

Building envelope integrated phase change material under hot climate towards efficient energy and CO2 emission saving

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Abstract:
Applying phase change materials (PCMs) for thermal energy storage is a prosperous technology nowadays in different heat storage and temperature regulation applications. These materials proved high potential in the building sector towards a sustainable and efficient built environment. In this paper, PCM incorporated building roof and walls was investigated experimentally to investigate the indoor temperature enhancement, heat gain reduction and CO2 emission saving. Two rooms, one loaded with PCM and the other without, were built and tested in southern Iraq under severe hot weather conditions for three consecutive days. The results indicated positive thermal behaviour of PCM in which the average indoor temperature was improved by 2 °C during day hours. Moreover, the average heat gain was reduced by 54-54.69 W, and CO2 emissions were saved by 1.299-1.348 kg per day. The results indicated that the PCM could not maintain acceptable thermal comfort in the studied location, and using air-conditioning systems is required.

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