

**VENTILATION AIR FOR DWELLING UNITS  
IN MULTI-UNIT RESIDENTIAL BUILDINGS**

**DISCUSSION**

This STANDATA has been developed to cover alternative methods of supplying ventilation air to dwelling units and suites that are served by corridors in multi-unit residential buildings. Included in this category are multi-unit residential buildings such as condominiums, apartments, hotels or motels.

Past practice to provide the ventilation air to suites in a multi-unit residential occupancy is to pressurize the corridor with a supply of outdoor ventilation air and rely on infiltration through the entrance doors of the individual suites or to provide transfer grilles over the entrance doors to facilitate air passage through the fire separation.

There has been a significant amount of research that indicates that these systems are not efficient at providing a reasonable level of indoor air quality and the level of ventilation required by the Alberta Building Code, for a number of reasons:

1. Stack and wind effects can cause individual suites to pressurize and prevent corridor air from entering and can adversely affect the operation of conventional corridor air supply and exhaust systems.
2. Occupant-installed door gaskets and weather-stripping can seal the doorway, preventing any corridor air from entering the suite. This would tend to indicate that suite occupants are not satisfied with the air quality and/or noise levels entering their suites from the corridors.
3. Maximum permitted gaps around doors in fire separations being inadequate to permit required air transfer.
4. Corridor air contamination from occupant activities within suites (i.e. cooking and smoking odors) as well as occupant activities in the corridors (i.e. smoking).
5. Suite air contamination from occupant activities in the corridors, such as smoking odors.
6. The ventilation air supplied to the corridor can find alternate paths through vertical shafts, stairwells and improperly sealed building construction joints, decreasing the level of corridor pressurization and thereby reducing the amount of ventilation air to each suite.

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Unless stated otherwise, all Code references in this STANDATA are to Division B of the Alberta Building Code 2006.

7. Required sound transmission ratings are negated by the installation of transfer grilles. These grilles also offer a direct path for fire, smoke and odors from the corridor to pass directly into the suites.
8. Exterior contamination via the hallway pressurization system. i.e. carbon monoxide, IAQ, etc.

## CODE REFERENCES

1. Sentence 5.9.1.2.(1) states:

1) Except as provided in Sentence (2), a *dwelling unit* shall be separated from every other space in a *building* in which noise may be generated by construction providing a sound transmission class rating not less than 50, measured in accordance with the standards referenced in Sentence 5.9.1.1.(1). (See A-9.11.1.1.(1) in Appendix A.)

2. Article 6.2.2.1. states:

### 6.2.2. Ventilation

#### 6.2.2.1. Required Ventilation

- 1) Except as provided in Sentence (3), all *buildings* shall be ventilated in accordance with this Part.
- 2) Except in *storage garages* covered by Article 6.2.2.3., the rates at which outdoor air is supplied in *buildings* by ventilation systems shall be not less than the rates required by ANSI/ASHRAE 62, "Ventilation for Acceptable Indoor Air Quality."
- 3) Self-contained mechanical ventilation systems serving only one *dwelling unit* which conform to the requirements of Subsection 9.32.3. shall be considered to satisfy the requirements of this Article.

3. Article 9.10.13.2. states:

### 9.10.13.2. Solid Core Wood Door as a Closure

- 1) A 45 mm thick solid core wood door is permitted to be used where a minimum fire-protection rating of 20 min is permitted or between a public corridor and a suite provided that the door conforms to CAN/ULC-S113, "Wood Core Doors Meeting the Performance Required by CAN/ULC-S104 for Twenty Minute Fire Rated Closure Assemblies." (See Appendix A.)
- 2) Doors described in Sentence (1) shall have not more than a 6 mm clearance beneath and not more than 3 mm at the sides and top.

4. Sentence 9.11.2.1.(1) states:

1) Except as provided in Sentence (2), every *dwelling unit* shall be separated from every other space in a *building* in which noise may be generated by a construction providing a sound transmission class rating of at least 50, measured in accordance with Subsection 9.11.1. or as listed in A-9.10.3.1. in Appendix A.

5. Article 9.32.1.2. states:

**9.32.1.2. Required Ventilation**

- 1) Every residential occupancy shall incorporate
  - a) provisions for non-heating-season ventilation in accordance with Subsection 9.32.2., and
  - b) except as required by Sentence (2), if supplied with electrical power and a heating system, provisions for heating-season ventilation in accordance with Part 6.
- 2) A self-contained heating-season ventilation system serving a single dwelling unit shall comply with Subsection 9.32.3.

