



Opteon™



Freon™

Refrigerants by The Chemours Company

Product Manual



Chemours™

Welcome to Chemours.

Not just a new name.

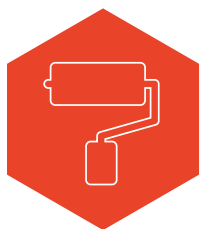
A new beginning.

A new company. A new purpose.

A new commitment to customers
and chemistry.

Chemours at a glance (NYSE: CC)

- Separated from DuPont on July 1, 2015.
- A 200-year-old start-up with over two centuries of experience in the chemical industry.
- Thousands of employees working worldwide and providing end-to-end support.
- Market leaders in reliable, high quality products; safety; and responsible handling of chemicals.
- Experience working across industries, such as automotive, paints, plastics, electronics, energy, and telecommunications.



Titanium Technologies

#1 global producer of high-quality titanium dioxide (TiO₂)



Fluoroproducts

#1 global manufacturer of fluoroproducts



Chemical Solutions

Leader in the safe and efficient production of industrial chemicals

70+ manufacturing facilities, laboratory sites, and offices globally

7,000 employees worldwide

Serving customers in more than **130** countries

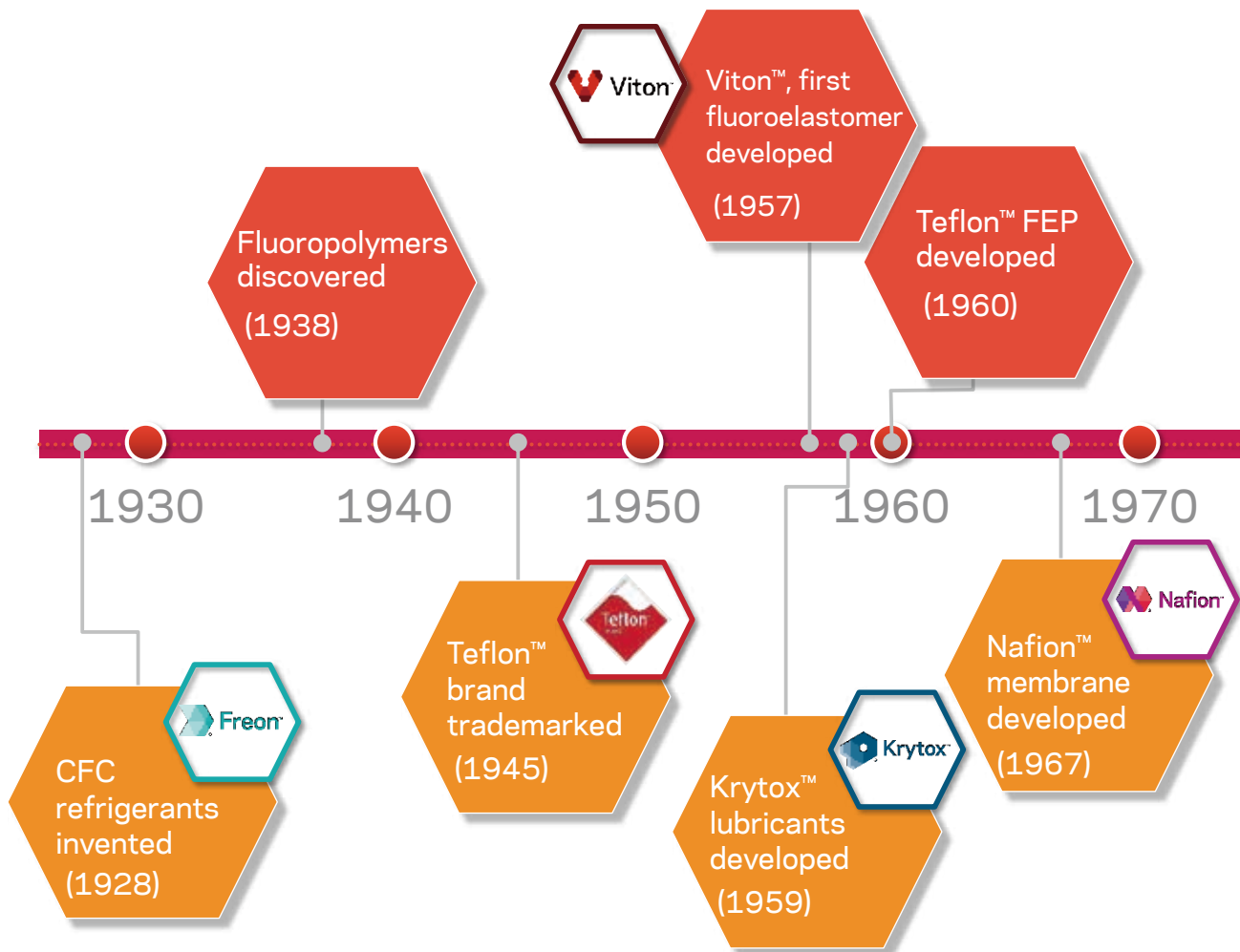


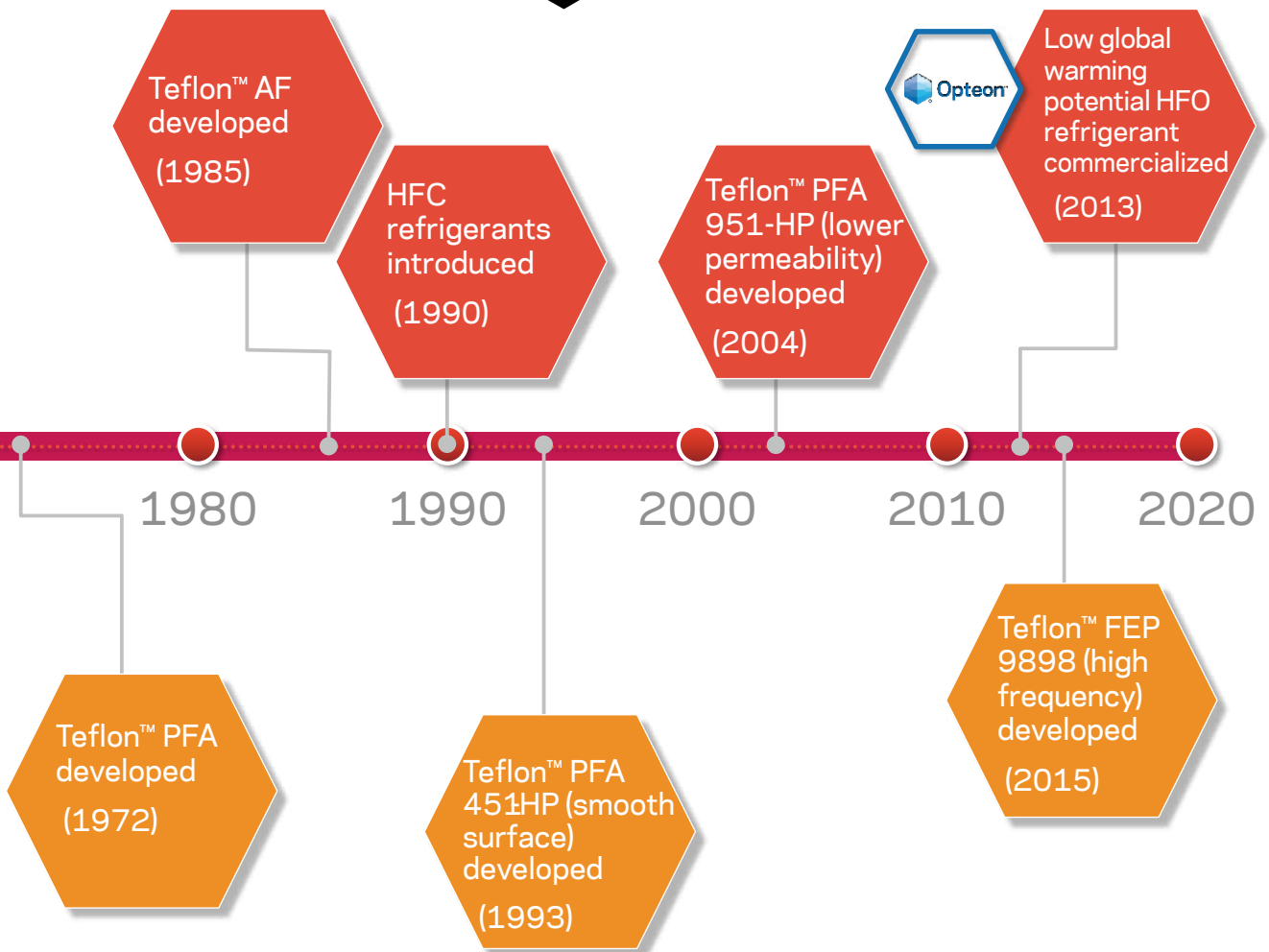
Fortune 500 Company



Chemours Named Chemical & Engineering News (C&EN) “Company of the Year” for 2017 on 1st January, 2018

