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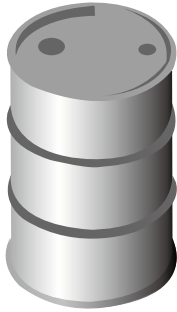
### HCFCs

The use and sale of hydrochlorofluorocarbons as refrigerants is restricted by the European Regulation 2037/2000 dated 29th June 2000 due to their depletion effect on the ozone layer (Montreal Protocol). HCFCs are banned in all new equipment with the exception of reversible heat pumps which are allowed until 01/01/04. The ban in other air conditioning equipment came into effect on 1st July 2002. New HCFCs will be allowed for use in existing equipment until 2010. Between 2010 and 2015 only recycled HCFCs will be allowed.

### HFCs

The use of hydrofluorocarbons is not restricted by regulations. Nevertheless, it is essential to use these refrigerants in closed systems and to provide a recovery service because of their "greenhouse" effect. HFCs have no ozone depletion potential and are recommended as replacement refrigerants for HCFCs.

# R-11



## Physical Properties

Chemical Formula	trichlorofluoromethane
Boiling Point	
°C@101.3kPa	23.7
°F@14.7psia	74.7
Critical Temperature	
°C	198.0
°F	388.4
Purity	99.5
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

## Common Data

### Description

A water—white volatile liquid with a slight ethereal odour. Supplied as a liquefied gas in low pressure cylinders.

### Classifications

H.S.Code	29034100
UN Number	Non-Hazmat Material

### Uses and Features

- Because of its high molecular weight, R-11 is especially suitable as a refrigerant for use in high rated single or multistaged compressors.
- Can be used as a solvent and as a chemical intermediate
- An effective flushing agent for cleaning refrigeration systems

### Material Compatibility

#### Metals

General Behavior:	Slight risk of corrosion in presence of water.
Aluminium	Satisfactory
Brass	Satisfactory
Copper	Satisfactory
Stainless Steel	Satisfactory

### Package:

- Iron Drum of 270Kgs, 250Kgs
- Non-refillable cylinder of 12Kgs, 13.6Kgs

# R-12



## Physical Properties

Chemical Formula	dichlorodifluoromethane
Boiling Point	
°C@101.3kPa	-29.8
°F@14.7psia	-21.6
Critical Temperature	
°C	112.0
°F	233.6
Purity	99.5
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

## Common Data

### Description

A colourless liquid, or at atmospheric pressure non-flammable, non-corrosive gas with a slight ethereal odour, supplied in low pressure steel cylinders.

### Classifications

H.S.Code	29034200
UN Number	1028
Class	2.2

### Uses and Features

- R-12 has wide application in the refrigeration industry, being suitable for rotary and reciprocating compressors
- Used in domestic, commercial and maritime refrigerators and deep freezers, water coolers and air conditioners.

### Material Compatibility

#### Metals

General Behavior:	Slight risk of corrosion in presence of water.
Aluminium	Satisfactory
Stainless Steel	Satisfactory

#### Plastics

PTFE	Acceptable but strong rate of permeation
PA(NYLON)	Satisfactory

#### Elastomers

Butyl rubber (IIR)	Non recommended, significant swelling.
Nitrile rubber (NBR)	Acceptable but important swelling.

### Package:

- Non-refillable cylinder of 13.6Kgs

### Oil Compatibility

- Mineral oil
- POE

# R-13



## Physical Properties

Chemical Formula	chlorotrifluoromethane
Boiling Point	
°C@101.3kPa	-81.5
°F@14.7psia	-114.7
Critical Temperature	
°C	28.9
°F	84.0
Purity	99.5
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

## Common Data

### Description

A colourless, non-flammable gas.

### Classifications

H.S.Code	29034510
UN Number	1022
Class	2.2

### Uses and Features

- Low temperature refrigerant

### Material Compatibility

#### Metals

**General Behavior:** Slight risk of corrosion in presence of water.

Aluminium	Satisfactory
Stainless Steel	Satisfactory

#### Plastics

PTFE	Satisfactory
PA(NYLON)	Satisfactory

#### Elastomers

Butyl rubber (IIR)	Satisfactory
Nitrile rubber (NBR)	Satisfactory

### Package:

- Non-refillable cylinder of 35Kgs

## R-22



### Physical Properties

Chemical Formula	chlorodifluoromethane
<b>Boiling Point</b>	
°C@101.3kPa	-40.8
°F@14.7psia	-41.5
<b>Critical Temperature</b>	
°C	96.2
°F	205.2
Purity	99.8
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
<b>Content Measured on Vapour Phase</b>	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable, non-toxic gas. In low concentrations it is odourless, in higher concentrations its odour is mild and somewhat ethereal. It is shipped in steel cylinders as a liquefied gas.

