

SAFETY DATA SHEET**Freon™ MP66 refrigerant**

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
 Date of first issue: 02/27/2017

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**Ingredients with workplace control parameters**

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Chlorodifluoromethane	75-45-6	TWA	1,000 ppm	ACGIH
		ST	1,250 ppm 4,375 mg/m ³	NIOSH REL
		TWA	1,000 ppm 3,500 mg/m ³	NIOSH REL
1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0	TWA	1,000 ppm	US WEEL
1,1-Difluoroethane	75-37-6	TWA	1,000 ppm	US WEEL

Engineering measures : Ensure adequate ventilation, especially in confined areas. Minimize workplace exposure concentrations.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection
Material : Heat resistant gloves

Remarks : Choose gloves to protect hands against chemicals depending on the concentration specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!

Eye protection : Wear the following personal protective equipment:
Chemical resistant goggles must be worn.
Face-shield

Skin and body protection : Skin should be washed after contact.

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

Protective measures : Wear cold insulating gloves/ face shield/ eye protection.

Hygiene measures : Ensure that eye flushing systems and safety showers are located close to the working place.
When using do not eat, drink or smoke.
Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Liquefied gas

Color : colorless

Odor : slight, ether-like

Odor Threshold : No data available

pH : No data available

Melting point/freezing point : No data available

Initial boiling point and boiling range : -30.5 °F / -34.7 °C (1,013 hPa)

Flash point : Not applicable

Evaporation rate : > 1 (CCL4=1.0)

Flammability (solid, gas) : Will not burn

Upper explosion limit / Upper flammability limit : Upper flammability limit
Method: ASTM E681
None.

Lower explosion limit / Lower flammability limit : Lower flammability limit
Method: ASTM E681
None.

Vapor pressure : 6,890 hPa (77 °F / 25 °C)

Relative vapor density : No data available

Relative density : 1.19 (77 °F / 25 °C)

Density : 1.186 g/cm³ (77 °F / 25 °C)
(as liquid)

Solubility(ies)
Water solubility : 1.0 g/l (77 °F / 25 °C)

Partition coefficient: n-octanol/water : Not applicable

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

Autoignition temperature : 1265 °F / 685 °C
Decomposition temperature : No data available
Viscosity
 Viscosity, kinematic : Not applicable
Explosive properties : Not explosive
Oxidizing properties : The substance or mixture is not classified as oxidizing.
Particle size : Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity : Not classified as a reactivity hazard.
Chemical stability : Stable if used as directed. Follow precautionary advice and avoid incompatible materials and conditions.
Possibility of hazardous reactions : Can react with strong oxidizing agents.
Conditions to avoid : Heat, flames and sparks.
Incompatible materials : Oxidizing agents
Hazardous decomposition products : No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Skin contact
Eye contact

Acute toxicity

Not classified based on available information.

Components:

Chlorodifluoromethane:

Acute inhalation toxicity : LC50 (Mouse): > 150000 ppm
Exposure time: 4 h
Test atmosphere: gas

Lowest observed adverse effect concentration (Dog): 50000 ppm
Test atmosphere: gas
Symptoms: Cardiac sensitization

No observed adverse effect concentration (Dog): 25000 ppm
Test atmosphere: gas

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

Symptoms: Cardiac sensitization

Cardiac sensitisation threshold limit (Dog): 175,000 mg/m³

Test atmosphere: gas

Symptoms: Cardiac sensitization

1-Chloro-1,2,2,2-tetrafluoroethane:

Acute inhalation toxicity : LC50 (Rat): > 230000 ppm
Exposure time: 4 h
Test atmosphere: gas

Lowest observed adverse effect concentration (Dog): 25000 ppm

Test atmosphere: gas

Symptoms: Cardiac sensitization

No observed adverse effect concentration (Dog): 10000 ppm

Test atmosphere: gas

Symptoms: Cardiac sensitization

Cardiac sensitisation threshold limit (Dog): 140,000 mg/m³

Test atmosphere: gas

Symptoms: Cardiac sensitization

1,1-Difluoroethane:

