

**International Energy Journal, Volume 10, Issue 4, December  
2009**

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## Performance Analysis of Thermal Insulation Screens used for Classic Roofs in Hot-Humid Tropics

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### Abstract

*This work is devoted to the thermal performance evaluation of insulation materials used as screens in modern buildings in hot-humid areas. Average indoor air temperature, radiative cooling, heating loads and solar heat gain factors are calculated using dynamic nodal models established by taking into account air infiltration, leakage, and also air temperature stratification into the buildings. The numerical analysis developed is supplemented by an experimental work on test structures. Experimental and numerical results have proved that bioclimatic screens were better suitable to insulate the building from heat gain than thermal plaster screens, ground layers, and polystyrene plates. The laboratory work and numerical calculations have shown that the solar heat gain factor of the bioclimatic screen studied is less than 5%. The effect analysis carried out shows the importance and the role of flagstone roof thickness and the leaf area index (LAI), and hence the vegetable canopy type selection, on the thermal efficiency of the bioclimatic insulation screens. Results determine that larger LAI reduces the penetrating solar flux, the indoor air temperature and stabilizes the fluctuating values.*

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