Leadership in Fluoroproducts Business to introduce its newest innovation





Chemours brings a history of proven leadership as part of our DuPont Refrigerants heritage

Global manufacturing and supply capability

Two Industry Leading Power Brands

Opteon™

Our platform of low global warming potential solutions

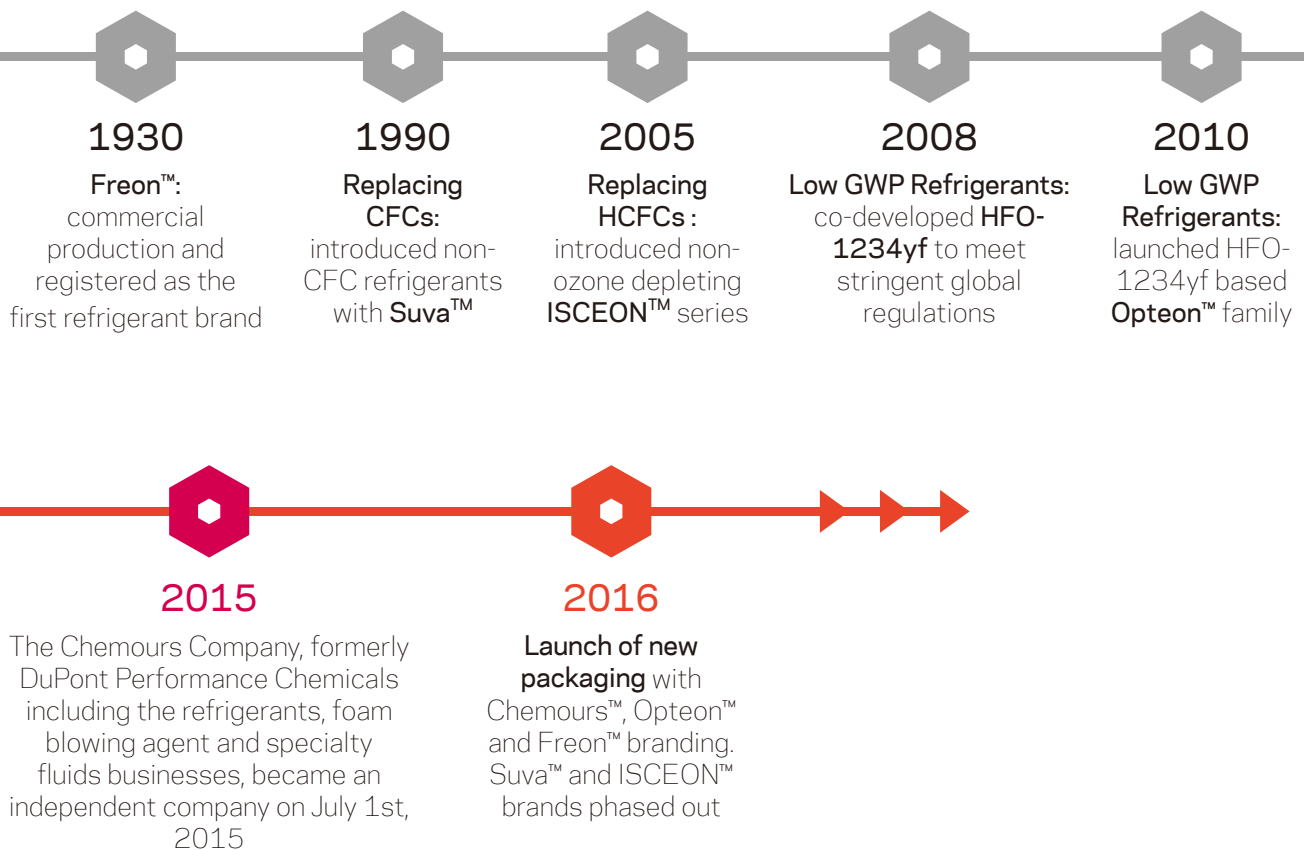
Freon™

The brand you've trusted for over 85 years



Refrigerants by The Chemours Company

Unshakable Leadership and Commitment



Opteon™ low global warming potential (GWP) products are a smart choice for a big change.

It's time to choose the optimal balance of performance, sustainability, safety, and cost efficiency. Opteon™ products are better for your business and better for the environment.

