

**SAFETY DATA SHEET**  
**USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

**1. IDENTIFICATION**

**PRODUCT NAME:** Used Refrigerants and Refrigerant Blends

**SYNONYMS:** USED (RECOVERED) REFRIGERANT 11  
USED (RECOVERED) REFRIGERANT 12  
USED (RECOVERED) REFRIGERANT 13  
USED (RECOVERED) REFRIGERANT 14  
USED (RECOVERED) REFRIGERANT 22  
USED (RECOVERED) REFRIGERANT 23  
USED (RECOVERED) REFRIGERANT 32  
USED (RECOVERED) REFRIGERANT 113  
USED (RECOVERED) REFRIGERANT 114  
USED (RECOVERED) REFRIGERANT 115  
USED (RECOVERED) REFRIGERANT 116  
USED (RECOVERED) REFRIGERANT 123  
USED (RECOVERED) REFRIGERANT 124  
USED (RECOVERED) REFRIGERANT 125  
USED (RECOVERED) REFRIGERANT 134a  
USED (RECOVERED) REFRIGERANT 236fa  
USED (RECOVERED) REFRIGERANT 401A  
USED (RECOVERED) REFRIGERANT 401B  
USED (RECOVERED) REFRIGERANT 401C  
USED (RECOVERED) REFRIGERANT 402A  
USED (RECOVERED) REFRIGERANT 402B  
USED (RECOVERED) REFRIGERANT 404A  
USED (RECOVERED) REFRIGERANT 407A  
USED (RECOVERED) REFRIGERANT 407C  
USED (RECOVERED) REFRIGERANT 408A  
USED (RECOVERED) REFRIGERANT 409A  
USED (RECOVERED) REFRIGERANT 410A  
USED (RECOVERED) REFRIGERANT 417A  
USED (RECOVERED) REFRIGERANT 422A  
USED (RECOVERED) REFRIGERANT 422D  
USED (RECOVERED) REFRIGERANT 423A  
USED (RECOVERED) REFRIGERANT 437A  
USED (RECOVERED) REFRIGERANT 438A  
USED (RECOVERED) REFRIGERANT 500  
USED (RECOVERED) REFRIGERANT 502  
USED (RECOVERED) REFRIGERANT 503  
USED (RECOVERED) REFRIGERANT 507  
USED (RECOVERED) REFRIGERANT 508B

**RECOMMENDED USE:** Following reclamation, recommended use is as a refrigerant

**DISTRIBUTOR:** Hudson Technologies Company  
**ADDRESS:** PO Box 1541  
One Blue Hill Plaza  
Pearl River, NY 10965

**EMERGENCY PHONE:** 1- 800-501-4376  
**CHEMTREC PHONE:** 1-800-424-9300  
**INFORMATION PHONE:** 1-800-953-2244

# SAFETY DATA SHEET USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

**OTHER INFORMATION:** The above components represent used refrigerant and refrigerant blends that are returned for reclamation. And and/or all components may be contained in the returned materials. The information presented herein is intended to be representative for any and all components.

## 2. HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW:** Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Contact with the liquid may cause frostbite. Overexposure to vapors by inhalation may cause dizziness and loss of concentration. At higher levels, central nervous system depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250°C), decomposition products may include Hydrochloric Acid (HCL), Hydrofluoric Acid (HF) and carbonyl halides.

### HAZARD

**CLASSIFICATION:** Gases Under Pressure  
USDOT Hazard Class 2.2, Non-Flammable Gas



**SIGNAL WORD:** WARNING

### HAZARD

**STATEMENTS:** Gas under pressure; may explode if heated. Harmful in contact with skin - may cause frostbite. May cause drowsiness or dizziness. May displace oxygen and cause rapid suffocation. May cause respiratory irritation. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death.

## PRECAUTIONARY STATEMENTS

**PREVENTION:** Do not breathe vapors. Use only with adequate ventilation - never in a closed space. Wear protective gloves. Wear eye protection.

**RESPONSE:** If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a physician.

If not breathing, give artificial respiration, preferably mouth to mouth.

If breathing is difficult, give oxygen. Avoid stimulants. Do not give adrenalin

If on skin: Wash with plenty of water (not hot water) or use other means to warm skin slowly.

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician.

**STORAGE:** Protect from sunlight. Store in well-ventilated place.

Do not heat above 120°F (50°C). Do not store in damp areas.

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

**CARCINOGENICITY:** Ingredients found on one of the OSHA designated carcinogen lists are listed below.

### INGREDIENT NAME

### NTP STATUS

### IARC STATUS

### OSHA LIST

No ingredients listed in this section

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

### 3. COMPOSITION / INFORMATION ON INGREDIENTS

The following components and contaminants are applicable to recovered refrigerant and recovered refrigerant blends that are returned for reclamation and/or destruction. Any or all of the following components and any or all of the following contaminants may be contained in the material returned, and as such the information presented below is representative for any and all components and/or contaminants:

#### COMPONENTS:

<u>MATERIAL</u>	<u>CAS NO.</u>	<u>%WT*</u>
Trichlorofluoromethane (CFC-11)	75-69-4	<99.9
Dichlorodifluoromethane (CFC-12)	75-71-8	<99.9
Chlorotrifluoromethane (CFC-13)	75-72-9	<99.9
Carbon Tetrafluoride (FC-14)	75-73-0	<60
Chlorodifluoromethane (HCFC-22)	75-45-6	<99.9
Trifluoromethane (HFC 23)	75-46-7	<99.9
Difluoromethane (HFC 32)	75-10-5	<50
1,1,2-Trichloro-1,2,2-Trifluoroethane (CFC-113)	76-13-1	<99.9
1,2-Dichloro-1,1,2,2-Tetrafluoroethane (CFC-114)	76-14-2	<99.9
Chloropentafluoroethane (CFC-115)	76-15-3	<60
Perfluoroethane (FC-116)	76-16-4	<60
2,2-Dichloro-1,1,1-Trifluoroethane (HCFC-123)	306-83-2	<99.9
1-Chloro-1,2,2,2-Tetrafluoroethane (HCFC-124)	2837-89-0	<99.9
Pentafluoroethane (HFC-125)	354-33-6	<50
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	<99.9
1-Chloro-1,1-Difluoroethane (HFC-142b)	75-68-3	<99.9
1,1,1,3,3,3-Hexafluoropropane (HFC-236fa)	690-39-1	<99.9
1,1,1-Trifluoroethane (HFC-143a)	420-46-2	<55
1,1-Difluoroethane (HFC-152a)	75-37-6	<30
Perfluoropropane (FC-218)	76-19-7	<10%
1,1,1,2,3,3,3-Heptafluoropropane (HFC-227ea)	431-89-0	<50
Propane (HC-290)	74-98-6	<6%
n-Butane (HC-600)	106-97-8	<5
Isobutane (HC-600a)	75-28-5	<5
Pentane (HC-601)	109-66-0	<1
2- Methylbutane (HC-601a)	78-78-4	<1