#### Classifications

H.S.Code	29034910.12
UN Number	1018
Class	2.2

#### Uses and Features

- R22 is very popular for use in all types of household and commercial refrigeration and air conditioning equipment with reciprocating rotary, scroll and screw compressors.
- The high refrigeration properties of R22 permit the use of smaller equipment—a considerable advantage where space is at a premium.

#### Material Compatibility

##### Metals

**General Behavior:** Slight risk of corrosion in presence of water.

Aluminium	Satisfactory
Stainless Steel	Satisfactory

##### Plastics

PTFE	Acceptable but strong rate of permeation
PA(NYLON)	Satisfactory

##### Elastomers

Butyl rubber (IIR)	Acceptable but important swelling
Nitrile rubber (NBR)	Non recommended, significant swelling.

#### Package:

- Non-refillable cylinder of 6.8Kgs, 13.6Kgs, 22.7Kgs,
- Ton cylinder of 800Kgs
- Can of 340g, 750g
- ISO Tank of 18ton

#### Oil Compatibility

- Mineral oil
- POE

## R-23



### Physical Properties

Chemical Formula	trifluoromethane
<b>Boiling Point</b>	
°C@101.3kPa	-82.0
°F@14.7psia	-115.6
<b>Critical Temperature</b>	
°C	26.1
°F	79.0
Purity	99.8
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
<b>Content Measured on Vapour Phase</b>	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless and non-flammable gas at normal temperature and pressure.

#### Classifications

H.S.Code	29033090.9
UN Number	1984
Class	2.2

#### Uses and Features

- Refrigerant and substitute for Halon fire extinguishant
- Used in plasma etching of silicon oxide or nitride layers.

#### Material Compatibility

##### Metals

**General Behavior:** Slight risk of corrosion in presence of water.

Aluminium	Satisfactory
Stainless Steel	Satisfactory

##### Plastics

PTFE	Satisfactory
PA(NYLON)	Satisfactory

##### Elastomers

Butyl rubber	Satisfactory
(IIR)	
Nitrile rubber	Satisfactory
(NBR)	

#### Package:

- Ton cylinder of 30Kgs

## R-32



### Physical Properties

Chemical Formula	difluoromethane
Boiling Point	
°C@101.3kPa	-51.7
°F@14.7psia	-61.0
Critical Temperature	
°C	78.1
°F	172.6
Purity	99.9
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable, non-toxic gas.

#### Classifications

H.S.Code	29033090.9
UN Number	3252
Class	2.1

#### Uses and Features

- Refrigerant using in blends

#### Precautions in Use

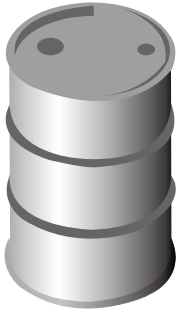
- Wear safety goggles, use leather/plastic protective gloves, wear overalls and safety shoes when handling cylinders.

#### Package:

- Ton cylinder of 280Kgs, 560Kgs



# R-113a



## Physical Properties

Chemical Formula	1,1,1-trichloro-2,2,2-trifluoroethane
Boiling Point	
°C@101.3kPa	45.8
°F@14.7psia	
Critical Temperature	
°C	487.3
°F	
Purity	99.5
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	N/A
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

## Common Data

### Description

A colorless transparent liquid. But it turns to be crystal in winter. It is non-flammable.

### Classifications

H.S.Code	29034300
UN Numbe	2810
Class	2.2

### Uses and Features

- Used to produce pesticides and drugs.
- Used to produce HFC-134a.

### Material Compatibility

#### Metals

**General Behavior:** Slight risk of corrosion in presence of water.

Aluminium	Satisfactory
Stainless Steel	Satisfactory

#### Plastics

PTFE	Satisfactory
PA(NYLON)	No data

#### Elastomers

Butyl rubber (IIR)	No data
Nitrile rubber (NBR)	No data

### Package:

- Iron Drum of 25Kgs, 50Kgs, 250Kgs

## R-123



### Physical Properties

Chemical Formula	2,2-dichloro-1,1,1-trifluoroethane
Boiling Point	
°C@101.3kPa	27.8
°F@14.7psia	82.1
Critical Temperature	
°C	183.7
°F	362.7
Purity	99.8
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	N/A
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable liquid at atmospheric pressure with a slight ethereal odour. Supplied in low pressure cylinders.

