



## BLDC Ceiling Fans: Choosing Efficiency!

A major part of our country suffers from scorching summer heats and ceiling fans are invariably used in most places. In the residential sector, fan is the largest end-use appliance. Ceiling fans consume about 50-80 watts. However, now a new technology called BLDC (brush-less direct-current) motor is used to make fans consume less energy, without compromising much on the air delivery. The motor in BLDC fans have permanent magnet instead of electromagnets found in a conventional induction motor. The BLDC motor has important advantages over the induction motor like low electricity consumption, lesser noise generation and better lifespan.

Consequently, BLDC ceiling fans are also getting popular as these consume 25-35 watts of energy, which is about 50-70 per cent less than regular fans. Besides, as there is no heating of the motor, the life of a BLDC fan is also expected to be much higher than ordinary fans. Yet, confusion arises when it comes to choosing the best brand of fans. Hence, we brought this comparative product testing report of BLDC Ceiling Fans, where we tested four popular brands. The report below is your go-to guide in buying the best brand.

*A Consumer VOICE Report*

## Comparative Product Testing

Today the typical regular selling ceiling fan is based on AC motors which are power hungry. Along with this, the typical AC motor-based fans have the speed controlled through the capacitor or resistor-based regulators and is not efficient as there is loss in the regulator itself to some extent. Bureau of Energy Efficiency (BEE) has implemented the energy rating plan (for 1200 mm size ceiling fans) where consumers now have informed choices for most efficient fans (5 star to least efficient one star). This size (1200 mm) is generally common for living rooms, offices, etc.

Ceiling fans are widely used in every part of the country which in turn consumes a huge amount of electricity. If even 40-50 per cent saving in electrical energy can be realised

by manufacturing fans with energy efficient motors, the total energy saving can be tremendous.

### How We Test

VOICE Society conducted the comparative testing of four brands of BEE 5 Star rated (energy efficient) BLDC type electric fans in an accredited laboratory as per Indian standard IS: 374-2019.

### Brands Tested

The following four brands of 1200 mm BLDC electric ceiling fans have been tested as per the Indian standard IS: 374:2019. The table below reflects which brand scores what to make ones buying decision easier.

Rank	Overall Score (out of 100)	Brand & Model	Purchase price/ MRP, (in Rs.)	Air Delivery (Declared), Cu m/min	Rated Power input, Watts	Warranty (in years)	BEE star rating	Manufacturer/ marketer
1	95	Atomberg Efficio 1200	3070/4300	220	35	2+1	5 star	Atomberg Technologies Pvt Ltd.
2	91	Havells Efficiencia NEO	3099/5225	220	26	2	5 star	Havells India Ltd.
3	88	Crompton Energion HS	3099/5080	215	32	5	5 star	Crompton Greaves Ltd.
4	81	Orient Hector 500	2768/3825	230.8	28	2	5 star	Orient Electricals Ltd.

Rating: >90 – Excellent \*\*\*\*\*, 71-90- Very Good \*\*\*\*, 51-70- Good \*\*\*, 31-50- Average \*\*, upto 30 – Poor \*

### CV recommendations

**Top Performer**

**Atomberg**

**Value for Money**

**Atomberg**



## Key Findings

1. In overall performance, Atomberg scored the highest and was ranked No. 1 followed by Havells and Crompton.
2. Atomberg is also Value for Money brand.
3. Service value was the highest of Atomberg followed by Havells and Crompton.
4. Air delivery was the highest of Crompton followed by Atomberg and Orient.
5. Power input was lowest of Havells followed by Atomberg. All the brands were found to be energy efficient as they were consuming between 26.9 to 35.42 watts and were rated 5 stars.
6. All brands meet all the requirements of Indian standard IS: 374-2019 and BEE star rating.

