

Rungtawee Padakan 2008: Study on the Correlation of Water Flow Rate and Light Intensity to the Efficiency of the Hot Water System. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering.
Thesis Advisor: Associate Professor Surachai Radakarn, Ph.D. 107 pages.

The purpose of this research was to consider the water flow rate and the light Intensity to the efficiency of the hot water system so it can be applied with the light and pressures other. The Experiment was done in a laboratory for control of the light intensity and the flowing rate of the water in the system and laboratory temperature. The design and development of the hot water system was an open system. The hot water system composes the collector which has an area for the receiver of 2.24 m^2 and uses a mirror in reflecting. The receiver which was used in this research was a vacuum tube. It had an area of 0.33 m^2 . This experiment used a light bulb for simulation because we wanted to control light intensity have stability and change light intensity for other conditions. The experiment had 3 cases. In the first experiment, we changed water flow rate at 0.0083 kg/s to 0.0499 kg/s and kept the light intensity stable. It was about 607.5 W/m^2 . In the second experiment, we changed the light intensity at 474.75 W/m^2 to $1,290.75 \text{ W/m}^2$ and water flow rate was stable at 0.0083 kg/s . In the third experiment, we had to test the hot water system in ASHRAE STANDARD 93-77. We changed the temperature of the water before it went inside a collector. We used water flow rate at 0.02 kg/s and light intensity was stable at 881.26 W/m^2 .

In the first experiment, The findings revealed that the efficiency of the system was 70 % to 72 % and the maximum temperature of water was 53°C at 0.0083 kg/s of the water flow rate and the light intensity was stable at 607.50 W/m^2 . In the second experiment, The findings revealed that the maximum temperature of water was 78°C at 0.0083 kg/s of the water flow rate and the light intensity was $1,290.75 \text{ W/m}^2$. In the third experiment, The result of this study showed that at 40°C of temperature condition of the water before it went inside a collector. The maximum temperature of water was 50.17°C and the efficiency of system was 53 %. The findings reveal that the water flow rate and the light intensity affect to the efficiency of system.

Student's signature

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