#### Classifications

H.S.Code 29034910.16  
UN Number Non-Hazmat Material

#### Uses and Features

- Centrifugal chiller air conditioning systems.
- A replacement for CFC-11

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium (i. e. some aluminium alloys) especially when moisture is present. May react violently with sodium, potassium, barium and other alkali or alkaline earth metals. Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers from excessive swelling.

#### Package:

- Iron Drum of 100Kgs, 250Kgs

#### Oil Compatibility

- POE

# R-124



## Physical Properties

Chemical Formula	2-chloro-1,1,1,2-tetrafluoroethane
Boiling Point	
°C@101.3kPa	-12.0
°F@14.7psia	10.4
Critical Temperature	
°C	122.3
°F	252.1
Purity	99.8
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

## Common Data

### Description

A colorless and transparent liquid at room temperature.

### Classifications

H.S.Code	2903.4910.17
UN Number	1021
Class	2.2

### Uses and Features

- As alternative to refrigerant CFC-114;
- As fire extinguisher.

### Precautions in Use

- Wear safety goggles, use leather / plastic protective gloves, wear overalls and safety shoes when handling cylinders.

### Package:

- Ton cylinder of 40Kgs, 400Kgs, 800Kgs

## R-125



### Physical Properties

Chemical Formula	pentafluoroethane
Boiling Point	
°C@101.3kPa	-48.1
°F@14.7psia	-54.6
Critical Temperature	
°C	66.0
°F	150.8
Purity	99.8
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colorless and transparent liquid at room temperature.

#### Classifications

H.S.Code	29033090.9
UN Number	3220
Class	2.2

#### Uses and Features

- As alternative to refrigerant R-502, R-22;
- As alternative to fire extinguisher Halon-1211 and Halon-1301.

#### Precautions in Use

- Wear safety glasses, use leather/plastic protective gloves, wear overalls and safety shoes when handling cylinders.

#### Package:

- Ton cylinder of 800Kgs

## R-227ea



### Physical Properties

Chemical Formula	1,1,1,2,3,3,3-
Boiling Point	Heptafluoropropane
°C@101.3kPa	-16.4
°F@14.7psia	
Critical Temperature	
°C	101.7
°F	
Purity	99.6
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	N/A
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colorless gas at normal temperature and pressure.

#### Classifications

H.S.Code	29033090.9
UN Number	3296
Class	2.2

#### Uses and Features

- Substitute for Halon 1301, and has been accepted by NFPA in its 2001 new standard.
- Used as refrigerant and medicine propellant.

#### Precautions in Use

- Wear safety goggles, use leather/plastic protective gloves, wear overalls and safety shoes when handling cylinders.

#### Package:

- Ton cylinder of 800Kgs

# R-141b



## Physical Properties

Chemical Formula	1,1-dichloro-1-fluoroethane
Boiling Point	
°C@101.3kPa	32.0
°F@14.7psia	89.6
Critical Temperature	
°C	206.8
°F	404.2
Purity	99.8
% by weight(min)	
Water Content	50
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	N/A
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

## Common Data

### Description

A nontoxic and colorless chemical with small ODP value and excellent chemical stability.

### Classifications

H.S.Code	29034910.22
UN Number	1078
Class	2.2

### Uses and Features

- Substitute CFC-11 as foaming agent for rigid or soft PU foam without changing process and equipment
- As metal cleaner and solder-remover

### Precautions in Use

- Wear safety glasses, use leather/plastic protective gloves, wear overalls and safety shoes when handling cylinders.

### Package:

- Iron Drum of 40Kgs, 235Kgs, 250Kgs
- Liquid Tank

## R-134a



### Physical Properties

Chemical Formula	1,1,1,2-tetrafluoroethane
Boiling Point	
°C@101.3kPa	-26.1
°F@14.7psia	-14.9
Critical Temperature	
°C	101.1
°F	214.0
Purity	99.9
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable gas at atmospheric pressure with a slight ethereal odour. Supplied at low pressure in metal cylinders. Also available pre-mixed with UV dye

#### Classifications

H.S.Code	29033990.9
UN Number	3159
Class	2.2

#### Uses and Features

- Wide use in household and commercial refrigeration, and automotive air-conditioning. Properties make R134a suitable for use in medium temperature food cabinets, water chillers and fountains, heat pumps and dehumidifiers.
- Increasing use as a replacement for CFC-12.
- Blowing agent for various foams.
- Propellant for aerosol pharmaceuticals, lacquers, deodorants, perfumes, mousses, air fresheners, insecticides, cleaning and other household products.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium (i.e some aluminium alloys) especially when moisture is present. May react violently with sodium, potassium, barium and other alkali or alkaline earth metals. Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers from excessive swelling.

