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ABSTRACT

A cylindrical solar water heater is designed and manufactured under the thesis work. It consists of a cylindrical tube made from high quality glass having a length of 1.524 m, 0.1143 m outer diameter and a thickness of 0.00254 m. A copper coil tube in the shape of spiral rings, with the tube inner diameter of 0.05m and outer diameter of 0.06m, painted black, serves as a collector to the incident solar energy on the cylinder wall. The thermal performance was evaluated extensively throughout the months of September and October 2019; a maximum temperature difference of 4.3⁰C between inlet and outlet of the solar water heater at a mass flow rate of .1512 L/min was achieved. The efficiency of the cylindrical solar water heater was calculated. The maximum value during the experimental period was found to be 31.6%. This reveals a good capability of the system to convert solar energy to heat which can be used for heating water. An economic analysis has reveals that the cylindrical solar water heater compared with the flat plate collector is cost effective.

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NOMENCLATURE

SWH	= Solar Water Heater.
OD	= Outside Diameter.
ID	= Inside Diameter.
HVAC	= Heating and Ventilation Air-Conditioning.
SOE	= Department of Energy.
Qu	= Useful Gain Energy.
Q	= Volume Flow Rate.
Cp	= specific heat in constant pressure.
Irad	= solar radiation in watt/meter square.
C	= Degree Celsius.
K	= Kelvin
am	= ante meridian
pm	= post meridian
m	= meter.
s	= second.
ft	= feet.
in	= inch.
w	= watt.
η	=efficiency.
J	= joule.
Kg	= kilogram.