

Aqua Condensers

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Abstract: The first law of thermodynamics provides the basic definition of internal energy, associated with all thermodynamic systems, and states the rule of conservation of energy. The second law is concerned with the direction of natural processes. It asserts that a natural process runs only in one sense, and is not reversible. For example, heat always flows spontaneously from hotter to colder bodies, and never the reverse, unless external work is performed on the system. The explanation of the phenomena was given in terms of entropy. Total entropy (S) can never decrease over time for an isolated system because the entropy of an isolated system spontaneously evolves toward thermodynamic equilibrium: the entropy should stay the same or increase.

In a fictive reversible process, an infinitesimal increment in the entropy (dS) of a system is defined to result from an infinitesimal transfer of heat (δQ) to a closed system (which allows the entry or exit of energy – but not mass transfer) divided by the common temperature (T) of the system in equilibrium and the surroundings which supply the heat.

Keywords – Aqua Condensers (AC) , Copper Tube, Air Conditioner (AC), environmentally friendly.

I. INTRODUCTION

In systems involving heat transfer, a condenser is a device or unit used to condense a gaseous substance into a liquid state through cooling. In so doing, the latent heat is released by the substance and transferred to the surrounding environment. Condensers can be made according to numerous designs, and come in many sizes ranging from rather small (hand-held) to very large (industrial-scale units used in plant processes). For example, a refrigerator uses a condenser to get rid of heat extracted from the interior of the unit to the outside air. Condensers are used in air conditioning, industrial chemical processes such as distillation, steam power plants and other heat-exchange systems. Use of cooling water or surrounding air as the coolant is common in many condensers. The earliest laboratory condenser, a "Gegenstromkühler" (counter-flow condenser), was invented in 1771 by the Swedish-German chemist Christian Weigel. By the mid-19th century, German chemist Justus von Liebig would provide his own improvements on the preceding designs of Weigel and Johann Friedrich August Götting, with the device becoming known as the Liebig condenser.

• What is AC (Aqua Condenser)?

A surface condenser is one in which condensing medium and vapors are physically separated and used when direct contact is not desired. It is a shell and tube heat exchanger installed at the outlet of every steam turbine in thermal power stations. Commonly, the cooling water flows through the tube side and the steam enters the shell side where the condensation occurs on the outside of the heat transfer tubes. The condensate drips down and collects at the bottom, often in a built-in pan called a hotwell. The shell side often operates at a vacuum or partial vacuum, produced by the difference in specific volume between the steam and condensate. Conversely, the vapor can be fed through the tubes with the coolant water or air flowing around the outside

Example,

1. Water-cooled
2. Air-cooled
3. Evaporative .

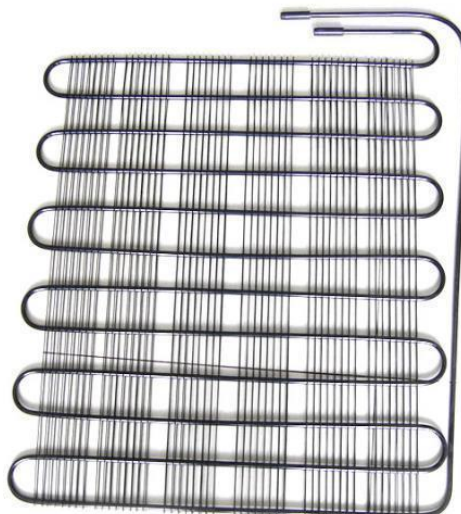


Fig.No1. The Layout of Aqua Condenser

Working of an Aqua Condenser Principle:

A condenser unit used in central air conditioning systems typically has a heat exchanger section to cool down and condense incoming refrigerant vapor into liquid, a compressor to raise the pressure of the refrigerant and move it along, and a fan for blowing outside air through the heat exchanger section to cool the refrigerant inside. A typical configuration of such a condenser unit is as follows: The heat exchanger section wraps around the sides of the unit with the compressor inside. In this heat exchanger section, the refrigerant goes through multiple tube passes, which are surrounded by heat transfer fins through which cooling air can circulate from outside to inside the unit. There is a motorized fan inside the condenser unit near the top, which is covered by some grating to keep any objects from accidentally falling inside on the fan. The fan is used to pull outside cooling air in through the heat exchanger section at the sides and blow it out the top through the grating. These condenser units are located on the outside of the building they are trying to cool, with tubing between the unit and building, one for vapor refrigerant entering and another for liquid refrigerant leaving the unit. Of course, an electric power supply is needed for the compressor and fan inside the unit.