#### Package:

- Non-refillable cylinder of 6.8Kgs, 13.6Kgs, 22.7Kgs
- Refillable Cylinder of 12Kgs, 13.6Kgs, 14.3Kgs
- Ton cylinder of 900Kgs , 940Kgs
- Can of 340g, 750g
- ISO Tank of 18ton

#### Oil Compatibility

- PAG
- POE

# R-142b



## Physical Properties

Chemical Formula 1-chloro-1,1-difluoroethane

### Boiling Point

°C@101.3kPa -9.2

°F@14.7psia 15.5

### Critical Temperature

°C 137.1

°F 278.8

Purity 99.8

% by weight(min)

Water Content 15

ppm by weight(max)

Acidity 3.0

ppm by weight(max) (as HCl)

Non Condensable Gasses 2.0

### Content Measured on Vapour Phase

% by volume(max)

Residues at High Boiling Point 0.01

% by volume(max)

Chloride pass

No visible turbidity

## Common Data

### Description

A colorless gas with slightly aromatic smell at room temperature, it becomes colorless and transparent liquid under the pressure created by itself. It dissolves in oil easily, but not in water.

### Classifications

H.S.Code	29034910
UN Number	2517
Class	2.1

### Uses and Features

- Cover refrigerating systems at high temperature, on-off thermostat and intermediate in the aviation properllant.
- Used in chemical industry.

### Material Compatibility

#### Metals

**General Behavior:** Slight risk of corrosion in presence of water.

Aluminium	Satisfactory
Stainless Steel	Satisfactory

#### Plastics

PTFE	Satisfactory
PA(NYLON)	Satisfactory

#### Elastomers

Butyl rubber (IIR)	Acceptable but important swelling
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Nitrile rubber (NBR)	Acceptable but important swelling
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### Package:

- Non-refillable cylinder of 13.6Kgs
- Ton Cylinder of 800Kgs



# R-143a



## Physical Properties

Chemical Formula	1,1,1-trifluoroethane
Boiling Point	
°C@101.3kPa	-47.2
°F@14.7psia	-53.0
Critical Temperature	
°C	72.7
°F	162.9
Purity	99.8
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

## Common Data

### Description

A colorless and transparent gas at the room temperature

### Classifications

H.S.Code	29033090.9
UN Number	2035
Class	2.1

### Uses and Features

- Refrigerant substituting for R-502

### Material Compatibility

#### Metals

<b>General Behavior:</b>	Slight risk of corrosion in presence of water
Aluminium	Satisfactory
Stainless Steel	Satisfactory

#### Plastics

PTFE	Satisfactory
PA(NYLON)	no data

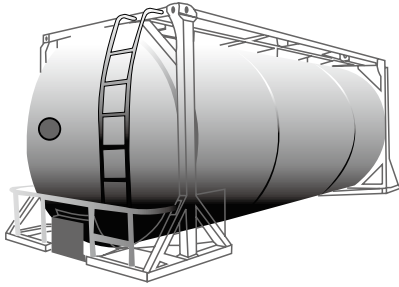
#### Elastomers

Butyl rubber (IIR)	no data
Nitrile rubber (NBR)	no data

### Package:

- Ton Cylinder of 670Kgs

## R-152a



### Physical Properties

Chemical Formula	1,1-difluoroethane
Boiling Point	
°C@101.3kPa	-24.0
°F@14.7psia	-11.2
Critical Temperature	
°C	113.3
°F	235.9
Purity	99.9
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colorless and transparent gas at the room temperature

#### Classifications

H.S.Code	29033090.9
UN Number	1030
Class	2.1

#### Uses and Features

- Used as refrigerant, intermediate of refrigerant and raw materials of fluororubbers.

#### Material Compatibility

##### Metals

**General Behavior:** Slight risk of corrosion in presence of water.

Aluminium	Satisfactory
Stainless Steel	Satisfactory

##### Plastics

PTFE	Satisfactory
PA(NYLON)	Satisfactory

##### Elastomers

Butyl rubber (IIR)	Acceptable but important swelling
Nitrile rubber (NBR)	Satisfactory

#### Package:

- Tank of 18ton

## R-404a



### Physical Properties

Refrigerant Components	R-125/143a/134a (44/52/4)	
Bubble Point		
°C@101.3kPa		-46.2
°F@14.7psia		-51.2
Critical Temperature		
°C		72.1
°F		161.8
Purity		99.8
% by weight(min)		
Water Content		20
ppm by weight(max)		
Acidity		1.0
ppm by weight(max) (as HCl)		
Non Condensable Gasses		1.5
Content Measured on Vapour Phase		
% by volume(max)		
Residues at High Boiling Point		0.01
% by volume(max)		
Chloride		pass
No visible turbidity		

### Common Data

#### Description

A colourless, non-flammable gas at atmospheric pressure with a slight ethereal odour. Supplied in low pressure cylinders.

