

Experimental Investigation for Enhancement of Thermal Energy Storage using Heat Pipe

Student Name: Siddharth Shandilya

Guide Name: Prof. C. L. Ladekar

With the continuous depletion of fossil fuels all across the globe, solar energy along with other non-conventional energy resources has gained renowned attention in 21st century. However, due to its intermittent nature, it is scarcely available or not available at all during evening and nights respectively. This work emphasizes on the study and analysis of the feasibility of solar energy using thermal energy storage with different Phase Change Materials (PCMs) utilizing Heat pipes. The energy which is getting stored can be utilized post sunset and when there is low or no solar radiation. This leads to hot water being available all throughout the day.

This work comprises on a system having two heat-absorbing units. First being a solar flat plate collector and other is Two Thermal energy storage tanks, one embedded with heat pipes and the other with copper pipes, PCM (paraffin) being their heat storage unity. The solar



Fig. Photograph of experimental set up

water heater supplies

hot water only during the day when the weather is not very cloudy. The TES tanks stores the heat in PCMs

effectively which is supported by Heat pipes and can supply hot water at night.

Initially, water is circulated between the heating panel (Solar collector) and the PCMs. The absorbed heat is then transferred to the PCM which changes its phase by absorbing latent heat and the excess heat is stored as sensible heat. In this project work, the heat transfer performance shall be

compared of heat pipe and copper pipe when different Phase change materials made of Paraffin wax, namely PCM 50, 55 and 58 are employed. The inlet water is supplied at particular mass flow rate on a particular day. This latent heat thermal energy storage can be utilized for domestic applications. The results, based on the Temperatures obtained at a particular mass flow rate of inlet water are compared and elaborated.