



## Refrigerants R134A

R134A is an HFC, it is a colourless, non-flammable gas at atmospheric pressure with a slight odour. Supplied at low pressure in welded metal cylinders.

### Precautions in Use

- wear overall and safety shoes when handling cylinders.

### Hazards

- Asphyxiant in high concentrations
- Sudden expansion will produce low temperatures.

Gas	Purity
HFC-134A, 1, 1, 1, 2 Tetrafluoroethane $C_2H_2F_4$	>99,7 (%)

Physical Data	
Reference: Pabs = 101,325 kPa T = 20°C	R134A
Boiling Point	-26,3°C
Bubble Pressure (absolute)	572,1 kPa
Relative Density Air = 1	3,601
Molecular Weight	102 kg/kmol
Critical Temperature	101°C
Critical Pressure	4 059 kPa
Liquid Density	1 225 kg/m <sup>3</sup>
ODP R11 = 1	0
GWP CO <sub>2</sub> = 1	1 300

Item Number	Cylinder Size	Contents (kg)	Valve Outlet Connection
W341045	Disposable	13,6	1/4" flare
578013-LG-N	Cylinder	60,0	5/8" BSPF right hand male
578013-TC-N	Drum	850,0	
578013-LC-N	Cylinder	22,0	

### Retrofit Information

<b>Replacement for:</b>	R12	With the phasing out of CFCs, R134a was introduced as a replacement for R12 systems in flooded evaporators and shell and tube systems chillers, white goods and automotive
<b>Other alternatives/replacements:</b>	R1234yf	Due to the high GWP of R134a, this gas is being replaced by HFO R1234yf in automotive and other applications using R134a. White goods is moving across to the hydrocarbon refrigerants R600, R600a and R290
<b>Compatible lubricants:</b>	PAG-Auto, POE	





### Environmental Impact

Ozone Depletion Potential (ODP)	0
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	1 300
Global Warming Potential (Rating)	

### Safety Information

ASHRAE Safety Group (2013)	A1
ASHRAE Flammability	No
ASHRAE Toxicity	No

### Common Refrigerant Applications



Domestic Refrigeration



Commercial Refrigeration



Transport/Refrigeration



Commercial Refrigeration:  
Plug-ins & Vending Machines



Industrial Refrigeration



Residential & Light Air-conditioning



Industrial/Commercial Air-conditioning  
DX Chillers

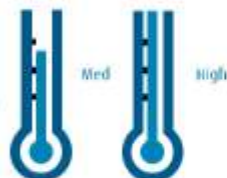


Industrial/Commercial  
Centrifugal Compressors



Mobile Air-conditioning

### Temperature Range





## Refrigerants R427A

R427A, also known as Forane® 427A, is an HFC blend. It is a non-toxic, non-flammable, zero-ODP (Ozone Depletion Potential) refrigerant. R427A has the lowest GWP of R22 retrofit replacement refrigerants.



Gas	%
Forane® - 134a (1,1,1,2-Tetrafluoroethane)	50
Forane® - 125 (Pentafluoroethane)	25
Forane® - 32 (Difluoromethane)	15
Forane® - 143a (1,1,1-Trifluoroethane)	10
Purity of each component (%)	>99,5 wt

### Physical Data

Reference: Pabs = 101,325 kPa T = 20°C	R427A
Moisture	≤ 10 ppm
Chlorine Ion Test	Negative
Air Vapour Phase	≤ 1,5%
Total Acidity	≤ 1 ppm
Boiling Point	-42,7°C
Temperature Glide	7 K
Latent Heat of Vaporisation at n.b.p.	223,3 kJ/K
Critical Temperature	85,3°C
Critical Pressure	4,39 MPa
Liquid Density at 20°C	1,172 kg/m <sup>3</sup>
Vapour Pressure at 20°C	0,97 MPa
ODP R11 = 1	0
GWP CO <sub>2</sub> = 1	2 138

Item Number	Cylinder Size	Contents (kg)	Valve Outlet Connection
578042-LA-N	Cylinder	10,0	5/8" BSPF right hand female
578042-LG-N	Cylinder	59,0	5/8" BSPF right hand female
578042-TA-N	Drum	800,00	5/8" BSPF right hand female

### Retrofit Information:

Replacement for:

R22

Retrofit gas or design for new equipment?

