

IMPACT OF THE REFRIGERANT COMPOSITION VARIATION IN A R-407C HEAT PUMP

C. FRADIN ^(a)

Tel: +33 (0)1 58 80 85 73, Fax: +33 (0) 1 40 27 20 47, E-mail: cedric.fradin@cnam.fr

M. YUBI-IDRISSI ^(a,*)

Tel: +33 (0)1 58 80 85 65, Fax: +33 (0) 1 40 27 20 47, E-mail: youbi@cnam.fr

M-F. TERRIER ^(a)

Tel: +33 (0)1 58 80 24 54, Fax: +33 (0) 1 40 27 20 47, E-mail: terrierm@cnam.fr

F. MEUNIER ^(a)

Tel: +33 (0)1 40 27 22 11, Fax: +33 (0) 1 40 27 20 47, E-mail: meunierf@cnam.fr

(a) Laboratoire du Froid (E.A. 1408), 292 rue Saint Martin, 75141 Paris cedex 03, France

Session topic: 3. New fluids and energy efficient transfer processes in advanced refrigeration technologies
Performance of HFC and natural refrigerants-measurements and modeling

Abstract

Due to the distillation, lots of designers are concerned by the use of zeotropic refrigerant blends. The main issue comes from the well known composition difference between the liquid and vapour phases. As a result, if a leakage (liquid or/and vapour) occurs, it will lead to a modification of the global composition of the mixture in the unit. In this work, the impact of such effects will be discussed based on experiments with R-407C which shows a high glide. Experiments have been performed on a domestic R-407C HP (operating in the heating mode as well as in the cooling mode). The HP has been designed for R-407C and experiments have been carried out not only with R-407C but also with other mixtures: 33%R32-25%R125-42%R134a and 13%R32-25%R125-62%R134a. Those mixtures are representative of what would produce a large composition variation of R-407C (because of zeotropic behaviour of R-407C) or an important leak either in the liquid or the gas phase. Global thermal and thermodynamic analysis (cooling rate, COP, EER, average heat transfer coefficient, ...) from the experimental data base will be presented. The results will be used to analyse the influence of a liquid or vapour leak which would occur on a unit as well as the influence of a refilling with R-407C. The experimental loop is equipped so that the circulating mass fraction of oil in the circuit can be measured, the influence of the mixture composition on the circulating mass fraction of oil will also be discussed. Conclusions will be drawn on the issues due to the variation of R-407C composition.

* Corresponding author