

Design and Manufacturing of 360 Degree Evaporative Cooler

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Abstract - As India moving towards development energy consumption by increasing day by day and this consumption will reach up to double or may be triple in next 15 to 20 years and also temperature of earth increases rapidly due to global warming and green house effect. There is need to save energy for future generation. conventional heating and ventilation systems consume nearly 50 to 60 % electrical energy which is not favor with nature and human being. Decision to select proper air conditioning system which not only conserve energy but also reduce harmful environmental effect like global warming. Design of evaporative cooler is a device which cools the air by evaporating water. By comparing evaporative cooling with typical air conditioning system ,evaporative cooling eliminates the vapour compression cycle, refrigeration effect, condenser effect. Evaporative cooling works by contacting water with air by increasing enthalpy of vaporization of water. During phase transition of water to air temperature of dry air can be dropped significantly. Evaporative coolers use in dry and hot region ,evaporative cooling of air added benefit of conditioning of air taking moisture comfort consideration. Working principle of evaporative cooler is given as by passing hot and dry air over wet pad which gives to decrease in temperature of air with increase in specific humidity as some water from pad is evaporated taking latent heat of vaporization from incoming air. 360 degree cooler consume less power as compared to air conditioning system and cost of manufacturing also less.360 degree cooler able to cool air all over four horizontal direction in room for better efficiency use chilled water in tank.

Key Words: Humidity, Temperature, Latent Heat, Sensible Heat, Enthalpy.

1. INTRODUCTION

The 360 EVAPORATIVE cooling is one of the earliest methods employed by men for conditioning their houses. Simple 360 EVAPORATIVE cooling is achieved by direct contact of water particles & a moving air stream. If the water is circulated without a source of heat & cooling, dry air will become more humid & will drop in temperature. In a complete contact process, the air would become saturated at WBT of the entering air. The air may be sufficiently cooled by 360 Evaporative process to results a considerable degree of summer comfort in climates of high dry-bulb temperatures associated with low relative humidity. The minimum outdoor temperature required for successful 360 EVAPORATIVE cooling is above 35^oc & another requirement is a relatively low. Wet bulb temperature. The comfort given by the 360 EVAPORATIVE cooling always depends upon the outdoor temperature & R.H. High D.B.T & low W.B.T. always

gives more comfort with 360 EVAPORATIVE cooling. Although the 360 EVAPORATIVE cooling does not perform all the function of true air-conditioning but it provides comfort by filtering & circulating the cooled air. This system does not dehumidify the air but on the contrary, further humidify air.

2. PROBLEM STATEMENT

In 360 cooler we are going to use four direction cooling pads which allows maximum efficiency & cooling more area in short time also we design special flapper to flow air in all direction with control. When trying to understand 360 EVAPORATIVE cooling, it may be best to think of air as a type of sponge. Like a sponge, as air comes into contact with water, it absorbs it. The amount of water absorbed depends largely on how much water is already in the air. After all, how easily you clean up a spill depend on how dry a sponge you are using. The term 'humidity' describes the level of water in the air. If the air holds 20% of its capacity, the humidity would be 20%. A humidity of 100% indicates that the air is holding all the moisture it can. The lower the humidity, the more water the air can hold, and the greater amount of evaporation that can take place. When describing the amount of moisture in the air, the term relative humidity is used because the sponginess of air changes relative to air temperature. The warmer the air, the more spongy it becomes and the more water it can hold. As a result, we must describe the level of humidity relative to the type of sponge we are talking about. Is it a 50° F sponge or an 80° F sponge? An 80°F sponge will hold more water at 50% humidity than a 50°F sponge.

3. OBJECTIVE

To develop the Energy efficient, environment friendly direct evaporative air conditioning system having low operating cost suitable for hot and dry regions. To design a cooler which allows air to 360 direction. To save the water and electricity by using the same cooler for all rooms of home. Main important of this cooler is that air cooler gives cool air as well hot air so for all season we can use it. Less weight with more benefits and safety for types users like industrial as well home.

4. PROCEDURE

360 degree cooler gives high efficiency to cool room in all four direction. A fan sucks the surrounding air through the continuously wetted pads made up of wooden shavings or loosely knit fibrous material (khus-khus), whereby the

outside air is cooled and humidified. The pads are fixed on all the four sides of the casing in louvered panels, which are provided with perforated water channels on the top. The bottom panel of the cooler is made is a water tray to which a water supply connection is given; a float valve controls the water level. A tiny pump picks up the water from the tray and pumps it to the perforated water channels provided on the louvered side panels. The water from the channels trickles down the pads to the tray, thus keeping the pads wet.

5. COMPONENTS

Table -1: Components of cooler

Components	Material	Specifications
Pump	Copper	
Water Tank	Mild steel	
Blower Motor	Mild steel	
M.S.Sheet	Pvc	

6. METHDOLOGY

Evaporative cooling is a heat and mass transfer process that uses water evaporation for air cooling, in which large amount of heat is transferred from air to water, and consequently the air temperature decreases. While taking in consideration the amount of moisture. When describing the amount of moisture in the air, the term relative humidity is used because the sponginess of air changes relative to air temperature. The warmer the air, the more spongy it becomes and the more water it can hold. As a result, we must describe the level of humidity relative to the type. With an 360 EVAPORATIVE cooler, air is drawn through a wet filter pad. As the air moves over the wet pad, water is evaporated off the pad removing heat from the air. The pad basically acts to support the water within the streaming of air The warmer the air, the more spongy it becomes and the more water it can hold. As a result, we must describe the level of humidity relative to the type. With an 360 EVAPORATIVE cooler, air is drawn through a wet filter pad. As the air moves over the wet pad, water is evaporated off the pad removing heat from the air. The pad basically acts to support the water within the streaming of air

7. ADVANTAGES

- It works best for comfort cooling where it is Hot and Dry.
- It is low cost as well as low power consumption as compared to compressor based A/C system.
- 360 design will allow person to sit in any direction.
- During winter it can be used for heating room.
- Air cooler can be made from Industrial Products.

8. DISADVANTAGES

- It may Increases weight of cooler as compare to normal.
- Cooler decreases Horsepower.

9. CONCLUSION

In this evaporative cooler as air and water is used it is most environmental friendly and effective cooling system. In technology can be used in indoor and outdoor application. It is more effectiveness and more economical in terms of energy consumption. It also controls the humidity in the air and gives the comforts to human.

10. FUTURE SCOPE

Optimization of the working parameters can be done in order to produce an effective and efficient system. We have to provide the heating coil so that it will give the heating effect in cold conditions.

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