



Opteon™ YF

Automotive Refrigerant

HFO-1234yf Vehicle Testing

Testing Objective

To check the performance of vehicle when HFO-1234yf is used as a refrigerant.

- Cooling capacity
- Refrigerant pressure

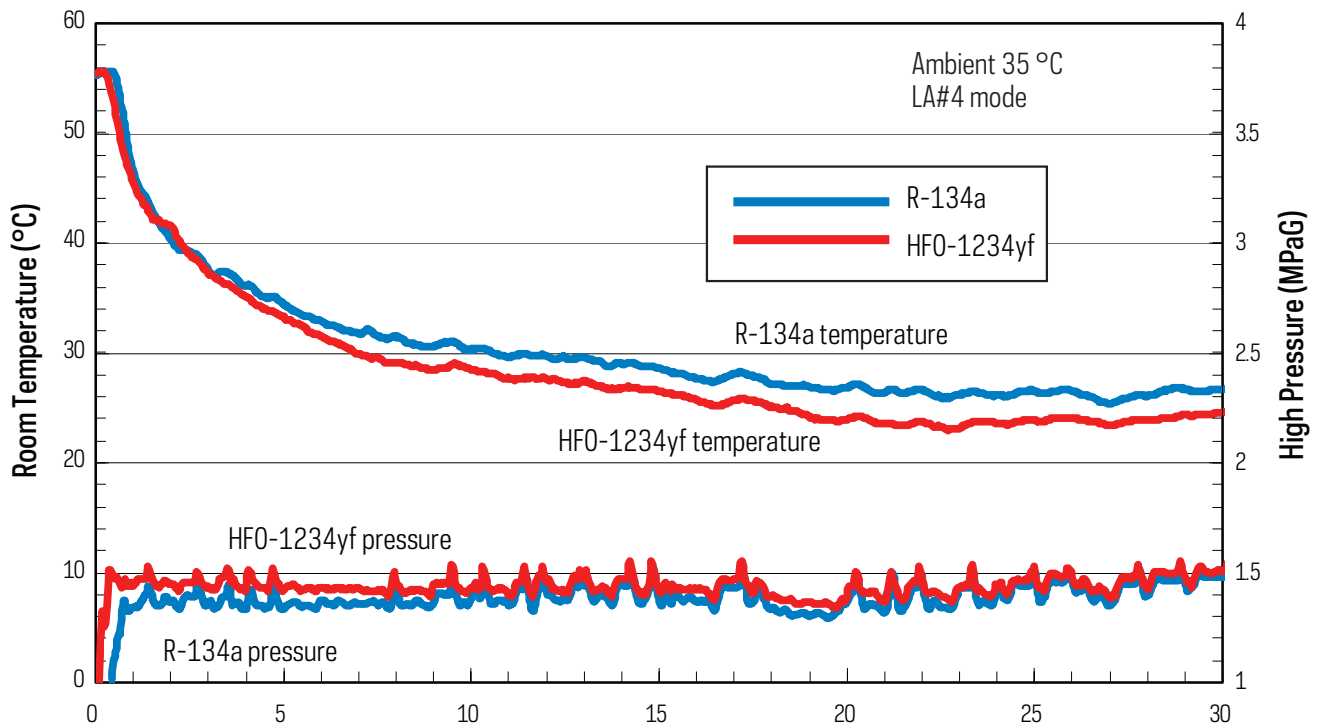
Vehicle Description

Component	GS430 (Large Vehicle)
Compressor	6 cylinders 160cc (Variable volume type)
Pulley ratio	1.22
Condenser	W660xH364xD16 f.p. 3.55
Evaporator	W293xH211xD38 f.p. 3.0
Expansion valve	TXV (optimized SH)
Hose	Rubber hose
Refrigerant charge	420 g (450 g for R-134a)

Toyota Vehicle Drop-In Tests for HFO-1234yf

Vehicle Cool Down Results

- HFO-1234yf pulls down to cooler temperature than R-134a, indicating higher cooling capacity.
- Pressures are similar.

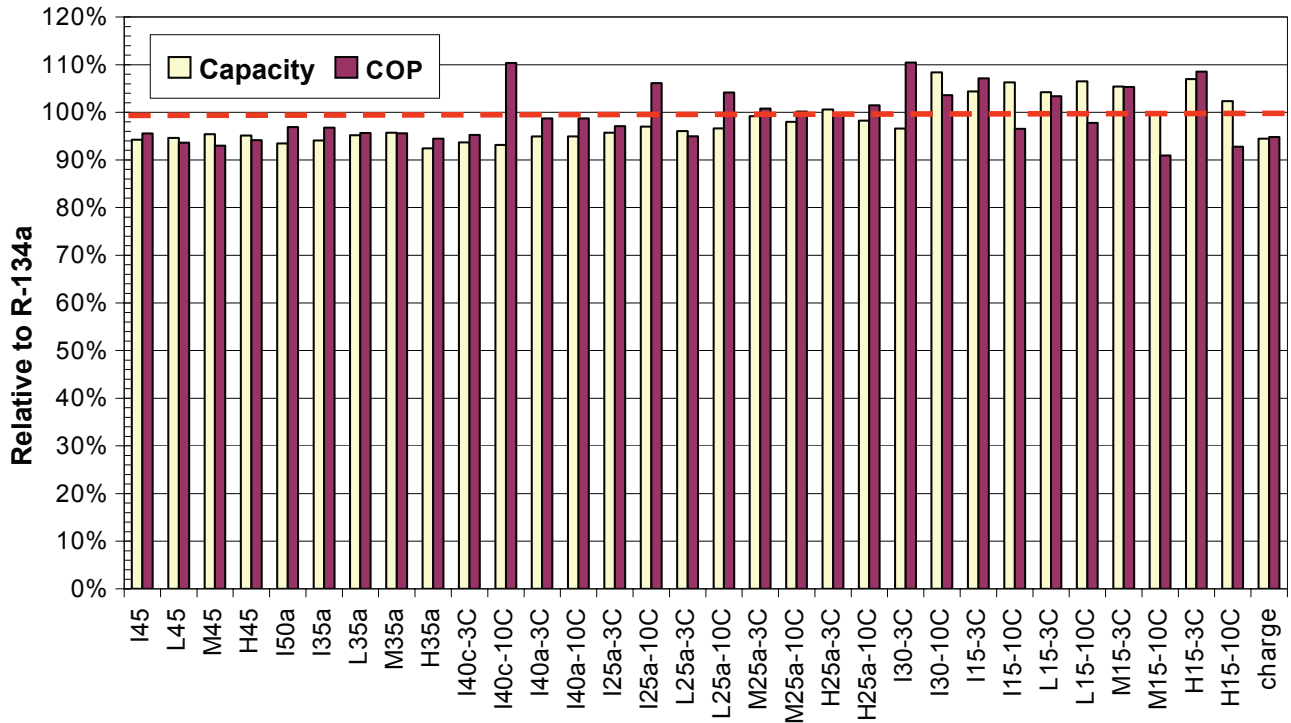


Testing Objective

To see how HFO-1234yf performs across various vehicle air conditioning conditions.

- Capacity
- COP

System Test Bench Results



- No changes were made to system, including TXV; industry standard test conditions
- Both Capacity and COP are generally within 5% of R-134a performance.
 - This was recently confirmed at two outside labs.
- Lower compression ratio, low discharge temperature (12 °C [54 °F] lower at peak conditions)
- Further improvements likely with minor system optimization, for example:
 - Lower ΔP suction line and/or TXV optimization to maintain a more optimum superheat.

HFO-1234yf performance is comparable to R-134a; further improvement possible with minor optimization

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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