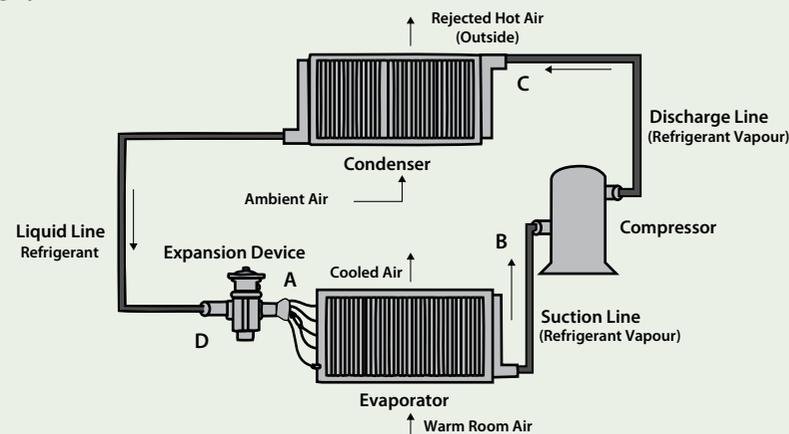


INTRODUCTION

Room air conditioner is an appliance used especially for lowering temperature and humidity of air in a room. Its purpose is to provide cooling comfort during hot weather. It removes heat from the enclosed space and discharges it to the outside. Air conditioner (AC), once considered a luxury, is now gradually becoming an essential requirement in many households. Popularity of a room air conditioner has increased enormously despite consuming a large amount of electricity. Typically, one AC of 1.5 T capacity may consume electricity equivalent to the running of about 25 ceiling fans, and thus can increase electricity bill in a household substantially. In real practice, electricity cost for running an AC depends upon its energy efficiency as designed by its manufacturer, number of operating hours and how efficiently we operate and maintain it.

AIR CONDITIONING SYSTEM BASICS

Basic components of the system include an evaporator, compressor, condenser (air-cooled or water cooled- Room ACs are air cooled), and an expansion device, similar to that of a domestic refrigerator. A refrigerant circulates in these components. It vaporizes in the evaporator absorbing the heat from the warm room air drawn across the evaporator coil. This cools and dehumidifies the air. The compressor raises the pressure and temperature of the refrigerant vapors. The condenser condenses the refrigerant and transforms the high pressure vapor into high pressure liquid. Heat is rejected via outside air drawn across the condenser. The expansion device transforms the high pressure high temperature liquid refrigerant to low pressure low temperature mixture of refrigerant liquid and vapor. The refrigerant goes to the evaporator, and the cooling cycle continues.



Two types of Room Air Conditioners are typically available in market. These are:

Window air conditioner: This is normally used for cooling individual room. Room air conditioner houses all the components of an air conditioning system (discussed in Box 1) in one casing.

Split-system air conditioner: This consists of an outdoor metal cabinet that contains the condenser, condenser fan, and compressor, and an indoor cabinet that contains the evaporator and air handler.

BEE STAR RATING AND LABELING OF AIR CONDITIONERS

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 air conditioners. Under this program, for the benefit of general public, the appliance manufacturers could voluntarily 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 the appliance energy efficiency and lower its electricity consumption (Refer Box 2 and Box 3). Affixing BEE star label has been made mandatory for Room ACs from January 2010.