#### CONTAMINANTS: Contains one or more of the following:

<u>MATERIAL</u>	<u>CAS NO.</u>	<u>%WT*</u>
Refined Mineral Oils	64742-44-5	<30
Refined Mineral Oils	64741-88-4	<30
Alkyl Benzene	68648-86-2	<30
Oil Mist If Generated		
Polyalkylene Glycol	9038-95-3	<30
Polyol Ester Plus Phosphate Ester Oil		<30
Polypropylene Glycol	9003-13-8	<30
Pentaerythritol esters of heptanoic and isonoionic acids	118685-29-3	<30

### 4. FIRST AID MEASURES

**SKIN:** Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms persist.

**EYES:** Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

# **SAFETY DATA SHEET**

## **USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

**INHALATION:** Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention. Do not give epinephrine (adrenaline).

**INGESTION:** Ingestion is unlikely because of the physical properties and is not expected to be hazardous. In case of accidental ingestion, get medical attention. Do not induce vomiting unless instructed to do so by a physician.

**ADVICE TO PHYSICIAN:** Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

### **5. FIRE FIGHTING MEASURES**

#### **EXTINGUISHING MEDIA:**

Use any standard agent – choose the one most appropriate for type of surrounding fire (material itself is not flammable)

#### **UNUSUAL FIRE AND EXPLOSION HAZARDS:**

Cylinders and drums may rupture under fire conditions. Decomposition may occur.

#### **SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:**

In the event of fire, firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed cylinders/tanks cool.

### **6. ACCIDENTAL RELEASE MEASURES**

#### **IN CASE OF SPILL OR OTHER RELEASE:**

(Always wear recommended personal protective equipment.)

Evacuate unprotected personnel. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Use self-contained breathing apparatus (SCBA) for large spills or releases. Unprotected personnel should not return until air has been tested and determined safe, including low-lying areas.

**Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.**

### **7. HANDLING AND STORAGE**

**NORMAL HANDLING:** Always wear recommended personal protective equipment.

Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.

#### **STORAGE RECOMMENDATIONS:**

Store in a clean and dry place. Store in cool, well-ventilated area of low fire risk and keep out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty. Cylinder temperatures should not exceed 52° C (125° F). Drum temperature should not exceed 46° C (115° F).

### **8. EXPOSURE CONTROLS / PERSONAL PROTECTION**

**ENGINEERING CONTROLS:** Normal ventilation for standard operating procedures is generally sufficient. Mechanical ventilation may be adequate for other operating and storage areas.

# **SAFETY DATA SHEET**

## **USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

### **PERSONAL PROTECTIVE EQUIPMENT**

**SKIN PROTECTION:** Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

**EYE PROTECTION:** For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

**RESPIRATORY PROTECTION:** None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH-approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH-approved gas mask with organic vapor canister.

**ADDITIONAL RECOMMENDATIONS:** Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations.

### **EXPOSURE GUIDELINES**

#### **Trichlorofluoromethane (CFC-11)**

Pel (Osha) 1,000 Ppm 5,600 Mg/M3, 8 Hr. Twa  
Tlv (Acgih) : Ceiling 1,000 Ppm, 5,620 Mg/M3, A4  
Ael \* (Dupont) : None Established

#### **Dichlorodifluoromethane (CFC-12)**

Pel (Osha) : 1,000 Ppm, 4,950 Mg/M3, 8 Hr. Twa  
Tlv (Acgih) : 1,000 Ppm, 4,950 Mg/M3, 8 Hr. Twa, A4  
Ael \* (Dupont) : None Established

#### **Chlorodifluoromethane (HCFC-22)**

Pel (Osha) : None Established  
Tlv (Acgih) : 1,000 Ppm, 3,540 Mg/M3, 8 Hr. Twa, A4  
Ael \* (Dupont) : None Established

#### **Trifluoromethane (HFC-23)**

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa

#### **Difluoromethane (HFC-32)**

Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa  
Weel (Aiha) : 1000 Ppm, 8 Hr. Twa  
1,1,2-Trichloro-1,2,2-Trifluoroethane  
Pel (Osha) : 1,000 Ppm, 7,600 Mg/M3, 8 Hr. Twa  
Tlv (Acgih) : 1,000 Ppm, 7,670 Mg/M3, 8 Hr. Twa, A4  
Stel 1,250 Ppm, 9,590 Mg/M3, A4  
Ael \* (Dupont) : None Established

#### **1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC-114)**

Pel (Osha) : 1,000 Ppm, 7,000 Mg/M3, 8 Hr. Twa  
Tlv (Acgih) : 1,000 Ppm, 6,990 Mg/M3, 8 Hr. Twa, A4  
Ael \* (Dupont) : None Established

#### **Chloropentafluoroethane (CFC-115)**

Pel (Osha) : None Established  
Tlv (Acgih) : 1,000 Ppm, 6,320 Mg/M3, 8 Hr. Twa  
Ael \* (Dupont) : None Established

#### **2,2-Dichloro-1,1,1-Trifluoroethane (HCFC-123)**

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 50 Ppm, 8 & 12 Hr. Twa  
Weel (Aiha) : 50 Ppm, 8 Hr. Twa

**SAFETY DATA SHEET**  
**USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

**1-Chloro-1,2,2,2-Tetrafluoroethane (HCFC-124)**

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa  
Weel (Aiha) : 1000 Ppm, 8 Hr. Twa

**Pentafluoroethane (HFC-125)**

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa  
Weel (Aiha) : 1000 Ppm, 4900 Mg/M3, 8 Hr. Twa

