Opteon™ YF

Automotive Refrigerant

General Product Information

Chemours has long been on a journey to deliver more sustainable product solutions that are easier on the planet without sacrificing performance. And when the European Commission challenged the industry to develop a product to meet the requirements of the MAC Directive (legislation that called for new automobiles to use a refrigerant with a Global Warming Potential (GWP) less than 150), Chemours went to work. We co-developed HFO-1234yf, a new more environmentally sustainable refrigerant for automobiles that has a 99.7% lower GWP than the currently used refrigerant, R-134a.

HFO-1234yf's similarity to R-134a performance and operating characteristics, overall safety in use, low global warming potential, and short atmospheric lifetime make it a natural choice for those automotive original equipment manufacturers who want to make the switch to a low GWP alternative.

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

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

General Flammability Information

HFO-1234yf can be described as being "mildly flammable" as measured by standard methodology. This descriptor is used to characterize the flammability in simplistic terms; however, properties, such as minimum ignition energy, heat of combustion, and burning velocity, are assessed in order to arrive at such a descriptor. These measured properties can be useful in determining if areas or apparatus modification should be considered. Measurement of HFO-1234yf flammability properties indicates that a typical static discharge will not have sufficient energy to ignite HFO-1234yf.

Table 2. Flammability Properties

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/m³ (25 °C [77 °F])	1092	1207
Vapor Density, kg/m³ (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) (IIR)

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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