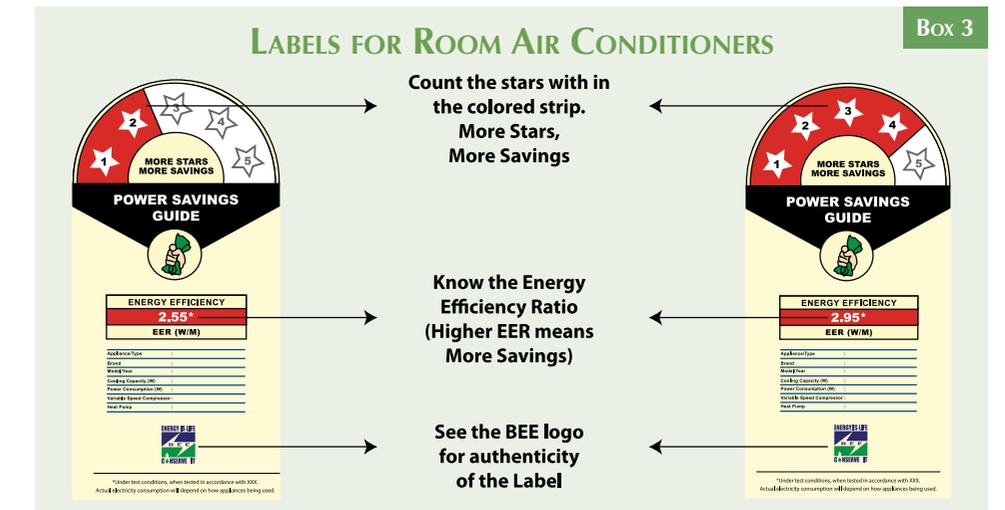


While selecting the air conditioner, do refer to the BEE Star Rated Label affixed on AC and also refer to the Star Rating analysis promoted by BEE from time to time through its web site (www.bee-india.nic.in) and advertisements.

ENERGY EFFICIENCY OF AIR CONDITIONER

Efficiency of a room air conditioner is normally measured as Energy Efficiency Ratio (EER), which is the ratio of the cooling output, measured in British thermal units (Btu) per hour, to the power input (in Watts, and includes all inputs to compressor, fan motors and controls) to operate AC at standard rating conditions. This means a higher the EER, the more efficient the air conditioner is.

At times, EER is defined a little differently. The cooling capacity instead of being denoted in Btu/hr is also denoted in Watts (1 Btu/ hr = 0.293 Watts). Thus EER is represented as Watts/Watts or as a number without any units.



Source: Bureau of Energy Efficiency

Table 1 highlights the energy cost savings by using various Star Rated ACs.

Table 1: Energy and Cost Saving for 1.5 Ton Window or Split Air Conditioner at Different Star Ratings

Star Rating	Minimum	Maximum	Input Power	Units Consumption/Day	Per Unit Charge (Approx.)	Electricity Cost/Month	Cost Saving Per Year (w.r.t. no star) (Approx.)
	Energy Efficiency Ratio (EER)	Cooling Capacity					
		Watts	Watts	kWh	Rs.	Rs.	Rs.
No Star	2.20	5200	2364	9.45	2.50	709	0
1	2.30	5200	2261	9.04	2.50	678	308
2	2.50	5200	2080	8.32	2.50	624	851
3	2.70	5200	1926	7.70	2.50	578	1313
4	2.90	5200	1793	7.17	2.50	538	1712
5	3.10	5200	1677	6.71	2.50	503	2059

Note: Assuming 8 hours operation per day for five months in a year

Source: Bureau of Energy Efficiency

CHOOSING THE RIGHT SIZE

Room air conditioners generally available in the market have cooling capacities that range from 0.7 to 2 Tons. The required cooling capacity for a room air conditioner mainly depends on the size of the room being cooled, apart from several other factors. An air conditioner that is too small may not do a good job of cooling a room at the desired temperature range. An oversized unit costs more and may cool the room quickly but it may lead to poor humidity removal due to excessive on-off cycling.

Experience shows a small unit running for an extended period operates more efficiently and is more effective than a large unit that cycles on and off too frequently. Important factors to consider when selecting the size of an air conditioner are room area, room height, location of room, number of persons likely to use the room, other electric equipment being used in room, window size, orientation of windows and walls, shading, local climate, etc. Though AC manufacturers do provide certain guidelines but it is advisable to seek expert advice as well, before selecting the size of AC.

Air conditioners generally do a better job blowing air in one direction than in the other. That can be a problem if window is not centered on the wall. To uniformly cool a room, it is important to direct cooled air to its center, so check whether AC needs to blow air to the right or to the left while choosing an AC.

If you need to mount the air conditioner at the narrow end of a long room, then look for a fan control in AC that sends the cooled air farther into the room.

INSTALLATION

A little planning before installing air conditioner can save energy and money. The unit should be levelled when installed, so that the inside drainage system and other mechanisms operate efficiently. If possible, the unit should be installed in a shaded spot on your home's north or east side. Direct sunshine on the unit's outdoor heat exchanger decreases efficiency by as much as 10%. You can plant trees and shrubs to shade the air conditioner, but do not block the airflow. Make sure, upon installation and routine maintenance, that the unit is well-sealed from the outdoors. Air leakage around AC can compromise both comfort and efficiency. "Caulk (special sealants)" can be applied to seal the area around the AC in case of a poor fit.