## Comparative Performance Score

Brand Test Parameter	weight age,%	Atomberg	Havells	Crompton	Orient
Model		Efficio 1200	Efficiencia NEO	Energion HS	Hector 500
Purchase Price/MRP, Rs.		3070/4300	3099/5225	3099/5080	2768/3825
Warranty, years		2+1	2	5	2
<b>Performance tests</b>					
Air Delivery	25	22.89	19.24	24.9	21.42
Input Power	12	11.31	11.68	8.81	8.61
Service Value	20	19.92	19.72	14	12.4
Starting	2	2.0	2.0	2.0	2.0
Speed	4	3.38	3.8	3.22	2.97
Power Factor	3	3.00	2.98	2.88	2.76
<b>Safety &amp; General tests</b>					
Mechanical strength	3	3.0	3.0	3.0	3.0
Heating	3	2.97	2.71	2.89	1.90
Creepage distance & Clearance	2	2.0	2.0	2.0	2.0
Endurance test	3	3.0	3.0	3.0	3.0
Harmonic distortion	4	3.52	3.68	3.64	3.24
Abnormal test	4	2.72	2.02	2.80	2.89
Leakage Current and Electric Strength at operating temperature	2	1.91	1.97	2.0	1.89
Leakage Current and Electric Strength	2	1.99	1.83	1.99	1.99
Moisture resistance	1	1.0	1.0	1.0	1.0
Earthing connections	1	1.0	1.0	1.0	1.0
Resistance to rusting	1	1.0	1.0	1.0	1.0
Radiation, toxicity and similar hazards	1	1.0	1.0	1.0	1.0
Resistance to heat and fire	1	1.0	1.0	1.0	1.0
Speed regulator	1	1.0	1.0	1.0	1.0
Protection against access to live parts	1	1.0	1.0	1.0	1.0
Stability & mechanical hazards	1	1.0	1.0	1.0	1.0
Packing & Marking	3	3.0	3.0	3.0	3.0





### TEST PARAMETER & RESULTS

#### Performance Tests

- ❖ **Air Delivery Test:** Air delivery essentially defines the amount of air a fan delivers – a crucial parameter since it translates into how comfortable you feel sitting under a running fan, and if you think sufficient air is being delivered or not. Minimum air delivery of 1200 mm ceiling fan should be 210 m<sup>3</sup>/min for 1200 mm size fan. Since all brands are BEE 5 star rated, their air delivery shall not be less than 210 m<sup>3</sup>/min. All the brands met the requirement. Crompton secured the highest air delivery (233.73 m<sup>3</sup>/min), against the declared value of 215 m<sup>3</sup>/min followed by Atomberg (228.36 m<sup>3</sup>/min) and Orient (224.46 m<sup>3</sup>/min).
- ❖ **Service Value:** 'Service value' denotes the air delivery in meter cube/minute, divided by electrical power input to the fan in watts (W) at test voltage and at full speed. In simpler

terms, service value means the amount of air delivered per minute per wattage of electricity. BIS standard specify that 1200 mm fans shall have a minimum service value of 4.0 meter cube/minute/watt. All the brands met this requirement. Highest service value was of Atomberg (8.18 m<sup>3</sup>/min/watt) followed by Havells (8.13 m<sup>3</sup>/min/watt) and Crompton (6.70 m<sup>3</sup>/min/watt).

- ❖ **Power Input Test:** Maximum power input for 1200 mm size fan shall be 50 watts. It may exceed the value given by manufacturer not more than 10 per cent provided service values are complied with as per Cl.8 & Table 2 of IS: 374. The 'power input test' defines the energy consumption of a fan. BIS standards lay down that the maximum 'power input' value of a ceiling fan (like the 1200 mm fans that have been tested here) should not exceed 50 to 55 W. Power input was lowest of Havells (26.9 W) followed by Atomberg(27.93 W).



- ❖ **Speed:** Fan speed shall not exceed the  $\pm 10$  per cent of rated value. Speed of all the brands was within the specified limit of Indian standard. Havells followed by Atomberg scored highest in this parameter.

