

## The Influence of Steel Connection on Fire Resistance of Composite Steel-Framed Buildings

**Authors :** Mohammed Kadhim, Zhaohui Huang

**Abstract :** Steel connections can play an important role in enhancing the robustness of structures under fire conditions. Therefore, it is significant to examine the influence of steel connections on the fire resistance of composite steel-framed buildings. In this paper, both the behavior of steel connections and their influence on composite steel frame are analyzed using the non-linear finite element computer software VULCAN at ambient and elevated temperatures. The chosen frame is subjected to ISO834 fire. The comparison between end plate connections, pinned connection, and rigid connection has been carried out. By applying different compartment fires, some cases are studied to show the behavior of steel connection when the fire is applied at certain beams. In addition, different plate thickness and deferent applied loads have been analyzed to examine the behavior of chosen steel connection under ISO834 fire. It was found from the analytical results that the beam with extended end plate is stronger and has better performance in terms of axial forces than those beams with flush end plate connection. It was also found that extended end plate connection has highest limiting temperatures compared to the flush end plate connection. In addition, it was found that the performance of end-plate connections is very close to rigid connection and very far from pinned connections. Furthermore, plate thickness has less effect on the influence of steel connection on fire resistance. In conclusion, the behavior of composite steel framed buildings is largely dependent on the steel connection due to their high impact under fire condition. It is recommended to consider the extended end-plate in the design proposes because of its higher properties compared to the flush end plate connection. Finally, this paper shows a steel connection has an important effect on the fire resistance of composite steel framed buildings.

**Keywords :** composite steel-framed buildings, connection behavior, end-plate connections, finite element modeling, fire resistance

**Conference Title :** ICCFC 2019 : International Conference on Composite Floor Construction

**Conference Location :** Helsinki, Finland

**Conference Dates :** July 18-19, 2019