

Improving the Performance of Evacuated Tube Collector

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Abstract— Renewal energy is very useful to us. Many countries use that is renewal energy. Renewal energy save our environment and conversional fuel resources. This energy is one of the most efficient clean and affordable energy available today. Now this day global warming is most of the one problem of our world. Because it is highly accoutre by ever increasing energy rates country a seriously looking for domestics and industrial use of solar energy. There are many causes of increasing of global warming. That is

- Cooling
- Refrigeration
- Air conditioning
- populations
- cutting the forest
- Pollution

In the present time a application of solar energy by using evacuated tube collector with aluminium sheets technology for hot water tank has been carried out. Evacuated tube would help and utilize the solar energy storage tank to improve the energy consumption and energy efficiency this is especially focuses on evacuated tube collector with aluminium sheets technology. This study also includes thermodynamic equation to find out efficiency of evacuated tube collector with aluminium sheet .reviewed design parameter and theoretical modal with equation and also reviewed comparisons of theoretical and experimental result of evacuated tube collector with aluminium sheets technology. This evacuated tube collector are mainly used for hot water generation which is furthers used of different purpose. This collector is higher efficiency less heat loss less friction and many more advantage than other collector tube.

Keywords: Heat Loss Less Friction, Higher Efficiency, Evacuated Tube, Aluminium Sheets, Solar Energy, Collector

I. INTRODUCTION

Energy is avidity to do work and solar is a Latin word from the sun so we can defend solar energy as solar energy obtund from the sun we can put this energy to work for us many way from heating water and living aspics with our homes to generating electrical energy. This energy is radiant light and heat from the sun. Everyday sun gives off far more energy than we need to power energy thing on earth the sun energy is the product of large free energy of the world .solar energy is that produced by the sun's light photovoltaic energy and its warmth solar energy for the generated of electricity or the sun energy change solar to the electricity energy. Since its coming from the sun, solar energy is harnessed using penal and mirror. The energy emitted by the sun is called solar energy or solar radiation

II. EXPERIMENTAL SETUP & RESEARCH METHODOLOGY

The motive of the experiment is to study the performance of evacuated tube solar collector for the water heating system. This system has forty evacuated tube with aluminium sheets

collector. A tube collector is a solar observed tube collector in which the reflecting surface is determined in the form of a parabola evacuated tube. The solar energy will be absorbed by surface of aluminium which is polished Aluminium sheets. The energy of beam radiation falling on the troughs which enter the collector parallel to its plane of symmetry is concentrated to tank along its focal line, where a receiver tube is held. Aluminium sheet has directly reflected to the sun light which will help full to heat transfer in the tube.

A. Theoretical Analysis:

An experimental set-up was designed and installed on a Energy park of LNCT campus Bhopal, Mechanical Engineering Department. Shows the entire experimental setup. In this experimental setup has been designed and developed at college, in which aluminium polished sheet has been taken, water tank which has capacity 300 lit, glass evacuated tube collector having selective coating chromium oxide and mounted on gig zag tube of 1.5 m and gig zag pipe diameter have 10mm. This is the function of mounted and giving on spots water tank .diameter of length evacuated tube is 10mm and lengths is 2.5 m.

B. Practical analysis and Design:

In the experiment use the arrangement of parabolic aluminium sheet and long evacuated tube glass collector and storage tank to preheat the water. With the use of this arrangement the performance were mesered in terms of hot water outlet in the tank.

C. Parabolic Aluminium Sheet Collector:

A parabolic aluminium sheet collector is a type of focus concentrating collector. The incoming solar ray radiations falling on the surface parallel to the axis of the aluminium concentrated at the focal point of the evacuated tube collector. This system uses a dual axis tracking which clearly means that it had to follow sun throughout the day in order for high efficiency. In this experiment first use the evacuated tube collector to heating the water. Here, with the use of parabolic aluminium sheet collector maximum temperature is obtained in this setup and this is the use to very important part of the experiments of generation hot water.

D. Evacuated tube Collector

An evacuated tube collector is the function of collect heat water or any liquid with sun energy. And an evacuated tube collector made of selective chromium oxide coating and its parabolic shape surface on the setup It's made of chromium oxide this reflecting surface is mostly made of reflecting evacuated tube or aluminium sheets. The solar energy falling on evacuated surface hence observed solar energy and convert hot water with alternative solar time its increases water temperature

E. Storage tank:

The storage tank is a function of store hot water in this setup. The tank will collect the hot water it will be helpful to study

of behaviour of hot water as the temperature increase. storage tank are container that hold liquid.

