



Frio Refrigerant Products



410a

Frio® 410a

DIFLUOROMETHANE / PENTAFLUOROETHANE

GENERAL DESCRIPTION

Near azeotropic HFC blend with a zero ODP designed to replace R-22 in many applications such as unitary A/C, chillers, and some refrigeration. It operates at a much higher pressure and capacity than R-22. Equipment, therefore, must be designed to handle R-410A.

SPECIFICATIONS

(Meets ARI 700 Specifications)

	Maximum (unless otherwise indicated)	Tolerance
Difluoromethane (HFC-32), wt %	50.0	-1.5%/+ 0.5%
Pentafluoroethane (HFC-125), wt %	50.0	-0.5%/+1.5%
Air and Other Non-condensable Gases, vol %	1.5	
Volatile Impurities, wt %	0.5	
High Boiling Residue, vol %	0.01	
Moisture (H ₂ O), ppm by wt	10	
Acidity, ppm by wt (as HCl)	1.0	
Chloride, no visible turbidity (indicates about 3 ppm)	Pass	
Particulates / solids (visually clean to pass)	Pass	

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole of blend)	72.59
Boiling Range at 1 atm	-60.2 to - 60.0°F -51.2 to -51.1°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0
Global Warming Potential (GWP) (CO ₂ = 1.0)	1,980

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia	155.0	213.3	353.9	404.5	490.4
Liquid Density, lb./ft ³	70.6	67.5	60.8	58.5	54.5



427a

Frio® 427a

Application:

R-427A is an R-22 retrofit for low and medium temperature refrigeration and air conditioning systems.

Properties & Performance:

R-427A is designed to meet the needs of many new and existing air conditioning and refrigeration systems. R-427A is a zeotropic HFC refrigerant blend, which is rated A1 by ASHRAE (lowest levels of toxicity and flammability) and has zero ozone depletion potential. R-427A has comparable capacity to R-22 and better efficiency than most other R-22 replacements. R-427A's discharge temperatures are typically 15 – 40°F lower than those of R-22, and it has one of the lowest global warming potentials (GWP) of the R-22 retrofits.

Lubrication:

Mineral oil and alkylbenzene are often acceptable with R-427A if the system has an oil separator and reliable oil return with R-22. Otherwise the oil must be changed to POE. If POE is required, usually only one change-out of the existing lubricant is needed, as R-427A can tolerate high levels of residual mineral oil or alkylbenzene remaining in the system.

Charging:

Due to the zeotropic nature of the R-427A blend, it should only be charged as liquid to prevent fractionation .

In situations where vapor would normally be charged into a system, a valve should be installed in the charging line to flash liquid from the cylinder into vapor. Never introduce liquid into a running system, as compressor damage may result. Manifold gage sets, charging machines and tanks used with R-22 should be compatible for use with R-427A, provided they have been properly evacuated to prevent mixing of the two gases.

Retrofit:

R-427A was developed to minimize the work necessary during an R-22 system retrofit: therefore, retrofits to R-427A do not require change-out of expansion valves or other major components. Expansion devices may need to be adjusted to optimize system performance.

Basic Properties

Average Molecular Weight (g/mol)	90.4
Normal Boiling Point (NBP) (°F)	-45.4
Critical Temperature (°F)	185.5
Critical Pressure (psia)	638.0
Bubble Pressure at 77°F	162.4
Density of Saturated Vapor @ NBP (lb/ft ³)	0.30
Density of Saturated Liquid @ 77 °F (lb/ft ³)	71.9
Specific Heat of Saturated Vapor @ NBP (BTU/lb °R)	0.201
Specific Heat of Saturated Liquid @ 77°F (BTU/lb °R)	0.38
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0
Global Warming Potential (GWP)	1,830



407a

Frio® 407a

DIFLUOROMETHANE / PENTAFLUOROETHANE 1,1,1,2-TETRAFLUOROETHANE

GENERAL DESCRIPTION

A zero ODP zeotropic HFC blend which closely matches the properties of R-22. It can be used in many A/C and refrigeration applications in new or retrofitted R-22 installations. Polyolester lubricants should be used with R-407A due to immiscibility with mineral oil or alkylbenzene.

