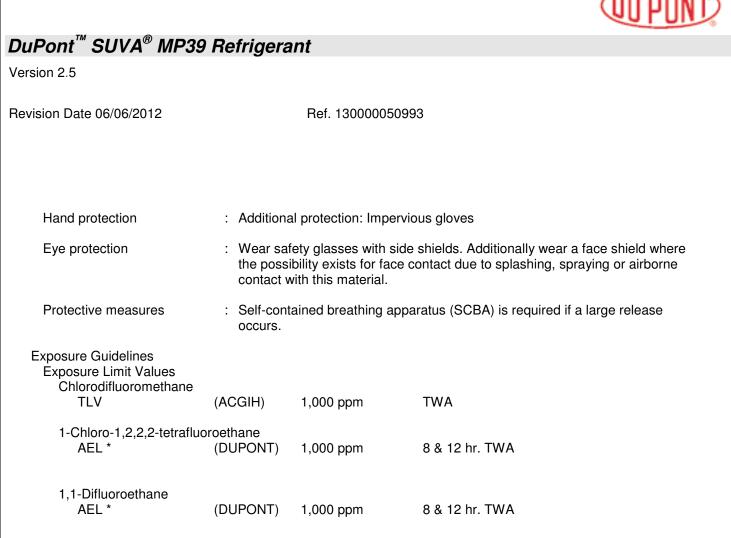
Version 2.5

rision Date 06/06/2012	Ref. 13000050993
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.
	: Because of possible disturbances of cardiac rhythm, catecholamine drugs,
Notes to physician	
CTION 5. FIREFIGHTING M	such as epinephrine, that may be used in situations of emergency life support should be used with special caution.
CTION 5. FIREFIGHTING M	such as epinephrine, that may be used in situations of emergency life support should be used with special caution.
CTION 5. FIREFIGHTING M Flammable Properties Flash point	such as epinephrine, that may be used in situations of emergency life support should be used with special caution. EASURES : does not flash
Flash point	such as epinephrine, that may be used in situations of emergency life support should be used with special caution. EASURES : does not flash : 681 ℃ (1,258 °F)
CTION 5. FIREFIGHTING M Flammable Properties Flash point Ignition temperature Lower explosion limit	such as epinephrine, that may be used in situations of emergency life support should be used with special caution. EASURES : does not flash : 681 ℃ (1,258 ℉) : Method : None per ASTM E681
CTION 5. FIREFIGHTING M Flammable Properties Flash point Ignition temperature Lower explosion limit	such as epinephrine, that may be used in situations of emergency life support should be used with special caution. EASURES : does not flash : 681 ℃ (1,258 ℉) : Method : None per ASTM E681
CTION 5. FIREFIGHTING M Flammable Properties Flash point Ignition temperature Lower explosion limit	such as epinephrine, that may be used in situations of emergency life support should be used with special caution. EASURES : does not flash : 681 ℃ (1,258 ℉) : Method : None per ASTM E681

uPont [™] SUVA [®] MP39 I	Refrigerant
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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.
CTION 6. ACCIDENTAL RELEA	ASE MEASURES
	G MEASURES and HANDLING (PERSONNEL) sections before proceeding with clea
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

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* 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 pН neutral Boiling point : -32.9 °C (-27.2 °F) % Volatile : 100 % Vapour Pressure : 7,765 hPa at 25 ℃ (77 °F) : 1.19 at 25 ℃ (77 °F) Specific gravity Water solubility : 1.0 g/l at 25 ℃ (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) 6/13

DuPont[™] SUVA[®] MP39 Refrigerant Version 2.5 Revision Date 06/06/2012 Ref. 130000050993 SECTION 10. STABILITY AND REACTIVITY Stability : Stable at normal temperatures and storage conditions. Conditions to avoid : Avoid open flames and high temperatures. : Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts Incompatibility

- Hazardous decomposition : Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming products hydrochloric and hydrofluoric acids, and possibly carbonyl halides., These materials are toxic and irritating., Avoid contact with decomposition products
- : Polymerization will not occur. Hazardous reactions

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
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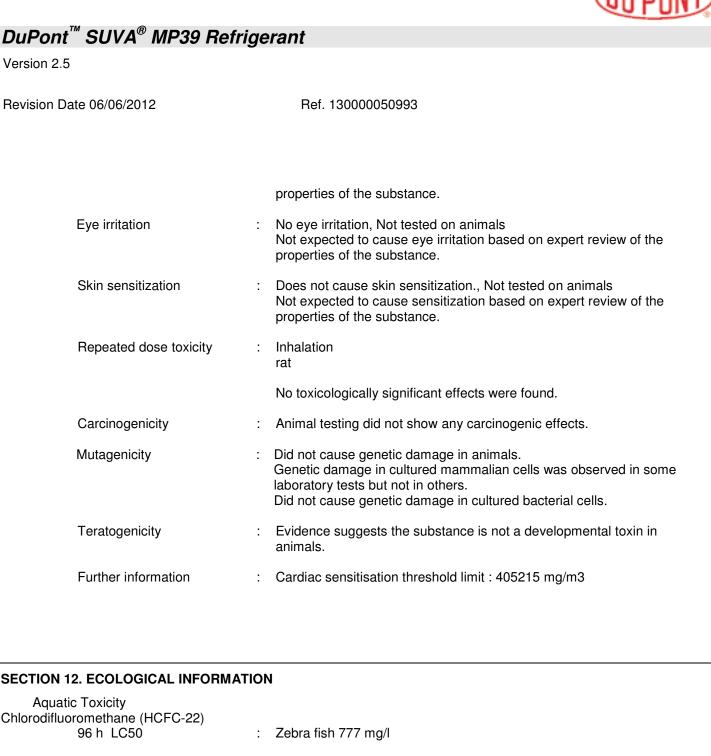




DuPont [™] SUVA [®] MP39 Ref	rigerant
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	Not expected to cause sensitization based on expert review of the properties of the substance.
Repeated dose toxicity	: Inhalation mouse
	No toxicologically significant effects were found.
Carcinogenicity	 An 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
-Chloro-1,2,2,2-tetrafluoroethane (HCF Dermal	C-124) : 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
	8 / 13

