

Design & Development of Air Conditioning, Water Cooler & Hand Drying System

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Abstract-This paper shows the combination of three different units in one system. Usually we have air conditioner, water cooler & hand dryer as three different units. Here we have integrated this three units in one system so as to get conditioned air, cold water for drinking & hot air for hand drying purpose. The main constraint of this project is cost, power consumption & space. Also use of R134a as a refrigerant for our project.

Keywords-Refrigerant, water cooler, R134a, COP

I. INTRODUCTION

Since in air conditioner and water cooler R22 refrigerant are used but it has a many drawback as high GWP (Global Warming Potential) and ODP (Open Depletion Potential) and hence it affects the environment. Hence to reduce the negative effects we will decided that we can use R134a refrigerant which has GWP value is 1300 and ODP value is zero. [1] For water cooling purpose we will gives the output of evaporator to the water cooler but for controlling the temperature of water we are using the bypass valve so that whenever water temperature will achieved it will stop the supply of cooled refrigerant from output of evaporator and directed to the compressor as normal system.

II. PROJECT LAYOUT

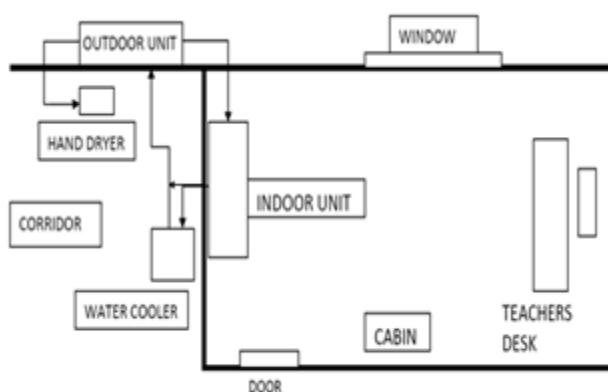


Figure 1

III. CONSTRUCTION & WORKING

Air conditioning is the process of altering the properties of air (primarily temperature and humidity) to more favorable conditions. More generally, air conditioning can refer to any form of technological cooling, heating, ventilation, or disinfection that modifies the condition of air.

For this the water cooler is installed between the evaporator and the compressor. The refrigerant pipe will flow from evaporator into the water cooler pipes and then from there to the compressor. The outlet temperature of the refrigerant from evaporator is still at a low temperature. Hence we are utilizing the low temperature of the refrigerant and cooling the water. The cooling coils would be wound around the water cooler. We are using a storage type water cooler. But the cooling in the water cooler would be controlled by temperature sensing device. When the refrigerant is in a gas form and is circulating in the pipes, it has the ability to absorb the heat away from the mineral water in the reservoir, leaving cool and refreshing water that is readily available. The heat in the refrigerant is then expelled from the water cooler. As people dispense water, the machine will refill the reservoir and the process begins again. Should the water reservoir empty completely during dispensing, it will take a few minutes before the water cooler chills the water to a low temperature. The refrigerant pipe would be bypassed. One will flow through water cooler and other directly to the compressor. When the water is cooled to the required temperature the sensor would sense the temperature and the bypass valve will actuate and the refrigerant would flow directly to the compressor. And when the temperature in the water cooler will fall the cooling will start again. Also we observe that the hot air exhausted from the condenser is a loss. Hence we are using that air to flow through duct and be used as a hand dryer. Here the heat energy will be recovered.

IV. REFRIGERANT

We have used R134a as a refrigerant. The properties are given below

Boiling point	-26.15°C
Freezing temperature	-101°C
Critical temperature	101.06°C
Condenser pressure	1.637 bar at 15°C
Evaporator pressure	7.7008 bar at 15°C
Specific volume	0.1213 m ³ /kg
Global warming potential	1300

Figure 2

V. CONCLUSION

By using this system we have save all the power required for running water cooler & hand dryer.

The space required for water cooler was reduced as there was no separated components for water cooler.

REFERENCES

- [1] B.O. Bolaji¹, M.A. Akintunde², and T.O. Falade³. Comparative Analysis of Performance of Three Ozone-Friends HFC Refrigerants in a Vapour Compression Refrigerator