Energy Efficiency Guide

Buying and Maintaining an Energy-Efficient Ceiling Fan

Regional Energy Efficiency Center for Home Appliances

West Bengal Renewable Energy Development Agency, Kolkata

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(Department of Power and N.E.S., Govt. of West Bengal)

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Introduction

A ceiling fan is a mechanical device typically suspended from the ceiling of a room. It employs a motor within a shell that revolves around it (most commonly known as direct-drive ceiling fans). The blades are attached to this shell. These blades move to generate air movement.

Ceiling fans do not have the capacity to change the space air temperature and work on the concept of moving air to create variations in thermal sensation of the occupant. Air velocity/movement is an important factor in determining the thermal comfort of an occupant and it has been established through studies that air movement especially in warm and/or humid conditions can increase heat loss through convection and provide enhanced thermal comfort (equivalent to an effect of a room feeling cooler by at least two-four degree Celsius). Therefore, ceiling fans can with minimal electricity consumption provide thermal comfort for significant hours in mild weather there by offering substantial savings on energy and capital cost (as an outcome of reduced air-conditioned hours or potential elimination of an air conditioning system).

Before Buying

Ceiling fan performance and energy savings rely on the proper selection, installation and operations. Consumers should read and understand manufacturer instructions before buying and installing a ceiling fan. The following are an outline of factors that a consumer should be mindful of:

- **Ceiling Fan Blades**
  - Number and size: The typical span of a ceiling fan blades ranges from 29 – 54 inches (approx 750-1350 mm)- the most popular being the 1200 mm model. To determine the size you need, measure the room where the ceiling fan

will be installed and map the ceiling fan size to ensure that entire volume of the room will get adequate air movement. Following are some reference guidelines that could form a benchmark for selecting the size of the ceiling fan. Another option is to install multiple ceiling fans in a larger room, instead of a single large ceiling fan.

Room Area	Suggested Fan Size
Up to 75 ft^2	29 – 36"
76 – 144 ft^2	36 – 42"
144 – 225 ft^2	44"
225 – 400 ft^2	50 – 54"

** Reference: American Lighting Association, 2003*

- Blade Pitch: The blades pitch of the ceiling fan should be at least at a 12 to 15 degree angle. The angle encourages and stirs air movement. A more flat blade simply slices through the air. Higher blade pitch usually moves more air, however, blade pitch alone does not determine air movement. Other factors such as the motor design and speed, as well as blade design, material, number, and length can contribute to the amount of air movement and should be considered before purchase. Higher pitch is not always optimal as some models offer a higher blade pitch to compensate for a smaller, less efficient motor.

BEE Star Rating and Labeling of Ceiling Fans

In May 2006, Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, launched Standard and Labeling Program of electrical home appliances including ceiling fans. Under this program, for the benefit of general public, the appliance manufactures can affix a Star Label on their appliances showing the level of energy consumption by the appliance both in terms of absolute values as well as equivalent number of stars varying from one to five, in accordance with BEE stipulation. The greater the number of stars on the label, higher its energy efficiency and lower its electricity consumption.

BEE labeling scheme for ceiling fans at present is applicable for ceiling fans of 1200 mm sweep with minimum air delivery of 210 cu. m/min. It requires the manufacturers to provide *an energy efficiency indicator, called the "Service Value" under voluntary scheme*. The Service Value of a ceiling fan is the ratio of the air delivery to the power input. For example, a service value of "4" or greater is equivalent to a 5 star rating. Greater the service value of a fan, higher its efficiency.

BEE Sample Label for Ceiling Fan[1]

ENERGY SAVING GUIDE	**Model No/Year** Service Value-3.9* Air Delivery-210 cu m/min Size-1200 mm	ENERGY IS LIFE BEE CONSERVE IT BEE/XYZ/000	IS:374
Manufaturer Address and other details if any specified in IS 374			
*Under standard test condition when tested in accordance with IS 374, the actual energy performance will depend on how the equipment is used			

While selecting a ceiling fan, do refer to the BEE Star Rated Label affixed on ceiling fan and also refer to the Star Rating analysis promoted by BEE from time to time through its web site (www.bee-india.nic.in) and advertisements.

Installation

- **Electrical Box:** The electrical outlet box is mounted on the ceiling and is the point to which the fan is attached, it houses all wiring needs.
- **Mounting:** Ceiling fans should be installed or mounted in the middle of the room and at least 2.0 to 3.0 meters above the floor and some distance from the walls and ceiling to ensure optimal air flow (no fan should be mounted with its blades closer than 24 inches/610 mm to the ceiling). For higher volume spaces extended mounts could be used to hang the fan. In addition, for spaces with lower ceiling heights, most standard fans can be installed as a flush mount. This reduces the distance of the ceiling fan blades from the ceiling. Even though such "low profile" installations are less effective as they do not move as much air due to being closer to the ceiling but they are still a more optimal solution for the first level of cooling than air conditioning. In addition to the energy performance, ceiling fans should be mounted keeping in mind the structure of the room to ensure that they are safe and secure.

[1] Source: BEE website (www.bee-india.niv.in)

Operations & Maintenance

Ceiling fans especially in mild weather can be used in lieu of space air conditioners. In addition, when using ceiling fans with air conditioner the thermostat can be set at a higher temperature than its normal setting. This results in reduction of energy consumption for the same level of thermal comfort in the space. Outlined below are some key measures to ensure an optimized operation and maintenance of ceiling fans:

- Ceiling fan motors need proper lubrication for smooth operation and longevity of the motor. Motors with sealed bearings require little or no maintenance.
- Motor Housing is the body of the fan that encloses the fan motor (also known as switch housing/switch cup). Fans that use heavier materials, such as metals, for housing tend to vibrate less, and last longer.
- Blades should be sealed from moisture to prevent warping, bubbling, or peeling. Some manufacturers offer special coatings on metal finishes to prevent scratches or tarnishing.
- High quality blades are weighed and balanced prior to shipment and come in factory-matched sets. For this reason, they cannot be switched out with other fans. For flexibility in design, a number of manufacturers offer a variety of blade styles and finishes for a particular fan. However, changing the blade style could affect the performance of the fan.
- Controls for the ceiling fans should be checked to ensure that all the electrical connections are working properly and that the speed of the fan is varying as desired.

Energy Saving Tips

Ceiling fan performance and energy savings rely heavily on the proper installation and use of the ceiling fan. Here are a few tips to ensure quality and product performance.

- Use fan as first line of defense against summer heat. Ceiling fans, for instance, cost about 30 paisa an hour to operate - much less than air conditioners (Rs10 per hour).
- While using ceiling fans in conjunction with air conditioning, set the thermostat of the air conditioners 1-3°C above normal.
- Reduce heat ingress, install movable interior shading devices on windows and draw them during peak summer conditions.
- Replace conventional regulators with electronic regulators such as step type switching (instead of knob type). Electronic fan regulators can save upto 30% power.
- The abnormal hot spots, sound etc indicate inefficiency. Invariably, the wall above the regulator will go grey due to the failure of resistance type rheostat allowing the fan to sweep in one speed only irrespective of the regulator position. It is better to replace with electronic type regulator.
- If the ceiling fan is making abnormal sounds, check its bearings.
- The blades should be clean so that dust is not contaminating the performance of the motor and circulating through the air as well.
- Turn off the fan when not using the room.

For any suggestions and additional information, please contact:

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