**1,1-Difluoroethane (HFC-152a)**

Pel(Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa  
Weel (Aiha) : 1000 Ppm, 8 Hr. Twa

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

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa  
Weel (Aiha) : 1000 Ppm, 8 Hr. Twa

**1-Chloro-1,1,-difluoroethane (HFC-142b)**

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa

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

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa  
Weel (Aiha) : 1000 Ppm, 8 Hr. Twa

**Chlorotrifluoromethane (CFC-13)**

No applicable data available

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

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa

**1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)**

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa

**1,1,1,2,3,3,3-Heptafluoropropane (HFC-227ea)**

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa

**Perfluoropropane (FC-116)**

Pel (Osha) : None Established  
Tlv (Acgih) : None Established  
Ael \* (Dupont) : 1000 Ppm, 8 & 12 Hr. Twa

**Propane (HC-290)**

Pel (OSHA): 1000 Ppm, 1,800 mg/m3, 8 Hr. Twa  
Tlv (Acgih): None Established

**Isobutane (HC-600a)**

Pel (Osha) : None Established  
Tlv (Acgih) : 1000 ppm STEL

# SAFETY DATA SHEET USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

## N-Butane (HC-600)

Pel (Osha) : None Established

Tlv (Acgih) : 1000 ppm STEL

## Pentane (HC-601)

Pel (Osha) 1,000 Ppm 2,950 Mg/M3, 8 Hr. Twa

Tlv (Acgih) : Ceiling 1,000 Ppm, Twa

Ael \* (Dupont) : 600 ppm, 8 & 12 Hr. Twa

## 2-Methylbutane (HC-601a)

Pel (OSHA): None Established

Tlv (Acgih), 1000 ppm Twa

## Carbon Tetrafluoride (FC-14)

No applicable data available

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL STATE:

Gas at ambient temperatures

### FORM

Liquid, compressed gas, liquefied gas

### COLOR

Clear, colorless, light yellow

### ODOR:

Faint ethereal odor

### SPECIFIC GRAVITY (water = 1.0):

No applicable data available

### SOLUBILITY IN WATER (weight %):

No applicable data available

### pH:

No applicable data available

### BOILING POINT:

No applicable data available

### FREEZING POINT:

No applicable data available

### VAPOR PRESSURE:

No applicable data available

### VAPOR DENSITY (air = 1.0):

No applicable data available

### EVAPORATION RATE:

No applicable data available

### COMPARED TO:

No applicable data available

### % VOLATILES:

No applicable data available

### FLASH POINT:

Pure refrigerants will not burn. However, oil contaminants will burn and concentration may be high enough that the mixture will burn

## 10. STABILITY AND REACTIVITY

**NORMALLY STABLE (CONDITIONS TO AVOID):** The product is stable.

Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.

**INCOMPATIBILITIES:** Incompatible with active metals, strong alkali or alkaline earth metals – potassium, calcium, powdered aluminum, magnesium and zinc.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Thermal decomposition products include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide and chlorine, and possibly carbonyl halides. These materials are hazardous - toxic and irritating.

**HAZARDOUS POLYMERIZATION:** Will not occur.

## 11. TOXICOLOGICAL INFORMATION

### Trichlorofluoromethane (CFC-11)

Inhalation 4 h LC50 :

> 65680 ppm , Rat

Inhalation Low Observed:

Dog -

Adverse Effect:

Cardiac sensitization

Concentration (LOAEC)

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

Inhalation No observed: adverse effect level	Dog Cardiac sensitization
Dermal LD50:	> 9,300 mg/kg , Rabbit
Oral LD50:	> 11,000 mg/kg , Rat
Repeated dose toxicity:	Ingestion: multiple species - 90 d NOAEL: > 450 mg/kg No toxicologically significant effects were found.
	Inhalation: multiple species - 28 d 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. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

### Dichlorodifluoromethane (CFC-12)

Inhalation 4 h LC50 :	1200000 ppm , Rat - Central nervous system effects
Inhalation No observed: adverse effect level	25000 ppm , multiple species Cardiac sensitization
Dermal :	no data available
Oral LD50 :	> 1,000 mg/kg , Rat
Skin irritation :	No skin irritation, Guinea pig
Eye irritation :	slight irritation, Rabbit
Repeated dose toxicity :	Inhalation: Rat - No toxicologically significant effects were found. Oral: multiple species - No toxicologically significant effects were found.
Carcinogenicity :	Not classifiable as a human carcinogen. Animal testing did not show any carcinogenic effects.
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.

### Chlorotrifluoromethane (CFC-13)

Inhalation 4 h LC50 :	> 425000 ppm, Rat- narcosis
Inhalation :	Dog - Cardiac sensitization
Dermal :	Not applicable
Oral :	Not applicable
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.
Repeated dose toxicity :	Inhalation: Rat - No toxicologically significant effects were found.
Mutagenicity :	Did not cause genetic damage in cultured bacterial cells.
Further information :	Cardiac sensitization threshold limit : 3419222 mg/m3

### Carbon Tetrafluoride(FC-14)

Inhalation :	Target Organs: Central nervous system depression
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### Chlorodifluoromethane (HCFC-22)

Inhalation 4 h LC50 :	> 150000 ppm , Mouse
Inhalation Low Observed: Adverse Effect	50000 ppm, Dog Cardiac sensitization
Concentration (LOAEC) :	25000 ppm, Dog



**SAFETY DATA SHEET**  
**USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

Adverse Effect:	Cardiac sensitization
Skin or eye irritation :	Not expected to cause skin 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.
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 sensitization threshold limit : 175000 mg/m3
<b>Trifluoromethane (HFC-23)</b>	
Inhalation 4 h LC50 :	> 663000 ppm , Rat
Inhalation Low Observed:	> 500000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Inhalation No Observed:	500000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration	
Repeated dose toxicity :	Inhalation: Rat- NOAEL: 28.634 mg/l No toxicologically significant effects were found.
Mutagenicity :	Animal testing did not show any mutagenic effects. Evidence suggests this substance does not cause genetic damage in animals.
Reproductive toxicity :	No toxicity to reproduction Evidence suggests the substance is not a reproductive toxin in animals.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : > 172414 mg/m3
<b>Difluoromethane (HFC-32)</b>	
Inhalation 4 h LC50 :	> 520000 ppm , Rat
Inhalation Low Observed:	>35000 ppm, Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Inhalation No Observed:	>35000 ppm, Dog
Adverse Effect	Cardiac sensitization
Skin or eye irritation :	Not tested on animals - Not expected to cause skin 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.
Mutagenicity :	Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction Animal testing showed no reproductive toxicity. Information given is based on data obtained from similar substances.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : > 735000 mg/m3

