

Accepted Manuscript

Reducing the power consumption of household refrigerators through the integration of latent heat storage elements in wire-and-tube condensers

G. Sonnenrein, A. Elsner, E. Baumhögger, A. Morbach, K. Fieback, J. Vrabec



PII: S0140-7007(14)00357-0

DOI: [10.1016/j.ijrefrig.2014.12.011](https://doi.org/10.1016/j.ijrefrig.2014.12.011)

Reference: JIJR 2941

To appear in: *International Journal of Refrigeration*

Received Date: 14 October 2014

Revised Date: 15 December 2014

Accepted Date: 16 December 2014

Please cite this article as: Sonnenrein, G., Elsner, A., Baumhögger, E., Morbach, A., Fieback, K., Vrabec, J., Reducing the power consumption of household refrigerators through the integration of latent heat storage elements in wire-and-tube condensers, *International Journal of Refrigeration* (2015), doi: 10.1016/j.ijrefrig.2014.12.011.

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.

Reducing the power consumption of household refrigerators through the integration of latent heat storage elements in wire-and-tube condensers

G. Sonnenrein ^a, A. Elsner ^a, E. Baumhögger ^a, A. Morbach ^b, K. Fieback ^c, J. Vrabec ^{a,1}

^a Thermodynamics and Energy Technology, University of Paderborn, Warburger Str. 100, 33098 Paderborn, Germany

^b Miele & Cie. KG, Carl-Miele-Straße 29, 33332 Gütersloh, Germany

^c Dr. Fieback PCM-innovativ GmbH, Am Fichtenberg 2, 14552 Michendorf, Germany

Highlights

- Heat storages may significantly decrease the condenser temperature of refrigerators.
- A lower condenser temperature decreases power consumption.
- Copolymer bound PCM can be dimensionally stable and leak proof.
- The thermal conductivity of the PCM copolymer compound was increased by adding graphite.
- A heat storage capacity of 180 kJ/kg was achieved.

Keywords

Household refrigerator, Power consumption, Condenser, Thermal storage, Phase change material, Polymer bound

Abstract

This study evaluates the influence of latent heat storage elements on the condenser temperature of a commercial household refrigerator. In order to determine the power consumption and the temperature distribution, a standard wire-and-tube condenser is equipped with different heat storage elements (containing water, paraffin or copolymer compound). The results indicate that particularly the application of phase change materials (PCM) lowers the condenser temperature, which leads to a significantly reduced power consumption.

¹ Corresponding author: jadran.vrabec@upb.de

Download English Version:

<https://daneshyari.com/en/article/7175539>

Download Persian Version:

<https://daneshyari.com/article/7175539>

[Daneshyari.com](https://daneshyari.com)