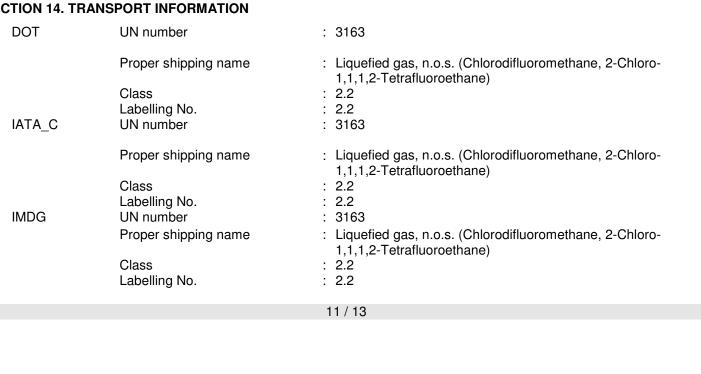


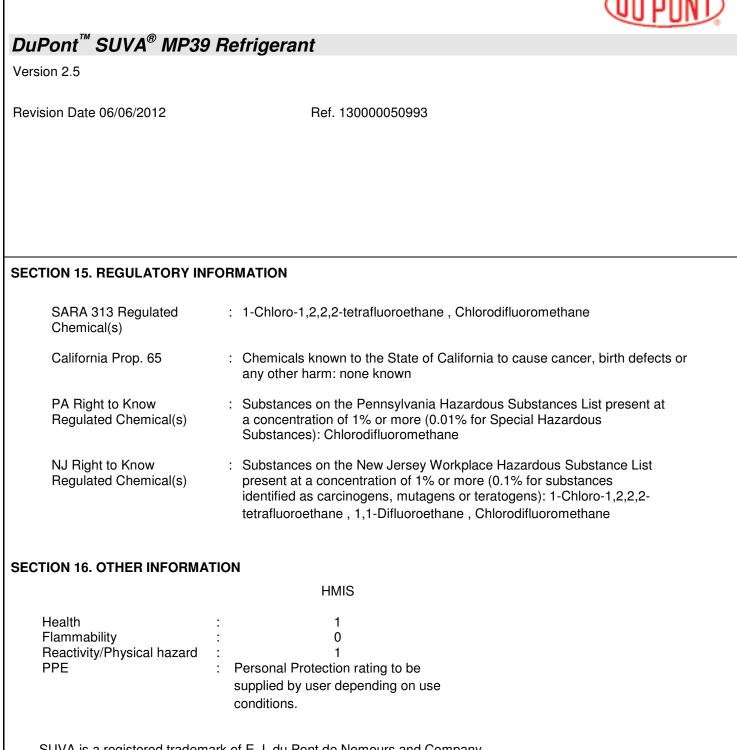
DuPont [™] SUVA [®] MF	239 Refrige	erant	
Version 2.5			
Revision Date 06/06/2012		Ref. 130000050993	
Skin sensitizatior	ı :	properties of the substance. Does not cause skin sensitization., Not tested on animals Not expected to cause sensitization based on expert review	of the
		properties of the substance. There are no reports of human respiratory sensitization.	
Repeated dose to	oxicity :	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	on :	Cardiac sensitisation threshold limit : 140000 mg/m3	
1,1-Difluoroethane (HFC-152a	a)		
Inhalation 4 h LC		> 437500 ppm , rat	
Inhalation 4 h No Observed Advers Concentration (N	se Effect	66400 ppm , rat	
Inhalation 4 h Lo Observed Advers Concentration (Lo	se Effect	175200 ppm , rat Respiratory effects Anaesthetic effects Central nervous system depression Narcosis	
Inhalation Low O Adverse Effect Concentration (Lu Inhalation No Ob Adverse Effect Concentration (N	OAEC) served :	150000 ppm , dog Cardiac sensitization 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
		9 / 13	



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	
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Material Safety Data Sheet DuPont[™] SUVA[®] MP39 Refrigerant Version 2.5 Revision Date 06/06/2012 Ref. 130000050993 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 1,1,1,2-Tetrafluoroethane) Class : 2.2 Labelling No. : 2.2 UN number IATA C : 3163 Proper shipping name





SUVA is a registered trademark of E. I. du Pont de Nemours and Company [®] DuPont's registered trademark 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,

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DuPont[™] SUVA[®] MP39 Refrigerant

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Revision Date 06/06/2012

Ref. 130000050993

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.

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DuPont[™] SUVA[®] 404A refrigerant

Version 2.4

Revision Date 06/06/2012

Ref. 13000000494

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

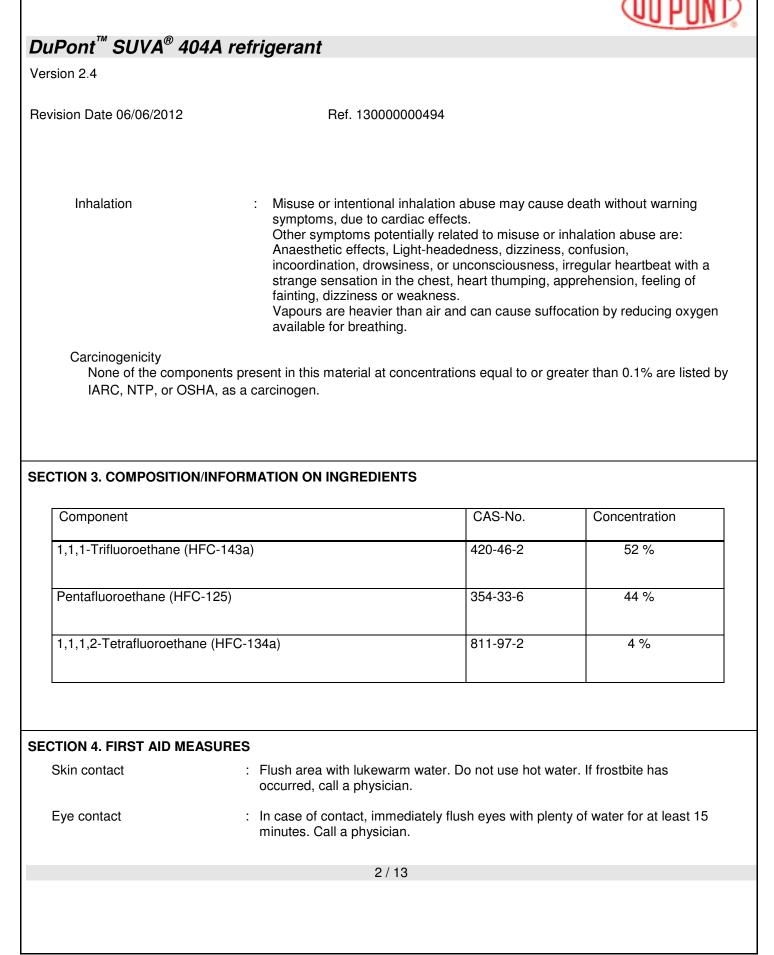
SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name Product Grade/Type	:	DuPont [™] SUVA [®] 404A refrigerant ASHRAE Refrigerant number designation: R-404A
Tradename/Synonym	:	HP62 404A
MSDS Number	:	13000000494
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information Medical Emergency Transport Emergency	: : :	1-800-441-7515 (outside the U.S. 1-302-774-1000) 1-800-441-3637 (outside the U.S. 1-302-774-1139) 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.