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

### 1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)

Inhalation 4 h :	521 mg/l , Rat Target Organs: Central nervous system Central nervous system effects Breathing difficulties, Tremors, Hyperactivity Convulsions, altered hematology
Inhalation 4 h LC50 :	404 mg/l , Rat Target Organs: Central nervous system Central nervous system effects Liver effects, Kidney effects, lung effects Altered respiratory rate, Anesthetic effects, Incoordination, Convulsions
Inhalation :	5000 ppm , Dog Cardiac sensitization
Dermal LD50 :	> 11,000 mg/kg , Rabbit
Oral LD50 :	43,000 mg/kg , Rat Liver effects, Kidney effects, lung effects, Gastrointestinal effects Lethargy, Altered respiratory rate, Fluid retention in lungs (pulmonary edema)
Skin or eye irritation :	slight irritation, Rabbit
Skin sensitization :	Did not cause sensitization on laboratory animals., Guinea pig
Repeated dose toxicity :	Dermal: Rabbit - Skin irritation, Kidney damage, Liver damage Oral: Rabbit - Increased mortality or reduced survival Inhalation: Rat - Weight loss, altered blood chemistry; lung effects Inhalation: Human - No toxicologically significant effects were found.
Carcinogenicity :	Not classifiable as a human carcinogen.
Mutagenicity :	Animal testing did not show any mutagenic effects. Tests on mammalian cell cultures showed mutagenic effects. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity :	No toxicity to reproduction Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 38300 mg/m3

### 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC-114)

Inhalation 4 h ALC - :	> 424000 ppm , Rat
Approximate Lethal Concentration	Target Organs: Central nervous system Central nervous system depression
Inhalation :	Cardiac sensitization
Repeated dose toxicity :	Inhalation multiple species - No toxicologically significant effects were found. Oral: multiple species - 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.
Reproductive toxicity :	No toxicity to reproduction Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 175000 mg/m3

### Chloropentafluoroethane (CFC-115)

Inhalation 4 h LC50 :	> 800000 ppm , Rat
Inhalation Low Observed: Adverse Effect Concentration (LOAEC)	150000 ppm , Dog Cardiac sensitization

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

Repeated dose toxicity :	Inhalation: multiple species - gas. No toxicologically significant effects were found.
Mutagenicity :	Did not cause genetic damage in cultured bacterial cells.
Further information :	Cardiac sensitization threshold limit : 947669 mg/m3
<b>Perfluoroethane (FC-116)</b>	
Inhalation 4 h LC50 :	> 500000 ppm , Rat
Inhalation No Observed	200000 ppm, Dog
Adverse Effect	Cardiac sensitization
Concentration	
Repeated dose toxicity :	Inhalation: Rat - Method: OECD Test Guideline 412
	No toxicologically significant effects were found.
Mutagenicity :	Animal testing did not show any mutagenic effects.
	Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 1129943.5 mg/m3
<b>2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)</b>	
Inhalation :	Target Organs: Central nervous system Central nervous system effects
Inhalation Low Observed:	20000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Inhalation No Observed:	10000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration	
Dermal LD50 :	> 2,000 mg/kg , Rabbit
Dermal LD50 :	> 2,000 mg/kg , Rat
Oral LD50 :	9,000 mg/kg , Rat - Respiratory effects, Abnormal posture
Skin or eye irritation :	No skin or eye irritation, Rabbit. Not expected to cause skin irritation based on expert review of the properties of the substance.
Skin sensitization :	Does not cause skin sensitization., Guinea pig. Did not cause sensitization on laboratory animals. Not expected to cause sensitization based on expert review of the properties of the substance.
Does not cause respiratory sensitization., multiple species	
Repeated dose toxicity :	Inhalation: Rat – vapor. No toxicological effects warranting significant target organ toxicity classification were seen below the recommended guidance values for classification.
Carcinogenicity :	Not classifiable as a human carcinogen.
	The observed tumors do not appear to be relevant for men.
Mutagenicity :	Animal testing did not show any mutagenic effects.
	Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity.
	No effects on or via lactation
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 124000 mg/m3
<b>1-Chloro-1,2,2,2-tetrafluoroethane (HCFC-124)</b>	
Inhalation 4 h LC50 :	> 230000 ppm , Rat
	Anesthetic effects
	Central nervous system effects
Inhalation Low Observed:	25000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC):	10000 ppm , Dog
Inhalation No Observed	Cardiac sensitization
Adverse Effect	
Concentration	

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

Skin or eye irritation :	Not expected to cause skin 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 sensitization.	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 sensitization threshold limit : 140000 mg/m3
<b>Pentafluoroethane (HFC-125)</b>	
Inhalation 4 h LC50 :	> 800000 ppm , Rat
Inhalation No Observed:	75000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration	
Inhalation Low Observed:	100000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Skin sensitization :	Does not cause respiratory sensitization., human
Repeated dose toxicity :	Inhalation: Rat – 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. Evidence suggests this substance does not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 490000 mg/m3
<b>1,1,1,2-Tetrafluoroethane (HFC-134a)</b>	
Inhalation 4 h LC50 :	> 567000 ppm , Rat
Inhalation No Observed:	40000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration	
Inhalation Low Observed:	80000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Skin or eye irritation :	No skin or eye irritation, Rabbit
Skin sensitization :	Does not cause skin sensitization., Guinea pig
Does not cause respiratory sensitization,	Rat
Repeated dose toxicity :	Inhalation: Rat – gas NOAEL: 50000. 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. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction. No effects on or via lactation. Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 334000 mg/m3
<b>1-Chloro-1,1-difluoroethane (HCFC-142b)</b>	
Inhalation 4 h LC50 :	> 400000 ppm , Rat
Target Organs:	Central nervous system, Narcosis, Lethargy