#### Classifications

H.S.Code	38247900
UN Number	3337
Class	2.2

#### Uses and Features

- Commercial and medium temperature refrigeration applications.
- A replacement for CFC-502.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium (i.e. some aluminium alloys) especially when moisture is present. May react violently with sodium, potassium, barium and other alkali or alkaline earth metals. Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers from excessive swelling.

#### Package:

- Non-refillable cylinder of 10.9Kgs

#### Oil Compatibility

- POE

## R-406a



### Physical Properties

Refrigerant Components	R-22/600a/142b (55/4/41)
Bubble Point	
°C@101.3kPa	-32.7
°F@14.7psia	-26.9
Critical Temperature	
°C	116.5
°F	241.7
Purity	99.9
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colorless&transparent gas

#### Classifications

H.S.Code	38247900
UN Number	3163
Class	2.2

#### Uses and Features

- Substitute for R-502 and R-12.

#### Precautions in Use

- Wear safety goggles,use plastic protective gloves,wear overalls and safety shoes when handling cylinders.

#### Package:

- Non-refillable cylinder of 11.3Kgs, 13.6Kgs

## R-407c



### Physical Properties

Refrigerant Components	R-32/125/134a (23/25/52)
Bubble Point	
°C@101.3kPa	-43.6
°F@14.7psia	-46.5
Critical Temperature	
°C	86.0
°F	186.8
Purity	99
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, flammable gas at atmospheric pressure with a slight ethereal odour. Supplied in low pressure cylinders.

#### Classifications

H.S.Code	38247900
UN Number	3340
Class	2.2

#### Uses and Features

- Large commercial refrigerated air conditioning systems.
- A replacement for HCFC-22.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosion breakdown products. Avoid using alloys with more than 2% magnesium (i.e. some aluminium alloys) especially when moisture is present. May react violently with sodium, potassium, barium and other alkali or alkaline earth metals. Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers from excessive swelling.

#### Package:

- Non-refillable cylinder of 11.3Kgs

#### Oil Compatibility

- POE

## R-408a



### Physical Properties

Refrigerant Components	R-125/143a/22 (7/46/47)
Bubble Point	
°C@101.3kPa	-44.6
°F@14.7psia	-48.2
Critical Temperature	
°C	83.1
°F	181.6
Purity	99.8
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non flammable gas at atmospheric pressure with a slight ethereal odour. Supplied in low pressure cylinders.

#### Classifications

H.S.Code	38247900
UN Number	3163
Class	2.2

#### Uses and Features

- Commercial refrigeration systems and mobile air conditioning.
- A drop-in replacement for CFC-502.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium (i.e.some aluminium alloys) especially when moisture is present. May react violently with sodium,potassium,barium and other alkali or alkaline earth metals. Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers from excessive swelling.

#### Package:

- Non-refillable cylinder of 10.9Kgs

#### Oil Compatibility

- Mineral Oil
- POE

## R-409a



### Physical Properties

Refrigerant Components	R-22/124/142b (60/25/15)
Bubble Point	
°C@101.3kPa	-34.7
°F@14.7psia	-30.4
Critical Temperature	
°C	106.9
°F	224.4
Purity	99.5
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable gas at atmospheric pressure with a slight ethereal odour. Supplied in low pressure cylinders.

#### Classifications

H.S.Code	38247900
UN Number	3163
Class	2.2

#### Uses and Features

- Commercial and domestic refrigeration and air conditioning systems.
- A drop-in replacement for CFC-12.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium (i.e. some aluminium alloys) especially when moisture is present. May react violently with sodium, potassium, barium and other alkali or alkaline earth metals. Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers from excessive swelling.

#### Package:

- Non-refillable cylinder of 13.6Kgs

#### Oil Compatibility

- Mineral oil
- POE

## R-409b



### Physical Properties

Refrigerant Components	R-22/124/142b (65/25/10)
Bubble Point	
°C@101.3kPa	-35.6
°F@14.7psia	-32.1
Critical Temperature	
°C	106.9
°F	224.4
Purity	99.5
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non flammable gas at atmospheric pressure with a slight ethereal odour. Supplied in low pressure cylinders.

#### Classifications

H.S.Code	38247900
UN Number	3163
Class	2.2

#### Uses and Features

- Air conditioning systems.
- A drop-in replacement for CFC-500.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium(i.e.some aluminium alloys) especially when moisture is present. May react violently with sodium, potassium, barium and other alkali or alkaline earth metals. Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers from excessive swelling.