Acute inhalation toxicity : LC50 (Rat): > 437500 ppm
Exposure time: 4 h
Test atmosphere: gas

No observed adverse effect concentration (Dog): 50000 ppm

Test atmosphere: gas

Symptoms: Cardiac sensitization

Lowest observed adverse effect concentration (Dog): 150000 ppm

Test atmosphere: gas

Symptoms: Cardiac sensitization

Cardiac sensitisation threshold limit (Dog): 405,000 mg/m³

Test atmosphere: gas

Symptoms: Cardiac sensitization

Skin corrosion/irritation

Not classified based on available information.

Serious eye damage/eye irritation

Not classified based on available information.

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

Respiratory sensitization

Not classified based on available information.

Components:

Chlorodifluoromethane:

Routes of exposure : Skin contact
Species : Not tested on animals
Result : negative

1-Chloro-1,2,2,2-tetrafluoroethane:

Routes of exposure : Skin contact
Species : Not tested on animals
Result : negative

Species : Not tested on animals
Result : negative

1,1-Difluoroethane:

Species : Rat
Result : negative

Germ cell mutagenicity

Not classified based on available information.

Components:

Chlorodifluoromethane:

Germ cell mutagenicity - Assessment : Weight of evidence does not support classification as a germ cell mutagen.

1-Chloro-1,2,2,2-tetrafluoroethane:

Germ cell mutagenicity - Assessment : Weight of evidence does not support classification as a germ cell mutagen.

1,1-Difluoroethane:

Germ cell mutagenicity - Assessment : Weight of evidence does not support classification as a germ cell mutagen.

Carcinogenicity

Not classified based on available information.

Components:

Chlorodifluoromethane:

Carcinogenicity - Assessment : Weight of evidence does not support classification as a carcinogen

1-Chloro-1,2,2,2-tetrafluoroethane:

Carcinogenicity - Assessment : Weight of evidence does not support classification as a carcinogen

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

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1,1-Difluoroethane:

|| Carcinogenicity - Assessment : Weight of evidence does not support classification as a carcinogen

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Components:

Chlorodifluoromethane:

|| Reproductive toxicity - Assessment : Weight of evidence does not support classification for reproductive toxicity

1,1-Difluoroethane:

|| Reproductive toxicity - Assessment : Weight of evidence does not support classification for reproductive toxicity

STOT-single exposure

Not classified based on available information.

STOT-repeated exposure

Not classified based on available information.

Components:

Chlorodifluoromethane:

|| Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

1-Chloro-1,2,2,2-tetrafluoroethane:

|| Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

1,1-Difluoroethane:

|| Assessment : No significant health effects observed in animals at concentrations of 1 mg/l/6h/d or less.

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

Repeated dose toxicity

Components:

Chlorodifluoromethane:

Species : Mouse
NOAEL : 10000 ppm
LOAEL : 50000 ppm
Application Route : inhalation (gas)
Exposure time : 581 d
Remarks : No significant adverse effects were reported

1-Chloro-1,2,2,2-tetrafluoroethane:

Species : Rat
NOAEL : 5000 ppm
LOAEL : 15000 ppm
Application Route : inhalation (gas)
Exposure time : 90 d
Method : OECD Test Guideline 413
Remarks : No significant adverse effects were reported

1,1-Difluoroethane:

Species : Rat
NOAEL : 67.485 mg/l
Application Route : inhalation (vapor)
Exposure time : 104 Weeks
Remarks : No significant adverse effects were reported

Aspiration toxicity

Not classified based on available information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Chlorodifluoromethane:

Toxicity to fish : LC50 (Zebrafish): 777 mg/l
Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 433 mg/l
Exposure time: 48 h
Toxicity to algae : EC50 (algae): 250 mg/l
Exposure time: 96 h

1-Chloro-1,2,2,2-tetrafluoroethane:

Ecotoxicology Assessment

Acute aquatic toxicity : No toxicity at the limit of solubility.