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.
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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.
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DuPont[™] SUVA[®] 404A refrigerant Version 2.4 Revision Date 06/06/2012 Ref. 13000000494 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. Selfcontained 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 cleanup. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up. Safeguards (Personnel) : Ventilate area, especially low or enclosed places where heavy vapours might

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

collect.

SECTION 7. HANDLING AND STORAGE



DuPont[™] SUVA[®] 404A refrigerant

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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 ℃. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present.
SECTION 8. EXPOSURE CONTRO	LS/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	
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UDant [™] SUVA® 101				
UFUIIL SUVA 404	IA refrigerar	nt		
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evision Date 06/06/2012		Ref. 1300000	00494	
Exposure Limit Values				
1,1,1-Trifluoroethane AEL *		1 000 nom	0 8 10 br TMA	
ALL	(DUPONT)	1,000 ppm	8 & 12 hr. TWA	
Pentafluoroethane				
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA	
1,1,1,2-Tetrafluoroeth				
AEL *	(DUPONT)	1,000 ppm	8 & 12 hr. TWA	
ECTION 9. PHYSICAL AND Form Color Odor Melting point Boiling point % Volatile Vapour Pressure Specific gravity Water solubility Vapour density Evaporation rate	: Liquefied : colourles : slight, et : Not avail : -46.2 °C : 100 % : 12,546 h : 1.05 at 2 : not deter	d gas ss her-like able for this mixt (-51.2 °F) Pa at 25 °C (77 °F) 5 °C (77 °F) mined °C (77 °F) and 10		
Form Color Odor Melting point Boiling point % Volatile Vapour Pressure Specific gravity Water solubility Vapour density	: Liquefied : colourles : slight, et : Not avail : -46.2 °C : 100 % : 12,546 h : 1.05 at 2 : not deter : 3.4 at 25 : > 1 (CCL4=1	d gas ss her-like able for this mixt (-51.2 °F) Pa at 25 °C (77 °F) 5 °C (77 °F) mined °C (77 °F) and 10	°F)	
Form Color Odor Melting point Boiling point % Volatile Vapour Pressure Specific gravity Water solubility Vapour density Evaporation rate	: Liquefied : colourles : slight, et : Not avail : -46.2 °C : 100 % : 12,546 h : 1.05 at 2 : not deter : 3.4 at 25 : > 1 (CCL4=1	d gas s her-like able for this mixt (-51.2 °F) Pa at 25 °C (77 °F) mined °C (77 °F) and 10 .0)	°F)	
Form Color Odor Melting point Boiling point % Volatile Vapour Pressure Specific gravity Water solubility Vapour density Evaporation rate	: Liquefied : colourles : slight, et : Not avail : -46.2 °C : 100 % : 12,546 h : 1.05 at 2 : not deter : 3.4 at 25 : > 1 (CCL4=1 D REACTIVITY : Stable at	d gas s her-like able for this mixt (-51.2 °F) Pa at 25 °C (77 °F) mined °C (77 °F) and 10 1.0)	°F) 013 hPa (Air=1.0)	
Form Color Odor Melting point Boiling point % Volatile Vapour Pressure Specific gravity Water solubility Vapour density Evaporation rate	: Liquefied : colourles : slight, et : Not avail : -46.2 °C : 100 % : 12,546 h : 1.05 at 2 : not deter : 3.4 at 25 : > 1 (CCL4=1 D REACTIVITY : Stable at	d gas s her-like able for this mixt (-51.2 °F) Pa at 25 °C (77 °F) mined °C (77 °F) and 10 1.0)	ੴ) 013 hPa (Air=1.0) tures and storage conditions.	
Form Color Odor Melting point Boiling point % Volatile Vapour Pressure Specific gravity Water solubility Vapour density Evaporation rate	: Liquefied : colourles : slight, et : Not avail : -46.2 °C : 100 % : 12,546 h : 1.05 at 2 : not deter : 3.4 at 25 : > 1 (CCL4=1 D REACTIVITY : Stable at	d gas her-like able for this mixt (-51.2 °F) Pa at 25 °C (77 °F) The construction of (77 °F) and 10 0 1.0) t normal temperation of flames and hi	ੴ) 013 hPa (Air=1.0) tures and storage conditions.	



