TECHNICAL SHEET

Energy-Efficient Ducted Evaporative Coolers

An Economical Cooling Option for Central Air Conditioning

Because of California's relatively low humidity, an Energy-Efficient Ducted Evaporative Cooler (EEDEC) may be a viable option and an economical alternative to a conventional central air conditioner. An EEDEC system's operating costs are about one-third the energy of a conventional air conditioner, and this advanced technology allows for greater efficiencies than a conventional evaporative cooler. The EEDEC efficiently delivers air 5-10 degrees cooler to the house and adds less moisture or humidity than a conventional evaporative cooler. In contrast, the operation of a conventional central air conditioner removes moisture and lowers relative humidity. Some people prefer the cool moist air delivered by evaporative cooling to the cold dry air supplied by conventional air conditioning.

How It Works

An EEDEC cools effectively by combining water evaporation with a simple, reliable air-moving system. Typically:

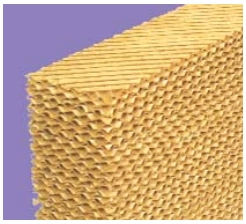
- A large fan pulls hot dry outside air into the unit.
- The hot dry outside air is cooled as it passes through moistened cellular, rigid or equivilent evaporative media, which is kept saturated by a re-circulating water pump.
- The fan then blows the cool air into the house through a sheet metal duct called a plenum.
- From the plenum, the cool air is distributed throughout the house in one of two ways: a) through a multi-duct system with vents in each room, or most commonly b) into one or two rooms and distributed by opening doors.
- Cooled air must be then exhausted to the outside in one of three ways, a) through opening windows or doors in each cooled room or b) through pressure relief dampers installed in the ceiling or wall of multiple rooms or c) a central pressure relief damper if a ducted distribution system is used.

- Control strategies: a) A thermostat designed especially for an EEDEC should be installed only when pressure relief dampers are also installed and the thermostat should be mounted remotely from the EEDEC; b) If pressure relief dampers are not installed, a multi function manual control should be installed and windows opened to provide adequate ventilation when the cooler is operating.

Note: To get the most out of your EEDEC, do not operate a central air-conditioning unit at the same time. They function on completely different types of cooling methods, and will work against each other.

Features

EEDEC units are more efficient than conventional evaporative coolers because of the following advanced features:



Rigid Evaporative Media (typically 8-12" thick)

- Evaporative media which comes from manufacturers, and is certified with an 85% or higher evaporation efficiency delivers air that is 5 to 10 degrees cooler than the air delivered by a conventional aspen pad media evaporative cooler.
- Multi-function controls allow the EEDEC to also function as a whole house fan.
- Pressure relief dampers, if present, help in two ways; 1) they exhaust air to the outside typically through the attic keeping the attic cool which may reduce heat gain in the house, and 2) allow the system to operate when the house is not occupied.
- Special thermostatic controls remotely mounted to the wall and paired with pressure relief dampers allow for operation of the unit based on cooling requirements of the home.
- A water quality management pump eliminates old water from the system periodically and uses less water overall than continuous bleed systems.
- The EEDEC provides fresh air as it cools, using 100% outside air instead of re-circulating the existing indoor air as with conventional central air conditioning.

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Selection and Sizing

It's important to select the correct size EEDEC unit for your home so that it can perform at its designed maximum efficiency. Check the manufacturer's specifications or use the following table as a guide for single stage EEDEC:

Cooler Capacity	Average Climate	Hot, Dry Climate
3,000 cfm	1,000 sq ft	750 sq ft
3,500 cfm	1,165 sq ft	875 sq ft
4,000 cfm	1,330 sq ft	1,000 sq ft
4,500 cfm	1,500 sq ft	1,125 sq ft
5,000 cfm	1,665 sq ft	1,250 sq ft
5,500 cfm	1,830 sq ft	1,375 sq ft
6,000 cfm	2,000 sq ft	1,500 sq ft
6,500 cfm	2,165 sq ft	1,625 sq ft

Note: *When the floor area of your home is between sizes shown in the table, select the next larger cooler capacity.*

Example 1

If you live in a hot, dry climate {such as California Energy Commission (CEC) climate zones 11, 12 or 13, the Central Valley} and the floor area of your home is 1,200 square feet, you would select a cooler capacity of 5,000 cubic feet per minute (cfm).

