

Date: 29th June, 2015

Schedule - 19

VARIABLE CAPACITY AIR CONDITIONERS

1. SCOPE

- 1.1. This schedule specifies the requirement for participating in the energy labeling program for single-phase upto & including 250V AC variable capacity air conditioners, commercially known as Inverter air conditioners of the vapour compression type for household and similar use up to and including a rated cooling capacity of 9000 kCal/h being manufactured, imported or sold in India.
- 1.2. This schedule covers the test and other requirements for variable capacity air conditioners.
- 1.3. In particular, this scheme specifies the following:
 - a. Standard cooling at full capacity and 50% of full capacity
 - b. Cooling Seasonal Energy Consumption (CSEC)
 - c. Cooling Seasonal Total Load (CSTL)
 - d. Indian Seasonal Energy Efficiency Ratio (ISEER) for cooling only
 - e. Performance requirements and Test Methods.
 - f. Star Rating plan
 - g. Validity period of the label.
 - h. Test report format
 - i. Label design and its contents.

NOTE: For the purpose of this schedule, the star rating shall be based on Cooling Seasonal Performance Factor (CSPF) as per Clause 6.1 of ISO 16358-1: 2013 (E). However, for the purpose of star labelling, the term Indian Seasonal Energy Efficiency Ratio (ISEER) is used in this schedule in place of CSPF.

- 1.4. This schedule does not apply to:
 - a. Multi split having multiple indoor and single outdoor unit
 - b. Evaporative coolers covered under IS 3315 or any other cooling equipment's that are not of the vapour compression type.

2. NORMATIVE REFERENCES

This schedule shall be read in conjunction with the following standards with all amendments, for the purpose of star labeling

Reference Standard	Title of the Standard
ISO 16358-1: 2013	Air-cooled air conditioners and air-to-air heat pumps — Testing and calculating methods for seasonal performance factors, Part 1: Cooling seasonal performance factor
IS 1391 (Part 1):1992	Room Air Conditioners-Specifications - Part 1 Unitary Air Conditioners
IS 1391 (Part 2):1992	Room Air Conditioners-Specifications - Part 2 Split Air Conditioners

3. TERMINOLOGY

For the purpose of this schedule the following definitions in addition to those given in ISO 16358-1:2013, IS 1391 (Part 1):1992 and IS 1391 (Part 2):1992 shall apply.

3.1 Cooling Seasonal Energy Consumption (CSEC) – Total annual amount of energy consumed by the equipment when it is operated for cooling in active mode.

3.2 Cooling Seasonal Total Load (CSTL) – Total annual amount of heat that is removed from the indoor air when the equipment is operated for cooling in active mode.

3.3 Indian Seasonal Energy Efficiency Ratio (ISEER) – Ratio of the total annual amount of heat that the equipment can remove from the indoor air when operated for cooling in active mode to the total annual amount of energy consumed by the equipment during the same period.

NOTE:

1. For the purpose of this schedule, the star rating shall be based on Cooling Seasonal Performance Factor (CSPF) as per Clause 6.1 of ISO 16358-1: 2013. However, for the purpose of star labelling, the term Indian Seasonal Energy Efficiency Ratio (ISEER) is used in this schedule in place of CSPF.

2. The terminologies that are not covered above may be referred in section 3 ‘Terms and definitions’ of ISO 16358, IS 1391 (Part 1):1992 and IS 1391 (Part 2):1992

3.4 Family of models- Family of models is the range of models of a particular brand, to which a single set of test reports is applicable and where each of the models has the same physical characteristics, cooling capacity, ISEER,CSEC,CSTL, power consumption and other performance characteristics.

3.5 Label means any written, printed, marked, stamped or graphic matter affixed to, or appearing, the variable capacity air conditioners.

3.6 Validity of Label means the validity period of ISEER under energy labeling plan specified in this schedule.

Note: Labels issued as per the requirement specified in Table 3 shall be valid from 29th June,2015 to 31st December,2019

4. TESTING GUIDELINES:

4.1 Methods of Tests : All the tests specified in this schedule shall be carried out as per IS 1391 Part 1 & 2: 1992 using the balanced ambient calorimeter method. The methodology/test protocol for calculating ISEER shall be in accordance with ISO-16358- 1: 2013 with following deviations considered especially for Indian conditions.

- Method of evaluation of CSTL, CSEC and ISEER is based on bin hours (as specified in the table 1) of national climatic zone.
- Method of evaluation of CSTL, CSEC and ISEER is based on bin temperature range of 24-43°C and 1600 operating hours for cooling per annum.
- The bin hours against each bin temperature is given in Table 1.

