A Review of the Criteria for People Exposure to Radiant Heat Flux from Fires

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Abstract

The NFPA 59A and the Federal Regulation 49 CFR Part 193 stipulate a level of 5 kW/m² as the criterion for determining the hazard distance to people exposure from a fire. Another Regulation (24CFR, §51.204) while stipulating a lower exposure limit of 1.5 kW/m² provides administrative relief from the regulation if mitigation measures are provided (24 CFR §51.205). Several countries in Europe and the Far East have adopted 5 kW/m² as the human exposure criterion for use in risk assessment but allow/require the use of lower values for children and physically challenged people.

This paper reviews the available literature on the basis of the 5 kW/m² and other criteria. In addition data from actual experiments on thermal exposure of human beings and animal studies are also reviewed. The paper in addition evaluates the realistic conditions of potential exposure of populations in an urban, industrial and residential environments to heat fluxes from a large fire, such an LNG fire. Exposures to which people are subject in other common situations encountered in the normal activities of citizens are also reviewed and evaluated both on the intensity of heat flux and the duration of exposures. The paper illustrates with an example the quantitative changes in the exposure due to mitigating parameters such as clothing, building wake shade, sizes of houses and structures on heat flux received by people within the (calculated) hazard zones using current regulatory models.