Studies on a novel porous double walled indoor fire test facility

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Abstract

The present study discusses evolution of a twin porous wall based indoor air facility to reduce the ambient disturbances on the fire. Natural convection based central exhaust through top opening reduces the dependence on heavy and power guzzling hot gas extraction equipment thus reducing the investment. Facility meets the national standards on emission. Measurements of wall temperatures at the top and the surrounding walls in a 2.1 m square pan fire with n-heptane for 90 s and diesel for 30 minutes show a maximum of 100°C ensuring structural safety. The need for one wall being solid (to connect to the auxiliary laboratory) was examined with FDS calculations on two alternate designs (a) with all sides porous and (b) three sides porous and one side solid to determine whether the fire is symmetrical. Short duration calculations show that the fire grows vertically towards the exhaust. Experimentally, the flame leans towards the solid wall after 45 to 50 seconds of heptane fire- attributed to wall heating near top. Based on this experience, a new design for the indoor fire laboratory is suggested.

Key words: Fire Suppression Testing, Heptane Pool fires, Fire Dynamics Simulation