Table 1: Reference outdoor temperature bin distribution – National weather data

Temperature in °C	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	Total
Average Annual Hours	527	590	639	660	603	543	451	377	309	240	196	165	130	101	79	59	44	31	20	10	5774
Fraction	9.1	10.2	11.1	11.4	10.4	9.4	7.8	6.5	5.4	4.2	3.4	2.9	2.3	1.7	1.4	1.0	0.8	0.5	0.3	0.2	100
Bin Hours	146	163	177	183	167	150	125	104	86	67	54	46	36	28	22	16	12	9	6	3	1600

Note: National weather data based on the weather profile for 54 cities across India. Source – The Indian Weather Data Handbook,2014.

4.2 Testing parameters

4.2.1 Power consumption The power consumption test of the air conditioner shall be conducted as per IS 1391 Part 1 & Part 2 with all amendments. The power consumption test shall be carried out at both standard cooling at full capacity and 50% of full capacity.

For the purpose of evaluating CSEC, Clause No. 6.7.4 of ISO 16358-1:2013 shall be followed.

4.2.2 Cooling capacity: The capacity rating test of the air conditioner shall be conducted as per IS 1391 Part 1 & Part 2 with all amendments. The cooling capacity test shall be carried out at standard cooling in full capacity and 50% of full capacity with appropriate frequency settings in order to achieve standard cooling at 50% of full capacity.

In order to achieve the standard cooling at 50% of full capacity, the manufacturer shall declare the frequency setting in their instruction manual or the product literature. The manufacturer shall provide the provision of frequency setting in the unit itself so that there is no intervention required at the time of check testing and shall be provided at the time of application or registration of model.

For the purpose of evaluating CSTL, Clause No. 6.7.3 of ISO 16358-1:2013 shall be followed.

4.2.3 Testing Conditions: The following test conditions are applicable for cooling capacity and power consumption tests

Table 2 Test Conditions

Temperature*		Cooling Capacity Test as per IS 1391 (Part 1 & Part 2)	Power Consumption Test as per IS 1391 (Part 1 & Part 2)
Outdoor	Indoor	At 35°C	
35°C DBT and 24°C WBT	27°C DBT and 19°C WBT	Standard cooling at Full Capacity	Standard cooling at Full Capacity
		Standard cooling at 50% of full capacity	Standard cooling at 50% of full capacity

4.2.4 Maximum Operating Condition Test: The Maximum Operating conditions test shall be carried out as per IS 1391 Part 1 & Part 2 with all amendments.

4.2.5 Power Factor Test: The power factor test shall be carried out as per Clause 10.3 of IS 1391 Part 1 and as per Clause 9.3 of IS 1391 Part 2.

5. METHOD TO CALCULATE ISEER

The formulas to calculate ISEER can be referred as per methodology laid out in Clause 6.1 and clause 6.7 of ISO 16358 – 1:2013.

Note:

1. For the purpose of this schedule, the star rating shall be based on Cooling Seasonal Performance Factor (CSPF) as per Clause 6.1 of ISO 16358-1: 2013 (E). However, for the purpose of star labelling, the term Indian Seasonal Energy Efficiency Ratio (ISEER) is used in this schedule in place of CSPF.
2. For the purpose of this schedule, ISEER shall be evaluated from the excel sheet and the link to download the same is given in section 5(c) of Annexure I.

For the purpose of deciding whether a particular requirement of this schedule is complied with, the final value, observed or calculated value, shall be rounded off in accordance with IS 2: 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should

be the same as that of the specified value in this standard. The value of ISEER (Wh/Wh) shall be rounded and recorded to two significant figures.

6. TEST REPORT

The results of test shall be reported in the prescribed format as given in Annexure I of this Schedule.

7. TOLERANCE LIMIT

For each unit tested, the following tolerances shall be applicable:

- the measured standard cooling at full capacity shall not be less than 95 percent of the rated value.
- the measured standard cooling at 50% of full capacity shall be $\pm 5\%$ of full load capacity (ie., as per clause 5.3.1 of ISO 16358).
- the measured power consumption for standard cooling at full capacity shall not be more than 5 percent of the rated value.
- the measured power consumption for standard cooling at 50% of full capacity shall not be more than 10 percent of the rated power consumption at 50% of full capacity.
- the measured energy consumption shall not be more than 5 percent of the rated value.
- For each unit tested, the ISEER shall not be less than 95 percent of the rated value.