**SAFETY DATA SHEET**  
**USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

Inhalation Low Observed: Adverse Effect Concentration (LOAEC)	Labored breathing, lung effects, Kidney effects 50000 ppm , Dog Cardiac sensitization
Inhalation No Observed: Adverse Effect Concentration	25000 ppm , Dog Cardiac sensitization
Repeated dose toxicity :	Inhalation: multiple species - No toxicologically significant effects were found.
Carcinogenicity :	Not classifiable as a human carcinogen.
Mutagenicity :	Animal testing did not show any mutagenic effects. Genetic damage in cultured mammalian cells was observed in some laboratory tests but not in others. Genetic damage in cultured bacterial cells was observed in some laboratory tests but not in others.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 205000 mg/m3
<b>1,1,1,3,3,3-Hexafluoropropane (HFC-236fa)</b>	
Inhalation 4 h LC50 :	> 457000 ppm , Rat
Inhalation 4 h LC50 :	> 189000 ppm , Rat
	Target Organs: Central nervous system
	Narcotic effects
	Central nervous system effects
Inhalation Low Observed: Adverse Effect Concentration (LOAEC)	150000 ppm , Dog Cardiac sensitization
Inhalation No Observed : Adverse Effect Concentration	100000 ppm , Dog Cardiac sensitization
Skin ore eye irritation :	No skin or eye irritation, Not tested on animals Not expected to cause skin 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 – gas.No toxicologically significant effects were found.
Mutagenicity :	Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Animal testing did not show any mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction Evidence suggests the substance is not a reproductive toxin in animals.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 932751 mg/m3
<b>1,1,1-Trifluoroethane (HFC-143a)</b>	
Inhalation 4 h LC50 :	> 591000 ppm , Rat
Inhalation No Observed: Adverse Effect Concentration	250000 ppm , Dog Cardiac sensitization
Inhalation Low Observed: Adverse Effect Concentration (LOAEC)	300000 ppm , Dog Cardiac sensitization
Skin sensitization :	Does not cause respiratory sensitization., human
Repeated dose toxicity :	Inhalation: Rat – gas NOAEL: > 40000, Method: OECD Test Guideline 413 No toxicologically significant effects were found.
Carcinogenicity :	Not classifiable as a human carcinogen. Animal testing did not show any carcinogenic effects.

**SAFETY DATA SHEET**  
**USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

Mutagenicity :	Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity:	No toxicity to reproduction. No effects on or via lactation Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 862068.97 mg/m3
<b>1,1-Difluoroethane (HFC-152a)</b>	
Inhalation 4 h LC50 :	> 437500 ppm , Rat
Inhalation No Observed:	50000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration	
Inhalation Low Observed:	150000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Skin sensitization :	Does not cause respiratory sensitization., 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.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 405000 mg/m3
<b>Perfluoropropane (FC-218)</b>	
Inhalation 4 h LC50 :	400000 ppm , Rat
Inhalation No Observed:	300000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration	
Inhalation Low Observed:	400000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Mutagenicity :	Animal testing did not show any mutagenic effects. Did not cause genetic damage in cultured bacterial cells.
Further information :	Cardiac sensitization threshold limit : 3080000 mg/m3
<b>1,1,1,2,3,3,3-Heptafluoropropane (HFC-227ea)</b>	
Inhalation 4 h LC50 :	> 788696 ppm , Rat Central nervous system effects Respiratory effects
Inhalation No Observed :	90000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration	
Inhalation Low Observed:	105000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Skin sensitization :	Does not cause respiratory sensitization., human
Repeated dose toxicity :	Inhalation: Rat – gas NOAEL: 731.69 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. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity.

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 730190 mg/m3
<b>Propane (HC-290)</b>	
Inhalation 4 h LC50 :	> 200000 ppm , Rat
Inhalation Low Observed:	100000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Inhalation No Observed:	50000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration Dermal :	Not applicable
Oral :	Not applicable
Skin or eye irritation :	Not applicable
Skin sensitization :	Not applicable
Repeated dose toxicity :	Inhalation: Rat – gas. No toxicologically significant effects were found.
Mutagenicity :	Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
	Animal testing did not show any mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 180369 mg/m3
<b>n-Butane (HC-600)</b>	
Inhalation 4 h LC50 :	277018 ppm , Rat
Target Organs:	Respiratory Tract, Central nervous system, Irritating to respiratory system.
Dermal :	Not applicable
Oral :	Not applicable
Skin or eye irritation :	No skin or eye irritation, Not tested on animals. Not expected to cause skin irritation based on expert review of the properties of the substance.
Skin sensitization :	Not tested on animals. There are no reports of human skin sensitization. Not expected to cause sensitization based on expert review of the properties of the substance.
Repeated dose toxicity :	Inhalation: multiple species - No toxicologically significant effects were found
<b>Isobutane (HC-600a)</b>	
Inhalation 4 h LC50 :	276808 ppm , Rat
	The toxicological data has been taken from products of similar composition.
Inhalation 4 h LC50 :	> 31 mg/l , Rat
Inhalation Low Observed:	50000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration (LOAEC)	
Inhalation No Observed:	25000 ppm , Dog
Adverse Effect	Cardiac sensitization
Concentration	
Dermal :	Not applicable
Oral :	Not applicable
Skin or eye irritation :	No skin or eye irritation, Not tested on animals. Not expected to cause skin 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.
Repeated dose toxicity :	Inhalation: Rat - No toxicologically significant effects were found
Mutagenicity :	Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
	Animal testing did not show any mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.
Further information :	Cardiac sensitization threshold limit : 118.9 mg/m3

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

### Pentane(HC-601)

Inhalation 4 h LC50 :	70000 ppm , Mouse Irritating to respiratory system. narcosis
Inhalation 4 h LC50 :	> 20 mg/l , Rat
Dermal :	Not applicable
Oral LD50 :	> 2,000 mg/kg , Rat Not applicable
Skin irritation :	Slight irritation, Rabbit
Eye irritation :	No eye irritation, Rabbit
Skin sensitization :	Animal test did not cause sensitization by skin contact., Guinea pig
Repeated dose toxicity :	Oral: Rat -No toxicologically significant effects were found. Inhalation: Rat - No toxicologically significant effects were found.
Mutagenicity :	Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Animal testing did not show any mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.