In a direct-contact condenser, hot vapor and cool liquid are introduced into a vessel and allowed to mix directly, rather than being separated by a barrier such as the wall of a heat exchanger tube. The vapor gives up its latent heat and condenses to a liquid, while the liquid absorbs this heat and undergoes a temperature rise. The entering vapor and liquid typically contain a single condensable substance, such as a water spray being used to cool air and adjust its humidity.

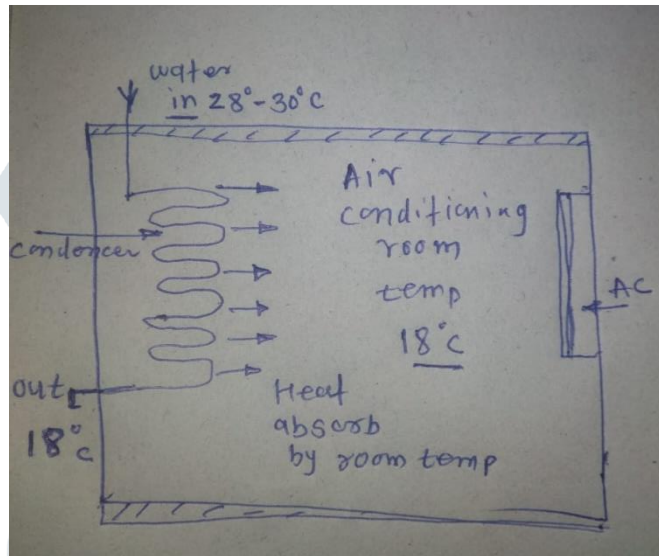


Fig.No.2 Working of Aqua Condenser (AC)

Major components of Aqua Condenser (AC)

1. Copper Tube

Copper is a chemical element with the symbol Cu (from Latin: *cuprum*) and atomic number 29. It is a soft, malleable, and ductile metal with very high thermal and electrical conductivity. A freshly exposed surface of pure copper has a pinkish-orange color. Copper is used as a conductor of heat and electricity, as a building material, and as a constituent of various metal alloys, such as sterling silver used in jewelry, cupronickel used to make marine hardware and coins, and constantan used in strain gauges and thermocouples for temperature measurement.

1. AC(Air Conditional).

Air conditioning (often referred to as AC, A/C, or air con) is the process of removing heat and moisture from the interior of an occupied space to improve the comfort of occupants. Air conditioning can be used in both domestic and commercial environments. This process is most commonly used to achieve a more comfortable interior environment, typically for humans and other animals; however, air conditioning is also used to cool and dehumidify rooms filled with heat-producing electronic devices, such as computer servers, power amplifiers, and to display and store some delicate products, such as artwork

2. Water Tank

Water tanks are used to provide storage of water for use in many applications, drinking water, irrigation agriculture, fire suppression, agricultural farming, bot for plants and livestock, chemical manufacturing, food preparation as well as many other uses. Water tank parameters include the general design of the tank, and choice of construction materials, linings. Various materials are used for making a water tank: plastics (polyethylene, polypropylene), fiberglass, concrete, stone, steel (welded or bolted, carbon, or stainless). Earthen pots, such as matki used in South Asia, can also be used for water storage. Water tanks are an efficient way to help developing countries to store clean water..

3. Copper Bender

Tube bending is any metal forming processes used to permanently form pipes or tubing. Tube bending may be form-bound or use freeform-bending procedures, and it may use heat supported or cold forming procedures. Form bound bending procedures like “press bending” or “rotary draw bending” are used to form the work piece into the shape of a die. Straight tube stock can be formed using a bending machine to create a variety of single or multiple bends and to shape the piece into the desired form. These processes can be used to form complex shapes out of different types of ductile metal tubing.^[1] Freeform-bending processes, like three-roll-push bending, shape the workpiece kinematically, thus the bending contour is not dependent on the tool geometry. Generally, round stock is used in tube bending.

• Design of elements :-

Calculated the design procedure for the development of the condenser for the sustainable in use.