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

Chronic aquatic toxicity : No toxicity at the limit of solubility.

1,1-Difluoroethane:

Toxicity to fish : LC50 (Fish): 295.78 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia): 146.7 mg/l
Exposure time: 48 h

Toxicity to algae : EC50 (algae): 47.76 mg/l
Exposure time: 96 h

Ecotoxicology Assessment

Acute aquatic toxicity : Harmful to aquatic life.

Chronic aquatic toxicity : This product has no known ecotoxicological effects.

Persistence and degradability

Components:

Chlorodifluoromethane:

Biodegradability : Result: Not readily biodegradable.

1,1-Difluoroethane:

Biodegradability : Result: Not readily biodegradable.

Bioaccumulative potential

Components:

1-Chloro-1,2,2,2-tetrafluoroethane:

Partition coefficient: n-octanol/water : log Pow: 1.67

1,1-Difluoroethane:

Partition coefficient: n-octanol/water : log Pow: -0.125

Mobility in soil

No data available

Other adverse effects

Components:

Chlorodifluoromethane:

Ozone-Depletion Potential : 0.055
Where a range of ODPs is indicated, the highest value in that range shall be used for the purposes of the Protocol. The ODPs listed as a single value have been determined from

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

calculations based on laboratory measurements. Those listed as a range are based on estimates and are less certain. The range pertains to an isomeric group. The upper value is the estimate of the ODP of the isomer with the highest ODP, and the lower value is the estimate of the ODP of the isomer with the lowest ODP.

Regulation: UNEP - Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer (Update: 2016-11-23)

Group: Annex C - Group I: HCFCs (consumption and production)

0.055

Includes all isomers of the substance, regardless of whether the isomer is explicitly listed on its own.

Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class II Substances (Update: 2014-10-28)

1-Chloro-1,2,2,2-tetrafluoroethane:

Ozone-Depletion Potential : 0.022

Where a range of ODPs is indicated, the highest value in that range shall be used for the purposes of the Protocol. The ODPs listed as a single value have been determined from calculations based on laboratory measurements. Those listed as a range are based on estimates and are less certain. The range pertains to an isomeric group. The upper value is the estimate of the ODP of the isomer with the highest ODP, and the lower value is the estimate of the ODP of the isomer with the lowest ODP.

Regulation: UNEP - Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer (Update: 2016-11-23)

Group: Annex C - Group I: HCFCs (consumption and production)

0.022

Includes all isomers of the substance, regardless of whether the isomer is explicitly listed on its own.

Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class II Substances (Update: 2007-07-01)

Additional ecological information : No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

Empty pressure vessels should be returned to the supplier.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number : UN 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(Chlorodifluoromethane, 1-Chloro-1,2,2,2-tetrafluoroethane)
Class : 2.2
Packing group : Not assigned by regulation
Labels : 2.2

IATA-DGR

UN/ID No. : UN 3163
Proper shipping name : Liquefied gas, n.o.s.
(Chlorodifluoromethane, 1-Chloro-1,2,2,2-tetrafluoroethane)
Class : 2.2
Packing group : Not assigned by regulation
Labels : Non-flammable, non-toxic Gas
Packing instruction (cargo aircraft) : 200
Packing instruction (passenger aircraft) : 200

IMDG-Code

UN number : UN 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(Chlorodifluoromethane, 1-Chloro-1,2,2,2-tetrafluoroethane)
Class : 2.2
Packing group : Not assigned by regulation
Labels : 2.2
EmS Code : F-C, S-V
Marine pollutant : no

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

Not applicable for product as supplied.