DuPont[™] SUVA[®] 404A refrigerant

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Incompatibility : A	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
products b	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 : F	Polymerization will not occur.
SECTION 11. TOXICOLOGICAL INFOR	RMATION
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) Skin irritation	 300000 ppm , dog Cardiac sensitization 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
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DuPont[™] SUVA[®] 404A refri version 2.4	5
version 2.4	
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	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.
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DuPont [™] SUVA [®] 404A refri	gerant
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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) Skin irritation	 75000 ppm , dog Cardiac sensitization 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
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DuPont [™] SUVA [®] 404A refr	rigerant
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	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 INFORM	ATION
Aquatic Toxicity	
1,1,1-Trifluoroethane (HFC-143a) 96 h LC50	: Oncorhynchus mykiss (rainbow trout) > 100 mg/l
3011 2030	
	: 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.
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uPont [™] SU\	/A [®] 404A refr	rigerant	
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evision Date 06/06	5/2012	Ref. 13000000494	
40 L - E	050		
48 h E	650	: Daphnia magna (Water flea) > 200 mg/l Information given is based on data obtained from similar su	ubstances.
1,1,2-Tetrafluoroe	thane (HFC-134a)		
96 h L		: Oncorhynchus mykiss (rainbow trout) 450 mg/l	
72 h E	C50	: Algae > 118 mg/l	
		Information given is based on data obtained from similar su	ubstances.
48 h E	C50	: Daphnia magna (Water flea) 980 mg/l	
Environmental	Fate		
Biodeg	radability		(0 to 2
Biodeg	radability OSAL CONSIDER		ve to a
Biodeg	osal consider	ATIONS Can be used after re-conditioning. Recover by distillation or remover permitted waste disposal facility. Comply with applicable Federal,	ve to a
Biodeg ECTION 13. DISP Waste Disposal	osal consider	ATIONS Can be used after re-conditioning. Recover by distillation or remov permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.	ve to a
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Biodeg ECTION 13. DISP Waste Disposal Environmental H ECTION 14. TRAN DOT	radability OSAL CONSIDER lazards ISPORT INFORMA UN number Proper shipping Class Labelling No. UN number Proper shipping Class Class	ATIONS Can be used after re-conditioning. Recover by distillation or remove permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations. Empty pressure vessels should be returned to the supplier. ATION i 3337 name : Refrigerant gas R 404A i 2.2 i 3337 name : Refrigerant gas R 404A i 2.2 i 3337 name : Refrigerant gas R 404A i 2.2	ve to a
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Material Safety Data Shee	ət (QU POND
DuPont [™] SUVA [®] 404A	refrigerant	
Version 2.4		
Revision Date 06/06/2012	Ref. 13000000494	
Proper shi Class Labelling N	ipping name : Refrigerant gas R 404A : 2.2 No. : 2.2	
SECTION 15. REGULATORY INI	FORMATION	
SARA 313 Regulated Chemical(s)	: SARA 313: This material does not contain any chemical comp known CAS numbers that exceed the threshold (De Minimis) r established by SARA Title III, Section 313.	
California Prop. 65	: Chemicals known to the State of California to cause cancer, bi any other harm: none known	irth defects or
SECTION 16. OTHER INFORMA	TION	
	HMIS	
Health Flammability Reactivity/Physical hazard PPE	1 0 1 Personal Protection rating to be supplied by user depending on use conditions.	
Before use read DuPont's sa	the local DuPont office or DuPont's nominated distributors.	
the date of its publication. The storage, transportation, disponding information relates only to the	this Safety Data Sheet is correct to the best of our knowledge, inform he information given is designed only as a guidance for safe handling osal and release and is not to be considered a warranty or quality sp he specific material designated and may not be valid for such materia in any process, unless specified in the text.	g, use, processing, pecification. The
Significant change from prev	vious version is denoted with a double bar.	
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DuPont[™] SUVA[®] 404A refrigerant

Version 2.4

Revision Date 06/06/2012

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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 Product Grade/Type	:	DuPont [™] SUVA [®] 410A Refrigerant ASHRAE Refrigerant number designation: R-410A
Tradename/Synonym	:	SUVA [®] 9100 R-410A Suva [®] R-410A 410A HFC 410A
MSDS Number	:	13000050990
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information Medical Emergency Transport Emergency	: : :	1-800-441-7515 (outside the U.S. 1-302-774-1000) 1-800-441-3637 (outside the U.S. 1-302-774-1139) 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

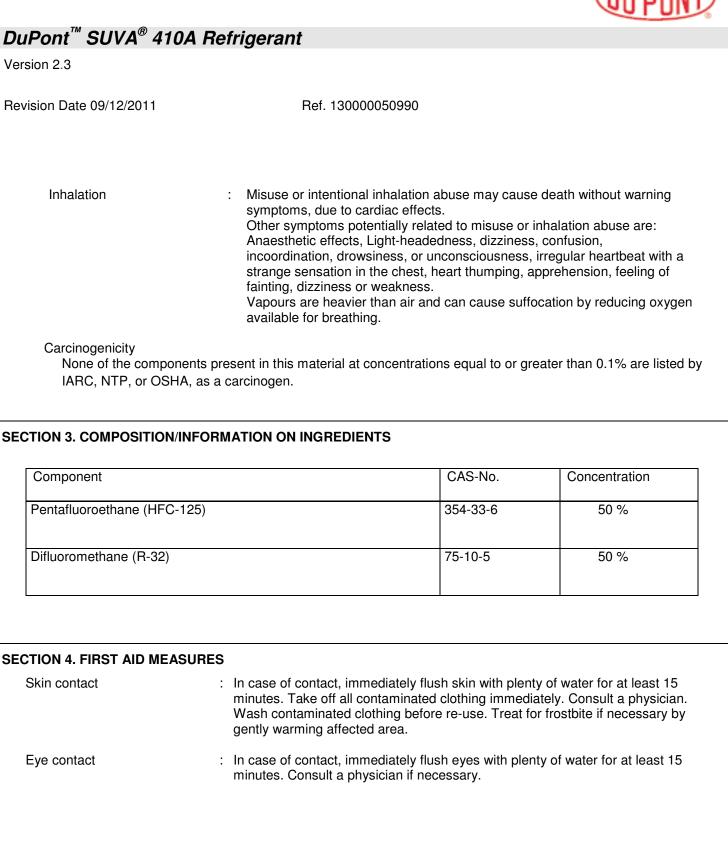
 Skin
 :

 Eyes
 :

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

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DuPont[™] SUVA[®] 410A Refrigerant

Version 2.3

Revision Date 09/12/2011	Ref. 13000050990
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.

