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Canada has the second highest fire death rate among 15 industrialized countries. In 1988, 72% of Canada's fire deaths and 40% of property occurred in small buildings.

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Controlling Fire Spread in Small Buildings

Each year in Canada building fires cause hundreds of deaths, thousands of injuries and billions of dollars of property damage. Canada has the second highest fire death rate among 15 industrialized countries. In 1988, 72% of deaths and 40% of property losses from fires in Canada occurred in small buildings. Clearly, if we want to reduce the fire-related deaths and property toll, we must focus our efforts on fire safety in small buildings.

Controlling fire spread within the compartment of origin: Fire spread within a compartment can be controlled by either passive or active fire protection measures. Passive measures include the use of materials that are difficult to ignite or that have low surface flame spread ratings and the use of fewer combustible items in the building.

One active fire protection measure is a quick sprinkler system. Sprinkler systems are not required by the National Building Code (NBC) for small buildings, but have sometimes been used as an equivalent to relax some code requirements, such as the fire resistance of fire separations. Sprinklers do a good job fighting fires in their early stages and also play a significant role in fire detection. Although sprinklers are primarily used to control fires until fire fighters arrive, in the majority of fires involving actuation of an automatic sprinkler system, the fire is fully extinguished without the fire fighters' intervention.

Despite their effectiveness, sprinkler systems in small buildings have one disadvantage: cost of installation. A task group for the NBC recently recommended that the installation of automatic sprinkler systems not be made mandatory in houses, except those intended to accommodate persons with special needs.

Controlling fire spread between compartments through interior openings and separations: To meet more stringent sound transmission levels in multi-family residential and small commercial buildings, designers often propose the installation of glass fibre in the cavities of conventional floor and wall assemblies. The Institute for Research in Construction (IRC) conducted two studies to determine whether sound-absorbing batts affect fire performance of these assemblies. The research showed that the installation of sound-absorbing material in a floor assembly (constructed as specified in Chapter 2 of the 1990 Supplement to the NBC) will not decrease its fire resistance rating. Also, the installation of glass fibre batts with a density of 0.6 kg/m³ in the wall cavity increases its fire resistance rating by five minutes.

Controlling fire spread between compartments through openings in exterior walls: Flames issuing from a broken window tend to curl back and touch the wall and window above. The objective is to prevent the flame from attacking the wall above the

window. There are many factors that affect this, such as window size and shape and horizontal and vertical baffles.

IRC research on the effect of window size on fire spread over the wall above it showed that a compartment with a large window, whose glass has been broken due to fire, allows more air to get into it than a small window and subsequently more fuel to be burned inside. This decreases the exterior fire plume temperature and height of the flaming portion of the plume.

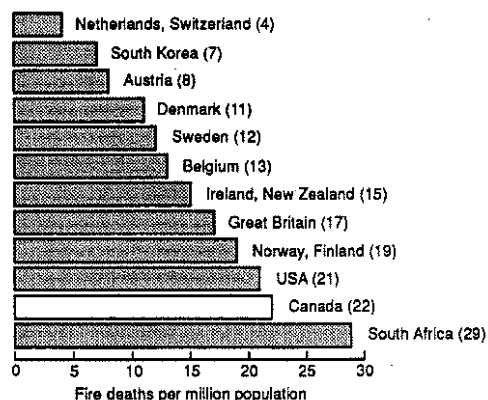
Research on the effect of the window shape on the spread of flame on the exterior wall showed that tall and narrow windows deflect flame away from the wall above it and subsequently reduce the heat feedback from the flame to the wall.

IRC studies on the effect of horizontal and vertical baffles on the flame spread over the wall above a window revealed that non-combustible baffles (such as a balcony) would significantly reduce the heat feedback from the flame to the wall above the window. On the other hand, vertical baffles at the window sides would cause the flame to stretch further up and increase the heat feedback to the wall.

Sound proofing can negate alarms: Sound-absorbing materials are now popular in the walls and floors of many multi-family projects. While these materials do not have an adverse effect, they can make a fire alarm less audible.

Fire alarms must be heard to be effective, especially since most fires occur when people are sleeping. Studies indicate that a 75dBA is required to awaken the average person. For that reason, a smoke alarm should be located on each level of a building and the alarms should be interconnected so they will all sound at once.

More details on fire safety are given in the IRC publication "Small Buildings: Technology in Transition, Building Science Insight '90," available for \$30 through Publication Sales, National Research Council of Canada, K1A 0R6. Order No. NRCC 32333. Make cheques payable to the Receiver General. **HB**



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