However, there is no negative tolerance for star rating band; the products tested must be at par or better than the star rating band threshold.

8. RATING PLAN

The star rating parameters for ISEER shall be as given in Table 3.

Table 3

(a) Star Rating Plan – Voluntary Phase
(Valid from 29/06/2015 to 31/12/2017)

Star Rating	Minimum ISEER	Maximum ISEER
1 Star	3.10	3.29
2 Star	3.30	3.49
3 Star	3.50	3.99
4 Star	4.00	4.49
5 Star	4.50	

(b) Star Rating Plan – Mandatory Phase
(Valid from 01/01/2018 to 31/12/2019)

Star Rating	Minimum ISEER	Maximum ISEER
1 Star	3.10	3.29
2 Star	3.30	3.49
3 Star	3.50	3.99
4 Star	4.00	4.49
5 Star	4.50	

There is no negative tolerance for the Star Rating Bands. All tested products must meet the minimum threshold for each Star rating Band. The scope for manufacturing tolerance and other variations shall be accounted by the manufacturer or permittee while determining the Star Rating of a particular model.

9. FEES

1. Application fee payable on application for assignment of the authority to affix label is INR1000/- (Rupees One thousand only)
2. Application fee payable on application for renewal of authority to affix labels is INR 500/- (Rupees Five hundred only).
3. Labelling fee for affixation of label on each unit of air conditioner is INR 30/- (Rupees Thirty only)-

10 LABEL DESIGN AND MANNER OF DISPLAY

10.1 Placement: All air conditioners must display the label at the point of sale. The label shall be affixed on the front of both the indoor and outdoor unit. The label shall also be displayed on the packaging.

For the air conditioners not on display, the label may be affixed to the exterior of the packing and the label may be attached to the unit when put on sale.

10.2 Material, Dimension and Shape

The label shall be of durable cardboard, or be self- adhesive and shall be cut to one of the outlines shown in figure 3.

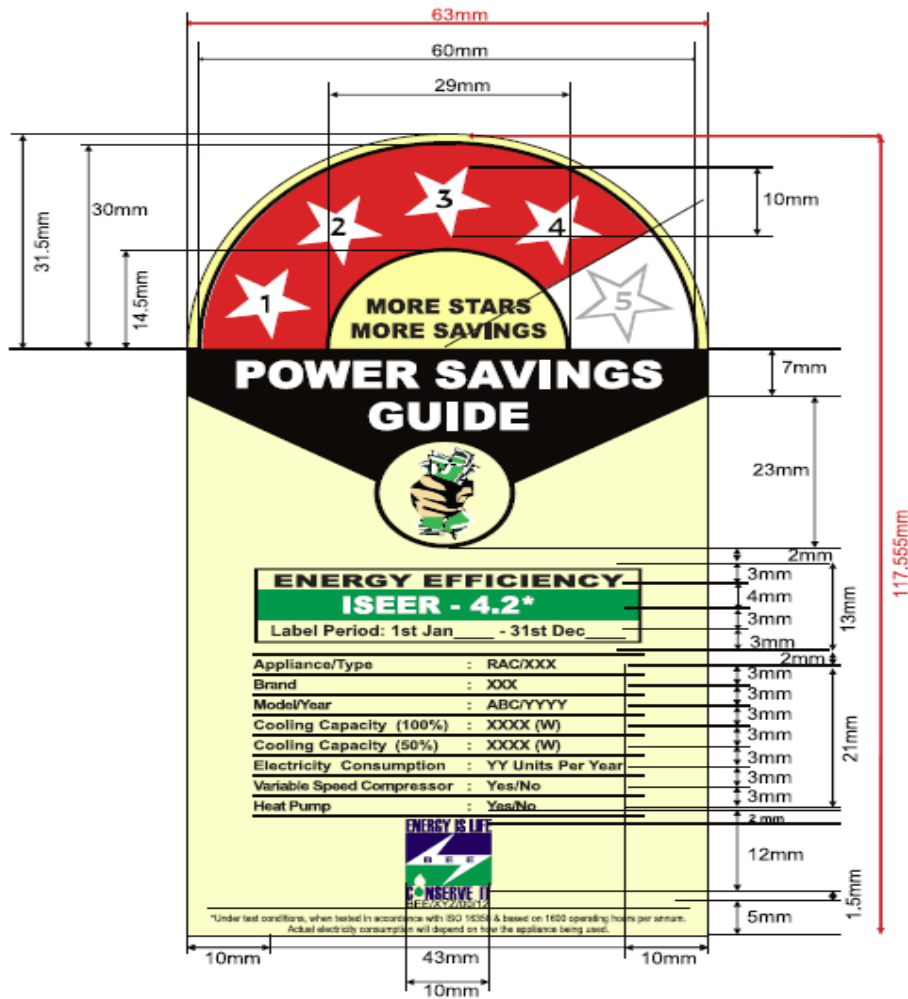


Figure 1 Dimension of Label

10.3 Color scheme

The label shall be printed as per the color scheme given in Figure 2.