#### Package:

- Non-refillable cylinder of 13.6Kgs

#### Oil Compatibility

- Mineral oil
- POE



## R-415b



### Physical Properties

Refrigerant Components	R-22/152a (25/75)
Bubble Point	
°C@101.3kPa	-27.7
°F@14.7psia	-17.8
Critical Temperature	
°C	111.3
°F	232.3
Purity	99.8
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable gas at atmospheric pressure with a slight ethereal odour. Supplied in low pressure cylinders.

#### Classifications

H.S.Code	38249090.90
UN Number	3163
Class	2.2

#### Uses and Features

- Good environmental protection property;
- No toxicity, non-combustibility;
- Fast refrigerating speed, good energy-saving
- Nearly no need to change parts, pipeline original refrigerator or icebox for original R12 and direct filling is enough.

#### Precautions in Use

- Wear safety goggles, leather/plastic protective gloves, overalls and safety shoes when handling cylinders.

#### Package:

- Non-refillable cylinder of 12 Kgs

## R-500



### Physical Properties

Refrigerant Components	R-12/152a (73.8/26.2)
Bubble Point	
°C@101.3kPa	-33.5
°F@14.7psia	
Critical Temperature	
°C	105.6
°F	
Purity	99.8
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	N/A
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable, non-corrosive gas with a faint ethereal odour, supplied in steel cylinders as a liquid at its own vapour pressure.

#### Classifications

H.S.Code	38247900
UN Number	2602
Class	2.2

#### Uses and Features

- Used in small and medium size equipment for home and commercial air-conditioning and in some refrigeration applications. An azeotropic mixture of R-12 and R-152a, it offers significantly greater refrigeration performance than either of its constituents alone.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium (i.e. some aluminium alloys, especially if moisture is present). Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers excessive swelling. PTFE and nylon are generally compatible.

#### Package:

- Ton cylinder of 800Kgs

#### Oil Compatibility

- Mineral oil
- POE

## R-502



### Physical Properties

Refrigerant Components	R-22/R115 (48.8/51.2)
Bubble Point	
°C@101.3kPa	-45.6
°F@14.7psia	
Critical Temperature	
°C	82.1
°F	
Purity	99.8
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable, non-corrosive Liquefiable gas with a slight ethereal odour, supplied in cylinders as a Liquid at its own vapour pressure.

#### Classifications

H.S.Code	38247100
UN Number	1973
Class	2.2

#### Uses and Features

- An azeotropic mixture of R22 and R115, R502 has a greater refrigeration capacity than R22 alone, while discharge temperatures are considerably lower.
- Particularly useful where R12 and R22 are reaching their effective working limits, and finding application in low to medium temperature cabinets for the display and storage of foodstuffs, in food freezing and in heat pumps.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium (i.e. some aluminium alloys, especially if moisture is present). Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers excessive swelling. PTFE and nylon are generally compatible.

#### Package:

- Non-refillable cylinder of 13.6Kgs

## R-507



### Physical Properties

Refrigerant Components	R-125/143a (50/50)
Bubble Point	
°C@101.3kPa	-47.1
°F@14.7psia	
Critical Temperature	
°C	78.9
°F	
Purity	99.8
% by weight(min)	
Water Content	20
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-flammable gas at atmospheric pressure with a slight ethereal odour. Supplied in low pressure cylinders.

#### Classifications

H.S.Code	38247900
UN Number	3163
Class	2.2

#### Uses and Features

- Commercial and medium temperature refrigeration applications.
- A replacement for CFC 502.

#### Material Compatibility

Most common materials are suitable for use under normal conditions in a dry system. At high temperatures, use stainless steel or Inconel to resist corrosive breakdown products. Avoid using alloys with more than 2% magnesium (i.e. some aluminium alloys) especially when moisture is present. May react violently with sodium, potassium, barium and other alkali or alkaline earth metals. Flexible hoses or gaskets should not contain natural rubber as rapid withdrawals of gas/liquid can extract compounding ingredients and it also suffers from excessive swelling.