With a legacy of over 85 years, Opteon™ is the best choice for forward thinkers.

Current		→ Low GWP Leading Options			
Product	GWP ^a	Nonflammable Class 1		Mildly flammable Class 2L	
		Product	GWP ^a	Product	GWP ^a
HFC-134a	1300	XP10 (R-513A)	573	YF (R-1234yf)	<1
HFC-404A	3943	XP40 (R-449A)	1282	XL40 (R-454A)	238
		XP44 (R-452A)	1945		
HFC-410A	1924	XP41 (R-463A)	1377	XL41 (R-454B)	467
				XL55 (R-452B)	676
HCFC-22	1760	XP20 (R-449C)	1146	XL20 (R-454C)	146
HCFC-123	79	XP30 (R-514A)	1		
HFC-245fa	1030	MZ (R-1366mzzZ)	9		

a: The AR5 reported GWP values





Opteon™ XP10 (R-513A)

Refrigerant

Replacement

R-134a

Application Scope

- Medium-temperature circuit of hybrid cascade systems
- Medium-temperature commercial and industrial DX refrigeration
- Water chillers, air conditioning, and heat pumps
- Ice rinks
- New equipment/retrofit of existing systems
- Self-contained systems

Benefits

- Low GWP: 56% reduction compared to R-134a
- Excellent capacity and energy efficiency match to R-134a
- Close performance match to R-134a for retrofit and new systems
- Azeotrope with zero glide
- Safe and nonflammable (ASHRAE A1)
- Approved by major equipment and component manufacturers
- Extensively field tested with no equipment/lubricant/seal changes (superheat adjustment may be required)
- Compatible with existing R-134a equipment design/lubricants





Opteon™ XP40 (R-449A)

Refrigerant

Replacement

R-404A/R-507/R-22/R-407

Application Scope

Low- and medium-temperature commercial and industrial DX refrigeration

- Supermarkets
 - Centralized rack systems
 - Distributed systems
 - Walk-in coolers/freezers, prep rooms, etc.
- Food service (e.g., condensing units)
- Cold storage
- Self-contained systems
- New equipment/retrofit of existing systems

Benefits

- Low GWP: 67% reduction compared to R-404A/R-507
- Up to 12% lower energy consumption compared to R-404A/R-507
- Safe and nonflammable (ASHRAE A1)
- Approved by major equipment and component manufacturers
- Alternative to R-407 series low- and medium-temperature refrigerants (equivalent capacity)
- Can be topped off after leaks
- Extensively field tested and proven
 - No lubricant or seal changes required when retrofitting from R-404A/R-507. Superheat adjustments likely.
 - Compatible with existing R-22/R-407 series equipment. For R-22 retrofits, oil change and seal replacements are recommended.





Opteon™ XP44 (R-452A)

Refrigerant

Replacement

R-404A/R-507

Application Scope

- Low- and medium-temperature transport DX refrigeration
 - Refrigerated trucks
 - Refrigerated vans
 - Reefer containers
- Low- and medium-temperature commercial and industrial DX refrigeration
- New equipment/retrofit of existing systems

Benefits

- Low GWP: 45% reduction compared to R-404A/R-507
- Matches discharge temperature of R-404A/R-507
 - Critical for transport applications
- Matches mass flow rate of R-404A/R-507
 - No TXV change necessary
- Provides quick, easy, and low cost retrofit from R-404A/R-507
- Safe and nonflammable (ASHRAE A1)
- Approved and adopted by major equipment manufacturers
- Compatible with existing equipment design/lubricants
- Can be topped off after leaks





Opteon™ XP30 (R-514A)

Refrigerant

Replacement

R-123

Application Scope

Low pressure centrifugal chillers

Benefits

- Low GWP: 97% reduction compared to R-123
- Excellent capacity and energy efficiency match to R-123
- Azeotrope with zero glide
- Nonflammable





Opteon™ XL41 (R-454B)

Refrigerant

Replacement

R-410A

Application Scope

- Positive displacement, DX air conditioning, heat pumps and chillers
 - Residential, light commercial, commercial
- Direct replacement for all equipment types designed for R-410A
 - Window units, portables, mini-splits, ducted splits, PTACs, multi-splits, DX chillers, and other

Benefits

- Lowest GWP replacement for R-410A (reduction of 78%; best where lowest GWP is required)