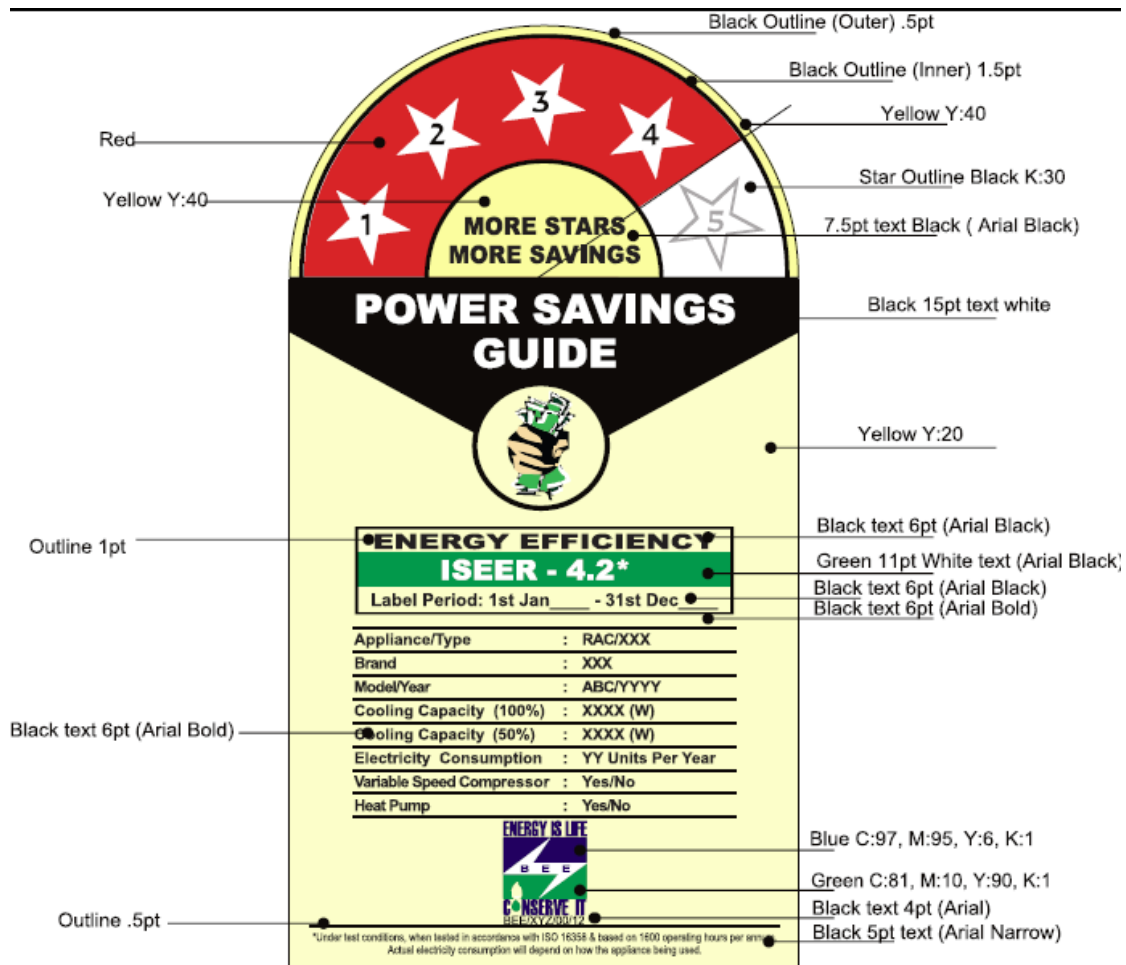


Figure 2 Color Scheme for the Label

Note: CDR File is available on BEE Website (www.beestarlabel.com)

10.4 Sample Label

An example of a printed star label to be affixed on the model is shown in Figure 3.