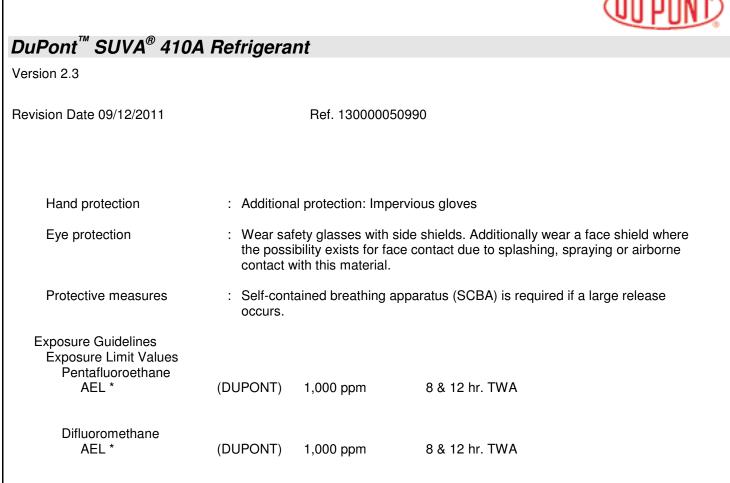
SECTION 5. FIREFIGHTING MEASURES

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

Material Safety Data Sheet		QU POND.
DuPont [™] SUVA [®] 410A F	Refrigerant	
Version 2.3		
Revision Date 09/12/2011	Ref. 13000050990	
Fire and Explosion Hazard	: Cylinders are equipped with pressure and temperature restill rupture under fire conditions. Decomposition may oc welding or soldering torch flame with high concentrations result in visible changes in the size and colour of the torce effect will only occur in concentrations of product well ab recommended exposure limit. Therefore stop all work and disperse refrigerant vapors from the work area before us. This substance is not flammable in air at temperatures u deg. F) at atmospheric pressure. However, mixtures of th high concentrations of air at elevated pressure and/or temperatures of the come combustible in the presence of an ignition source can also become combustible in an oxygen enriched environmentations greater than that in air). Whether a mixture substance and air, or this substance in an oxygen enriched environcembustible depends on the inter-relationship o 2) the pressure, and 3) the proportion of oxygen in the methic substance should not be allowed to exist with air abor pressure or at high temperatures; or in an oxygen enriched example this substance should NOT be mixed with air un testing or other purposes. Experimental data have also be indicate combustibility of this substance in the presence concentrations of chlorine.	cur. Contact of s of refrigerant can ch flame. This flame ove the id ventilate to sing any open flames. p to 100 deg. C (212 his substance with imperature can ce. This substance vironment (oxygen re containing this led atmosphere f 1) the temperature hixture. In general, ove atmospheric ed environment. For nder pressure for leak been reported which
Suitable extinguishing media	: Use extinguishing measures that are appropriate to loca the surrounding environment.	circumstances and
Firefighting Instructions	: Cool containers / tanks with water spray. Self-contained (SCBA) is required if containers rupture and contents are conditions. Water runoff should be contained and neutralized prior	e released under fire
	ASE MEASURES A MEASURES and HANDLING (PERSONNEL) sections before L PROTECTIVE EQUIPMENT during clean-up.	proceeding with clean-

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

Material Safety Data Sheet			
DuPont [™] SUVA [®] 410A F	Refrigerant		
Version 2.3			
Revision Date 09/12/2011	Ref. 13000050990		
SECTION 7. HANDLING AND STO	PAGE		
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 ℃ (<126 ℉)		
SECTION 8. EXPOSURE CONTRO	DLS/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.		
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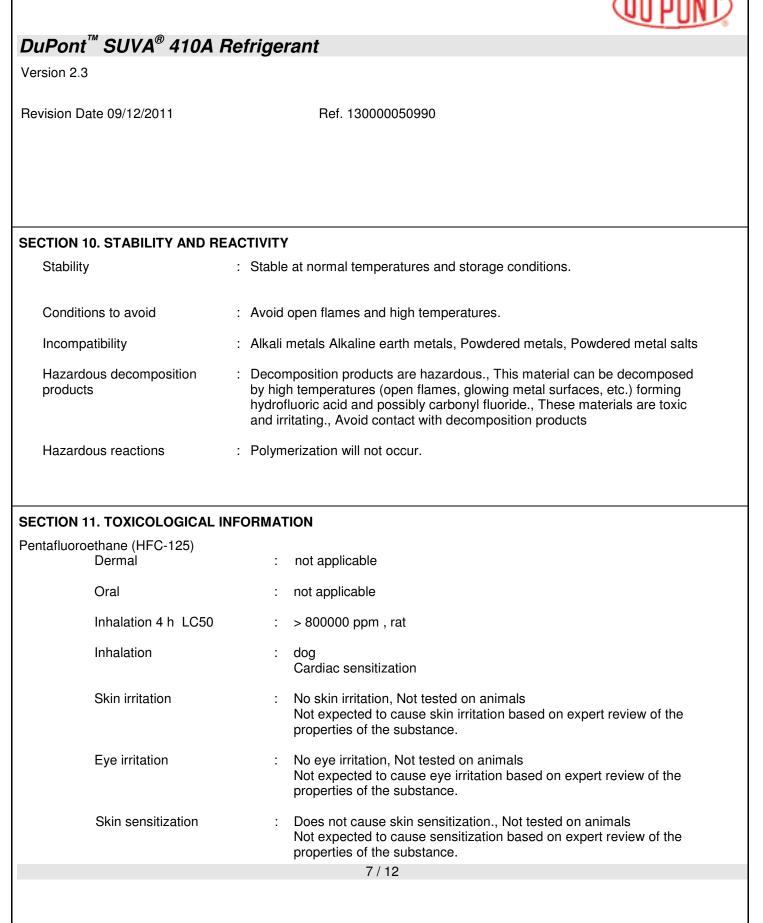
* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

