THERMAL PERFORMANCE OF HIGH-RISE APARTMENT IN SURABAYA WITH PRECAST CONCRETE FOR THE BUILDING ENVELOPE

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ABSTRACT

Construction of apartements in Surabaya has increased rapidly. Contractors and investors asses the market opportunities in Surabaya. Expansion construction of apartments in Surabaya is also caused by the increasing proliferation of township development with lack of land horizontally. The option which offered to prevent the problem is by making vertical residential apartments. Currently material that widely used in building envelope is precast concrete. Precast concrete is a concrete material that had been made at the factory in accordance with design. The precast concrete is expected to affect the thermal performance of the building itself.

The research method used in this research is a computer simulation. This method is used to determine the performance of precast concrete that is affected by the thickness of precast concrete walls and WWR. This study will use 3 difference thicknesses of precast concrete wall namely precast 75 mm, 100 mm, and 125 mm. This study determines the thermal performance of precast concrete and the effect of modification of the thickness and WWR. Experiments performed with precast concrete thermal simulation using a computer program called ARCHIPAK 5.1.

The results showed that thermal properties of material with difference thicknesses affected on each thermal performance. Based on simulation, 125 mm precast concrete wall is the best alternative to apply in high rise building in tropical urban area. The reason is because 125 mm precast concrete wall had the lowest value of overheating degree hours which influence in indoor temperature. Second result of the simulation showed that precast concrete in floors 1-10 of 125 mm and 100 mm precast concrete on floors 11-30 is the best configuration for high rise apartment in tropical urban areas based on thickness configuration.

Keywords : thermal, high-rise apartment, facade design, window-to-wall-ratio
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