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Instant Ice Making Machine

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ABSTRACT

The aim of this paper is to give an idea of instant ice making machine. Nowadays hotels, resort and bar required more ice in very less time. So to solve this problem we construct an ice cube making machine. In present days, this machine is available with very high cost in the market. So we are trying to make that at optimum price. Ice making machine consists of four key components; the evaporator, the condenser, the compressor and the throttle valve. The compressor is to compress low pressure refrigerant vapor into high pressure vapor and deliver it to the condenser. The vapor with high pressure is condensed into high pressure liquid and passed through the throttle valve to become low pressure liquid. At this instant the liquid is passed to the evaporator where heat exchanging occurs and ice is created. This is one complete cycle of refrigeration. Ice making machine works on vapour compression refrigeration cycle. A field study of an ice cube machines in restaurants confirms that the ice production was always coincident with utility peak periods. The measured duty cycles, combined with the actual electric load profiles, demonstrated the potential for off- peak operation in addition to energy saving by using more efficient machines.

Keywords : Ice Making Machine, CFC, HFC

I. INTRODUCTION

Refrigeration and cooling is important in our day today life situation. It also as various industrial application too. Refrigeration is used in manufacturing of ice, domestic and commercial , large scale ware house for storage and preservation of foods beverages and medicines. Refrigeration is the process of maintaining a temperature of a system lower than the temperature of surrounding by continuous removal of heat. It work on the vapour compression refrigeration cycle. The main component of the system are compressor, condenser, evaporator, expansion valve, receiver. Due to the phase out of CFC which was responsible for major ozone depletion and global warming are now being replaced by substitutes which are friendly to the environment. R134a is Zeotropic refrigerant which can be a suitable alternate for R404a, R410a and CFC R502 Zeotropic refrigerants therefore do not boil at constant temperatures unlike azeotropic refrigerants. Any substitute should generally possess some ideal properties like non flammability, non toxic, friendly to the natural environment, stable at all operating conditions and have similar characteristics of the refrigerant for which Hydro Flouro Carbons (HFC's) and its blends of refrigerants such as zeotropes are finding its applications in most of the commercial refrigeration sector as alternate substitutes and are cost effective. In old refrigeration system CFCs and HFC refrigerant such as R-22 was widely used . The HFCs are fully accepted because they contain

basically zero ozone depletion potential (ODP). They also have an assigned global warming potential (GWP) factor which is drastically lower than that of HCFCs. CFCs refrigerant should be replaced due to main reason 1) Due to harmful effect on ozone layer 2) Need of improvement in efficiency of system to conserves resources. Therefore the requirement for eco friendly, working refrigerants necessitated the invention of refrigerant R-404A. Refrigerant R-404A was developed to replace CFC R-502 and HCFC R-22. Refrigerant R-404 A is already known as a suitable replacement for R -22 in low temperature applications. Refrigerant R- 404a is blended product of 44% R125+ 52% R143A+4%R134A.

II. Problem Statement

There are many requirements in food industries to make instant ice to reduce long ice forming time in objective to increase production time of industry. In local economy it very useful for ice candy for the production of kulfi which has good Indian market for this many problem it become essential to come up with an solution for instant ice making.

III. Construction & Working

The construction of our project is as simple as a regular VCRS System but with some extra parts Some of the main components are compressor, condenser, expansion device, evaporator, and a chiller Tank with Slots in the shape of ice candy.

In our Project we are using two different refrigerants Primary and Secondary. Primary refrigerant is R134a and Secondary is a Solution of water and ethylene glycol.

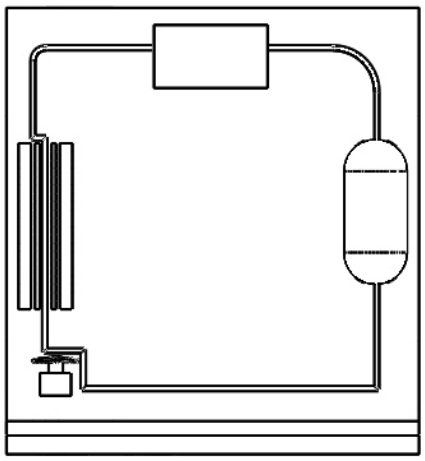
Whole ice making system is divided into two circuits , in first circuit VCRS system working with r134a as refrigerant, low pressure refrigerant enters the compressor where its temperature and pressure rises and then it passes to the condenser

In the condenser high pressurehigh temperature vapor refrigerant losses heat and condenses and leaves as liquid form then this refrigerant passes through expension valve where its pressure falls and temperature also decreases then the low temperature low pressure liquid refrigerant enters the evaporator , the evaporator is situated in the chiller tank and the secondary refrigerant is circulated around the evaporator .