Domestic regulation

49 CFR

UN/ID/NA number : UN 3163
Proper shipping name : Liquefied gas, n.o.s.
(Chlorodifluoromethane, 1-Chloro-1,2,2,2-tetrafluoroethane)
Class : 2.2
Packing group : Not assigned by regulation
Labels : NON-FLAMMABLE GAS
ERG Code : 126
Marine pollutant : no

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Gases under pressure
Simple Asphyxiant

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Chlorodifluoro-methane	75-45-6	61 %
1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0	28 %

US State Regulations

Pennsylvania Right To Know

Chlorodifluoromethane	75-45-6
1-Chloro-1,2,2,2-tetrafluoroethane	2837-89-0
1,1-Difluoroethane	75-37-6

California List of Hazardous Substances

Chlorodifluoromethane	75-45-6
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California Permissible Exposure Limits for Chemical Contaminants

Chlorodifluoromethane	75-45-6
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International Regulations

Montreal Protocol (Ozone Depleting Substances) : Chlorodifluoromethane
1-Chloro-1,2,2,2-tetrafluoroethane

SAFETY DATA SHEET



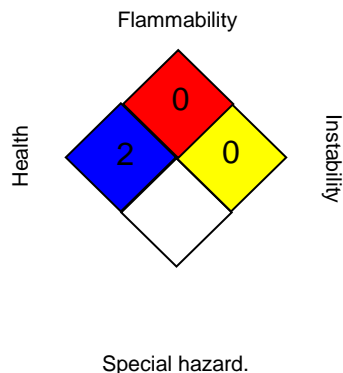
Freon™ MP66 refrigerant

Version 5.0 Revision Date: 11/01/2018 SDS Number: 1336476-00033 Date of last issue: 06/20/2018
Date of first issue: 02/27/2017

SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



HMIS® IV:

HEALTH	/	0
FLAMMABILITY		0
PHYSICAL HAZARD		3

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

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Chemours™ and the Chemours Logo are trademarks of The Chemours Company.

Before use read Chemours safety information.

For further information contact the local Chemours office or nominated distributors.

All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
US WEEL	:	USA. Workplace Environmental Exposure Levels (WEEL)
ACGIH / TWA	:	8-hour, time-weighted average
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
US WEEL / TWA	:	8-hr TWA

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health

SAFETY DATA SHEET



Freon™ MP66 refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: 06/20/2018
5.0	11/01/2018	1336476-00033	Date of first issue: 02/27/2017

Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to compile the Material Safety Data Sheet : Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, <http://echa.europa.eu/>

Revision Date : 11/01/2018

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

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 is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

US / Z8

**DuPont™ Suva® MP66 Refrigerant**

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

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

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : DuPont™ Suva® MP66 Refrigerant
Product Use : Refrigerant, For professional users only.

Restrictions on use : Do not use product for anything outside of the above specified uses
Manufacturer/Supplier : DuPont
1007 Market Street
Wilmington, DE 19898
United States of America

Product Information : +1-800-441-7515 (outside the U.S. +1-302-774-1000)
Medical Emergency : 1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency : CHEMTREC: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION**Product hazard category**

Gases under pressure

Liquefied gas

Label content

Pictogram :



Signal word

: Warning

**DuPont™ Suva® MP66 Refrigerant**

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

Hazardous warnings : Contains gas under pressure; may explode if heated.

Hazardous prevention measures : Protect from sunlight. Store in a well-ventilated place.

Other hazards

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.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Chlorodifluoromethane (HCFC-22)	75-45-6	61 %
1-Chloro-1,2,2,2-tetrafluoroethane (HCFC-124)	2837-89-0	28 %
1,1-Difluoroethane (HFC-152a)	75-37-6	11 %

SECTION 4. FIRST AID MEASURES

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

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.

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

**DuPont™ Suva® MP66 Refrigerant**

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

- Eye contact : Rinse immediately with plenty of water and seek medical advice.
- Ingestion : Is not considered a potential route of exposure.
- Most important symptoms/effects, acute and delayed : Anaesthetic effects Light-headedness irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness
- Protection of first-aiders : If potential for exposure exists refer to Section 8 for specific personal protective equipment.
- 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

- Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
- Unsuitable extinguishing media : No applicable data available.

