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High pressure water mist system as fire curtain

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Abstract

For decades, a predominant principle has been to mitigate the risk of fire spread by using passive fire separation. An example is by use of fire doors. Modern architecture has developed extensively over the same period to include more and larger areas of open space, such as atriums. For this reason, the opportunities for traditional passive fire separation design has been challenged.

High-pressure water mist is a new technology, and often with a better performance than traditional active systems such as sprinklers [1][2]. High-pressure water mist technology provides an opportunity to rethink traditional ways of designing fire safe buildings. One example of this is to use high-pressure water mist as an active fire separation.

The objective of this paper is to present a study through large-scale fire testing of the ability of a high-pressure water mist curtain to serve as an active fire barrier for the protection of building and humans [3]. Acceptance criteria have been determined for the level of critical temperatures and radiation, according to performance requirements in Danish building regulations [4]. The next objective was to determine an appropriate test scenario for large-scale fire testing, which we did by designing the test setup similar to applications for public and commercial building types [3].

The results of high-pressure water mist curtains' attenuation effect on radiation, when acting as an active fire separation in a multi room building similar to a typical apartment configuration, is presented in *Figure 1*. A total of four tests were performed; one free burning test (test 0) and three tests (test 1-3) with 7.5, 10.5 and 11.9 L/min water pendent spraying in the door opening using micro nozzles of Danfoss type 1918, 1922 and 1934. The test is set up with a fire in one room, with a door opening to an adjacent target room protected by an active fire separation as a high-pressure water mist curtain. The evaluation of the performance of the high-pressure water mist curtain is based on the ability to attenuate temperatures and radiation through a door opening [3].

The results of room and surface temperatures, as well as radiation, have shown that a high-pressure water mist curtain has sufficient attenuation effect to eliminate risk of fire spread, thereby ensuring a safe building design. In addition, results have shown an extensive attenuation effect that can lower temperature and radiation levels to a point ensuring human safety, thus providing opportunities to design escape routes etc. using active fire separations. The overall result is that building design with a high-pressure water mist curtain as active fire separation can potentially ensure a safe building design in relation to risk of fire spread and human safety [3].

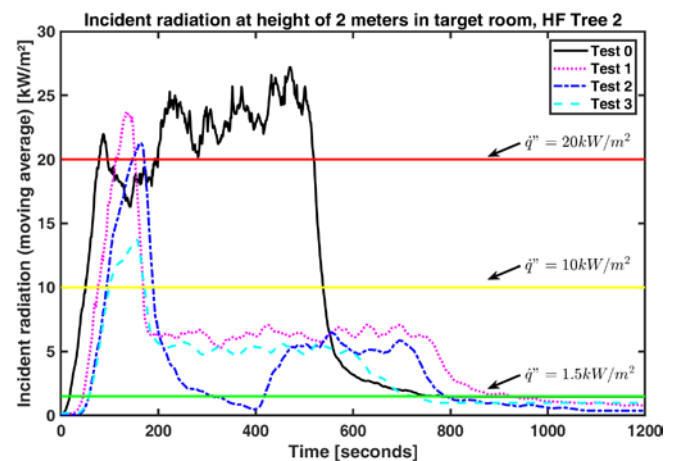


Figure 1 Temperature in target room

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