Energy and environmental performance assessment of R744 booster supermarket refrigeration systems operating in warm climates - DTU Orbit (09/11/2017)

Energy and environmental performance assessment of R744 booster supermarket refrigeration systems operating in warm climates

This paper presents a theoretical comparison among different commercial refrigeration systems in terms of annual energy consumption and environmental impact. Eight configurations were studied: a R744/R134a cascade refrigeration system (baseline), a conventional and an improved R744 booster system, two R744 booster solutions with dedicated mechanical subcooling, a R744 booster with parallel compression and two solutions which combined the parallel compression and the mechanical subcooling. The evaluation was based on the weather data in Valencia (Spain) and in Athens (Greece), as well as on the running modes of a conventional European supermarket. A transition zone, which occurred between sub critical and transcritical operations, was adopted.The results showed that all the enhanced configurations may achieve a comparable energy saving to the one of the baseline in both the selected locations. Furthermore, they allow reducing the Total Equivalent Warming Impact (TEWI) by at least 9.6% beside the cascade solution. (C) 2016 Elsevier Ltd and IIR. All rights reserved.

General information

State: Published
Organisations: Department of Mechanical Engineering, Thermal Energy, University of Udine
Authors: Gullo, P. (Ekstern), Elmegaard, B. (Intern), Cortella, G. (Ekstern)
Pages: 61-79
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information

Journal: International Journal of Refrigeration
Volume: 64
ISSN (Print): 0140-7007
Ratings:
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.06 SJR 1.344 SNIP 1.598
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.396 SNIP 1.537 CiteScore 2.44
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.667 SNIP 2.117 CiteScore 2.6
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.461 SNIP 1.979 CiteScore 2.25
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.426 SNIP 1.908 CiteScore 2.09
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.308 SNIP 2.129 CiteScore 2.2
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.372 SNIP 1.786
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.569 SNIP 1.954
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1

Scopus rating (2008): SJR 1.309 SNIP 1.737
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.841 SNIP 1.646
Scopus rating (2006): SJR 1.5 SNIP 1.629
Scopus rating (2005): SJR 1.409 SNIP 1.718
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.193 SNIP 1.933
Scopus rating (2003): SJR 1.241 SNIP 1.542
Scopus rating (2002): SJR 1.592 SNIP 1.807
Scopus rating (2001): SJR 1.775 SNIP 1.86
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.001 SNIP 1.279
Scopus rating (1999): SJR 0.824 SNIP 1.213
Original language: English
Annual energy consumption, Compressor efficiency, Dedicated mechanical subcooling, Parallel compression, TEWI, CO2
DOIs:
10.1016/j.ijrefrig.2015.12.016
Source: FindIt
Source-ID: 2290149458
Publication: Research - peer-review › Journal article – Annual report year: 2016