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REVIEW STUDY ON OF AIR CONDITIONING SYSTEM AND ITS APPLICATION

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ABSTRACT

A/C or AC stands for "air conditioning," which is the act of removing heat and regulating the humidity of air in an enclosed area using powered "air conditioners" or a number of alternative techniques such as passive cooling and ventilation cooling. Air conditioning is one of a family of heating, ventilation, and air conditioning systems and methods (HVAC). In public buildings, room air conditioners are often utilized in a single room. Both heating and cooling are accomplished using RACs. RACs come in a variety of sizes, including 1 ton and 2 ton. We will determine and find out the precise or approximate temperature needed for the chosen room in which we will install AC in this article. This is significant for a number of reasons. Insufficiently sized air conditioning unit- This will not chill the space during the summer or hot weather season. Oversized air conditioning unit - This will impact body comfort by providing more cooling and will also cost more money. So, by utilizing a room calculation, we can figure out how much cooling or heating the room will cost. We will save energy, money, and heat in the environment as a result of this.

KEYWORDS: *Atmosphere, Air Conditioner, Heat, Load, Temperature.*

1. INTRODUCTION

Vapor-Compression Refrigeration, also known as vapor-compression refrigeration system (VCRS), is a refrigeration cycle in which the refrigerant undergoes stage changes and is the most commonly used method for air cooling buildings and automobiles. It's also found in refrigerators for homes and businesses, large-scale warehouses for chilled or frozen food and meat storage, cooled trucks and train cars, and a variety of other industrial and commercial applications[1]–[4].

Little environment conditioning systems (Air conditioning unit) like break up air fitness systems are often put without a thorough investigation of building package efficiency due to their cheap cost (Figure 1). Furthermore, these systems are often put up by tradespeople who fail to follow the proper standards and regulations. Finally, when routine maintenance is not carried out with care (as is often the case), the system's dynamic functioning is endangered over time. Because cooling and heating take place in the air handling unit, it may be called the heart of all-air systems[5]–[7]. It also mixes the outside air with the return air once it has been cleaned, and then performs the required psychometric procedures. The air conditioner is subsequently ejected or removed from the area to be cooled. These units are used for air flow rates greater than 100,000 CFM (50 m3/s).

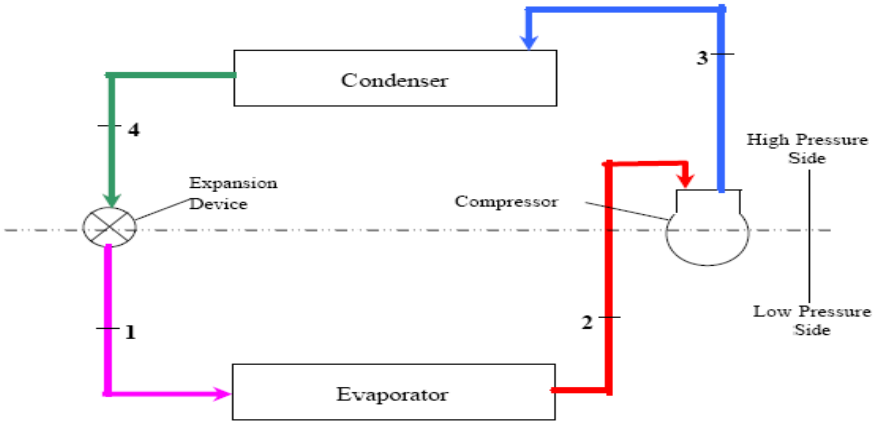

Figure 1: The Above Figure Represent the Typical Vapor Compression Refrigeration (VCR) cycle[8]**.**

Refrigeration may be described as the process of decreasing the heat range of an enclosed area by removing high temperatures from that place and transferring them to another location. A device that accomplishes this job is referred to as an air conditioner.

1.1.The following are the stages of the VCRS cycle:

1.1.1. Evaporator:

It is the part of a refrigeration system that removes heat from the environment, drinking water, or any other body that has to be cooled by the evaporating refrigerant. Inundated or instantaneous enlargement, i.e., dried out, evaporators are the most common types. The liquefied refrigerants cover the whole heat transfer surface in battered evaporators. A portion of the warmth transfer surface is used to superheat the fumes in or dry evaporators.

