

Experimental Measurements of Evacuated Enclosure Thermal Insulation Effectiveness for Vacuum Flat Plate Solar Thermal Collectors

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Abstract : Encapsulating the absorber of a flat plate solar thermal collector in vacuum by an enclosure that can be evacuated can result in a significant increase in collector performance and achievable operating temperatures. This is a result of the thermal insulation effectiveness of the vacuum layer surrounding the absorber, as less heat is lost during collector operation. This work describes experimental thermal insulation characterization tests of prototype vacuum flat plate solar thermal collectors that demonstrate the improvement in absorber heat loss coefficients. Furthermore, this work describes the selection and sizing of a getter, suitable for maintaining the vacuum inside the enclosure for the lifetime of the collector, which can be activated at low temperatures.

Keywords : vacuum, thermal, flat-plate solar collector, insulation

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