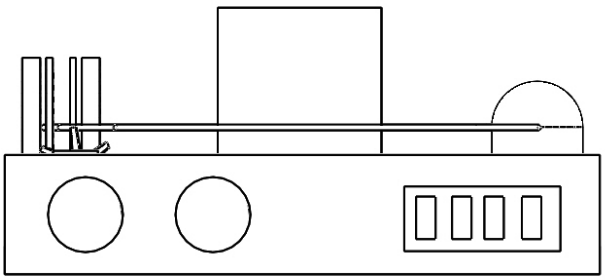
In the chiller tank secondary refrigerant is circulated around evaporator and the ice cans, primary refrigerant in the evaporator absorbs the heat from secondary refrigerant. This cycle repeats several times until temperature of secondary refrigerant reaches a stable temperature around -10 to -12 , the secondary refrigerant is continuously removing heat from the water in the ice candy can .

Reason why the solution of water and ethylene glycol is the secondary refrigerant is that when ethylene glyol is mixed with water, the mixture freezes at very low temperature. For example, mixture of 60% ethylene glycol and 40% water freezes at –45 °C (–49 °F).

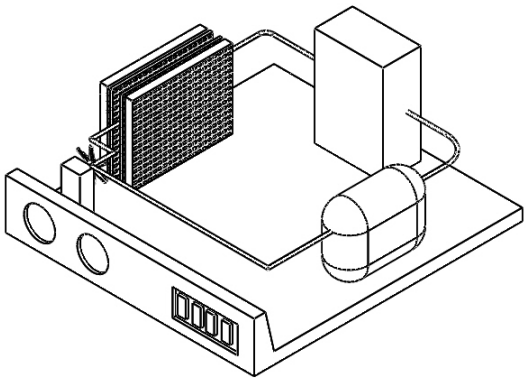
Diagrams



TOP VIEW



SIDE VIEW



ISOMETRIC VIEW

III. CONCLUSION

The Ice making machine will produce a specified quantity of ice cube by dispensing water into ice cube cavities in the evaporator which is coupled with cooling coils that are in turn coupled with a refrigeration system. Evaporator contains ice cube tray which has number of indentations on its surface where water flowing over the surface can collect. Typically the indentations are die formed recesses within a metal plate having high thermal conductivity. As water flows over the indentations or cavities, it freezes into ice after completion of refrigeration cycle.

The system Design of Ice Making Machine will produce two ice cubes for each cycle using vapor compression cycle and water dispensing system with six nozzles; system takes approximately 5 to 6 minutes to complete each cycle. The evaporator is heated by hot vapor flowing through the evaporator coils.

IV. REFERENCES

[1]. ETSU Good Practice Guides, Energy Efficiency Best Practice Programme, U.K.

[2]. Saving Electricity in Utility Systems of Industrial Plants, Devki Energy Consultancy Pvt. Ltd., Baroda, 1996.

[3]. Efficient Use & Management of Electricity, Devki Energy Consultancy Pvt. Ltd., Baroda, 2004.

[4]. Industrial Refrigeration Handbook, Wilber F. Stoeker, McGraw Hill (1995).

[5]. Refrigeration and Air conditioning, Manohar Prasad, New Age International (P) Ltd., 1996.

[6]. ASHRAE Handbooks, ASHRAE, Atlanta, Georgia, USA.

[7]. Cooling Tower Technology – Maintenance, Upgrading and Rebuilding, Robert Burger, The Fairmont Press Inc., Georgia, USA.

[8]. Low-E Glazing Design Guide, Timothy E. Johnson, Butterworth Architecture.

[9]. ISHRAE Journals (1998-2004), Indian Society for Heating, Refrigeration and Air Conditioning Engineers, Mumbai.

[10]. Catalogues of Manufacturers.

[11]. W. M. Conlon, C. N. Chang and D. M. Hendricks. Purified Water Dispensers for Refrigerators, 40th International Appliance Technical Conference. (May 1989).