

Performance characteristics and practical applications of common building thermal insulation materials

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Abstract

Buildings are large consumers of energy in all countries. In regions with harsh climatic conditions, a substantial share of energy goes to heat and cool buildings. This heating and air-conditioning load can be reduced through many means; notable among them is the proper design and selection of building envelope and its components.

The proper use of thermal insulation in buildings does not only contribute in reducing the required air-conditioning system size but also in reducing the annual energy cost. Additionally, it helps in extending the periods of thermal comfort without reliance on mechanical air-conditioning especially during inter-seasons periods. The magnitude of energy savings as a result of using thermal insulation vary according to the building type, the climatic conditions at which the building is located as well as the type of the insulating material used. The question now in the minds of many building owners is no longer should insulation be used but rather which type, how, and how much.

The objective of this paper is to present an overview of the basic principles of thermal insulation and to survey the most commonly used building insulation materials, their performance characteristics and proper applications.

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