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

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Material Safety D	ata Sheet
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DuPont [™] SUVA® 410A Ref	rigerant
Version 2.3	
Revision Date 09/12/2011	Ref. 13000050990
	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.
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DuPont [™] SUVA [®] 410A Ref	gerant	
Version 2.3	-	
Revision Date 09/12/2011	Ref. 130000050990	
	There are no reports of human respira	tory sensitization.
Repeated dose toxicity	: Inhalation	
	rat	
	No toxicologically significant effects w	ere found.
Carcinogenicity	: Overall weight of evidence indicates the	nat the substance is not
	carcinogenic.	
Mutagenicity	: Did not cause genetic damage in anim	
	Did not cause genetic damage in cultu Did not cause genetic damage in cultu	
	ç ç	
Reproductive toxicity	: Animal testing showed no reproductive Information given is based on data ob	
	-	
Teratogenicity	: Animal testing showed no development	ntal toxicity.
SECTION 12. ECOLOGICAL INFORM	ΓΙΟΝ	
Aquatic Toxicity		
Pentafluoroethane (HFC-125)		04.0
96 h LC50	: Oncorhynchus mykiss (rainbow trout) Information given is based on data ob	
	C C	
96 h LC50	: Danio rerio (zebra fish) > 200 mg/l Information given is based on data ob	tained from similar substances
96 h LC50	: Oncorhynchus mykiss (rainbow trout) Information given is based on data ob	
	information given is based on data ob	lamed nom similar substances.
72 h EC50	: Pseudokirchneriella subcapitata (gree	
	Information given is based on data ob	tameu nom sinnar substances.
72 h EC50	: Pseudokirchneriella subcapitata (gree	
	Information given is based on data ob	lameu irom similar sudstances.
96 h EC50	: Algae 142 mg/l	
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DuPont [™] SUV/	A® 410A Refriger	rant		
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		Information given is based on data obtained from similar substances.		
48 h EC	:50 :	Daphnia magna (Water flea) > 200 mg/l Information given is based on data obtained from similar substances.		
48 h EC	:50 :	Daphnia magna (Water flea) > 97.9 mg/l Information given is based on data obtained from similar substances.		
Difluoromethane (R-3 96 h LC		Fish 1,507 mg/l		
96 h EC	:50 :	Algae 142 mg/l		
48 h EC	48 h EC50 : Daphnia 652 mg/l			
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. TRANS	SPORT INFORMATION			
DOT	UN number	: 3163		
IATA_C	Proper shipping name Class Labelling No. UN number Proper shipping name	Difluoromethane) : 2.2 : 2.2 : 3163 : Liquefied gas, n.o.s. (Pentafluoroethane, Difluoromethane)		
IMDG	Class Labelling No. UN number	: 2.2 : 2.2 : 3163		
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Material Safety Data Sh	eet		QU PONT?
DuPont [™] SUVA [®] 410	A Refrigerant	t	
Version 2.3			
Revision Date 09/12/2011		Ref. 130000050990	
Proper s Class Labellin	shipping name g No.	 : Liquefied gas, n.o.s. (Pen Difluoromethane) : 2.2 : 2.2 	tafluoroethane,
SECTION 15. REGULATORY	INFORMATION		
SARA 313 Regulated Chemical(s)	known CAS	This material does not contain any S numbers that exceed the threshol I by SARA Title III, Section 313.	
California Prop. 65		known to the State of California to e arm: none known	cause cancer, birth defects or
PA Right to Know Regulated Chemical(s)	a concentra	s on the Pennsylvania Hazardous S ation of 1% or more (0.01% for Spe s): Difluoromethane	
NJ Right to Know Regulated Chemical(s)	present at a	s on the New Jersey Workplace Ha a concentration of 1% or more (0.19 s carcinogens, mutagens or teratog	% for substances
SECTION 16. OTHER INFORM	ΙΑΤΙΟΝ		
		HMIS	
Health Flammability Reactivity/Physical hazard PPE	: Personal Pro	1 0 1 otection rating to be user depending on use	
Before use read DuPont's	safety information.	nt de Nemours and Company nt office or DuPont's nominated dis 11 / 12	tributors.
		11712	



DuPont[™] SUVA[®] 410A Refrigerant

Version 2.3

Revision Date 09/12/2011

Ref. 130000050990

[®] 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.



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 Product Grade/Type	:	DuPont [™] SUVA [®] HP80 Refrigerant ASHRAE Refrigerant number designation: R-402A
MSDS Number	:	13000050991
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information Medical Emergency Transport Emergency	:	1-800-441-7515 (outside the U.S. 1-302-774-1000) 1-800-441-3637 (outside the U.S. 1-302-774-1139) 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.



DuPont [™] SUVA [®] HP	80 Refrigerant					
Version 2.1						
Revision Date 08/02/2011	Ref. 130000	0050991				
Inhalation	 alation 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 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 oxygavailable for breathing. 					
Carcinogenicity None of the components NTP, or OSHA, as a carc	present in this material at concer inogen.	ntrations equal to or greater	than 0.1% are listed by IARC,			
SECTION 3. COMPOSITION/	INFORMATION ON INGREDIEN	NTS				
Component		CAS-No.	Concentration			
Pentafluoroethane (HFC-	125)	354-33-6	60 %			
Chlorodifluoromethane (H	ICFC-22)	75-45-6	38 %			
Propane		74-98-6	2 %			
SECTION 4. FIRST AID MEA	SURES					
		ntaminated clothing immedi othing before re-use. Treat fo	ately. Consult a physician.			
Eye contact	: In case of contact, imm minutes. Consult a physical sectors of the sector of the sec	ediately flush eyes with pler sician if necessary.	ity of water for at least 15			
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DuPont[™] SUVA[®] HP80 Refrigerant

Version 2.1

Revision Date 08/02/2011	Ref. 13000050991
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.

DuPont[™] SUVA[®] HP80 Refrigerant Version 2.1 Revision Date 08/02/2011 Ref. 130000050991 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. Selfcontained 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.

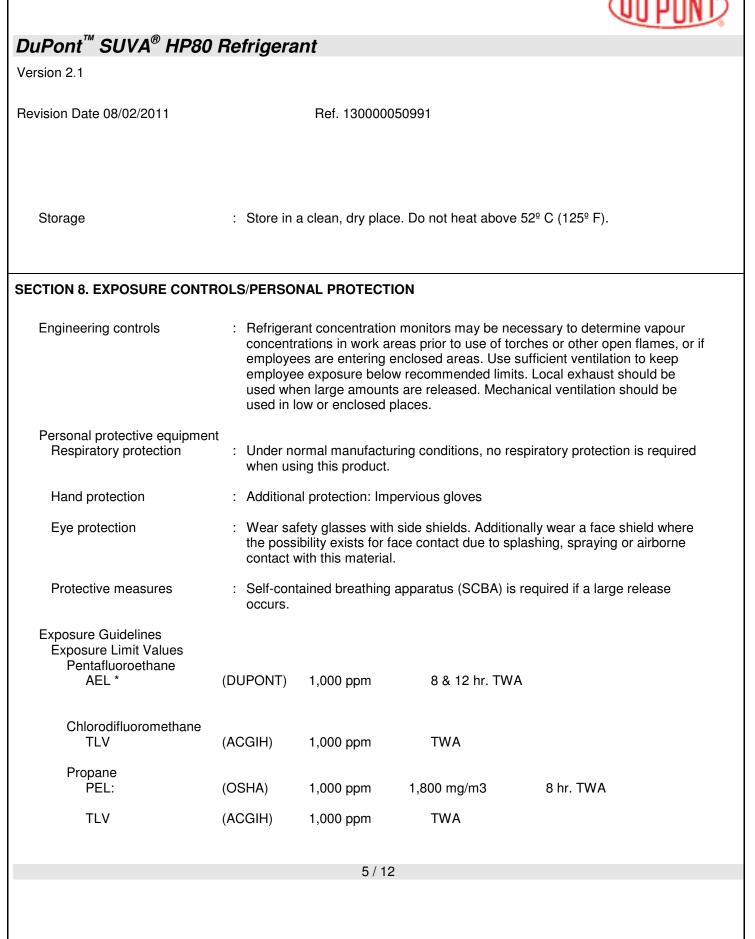
SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with cleanup. 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. 4/12