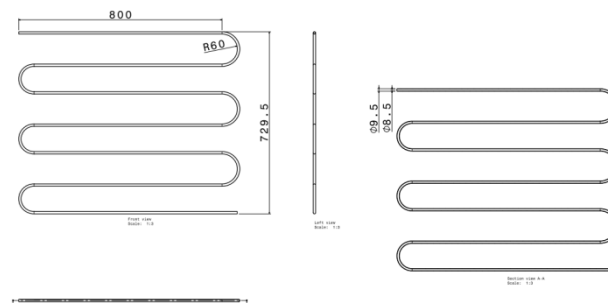


Fig.No:-3 Design Of Elements

II. LITERATURE REVIEW

According to second law of thermodynamics, Heat always flow from high temperature to low temperature. our project is based on exchanging the heat. We know that, thermal conductivity of copper = 385 (W/m K)

Watt/meter Kelvin and making condenser from copper is feasible. Under this project, we are going to make copper tube condenser. Condenser will be hang over the wall in air conditioning room. When water will start flowing through condenser inlet, it will release heat from water or heat absorb by room temperature. Due to this exchange of heat, we can achieve temperature drop in water at outlet.

In this system involving heat transfer. a condenser is a device or unit used to condense a gaseous substance into a liquid state through cooling. In so doing the latent heat is released by the substance and transferred to the surrounding environment. Condensers can be made according to numerous designs, and come in many sizes ranging from rather small (hand-held) to very large (industrial-scale units used in plant processes). For example, a refrigerator uses a condenser to get rid of heat extracted from the interior of the unit to the outside air.

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Sahu et al presented an experimental analysis of domestic refrigeration system by using wire-on-tube condenser with different spacing of wire, they found that the operating parameters like heat transfer rate, condenser pressure and condenser temperature, refrigerating effect was increased by using wire-on-tube condenser comparatively power consumption remains the same as with air cooled condenser in a domestic refrigeration system. Therefore wire-on-tube condenser can replace the ordinary air cooled condenser in a domestic refrigeration system. Collicott et al presented an experimental study to calculate heat transfer factor by free convection and shape factor for wire-and-tube condenser. It was found that the diameter of tube or wire proportional to space between the tube or wire. Taibet al presented the development process of refrigeration, reliable test

rig and performance analysis of a domestic refrigerator. The indicator of COP was about 2.75 and refrigeration capacity was ranging from 150 to 205 W. Fatemeh et al highlighted that a 23.6 % energy consumption reduction of refrigerator by hot wall condenser removal, 19.3 % R134a refrigerant charge amount reduction of refrigerator cycle, reduction of the production cost by eliminating of nearly 10 m of pipe.

III. PROBLEM STATEMENT

Our topic is relevant to the environment based out come which currently based on the global warming. Currently, we are facing the problems of global warming and due to global warming the there is an issue of depletion on the ozone layer and it have been causing the effect to the human life making the disease of skin cancer and many more. Because of this it is been reducing the population of people due to nu natural death. The reason of causing the effect is due to the increase of the HFC (Hydro Fluoro Carbon) which is been excreted by the air conditioner and the Refrigerator so to reduce the effect we have been plan to work on the effect and reduce the effect which is been causing the harm on the environment

IV. CONCLUSION.

By this report we are able to identify the problems arising in designing an aqua condenser. We are able to rectify the small glitches occurring in the condenser. By this report we are able to know the effects of Global warming on the environment and to save the energy. Also we are able to explain the benefits of an aqua condenser in the current situation. We are able to diffentiate between heat transfer materials. We have also highlighted the components which are used making an aqua condenser. We are able to plan our budget according to our project expenses.

V. ACKNOWLEDGMENT

I wish to express my sincere thanks to Prof. G.S. Joshi. (Principal of M. M. Polytechnic, Thergaon) for providing me with all the necessary facilities for the research. I place on record, my sincere thank you to Prof. P. N. Suryawanshi (HOD Automobile Department)) for the continues encouragement. I am extremely thankful and indebted to Prof. T. J. Gargade (Project Guide) for sharing expertise, and sincere and valuable guidance and encouragement extended to me. I take this opportunity to express gratitude to all of the Department faculty members for their help and support. I also thank my parents for the unceasing encouragement, support and attention.

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Biobiligraphy

authors: Some of the authors of this publication are also working on these related projects: Condenser Enhancement View project

i) Mohammed Hamed Alhamdo College of Engineering, AlMustansiriyah University 7 PUBLICATIONS 15 CITATIONS SEE PROFILE

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iii) Jaafar Abdulhameed Al-Mustansiriya University