Numerical modelling and experimental measurements for a low-temperature district heating substation for instantaneous preparation of DHW with respect to service pipes - DTU Orbit (17/12/2018)

Numerical modelling and experimental measurements for a low-temperature district heating substation for instantaneous preparation of DHW with respect to service pipes

Traditional district heating (DH) systems are becoming uneconomic as the number of new and renovated buildings with reduced heating requirements increases. To keep DH competitive in the future, heat losses in DH networks need to be reduced. One option is to reduce the supply temperature of DH as much as possible. This requires a review and improvement of a DH network, in-house substations, and the whole domestic hot water (DHW) supply system, with the focus on user comfort, hygiene, overall cost and energy efficiency. This paper describes some practical approaches to the implementation of low-temperature district heating (LTDH) with an entry-to-substation temperature around 50 °C. To this end we developed a numerical model for an instantaneous LTDH substation that takes into consideration the effect of service pipes. The model has been verified and can be used for the further optimization of the whole concept as well for individual components. The results show that the way that the service pipe is operated has a significant effect on waiting time for DHW, heat loss, and overall cost. Furthermore, the service pipe should be kept warm by using a bypass in order to fulfill the comfort requirements for DHW instantaneously prepared.

General information
State: Published
Organisations: Department of Civil Engineering, Section for Building Physics and Services, Danfoss AS
Contributors: Brand, M., Thorsen, J. E., Svendsen, S.
Pages: 392-400
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Energy
Volume: 41
Issue number: 1
ISSN (Print): 0360-5442
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 5.6 SJR 1.99 SNIP 1.923
Web of Science (2017): Impact factor 4.968
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.17 SJR 1.974 SNIP 1.823
Web of Science (2016): Impact factor 4.52
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 5.03 SJR 2.22 SNIP 2.037
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 5.7 SJR 2.575 SNIP 2.602
Web of Science (2014): Impact factor 4.844
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 5.02 SJR 2.458 SNIP 2.556
Web of Science (2013): Impact factor 4.159
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 4.25 SJR 1.935 SNIP 2.214
Web of Science (2012): Impact factor 3.651
ISI indexed (2012): ISI indexed yes