

Fire Protection Performance of Different Industrial Intumescent Coatings for Steel Beams

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Abstract : This study investigates the efficiency of two different industrial intumescent coatings which have different types of certifications, in the fire protection performance in steel beams in the case of ISO 834 fire for 2 hours. A better understanding of industrial intumescent coatings, which assure structural integrity and prevent a collapse of steel structures, is needed to minimize the fire risks in steel structures. A comparison and understanding of different fire protective intumescent coatings, which are Product A and Product B, are used as a thermal barrier between the steel components and the fire. Product A is tested according to EN 13381-8 and BS 476-20,22 and is certificated by ISO Standards. Product B is tested according to EN 13381-8 and ASTM UL-94 and is certificated by the Turkish Standards Institute (TSE). Generally, fire tests to evaluate the fire performance of steel components are done numerically with commercial software instead of experiments due to the high cost of an ISO 834 fire test in a furnace. Hence, there is a gap in the literature about the comparisons of different certificated intumescent coatings for fire protection in the case of ISO 834 fire in a furnace experiment for 2 hours. The experiment was carried out by using two 1-meter UPN 200 steel sections. Each one was coated by different industrial intumescent coatings. A furnace was used by the Turkish Standards Institute (TSE) for the experiment. The temperature of the protected steels and the inside of the furnace was measured with the help of 24 thermocouples which were applied before the intumescent coatings during the two hours for the performance of intumescent coatings by getting a temperature-time curve of steel components. FIN EC software was used to determine the critical temperatures of protected steels, and Abaqus was used for thermal analysis to get theoretical results to compare with the experimental results.

Keywords : fire safety, structural steel, ABAQUS, thermal analysis, FIN EC, intumescent coatings

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