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Investigation of Atrium Smoke-Management Design Related to Balcony Spill Plumes

Objective

To investigate existing design equations for smoke production in atriums and the applicability of these equations to situations where the smoke is produced by a fire located either under a balcony or in a room opening onto a balcony (producing a balcony spill plume).

Background

With the introduction of performance-based design approaches, there is an increasing demand for consideration of the smoke produced by a fire located either under a balcony or in a room opening onto a balcony. Currently, there are several design methods for estimating the smoke-production rate; however, they are based on scale-model testing conducted in the U.K. and assume that the fire is in an adjacent room. As well, there are considerable differences in the capacity of the required smoke-exhaust system as calculated using these various approaches. These differences become particularly significant when one tries to apply them to the large atriums often found in North American buildings.

Statement of Work

The project will include both full-scale testing and CFD modelling. The primary focus is on fires in a compartment opening onto a balcony. However, the project will also examine the situation where the fire is located under a balcony, since at present, there are no design methods that address this situation.

Expected Outcomes

An updated set of design equations for atrium smoke-management design.

Partner

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

Start/Expected Completion Dates

The project began October 2002 and will be completed in 2007.

Project Manager

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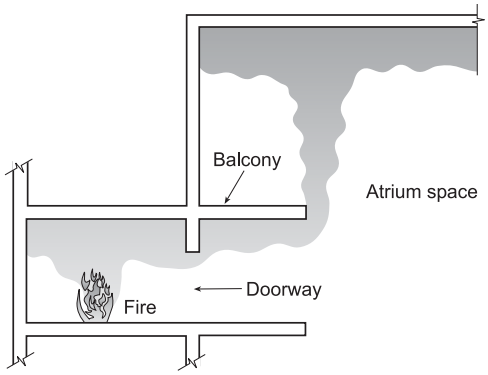
For more information, see http://irc.nrc-cnrc.gc.ca/fr/smbe/balcony_e.html



Spill plume from beneath balcony

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