The peripheral speed of the fan at test voltage and rated frequency shall be maximum 30 m/s. Peripheral speeds of all the brands were within the specified limit.

- ❖ **Power Factor:** In AC circuits, the power factor is the ratio of the real power that is used to do work and the apparent power that is supplied to the circuit. The power factor under specified conditions shall not be less than 0.90. Power factor shall not deviate from rated value by minimum 0.02 and maximum 0.07. Among the brands tested, the power factor was the highest in case of Atomberg (9.9) and the lowest was of Orient (9.7). However, all the brands met the requirement.

### Safety Tests and General Requirements

The design and general construction of a fan

should be such that the blades will be securely fixed. Material used in fans should be heat and corrosion-resistant. There should be precautions against direct contact with live parts, amongst other things.

- ❖ **Starting:** All the brands were capable of starting from rest when 85% of test voltage or lower limit of voltage range is applied.
- ❖ **Leakage Current and Electric Strength:** The leakage current shall not exceed the maximum value 3.5 mA and shall withstand high voltage test at 1250 volt for one minute. All the brands met the requirement of leakage current and withstood high voltage test.
- ❖ **Leakage Current and Electric Strength at operating temperature:** After the appliance has been operated for a duration, the leakage current shall not exceed the value 3.5mA, and shall withstand high voltage test at 1000 volt for one minute. All brands passed this test.



- ❖ **Mechanical strength:** Appliance shall have adequate mechanical strength and be constructed to withstand such rough handling that may be expected in normal use. A load of 10000 N is suspended from the body of the fan for 1 min. A torque of 50 Nm is then applied to the fixed body of the fan for 1 min. The test is repeated with the torque applied in the reverse direction. The suspension system shall not break. All the brands withstood in this test so you can rest assured that you will be safe while directly under a fan.
- ❖ **Endurance test:** Fans are subjected to 1000 cycles of operation at rated voltage and frequency, each cycle of operation shall comprise the blades to reach maximum rated speed and then shutting off the fan and allow the blades to come to a complete stop. All brands met this requirement.

### Harmonic Distortion

These current harmonics distort the voltage waveform and create distortion in the power system which can cause many problems. Total harmonic distortion shall be less than 20 per cent. All the brands complied with this requirement.

### Abnormal test

Appliance shall be constructed so that as a result of abnormal or careless operation, the risk of fire or mechanical damage shall be minimised. Stalling test was conducted by locking the motor. During the test, the temperature of the winding

shall not exceed the relevant value specified. All the brands met this requirement.

All the brands meet the safety and general requirements of Indian standard i.e. heating, creepage distance and clearance, moisture resistance, resistance to rusting, radiation, toxicity and similar hazards, resistance to heat and fire, speed regulator, stability & mechanical hazards, construction, internal wiring, supply connection & external cord, provision for earthing and protection against access to live parts, etc.

### Tips before Buying

- Higher the 'air delivery', better the breeze.
- Lower the 'power input', less the electricity bill.
- Purchase a ceiling fan with a higher BEE star.
- Select ceiling fan for your room as per its size.

### Conclusion

In this study, the Consumer VOICE team only considered super-efficient BLDC type ceiling fans with five stars. All the tested brands meet the requirement of Indian standard IS: 374-2019 and BEE 5 star rating, especially in air delivery and service value which is the basic requirement for consumers. In overall performance, Atomberg was the highest achiever and hence ranked no. 1 followed by Havells and Crompton.

### Why not a BLDC Fan at Home?

#### Energy Consumption: Ordinary Fans Vs BLDC Fans

Type of Fan	Power Consumption in Watts	Daily Electricity Consumption, Units	Yearly Electricity Consumption, Units	Yearly Costs (assuming Rs 6 per unit)
Regular Fan	75	1.125	410.625	Rs. 2463.75
BLDC Fan	30	0.45	164.25	Rs. 985.5

NOTE: As shown above, you can recover the cost of the fan in less than 2 years in the form of energy savings with BLDC fans.