Accepted Manuscript

Title: Experimental study of R450A drop-in performance in an r134a small capacity refrigeration unit

Author: Pavel Makhnatch, Adrián Mota-Babiloni, Rahmatollah Khodabandeh

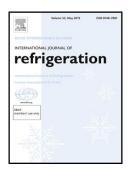
PII: S0140-7007(17)30329-8

DOI: http://dx.doi.org/doi: 10.1016/j.ijrefrig.2017.08.010

Reference: JIJR 3728

To appear in: International Journal of Refrigeration

Received date: 13-1-2017 Revised date: 22-8-2017 Accepted date: 23-8-2017



Please cite this article as: Pavel Makhnatch, Adrián Mota-Babiloni, Rahmatollah Khodabandeh, Experimental study of R450A drop-in performance in an r134a small capacity refrigeration unit, *International Journal of Refrigeration* (2017), http://dx.doi.org/doi: 10.1016/j.ijrefrig.2017.08.010.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Experimental study of R450A drop-in performance in an R134a small capacity refrigeration unit

Pavel Makhnatch ^{a,*}, Adrián Mota-Babiloni ^{a,b}, Rahmatollah Khodabandeh ^a

^a Royal Institute of Technology, Department of Energy Technology, Division of Applied

Thermodynamics and Refrigeration, Brinellvägen 68, 100 44 Stockholm, Sweden

^b ISTENER Research Group, Department of Mechanical Engineering and Construction, Campus

de Riu Sec s/n, University Jaume I, E-12071 Castellón de la Plana, Spain

HIGHLIGHTS

R450A is tested in an R134a small capacity refrigeration unit.

• Evaporating temperature is varied between -15°C and 12.5°C.

• Average mass flow rate and cooling capacity are 9.1% and 9.9% lower for

R450A.

• Average compressor power consumption and COP values are 7.2 and 2.9%

lower for R450A.

• R450A can be considered as R134a drop-in replacement if decrease in

cooling capacity is acceptable.

Abstract

(HFCs) phase out as a priority to reduce the future global Earth's mean temperature increase. R134a is the most abundant HFC in the atmosphere and therefore it must be substituted using environmentally benign alternatives. In the short term, blends of HFCs and hydrofluoroolefins can replace R134a. This paper experimentally evaluates R450A (GWP of 547), a nonflammable mixture of R1234ze(E) and R134a, in an R134a small capacity refrigeration system. The controlled experimental conditions cover evaporating temperatures from -15 to 12.5 °C and condensing temperature of 25, 30 and 35 °C (36 tests in total for each refrigerant). The experimental results showed that with only a thermostatic expansion valve adjustment the

The Kigali's amendment to the Montreal Protocol has highlighted the hydrofluorocarbons

average R450A cooling capacity and COP are 9.9 and 2.9% lower than those measured using

R134a. Besides, the observed compressor discharge temperature values of R450A are not

greater than that of R134a.

* Corresponding Author:

Tel: +46 8 790 6885

E-mail address: pavelma@kth.se

1

Download English Version:

https://daneshyari.com/en/article/5016939

Download Persian Version:

https://daneshyari.com/article/5016939

<u>Daneshyari.com</u>