R427A is suitable as a retrofit gas for R22

Other alternatives/replacements:

R417A, R422A, R422D, R424A, R434A, R437A, R438A

Compatible lubricants:

POE



### Environmental Impact

Ozone Depletion Potential (ODP)	0
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	2.138
Global Warming Potential (Rating)	

### Safety Information

ASHRAE Safety Group (2013)	A1
ASHRAE Flammability	No
ASHRAE Toxicity	No

### Common Refrigerant Applications



Commercial Refrigeration



Commercial Refrigeration:  
Plug-ins & Vending Machines



Industrial/Commercial Air-conditioning  
DX Chillers

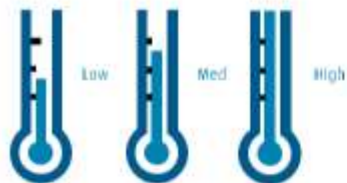


Industrial Refrigeration



Residential & Light Air-conditioning

### Temperature Range





## Refrigerants R22

R22 is an HCFC. It is a colourless, non-flammable, non-toxic gas. In low concentrations, it is odourless. In higher concentrations, its odour is mild. It is shipped in steel cylinders as a liquefied gas.

### Precautions in Use

- wear overall and safety shoes when handling cylinders.

### Hazards

- Dangerous for the ozone layer - part of phase-out schedule
- Asphyxiant in high concentrations
- Sudden expansion will produce low temperatures.

**QUOTA RESTRICTION**  
- due to HCFC phase out



Gas	Purity
HCFC-22 Chlorodifluoromethane $\text{CHClF}_2$	>99,5 (%) wt

Physical Data	
Reference: $P_{\text{abs}} = 101,325 \text{ kPa}$ $T = 20^\circ\text{C}$	<b>R22</b>
Boiling Point	-40,8°C
Bubble Pressure (absolute)	910,3 kPa
Relative Density Air = 1	3,032
Molecular Weight	86,47 kg/kmol
Critical Temperature	96,13°C
Critical Pressure	4 989 kPa
Liquid Density	1 210 kg/m <sup>3</sup>
ODP R11 = 1	0,055
GWP CO <sub>2</sub> = 1	1 760

Item Number	Cylinder Size	Contents (kg)	Valve Outlet Connection
W341078	Disposable	13,6	1/4" flare
577022-LG-N	Cylinder	59,0	5/8" BSPF right hand male
577022-TA-N	Drum	785,0	



### Retrofit Information:

#### Replacement for:

Operates at similar pressure to temperature parameters

#### Other alternatives/replacements:

R404a, R417A,  
R422A, R422D,  
R424A, R427A,  
R428A, R434A,  
R438A

#### Compatible lubricants:

MO, AB



Environmental Impact

Ozone Depletion Potential (ODP)	0,055
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	1 760
Global Warming Potential (Rating)	

considering alternative solutions.

Safety Information

ASHRAE Safety Group (2013)	A1
ASHRAE Flammability	No
ASHRAE Toxicity	No

Common Refrigerant Applications



Commercial Refrigeration



Commercial Refrigeration:  
Plug-ins & Vending Machines



Industrial/Commercial Air-conditioning  
DX Chillers



Industrial Refrigeration



Residential & Light Air-conditioning

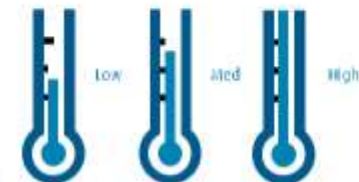


Industrial/Commercial  
Centrifugal Compressors



Transport/Refrigeration

Temperature Range





## Refrigerants R404A

R404A is an HFC blend. It is a colourless, non-flammable gas mixture

used as an alternative gas for R22 systems with an oil change.