- Improved capacity and efficiency compared to R-410A
- Excellent performance in normal and high ambient conditions
- Very close match to R-410A - easily convertible from R-410A design with minimal changes
- Very low temperature glide - can be topped off after leaks
- Non-toxic and mildly flammable (ISO/ASHRAE A2L)
- Allows >1.7 kg minimum filling charge under new Codes & Standards (e.g. ISO 5149 or EN 378)
- Miscible with POE lubricants





Opteon™ XL55 (R-452B)

Refrigerant

Replacement

R-410A

Application Scope

- Positive displacement, DX air conditioning, heat pumps and chillers
 - Residential, light commercial, commercial
- Direct replacement for all equipment types designed for R-410A
 - Window units, portables, mini-splits, ducted splits, PTACs, commercial packaged, multi-splits, DX chillers, and other

Benefits

- Most optimized low GWP replacement for R-410A
- Superior performance compared to R-410A
 - up to 5% energy efficiency improvement
- Ultra-low class 2L flammability properties
 - best-in-class of leading R-410A replacements
- Excellent performance in high ambient conditions
- Very close match to R-410A - easily convertible from R-410A design with minimal changes
- Very low temperature glide



Opteon™ XL20 (R-454C)

Refrigerant

Replacement

R-404A/R-22

Application Scope

Low- and medium-temperature commercial and industrial refrigeration systems formerly designed for R-404A or R-22

- Supermarkets
- Condensing units (e.g. in food service)
- Cold stores
- Self-contained systems

Benefits

- < 150 GWP (96% reduction versus R-404A); meets F-Gas and Eco-Design GWP requirements; zero ozone depletion
- Close performance match to R-404A; slightly reduced capacity, improved efficiency
- Easily convertible from R-404A and R-22 design with minimal changes
- Non-toxic and mildly flammable (A2L)
- Miscible with POE lubricants





Opteon™ YF (R-1234yf)

Refrigerant

ASHRAE#

R-1234yf or HFO-1234yf

Application Scope

New MAC systems

Benefits

- Non-ozone depleting hydrofluoro-olefin (HFO)
 - Not subject to phaseout under Montreal Protocol
- Low GWP refrigerant
- Toxicity comparable to R-134a (A rating)

- Good environmental performance, lowest Life Cycle Climate Performance (LCCP) potential of all next generation alternatives
- Similar operating conditions compared to R-134a (similar Pressure-Temperature [P-T] curve)
- Thermally stable under extreme use conditions encountered in an MAC system
- Cooling capacity and energy efficiency similar to R-134a

Lubricant Recommendation

- PAGs that have been formulated specifically for use with HFO-1234yf
- Compatible with POE lubricants





Freon™ 22 (R-22)

Refrigerant

Freon™ 22 is an HCFC refrigerant used for residential and commercial air conditioning and for medium- and low-temperature commercial refrigeration applications, including: food service, supermarket display cases, food storage and processing, and transport refrigeration systems.

Application Scope

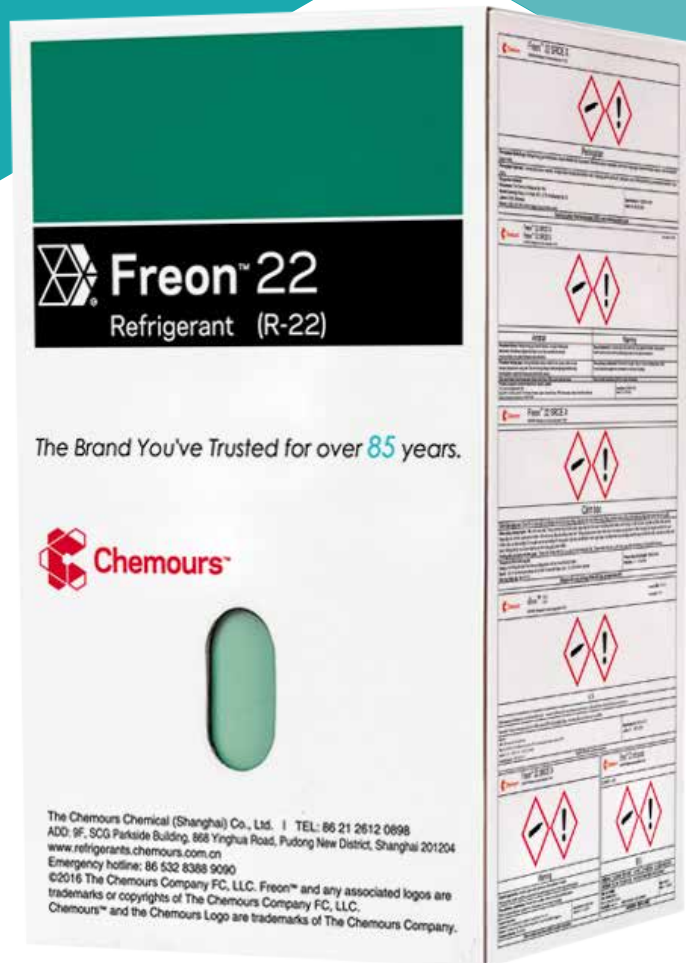
- Residential and Commercial A/C
- Medium- and low-temperature commercial refrigeration:
 - food service
 - supermarket display cases
 - food storage and processing
 - ice machines
 - some transport

