

Refrigerant 1234YF's Potential Impact in Automotive Applications

Refrigerant HFC R134a is soon to be replaced in automotive applications. The phase-out of R134a is to begin in 2011 in Europe with a total ban due by 2017. In the US, the 2017 target date is desired, but the Automotive Industry is pushing for accelerated progress, as environmental concerns over climate change escalate.

The leading MAC (Mobile Air Conditioning) replacement candidate is HFO R1234yf. It is behaviorally very similar to R134a, which allows component manufacturers as well as automotive designers the luxury of not having to make drastic changes to current products. In fact, data suggests the possibility that R1234yf could be used as a direct replacement, with only minimal efficiency loss when used in existing R134a systems, allowing for swift global adoption. Studies of the effects of mixing R1234yf with R134a show only minor pressure increases resulting from their blending. R1234yf also has the potential to be used in direct expansion systems which are more efficient and smaller than secondary loop systems. This will help meet Coefficient of Performance requirements for overall A/C system efficiency.

R1234yf was submitted to the EPA's SNAP (Significant New Alternatives Policy) program for regulatory approval and granted acceptance for review in July 2008. Meanwhile, the Automotive Air Conditioning industry has been busy compiling data and performing key studies, testing R1234yf independently. This refrigerant has been proven safe from a human health hazard and risk assessment standpoint, as well as having met system performance standards of SAE and of individual OEM's. Environmental evaluations such as LCCP (Life Cycle Climate Performance) and Material Compatibility & Durability Testing have also been favorable. A ruling is expected in the first half of 2011, but many states in the US have already removed the ban on use of flammable refrigerants in mobile applications.

R1234yf has the following positive characteristics:

- Global Warming Potential of 4 in 100 years versus 1410 of R134a (the EU's new limit is 150).
- Ozone Depletion score of 0.
- Lowest LCCP of other known alternatives.
- Flammability listed as "mild" or "manageable" compared to the higher flammability of R152-a.
- Much lower operating pressure versus CO2 (R744).

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Sources and Links:

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