**DuPont™ Suva® MP66 Refrigerant**

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

- Specific hazards** : 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.
- Special protective equipment for firefighters** : In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire.
- Further information** : Cool containers/tanks with water spray. Self-contained breathing apparatus (SCBA) is required if containers rupture and contents are released under fire conditions.
Water runoff should be contained and neutralized prior to release.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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

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

**DuPont™ Suva® MP66 Refrigerant**

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

- Environmental precautions : Should not be released into the environment. In accordance with local and national regulations.
- Spill Cleanup : Evaporates. Ventilate area using forced ventilation, especially low or enclosed places where heavy vapors might collect.
- Accidental Release Measures : Avoid open flames and high temperatures. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

SECTION 7. HANDLING AND STORAGE

- Handling (Personnel) : Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.
- Handling (Physical Aspects) : The product should not be mixed with air for leak testing or used with air for any other purpose above atmospheric pressure. Contact with chlorine or other strong oxidizing agents should also be avoided.
- Dust explosion class : Not applicable
- 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.
The product has an indefinite shelf life when stored properly.
- Storage period : > 10 yr
- Storage temperature : < 52 °C (< 126 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION


DuPont™ Suva® MP66 Refrigerant

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

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

Exposure Guidelines
 Exposure Limit Values

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

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

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

**DuPont™ Suva® MP66 Refrigerant**

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

Physical state	: gaseous
Form	: Liquefied gas
Color	: colourless
Odor	: slight, ether-like
Odor threshold	: No applicable data available.
pH	: neutral
Melting point/range	: No applicable data available.
Boiling point/boiling range	: Boiling point -34.6 °C (-30.3 °F)
Flash point	: does not flash
Evaporation rate	: > 1 (CCL4=1.0)
Flammability (solid, gas)	: No applicable data available.
Upper explosion limit	: Method: None per ASTM E681
Lower explosion limit	: Method: None per ASTM E681
Vapor pressure	: 8,224 hPa at 25 °C (77 °F)
Vapor density	: 3.3 at 25°C (77°F) and 1013 hPa (Air=1.0)
Specific gravity (Relative density)	: 1.19 at 25 °C (77 °F)
Water solubility	: 1.0 g/l at 25 °C (77 °F) at 1,013 hPa
Solubility(ies)	: No applicable data available.
Partition coefficient: n-octanol/water	: No applicable data available.
Auto-ignition temperature	: No applicable data available.
Ignition temperature	: 685 °C



DuPont™ Suva® MP66 Refrigerant

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

Decomposition temperature	:	No applicable data available.
Viscosity, kinematic	:	No applicable data available.
Viscosity	:	No applicable data available.
% Volatile	:	100 %

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Stable at normal ambient temperature and pressure.
Chemical stability	:	Stable under recommended storage conditions.
Possibility of hazardous reactions	:	Polymerization will not occur.
Conditions to avoid	:	Avoid open flames and high temperatures.
Incompatible materials	:	Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts
Hazardous decomposition products	:	Decomposition products are hazardous., This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrochloric and hydrofluoric acids, and possibly carbonyl halides., These materials are toxic and irritating., Avoid contact with decomposition products

SECTION 11. TOXICOLOGICAL INFORMATION

Chlorodifluoromethane (HCFC-22)		
Inhalation 4 h LC50	:	> 150000 ppm , Mouse
Inhalation Low Observed Adverse Effect Concentration (LOAEC)	:	50000 ppm , Dog Cardiac sensitization
Inhalation No Observed Adverse Effect Concentration	:	25000 ppm , Dog Cardiac sensitization
Skin irritation	:	Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	Not expected to cause eye irritation based on expert review of the properties of the substance.