6. Sentences 9.32.3.7.(1) to (4) state:

**9.32.3.7. Supplemental Exhaust**

- 1) Except as provided in Sentences (2) and (3), a supplemental exhaust fan with a rated capacity not less than 50 L/s shall be installed in each kitchen.
- 2) A supplemental exhaust fan is not required in a kitchen where the only exhaust air intake for the principal ventilation fan is located in that kitchen.
- 3) A supplemental exhaust fan is not required in a kitchen where the principal ventilation fan draws from that kitchen and other rooms, provided
  - a) the principal ventilation fan can be switched to a high exhaust rate equal to not less than 2.5 times the minimum normal operating exhaust capacity specified in Table 9.32.3.3., and
  - b) the high exhaust rate of the principal ventilation fan, as described in Clause (a), is activated by a manual switch in the kitchen labelled "KITCHEN EXHAUST."
- 4) Where an exhaust air intake for the principal ventilation fan is not located in a bathroom or water-closet room, a supplemental exhaust fan with a rated capacity not less than 25 L/s shall be installed in that bathroom or water-closet room.

7. ASHRAE 62-2001 requires the following minimum rates of ventilation for residential occupancies:

- a. Living areas: 0.35 air changes per hour but not less than 15 cfm (7.5 L/s) per person.
- b. Kitchens: 100 cfm (50 L/s) intermittent or 25 cfm (10 L/s) continuous or openable windows. (for exhaust only. Climatic conditions may affect choice of the ventilation system)
- c. Baths, Toilets: 50 cfm (25 L/s) intermittent or 20 cfm (10 L/s) continuous or openable windows. (for exhaust only)

## DESIGN OPTIONS

In light of the above-mentioned factors, it is recommended that alternate methods of suite ventilation be utilized, such as:

## **1. Supply Ducts To Each Suite From Central System**

### *Description:*

- Individual suites provided with a ventilation duct branch that passes through the corridor wall to provide central ventilation make-up air to each suite.
- Designers and installers are cautioned to ensure fire dampers are installed properly at locations where the ducts pass through required fire separations.
- Corridor air ventilation is provided by the central system at reduced rates.

### *Advantages:*

- Allows corridors to remain at a neutral or slightly positive pressure.
- Provides required ventilation levels to each suite.
- Facilitates operation and maintenance since equipment is centrally located.

### *Disadvantages:*

- Clearance required in hallway floor space for large ductwork.
- Room required on each floor for central ductwork to pass through floors with vertical shafts.
- Difficult to provide occupants with direct control of ventilation levels.
- Susceptible to the transfer of suite-to-suite noise through ductwork.
- Smoke contamination hazard, as fire dampers do not respond to the presence of smoke alone.
- Extra care must be taken to ensure fire dampers and fire stopping are installed correctly.

## **2. Supply Ducts to Each Suite from Floor-by-Floor System**

### *Description:*

- Individual suites provided with a ventilation duct branch that passes through the corridor wall to provide central ventilation make-up air to each suite. Each floor of the building has a make-up air unit.
- Designers and installers are cautioned to ensure fire dampers are installed properly at locations where the ducts pass through required fire separations.
- Corridor air ventilation is provided by the central system at reduced rates.

### *Advantages:*

- Allows corridors to remain at a neutral or slightly positive pressure.
- Eliminates the amount of room required for central ductwork to pass through floors with vertical shafts.
- Provides required ventilation levels to each suite.

- Not as susceptible to wind and stack effects as central systems.
- The servicing or failure of one unit does not affect the entire building.
- Facilitates operation and maintenance since equipment is centrally located.

*Disadvantages:*

- Clearance required in hallway floor space for large ductwork.
- Susceptible to the transfer of suite-to-suite noise through ductwork.
- Smoke contamination hazard, as fire dampers do not respond to the presence of smoke alone.
- Extra care must be taken to ensure fire dampers and fire stopping are installed correctly.

### **3. Self-Contained Mechanical Ventilation Systems Description:**

*Description:*

- Individual suites provided with self-contained mechanical ventilation systems (i.e. fancoil units, mechanical rooms on balconies, HRV's, etc.).
- These systems provide ventilation air to individual suites and would then be designed according to Section 9.32. of the Alberta Building Code.
- Corridor air ventilation is provided by a separate system at reduced rates.

*Advantages:*

- Allows corridors to remain at a neutral or slightly positive pressure.
- Gives occupants direct control of ventilation levels in each suite.
- Eliminates central ductwork and fire separation penetration problems.
- Provides required ventilation levels to each suite.

*Disadvantages:*

- More building envelope penetrations may be required.
- May require more suite space.
- Potential problems with maintenance (becomes more of an issue for individual tenants).

**Please note:** Other options may be available that provide the same or better level of ventilation that would be acceptable to the authority having jurisdiction. These designs are left to the discretion of the designer and builders, in consultation with the authority having jurisdiction. Designers are cautioned that the authority having jurisdiction may require proof of ventilation rates to individual suites (i.e. calculations, computer simulations, scale models).