



Opteon™ YF

Automotive Refrigerant (R-1234yf)

Product Information

Opteon™ YF (R-1234yf) is a non-ozone depleting, low global warming potential (GWP) refrigerant that was initially developed to meet the EU Mobile Air Conditioning (MAC) Directive, which called for new automobiles to use refrigerant with a GWP of less than 150, and has since become the standard refrigerant for the majority of automotive manufacturers globally.

ASHRAE #: R-1234yf or HFO-1234yf

ASHRAE and ISO817 Safety Rating: A2L

Benefits

- Non-ozone depleting hydrofluoroolefin (HFO)
 - Not subject to phaseout under Montreal Protocol
- Low GWP refrigerant
- Performance and operating characteristics similar to R-134a
- Cooling capacity and energy efficiency similar to R-134a
- Thermally stable under extreme use conditions encountered in MAC systems

Table 1. HFO-1234yf vs. R-134a Property Comparison

Properties	HFO-1234yf	R-134a
Boiling Point, T _b	-29.5 °C (-21.1 °F)	-26.1 °C (-14.9 °F)
Critical Point, T _c	94.7 °C (202.5 °F)	101 °C (214 °F)
P _{vap} , MPa (25 °C [77 °F])	0.683	0.665
P _{vap} , MPa (80 °C [176 °F])	2.62	2.63
Liquid Density, kg/m ³ (25 °C [77 °F])	1092	1207
Vapor Density, kg/m ³ (25 °C [77 °F])	37.6	32.4
ASHRAE Safety Class	A2L	A1

Information generated using REFPROP version 9, release date November 2010.
 Ref. State: Enthalpy = 200 kJ/kg, entropy = 1 kJ/kg-K for the saturated liquid at 0 °C (32 °F) (lir)

Additional Information

- Opteon™ YF is compatible with POE lubricants and PAGs that have been formulated specifically for use with R-1234yf.
- Opteon™ YF cannot be used for retrofit applications.
- Opteon™ YF may require additional safety measures during implementation, use, and service compared to R-134a, due to its A2L classification.
- Opteon™ YF will require the use of accessories and toolings that meet the following standards:
 - Recovery/RRR equipment: J2843, J2851, and/or VDA
 - Leak detectors: J2913 and/or VDA
 - Refrigerant identifiers: J2927 or J2912 and/or VDA
 - Evaporators: ISO 13043 and/or SAE J2842

A2L Refrigerant Information

R-1234yf has an A2L ASHRAE classification. A2L refrigerants are described as low or mildly flammable in simplistic terms; however, they are difficult to ignite. Assessment of properties, such as minimum ignition energy, heat of combustion, and burning velocity, indicates that a typical status discharge will not have sufficient energy to ignite R-1234yf.

Table 2. Flammability Properties

Upper Flammability Limit, Vol% in air (21 °C [10 °F], ASTM E681-04)	12.3
Lower Flammability Limit, Vol% in air (21 °C [70 °F], ASTM E681-04)	6.2
Minimum Ignition Energy, mJ at 20 °C (68 °F) and 1 atm (Chemours in-house method. Tests conducted in 12 liter flask to minimize wall quenching effects)	5,000-10,000
Autoignition Temperature, °C (°F) (EC Physico/Chemical Test A15, Measured by Chilworth Technology, UK)	405 (761)
Heat of Combustion, MJ/kg per ASHRAE Standard 34 (Stoichiometric composition 7.73% in air)	10.7
Fundamental Burning Velocity, cm/s (per ISO 817, Measured by AIST, Japan)	1.5

For more information, on the Opteon™ family of refrigerants, or other refrigerants products, visit opteon.com or call (800) 235-7882.

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