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RETV ANALYSIS ON ENERGY CONSUMPTION FOR RESIDENTIAL BUILDINGS THROUGH BUILDING ENVELOPES IN THE COMPOSITE CLIMATE OF NEW DELHI

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Abstract

India is one of the rapidly urbanising nations, with its population increasing. It requires a significant increase in residential buildings to house the population. With house units predicted to double in the coming periods, the country's energy demand is also expected to triple, placing significant pressure on its power sector, particularly during the summer months. As a result, this rapid growth of urban housing, particularly in New Delhi's composite climate, has intensified the demand for air conditioning due to the poor thermal performance of residential building envelopes. Many existing buildings lack effective passive strategies, leading to high energy consumption. The method for evaluating the building's thermal efficiency is the Residential Envelope Transmittance Value (RETV) analysis, followed by the Indian energy conservation code, Eco-Niwas Samhita. Earlier, there was no code to analyse the thermal efficiency for the building envelope. The study selected the five different types of existing buildings to examine the current RETV status. Field measurement was used to achieve the objectives. The study yields significant results: Case 1, with no insulation, had the highest RETV at 19.74 W/m², exceeding the benchmark of 15 W/m², while Case 5, built with AAC blocks and insulation, achieved the lowest at 10.04 W/m². It reflects a 49% improvement in envelope performance. The study highlights that incorporating energy-efficient materials such as EPS, AAC blocks, and low-E glazing can reduce envelope heat gain and cooling energy consumption. The findings emphasise RETV as an effective metric for guiding retrofitting strategies to enhance thermal comfort and reduce energy use in residential buildings.

Key words: air conditioning, building envelope, energy consumption, RETV, thermal efficiency

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