

Phase Change Materials and its Applications in Cooling and Heating

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ABSTRACT

This paper compiles information available on the applications of different PCM systems. Engineers and scientists all over the world are thinking for sophisticated technology of renewable energy. One such way by which we can produce renewable large quantity of energy is the methods of latent heat storage through phase change materials (PCMs). PCMs have different melting temperatures for each and every application and fortunately a large number of PCMs are known to melt with heat of fusion in the required range.

Organic and inorganic PCMs are the two main types of phase change materials and each of them has their own advantages and disadvantages. Regarding thermal latent heat storage in buildings, the special considerations include the amount of energy for heating or cooling required, the daily temperature of the entire year, the source of heat energy available, the capacity and type of thermal energy storage system and how the air supply will be cleaned, heated, cooled, humidified, dehumidified and exhaust required. PCM's wall boards, PCM's shutters, PCM's building blocks, PCM's trombe wall and PCM for floor and ceiling heating and cooling are all available choices which have studied by many authors.

Phase change materials can be incorporated in three ways that is direct incorporation, immersion and encapsulation. Since PCMs can adversely affect the function of the constructions materials, therefore they must be encapsulated. Micro and macro encapsulation are the two available methods of PCMs's encapsulation.

Phase change materials can be used for daily air-conditioning, either solely they can work or they can boost the main air-conditioning system. For daily air-conditioning the day night temperature and the selection of an appropriate PCM is of utmost importance. Currently so many new areas for the applications of PCMs have been proposed. Use of PCMs in electronic devices can be successfully achieved. Similarly use of PCMs in fabrics, for satellite power, for portable refrigerator, for solar still and for cooling of automobile are proposed. A broad range of PCMs are available in literature for various applications. However most of the literature is wide spread and there is a need for its proper management. Even though PCMs are very useful and can store many times more heat energy than ordinary conventional materials, there are so many challenges for their practical usage. Packing, cost and knowledge to the consumers are other parameters which need special attention.

References

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