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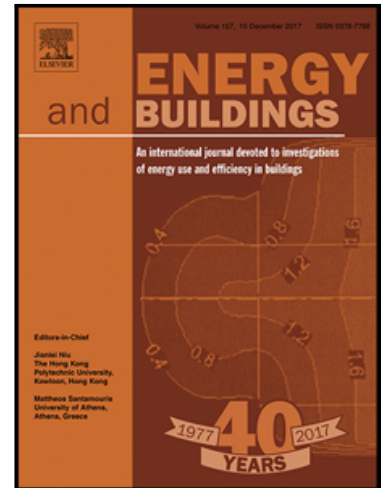
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# A Novel Method for Measuring Air Infiltration Rate in Buildings

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## Abstract

Measuring the air infiltration rate in buildings is essential for reducing energy use and improving indoor air quality. This rate has traditionally been determined by means of the blower door method, which is disruptive to building occupants, cannot identify the location of infiltration, cannot provide the infiltration rate for a section of the envelope, and requires considerable effort for setup and tear-down. Therefore, this study has developed a novel technique to measure air infiltration in buildings using an infrared camera. A thermographic image of a building envelope produced by an infrared camera and the measured indoor/outdoor air parameters (velocity, temperature, and pressure) were used to identify the effective crack size and air infiltration rate by means of theoretical heat transfer and fluid mechanics analyses. The proposed method was validated by experimental measurements in an environmental chamber and an office. The experiment in the environmental chamber constructed a small-scale room with known crack size. The experimental setup was comparable to actual conditions. The proposed method was able to predict the crack size within a relative error of 20%. For the experiment in the office, this study used the tracer-gas decay method to measure the air infiltration rate, and the relative error of the calculated air infiltration rate was only 3%.

**Keywords:** Air infiltration; Infrared camera; Thermography

## 1. Introduction

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