

## Accepted Manuscript

Impact of demand controlled ventilation on system performance and energy use

Muhannad Delwati , Bart Merema , Hilde Breesch , Lieve Helsen , Maarten Sourbron

PII: S0378-7788(17)34149-X  
DOI: [10.1016/j.enbuild.2018.06.015](https://doi.org/10.1016/j.enbuild.2018.06.015)  
Reference: ENB 8617



To appear in: *Energy & Buildings*

Received date: 30 December 2017  
Revised date: 17 June 2018  
Accepted date: 17 June 2018

Please cite this article as: Muhannad Delwati , Bart Merema , Hilde Breesch , Lieve Helsen , Maarten Sourbron , Impact of demand controlled ventilation on system performance and energy use, *Energy & Buildings* (2018), doi: [10.1016/j.enbuild.2018.06.015](https://doi.org/10.1016/j.enbuild.2018.06.015)

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.

# Impact of demand controlled ventilation on system performance and energy use

Muhannad Delwati<sup>1,4</sup>, Bart Merema<sup>2</sup>, Hilde Breesch<sup>2</sup>, Lieve Helsen<sup>1,3</sup> and Maarten Sourbron<sup>1</sup>

<sup>1</sup> Department of Mechanical Engineering, KU Leuven, Leuven, Belgium

<sup>2</sup> Department of Civil Engineering, Construction Technology Cluster, KU Leuven, Ghent, Belgium

<sup>3</sup> Elle, Thor Park, Waterschei (Genk), Belgium

<sup>4</sup> Department of Architecture, KU Leuven, Leuven, Belgium

*Corresponding author: Muhannad.delwati@kuleuven.be*

## Abstract

Demand-controlled-ventilation (DCV) refers to a ventilation system with controlled air flow rate based on indoor air quality. DCV operates at reduced air flow rates during most of the operation time. Therefore, less energy is required for fan operation, compared to a constant-air-volume (CAV) ventilation system.

Typically, DCV has a two-layer control with variable-air-volume (VAV) valves, and a fan speed control to maintain a constant-static-pressure in the duct system based on a pressure set point.

However, this nominal design based fan pressure setpoint is higher than required when all VAV-valves are closed to a certain extent. Therefore, advanced pressure-reset (PR) control - resetting the pressure set point - potentially reduces fan energy use even further.

This paper assesses the impact of fan control on both fan energy use and ventilation performance in DCV system of a densely occupied office. Results of a simulation model and realistic measurement setup are compared. The PR control, using air flow rate and VAV-valve position measurements as feedback, causes significantly reduction on fan energy use. These reductions compared to conventional DCV and CAV respectively, are approximately 10% and 72% in case of high occupancy and 50% and 93% in case of low occupancy. Largely, DCV with PR control

Download English Version:

<https://daneshyari.com/en/article/6727219>

Download Persian Version:

<https://daneshyari.com/article/6727219>

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