

Fire resistance performance of concrete-PVC panels with polyvinyl chloride (PVC) stay in place (SIP) formwork

Michel Murillo A., Bernardo F. Tutikian, Vinicius Ortolan, Marcos L. S. Oliveira, Carlos H. Sampaio, Leandro Gómez P., Luis F. Silva O.

Abstract

Stay-in-place (SIP) formwork is a more-practical alternative to traditional steel or wood formworks due to its improved constructability and durability. The aim of this paper was to study the fire resistance performances of structural and non-structural concrete panels with polyvinyl chloride (PVC) SIP formwork. Three 124.01 in × 110.24 in × 3.15 in panels of PVC SIP formwork were tested and compared to one another. All panels were aged for 28 days, then exposed to the standard fire curve based on the ISO 834:2014 standard, and the temperatures in each panel surface recorded. The results indicate that concrete strength significantly influenced the structural stability and the fire resistance time of the panels (under load), even in this type of panels when exposed to high temperatures. It was found that the PVC encasement enhanced the thermal insulation property, one of the fire resistance performance criteria. Overall, the importance of this alternative formwork is the reduction in the use of forest resources, the raise of awareness of their conservation, and the promotion of their rational use as this a material is friendly to the environment.

Keywords

Concrete panels, Fire resistance, Precast concrete, PVC encased system, Stay-in-place formwork