

# Accepted Manuscript

Study of Outdoor Ozone Penetration into Buildings through Ventilation and Infiltration

Dayi Lai, Panagiota Karava, Qingyan Chen



PII: S0360-1323(15)30029-9

DOI: [10.1016/j.buildenv.2015.06.015](https://doi.org/10.1016/j.buildenv.2015.06.015)

Reference: BAE 4159

To appear in: *Building and Environment*

Received Date: 1 April 2015

Revised Date: 7 June 2015

Accepted Date: 15 June 2015

Please cite this article as: Lai D, Karava P, Chen Q, Study of Outdoor Ozone Penetration into Buildings through Ventilation and Infiltration, *Building and Environment* (2015), doi: 10.1016/j.buildenv.2015.06.015.

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.

# Study of Outdoor Ozone Penetration into Buildings through Ventilation and Infiltration

Dayi Lai<sup>1</sup>, Panagiota Karava<sup>2</sup>, and Qingyan Chen<sup>1,3,\*</sup>

<sup>1</sup>School of Mechanical Engineering, Purdue University, West Lafayette, IN 47907, USA

<sup>2</sup>School of Civil and Environmental Engineering, Purdue University, West Lafayette, IN 47907, USA

<sup>3</sup>Tianjin Key Laboratory of Indoor Air Environmental Quality Control, School of Environmental Science and Engineering, Tianjin University, Tianjin 300072, China

\*Corresponding author: Qingyan Chen

Phone: +1-765-496-7562, Email: yanchen@purdue.edu

## Abstract

Ozone is known to cause adverse health effects such as decreased lung function and respiratory symptoms. Indoor ozone originates mainly from the outdoor environment and enters a building through three different ventilation mechanisms: infiltration, natural ventilation, and mechanical ventilation. This study investigated the relationship between ventilation and indoor/outdoor ozone concentration by measuring the concentration and the ventilation rate in two chambers and in an actual office space with different ventilation systems. The ventilation rate was determined by using the decay method with sulfur hexafluoride ( $\text{SF}_6$ ) as a tracer gas. The surface removal rates were estimated from the information provided in the previous literature. The results show that within the range of our investigation, the indoor/outdoor ozone concentration ratio can be predicted by a simple steady-state model within 80% accuracy. By using the model and according to the ventilation rate and surface removal rate data collected from literature, the most common indoor-to-outdoor ozone ratios were found to be 0.09, 0.19, and 0.47 for infiltration, mechanical ventilation, and natural ventilation, respectively.

**Keywords:** Ozone; Infiltration; Natural ventilation; Mechanical ventilation; Air exchange rate; Surface removal rate

Download English Version:

<https://daneshyari.com/en/article/10282802>

Download Persian Version:

<https://daneshyari.com/article/10282802>

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