Professional Engineers and Geoscientists of BC
Building progress through innovation every day
200 - 4010 Regent Street, Burnaby, BC V5C 6N2
T. 604-430-8035 | F. 604-430-8085 | 1-888-430-8035
www.apeg.bc.ca

Addressing Smoke and CO Control in Elevator Machine Rooms - *Innovation May/June 2006*

In recent years, new technology in multistorey building construction has allowed the elevator machine room, which formerly was commonly located at the top of the building, to be moved into the basement, with the remainder of the basement used for a parking garage. In certain instances this has raised concerns over smoke migration and control in highrise buildings and carbon monoxide control in all buildings.

This issue, which is not clearly addressed in the current BC Building Code, was brought to the attention of the APEGBC Building Codes Committee. This Technical Bulletin is issued for general information and is not to be relied upon as a solution to this issue; the possible solutions need to be evaluated on a project-by-project basis.

The Problem

On recent projects, ventilation openings between the elevator machine room and the parking garage have been provided without taking into account the existence of openings between the elevator machine room and the elevator shaft. Openings between the elevator machine room and the elevator shaft are permitted by Part 3 (Sentence 3.5.3.3.(2)) of the BC Building Code.

Designers are also meeting the Building Code requirement for a fire separation between the elevator machine room and the adjacent floor area by providing a fire damper at the ventilation openings between the parking garage and elevator machine room.

However, since fire dampers are heat activated and do not activate by smoke or carbon monoxide, there is the possibility of smoke and carbon monoxide migration from the parking garage through the elevator machine room and into the elevator shaft.

What the Code Currently Requires

For highrises (as defined under the Building Code), Part 3 (Sentence 3.2.6.2.(2)) of the Code requires measures to limit smoke movement from a fire in a floor area below the exit storey into upper storeys. This requirement is applicable to elevator shafts and other shafts in highrise buildings. Depending on the number of levels below grade, the Building Code requires a two-hour rated elevator vestibule on the levels below the lowest exit storey.

For all other buildings (non-highrises), measures to limit smoke movement are not required by the Building Code.

For all types of buildings, Part 3 requires a pressurized vestibule between a parking garage and an elevator shaft to limit the potential migration of carbon monoxide.

Therefore under the current Building Code provisions a highrise building requires review of both smoke and carbon monoxide control, and a non-highrise building requires review of carbon monoxide control only.

Despite the above provisions the Building Code, by requiring only fire dampers at the vent openings between the parking garage and elevator machine room, does not clearly address smoke management and carbon monoxide management.

Possible Solutions

Notwithstanding the Building Code's lack of clarity on smoke and carbon monoxide management, under the prescriptive requirements of Part 3 such an approach should be developed to apply to all parkade elevator machine rooms. There are two possible options for consideration:

Option 1

Ventilation to the elevator machine room will consist of a supply duct (100% exterior air) and an exhaust duct that discharges directly to the exterior. Fire dampers are still required where the ducts penetrate the elevator machine room. The ducts need not be enclosed in a rated shaft.

Option 2

Ventilation to the elevator machine room will consist of a supply duct (100% exterior air) and an exhaust fan to the parking garage with a fire damper. The fan should be on continuously, on emergency power, to avoid air movement from the parking garage to the machine room. A fire damper is still required where the duct penetrates the elevator machine room. The duct need not be enclosed in a rated shaft.

Other Considerations

The air supply duct for the elevator machine room may ultimately serve the elevator shaft through the openings between the machine room and the shaft, and air movement may be further assisted by the stack effect. This aspect, and the location of the air supply duct, may require more attention as the intake may introduce contaminated air into the building through the elevator shaft. In addition, consideration should be given to addressing negative pressures created in the elevator shaft.

Smoke management and carbon monoxide management require a coordinated approach among the architect and mechanical and electrical engineers, with the solution confirmed with the Authority Having Jurisdiction.