Optimization of Occupancy Based Demand Controlled Ventilation in Residences - DTU Orbit (04/12/2018)

Optimization of Occupancy Based Demand Controlled Ventilation in Residences

Although it has been used for many years in commercial buildings, the application of demand controlled ventilation in residences is limited. In this study we used occupant exposure to pollutants integrated over time (referred to as "dose") as the metric to evaluate the effectiveness and air quality implications of demand controlled ventilation in residences. We looked at air quality for two situations. The first is that typically used in ventilation standards: the exposure over a long term. The second is to look at peak exposures that are associated with time variations in ventilation rates and pollutant generation. The pollutant generation had two components: a background rate associated with the building materials and furnishings and a second component related to occupants. The demand controlled ventilation system operated at a low airflow rate when the residence was unoccupied and at a high airflow rate when occupied. We used analytical solutions to the continuity equation to determine the ventilation effectiveness and the long-term chronic dose and peak acute exposure for a representative range of occupancy periods, pollutant generation rates and airflow rates. The results of the study showed that we can optimize the demand controlled airflow rates to reduce the quantity of air used for ventilation without introducing problematic acute conditions.

General information
State: Published
Organisations: Department of Civil Engineering, Lawrence Berkeley National Laboratory
Contributors: Mortensen, D. K., Walker, I., Sherman, M.
Pages: 49-60
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: International Journal of Ventilation
Volume: 10
Issue number: 1
ISSN (Print): 1473-3315
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 0.65 SJR 0.366 SNIP 0.55
Web of Science (2017): Impact factor 0.881
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.39 SJR 0.373 SNIP 0.336
Web of Science (2016): Impact factor 0.391
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 0.78 SJR 0.49 SNIP 0.693
Web of Science (2015): Impact factor 0.662
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 0.47 SJR 0.348 SNIP 0.581
Web of Science (2014): Impact factor 0.508
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 0.3 SJR 0.213 SNIP 0.207
Web of Science (2013): Impact factor 0.303
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.21 SJR 0.193 SNIP 0.288
Web of Science (2012): Impact factor 0.224
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 0.32 SJR 0.26 SNIP 0.34
Web of Science (2011): Impact factor 0.185
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.369 SNIP 0.422
Web of Science (2010): Impact factor 0.379
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.868 SNIP 0.71
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.43 SNIP 0.714
Scopus rating (2007): SJR 0.333 SNIP 0.717
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.274 SNIP 0.304
Web of Science (2006): Indexed yes
Original language: English
Source: orbit
Source-ID: 276393
Research output: Research - peer-review › Journal article – Annual report year: 2011