



SCHEDULE – 22

MICROWAVE OVENS

1. SCOPE

- 1.1. This schedule specifies the requirement for participating in the energy-labeling program for all types of microwave ovens (including combination microwave ovens) meant for household or similar use, with or without grill or convection functions, being manufactured, imported or sold in India.

This schedule applies to all types of counter-top microwave oven (covered under the scope of IS 302-2-25, and IEC 60705).

From technology perspective, any additional feature built into the oven are also covered within the scope of the standard provided it does not influence the various requirements specified in this schedule.

- 1.2. This schedule specifies the requirements for following performance parameters for microwave ovens:
- Microwave function efficiency
 - Energy consumption
 - Power consumption in Standby mode

NOTE: For the purpose of this schedule, the star rating shall be based on per-cooking-cycle energy consumption (Wh/cooking cycle), with energy consumption measured as per methodology specified in the latest version of IEC 60705.

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
IEC 60705: Amendment 1, 2010 and Amendment 2, 2018	Household microwave ovens – Methods for measuring performance
IEC 62301	Household electrical appliances – measurement of standby power
IS 302-2-25	Safety of household and similar electrical appliances



3. TERMINOLOGY

For the purpose of this schedule the following definitions in addition to those given in IEC 60705, and IS 302-2-25 shall apply.

3.1 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, energy performance, microwave function efficiency, standby power and other performance characteristics.

3.2 Label means any written, printed, marked, stamped or graphic matter affixed to, or appearing on the microwave oven.

3.3 Validity of Label: means the validity period of energy consumption norm under energy labeling plan specified in this schedule.

4. TESTING GUIDELINES

4.1 Methods of Tests: The tests specified in this schedule shall be carried out as per IEC 60705 with all Amendments and IEC 62301. The testing guideline for each of the performance parameters is mentioned below.

4.2 Testing parameters

4.2.1 Microwave power output: The test for measuring microwave power output shall be conducted as per IEC 60705 Amendment 1 and Amendment 2.

The value of microwave power output shall be reported in Watts.

4.2.2 Microwave function efficiency: The test for measuring microwave function efficiency of the microwave oven shall be conducted as per IEC 60705 Amendment 1 and Amendment 2.

The value of microwave function efficiency shall be indicated as a percentage.

4.2.3 Energy consumption (per cooking cycle): The per-cooking-cycle energy consumption of the microwave oven shall be calculated as per IEC 60705 Amendment 1 and Amendment 2.

The energy consumption shall be reported in Wh/cooking cycle.

4.2.4 Power consumption in Standby mode: The standby power of the microwave oven shall be calculated as per IEC 62301 with all amendments.

4.2.5 Testing conditions: As per the methods prescribed in IEC 60705, and IEC 62301 respectively.



5. TEST REPORT

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

Test report of 3 samples for each model of Microwave Oven is required for registration.

All 3 tests i.e. Standby power, Microwave Function Efficiency and Energy consumption is required for each of the 3 samples.

6. TOLERANCE LIMIT

The tolerance on the measured value for microwave function efficiency, power consumption on standby mode and microwave power output shall be as given in section 7.2 of this schedule.

7. MINIMUM QUALIFICATION REQUIREMENTS

7.1 The product shall be BIS certified for safety as per IS 302-2-25

7.2 The following benchmarks should be ensured by the manufacturer with relevant test reports (testing conditions as per respective IEC standards with latest amendments). These would be additional parameters verified other than energy consumption in the BEE check/challenge testing of the sample drawn.

Microwave oven	
Parameter	Minimum requirement
Microwave function efficiency	$\geq 54\%$
Power consumption in standby mode	$\leq 0.6 \text{ W}$

8. RATING PLAN

Table Validity Period 1st March 2019 to 31st December 2024	
Star rating	Energy consumption per cooking cycle (E) Wh
1-star	$56 < E \leq 60$
2-star	$52 < E \leq 56$
3-star	$48 < E \leq 52$
4-star	$44 < E \leq 48$
5-star	$E \leq 44$



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 INR 2000/- (Rupees Two thousand only)
2. Application fee payable on application for renewal of authority to affix labels is INR 1000/- (Rupees One Thousand only).
3. Labeling fee for affixation of label on each unit of microwave oven is INR 20/- (Rupees twenty only)-

10 LABEL DESIGN AND MANNER OF DISPLAY

10.1 Placement: The microwave ovens must display the label at the point of sale. The label shall be affixed on the front/side/top of the product. The label shall also be displayed on the packaging.

