Research & Development Highlights

Technical Series
90-215

The Effectiveness of Low Cost Mechanical Ventilation Systems

Introduction

Several low-cost ventilation systems intended to meet the continuous ventilation requirements *of CSA F326: Residential Mechanical Ventilation Systems* were investigated. Eight ventilation systems were installed, commissioned, and tested in the field to obtain operating experience with the systems and to establish confidence in performance characteristics to be simulated with computer software. Carbon dioxide and formaldehyde levels were simulated in case houses with several different ventilation system configurations, levels of envelope airtightness, and occupancy loads.

Research Program and Findings

Upgraded bathroom fans and kitchen fans were found to be able to provide the required ventilation capacity. Upgrading is necessary to avoid noise and durability problems under continuous operation. When there is no direct ventilation supply air distribution, indoor recirculation rates as low as *0.5* air change per hour (ac/h) appear to be adequate for this purpose.

In houses with forced warm air heating systems, the addition of a fan-powered ventilation supply to the recirculation system is relatively simple but will lead to condensation problems in furnace heat exchangers. Passive ducting connected to the return side of forced warm air heating systems is only useful in reducing house depressurization. The least problematic method of meeting CSA F326 in gas heated houses is the use of a combined function ventilation exhaust fan and draft inducer. This fan could run continuously at a rate required for ventilation and be controlled by an override to exhaust combustion gases from the furnace or domestic hotwater heater on demand. Appropriate regulatory approvals would be required.

For electric baseboard heated houses, or other houses without an air recirculation system, the addition of a limited ventilation air distribution system employing small diameter ducting or individual fan units appear to be viable options. Direct supply air distribution does not appear to be necessary for all rooms when rooms are open to one another and ventilation air is provided to at least one of the rooms at the total ventilation rate required.

Passive ventilation air inlets in mechanical exhaust-only systems will stagnate under some normal operating conditions and therefore do not constitute a reliable ventilation air distribution option.

All of the computer simulated system cases displayed contaminant concentration control to within ASHRAE and Health and Welfare Canada guidelines. Systems that would fail to pass but were not simulated included closed bedrooms and mechanical exhaust-only ventilation systems without air recirculation.

Project Manager: Tom Hamlin

Research Report: The Effectiveness of Low-Cost *Continuous Ventilation Systems (1990)*

Research Consultant: Caneta Research Inc.

A full report on this research project is available from the Canadian Housing Information Centre at the address below.

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