# To Study Earth Tube Heat Exchanger Cooling of Air in Different Month of Bhopal MP

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***Abstract - The aim of this study to test the performance of horizontal ground heat exchanger. An experimental set-up has been constructed for climatic condition for space cooling. Results obtained during experiment will be present and discuss. The ground temperature at several depths was measured in different season with 25 m of length buried at 3 m depth, covers 38% of the total cool requirement of the tested room. This study showed that the ground heat exchanger provide a new way of cooling buildings. This experiment will perform LNCT Energy park Bhopal.***

***Keywords:** Eath Tube Heat Exchanger, Blower.*

## 1. INTRODUCTION

A ground-coupled heat exchanger is an underground heat exchanger that can capture heat from and/or dissipate heat to the ground. They use the Earth's near constant subterranean temperature to warm or cool air or other fluids for residential, agricultural or industrial uses. If building air is blown through the heat exchanger forheat recovery ventilation, they are called earth tubes (also known as earth cooling tubes or earth warming tubes) in Europe or earth-air heat exchangers (EAHE or EAHX) in North America. These systems are known by several other names, including: air-to-soil heat exchanger, earth channels, earth canals, earth-air tunnel systems, ground tube heat exchanger, hypocausts, subsoil heat exchangers, thermal labyrinths, underground air pipes, and others.

Earth tubes are often a viable and economical alternative or supplement to conventional central heating or air conditioning systems since there are no compressors, chemicals or burners and only blowers are required to move the air. These are used for either partial or full cooling and/or heating of facility ventilation air. Their use can help buildings meet Passive House standards or LEED certification.

Earth-air heat exchangers have been used in agricultural facilities (animal buildings) and horticultural facilities (greenhouses) in the United States over the past several decades and have been used in conjunction with solar chimneys in hot arid areas for thousands of years, probably beginning in the Persian Empire. Implementation of these systems in Austria, Denmark, Germany, and India has become fairly common since the mid-1990s, and is slowly being adopted in North America.

Ground-coupled heat exchanger may also use water or antifreeze as a heat transfer fluid, often in conjunction with a geothermal heat pump. See, for example down hole heat exchangers. The rest of this article deals primarily with earth-air heat exchangers or earth tubes.

Earth-air heat exchangers can be analyzed for performance with several software applications using weather gage data. These software applications include GAEA, AWADUKT Thermo, Energy Plus, L-Autism, WKM, and others. However, numerous earth-air heat exchanger systems have been designed and constructed improperly, and failed to meet design expectations. Earth-air heat exchangers appear best suited for air pretreatment rather than for full heating or cooling. Pretreatment of air for an air-source heat pump or ground often provides the best economic return, with simple payback often achieved within one year after installation.

Most systems are usually constructed from 100 to 600 mm (4 to 24 inch) diameter, smooth-walled (so they do not easily trap condensation moisture and mold), rigid or semi-rigid plastic, plastic-coated metal pipes or plastic pipes coated with inner antimicrobial layers, buried 1.5 to 3 m (5 to 10 ft) underground where the ambient earth temperature is typically 10 to 23 °C (50-73 °F ) all year round in the temperate latitudes Heat recovery ventilation, often including an earth-to-air heat exchanger. where most humans live. Ground temperature becomes more stable with depth. Smaller diameter tubes require more energy to move the air and have less earth contact surface area. Larger tubes permit a slower airflow, which also yields more efficient energy transfer and permits much higher volumes to be transferred, permitting more air exchanges in a shorter time period, when, for example, you want to clear the building of objectionable odors or smoke but suffer from poorer heat transfer from the pipe wall to the air due to increased distances.

Some consider that it is more efficient to pull air through a long tube than to push it with a fan. A solar chimney can use natural convection (warm air rising) to create a vacuum to draw filtered passive cooling tube air through the largest diameter cooling tubes. Natural convection may be slower than using a solar-powered fan. Sharp 90-degree angles should be avoided in the construction of the tube – two 45-degree bends produce less-turbulent, more efficient air flow. While smooth-wall tubes are more efficient in moving the air, they are less efficient in transferring energy.