SPECIFICATIONS

(Meets ARI 700 Specifications)

	Maximum (unless otherwise indicated)	Tolerance
Difluoromethane (HFC-32), wt %	20 (nominal)	± 2%
Pentafluoroethane (HFC-125), wt %	40 (nominal)	± 2%
1,1,1,2-Tetrafluoroethane (HFC-134a), wt %	40 (nominal)	± 2%
Air and Other Non-condensable Gases, vol %	1.5	
Volatile Impurities, wt %	0.5	
High Boiling Residue, vol %	0.01	
Moisture (H ₂ O), ppm by wt	10	
Acidity, ppm by wt (as HCl)	1.0	
Chloride, no visible turbidity (indicates about 3 ppm)	Pass	
Particulates / solids (visually clean to pass)	Pass	

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole of blend)	86.20
Boiling Range at 1 atm	-46.4 to -33.9°F -43.6 to -36.6°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0
Global Warming Potential (GWP) (CO ₂ = 1.0)	1,655

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia	92.2	129.9	222.5	256.6	315.6
Liquid Density, lb./ft ³	74.9	72.1	66.6	64.8	61.9



407c

Frio® 407c

DIFLUOROMETHANE / PENTAFLUOROETHANE 1,1,1,2-TETRAFLUOROETHANE

GENERAL DESCRIPTION

A zero ODP zeotropic HFC blend which closely matches the properties of R-22. It can be used in many A/C and refrigeration applications in new or retrofitted R-22 installations. Polyolester lubricants should be used with R-407C due to immiscibility with mineral oil or alkylbenzene.

SPECIFICATIONS

(Meets ARI 700 Specifications)

	Maximum (unless otherwise indicated)	Tolerance
Difluoromethane (HFC-32), wt %	23 (nominal)	± 2%
Pentafluoroethane (HFC-125), wt %	25 (nominal)	± 2%
1,1,1,2-Tetrafluoroethane (HFC-134a), wt %	52 (nominal)	± 2%
Air and Other Non-condensable Gases, vol %	1.5	
Volatile Impurities, wt %	0.5	
High Boiling Residue, vol %	0.01	
Moisture (H ₂ O), ppm by wt	10	
Acidity, ppm by wt (as HCl)	1.0	
Chloride, no visible turbidity (indicates about 3 ppm)	Pass	
Particulates / solids (visually clean to pass)	Pass	

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole of blend)	86.20
Boiling Range at 1 atm	-46.4 to -33.9°F -43.6 to -36.6°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0
Global Warming Potential (GWP) (CO ₂ = 1.0)	1,655

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia	92.2	129.9	222.5	256.6	315.6
Liquid Density, lb./ft ³	74.9	72.1	66.6	64.8	61.9



134a

Frio® 134a

1,1,1,2-TETRAFLUOROETHANE (CH₂FCF₃)

GENERAL DESCRIPTION

A zero ODP HFC used alone (as an R-12 replacement) or as a component in blends (especially those designed to replace R-22 and R-502). Some current applications include automotive A/C, positive pressure centrifugal chillers, medium to high temperature commercial refrigeration, refrigeration appliances, and transport refrigeration.

