

# A Field Investigation of Air Infiltration Rates through Automatic Entrance Doors in Retail Buildings

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## Abstract

This paper presents field investigations of air infiltration rates in twelve big-box retail stores and two small grocery stores located in two different climate zones: hot and humid (zone 2a) and moderate to cold (zone 5a) climates. The investigations of the entrance door characteristics, differential pressures across the automatic entrance doors, and number of people using the doors per hour were used to calculate transient air infiltration rates through various types of automatic entrance doors. It was found that the calculated air infiltration rates for retail stores and supermarkets ranged from 40 L/s to 5,800 L/s. Normalized by the door area, the range of air infiltration rates through the automatic entrance door for a supermarket was from 100 L/s.m<sup>2</sup> to 3,000 L/s.m<sup>2</sup>, which was greater than the range previously observed in retail stores from 100 L/s.m<sup>2</sup> to 1,100 L/s.m<sup>2</sup>. In terms of air exchange rates, the air infiltration rates through the automatic entrance doors for small stores, especially in supermarkets and grocery stores, had a larger impact than those rates found in the big-box retail stores due to the size of building volume.

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