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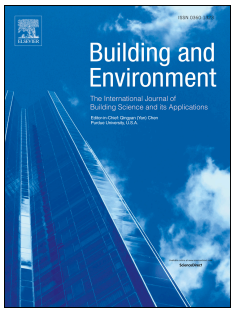

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Study of Outdoor Ozone Penetration into Buildings through Ventilation and Infiltration

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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 mechanism: 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 (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