

Making our world more productive



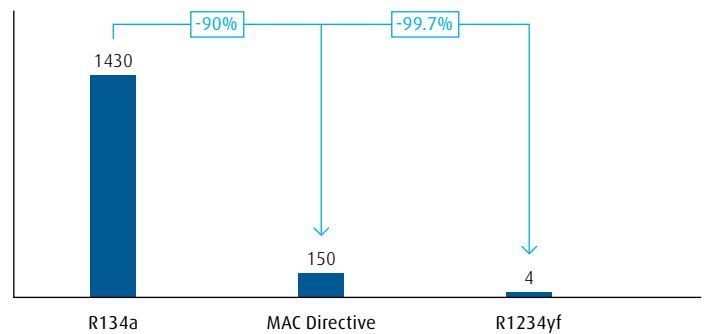
# R1234yf – Opteon<sup>®</sup> YF.

Automotive refrigerant with  
low global warming potential.



# R1234yf. Low-GWP refrigerant for mobile air conditioning.

## Global warming potential



## The environmental challenge

For over twenty years, R134a has been an extremely useful refrigerant gas in a number of applications. In fact, it is the most common refrigerant gas in mobile air conditioning (MAC) systems. R134a has a global warming potential (GWP) of 1430, creating direct greenhouse gas emissions that contribute to the total CO<sub>2</sub> equivalent emissions (i.e. carbon footprint) of MAC systems over their lifetime.

A growing focus on the environmental impact of refrigerants is fuelling demand for sustainable refrigeration solutions that can provide satisfactory cooling performance with a lower global warming impact.

The EU MAC directive (2006/40) was put in place in 2006. It limits the GWP of MAC refrigerant gases used in new car platforms to 150 from January 2011. From 2017 onwards, this standard will apply to all new cars.

## The next generation low-GWP solution

Developed jointly by Honeywell and DuPont™, Opteon® YF (R1234yf) is a next-generation HFO refrigerant that combines environmental benefits with excellent cooling performance. The majority of the automotive OEMs have already launched new car models using R1234yf and is therefore the low-GWP refrigerant of choice.

HFO R1234yf has a GWP of just 4, providing substantially lower direct greenhouse gas emissions than R134a systems. It thus significantly reduces the carbon footprint of refrigeration systems over the total lifetime. This lower-GWP alternative has been comprehensively tested and shown to be a reliable, cost-efficient solution.

	R134a	Opteon® YF (R1234yf)
Chemical name	1,1,1,2-tetrafluoroethane	2,3,3,3-tetrafluoropropene
Chemical formula	CH <sub>2</sub> FCF <sub>3</sub>	CF <sub>3</sub> CF = CH <sub>2</sub>
Product group	Hydrofluorocarbon (HFC)	Hydrofluoroolefin (HFO)
Preferred oil	Poly Alkylene Glycol (PAG) (Polyolester (POE))	Poly Alkylene Glycol (PAG) formulated for R1234yf (Polyolester (POE))
ASHRAE safety classification	A1 – non-toxic & non-flammable	A2L – non-toxic & mildly-flammable
Boiling Point @ 1atm	-26°C	-29°C
Critical Temperature	102°C	95°C
Critical Pressure	41 bar(a)	34 bar(a)
ODP	0	0
GWP	1430	4
GWP as % of R134a	100%	0.3%



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## Benefits at a glance

### Impressive performance

- Designed for use in mobile air conditioning systems
- Similar cooling capacity & energy efficiency to R134a
- Suited to all climates across the world

### Lower environmental impact

- Meets the world's toughest environmental standards
- GWP of just 4 – 99.7% lower than R134a
- Zero ozone depletion potential
- Non-toxic

## Additional information

R1234yf is flammable and may require additional safety measures during implementation, use and service. We recommend that you carry out a risk assessment prior to purchasing.

R1234yf should only be used in mobile air conditioning systems designed to operate with this gas. It should not be used to retrofit existing R134a systems.

R1234yf is a more complex and costly refrigerant gas to produce than R134a. We are happy to work with you to effectively manage your stocks.

## Trusted partner

The Gases Division of The Linde Group is one of the largest and most global distributors of refrigerants. For more than 40 years, we have been a trusted partner of refrigeration and air conditioning companies around the world. We operate throughout Europe, Africa, Asia-Pacific and the Americas.

Our broad product range spans both traditional fluorocarbon and natural refrigerants in a wide range of packages. R1234yf is commonly available in cylinders. Other packages may be available upon request. Our high-quality operations and vast distribution networks ensure the quality and availability of our products. We also offer a range of complementary services, including technical support, legislative compliance assistance and environmental audits.

If you have any questions, or wish to place orders, please contact your local Linde supplier. You can also visit us at [www.linde-gas.com/refrigerants](http://www.linde-gas.com/refrigerants).

# Getting ahead through innovation.

With its innovative concepts, Linde is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

Linde offers more. We create added value, clearly discernible competitive advantages, and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardised as well as customised solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimisation, and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

Linde – Making our world more productive.

Distribution partner for

**DuPont™ Opteon® YF**

**AUTOMOTIVE REFRIGERANT  
HFO-1234yf**

Linde Gas

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