There are three configurations, a closed loop design, an open 'fresh air' system or a combination:

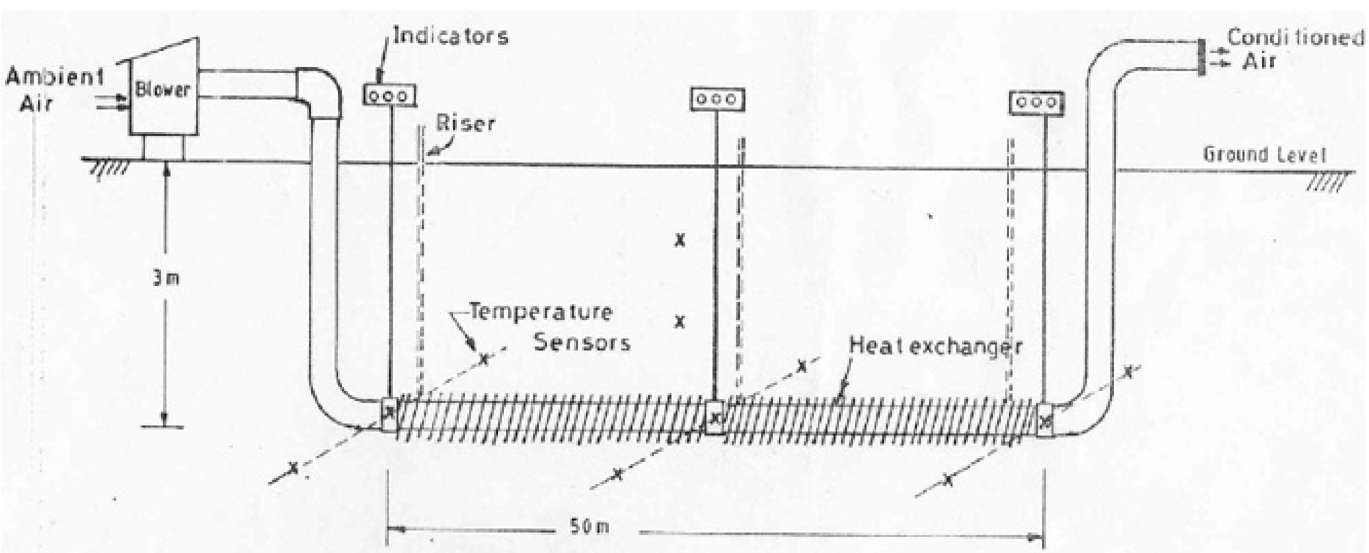
- Closed loop system: Air from inside the home or structure is blown through a U-shaped loop of typically 30 to 150 m (100 to 500 ft) of tube(s) where it is moderated to near earth temperature before returning to be distributed via ductwork throughout the home or structure. The closed loop system can be more effective (during air temperature extremes) than an open system, since it cools and recools the same air.

- Open system: Outside air is drawn from a filtered air intake (Minimum Efficiency Reporting Value MERV 8+ air filter is recommended). The cooling tubes are typically 30 m (100 ft) long straight tubes into the home. An open system combined with energy recovery ventilation can be nearly as efficient (80-95%) as a closed loop, and ensures that entering fresh air is filtered and tempered.

- Combination system: This can be constructed with dampers that allow either closed or open operation, depending on fresh air ventilation requirements. Such a design, even in closed loop mode, could draw a quantity of fresh air when an air pressure drop is created by a solar chimney, clothes dryer, fireplace, kitchen or bathroom exhaust vents. It is better to draw in filtered passive cooling tube air than unconditioned outside air.

Single-pass earth air heat exchangers offer the potential for indoor air quality improvement over conventional systems by providing an increased supply of outdoor air. In some configurations of single-pass systems, a continuous supply of outdoor air is provided. This type of system would usually include one or more ventilation heat recovery units.

## 2. SYSTEM MODEL




## 3. PREVIOUS WORK

The previous work of given project to find out the COP of the system with summer and winter season only not monthaly.

## 4. PROPOSED METHODOLOGY

In this paper to find out the COP of system in Jun 2015 to NOV 2015.

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