

Thesis Abstract cohort 2012-2014
The International Master of Science in Fire Safety Engineering

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Positive pressure ventilation in underground systems - an experimental and modelling study

Positive pressure ventilation (PPV) is a tactic used by the fire service. Fans are positioned at the fire ground to direct the movement of the smoke. In this work a study has been made to assess whether or not PPV fans are capable of creating a smoke-free environment in an underground system after a fire. Secondly, the study verifies whether or not ventilation can be used during extinguishment.

In tunnel research, the critical velocity is defined as the ventilation velocity which will prevent backlayering, irrespective of the size of the fire. The critical velocity has been used as a criterion of success in this work.

Over 300 FDS simulations were performed to evaluate the behaviour of the fans in different enclosures. A series of tests were carried out in a training building of the Frankfurt Fire Brigade to collect experimental data.

The main conclusion was that the tested fans have the capacity to create a smoke-free environment after a fire. In small stations/tunnels, the fans will be able to prevent or limit backlayering. This will help the fire service to deal with the fire. In bigger, more complex stations, the critical velocity is not achieved and the fans are less beneficial.