DuPont™ Suva® MP66 Refrigerant

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

Skin sensitization	:	Not expected to cause sensitization based on expert review of the properties of the substance.
Repeated dose toxicity	:	Inhalation Mouse - gas No toxicologically significant effects were found.
Carcinogenicity	:	Not classifiable as a human carcinogen. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Animal testing did not show any mutagenic effects. Experiments showed mutagenic effects in cultured bacterial cells.
Reproductive toxicity	:	No toxicity to reproduction
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.
Further information	:	Cardiac sensitisation threshold limit : 175000 mg/m3

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

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
Inhalation No Observed Adverse Effect Concentration	:	10000 ppm , Dog Cardiac sensitization
Skin irritation	:	Not expected to cause skin irritation based on expert review of the properties of the substance.
Eye irritation	:	Not expected to cause eye irritation based on expert review of the properties of the substance.
Skin sensitization	:	Not expected to cause sensitization based on expert review of the properties of the substance. Does not cause respiratory sensitisation.,


DuPont™ Suva® MP66 Refrigerant

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

There are no reports of human respiratory sensitization.

- Repeated dose toxicity : Inhalation
multiple species
-
No toxicologically significant effects were found.
- Carcinogenicity : Not classifiable as a human carcinogen.
- Mutagenicity : Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Animal testing did not show any mutagenic effects.
- Teratogenicity : Animal testing showed no developmental toxicity.
- Further information : Cardiac sensitisation threshold limit : 140000 mg/m3

1,1-Difluoroethane (HFC-152a)

- Inhalation 4 h LC50 : > 437500 ppm , Rat
- Inhalation No Observed Adverse Effect Concentration : 50000 ppm , Dog
Cardiac sensitization
- Inhalation Low Observed Adverse Effect Concentration (LOAEC) : 150000 ppm , Dog
Cardiac sensitization
- Skin sensitization : Does not cause respiratory sensitisation., Rat
- Repeated dose toxicity : Inhalation
Rat
-
NOAEL: 67.485 mg/l
No toxicologically significant effects were found.
- Carcinogenicity : Not classifiable as a human carcinogen.
Animal testing did not show any carcinogenic effects.
- Mutagenicity : Animal testing did not show any mutagenic effects.
Did not cause genetic damage in cultured bacterial cells.
Tests on mammalian cell cultures showed mutagenic effects.
- Reproductive toxicity : No toxicity to reproduction
Animal testing showed no reproductive toxicity.


DuPont™ Suva® MP66 Refrigerant

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

Teratogenicity : Animal testing showed no developmental toxicity.

Further information : Cardiac sensitisation threshold limit : 405000 mg/m3

Carcinogenicity

The carcinogenicity classifications for this product and/or its ingredients have been determined according to HazCom 2012, Appendix A.6. The classifications may differ than those listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or those found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition).

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 12. ECOLOGICAL INFORMATION
Aquatic Toxicity
Chlorodifluoromethane (HCFC-22)

96 h LC50 : Zebra fish 777 mg/l

96 h EC50 : Algae 250 mg/l

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

1,1-Difluoroethane (HFC-152a)

96 h LC50 : Fish 295.78 mg/l

96 h EC50 : Algae 47.76 mg/l

48 h EC50 : Daphnia (water flea) 146.7 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 methods - : Can be used after re-conditioning. Recover by distillation or remove to a


DuPont™ Suva® MP66 Refrigerant

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

Product permitted waste disposal facility. Comply with applicable Federal, State/Provincial and Local Regulations.

Contaminated packaging : Empty pressure vessels should be returned to the supplier.

SECTION 14. TRANSPORT INFORMATION

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

SECTION 15. REGULATORY INFORMATION

TSCA	: On the inventory, or in compliance with the inventory
SARA 313 Regulated Chemical(s)	: 1-Chloro-1,2,2,2-tetrafluoroethane, Chlorodifluoromethane
PA Right to Know Regulated Chemical(s)	: Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Chlorodifluoromethane
NJ Right to Know Regulated Chemical(s)	: Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as



DuPont™ Suva® MP66 Refrigerant

Version 2.0

Revision Date 03/13/2015

Ref. 130000050994

carcinogens, mutagens or teratogens): 1-Chloro-1,2,2,2-tetrafluoroethane,
1,1-Difluoroethane, Chlorodifluoromethane

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

SECTION 16. OTHER INFORMATION

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.

Revision Date : 03/13/2015

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.

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