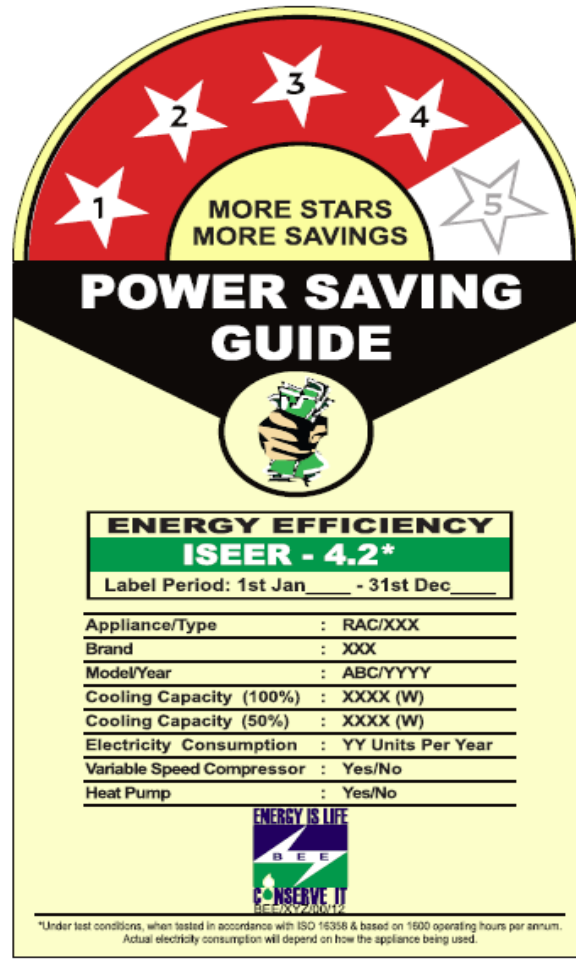


Figure 3: Sample Label

**ANNEXURE I
TEST REPORT FORMAT FOR MANUFACTURERS LAB and INDEPENDENT LAB**

1. General Information

Manufacturer/ Laboratory Name			
Address			
Date of Receipt (for Independent Labs)			
Test Report No.		Date of testing	
Tested by		Reviewed By	

2. Details of the Sample Tested

Brand Name			
Model Name		Year of Manufacturer	
Model Number (Indoor Unit)		Model Number (Outdoor Unit)	
Serial No. (Indoor Unit)		Serial No. (Outdoor Unit)	
Standard Cooling at Full Capacity (W)		Standard Cooling at 50% of Full Capacity (W)	
Rated Power Consumption (in W) at Standard Cooling at Full Capacity		Rated Power Consumption (in W) at Standard Cooling at 50% of Full Capacity	
Rated Frequency (in Hz) at Standard Cooling at Full Capacity		Frequency setting (in Hz) at Standard Cooling at 50% of Full Capacity	
Rated Voltage (V) or Voltage range		Nominal current (A) at rated conditions	
Rated CSEC (kWh)		Rated CSTL (kWh)	
Rated ISEER		Star Rating	

3. Measuring Equipment/Instruments Details

Sr. No.	Instrument/Equipment Name	Make	Accuracy Class	Range and least count	Cal. Valid Date

4. Test Conditions

a) Temperature settings

Temperature*		Cooling Capacity Test as per IS 1391 (Part 1 & Part 2)	Power Consumption Test as per IS 1391 (Part 1 & Part 2)
Outdoor	Indoor	At 35°C	
35°C DBT and 24°C WBT	27°C DBT and 19°C WBT	Standard cooling at Full Capacity	Standard cooling at Full Capacity
		Standard cooling at 50% of full capacity	Standard cooling at 50% of full capacity

b) Frequency settings

	Standard cooling at Full Capacity (Rated)	Standard cooling at 50% of full capacity (Rated)
Frequency setting (in Hz)		

5. Test Results

a) Measured input values (at 35°C)

Standard Cooling at Full Capacity (W)		Standard Cooling at 50% of Full Capacity (W)	
Rated Power Consumption (in W) at Standard Cooling at Full Capacity		Rated Power Consumption (in W) at Standard Cooling at 50% of Full Capacity	

b) Calculated input values (for 29°C)

Standard Cooling at Full Capacity (W)		Standard Cooling at 50% of Full Capacity (W)	
Power Consumption (in W) at Standard Cooling at Full Capacity		Power Consumption (in W) at Standard Cooling at 50% of Full Capacity	

c) Calculated & Rated Value

Parameters	Calculated	Rated
CSTL (kWh)		
CSEC (kWh)		
ISEER		
Star Rating		

Note: For the purpose of this schedule, an excel sheet has been provided at [LINK](#) to calculate the value of ISEER.