1.1.2. Suction Series:

In the evaporator coil, the refrigerant evaporates into a gas; the portion of pipes connecting this coil to the condenser coil is known as the suction collection.

1.1.3. Compressor for air:

The electric motor, cylinder, and turn case are all enclosed within a dome in hermetically sealed and semi hermetic compressors. Inbound suction vapours cool down the motor windings. These have the advantages of no loss, reduced sound, and compactness.

1.1.4. Growth Control Valve:

An expansion device is basically a restriction that provides resistance to flow such that the pressure decreases, resulting in a throttling process.

1.1.5. Ur-134A Refrigerant:

R134a is also known as Tetrafluoroethane (CF3CH2N) and belongs to the HFC refrigerant family. Following the discovery of the harmful effects of CFCs and HCFCs refrigerants on the ozone layer, the HFC family of refrigerants has been widely utilized as a replacement. It is currently being used in centrifugal, rotary mess, scroll, and reciprocating compressors as a replacement for R12 CFC refrigerant. It's safe to use on a regular basis since its nontoxic, nonflammable, and noncorrosive.

1.2. Psychrometric:

Approximately 78 percent of the air flow is nitrogen, 21% is air, and 1% is other fumes. In a wilderness, though, the air is generally not completely dry. Water covers two-thirds of the earth's surface, and this, combined with other surface water and rains, keeps low-pressure water vapour hanging in the atmosphere, contributing to the 1% of other gases. The characteristics of this drinking water steam are shown in the psychrometric chart using the following guidelines:

1.3. Temperature of a 4.1 dry light bulb:

The temperature of air recorded by a thermometer freely exposed to the air but protected from rays and moisture is known as the dry-bulb temperature (DBT). The exact thermodynamic temperature is DBT, which is the temperature that is often thought of as air heat.

1.4. Temperature of wet bulb (also known as saturation temperature):

When the air flow comes into contact with wet cloth, it absorbs moisture and gives off heat, lowering the temperature of the surrounding environment. The wet light bulb heat range refers to the lower temperature measured by the thermometer.

1.4.1. Temperature at the 4.3 dew point:

The dewpoint temperature is the temperature at which the air can no longer "hold" all of the water vapor it contains, and part of the drinking water vapor must condense into water. The dew point is typically lower (or the same as) the ambient temperature.

1.4.2. Humidity of 4.4 family members:

The proportion of the part pressure of drinking water vapor to the balance vapour pressure of water at a particular temperature is known as family member moisture (RH).

1.4.3. Material with a moisture content:

The mass of water in a volume occupied by 1 kilogram of dried out air is measured by the humidity ratio. In other words, it is the amount of water that must be evaporated into 1 kilogram of dry air to achieve a certain level of wetness.

1.4.4. Total high temperature:

The total energy of a humid gas is measured. It may be described as the practical heat plus the latent heat in a variety of ways. Enthalpy is a helpful concept in air flow health and fitness, where it's important to understand how much of the "held" energy is used or released when the temperature or moisture content is increased or decreased.

1.4.5. specific volume:

The specific volume is the volume of a unit mass of dried out air at a certain temperature, which is usually expressed in m3/kg and shown in the psychrometric graph. The inverse of density (kg/meters3) is typically the volume. Vapor-Compression One of the numerous refrigeration cycles is refrigeration, or vapor-compression refrigeration system (VCRS), in which the refrigerant undergoes stage changes. It is the most commonly used method for air-conditioning buildings and vehicles. It's also used in refrigerators in homes and businesses, large-scale warehouses for chilled or frozen food and meat storage, cooled trucks and train cars, and other industrial and commercial solutions.

Little environment conditioning systems (Air conditioning unit) like break up air fitness systems are often put without a thorough investigation of building package efficiency due to their cheap cost. Furthermore, these systems are often put up by tradespeople who fail to follow the proper standards and regulations. Finally, when routine maintenance is not carried out with care (as is

often the case), the system's dynamic functioning is endangered over time. Refrigeration may be described as the process of decreasing the heat range of an enclosed area by removing high temperatures from that place and transferring them to another location. A device that accomplishes this job is referred to as an air conditioner.