### 2-Methylbutane (HC-601a)

Inhalation 4 h LC50 :	1,281.9 mg/l , Rat
Target Organs:	Central nervous system Central nervous system depression narcosis
Inhalation 4 h LC50 :	70000 ppm , Rat
Oral LD50 :	> 2,000 mg/kg , Rat
Skin irritation :	Slight irritation, human
Eye irritation :	No eye irritation, Rabbit
Skin sensitization :	Did not cause sensitization on laboratory animals., Guinea pig
Repeated dose toxicity :	Inhalation: Rat - No toxicologically significant effects were found.
Mutagenicity :	Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Animal testing did not show any mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.

### Alky Benzene

Dermal LD50 :	> 2,000 mg/kg , Rat
Oral LD50 :	> 5,000 mg/kg , Rat
Skin irritation :	No skin irritation, Rabbit slight irritation
Eye irritation :	No eye irritation, Rabbit slight irritation
Skin sensitization :	Patch test on human volunteers did not demonstrate sensitization properties., human
Repeated dose toxicity :	Inhalation: Rat - No toxicologically significant effects were found. Dermal: Mouse - 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. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity :	No toxicity to reproduction. 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.

### Polypropylene Glycol

Inhalation 4 h LC50 :	> 100 mg/l , Rat
Dermal LD50 :	> 2,000 mg/kg , Rat
Oral LD50 :	300 - 2,000 mg/kg , Rat
Skin irritation :	Skin irritation, Rabbit



# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

Eye irritation :	Eye irritation, Rabbit
Skin sensitization :	Does not cause skin sensitization., human Patch test on human volunteers did not demonstrate s sensitization properties.
Repeated dose toxicity :	Oral: Rat - No toxicologically significant effects were found. Inhalation :Rat - No toxicologically significant effects were found.
Carcinogenicity :	Not classifiable as a human carcinogen. Animal testing did not show any carcinogenic effects.
Mutagenicity :	Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Evidence suggests this substance does not cause genetic damage in animals.
Reproductive toxicity :	No toxicity to reproduction. No effects on or via lactation. Animal testing showed no reproductive toxicity.
Teratogenicity :	Animal testing showed no developmental toxicity.

### Polyalkylene Glycol

Dermal LD50 :	> 2,000 mg/kg , Rabbit
Oral LD50 :	> 5,000 mg/kg , Rat
Skin irritation :	No skin irritation, Rabbit-slight irritation
Eye irritation :	No eye irritation, Rabbit
Skin sensitization :	Does not cause skin sensitization., human. Patch test on human volunteers did not demonstrate sensitization properties.
Repeated dose toxicity :	Oral: Rat - No adverse effect has been observed in chronic toxicity tests. Inhalation: Rat - lung effects, Reversible
Carcinogenicity :	Not classifiable as a human carcinogen. Animal testing did not show any carcinogenic effects.

### Refined Mineral Oils (CAS NO. 64742-44-5)

Inhalation 4 h LC50 :	> 5.53 mg/l , Rat
Oral LD50 :	> 5,000 mg/kg , Rat
Skin irritation :	No skin irritation, Rabbit- slight irritation
Eye irritation :	No eye irritation, Rabbit slight irritation
Skin sensitization :	Does not cause skin sensitization., animals (unspecified species)
Repeated dose toxicity :	Dermal: Rat - No toxicologically significant effects were found. Inhalation: Rat - No toxicologically significant effects were found.
Carcinogenicity :	Not classifiable as a human carcinogen. Animal testing did not show any carcinogenic effects.
Mutagenicity :	Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Evidence suggests this substance does not cause genetic damage in animals.
Reproductive toxicity :	No toxicity to reproduction. 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.

### Refined Mineral Oils (CAS NO. 64741-88-4)

Inhalation 4 h LC50 :	> 5.0 mg/l , Rat., The toxicological data has been taken from products of similar composition.
Dermal LD50 :	> 5,000 mg/kg , Rabbit. The toxicological data has been taken from products of similar composition.
Oral LD50 :	> 5,000 mg/kg , Rat. The toxicological data has been taken from products of similar composition.
Skin irritation :	No skin irritation, Rabbit. The toxicological data has been taken from products of similar composition.
Eye irritation :	No eye irritation, Rabbit. The toxicological data has been taken from products of similar composition.

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

Skin sensitization :	Did not cause sensitization on laboratory animals., Guinea pig The toxicological data has been taken from products of similar composition.
Does not cause respiratory sensitization., Not tested on animals. The toxicological data has been taken from products of similar composition.	
Repeated dose toxicity :	Inhalation: Rat - No toxicologically significant effects were found., The toxicological data has been taken from products of similar composition. Dermal: Rabbit - No toxicologically significant effects were found., The toxicological data has been taken from products of similar composition.
Carcinogenicity :	Not classifiable as a human carcinogen. Information given is based on data obtained from similar substances.
Mutagenicity :	Tests on bacterial or mammalian cell cultures did not show mutagenic effects. Animal testing did not show any mutagenic effects. Information given is based on data obtained from similar substances.
Reproductive toxicity :	No toxicity to reproduction. Animal testing showed no reproductive toxicity. The toxicological data has been taken from products of similar composition.
Teratogenicity :	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity. Information given is based on data obtained from similar substances.
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 from 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.	

## 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

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

96 h LC50:	Oncorhynchus mykiss (rainbow trout) 450 mg/l
96 h ErC50 :	Algae 142 mg/l. Information given is based on data obtained from similar substances.
72 h NOEC :	Pseudokirchneriella subcapitata (green algae) 13.2 mg/l. Information given is based on data obtained from similar substances.
48 h EC50:	Daphnia magna (Water flea) 980 mg/l

#### Pentafluoroethane (HFC-125)

96 h LC50:	Oncorhynchus mykiss (rainbow trout) 450 mg/l. Information given is based on data obtained from similar substances
96 h ErC50 :	Algae 142 mg/l. Information given is based on data obtained from similar substances.
72 h NOEC :	Pseudokirchneriella subcapitata (green algae) 13.2 mg/l. Information given is based on data obtained from similar substances.
48 h EC50:	Daphnia magna (Water flea) 980 mg/l. Information given is based on data obtained from similar substances.

