EXPERIMENTAL STUDY OF DOMESTIC REFRIGERATOR BY USING EVAPORATIVE CONDENSER

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ABSTRACT!
Refrigerator has become an essential commodity rather than luxury item. It is one of the home appliance **ukkigg,** vapour compression cycle in it process. Performance of this system becomes main issue and many researches are still ongoing to evaluate and improve efficiency of the system. This study presents effect of evaporative condenser on COP of domestic refrigerator. The purpose of this article is to compare the COP of refrigerator by
using air cooled condenser and evaporative condenser of same length and same diameter.
This experiment is carried out on domestic refrigerator (185 ikr4 test rig. In this study, an innovative, evaporative condenser for residential refrigerator was introduced. A yaw compression cycle incorporating the proposed evaporative condenser was tested to evaluate the cycle performance. To allow for evaporative cooling, sheets of cloth were wrapped around condenser to suck the water sprayed on it. The thermal properties at the different points of the refrigeration cycle were measured for typical operating conditions.
Further to compare both the condensers some parameters like condenser outlet temperature, evaporator inlet temperature, power consumption have taken. After investigation it was found that evaporative condenser may replace the air cooled condenser from domestic refrigerator

KEYWORDS: Refrigerator, Condenser, Evaporator, COP, Refrigerating Effect, Compressor.

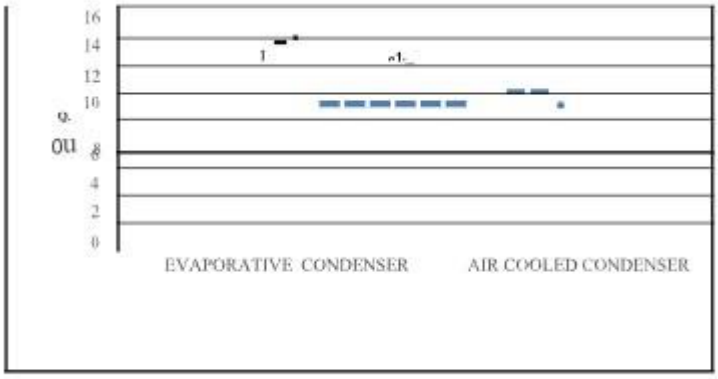
EXPERIMENTAL SETUP:
The apparatus for experimental studies on COP enhancement in domestic refrigerator using evaporative condenser and control panel shown in figure 1 and 2. It consists of evaporator, compressor, and air cooled condenser and capillary tube with the knob for on-off operation. In this refrigerator R134a refrigerant used.

The refrigerator was instrumented with two pressure gauges at inlet and outlet of the compressor. The temperature at four different points is taken by 8 digital sensors. Current and volt of the refrigerator is measured by digital clamp meter.

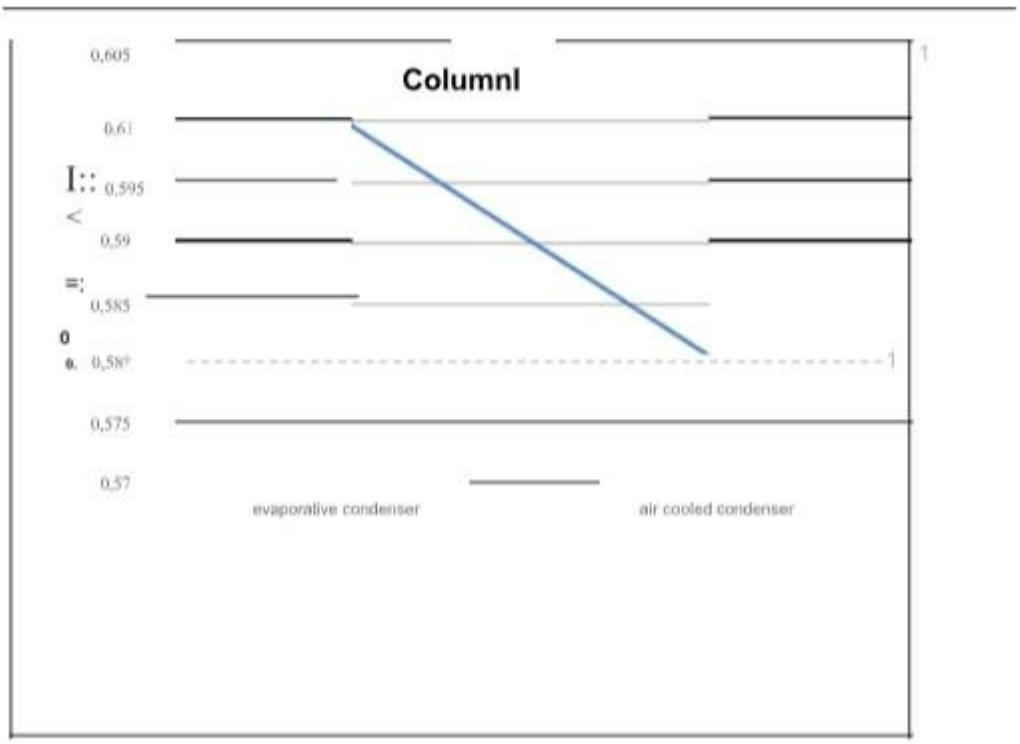
METHODOLOGY:

Fill the vessel with the known quantity of water. Switch on the main supply, temperature indicator. Measure the suction and discharge pressure of refrigerant with the help of pressure gauges. Take initial erergy meter reading of compressor. Also measure the initial temperature of water in the evaporator cabin. Take the reading of nearly 10 minute of time span to measure the various temperatures of setup from digital temperature indicator i.e. T1,T2,T3,T4,T5,T6. Water is sprayed uniformly on the condenser coil after every
10 minutes. Experiment is conducted for 500 ml of water in the evaporator for this work. Then note down the measured temperatures in tabular formal

RESULTS AND DISCUSSION



EVAPORATIVE CONDENSER AIR COOLED CONDENSER



evaporative condenser air cooled condenser

CONCLUSION:

After the successful investigation on the performances of refrigerator with both the condenser, the following conclusions can be drawn based on the results obtained:

1. COP of refrigerator.

Overall average COP of evaporative condenser was higher than the air cooled condenser. COP for air cooled condenser was found 8.7 where as COP of evaporative condenser was found 13.8.

2. **Energy consumption of refrigerator.**

Air cooled condenser offers lowest energy consumption of 0.58KW. The compressor Consumes 2.14% less energy when evaporative condenser was used in the system.

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