

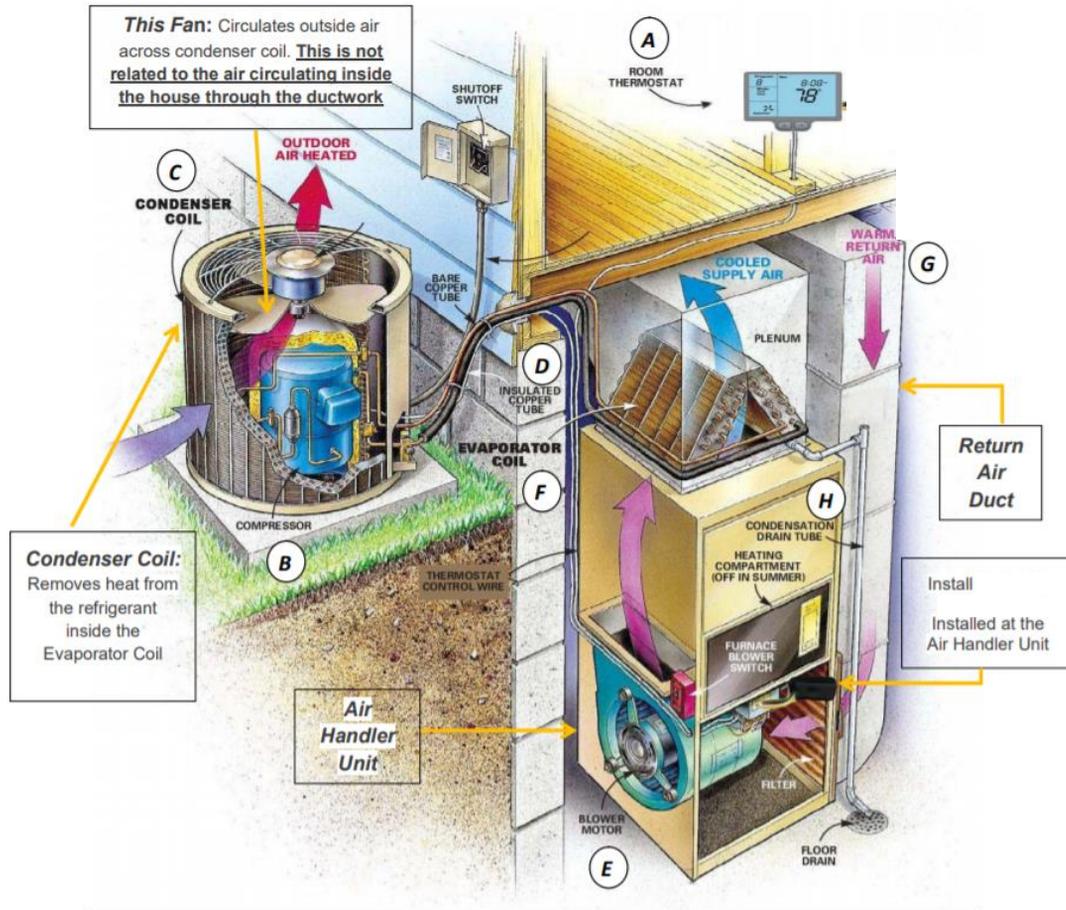


TOWER
ENGINEERING

Why Ecostella Works in Humid Regions

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Using the Ecostella in Humid Regions



The above picture shows a typical HVAC system used in the United States, Canada, Mexico and other parts of the world where a central Room Thermostat (A - top right in picture above) is used to detect the room air temperature and turned on or off the HVAC based on the temperature settings.

During the summer, the thermostat will turn the air conditioner Compressor (B - left in the above picture) on and off. This compressor is typically mounted outside the building. The Condenser Coil (C - left in the above picture) in the compressor cools the refrigerant or cooling liquid that are piped into the building (D - see Insulated Copper Tube in the picture) where the Air Handler Unit (see bottom right in the picture) is located.

The Air Handler Unit is also the best location to install the Ecostella. The Ecostella is installed at the terminal block of the Air Handler Unit's PC board.

Using the Ecostella in Humid Regions

The air handler unit has a blower Motor (E - see lower bottom right in the picture) that blows the air in the ductwork across the Evaporator or Cooling Coil (F - see middle right in the picture). This process cools the air in the duct that is sent into the rooms, cooling the rooms.