#### Difluoromethane (HFC-32)

96 h LC50:	Fish 1,507 mg/l
96 h EC50 :	Algae 142 mg/l
48 h EC50:	Daphnia (water flea) 652 mg/l
30 d :	NOEC Fish (unspecified species) 65.8 mg/l

**SAFETY DATA SHEET**  
**USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

**Trifluoromethane (HFC-23)**

96 h LC50: Pimephales promelas (fathead minnow) 633.26 mg/l  
 96 h EC50 : Algae 154.54 mg/l  
 48 h EC50: Daphnia magna (Water flea) 323.05 mg/l

**2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)**

96 h LC50: Oncorhynchus mykiss (rainbow trout) 55.5 mg/l 96 h ErC50:  
 Pseudokirchneriella subcapitata (green algae) 96.6 mg/l  
 96 h EbC50 : Pseudokirchneriella subcapitata (green algae) 67.8 mg/l  
 48 h EC50: Daphnia magna (Water flea) 17.3 mg/l

**1-Chloro-1,1-difluoroethane (HCFC-142b)**

96 h LC50: Oncorhynchus mykiss (rainbow trout) 36 mg/l  
 48 h EC50: Daphnia magna (Water flea) > 190 mg/l

**1,1,1,3,3,3-Hexafluoropropane (HFC-236fa)**

96 h LC50: Zebra fish 292 mg/l  
 96 h ErC50 : Pseudokirchneriella subcapitata (microalgae) > 186 mg/l 48 h EC50:  
 Daphnia magna (Water flea) 299 mg/l

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

96 h LC50: Oncorhynchus mykiss (rainbow trout) > 40 mg/l OECD Test Guideline 203  
 96 h ErC50 : Pseudokirchneriella subcapitata (green algae) > 44 mg/l OECD Test Guideline 201  
 48 h EC50: Daphnia magna (Water flea) 300 mg/l OECD Test Guideline 202

**1,1,1,2,3,3,3-Heptafluoropropane (HFC-227ea)**

96 h LC50: Danio rerio (zebra fish) > 200 mg/l OECD Test Guideline 203. Information given is based on data obtained from similar substances.  
 72 h ErC50 : Pseudokirchneriella subcapitata (green algae) > 114 mg/l OECD Test Guideline 201. Information given is based on data obtained from similar substances.  
 72 h NOEC : Pseudokirchneriella subcapitata (green algae) 13.2 mg/l OECD Test Guideline 201. Information given is based on data obtained from similar substances.  
 48 h EC50: Daphnia magna (Water flea) > 200 mg/l OECD Test Guideline 202. Information given is based on data obtained from similar substances.

**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

**Perfluoropropane (FC-218)**

This product has no known ecotoxicological effects.  
 This product has no known ecotoxicological effects.  
 This product has no known ecotoxicological effects.  
 NOEC Fish (unspecified species) - Due to its physical properties, there is no potential for adverse effects.  
 NOEC Daphnia (water flea) - Due to its physical properties, there is no potential for adverse effects.

**Trichlorofluoromethane (CFC-11)**

96 h LC50: Oncorhynchus mykiss (rainbow trout) 190 mg/l  
 48 h EC50: Daphnia magna (Water flea) 130 mg/l

**Dichlorodifluoromethane (CFC-12)**

48 h LC50: Oryzias latipes (Orange-red killifish) 67 mg/l  
 48 h EC50: Daphnia magna (Water flea) 95 mg/l

**1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)**

96 h LC50: Oncorhynchus mykiss (rainbow trout) 7.4 mg/l  
 96 h LC50: Pimephales promelas (fathead minnow) > 1,000 mg/l  
 96 h EC50 : Algae 8.75 mg/l  
 48 h EC50: Daphnia magna (Water flea) 71 mg/l

**1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC-114)**

96 h LC50: Fish 21.5 mg/l  
 96 h EC50 : Algae 16 mg/l

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

48 h EC50: Daphnia (water flea) 24.4 mg/l Chloropentafluoroethane (CFC-115)

No acute toxicity effects at concentrations up to the limit of aqueous solubility

No acute toxicity effects at concentrations up to the limit of aqueous solubility

### Perfluoroethane (FC-116)

96 h LC50: Pimephales promelas (fathead minnow) 82.3 mg/l

96 h EC50 : Algae 37.5 mg/l

48 h EC50: Daphnia magna (Water flea) 47.4 mg/l

### Propane(HC-290)

96 h LC50 : Fish 24.11 mg/l 72 h EC50 : Algae 7.71 mg/l

48 h EC50: Daphnia (water flea) 14.22 mg/l

### n-Butane (HC-600)

96 h LC50: Fish (unspecified species) > 1,000 mg/l

### Pentane(HC-601)

96 h LC50: Oncorhynchus mykiss (rainbow trout) 4.26 mg/l

72 h ErC50 : Scenedesmus capricornutum (fresh water algae) 10.7 mg/l

72 h EbC50 : Scenedesmus capricornutum (fresh water algae) 7.51 mg/l

48 h EC50: Daphnia magna (Water flea) 2.7 mg/l

28 d : NOEC Oncorhynchus mykiss (rainbow trout) 6.165 mg/l

21 d : NOEC Daphnia magna (Water flea) 10.76 mg/l

### Isobutane (HC-600a)

96 h LC50: Fish 24.11 mg/l

72 h EC50 : Algae 7.71 mg/l

48 h EC50: Daphnia (water flea) 14.22 mg/l 2-Methylbutane (HC-601a)

96 h LC50: Oncorhynchus mykiss (rainbow trout) 4.26 mg/l

72 h ErC50 : Pseudokirchneriella subcapitata (green algae) 25.12 mg/l

72 h ErC50 : Scenedesmus capricornutum (fresh water algae) 10.7 mg/l

72 h EbC50 : Scenedesmus capricornutum (fresh water algae) 7.51 mg/l

48 h EC50: Daphnia magna (Water flea) 2.3 mg/l

28 d : NOEC Oncorhynchus mykiss (rainbow trout) 7.6 mg/l

21 d : NOEC Daphnia magna (Water flea) 13.29 mg/l

### Alkyl Benzene

96 h LC50: Lepomis macrochirus (Bluegill sunfish) > 1,000 mg/l. Aquatic toxicity is unlikely due to low solubility.

96 h LC50: Pimephales promelas (fathead minnow) > 1,000 mg/l. Aquatic toxicity is unlikely due to low solubility.

