



# A STUDY ON RADIANT COOLING SYSTEM IN INTERIORS

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## ABSTRACT

Radiant cooling refers to any system where surrounding surface temperatures are lowered to remove sensible thermal loads from a conditioned space and its occupants. Numerous elements of radiant systems help lower energy usage. Hence by incorporating Radiant cooling system the energy consumption level can be reduced to the maximum level and paves way to sustainability. The information was collected through Descriptive case study. The main study was conducted among the various Radiant cooling system dealers across India using prepared interview schedule method. It has been discovered that radiant cooling systems are among the environmentally friendly cooling technologies. They are less costly and more energy-efficient than air-based cooling systems, which would help create a sustainable energy supply and improve energy security.

KEYWORDS - Radiant cooling system, Energy efficient, Passive Cooling method, Sustainability.

## INTRODUCTION

Any technology that lowers the ambient surface temperatures to relieve reasonable thermal loads from a conditioned space and its occupants in order to provide or enhance thermal comfort is referred to as radiant cooling. Radiant cooling removes excess thermal energy from a space by absorbing it from actively cooled surfaces. The radiant floor heating systems are the opposite of this.

(Shika Aggarwal, 2015).

With minimal energy use, a ceiling radiant cooling system (CRCS) can provide a cozy atmosphere. According to reports, the presence of a plenum causes the quantity of heat removed by radiant panels alone to be higher than that removed by air handling units (AHUs) alone. (Ojima et al, 2019).

Numerous elements of radiant systems help lower energy usage. The first decrease is explained by the fact that heat is transferred by circulating water rather than air. (Stetiu 1999, Raftery et al. 2011).

## PURPOSE OF THE STUDY

The available information regarding the performance of radiant cooling systems indicates that these systems not only reduce the energy consumption but they also provide draft-free and noise-free cooling, reduce building space requirements. Hence by incorporating Radiant cooling system the energy consumption level can be reduced to the maximum level and paves way to sustainability.

## OBJECTIVES

- To know the working mechanism, components and cost of installation of Radiant cooling system.
- To study the method of installing radiant cooling system before and after the construction of a building.
- To analyse the problems and measures taken while installing Radiant cooling system.
- To create awareness to the society by educating them about Radiant cooling system.

## RESEARCH METHODOLOGY

"Plan, Structure, and Strategy of Investigation so conceived as to obtain answers to research questions or problems" is the definition of research design. The plan is the entire study program or design. (Chawla & Sondhi, 2011).

Focused and in-depth, a descriptive case study meticulously examines and formulates hypotheses and questions on a phenomenon from the outset. The main goal of the descriptive case study is to assess a sample in detail and in depth, based on an articulation of a descriptive theory (Albert & Eden, 2010).

### Nature of Sample:

The samples comprise from Commercial sector where radiant cooling system has been installed.

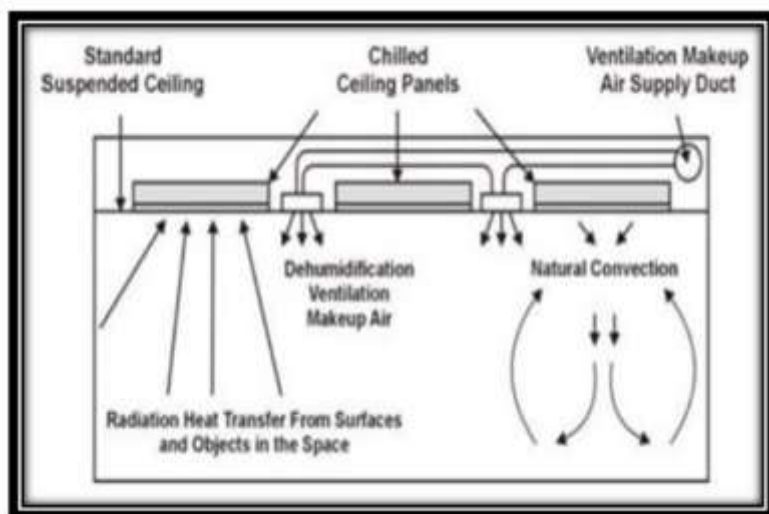
### Tools Used for Assessment:

The interview schedule method was one of the primary strategies utilized in this investigation. According to Thomas arson (2013), the schedule is nothing but a list of questions which is necessary to test the hypothesis. To put it simply, a schedule is a list of questions created and given specifically to evaluate a hypothesis or assumption.

A set of questions which are asked by an interviewer and filled in on the spot in a face to face interaction with another person (Goode & Hatt, 2003) It is a name applied to a set of questions which are asked and filled by the investigator himself (Young, 2003)

### Main study:

The main study was conducted among the various Radiant cooling system dealers across India through prepared interview schedule method. The managers were contacted personally and the purpose of study was explained to them. A good rapport was established and information was gathered about Radiant cooling system. On the spot, technical terms were explained and any questions were answered. The study fostered to create awareness to the society by educating them about radiant cooling system. The target groups focused to induce the knowledge about radiant cooling system were Interior Design students and General public.



process of radiant cooling system



ceiling panels

## RESULTS AND DISCUSSION

The Interview was conducted among 3 Radiant cooling system dealers in India. From this study, it has been revealed that the basic space in terrace or at basement is required to install the chiller. The location for installing Radiant cooling system is in three ways i.e., walls, ceiling, roof cooling system. The main way of installing this system is during the phase of

constructing building; pipes are laid on the slab, which is then covered with concrete.

For already constructed buildings it can be installed as false ceiling method in ceiling, for roof and walls it is attached behind the panels. It requires minimum of 3000-4000 sq.ft for installing this system, it can't be done on individual rooms. The major components used in Radiant cooling system are chiller, PEX pipes, pressure gauge, temperature and humidity controller, valves etc., Also it is 42% energy efficient compared to air based cooling system, it requires very less energy, and renewable energy can be used such as solar energy. This system does not have water wastage. The cost of Radiant cooling system may vary according to the sq. ft, per square feet it ranges around 200-300 rupees. There is no maintenance needed for this system, except for changing water once a year, which can be done ourselves or by skilled labour.

### **PHASE - II: Creating Awareness on Radiant cooling system among College Students:**

The study fostered to create awareness to the society by educating them about radiant cooling system. The target groups focused to induce the knowledge about radiant cooling system were Interior Design students and General public. Since the students of adolescent age were going to be the future endeavor for the development of the society in saving energy consumption and sustainability. The awareness program was organized through online mode using Google Meet platform. The awareness program covered the topics which includes concept of Radiant cooling system, types, installation process, cost effectiveness, advantages and disadvantages of Radiant cooling system.

### **SUMMARY & CONCLUSION**

From the study it is concluded that Radiant cooling system is one of the sustainable cooling technologies which is energy efficient, less expensive compared to air based cooling system which would contribute to the development of a sustainable energy supply and enhanced energy security. The benefit of using Radiant cooling system is to save energy and to bring out the sustainability in buildings.

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