### Precautions in Use

- wear overall and safety shoes when handling cylinders.

### Hazards

- Asphyxiant in high concentrations
- Sudden expansion will produce low temperatures.

Gas	%
HFC-143a Trifluoroethane	52
HFC-125 Pentafluoroethane	44
HFC-134a Tetrafluoroethane	4
Purity (%)	>99,7

Physical Data	
Reference: Pabs = 101,325 kPa T = 20°C	<b>R404A</b>
Boiling Point	-46,6°C/-45,8°C
Bubble Pressure (absolute)	1 088 kPa
Relative Density Air = 1	3,429
Molecular Weight	97,6 kg/kmol
Critical Temperature	72,15°C
Critical Pressure	3 735 kPa
Liquid Density	1 066 kg/m <sup>3</sup>
ODP R11 = 1	0
GWP CO <sub>2</sub> = 1	3 922

Item Number	Cylinder Size	Contents (kg)	Valve Outlet Connection
W341079	Disposable cylinder	10,9	1/4" flare
578040-LG-C	Cylinder	44,0	5/8" BSPF right hand male

### Retrofit Information:

#### Replacement for:

R502, R22

#### Retrofit gas or design for new equipment?

R404A is suitable for use in new equipment as a replacement for older R502 applications. It can also be used to retrofit some old systems with an oil change

#### Other alternatives/replacements:

R407A, R407F, R442A

#### Compatible lubricants:

POE





### Environmental Impact

Ozone Depletion Potential (ODP)	0
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	3.922
Global Warming Potential (Rating)	

### Safety Information

ASHRAE Safety Group (2013)	A1
ASHRAE Flammability	No
ASHRAE Toxicity	No

### Common Refrigerant Applications



Commercial Refrigeration



Commercial Refrigeration :  
Plug-ins & Vending Machines

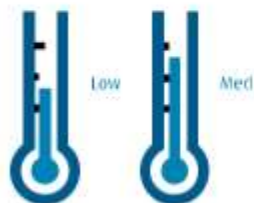


Industrial Refrigeration



Transport/Refrigeration

### Temperature Range







## Refrigerants R152A

its flammability creates challenges, thus limiting its use:

### Precautions in Use

- wear overall and safety shoes when handling cylinders.

### Hazards

- Extremely flammable gas
- Contact with liquid may cause frostbite and injury
- Inhalation of high concentration of vapour is harmful to health
- Material can be decomposed by high temperatures forming hydrofluoric acid, and possibly carbonyl fluoride

Gas	%
1,1-Difluoroethane $C_2H_4F_2$	100

Physical Data	
Reference: $P_{abs} = 101,325 \text{ kPa}$ $T = 20^\circ\text{C}$	R152A
Chemical Symbol	$CH_2H_4F_2$
Molecular weight	66,05 kg/kmol
Critical temperature	113,26 °C
Critical Pressure	47,6 bar
Specific Gravity	2,36
Boiling point @ 101,325 kPa	-24,70C
ODP	0
GWP	138

Item Number	Cylinder Size	Contents (kg)	Valve Outlet Connection
578015-LG-N	Cylinder	47,0	G5/8" LH-F
578015-TB-N	Drum	658	5/8" BSPF right hand male



### Retrofit Information:

Replacement for:

R134a

Retrofit gas or design for new equipment?

R152a is suitable for use in new equipment

Other alternatives/replacements:

R134a, R227ea, R245fa, R600a, Pentanes

Compatible lubricants:

-



### Environmental Impact

Ozone Depletion Potential (ODP)	0
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	138
Global Warming Potential (Rating)	

### Safety Information

ASHRAE Safety Group (2013)	A2
ASHRAE Flammability	Yes
ASHRAE Toxicity	No

### Common Refrigerant Applications

Propellant                      Foam Blowing Agent

### Temperature Range





## Refrigerants R407C

R407C is an HFC blend. It is a colourless and non-flammable gas

low pressure cylinders.