96 h : Selenastrum capricornutum (green algae). Aquatic toxicity is unlikely due to low solubility.

48 h EC50: Daphnia magna (Water flea) OECD Test Guideline 202. Aquatic toxicity is unlikely due to low solubility.

### Polypropylene Glycol

96 h LC50: Danio rerio (zebra fish) 104 mg/l OECD Test Guideline 203

72 h ErC50 : Pseudokirchneriella subcapitata (green algae) 333 mg/l OECD Test Guideline 201

72 h EbC50 : Pseudokirchneriella subcapitata (green algae) 112 mg/l OECD Test Guideline 201

48 h EC50: Daphnia magna (Water flea) > 100 mg/l OECD Test Guideline 202

### Refined Mineral Oils (CAS # 64742-44-5)

96 h LC50: Pimephales promelas (fathead minnow) > 100 mg/l

48 h EC50: Daphnia magna (Water flea) > 10,000 mg/l

21 d : NOEC Daphnia magna (Water flea) 1,000 mg/l

### Refined Mineral Oils (CAS # 64741-88-4)

96 h LC50: Pimephales promelas (fathead minnow) > 100 mg/l OECD Test Guideline 203

The toxicological data has been taken from products of similar composition.

72 h NOEC : Pseudokirchneriella subcapitata (green algae) > 100 mg/l OECD Test Guideline 201

The toxicological data has been taken from products of similar composition.

# SAFETY DATA SHEET

## USED REFRIGERANT AND REFRIGERANT BLEND

November 21, 2018 Revised

48 h EC50: Daphnia magna (Water flea) > 10,000 mg/l OECD Test Guideline 202  
The toxicological data has been taken from products of similar composition.  
21 d : NOEC Daphnia magna (Water flea) 10 mg/l OECD Test Guideline 211. The toxicological data has been taken from products of similar composition.

### Environmental Fate

#### Chlorodifluoromethane (HCFC-22)

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

#### Difluoromethane (HFC-32)

Biodegradability : 5 % OECD Test Guideline 301D. Not readily biodegradable.

#### Trifluoromethane (HFC-23)

Biodegradability : Not readily biodegradable.

Bioaccumulation : Bioconcentration factor (BCF) : 3.2. Bioaccumulation is unlikely.

#### 2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)

Biodegradability : 24 %. Not readily biodegradable.

Bioaccumulation : Bioconcentration factor (BCF) : 33. Bioaccumulation is unlikely.

#### 1-Chloro-1,1-difluoroethane (HCFC-142b)

Biodegradability : Not readily biodegradable.

Bioaccumulation : Bioaccumulation is unlikely.

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

Bioaccumulation : Information given is based on data obtained from similar substances.

#### Perfluoropropane (FC-218)

Biodegradability : Not biodegradable. Not readily biodegradable.

#### Dichlorodifluoromethane (CFC-12)

Bioaccumulation : Bioconcentration factor (BCF) : < 10. Bioaccumulation is unlikely

#### 1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)

Bioaccumulation : Bioconcentration factor (BCF) : 11 - 86. Bioaccumulation is unlikely.

#### 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC-114)

Biodegradability : Not readily biodegradable.

Bioaccumulation : Bioaccumulation is unlikely.

#### Perfluoroethane (FC-116)

Bioaccumulation : Bioaccumulation is unlikely.

#### n-Butane (HC-600)

Biodegradability : 100 % Readily biodegradable

#### Pentane(HC-601)

Biodegradability : 71 % Readily biodegradable

Bioaccumulation : Bioconcentration factor (BCF): 171. Bioaccumulation is unlikely.

#### 2-Methylbutane (HC-601a)

Biodegradability : 71.43 % Readily biodegradable

Bioaccumulation : Bioconcentration factor (BCF) : 171. Bioaccumulation is unlikely.

#### Alkyl Benzene

Biodegradability : 60 % OECD Test Guideline 301. Readily biodegradable

Bioaccumulation : Bioconcentration factor (BCF) : 35. Bioaccumulation is unlikely.

#### Polypropylene Glycol

Biodegradability : 79 % OECD Test Guideline 301. Readily biodegradable

Bioaccumulation : Bioconcentration factor (BCF) : 3.16. Bioaccumulation is unlikely.

#### Refined Mineral Oils (CAS # 64742-44-5)

Biodegradability : Not readily biodegradable.

#### Refined Mineral Oils (CAS # 64741-88-4)

Biodegradability : 31 % OECD Test Guideline 301. Inherently biodegradable. Information given is based on data obtained from similar substances.

**SAFETY DATA SHEET**  
**USED REFRIGERANT AND REFRIGERANT BLEND**

**November 21, 2018 Revised**

**13. DISPOSAL CONSIDERATIONS**

Disposal must comply with federal, state, and local disposal or discharge laws. R-12 is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

**The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.**

**14. TRANSPORT INFORMATION**

U.S. DEPARTMENT OF TRANSPORTATION

PROPER SHIPPING NAME: Refrigerant gas n.o.s. (fluorinated hydrocarbons)

HAZARD CLASS: 2.2

ID NUMBER: UN1078

PACKING GROUP: N/A

LABEL STATEMENT: NONFLAMMABLE GAS

**NOTE: The following shipping description is for used R-11, used R-113, and used R-123 only:**

Used (Recovered) Refrigerant – Not Regulated

**15. REGULATORY INFORMATION**

U.S. FEDERAL REGULATIONS

TSCA (TOXIC SUBSTANCE CONTROL ACT): TSCA Inventory Status: Reported/Included

CERCLA Hazardous Substance – Yes\*

SARA Extremely Hazardous Substance – No

SARA Toxic Chemical – Yes\*\*

\* For Refrigerant 11 and Refrigerant 12

\*\*See component section

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT): Sec. 311, 312

Acute: Yes

Chronic: Yes

Fire: No

Reactivity: No

Pressure : Yes

**California Prop. 65:** This product does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

**16. OTHER INFORMATION**

**DISCLAIMER:** The above information is based upon technical information believed to be accurate but does not purport to all-inclusive and should be used only as a guide. Hudson Technologies Company shall not be held liable for any damage from handling or from contact with this product. No warranty of merchantability or any warranty, express or implied is made with respect to such information

**END OF SDS**