#### Package:

- Non-refillable cylinder of 11.3Kgs

#### Oil Compatibility

- POE

## R-600a Propellant A-31 Isobutane



### Physical Properties

Chemical Formula	2-methylpropane
Bubble Point	
°C@101.3kPa	-11.8
°F@14.7psia	
Critical Temperature	
°C	134.98
°F	
Purity	99.5
% by weight(min)	
Water Content	10
ppm by weight(max)	
Acidity	1.0
ppm by weight(max) (as HCl)	
Non Condensable Gasses	1.5
Content Measured on Vapour Phase	
% by volume(max)	
Residues at High Boiling Point	0.01
% by volume(max)	
Chloride	pass
No visible turbidity	

### Common Data

#### Description

A colourless, non-ozone depleting non-corrosive, non-toxic, non-global warming refrigerant

#### Classifications

H.S.Code	29011000
UN Number	1969
Class	2.1

#### Material Compatibility

##### Metals

<b>General Behavior:</b>	Risk of corrosion by gas contained impurities in presence of moisture
Aluminium	Satisfactory
Stainless Steel	Satisfactory

##### Plastics

PTFE	Satisfactory
PA(NYLON)	Satisfactory

##### Elastomers

Butyl rubber	Non recommended, significant swelling.
(IIR)	
Nitrile rubber	Satisfactory
(NBR)	

#### Uses and Features

- Used widely in refrigerator
- Used as blends in most aerosols field for pharmaceutical, the agrochemical, the cosmetics, cleaning, household aerosol products.

#### Package:

- Ton cylinder of 490Kgs
- ISO TANK

## R-600 Propellant A-17 N-butane



### Properties

ETHANE	0.1Max.
PROPANE	1.0Max
ISOBUTANE	5.0MAX
n-BUTANE	95.0Min
PENTANES	3.0Max
TOTAL UNSATURATES	200MAX.
VAPOR PRESSURE	
@21.1°C(PSIG)	16-19
@21.1°C(MPa)	0.11-0.13
SULFUR (PPM)	1MAX
MOISTURE(PPM)	10MAX.
RESIDUES	0.05ml/100mlMAX
ODOR	Pass

### Common Data

#### Description

A colourless, non-ozone depleting non-corrosive, non-toxic , non-global warming propellant

#### Classifications

H.S.Code	29011000
UN Number	1969
Class	2.1

#### Uses and Features

- Used as blends in most aerosols field for pharmaceutical, the agrochemical, the cosmetics, cleaning, household aerosol products.

#### Package:

- Ton cylinder of 510Kgs
- ISO TANK

## R-290 Propellant A-108 Propane



### Properties

ETHANE	0.5Max.
PROPANE	95.0Min
BUTANE	4.0Max
TOTAL UNSATURATES	500MAX
VAPOR PRESSURE	
@21.1°C (PSIG)	105-111
@21.1°C (MPa)	0.72-0.77
SULFUR (PPM)	1Max.
MOISTURE (PPM)	10Max.
RESIDUES	0.05ml/100mlMAX
ODOR	Pass

### Common Data

#### Description

A colourless, non-ozone depleting non-corrosive, non-toxic, non-global warming propellant

#### Classifications

H.S.Code	29011000
UN Number	1969
Class	2.1

#### Uses and Features

- Used as blends in most aerosols field for pharmaceutical, the agrochemical, the cosmetics, cleaning, household aerosol products.

#### Package:

- Ton cylinder of 410Kgs
- ISO TANK

## Polyol Blend

Item Type	Appearance	OH value mgKOH/g	Dynamic viscosity 20°C Pa·s	foaming technical parameter A/B=1:1-1:1.35			Freely foaming Density Kg/m <sup>3</sup>	Application
				Cream time s	Gel time s	Tack-free s		
HF-01	Brown and yellow ropy liquid, without solid and mechanical impurity	320+50	≤ 0.4	15+3	80+20	100+35	≥ 23	lcc-cabinet
HF-02		320+50	≤ 0.4	15+3	80+20	100+35	≥ 23	Refrigerator
HF-03		320+50	≤ 0.4	15+5	80+20	100+35	≥ 23	Garage gate Electrical water bowl
HF-04		320+50	≤ 0.4	10+3	35+10	50+15	≥ 26	Continuous board
HF-05		320+50	≤ 0.4	3+1	–	–	≥ 23	Spray-smear material
HF-06		320+50	≤ 0.4	6+3	–	40+20	≥ 23	Tun for beer pipeline
HF-07		320+50	≤ 0.4	10+3	–	30+15	≥ 35	EPS adhesives
HF-08		320+50	≤ 0.4	30+10	–	100+35	≥ 60	High density
HF-09		320+50	≤ 0.4	15+5	80+20	100+35	≥ 27	High temperature
HF-10		320+50	≤ 0.4	15+5	80+20	100+35	≥ 27	Solar hot water bowl
HF-11		320+50	≤ 0.4	15+5	80+20	100+35	≥ 15	Low density

**Note:** Froth techniques parameter can be adjusted properly.

## Polymeric MDI

Polymeric MDI (polymethane polyphenyl Isocyanate)