Example 2

If you live in an average climate, (such as climate zones 1-5 or 16, coastal, high altitude) and the floor area of your home is 1,200 square feet, you would select a cooler capacity of 4,000 cubic feet per minute (cfm).

To calculate the cooler capacity required for any sized area, use the following formulas:

Hot, Dry Climate = Floor Area (sq ft) x 4 (cubic feet per minute (cfm) per square foot of floor area based on 30 air-changes-per-hour, for 8-foot ceilings).

Average Climate = Floor Area (sq ft) x 3 (cubic feet per minute (cfm) per square foot of floor area based on 22.5 air-changes-per-hour, for 8-foot ceilings)

If you home has vaulted ceilings or a ceiling height greater than 8 ft., check the manufacturer's specifications or with a licensed installation contractor.

EEDEC Installation

An EEDEC must be installed per manufacturer's instructions, and be in compliance with the California Building Code, the California Electrical Code and with all local codes and safety regulations. The unit should be plumb, level and securely attached to the structure/wall. This cooler may be roof- or wall-mounted and should be ducted into a central or multiple locations of the home.

- A roof-mounted unit will typically push the air out the bottom of the cooler (down draft) and should be positioned near the center of the home.
- A wall-mounted cooler pushes the air out the side of the unit (side draft). These units may be placed on a gable end-wall through the use of A-frame brackets to help support it. Alternatively, these units may be pad mounted much like a conventional central air conditioner unit and should be ducted to a central or multiple locations within the home.
- A **unit** should have two square feet of net free vent area (NFVA) for both unit intake and exhaust air, for every 1,000 cubic feet per minute (cfm) of rated air flow.
- In addition, the **house** requires two square feet of NFVA per 1,000 cfm of rated air flow when unit is operating. This can be accomplished by the use of pressure relief dampers or by opening windows. If pressure relief dampers are used, the attic **also** requires 2 square feet of NFVA per 1,000 cfm of rated air flow.
- When pressure rellief dampers are installed, be sure they are securely sealed to prevent heat loss or draft during the winter.

If you intend to use a contractor for this project, you may want to contact the Contractors State License Board (CSLB) for licensing requirements at 1.800.321.2752 or www.cslb.ca.gov.

Operating your EEDEC

If you have installed pressure relief dampers and a thermostat specifically designed for an EEDEC, you can leave the EEDEC system on all day, cycling according to manufacturers' recommended thermostat setting, even when you are not at home. With pressure relief dampers, the house remains secure (without windows being left open) and does not get as hot as with conventional central air conditioning systems that are turned off during the day. When properly sized, the EEDEC will maintain a comfortable indoor temperature and does not allow the walls and attic to overheat. In many climates where the evening outdoor temperature drops 10 to 20 degrees below the indoor temperature, you can operate the EEDEC system with the water pump off (media dry) and it will function like a whole house fan. If the temperature does not drop at night you may want to continue to use the unit's operation as an evaporative cooler with water pump on (media wet).

2 Stage Evaporative Technology

An Indirect Direct Evaporative Cooler, (IDEC), or two stage evaporative cooler, is the next generation of Energy-Efficient Ducted Evaporative Coolers. This technology passes the outside air through a first stage, an indirect heat exchanger, that cools the air without adding any moisture to the air. The second stage passes the air through the same type of rigid evaporative media that is in most single stage units but, because the air has been pre-cooled in the first stage, when it leaves the second stage it is cooler and has less moisture than the air leaving the single stage unit. This technology acheives evaporative efficiency of .95 or greater to take full advantage of the natural cooling effect when water evaporates and has the potential in many parts of California to replace conventional central air conditioning.

For More Information

Visit www.pge.com/foryourhome or call PG&E's Smarter Energy Line at 1.800.933.9555.

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