Benefits

- High performance, low cost
- Good thermodynamic property
- Broadly used

Lubricant Recommendation

- AB or MO





Freon™ 123 (R-123)

Refrigerant

Freon™ 123 is an HCFC retrofit refrigerant for R-11 in low-pressure centrifugal chillers. New centrifugal equipment designed with Freon™ 123 provides excellent energy efficiency.

Replacement

R-11

Application Scope

- Low-pressure centrifugal chillers New centrifugal equipment

Benefits

- OEM Acceptance: Endorsed by many major chiller manufacturers
- Low overall operating cost in new equipment
- Proven R-11 replacement in chiller systems worldwide
- Excellent environmental properties: Low ozone depletion

Lubricant Recommendation

- MO





Freon™ 134a (R-134a)

Refrigerant

Freon™ 134a is an HFC retrofit refrigerant for R-12. It is used in medium- and high-temperature stationary commercial refrigeration, as well as chiller systems and home appliances. In addition, it can be used to retrofit existing R-12 refrigeration and air conditioning systems.

Replacement

R-12

Application Scope

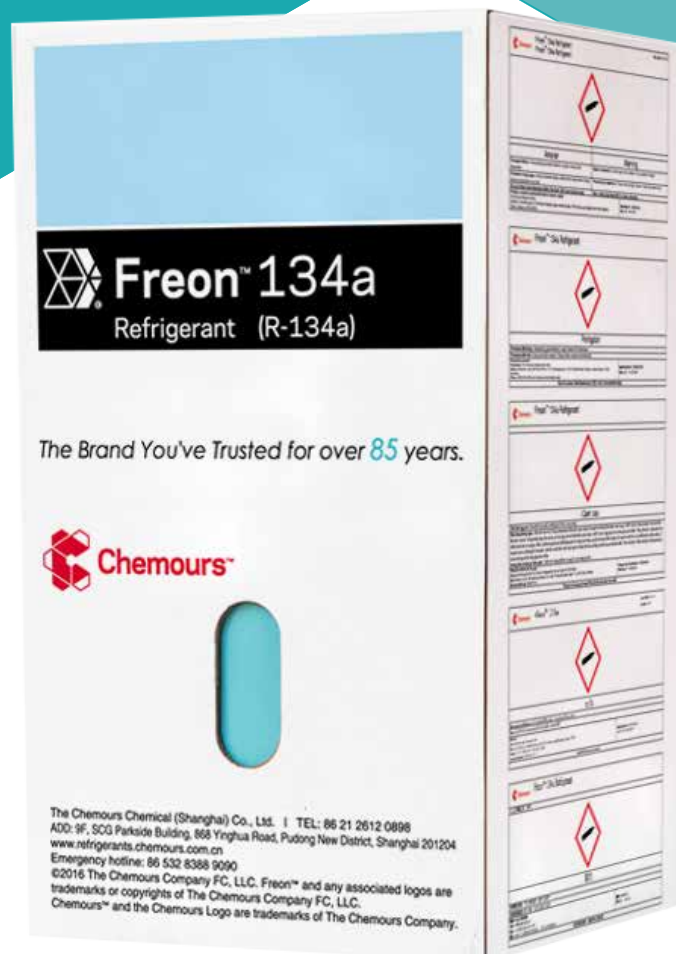
- Medium- and high-temperature:
 - stationary commercial refrigeration
 - chiller equipment
 - home appliances
- Retrofit existing R-12 refrigeration and air conditioning equipment

Benefits

- Broadly used in commercial and stationary applications

Lubricant Recommendation

- POE for stationary/commercial applications





Freon™ 134a AUTO (R-134a)

Refrigerant

Freon™ 134a is an HFC refrigerant that can be used in after-market service for automotive air-conditioning .