1.5. Control systems are used to keep things under control:

Control systems may range from basic to sophisticated, including cutting-edge technology such as programmable logic controllers. The temperatures and humidity of the supply air to the zones are usually controlled by controls. The damper systems in the AHU are also controlled by it. Furthermore, depending on the necessary temperature in the zone and the zone exit damper, sophisticated control systems may even regulate the fan rotation and therefore the rate of air delivered to the zone. In such systems, a pressure sensor connected to the control system will be installed in the air duct, and as the zone reaches the desired temperature, dampers will close, increasing the duct-sensed pressure, which will cause the fan connected to the control system to reduce its speed, resulting in energy-efficient performance.

2. REVIEW OF THE LITERATURE

LUCAS et al. have provided a helpful, global method to analyzing the functionality of known small airconditioning installations in Reunion-area homes[9]. This tropical area wants to be self-sufficient in terms of electricity. This approach is based on a statistical tool and sophisticated simulations of homes with air conditioners. The simulations are centered on the kernel computation Energy Plus, which takes into consideration the building cover, a program explanation, and the users' techniques. They also take into consideration the region's climatic conditions and provide an estimate of the region's yearly electric power consumption for air conditioning. This comprehensive assessment aids in the determination of an energy label for the whole system. An analysis method is often recommended in combination with the device, helping an auditor in deciding assistance to improve the building envelope as well as to set up and maintain the program.

Kindaichi et al. measured RAC energy usage under various heat-load conditions and activities. A lot of energy consumption data for 87 RAC units had specific procedures removed[10]. The data on person operations was split into two groups: moderate- and severe-load situations, with outside temperatures varying by 5 _C. Individual process durations were known to be shorter under mild-load settings than under severe-load situations, implying a significant change in consumer habits. Common energy reductions of 40% were found when particular operating durations were decreased by 20%. A portion of this decrease was due to a reduction in time; the rest came from changes in RAC physical efficacy, which is affected by outside temperature and heating/cooling load. When person procedure stays were reduced by more than 20% during heating or by more than 26% during chilling, the time-saving benefit outweighed the physical-efficiency impact.

Matsumoto et al. investigated the hedonic cost version to see how Vietnamese customers value the energy efficiency of air conditioners[11]. We believe that the energy efficiency of air conditioners in the Vietnamese market is comparable to that of air conditioners in Japan. The payback time is then calculated by dividing the capital cost of improving energy efficiency by the annual cost of saving electricity. We show that the initial investment price may be returned in a short time. We calculate the implied reduced pricing rate during purchase to demonstrate how Vietnamese consumers appreciate energy efficiency spending. We find that the implicit price reduction price in the Vietnamese air conditioning unit market is considerably higher than the prices reported in global studies on developed nations. As a result, consumers in developing nations put a lower value on energy efficiency than consumers in rapidly growing countries, despite the fact that purchasing energy-efficient household equipment allows them to save significant amounts of money.

3. DISCUSSION

In these systems, air is utilized only as a working fluid to generate cooling or heating in air-conditioned zones; in addition, air is responsible for regulating the zones' humidity level and providing the necessary ventilations. Furthermore, air is utilized for aromatization in all-air systems. As a result, just arias working fluid is responsible for delivering comfort, such as cooling, heating, humidity control, and odor ventilation, and these systems are referred to as all-air systems. Nowadays, it is clear that modernization has an impact on the residential and commercial HVAC industries, necessitating the use of high-tech, energy-efficient central air conditioning systems. As a result, correct selection of a central air-conditioning system is a critical goal in the building business, as poor selection may increase the system's initial and/or operating costs while lowering human comfort and indoor air quality standards. In reality, choosing the appropriate kind of central air conditioning system necessitates a pre-assessment of the building type and budget available.

4. CONCLUSION

Air conditioning has become more common as people's living standards have improved. However, health issues related to air conditioning systems and indoor air quality are becoming increasingly common. Recent research on air-conditioning systems and indoor air quality management for human health is discussed in this article. The current research's difficulties are outlined. For a healthy indoor air environment, further research on air-conditioning systems and indoor air quality management is recommended. This article began a review-based investigation of an air conditioner study in a specific space. This study has enormous implications for the development of new energy-saving technologies in order to obtain hot/cold air at a lower starting cost, with no negative side effects and a lower environmental impact. As a result, greater attention is required in this area, and a significant amount of work must be completed in terms of background, originality, current status, and research.

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