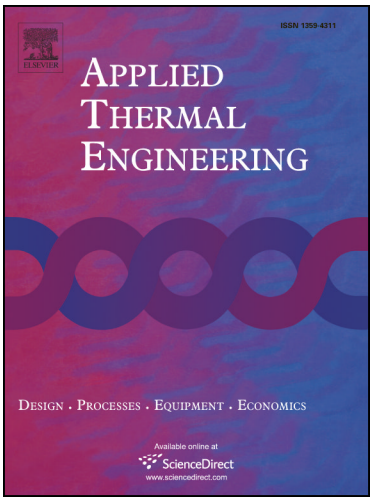

HFOs and their binary mixtures with HFC134a working as drop-in refrigerant in a household refrigerator: energy analysis and environmental impact assessment

C. Aprea, A. Greco, A. Maiorino

PII: S1359-4311(17)35836-2
DOI: https://doi.org/10.1016/j.applthermaleng.2018.02.072
Reference: ATE 11854

To appear in: *Applied Thermal Engineering*

Received Date: 8 September 2017
Revised Date: 8 February 2018
Accepted Date: 20 February 2018

Please cite this article as: C. Aprea, A. Greco, A. Maiorino, HFOs and their binary mixtures with HFC134a working as drop-in refrigerant in a household refrigerator: energy analysis and environmental impact assessment, *Applied Thermal Engineering* (2018), doi: https://doi.org/10.1016/j.applthermaleng.2018.02.072

HFOs and their binary mixtures with HFC134a working as drop-in refrigerant in a household refrigerator: energy analysis and environmental impact assessment

C. Aprea[1], A. Greco[2] *, A. Maiorino[1]
1 Dipartimento di Ingegneria Industriale, Università di Salerno, via Ponte Don Melillo, 84084 Fisciano, Salerno, Italia
2 DETEC, Università degli Studi di Napoli Federico II, P.le Tecchio 80, 80125 Napoli, Italia

* Corresponding author: Tel. +39 0817682289; Fax +39 0812390364;
e-mail: adriana.greco@unina.it

Abstract

Global warming is a worldwide common theme. Due to the Regulation (EU) no. 517/2014, refrigerants with a GWP (Global Warming Potential) higher than 150 are not allowed from January 1st, 2015 in new domestic refrigerators. Thus, a replacement for HFC134a is needed.
In this paper attention is devoted to the drop-in substitution of HFC134a with HFO refrigerant fluids in a domestic refrigerator. An experimental evaluation of the environmental impact in term of the greenhouse effect of the substitution of HFC134a with HFOs has been reported. The greenhouse effect is accounted for the experimental evaluation of the LCCP (Life Cycle Climate Performance) index. The refrigerant fluids that have been tested as a drop-in are: pure HFO1234yf, the mixture HFO1234yf/HFC134a (90/10 % in weight), pure HFO1234ze (E) and the mixture HFO1234ze (E)/HFC134a (90/10 % in weight). The plant working with pure HFOs or with both mixtures achieves the same temperature levels of HFC134a in the freezer and the refrigerator cabinet. The experimental results clearly show that the lower environmental impact in term of global warming can be achieved with both mixtures. The lower LCCP index can be obtained with HFC134a/HFO1234yf (with a 17 % reduction respect to HFC134a).

Keywords: HFC134a, HFO1234ze (E), HFO1234yf, Binary Mixtures, Drop-in Refrigerants, Domestic Refrigerator, LCCP