ENERGY SAVING TIPS

- Use ceiling or table fan as first line of defence against summer heat, as running cost of using an AC could be 25 times or more than that of a ceiling fan.
- Keep windows and doors of air-conditioned rooms closed as often as possible.
- Avoid outside air intake: Since outdoor air is warmer and contains more heat and moisture than the conditioned air and thus it increases electricity consumption. Keep in mind that natural leakage through windows and doors will generally supply sufficient outdoor air for assuring comfort conditions and minimizing odor.
- Remove obstructions (e.g., furniture, piled books, etc.) to air passage to the unit. AC operates most efficiently when intake and discharge airflows are free from nearby obstacles.

- Set AC thermostat settings properly: AC uses 3 to 5 percent less energy for each degree set above 22°C, therefore set AC's thermostat at a temperature as high as is comfortably possible (25 - 26°C) in the summer. Smaller the difference between the indoor and outdoor temperatures, lower will be the electricity consumption.
- Consider using an interior ceiling fan in conjunction with your AC to spread the cooled air more effectively within the room. Using fan allows you to set the thermostat temperature higher and thus reduces the energy consumption.
- Do not set your thermostat at a colder setting than normally needed when you turn on your air conditioner; it does not cool your room any faster and could result in excessive cooling and unnecessary expense.
- Do not place lamps, televisions or other electric appliances near AC. As these appliances generate heat, and the thermostat senses heat from these appliances causing the air conditioner to run longer than necessary.
- Plant trees and shrubs to keep the day's hottest sun off your house, wherever possible. This will reduce energy consumption in AC.
- Clean the air-conditioner filter regularly: A dirty air filter reduces airflow and may damage the unit. Clean filters enable the unit to cool down quickly and use lesser energy. A filter that slides out easily facilitates easier cleaning. Follow the manual's instructions for removal and cleaning of filter.
- Clean outdoor coils when they become dusty. Efficiency of AC degrades in dusty conditions, and especially when layers of dirt and mud are evident.
- Make sure upon installation and routine maintenance that the unit is well-sealed from the outdoors.
- Give the annual maintenance contract of AC directly to the manufacturer or its authorized company which has trained and well-qualified technical staff.
- Always insist that the maintenance technician measures total current drawn (in Amperes) by AC. Higher the current value greater is the electricity consumption.
- If room air conditioner is older and needs major repairs, it is likely to become inefficient after repairs. It may be advisable to replace old AC with a new and energy-efficient one.

FOR ANY SUGGESTIONS AND ADDITIONAL INFORMATION, PLEASE CONTACT:



West Bengal Renewable Energy Development Agency

Director
West Bengal Renewable Energy Development Agency
Bikalpa Shakti Bhavan, J1/10, EP – GP Block Sector –V, Salt Lake Electronics Complex, Kolkata - 700 091, India
Phone: +91-33-2357-5038 /5348 /5037
Fax: +91-33-2357 5037
E-mail: sushobhan1234@rediffmail.com;
Web Site: www.wbreda.org



USAID ECO-III Project

Authors: Satish Kumar & Ravi Kapoor
International Resources Group
AAD1 Building, Lower Ground Floor
2, Balbir Saxena Marg, Hauz Khas
New Delhi - 110016, India
Phone: +91-11-2685-3110
Fax: +91-11-2685-3114
Email: eco3@irgssa.com
Web Site: www.eco3.org



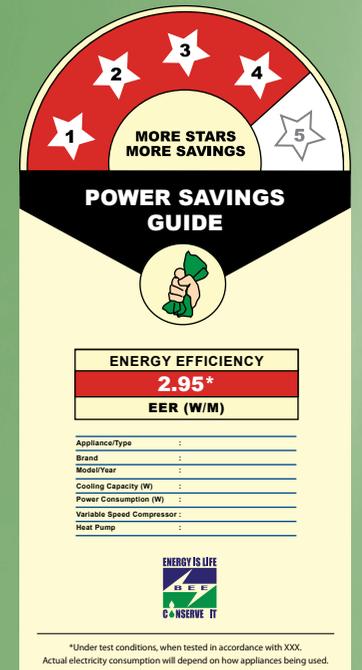
Bureau of Energy Efficiency

Director General
Bureau of Energy Efficiency
Government of India, Ministry of Power
4th Floor, SEWA Bhawan, R. K. Puram
New Delhi - 110066, India
Phone: +91-11-2617-9699
Fax: +91-11-2617-8352
Email: webmanager-bee@nic.in
Web Site: www.bee-india.nic.in

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Energy Efficiency Guide

Buying and Maintaining an Energy-Efficient Room Air Conditioner



Regional Energy Efficiency Center for Home Appliances
West Bengal Renewable Energy Development Agency, Kolkata