DuPont[™] SUVA[®] HP80 Refrigerant

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* 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

Color:Odor:pH:Boiling point:% Volatile:Vapour Pressure:Specific gravity:Water solubility:Vapour density:Evaporation rate:	Liquefied gas clear, colourless slight, ether-like neutral -48.9 °C (-56.0 °F) 100 % 13,499 hPa at 25 °C (77 °F) 1.15 at 25 °C (77 °F) not determined 3.6 at 25 °C (77 °F) and 1013 hPa (Air = 1.0) > 1 (CCL4=1.0)
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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.				
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DuPont [™] SUVA [®] HP80 Ref	frigerant
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SECTION 11. TOXICOLOGICAL INFO	RMATION
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.
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Revision Date 08/02/2011	Ref. 13000050991
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.
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	t [™] SUVA [®] HP80 Ref	nge	rant
Version 2.	1		
Revision [Date 08/02/2011		Ref. 130000050991
	Further information		Cardiac sensitisation threshold limit : 175000 mg/m3
Dronono		•	Cardiac sensitisation threshold himt . 175000 mg/m5
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 INFORM	ΔΤΙΟΝ	J
	tic Toxicity		
Pentafluor	oethane (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
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DuPont [™] SUVA [®] HP80 F	efrigerant
Version 2.1	
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	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 CONSIDE	RATIONS
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 INFOR	ΜΑΤΙΟΝ
DOT UN number	: 3163
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DuPont [™] SUV	A [®] HP80 Rei	frigerant	t		
Version 2.1					
Revision Date 08/02/	/0011		Def 100	000050991	
Revision Date 06/02/	2011		Rel. 130	000050991	
	Proper chipping	nama		Liquefied and no. (Chlorediflueremethane	`
	Proper shipping	Jilaille	•	Liquefied gas, n.o.s. (Chlorodifluoromethane Pentafluoroethane)	;,
	Class		:	2.2	
	Labelling No.			2.2	
IATA_C	UN number		:	3163	
	Proper shipping	g name	:	Liquefied gas, n.o.s. (Chlorodifluoromethane),
	Class			Pentafluoroethane) 2.2	
	Labelling No.			2.2	
IMDG	UN number			3163	
	Proper shipping	name		Liquefied gas, n.o.s. (Chlorodifluoromethane).
	1 11 3	•		Pentafluoroethane)	,
	Class			2.2	
	Labelling No.		:	2.2	
SECTION 15. REGU		MATION			
SARA 313 Reg	gulated :	Chlorodifluc	orometha	ane	
Chemical(s)					
California Prop		Chamicala	known to	the State of California to cause cancer, birth	dofoata ar
Gailloffila Prop	. 65 .	any other h		-	delects of
		any other n			
PA Right to Kr	now :	Substances	s on the I	Pennsylvania Hazardous Substances List pre	sent at
Regulated Che	emical(s)			% or more (0.01% for Special Hazardous	
		Substances	s): Propa	ne , Chlorodifluoromethane	
N I Diabt to Ka		Cubatanaaa	a a a tha M		- 1 :-+
NJ Right to Kn Regulated Che				New Jersey Workplace Hazardous Substance tration of 1% or more (0.1% for substances) LISI
negulated One	enneai(s)			gens, mutagens or teratogens): Propane,	
		Chlorodifluo			
		2			
SECTION 16. OTHER	R INFORMATION	1			
			HMIS		
			1	1 / 12	

Material Safety Data Sheet 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. SUVA is a registered trademark of E. I. du Pont de Nemours and Company 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. 12/12



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 Product Grade/Type	:	DuPont [™] SUVA [®] HP81 Refrigerant ASHRAE Refrigerant number designation: R-402B
MSDS Number	:	13000050992
Product Use	:	Refrigerant
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information Medical Emergency Transport Emergency	:	1-800-441-7515 (outside the U.S. 1-302-774-1000) 1-800-441-3637 (outside the U.S. 1-302-774-1139) 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.
Eves	:	Contact with liquid or refrigerated gas can cause cold burns and frostbite.



DuPont [™] SUVA [®] HP8	81 Refrigerant		
Version 2.2			
Revision Date 09/12/2011	Ref. 130	0000050992	
Inhalation	symptoms, due to Other symptoms Anaesthetic effec incoordination, dr strange sensatior fainting, dizziness	potentially related to misuse or ets, Light-headedness, dizziness rowsiness, or unconsciousness, n in the chest, heart thumping, a s or weakness. vier than air and can cause suffe	inhalation abuse are: , confusion, irregular heartbeat with a pprehension, feeling of
NTP, or OSHA, as a carci	nogen.	ncentrations equal to or greater	than 0.1% are listed by IARC,
SECTION 3. COMPOSITION/I	NFORMATION ON INGREE	DIENTS	
Component		CAS-No.	Concentration
Chlorodifluoromethane (H	ICFC-22)	75-45-6	60 %
Pentafluoroethane (HFC-	125)	354-33-6	38 %
Propane		74-98-6	2 %
		i	
SECTION 4. FIRST AID MEAS	SURES		
Skin contact	minutes. Take off a	immediately flush skin with plen Il contaminated clothing immedi d clothing before re-use. Treat fo acted area.	ately. Consult a physician.
Eye contact		immediately flush eyes with pler physician if necessary.	nty of water for at least 15
		2/12	



DuPont[™] SUVA[®] HP81 Refrigerant

Version 2.2

Revision Date 09/12/2011	Ref. 13000050992
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.
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DuPont[™] SUVA[®] HP81 Refrigerant Version 2.2 Revision Date 09/12/2011 Ref. 130000050992 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. Selfcontained breathing apparatus (SCBA) is required if containers rupture and

SECTION 6. ACCIDENTAL RELEASE MEASURES

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

contents are released under fire conditions.

