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REVIEW ON THE EFFECTIVE PARAMETERS OF MACRO-ENCAPSULATED PARAFFIN ON THE PERFORMANCE OF THERMAL ENERGY STORAGE SYSTEMS

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ABSTRACT

Thermal energy storage (TES) can be achieved by increasing the internal energy of a material as sensible heat, latent heat, and thermo-chemical heat, or combination of these. The usage of macro-encapsulated paraffin to store the heat in the form of latent heat is increased, because a large quantity of thermal energy is stored in smaller volumes. Macro-encapsulation can be achieved by many techniques such as tubes, pouches, spheres, panels, plates or other receptacles. On one hand, Paraffin is characterized by a high energy storage density, but on the other hand it suffers from the low thermal conductivity, which limits the power that can be extracted from the TES. By extension of the heat transfer area between paraffin and Heat Transfer Fluid (HTF) and enhancement of the thermal conductivity of paraffin can be improved the heat conductivity during melting and solidification processes, which is very important to be able to charge and discharge the energy storage with a thermal power. The mass flow rate plays effective role in heat extraction from the collector. Combined sensible and latent heat storage system reduces the size of the storage tank. The heat storage capacity of the combined system is raised in comparison with the conventional Sensible Heat Storage (SHS) system.

Keywords: Thermal energy storage, sensible heat, latent heat, Macro-encapsulation of Paraffin.