

Building energy consumption is increasing rapidly, demanding urgent improvement of insulation techniques in order to promote the building's energy efficiency. The Kingdom of Bahrain presents huge energy demands to the residential buildings due to the continuing air-conditioning units' operation. Due to this reason, in the present paper, we present the design and development of a modified mini scale hot-box experimental apparatus as well as an experimental and an analytical investigation of the used insulation blocks and techniques in Bahrain, with the aim to measure and evaluate the thermal resistance. The experimental process is developed based on a standardized hot-box design and manufactured with appropriate dimensions, in order to measure the temperature distribution according various climatic conditions. Important results and estimations are produced concerning the thermal resistance of insulation blocks, temperature distribution and heat transfer coefficients. The results are accurate enough and these are validated with the corresponding ones of the literature, through analytical calculations as well as with the manufacturer's values. It seems that the insulation blocks' efficiency is adapted to the regional climatic conditions and possible reliable solutions can be applied for further improvement.