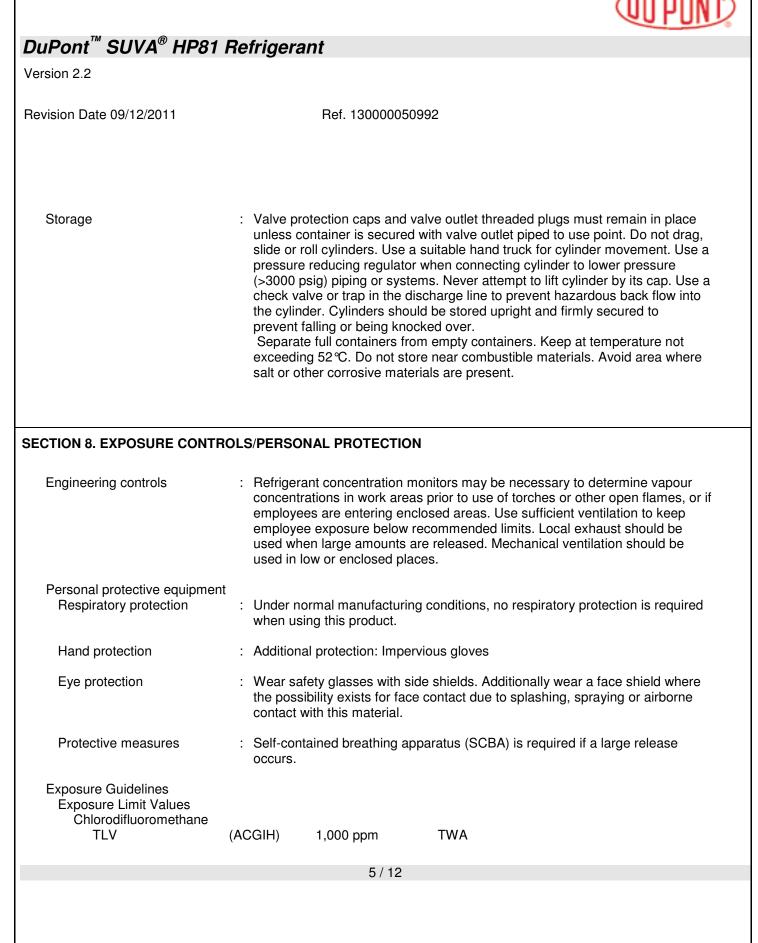
Water runoff should be contained and neutralized prior to release.

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.
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Material Safety Data Sheet DuPont[™] SUVA[®] HP81 Refrigerant Version 2.2 Revision Date 09/12/2011 Ref. 130000050992 Pentafluoroethane AEL * (DUPONT) 1,000 ppm 8 & 12 hr. TWA Propane PEL: 8 hr. TWA (OSHA) 1,000 ppm 1,800 mg/mTLV (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 clear, colourless Color Odor : slight, ether-like pН : neutral Boiling point : -47.0 °C (-52.6 °F) % Volatile : 100 % Vapour Pressure : 12,591 hPa at 25 ℃ (77 °F) Specific gravity : 1.15 at 25 ℃ (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 : Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming products 6/12



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	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 INI	FORMATION
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.
Dopostod doop tovicity	: Inhalation
Repeated dose toxicity	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.
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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.
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DuPon	t [™] SUVA [®] HP81 Ref	irige	erant
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	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
05071011			
	12. ECOLOGICAL INFORM	ATIO	N
	oromethane (HCFC-22) 96 h LC50	:	Zebra fish 777 mg/l
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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 si	milar substances.
96 h LC50	: Danio rerio (zebra fish) > 200 mg/l Information given is based on data obtained from si	milar substances.
96 h LC50	: Oncorhynchus mykiss (rainbow trout) 450 mg/l Information given is based on data obtained from si	milar substances.
72 h EC50	: Pseudokirchneriella subcapitata (green algae) > 118 Information given is based on data obtained from si	
72 h EC50	: Pseudokirchneriella subcapitata (green algae) > 114 Information given is based on data obtained from si	
96 h EC50	: Algae 142 mg/l Information given is based on data obtained from si	milar substances.
48 h EC50	: Daphnia magna (Water flea) > 200 mg/l Information given is based on data obtained from si	milar substances.
48 h EC50	: Daphnia magna (Water flea) > 97.9 mg/l Information given is based on data obtained from si	milar substances.
Environmental Fate		
Chlorodifluoromethane (HCFC-22) Biodegradability	: According to the results of tests of biodegradability t readily biodegradable.	his product is not
SECTION 13. DISPOSAL CONSIDEF Waste Disposal :	ATIONS Can be used after re-conditioning. Recover by distillation or permitted waste disposal facility. Comply with applicable Fe State/Provincial and Local Regulations.	
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Material Safety [Data Sheet
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Material Safety D	Data Sheet			QU POND.
DuPont[™] SUVA Version 2.2	A [®] HP81 Rei	frigerant		
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Environmental Ha	zards :	Empty pressure ve	essels should be returned to the supplier.	
SECTION 14. TRANS	PORT INFORM	ATION		
DOT	UN number		: 3163	
IATA_C	Proper shipping Class Labelling No. UN number		 Liquefied gas, n.o.s. (Chlorodifluoromet Pentafluoroethane) 2.2 2.2 3163 	thane,
IMDG	Proper shipping Class Labelling No. UN number Proper shipping Class Labelling No.	name	 Liquefied gas, n.o.s. (Chlorodifluoromet Pentafluoroethane) 2.2 2.2 3163 Liquefied gas, n.o.s. (Chlorodifluoromet Pentafluoroethane) 2.2 2.2 2.2 	
SECTION 15. REGUL	ATORY INFORM	ΙΑΤΙΟΝ		
SARA 313 Reg Chemical(s)	julated :	Chlorodifluorometh	hane	
California Prop	. 65 :	Chemicals known any other harm: no	to the State of California to cause cancer, one known	birth defects or
PA Right to Kn Regulated Che		a concentration of	e Pennsylvania Hazardous Substances Lis 1% or more (0.01% for Special Hazardou bane , Chlorodifluoromethane	
NJ Right to Kno Regulated Che			e New Jersey Workplace Hazardous Subs entration of 1% or more (0.1% for substance	
			11/12	

