

# Computer Models For Fire and Smoke

*Model Name:* RISK-COST

*Very Short Description:* RISK-COST computes the Expected Risk to Life (ERL) and the Fire Cost Expectation (FCE) resulting from fires in multistory buildings.

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*References:*

1. Beck, V.R. and Yung, D., "A Cost-Effective Risk Assessment Model for Evaluating Fire Safety and Protection in Canadian Apartment Buildings," Proceedings of the international Fire Protection Engineering Institute-V, Ottawa, Canada, May 21-31, 1989.
2. Yung, D. and Beck, V.R., "A Risk-Cost Assessment Model for Evaluating Fire Risks and Protection Costs in Apartment Buildings," Proceedings of the International Symposium on Fire Engineering for Building Structures and Safety, Melbourne, Australia, November 14-15, 1989, pp. 15-19.

*Availability:* Model will become available in the future. Calculations can be made by NRCC at present.

*Hardware:* IBM-compatible PC

*Language:* FORTRAN 77

*Size:* 1 MB

*Detailed Description:*

The model uses both deterministic and stochastic methods to calculate the ERL and FCE values resulting from fires in multistory buildings. For these calculations all possible fire scenarios are considered. These include post-flashover, non-flashover and smoldering fires, all starting on each floor, and for both door open and closed conditions. For each fire scenario, the fire and smoke spread probabilities throughout the building are computed at a critical time when

the occupants cannot evacuate the building safely. These probabilities are used together with the population trapped in the buildings to obtain the Expected Risk to Life and also to compute the Fire Cost Expectation.

The main inputs to the model are: building dimensions, fire resistance ratings of the building elements, the number of occupants, and the fire protection systems available.

The outputs of the model are the Expected Risk to Life and the Fire Cost Expectation.

*Limitations:*

The model cannot be used to obtain absolute levels of risk but relative estimates. Fire safety designs are compared to designs that comply with the requirements of the National Building Code.