### Precautions in Use

- wear overall and safety shoes when handling cylinders.

### Hazards

- Asphyxiant in high concentrations
- Sudden expansion will produce low temperatures.

Gas	%
HFC-32 Difluoromethane	23
HFC-125 Pentafluoroethane	25
HFC-134a Tetrafluoroethane	52
Purity (%)	>99,7

Physical Data	
Reference: Pabs = 101,325 kPa T = 20°C	R407C
Boiling Point	-43,8°C/-36,7°C
Bubble Pressure (absolute)	864,8 kPa
Relative Density Air = 1	3,022
Molecular Weight	86,2 kg/kmol
Critical Temperature	86,79°C
Critical Pressure	4 597 kPa
Liquid Density	1 157 kg/m <sup>3</sup>
ODP R11 = 1	0
GWP CO <sub>2</sub> = 1	1 774

Item Number	Cylinder Size	Contents (kg)	Valve Outlet Connection
W341107	Disposable Cylinder	11,3	1/4" flare



### Retrofit Information:

Replacement for:

R22

Retrofit gas or design for new equipment?

R407C is suitable for use in new equipment. It can also be used to retrofit some old R22 systems with an oil change

Other alternatives/replacements:

R407A, R407F

Compatible lubricants:

POE



### Environmental Impact

Ozone Depletion Potential (ODP)	0
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	1.774
Global Warming Potential (Rating)	

### Safety Information

ASHRAE Safety Group (2013)	A1
ASHRAE Flammability	No
ASHRAE Toxicity	No

### Common Refrigerant Applications



Industrial/Commercial Air-conditioning  
DX Chillers



Industrial Refrigeration



Residential & Light Air-conditioning

### Temperature Range





## Refrigerants R417A

R417A (ISCEON® 59) has been primarily developed to replace R22 in air-conditioning applications but has also been successfully utilised in refrigeration applications such as commercial refrigeration.

### Precautions in Use

- wear overall and safety shoes when handling cylinders.

### Hazards

- Asphyxiant in high concentrations
- Sudden expansion will produce low temperatures.



Gas	%
HFC - 1,1,1,2-Tetrafluoroethane - R134a	50
HFC -Pentafluoroethane - R125	46,6
HC - N-butane - R600	3,4
Purity (%)	>99,8

Physical Data	
Reference: Pabs = 101,325 kPa T = 25°C	<b>R417A</b>
Boiling Point	-41,2°C/-40,1°C
Bubble Pressure (absolute)	8,57 bar
Relative Density Air = 1	1 172,20 kg/m <sup>3</sup>
Molecular Weight	109 kg/kmol
Critical Temperature	89,89°C
Critical Pressure	4 102 kPa
Liquid Density	41,07 kg/m <sup>3</sup>
ODP R11 = 1	0
GWP CO <sub>2</sub> = 1	2 346

Item Number	Cylinder Size	Contents (kg)	Valve Outlet Connection
W3-41083	Disposable Cylinder	13,0	1/4" flare

### Retrofit Information:

Replacement for:

R22

Retrofit gas or design for new equipment?

R407C is suitable for use in new equipment. It can also be used to retrofit some old R22 systems with an oil change

Other alternatives/replacements:

R407A, R407F

Compatible lubricants:

POE



### Environmental Impact

Ozone Depletion Potential (ODP)	0
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	2 346
Global Warming Potential (Rating)	

### Safety Information

ASHRAE Safety Group (2013)	A1
ASHRAE Flammability	No
ASHRAE Toxicity	No

### Common Refrigerant Applications



Industrial/Commercial Air-conditioning  
DX Chillers



Industrial Refrigeration



Residential & Light Air-conditioning

### Temperature Range





## Refrigerants R410A

R410A is an HFC blend. It is non-flammable and non-toxic. It operates at high pressures and cannot be used as a retrofit for R22 systems. Systems designed for R410A can take advantage of its ability to use smaller components.

