Study on Fire Behavior of Bed mattress

- Analysis on Burning Area Expansion and its Heat Release Rate in Combustion -

Jong-Jin, Jeong(K113608)

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In this study, to investigate the fire hazard of the bed mattress, the purpose of grasping the combustion properties, were carried combustion experiments in different environments of installation height from the floor surface. Experiments floor under hood, on top of the pool under hood, has been carried out in 3 Pattern of partition, specimens of mattress that was used in this experiment, made in Japan pocket coil mattress Yes, its dimensions are width 970mm × length 1960mm × thickness 230mm. Test body, I was the height HB [mm] up mattress underside from the floor and 6 pattern of 0,115,215,315,515mm installed. Ignition method is based on the arrangement conditions of the burner according to ISO 12949, in parallel with the mattress top and sides were arranged keeping an interval of 40mm linear burner from the mattress surface.

As a result, experiments conducted on the under hood pool, even installation height is different, to have displays the results of the most similar tendency, results of hood and collecting the smoke compartment below it has revealed.

1) If the heat release rate for heating speed of changing the installation height HB [mm], 515> 315> 215> 115> it becomes 0 magnitude relation, but not significant difference is found in HB = 515,315mm, they higher installation height is higher than the maximum heat release rate is large, tended fire growth is faster.

2) for the time the combustion range of the mattress top surface reaches the edge time the combustion range of the mattress top surface reaches the edge, if the HB = 0mm placed on the floor becomes longer the most time, high general installation height shorter trend as was observed.

3) When the flammable range of the mattress is assumed to have reached when the temperature reached 300℃ near the expansion properties of the mattress top and bottom surfaces of the combustion range of the mattress, the temperature of the thermocouple for each position reached 300℃ the amount of time and the results of comparing the burning spread the tip of the flammable range obtained from video, results showing substantially the same tendency was obtained.

4) When arranging the maximum height compares the installation height in the descending order of the average flame height than video for flame height was 515> 215> 0.

5) expansion of combustion range higher installation height of the mattress tends to be faster I seen the effects of the burning spread. Also, the expansion of the combustion range of upper and lower surfaces of the mattress tended slightly towards the bottom surface is increased.

6) The heat release rate measured at experiment is separated into combustion in the combustion and the floor in the mattress portion, and to understand their heat release rate from the different experiments, respectively, to predict the heat release rate by synthesizing these I have proposed a method. As a result, it was confirmed that it is possible to predict the history of the heat release rate in accordance with the burning process spread to some extent. However, the maximum heat release rate in the time zone before going to the heating speed there is the step of rapidly increases, to capture the trend pool fires on the floor surface of the mattress portion in particular when there is a high installation height of the mattress and to elucidate the interactions and the like effects and both on the combustion, it has been found that it is necessary to incorporate the quantitative calculation model the effect.