SPECIFICATIONS

	Maximum (unless otherwise noted)
1,1,1,2-Tetrafluoroethane, wt %	99.8 (minimum)
Air and Other Non-condensable Gases, vol %	1.5
Volatile Impurities, wt. %	0.5
High Boiling Residue, vol %	0.01
Moisture (H ₂ O), ppm by wt	10
Acidity, ppm by wt (as HCl)	1.0
Chloride, no visible turbidity (indicates about 3 ppm)	Pass
Particulates / solids (visually clean to pass)	Pass

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole)	102.03
Boiling Point at 1 atm	-15.1°F/-26.2°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0
Global Warming Potential (GWP) (CO ₂ = 1.0)	1,300

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia	60.1	85.7	149.6	173.1	213.4
Liquid Density, lb./ft ³	78.7	76.2	71.4	69.9	67.5



404a

Frio® 404a (FX 70)

PENTAFLUOROETHANE / 1,1,1-TRIFLUOROETHANE / 1,1,1,2-TETRAFLUOROETHANE

GENERAL DESCRIPTION

A zero ODP near azeotropic HFC refrigerant blend which has applications in medium to low temperature ranges. Its properties are similar to those of R-502.

SPECIFICATIONS

(Meets ARI 700 Specifications)

	Maximum (unless otherwise indicated)	Tolerance
Pentafluoroethane (HFC-125), wt %	44 (nominal)	± 2%
1,1,1-Trifluoroethane (HFC-143a), wt %	52 (nominal)	± 1%
1,1,1,2-Tetrafluoroethane (HFC-134a), wt %	4 (nominal)	± 2%
Air and Other Non-condensable Gases, vol %	1.5	
Volatile Impurities, wt %	0.5	
High Boiling Residue, vol %	0.01	
Moisture (H ₂ O), ppm by wt	10	
Acidity, ppm by wt (as HCl)	1.0	
Chloride, no visible turbidity (indicates about 3 ppm)	Pass	
Particulates / solids (visually clean to pass)	Pass	

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole of blend)	97.60
Boiling Range at 1 atm	-51.0 to -49.8°F -46.1 to -45.4°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0
Global Warming Potential (GWP) (CO ₂ = 1.0)	3,785

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia	117.7	161.5	265.9	303.3	366.7
Liquid Density, lb./ft ³	69.3	66.3	60.0	57.8	54.1



507c

Frio® 507a

PENTAFLUOROETHANE / 1,1,1-TRIFLUOROETHANE

GENERAL DESCRIPTION

An azeotropic HFC refrigerant blend for medium to low temperature refrigerant applications.

SPECIFICATIONS

(Meets ARI 700 Specifications)

	Maximum (unless otherwise indicated)	Tolerance
Pentafluoroethane (HFC-125), wt %	50.0	-0.5%/+1.5%
Trifluoroethane (HFC-143a), wt %	50.0	-1.5%/+ 0.5%
Air and Other Non-condensable Gases, vol %	1.5	
Volatile Impurities, wt %	0.5	
High Boiling Residue, vol %	0.01	
Moisture (H ₂ O), ppm by wt	10	
Acidity, ppm by wt (as HCl)	1.0	
Chloride, no visible turbidity (indicates about 3 ppm)	Pass	
Particulates / solids (visually clean to pass)	Pass	

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole of blend)	98.86
Boiling Point at 1 atm (initial)	-52.1°F/-46.7°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0
Global Warming Potential (GWP) (CO ₂ = 1.0)	3,850

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia	122.8	168.1	276.0	314.7	380.2
Liquid Density, lb./ft ³	69.3	66.2	59.6	57.3	53.0



Frio® 22

CHLORODIFLUOROMETHANE (CHClF₂)

GENERAL DESCRIPTION

HCFC used alone or as a component in blends in medium to low temperature refrigeration applications or in A/C (commercial and residential).

SPECIFICATIONS

(Meets ARI 700 Specifications)

	Maximum (unless otherwise noted)
Chlorodifluoromethane (R-22), wt %	99.5 (minimum)
Air and Other Non-condensable Gases, vol %	1.5
Volatile Impurities, wt. %	0.5
High Boiling Residue, vol %	0.01
Moisture (H ₂ O), ppm by wt	10
Acidity, ppm by wt (as HCl)	1.0
Chloride, no visible turbidity (indicates about 3 ppm)	Pass
Particulates / solids (visually clean to pass)	Pass

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole)	86.47
Boiling Point at 1 atm	-41.4°F/-40.8°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0.055
Global Warming Potential (GWP) (CO ₂ = 1.0)	1,700

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia	98.7	136.1	225.4	257.4	311.5
Liquid Density, lb./ft ³	78.0	75.5	70.5	68.9	66.3



408a

Frio® 408a (FX 10)

PENTAFLUOROETHANE / 1, 1, 1-TRIFLUOROETHANE CHLORODIFLUOROMETHANE

GENERAL DESCRIPTION

A low ODP near-azeotropic refrigerant blend for medium and low temperature refrigeration systems to replace R-502 using mineral oil or alkylbenzene.