Replacement

R-12

Application Scope

- After-market service for automotive air-conditioning
- MAC system

Benefits

- Meet the international new automotive air-conditioning standard

Lubricant Recommendation

- PAG





Freon™ 404A (R-404A)

Refrigerant

Freon™ 404A has been the long-standing HFC replacement for R-502 and R-22 in refrigeration applications.

Replacement

R-502/R-22

Application Scope

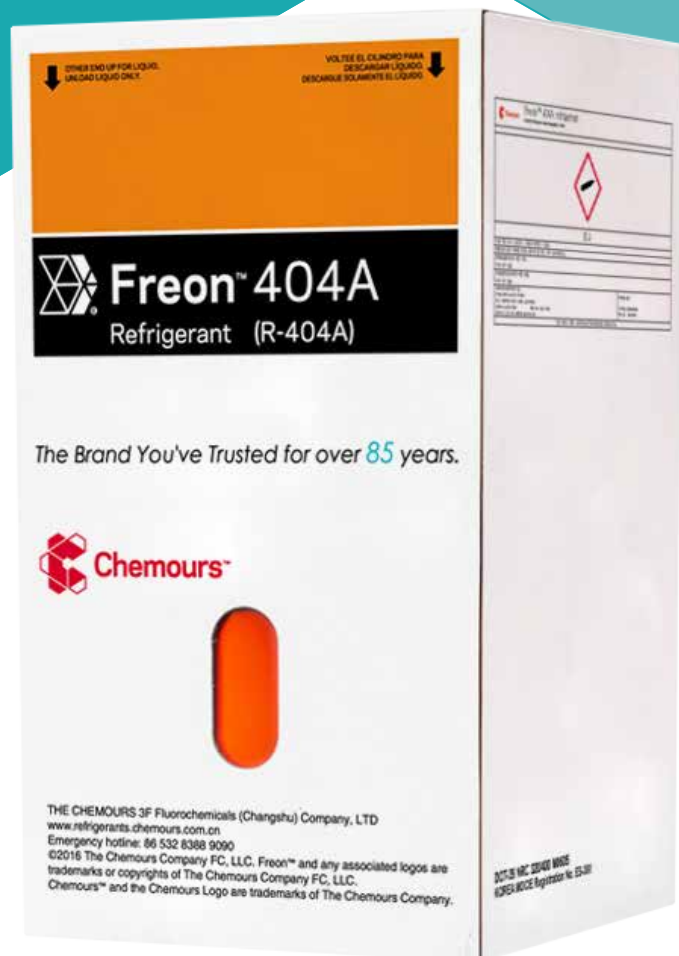
- Commercial refrigeration equipment
- New and existing R-502 equipment

Benefits

- Close Match for R-502: Works over the entire R-502 operating range
- OEMs recommend POE oil for optimum reliability

Lubricant Recommendation

- POE



This package is only for Korea, GHS Label should be compliant with local/regional/ national legislation



Freon™ 407C (R-407C)

Refrigerant

Freon™ 407C is a R-22 replacement primarily for air-conditioning. It's a HFC blend that requires a POE lubricant.

Replacement

R-22

Application Scope

- Positive displacement equipment:
 - New or existing residential and commercial air-conditioners
 - New or existing residential and commercial heat pumps
- Existing medium-temperature applications

Benefits

- Similar to R-22 in capacity and energy efficiency

Lubricant Recommendation

- POE



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Freon™ 410A (R-410A)

Refrigerant

Freon™ 410A is the leading HFC refrigerant for replacing R-22 in positive displacement residential and light commercial air-conditioning and heat pump systems. It has higher cooling capacity and significantly higher pressure than R-22 and should be used only in systems specifically designed for R-410A.

Replacement

R-22

Application Scope

- New residential and commercial air conditioning and heat pumps

Benefits

- Equipment designed for Freon™ 410A has up to 60% greater capacity than current R-22 equipment
- A/C systems with Freon™ 410A can meet or exceed local energy performance guidelines, such as U.S. DOE guidelines for 13 SEER

Lubricant Recommendation

- POE



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Freon™ 507 (R-507)

Refrigerant

Freon™ 507 is a non-ozone depleting replacement for R-502 in refrigeration applications.

