

Flatwise and edgewise compression strengths of sandwich panel with silica aerogel mat

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Abstract. Facade of building are mainly made up from red clay brick and concrete block. However, both materials are having high thermal mass and promote high indoor thermal discomfort level. Therefore, it is necessary to invent new building material that have low thermal mass and able achieve strength required. Silica aerogel possesses properties of lightweight and low thermal conductivity as compared to other construction materials. In this study, sandwich panel with silica aerogel mat was studied where the properties of sandwich panel silica aerogel mat are rarely found in previous investigations. Before checking its reliability as thermal insulation panel, the mechanical properties of this panel was investigate. The panel was made-up by concrete wythes with type N mortar and the silica aerogel mats with different thickness. Both concrete wythes were casted and then attached together with silica aerogel mat as the cover. 3 types of panel with different insulation thickness were then tested for flatwise and edgewise compression test. From the results, it was found that core thickness of silica aerogel mat has less influence in flatwise and edgewise compression strengths of the sandwich panel. All specimens achieved minimum strength of type N mortar. Therefore, it is recommended to be used in construction that has equivalent application of type N mortar.

1. Introduction

Scholars, architect, contractor, government and developers are paying attention to the issues related with indoor thermal comfort. Building envelope is the physical divider between the indoor and outdoor of a building. There is a close relationship between building envelope and indoor thermal comfort. In order to maintain thermal comfort, absorptivity of external surfaces, thermal capacity, and thermal conductivity of the building envelope greatly influence the internal environment and consequently the energy consumption inside the building [1]. Construction materials such as brick and concrete are having criteria such as high thermal mass and thermal conductivity. Those materials tend to store heat during daytime and release the heat at night with high rate of heat transfer across the material itself. Therefore, application of thermal insulation material to control heat transfer is an easier and practical way to maintain indoor thermal comfort level. However, conventional thermal insulation materials are either non-environment friendly or causing health issues.

Composite sandwiched structures are recently being widely applied by the world especially the marine and aviation industries [2]. Sandwiched materials are knowns to be able to provide high

