

Effect of roof materials on the thermal performance of passive buildings

For houses built in Sri Lanka, roof is one of the main sources of heat gains. Therefore, it is useful to select an appropriate combination for the roof covering and ceiling materials possibly with insulation to minimize the thermal gains. It is also necessary to strike a correct balance in this material selection since the strategies used to minimize the heat gains can inhibit the cooling of the structure during the night. This could make the indoors too warm when the outdoor is quite pleasant.

It is shown with computer simulations that the calicut tile roofs can perform better than cement fibre roofs. Still, tile roofs fail to achieve the indoor temperatures desirable to provide thermally comfortable conditions such as 30 °C with enhanced ventilation. When polystyrene type insulation material is used along with the reflective type, the performance did not change appreciably. The performance of the cement fibre sheet roofs during daytime can be marginally improved by covering the sheets with two layers of half tiles. The most significant improvement was noticed when the reflective

type aluminium foil is used to reduce the amount of heat transferred. Thus the ideal roof from for Sri Lanka is cement fibre sheets or calicut tiles with reflective type insulation.