

COOLING EFFECT OF CAPILLARY TUBE IN REFRIGERATOR

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Abstract

Capillary tube is one of the circulating device in the refrigeration, such as a small refrigerator. In this research, the capillary tube is made of a copper tube with internal diameter of 0.065 m and the length of 0.218 m. Performance of the evaporator can be influenced by shape and dimension of the capillary tube. Dissolution around the capillary tube is expected increase the performance of the refrigerator. Refrigerant R22 is used in the experiment. The highest and lowest of the Coefficient of Performance (COP) of the refrigerator are investigated at position T_{ev} and T_{co} .

Keywords: Refrigerant 22, refrigeration effect, COP, capillary tube

INTRODUCTION

Refrigeration system is used in many applications such as domestic refrigeration, commercial refrigeration, industrial refrigeration and marine refrigeration. Generally, system refrigeration has 4 basic components, evaporator, condenser, expansion, and compressor. Expansion is used adhere on the refrigeration system. Expansion valve usually is used at the big scale refrigeration and the capillary tube is used for the small scale and simple refrigeration.

Generally, capillary tube made of a copper material that is used for refrigerant 22 with diameter of 0.5 to 2 mm, depend on the load of system refrigeration. The length of the capillary tube is also varied. Using capillary tube in the system of refrigeration has some benefit such as the shape of the expansion is very simple and also the cost to operate inexpensive compared with expansion valve.

Precooling of the capillary tube is expected increase of the performance of the refrigerator. Many researchers did the experiment about the replacement of the capillary tube in right place to increase and get more efficient of the performance of refrigerator. Akinunde (2007) did the research about capillary tube with difference shape as helical and serpentine shape using R-134a refrigerant. His results show the performance of the refrigerator is not influenced with the various pitch of the helical capillary tube. It is different with the serpentine capillary tube which is influenced with pitch.

Performance of the helical and serpentine capillaries tubes are influenced by the diameter and high, respectively. The results are indicated that the shape and dimension of the capillary tube can affect of the performance. This research investigate the effect of precooling of capillary tube in refrigerator using R 22 refrigerant.

MATERIAL AND METHOD

Vapour compression refrigeration system is a refrigeration simplest cycle. The basic principle of refrigeration is liquid or refrigerant absorb heat when changed from liquid to gas and gases give off heat when changed from gas to liquid. This phenomena is occurred when the gases compressed and condensed. Vapour compression refrigeration system has four basic components; compressor, evaporator, condenser, and expansion. This research use capillary tube expansion. Compressor is used to compress the vapour refrigerant to increase the pressure of refrigerant in order can be decreased rapidly by

expansion tube. Evaporator and condenser are used to evaporate and condense the refrigerant in the system with absorb and release the heat from environment, respectively. A installation diagram of the refrigeration system is shown in figure 1.



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