Brand Name	Appearance	Viscosity @ 25°C mPa.s	NCO%	Density (25°C, g/cm <sup>3</sup> )	Acid Content (HCL)%	Hydrolyzable Chlorine %
Wannate PM-130	dark brown liquid	100-150	30.5-32.0	1.22-1.25	≤ 0.05	≤ 0.2
Wannate PM-200	brown liquid	150-250	30.2-32.0	1.22-1.25	≤ 0.05	≤ 0.2
Wannate PM-300	brown liquid	250-350	30.0-32.0	1.22-1.25	≤ 0.05	≤ 0.2
Wannate PM-400	brown liquid	350-700	30.0-32.0	1.22-1.25	≤ 0.05	≤ 0.2
Wannate PM-2025	brown liquid	150-250	30.0-32.0	1.22-1.25	≤ 0.05	≤ 0.2
Wannate PM-6302	brown liquid	100-300	30.0-32.0	1.22-1.25	≤ 0.1	≤ 0.2
Wannate PM-6304	brown liquid	300-1000	29.0-32.0	1.22-1.25	≤ 0.1	≤ 0.2

### PM-200 Application:

Wannate PM-200 can be widely used in the production of PU rigid insulation foams and polyisocyanurate foams. Other uses include paints, adhesives, sealants, structural foams, microcellular integral skin foams, automotive bumper and interior parts, high-resilience foams and synthetic wood. Due to its unique composition, Wannate PM-200 offers excellent flowability.

**Packing:** Iron drum: 250Kgs.



## Cyclopentane



### Physical Properties

Item	Cyclopentane
Boiling point (101.3kPa):	49.25℃
Relative density (20℃)	0.745
Flash point:	-42℃
Density (g/cm <sup>3</sup> )	0.73-0.75
Cyclopentane (wt%)	≥95
n-pentane (wt%)	≤3.5
Isopentane (wt%)	≤3.5
Isohexane (wt%)	≤1.5
n-hexane (ppm)	≤10
Benzene (ppm)	≤1
Water (ppm)	≤150

### Common Data

#### Description

A colorless and transparent liquid, no mechanical impurity and suspending matters

#### Uses and Features

- Used as a new foaming agent for rigid polyurethane foam
- Substitute for CFCs which destroys the atmospheric ozone layer.
- Used in producing non CFCs refrigerator, freezer and cold storage and tubing insulating materials

#### Precautions in Use

- Shall be kept far from heat, fire, oxidant and chemical reactant
- Shall be kept in shady, cool, dry and well ventilated place. when transporting, loading and unloading
- Don't swallow when operation, and avoid steam absorbing and touch into eye, skin and clothes.

#### Package:

- Iron drum of 130Kgs
- Liquid Tank

## N-pentane



### Physical Properties

Item	n-pentane
Boiling point(101.3kPa):	36.1℃
Relative density(20℃)	0.63
Flash point:	-40℃
Density (g/cm <sup>3</sup> )	0.60-0.65
n-pentane (wt%)	≥95
Cyclopentane (wt%)	≤0.5
C <sub>6</sub> (wt%)	≤0.5
Sulfur (ppm)	≤1
Free water (wt%)	No

### Common Data

#### Description

A colorless and transparent liquid, no mechanical impurity and suspending matters

#### Uses and Features

- Used as a foaming agent of EPS.
- Used as desorption agent for dewax of molecular sieve.

#### Precautions in Use

- Shall be kept far from heat, fire, oxidant and chemical reactant
- Shall be kept in shady, cool, dry and well ventilated place. when transporting, loading and unloading
- Don't swallow when operation, and avoid steam absorbing and touch into eye, skin and clothes.

#### Package:

- Liquid Tank

# Isopentane



## Physical Properties

Item	figures
Boiling point (101.3kPa):	27.85℃
Relative density (20℃)	0.62
Flash point:	-56℃
Density (g/cm <sup>3</sup> )	0.58-0.63
Isopentane (wt%)	≥95
n-pentane (wt%)	≤4
Sulfur (ppm)	≤1
Free Water	No

## Common Data

### Description

A colorless and transparent liquid, no mechanical impurity and suspending matters

### Uses and Features

- Isopentane can be mixed with n-pentane to make EPS
- Can be mixed with cyclopentane as a foaming agent for rigid urethane foam.

### Precautions in Use

- Shall be kept far from heat, fire, oxidant and chemical reactant
- Shall be kept in shady, cool, dry and well ventilated place. when transporting, loading and unloading
- Don't swallow when operation, and avoid steam absorbing and touch into eye, skin and clothes.

### Package:

- Liquid Tank