STUDY OF THERMAL SHIELDING BY LIQUID SPRAYS

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The objective of this work has been to study the efficiency of sprays as a protection against a radiative heating source. It deals typically with the development of cooling devices to mitigate fire consequences in petro-chemical storage plants.

Earlier, the efficiency of vertical water spray curtains and liquid films have been investigated separately. The protection by liquid film has been found to be very important, but the evaporation is high, reducing the thermal shielding time considerably. In this study, the two methods are combined, using impinging sprays that create, and continuously feed a liquid film on the wall to be cooled.

The thermal shielding is highly dependent on the spray characteristics (droplet diameter, velocity) and the thickness of the liquid film. This work consists therefore of modelling the attenuation with respect to these characteristics and comparing the model prediction with experimental results.

Experiments are conducted in VKI Water Spray Facility (WSF). Spray characteristics are measured with Phase Doppler Anemometry (PDA) and direct heat flux measurements with radiometers.

The technique of impinging sprays presents very interesting results for attenuation (in the order of 80-90%) and the validation of the experimental data with an engineering code are good.

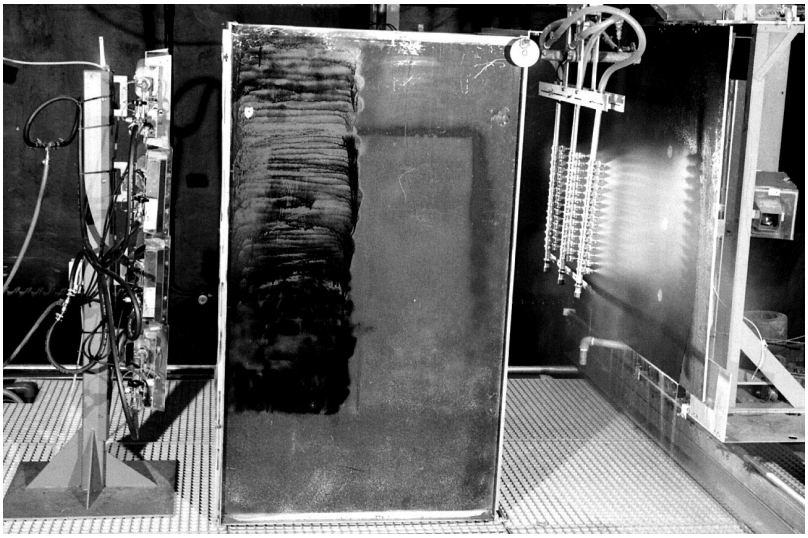

Figure 1: Water spray facility