

# Fire Resistance Performance of Prefabricated Composite Floor System Infilled with Phase Change Material

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## Abstract

In South Korea, the most common floor system installed on steel frames have been deck slab system. Disadvantage of this system is increasing construction duration due to concrete curing and additional fireproofing protection works. As fireproofing protection installed by people handwork had low quality and material wastes, floor systems that had fire resistance performance and easily applied to steel frames started being developed. Prefabricated Composite Floor System was also developed to apply to steel structures without fireproofing protection and features of this system were largely influenced by Phase Change Material filled inside the system. Phase Change Material could be differently made by additives and some materials were developed to enhance the fire resistance performance of systems by changing additives. In this research, the fire resistance performance of Prefabricated Composite Floor system with infilled different Phase Change Material was evaluated and predicted by using finite element analysis program ABAQUS/CAE 6.10-1. In addition, the effect of wire meshes and the type of PCM were investigated by using temperature distributions and displacements during 2 hours fire test modelled at finite element program.

**Keywords:** Fire Resistance; Finite Element Analysis; Phase Change Material; Heat Transfer Analysis; Floor System; Prefabricated; Composite System.

## 1 Introduction

Since slabs should have 2 hours of fire resistance performance in Korea to be installed at office building of which stories are more than 15, it is necessary to install fire resistance covering for slabs that lack fire resistance [1]. Reliability of these quality was very low and materials were wasted and construction duration increased, because installing fire resistance covering was done by

handwork [2]. To skip this work, researches about fire resistant floor system increased and this paper will explain the Prefabricated Composite Floor System one of fire resistant floor system. This system is called *iFLASH System* and infilled with PCM (Phase Change Material) that leads the system to behave as fully-composite between upper and lower steel plates (Figure 1.). The wire meshes were installed inside of this system to enhance fully-composite behaviour (Figure2.) [3].