Abstract

The first part of the work presented in this publication was an experimental study of the heat radiation from wood and petroleum fires.

The main purpose was to determine the radiative heat flux conditions near a fire - at the flame surface as well as at different distances from the fire and the spectral distribution of the radiant energy.

For thin flames the band radiation was dominating while the contribution of continous soot radiation increased with increasing flame depth.

For the wood flames the emissivity approached unity and the flame radiant intensity the value of 16 W/cm2 for thicknesses greater than 200 cm.

For the petroleum fires the intensity increased to the value of 13 W/cm2 at the flame depth of 150 cm. With further increase of the fire size the values of the intensity were considerably lower due to smoke blocking effects of the flame zone.

A method for assessing the radiation field near petroleum, fires is presented.

The second part of the work was to study how a number of room variables, material properties and the thermal load influence the temperature and the radiant heat conditions during the early stages of room fires. The principal purpose was to develop a generalized scaling law to be used for rough estimates of the flashover potential in residential rooms - based on both the gastemperature criterion and on the radiation-to-the-floor criterion.

For the given configuration of the presented two-layer model the predicted values of temperature and of the radiant heat flow are expected to be fairly accurate.