

Studies on the application of gas cooling as used by firefighters

Gas cooling is a technique used by firefighters to create a safer work environment inside a compartment fire. By spraying water into the smoke layer, the smoke layer temperature will decrease significantly. Next to the lower temperature, the flammability of the smoke layer will also decrease. Due to the cooling of the fire gases, the smoke layer may contract.

This work focused on different parameters that may affect the efficiency of gas cooling and was based on experiments. A series of tests were conducted inside an adjusted half-scale ISO9705 room. A rotatable nozzle was used to analyse different application methods, spraying times, spray angles and droplet size. Temperatures inside the room, velocities in the door opening and contraction of the smoke layer were measured.

Out of the experimental results, the conclusion was made that there were no large differences between using the sweep or the pulsing method. There is no such thing as the one method that is the best way to apply the water spray to cool the overhead fire gases. When the fire gases must be cooled on a larger distance, pulsing will result in better cooling of the fire gases. The sweep is less influenced by the droplet size. So when the desired work pressure is not possible on the firefighter's nozzle, and the ideal droplet sizes are not created, the cooling efficiency of the sweep method will be less influenced.

The time between every spray must be as small as possible. It is better to open the nozzle once until enough water is applied into the smoke layer than open the nozzle multiple times for the same amount of water.