Label contents:

- Electricity consumption per cooking cycle (Wh)
- Label period
- Appliance type (solo /convection /grill)
- Brand
- Model no. /year of manufacturing
- Capacity
- Rated Power Output

Material, Dimension and Shape

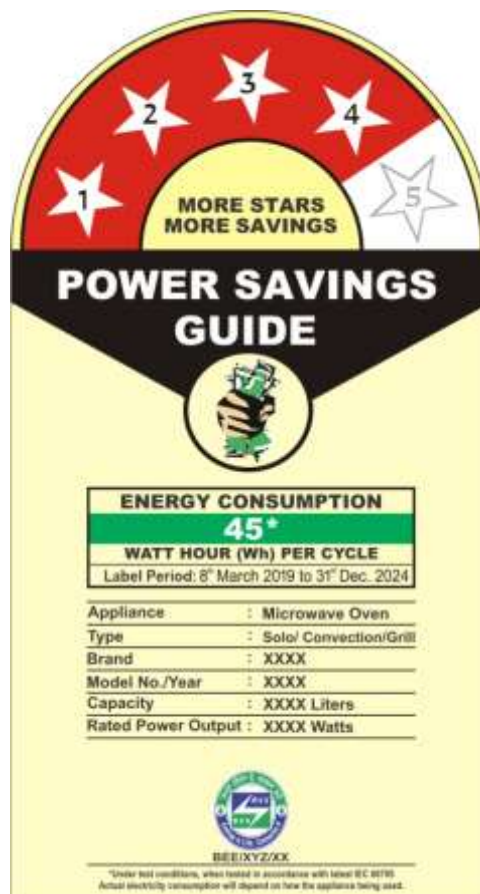
The label shall be of durable cardboard, or be self- adhesive and shall be cut to one of the outlines shown in figure 1.



10.3 Sample Label

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

Figure 1: Sample Label





10.5 Color scheme

The label shall be printed as per the color scheme given in figure below.

Figure 2: Color Scheme for the Label

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

11. Check Testing

As described in the operations manual of BEE's S&L program.



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

1. General Information /sample details

Name of Manufacturer			
Test Lab Name, address and contact details			
Rated power output			
Rated voltage/voltage range			
Rated microwave frequency			
Rated capacity/Volume			
Serial number of the sample			
Model number			
Family of models details			
Condition of unit under testing on receipt			
Date of receipt of samples			
Applicable standard		IEC 60705:2010 + AMD1:2014, Edition 4.1: 2014-06 & AMD2:2018	
		IEC 62301, Edition 2.0: 2011-01	
Date of Testing	(Start date)	End Date	
General ambient condition		Temperature in °C	23 ± 2°C
		Relative humidity in %	45-70 %
Date of Reporting			

2. Details of the Sample tested

S. No.	Test Parameter	Standard & Clause Number	Result (observed values)
1.	Microwave Power Output	Clause 8 of IEC 60705	
2.	Microwave Function Efficiency	Clause No. 9 of IEC 60705:2010 + AMD1:2014, Edition 4.1: 2014-06 and AMD:2 in 2018	
3.	Energy consumption for the microwave function	Clause No. 14 of IEC 60705:2010 + AMD1:2014, Edition 4.1: 2014-06 and AMD2: 2018	
4.	Standby Power	Clause 15 of IEC 60705:2010 +	



	Consumption	AMD1:2014, Edition 4.1: 2014-06 and Clause No. 5 of IEC 62301, Edition 2.0: 2011-01	
--	-------------	---	--

3. Details of each test conducted

Test No.1- Microwave power input as per clause 8 of IEC 60705

Test methodology adopted: The microwave power output is calculated from the formula:

$$P = [4.187 \times mw(T1 - T0) + 0.55 \times mc(T1 - TA)]/t$$

Following data to be recorded:

Sr. No	Symbols	Parameters	Observed values
1	P	is the microwave power output (W);	
2	m_w	is the mass of the water (g);	
3	m_c	is the mass of the container (g);	
4	T_A	is the ambient temperature (°C);	
5	T_0	is the initial temperature of the water (°C);	
6	T_1	is the final temperature of the water (°C);	
7	t	is the heating time (s), excluding the magnetron filament heating-up time.	

