ABSTRACT

An experimental investigation is carried out to measure the effect of a fire source (burner) location inside a compartment on the structure (walls, floor and ceiling) and to measure also the effect of the bulk temperature inside the model. A three selected locations of the burner in the compartment are considered placed once in center, corner or side wall. A 1:4 scale model made of gypsum is used with the proper selected dimensions and having a suitable single vent.

An evaluation of the percentage of conduction heat load passes through the compartment walls and the percentage of convection heat loads affecting on the environmental temperature inside the compartment. Temperatures distributions along the interior surface of the wall are also plotted in a dimensionless coordinates.

The results show that the conduction heat loads through each wall of the compartment increases with the time and reaches the steady state of conduction load within about 20 minute and there is a small temperature variation with the time after the steady state period of continuous burning. The total conduction heat load through the compartment walls, floor, and ceiling is then evaluated and it is found that it increases with the time and represents about 60 % of steady state conditions of the fire source heat load.

The results indicates that the corner location of the fire source is the worst case for producing the highest conduction heat load affecting on the structure of the compartment and the center fire location is the lowest one. The convection heat load is found to decrease with the time as the air temperature inside the compartment increases with the time and the corner

location gives the lowest convection heat load while the center location was the highest one.

The results also show that the smoke stratifies in the higher layer of the building and the temperature decreases as the distance from the fire source increases. The overall temperature of interior air and the wall temperatures increase with the time increase of continuous burning.