

Experimental study of energy performance in low-temperature hydronic heating systems - DTU Orbit (08/11/2017)

Experimental study of energy performance in low-temperature hydronic heating systems

Energy consumption, thermal environment and environmental impacts were analytically and experimentally studied for different types of heat emitters. The heat emitters studied were conventional radiator, ventilation radiator, and floor heating with medium-, low-, and very-low-temperature supply, respectively. The ventilation system in the lab room was a mechanical exhaust ventilation system that provided one air change per hour of fresh air through the opening in the external wall with a constant temperature of 5°C, which is the mean winter temperature in Copenhagen. The parameters studied in the climate chamber were supply and return water temperature from the heat emitters, indoor temperature, and heat emitter surface temperature. Experiments showed that the mean supply water temperature for floor heating was the lowest, i.e. 30°C, but it was close to the ventilation radiator, i.e. 33°C. The supply water temperature in all measurements for conventional radiator was significantly higher than ventilation radiator and floor heating; namely, 45°C. Experimental results indicated that the mean indoor temperature was close to the acceptable level of 22°C in all cases. For energy calculations, it was assumed that all heat emitters were connected to a ground-source heat pump. Analytical calculations showed that using ventilation radiator and floor heating instead of conventional radiator resulted in a saving of 17% and 22% in heat pump's electricity consumption, respectively. This would reduce the CO₂ emission from the building's heating system by 21% for the floor heating and by 18% for the ventilation radiator compared to the conventional radiator.

General information

State: Published

Organisations: Department of Civil Engineering, Section for Indoor Climate and Building Physics, KTH - Royal Institute of Technology

Authors: Hesarakı, A. (Ekstern), Bourdakı, E. (Intern), Ploskić, A. (Ekstern), Holmberg, S. (Ekstern)

Pages: 108-114

Publication date: 2015

Main Research Area: Technical/natural sciences

Publication information

Journal: Energy and Buildings

Volume: 109

ISSN (Print): 0378-7788

Ratings:

BFI (2017): BFI-level 2

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 2

Scopus rating (2016): CiteScore 4.64 SJR 2.093 SNIP 1.965

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 2

Scopus rating (2015): SJR 2.088 SNIP 2.174 CiteScore 4.07

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 2

Scopus rating (2014): SJR 2.123 SNIP 2.936 CiteScore 4.21

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 2

Scopus rating (2013): SJR 1.897 SNIP 2.433 CiteScore 3.79

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 2

Scopus rating (2012): SJR 1.816 SNIP 2.737 CiteScore 3.36

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 2

Scopus rating (2011): SJR 1.506 SNIP 2.536 CiteScore 3.23

ISI indexed (2011): ISI indexed yes

Web of Science (2011): Indexed yes

BFI (2010): BFI-level 2

Scopus rating (2010): SJR 1.631 SNIP 2.081

Web of Science (2010): Indexed yes

BFI (2009): BFI-level 2

Scopus rating (2009): SJR 1.564 SNIP 1.79

Web of Science (2009): Indexed yes

BFI (2008): BFI-level 1

Scopus rating (2008): SJR 1.624 SNIP 2.028

Web of Science (2008): Indexed yes

Scopus rating (2007): SJR 1.033 SNIP 1.718

Web of Science (2007): Indexed yes

Scopus rating (2006): SJR 1.411 SNIP 1.788

Web of Science (2006): Indexed yes

Scopus rating (2005): SJR 1.293 SNIP 1.277

Web of Science (2005): Indexed yes

Scopus rating (2004): SJR 0.81 SNIP 1.628

Web of Science (2004): Indexed yes

Scopus rating (2003): SJR 1.567 SNIP 1.4

Scopus rating (2002): SJR 1.172 SNIP 1.631

Web of Science (2002): Indexed yes

Scopus rating (2001): SJR 0.942 SNIP 1.095

Scopus rating (2000): SJR 0.505 SNIP 1.226

Web of Science (2000): Indexed yes

Scopus rating (1999): SJR 0.25 SNIP 0.589

Original language: English

Energy performance, Experimental study, Floor heating, Low-temperature hydronic heating systems, Thermal environment, Ventilation radiator

DOIs:

10.1016/j.enbuild.2015.09.064

Source: FindIt

Source-ID: 2282339766

Publication: Research - peer-review › Journal article – Annual report year: 2015