### Precautions in Use

- wear overall and safety shoes when handling cylinders.

### Hazards

- Asphyxiant in high concentrations
- Sudden expansion will produce low temperatures.



Gas	%
HFC-32 Difluoromethane	50
HFC-125 Pentafluoroethane	50
Purity (%)	>99,7 wt

Physical Data	
Reference: Pabs = 101,325 kPa T = 20°C	R410A
Boiling Point	-51,6°C/-51,5°C
Bubble Pressure (absolute)	1.437 kPa
Relative Density Air = 1	2,543
Molecular Weight	72,58 kg/kmol
Critical Temperature	72,13°C
Critical Pressure	4.770 kPa
Liquid Density	1.087 kg/m <sup>3</sup>
ODP R11 = 1	0
GWP CO <sub>2</sub> = 1	2.088

Item Number	Cylinder Size	Contents (kg)	Valve Outlet Connection
W341134	Disposable cylinder	11,3	1/4" flare

### Retrofit Information:

#### Replacement for:

R22, R13B1

#### Retrofit gas or design for new equipment?

R410A is suitable for new equipment designed to operate with the higher pressure necessary for this gas

#### Other alternatives/replacements:

R32, M089, R23, R508B

#### Compatible lubricants:

POE



Environmental Impact

Ozone Depletion Potential (ODP)	0
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	2 088
Global Warming Potential (Rating)	

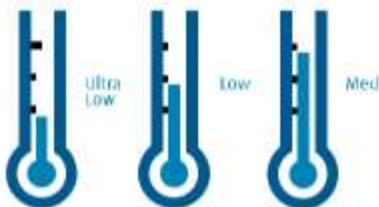
Safety Information:

ASHRAE Safety Group (2013)	A1
ASHRAE Flammability	No
ASHRAE Toxicity	No

Common Refrigerant Applications



Temperature Range







## Refrigerants R507A

R507A is an HFC blend. It is a colourless, non-flammable gas low pressure cylinders.

### Precautions in Use

- wear overall and safety shoes when handling cylinders.

### Hazards

- Asphyxiant in high concentrations
- Sudden expansion will produce low temperatures.

Gas	%
HFC-125 Pentafluoroethane	50
HFC-143a Trifluoroethane	50
Purity (%)	>99,7 wt

### Physical Data

Reference: Pabs = 101,325 kPa T = 20°C	R507A
Boiling Point	-46,7°C/-40°C
Bubble Pressure (absolute)	1 126 kPa
Relative Density Air = 1	3,471
Molecular Weight	98,86 kg/kmol
Critical Temperature	70,74 °C
Critical Pressure	3 714 kPa
Liquid Density	1 070 kg/m <sup>3</sup>
ODP R11 = 1	0
GWP CO <sub>2</sub> = 1	3 985

Item Number	Cylinder Size	Contents (kg)	Charging Pressure kPa at 20°C	Valve Outlet Connection
W341080	Disposable	11,3	Vapour Pressure	1/4" flare



### Retrofit Information:

Replacement for:

R502, R22

Retrofit gas or design for new equipment?

R507A is suitable for use with new equipment in applications that used to use R502

Other alternatives/replacements:

R404A, R407A, R407F

Compatible lubricants:

POE



Environmental Impact

Ozone Depletion Potential (ODP)	0
Ozone Depletion Potential (Rating)	
Global Warming Potential (GWP)	3 985
Global Warming Potential (Rating)	

Safety Information:

ASHRAE Safety Group (2013)	A1
ASHRAE Flammability	No
ASHRAE Toxicity	No

Common Refrigerant Applications



Industrial Refrigeration



Industrial/Commercial  
Centrifugal Compressors

Temperature Range