Replacement

R-22/R-502

Application Scope

- Commercial systems, such as supermarkets or transport refrigeration

Benefits

- A long-term replacement for R-502 and offers good operating characteristics when compared to R-502
- Capacity and efficiency values should be nearly equivalent to R-502

Lubricant Recommendation

- POE



This package is only for Korea, GHS Label should be compliant with local/regional/ national legislation



Freon™ MO59 (R-417A)

Refrigerant

Freon™ MO59 is an easy-to-use, non- ozone-depleting HFC retrofit refrigerant for R-22 in direct expansion stationary air conditioning and medium-temperature commercial refrigeration systems.

Replacement

R-22

Application Scope

- Residential and commercial air conditioning
- Medium temperature commercial refrigeration
 - Food service
 - Supermarket display cases
 - Food storage and processing

Benefits

- Provides easy, quick cost-effective retrofits
- Non-ozone-depleting HFC
 - Not subject to phase-out under the Montreal Protocol

- Enables continued use of existing equipment
- Non- flammable, ASHRAE safety classification: A1
- US EPA SNAP accepted for broad range of A/C and refrigeration applications
- Lower discharge pressure and temperature than R-22
 - Likely to prolong compressor life
- Low toxicity (similar to R-22)

Lubricant Recommendation

- MO, AB or POE





Freon™ M099 (R-438A)

Refrigerant

Freon™ M099 combines R-22 pressure-enthalpy characteristics with mineral oil compatibility in a unique HFC refrigerant that can be used to replace R-22 over a wide range of evaporator temperatures.

Replacement

R-22

Application Scope

- Commercial air-conditioning, such as roof top units, indoor packaged units, DX chillers and split systems
- Residential air-conditioning
- Low- and medium-temperature refrigeration systems, such as self-contained systems, condensing units and rack systems

Benefits

- Lower retrofit costs versus HFC/POE options
 - No expansion valve or line set changes
 - Eliminates disruptive oil changes
- Compatible with AB, MO and POE lubricants
 - Minimizes time spent on control set point adjustments and subsequent service calls
- Not subject to phaseout under the Montreal Protocol and the U.S. Clean Air Act
- 42% lower global warming potential (GWP) than R-404A

Lubricant Recommendation

- MO, AB, POE



Chemours Brand Assurance Program

Why Buying A Genuine Refrigerant Matters

At Chemours, our Core Values of Safety Obsession and Integrity are at the heart of everything we do. We take counterfeit matters very seriously and are taking action to crack down on the counterfeiting and infringement of products.

Counterfeit refrigerants have resulted in harmful effects to users including:

- High risk of explosion from dangerous compositions
- Lack of testing for health and environmental impact
- Unknown ingredients with different toxicity profiles than are labeled
- Varying percentages of ozone depleting substances (ODS) that may be illegal based on the Montreal Protocol
- Damage to refrigeration equipment due to incompatibility



Chemours Anti-Counterfeiting Authentication Label

Our goal is to protect our customers and the value chain from the possibility of financial loss, safety and legal issues, or business interruption caused by counterfeit products, as well as give you peace of mind that you're purchasing (and using) genuine Chemours refrigerants — every time.

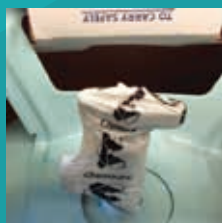
Did you know there are multiple ways to ensure that you have genuine Chemours refrigerant? Here are some steps you can take to ensure you are using the trusted, safe, and reliable product you've come to enjoy.

SAFEguard Yourself Against Counterfeit Refrigerants

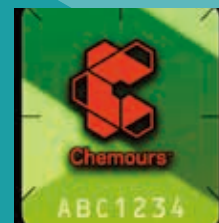
Select - Make sure you select a reputable Chemours refrigerants distributor for all of your purchases. You can locate a distributor in your geographic area on our Chemours Brand Assurance web site.

Ask - Don't leave it up to chance. Ask for Chemours Freon™ or Opteon™ refrigerant by name.

Find - Closely examine your refrigerant packaging to find these key security features. All cylinders should include an Anti-Counterfeiting Security Shrink Sleeve, while disposable cylinders (DACs) should also include a Izon™ security label.



Anti-Counterfeiting Security Shrink Sleeve



Izon® Security Label

Ensure - Take a moment to ensure the authenticity of your refrigerant package using the immediate confirmation options of scanning the QR code on the Izon™ label or visit www.GenuineRefrigerants.com, enter the 7-digit code found on the Izon™ security label and click submit.

For more information, visit https://www.chemours.com/Refrigerants/en_US/brand_assurance/index.html

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