F. Thermometer

Thermometer is a device of measuring temperature data with alternative solar time in this setup. it is very important parts of the setup. it is give reading own setup and determent temperature of hot water on solar time

III. RESULTS AND DISCUSSIONS

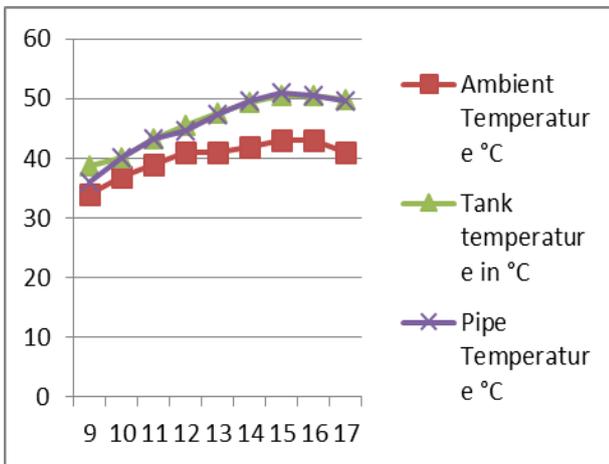
The experiment was conducted an hour times interval in a day and results of the experiments was reported here and did the analysis of the obtained result. Preheating with using evacuated tube collector to achieve maximum solar water temperature outlet. In this experiment determine the parameter such as ambient temperature, tank temperature, and evacuated tube collector temperature.

Time	Temperature in c	Tank temperature in c	Evacuated tube temperature
9:00 am	34	38.8	35.9
10:00 am	37	40.1	40.2
11:00 am	39	43.2	43.3
12:00 pm	41	45.6	44.7
1:00 pm	41	47.6	47.4
2:00 pm	42	49.3	49.6
3:00 pm	43	50.5	50.9
4:00 pm	43	50.6	50.4
5:00 pm	41	49.9	49.5

Table 1: 1st day

Show the table chart of outlet temperature with the sun time in 1st day 4.1. In 1st day solar temperature obtained at 9:00 am is very low ambient temperature is 34°C. solar water evacuated tube collector and its evocated tube temperature at 3:00 pm is maximum temperature is 50.9 °c when the aluminium sheet collector attached the up the solar tube collector for given maximum out let tube temperature than the preheating maximum solar evacuated tube temperature at 4 :00 pm is 50.4°C

A. Graph -4.1 1st day

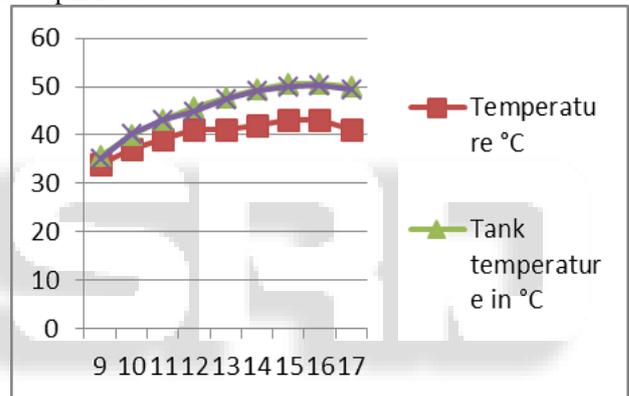


Graph 4.1: The variation of pipe Temperature with Solar Time on 1nd Day

Time	Temperature in c	Tank temperature in c	Evacuated tube temperature
9:00 am	34	35.8	35
10:00 am	37	40.1	40.2
11:00 am	39	43.2	43.1
12:00 pm	41	45.6	44.7
1:00 pm	41	47.6	47.4
2:00 pm	42	49.3	49.2
3:00 pm	43	50.5	50.1
4:00 pm	43	40.6	50.4
5:00 pm	41	49.3	49.5

Table 4.2: 2nd day

Show the table chart of outlet temperature with the sun time in 1st day 4.2. In 1st day solar temperature obtained at 9:00 am is very low ambient temperature is 34°C. solar water evacuated tube collector and its evocated tube temperature at 3:00 pm is maximum temperature is 50.1 °c when the aluminium sheet collector attached the up the solar tube collector for given maximum out let tube temperature than the preheating maximum solar evacuated tube temperature at 4 :00 pm is 50.4°C.



Graph 4.2:

IV. CONCLUSION

A evacuated tube of a solar water preheating system with the arrangement of these equipment as like parabolic aluminium sheet and evacuated tube collector and Storage tank was constructed and tested in college campus LNCT Bhopal on April 2019. Here preheating is done to improve the solar water temperature and its efficiency. The solar evacuated tube collector system is used for generation of heat high temperature as the system is capable of producing high temperature. This system is also refer for water heating, process steam application and air heating as well. In this present study an evacuated tube collector with steel reflecting surface is used for the parametric analysis is used. During the experimental investigation receiver tubs of two different diameters and different material are used in this system. In this evacuated tube collector we use the chromium to obtained better preheating the solar water. It is obtained from the observation that the heat transfer rate and a collector efficiency is strongly depends on solar radiation. There, the temperature is obtained with the use of evacuated tube and aluminium sheet arrangement is 45°C and efficiency is also is increased in this system. It is found from the experimental result analysis in third ambient temperature day 43 °c at this

temperature tube temperature 50.4°C by that water getting the temperature 50.7°C has been achieved and so on.

V. WORK IN FUTURE

Research on solar is in infant stage there is need of technology development for its research commercial and awareness of society

- Solar water heater is being used in residential building and hotel industries to some extent.
- There is a huge gap between research workers and end users this gap need be research
- There is a need of change the temperature in evacuated tube and do the further study
- Modification of in the experimental setup can also be a part of further study.
- An in this analysis into the most appropriate type of tracking system for this application;
- In this study of condensation area and associated shading is same exploring.

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