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“effectiveness of activation for thin intumescent coatings”

thin intumescent coating used for fire protection of steel structures swells during exposure to heat. protection is derived from the swelling insulating layer that delay the heat transfer from the gas phase into load-bearing steel elements. however, there is limited understanding in the early stages of the intumescence process which promote an effective swelling activation of thin intumescent coatings.

this work investigates the occurrence and behavior of swelling activation for thin intumescent coating under range of heating conditions in which incident radiant heat flux was carefully controlled and monitored. a heat transfer model allowed for estimations of accumulative thermal energy flux prior to activation.

results show that swelling activation occur for an accumulative thermal energy flux of 12-13 $mj/m^2$, when the steel temperature was in a range of 180-240$^o$c. test results also showed that no swelling activation occurred when incident radiant heat flux was kept below 23 $kw/m^2$, indicating a threshold for swelling activation heat flux. moreover, this study also assessed the swelling rate for tests in which activation was achieved.