Test No.2- Efficiency as per Clause 9 of IEC 60705

Test methodology adopted: The energy consumed during the test as per clause 8 is used to determine the Efficiency. The efficiency of the oven is calculated from the formula:

$$\eta = 100 \frac{Pt}{W_{in}}$$

The efficiency is expressed in percentage.



Following data to be recorded:

S. No.	Symbol	Parameters	Observed values
1.	η	Efficiency (%)	
2.	P	Microwave Power(W) output	
3.	t	heating time(s), excluding the magnetron	
		filament heating up time	
4.	W_{in}	Input Energy(Wh) including the magnetron	
		filament heating-up energy consumption	

Test No.3- Energy Consumption for the Microwave Function as per Clause 14 of IEC 60705

Test methodology adopted: The test Load was used as per the Table 4 of clause 14.2 of IEC 60705:2010 + AMD1:2014, Edition 4.1: 2014-06. The measurement of energy consumption has been performed as per clause 14.5 of IEC 60705:2010 + AMD1:2014, Edition 4.1: 2014-06

The final energy consumption W_{final} was calculated from the formula:

$$W_{final, \text{cooking cycle}} = \frac{3 \cdot W_{50,s} + 6 \cdot W_{50,m} + 2 \cdot W_{50,l}}{11}$$

Following data to be recorded:

A. Measurement of energy consumption for a cooking cycle

S. No.	Parameter	Observed value
1.	Heating time t_{low} and t_{high} (s); including the magnetron filament heating-up time	
2.	Initial temperature T_0 (°C)	
3.	Final temperature T_{low} and T_{high} (°C)	
4.	Energy consumption W_{low} and W_{high} (Wh)	
5.	Test voltage (V)	
6.	Energy Consumption for small load ($W_{50,s}$) (Wh)	
7.	Energy Consumption for medium load ($W_{50,m}$) (Wh)	
8.	Energy Consumption for large load ($W_{50,l}$) (Wh)	
9.	heating time t_{low} and t_{high} (s); including the magnetron filament heating-up time	
10.	Initial temperature T_0 (°C)	
11.	Final temperature T_{low} and T_{high} (°C)	
12.	Energy consumption W_{low} and W_{high} (Wh)	
13.	Ambient temperature (°C) at the start of the test (when the water is positioned in the appliance)	
14.	Actual and nominal mass of water (g)	
15.	Actual mass of the water (g); (mw)	
16.	Nominal mass of water (275 g, 350 g, 1 000 g); (mw,n)	
17.	Actual mass of the container (g); (mc)	



18.	Initial temperature of the water (°C);(T_0)	
19.	Final temperature of the water for the low temperature range (°C); (T_{low})	
20.	Final temperature of the water for the high temperature range (°C);(T_{high})	

B. Calculation for the energy consumption of a cooking cycle

S. No.	Parameter	Observed value
1.	Microwave power output measured according to Clause 8	
2.	Type of the appliance, available heating function(s)	
3.	Type of the appliance, available heating function(s)	
4.	Fitted with turntable or reciprocating tray	
5.	Position of the loads	
6.	Supply voltage at which the measurements were made	
7.	energy consumption in Wh rounded to one decimal according to 14.6 for each load	
8.	final result per cooking cycle, W_{final} , in Wh rounded to one decimal according to 14.7	

Test No.4- Standby Power Consumption as per Clause 15 of IEC 60705 + Clause 5.3 of IEC 62301

Test methodology adopted: The Product Standby power was measured as per Clause 15 of IEC 60705:2010 + AMD1:2014, Edition 4.1: 2014-06 and the clause 5.3 of IEC 62301, Edition 2.0: 2011-01. The product was configured for standby mode.

Test observations:

S. No.	Parameter	Observed values
1.	Product Mode	
2.	Average Power (W)	
3.	Uncertainty of the result due to the measuring instrument (%)	
4.	Measurement method use	
5.	Sampling interval	
6.	Total duration of measurement (min)	
7.	Stability Period (min)	
8.	Energy (Wh)	
9.	Ambient conditions (temp.) (°C)	
10.	Total harmonic distortion	
11.	Accumulated energy and period of measurement (s/m/hr)	
12.	Description of how the appliance mode selected and programmed.	
13.	Sequence of events to reach the mode where equipment automatically changes mode, if any	