The Ecostella extends this blower Motor (E) run time after the Compressor (B) has shut down. This allows the cool energy still left in the Cooling Coil (F) to be pushed into the rooms, providing additional cooling and saving energy. Note that the Ecostella does not affect the Compressor (B) fan operation. When the Compressor shuts off, this fan shuts down completely as well and will not be turned on again until the Compressor turns on.

The Ecostella can be installed EITHER at the thermostat OR at the Air Handler Unit' PC Board. Please see installation instructions for more details.

The above picture shows the Warm Return Air (G) being blown into the Cooling Coils (F) of the air handler unit which cools the air down and dehumidifying it at the same time. In a hot humid region, a conventional air conditioner system works by drawing the hot, humid air throughout the house into the return ductwork, cooling and dehumidifying it and returning it into the room. The newly cooled and dehumidified air is much more comfortable.

Residential Central air conditioning units can be split, meaning there is a condenser/compressor unit outside the house and an evaporative unit or cooling coil inside the house, usually mounted on the furnace or at air handler unit.

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Commercial HVAC usually come as Roof Top Unit (RTU), where the compressor and evaporator cooling coil are packaged in a single unit and is mounted on the roof top, outside the building. HVAC unit also be Ductless Central Air Conditioning Units, sometimes referred to as a mini-split system. It works by using an outdoor compressor that serves as individual unit. It has an evaporator cooling coils and blower fan combination unit that are usually placed on the top half of a room's exterior walls inside the room, and with a small drainpipe to drain the condensed water to the outside. These units are large but are relatively unobtrusive. It is often more expensive than a conventional unit, but homeowners can save a lot of money by not having to have their homes fitted with ductwork. As opposed to window units, a ductless system is quieter, doesn't block your view and will also heat the home.

A Residential Central HVAC Unit is usually a closed system. A closed system means the same air is being recirculated in the room through the ductwork and no outside air is drawn into the rooms. During the hot humid summer, the Intake air or the warm return air is taken from rooms inside the building and air output or cooled supply air goes into the same rooms inside the building as well. No fresh humid air is piped or introduced into the ductwork, except those outside air that got into the rooms if the windows are open or if the doors are left open, or if the building owner intentionally let some fresh outside air into the HVAC ductwork.

In a hot humid region, when the air conditioner is turned on, the humidity of the air in the room condensates onto the evaporative cooling coil. This is called cooling and dehumidifying. The water that is extracted from the humid air as it cools is drained to the outside of the house. The Condensation Drainage Pipe (H - see picture lower right) drains this water that is condensed from the humidity of the air into a drain outside the house. In this way, the humidity of the air in all the rooms is kept at a relatively low humidity levels even after the air conditioner is shut off as no fresh humid air enters the ducts.

When the building owner installs the Ecostella, the extend fan run time will evaporate away the small amount of condensed water still left in the Evaporator Cooling Coil (F) and blows the residual cool air into the rooms. The small amount of condensed water left in the evaporator cooling coil will NOT make the room air more humid or as humid as the outside air since no new fresh humid air is introduced by extending the fan run time. This is a closed system. The air in the rooms and in the ducting have all have been dehumidified. The humidity in the air has already been extracted and drains out as water into the floor drain.

This water that was extracted out from the humidity of the air in all the rooms is not being reintroduced into the house again when the Compressor (B) shuts down and the Ecostella keeps the Blower Motor (E) run for a few more minutes longer.

Note that the majority of residential central HVAC system is using a closed loop system.

During summer, the Air Input or the warm return air is taken from rooms inside the building and Air Output or cooled supply air goes to the rooms inside the building as well.

In most HVAC system, when the Compressor (B) shuts down and if the blower motor (E) is kept running, there is no humid air being blown into the rooms. Many HVAC contractors are mistaken by thinking that the additional blower run time will introduce humidity into the rooms in the humid regions like Florida.

This is because many wrongly believe that the AIR INPUT or the INLET AIR is taken from outside the building or from outside the house. This is NOT correct. The Inlet air into the ducts is taken from INSIDE the rooms of the building that has already been dehumidified as it gets cooled down and when the inside the room air temperature rises, the humidity does not go up significantly.

In very large industrial buildings that houses lots of people, there is a fresh air vane that allows some mixing of outside air with the inside room air in the ducting. This vane opening is set by the HVAC electricians or sometimes set automatically through a central control.

Even in such as case, the amount of humidity introduced into the ducts is limited by the openings of these vanes which are usually small. In almost all home-based HVAC system, a closed system is used, and the inlet air is not mixed with fresh outside air and therefore, no humid air is blowing back into the room when the Ecostella is used.

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