

The Swedish Fire Research Board and the U.S. Federal Emergency Management Agency are sponsoring a project to further the understanding of the basic mechanisms involved, as well as to support the development of standards for and to seek ways of improving the performance of portable fire suppression systems used by fire departments.

This paper describes a physically based computer model developed to simulate one aspect of the problem: the manual suppression of postflashover fires. This includes: (1) an overview of the physical basis behind the model; (2) a comparison of model predictions with available experimental data, and (3) an analysis of fire suppression effectiveness using the model.

The analysis concludes that, when direct access and extinguishment of the burning fuel is not possible, improved fire control occurs with water sprays having a Rosin-Rammler distribution of droplet sizes with volume-median-drop diameters in the 0.15 to 0.35 mm range. This agrees with available experimental data.

It is also shown that fire fighting venting and standoff distance requirements may lead to more severe fires requiring more water for control; although venting and water spray induced air/gas flow also serve to channel hot steam and gases away from the fire fighter adding to his safety.

The analysis also shows that allowing higher gas and surface temperatures at fire control through improved fire fighter protective clothing and equipment design reduces water flow rate requirement. Additional experimental work is recommended before all these conclusions are considered definitive.