SPECIFICATIONS

(Meets ARI 700 Specifications)

	Maximum (unless otherwise indicated)	Tolerance
Pentafluoroethane (HFC-125), wt %	7 (nominal)	± 2%
1,1,1-Trifluoroethane (HFC-143a), wt %	46 (nominal)	± 1%
Chlorodifluoromethane (HCFC-22), wt %	47 (nominal)	± 2%
Air and Other Non-condensable Gases, vol %	1.5	
Volatile Impurities, wt %	0.5	
High Boiling Residue, vol %	0.01	
Moisture (H ₂ O), ppm by wt	10	
Acidity, ppm by wt (as HCl)	1.0	
Chloride, no visible turbidity (indicates about 3 ppm)	Pass	
Particulates / solids (visually clean to pass)	Pass	

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole of blend)	87.01
Boiling Range at 1 atm	-48.8 to -47.9°F -44.9 to -44.4°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0.026
Global Warming Potential (GWP) (CO ₂ = 1.0)	3,020

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia	109.0	149.8	247.5	282.6	342.1
Liquid Density, lb./ft ³	69.9	67.3	62.0	60.2	57.3



409a

Frio® 409a (FX 56)

CHLORODIFLUOROMETHANE / 2-CHLORO-1,1,1,2-TETRAFLUOROETHANE / 1-CHLORO-1,1-DIFLUOROETHANE

GENERAL DESCRIPTION

A low ODP HCFC blend for retrofitting R-12 and R-500 medium and low temperature refrigeration systems.

SPECIFICATIONS

(Meets ARI 700 Specifications)

	Maximum (unless otherwise indicated)	Tolerance
Chlorodifluoromethane (HCFC-22), wt %	60 (nominal)	± 2%
2-Chloro-1,1,1,2-Tetrafluoroethane (HCFC-124), wt %	25 (nominal)	± 2%
1-Chloro-1,1-Difluoroethane (HCFC-142b), wt %	15 (nominal)	± 1%
Air and Other Non-condensable Gases, vol %	1.5	
Volatile Impurities, wt %	0.5	
High Boiling Residue, vol %	0.01	
Moisture (H ₂ O), ppm by wt	10	
Acidity, ppm by wt (as HCl)	1.0	
Chloride, no visible turbidity (indicates about 3 ppm)	Pass	
Particulates / solids (visually clean to pass)	Pass	

PROPERTIES

Appearance	Colorless liquefied gas
Odor	Faint, ether-like odor
Molecular Mass (g/mole of blend)	97.43
Boiling Range at 1 atm	-32.4 to -18.2°F -35.8 to -27.9°C
Flammable Limits (LFL, UFL), vol % (1 atm, 25°C)	NA / NA
ANSI/ASHRAE Standard 34 Safety Group Classification	A1
Ozone Depletion Potential (ODP) (CFC-11 = 1.0)	0.049
Global Warming Potential (GWP) (CO ₂ = 1.0)	1,440

Temperature	50°F	70°F	105°F	115°F	130°F
Vapor Pressure, psia ⁽¹⁾	59.0	83.3	144.3	167.0	206.3
Liquid Density, lb./ft ³⁽¹⁾	79.1	76.8	72.3	70.9	68.7





Tel: (+ 965) 22255995 - Fax: (+ 965) 22255990
P.O Box 626 Safat 13007 Kuwait
info@alrayaholding.com