GUIDELINES ON ENERGY-USING PRODUCT

[GP/ST/No.50/2024]

Registration Record

DOCUMENT CONTROL		
REGISTRATION NO.	**REVISION DATE**	**REMARKS**

ENERGY EFFICIENCY AND CONSERVATION ACT 2024
[*Act 861*]

GUIDELINES ON ENERGY-USING PRODUCT

GP/ST/No.50/2024

IN exercise of the powers conferred by paragraph 3(1)*(c)* and section 67 of the Energy Efficiency and Conservation Act 2024 [*Act 861*], the Commission issues the following guidelines:

Citation and commencement

1. These guidelines may be cited as the Guidelines On Energy-Using Product.

2. These Guidelines shall come into operation on 1 January 2025.

Purpose

3. The purpose of these Guidelines are to specifies the detail requirement on—

(a) the energy-using product;
(b) the energy efficiency criteria, testing methodology;
(c) the minimum energy performance standards;
(d) the energy efficiency rating table and calculation method for each of energy products;
(e) the methodology of calculation of the energy efficiency rating; and
(f) the Energy Efficiency Labeling requirement and specification.

Dated: 30 December 2024

DATO' IR. TS. ABDUL RAZIB BIN DAWOOD
Chief Executive Officer
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CHAPTER 1 : GENERAL SCOPE

1. Application

1.1. These Guidelines shall apply to the following energy-using products:

(a) air-conditioner;
(b) refrigerator;
(c) domestic fan;
(d) lamp;
(e) television;
(f) washing machine;
(g) microwave oven;
(h) electric rice cooker;
(i) freezer; and
(j) electric oven.

1.2. Energy-using product which is used for exhibitions, laboratory work, research, and testing are not included within the scope of these Guidelines.

1.3. Any energy-using product which has been issued with release letter under Act 447 by the relevant regulatory authority are excluded as energy-using product referred under this guideline.

1.4. All energy-using product shall meet the Minimum Energy Performance Standard (MEPS) rating of 2-star as stated in the Energy Efficiency and Conservation Regulation 2024.

2. Interpretation

In these Guidelines, the following terms shall have the following meanings:

"Act"	means the Energy Efficiency and Conservation Act 2024 [*Act 861*]
"Act 447"	means the Electricity Supply Act 1990 [*Act 447*]
"Commission"	has the meaning assigned to it under the Energy Efficiency and Conservation Act 2024 [*Act 861*].

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PART 1 : AIR CONDITIONER

1.1 Scope

The air conditioner which is classified as energy-using product shall have the following criteria:

(a) single-phase;
(b) non-ducted;
(c) single-split wall mounted;
(d) vapor compression air conditioners; and
(e) with a cooling capacity of up to 7.1 kW.

1.2 Interpretation

In this part, the following terms shall have the following meanings:

non-inverter air conditioner	means air conditioner that uses technology to control the compressor's output through start-stop operation.
inverter air conditioner	means air conditioner that uses technology to vary the compressor's output by methods other than start-stop operation.
wall mounted air conditioner	means an encased assembly consisting of at least an evaporator, fan motor assembly, and electrical assembly, designed to be mounted on a wall. It is primarily intended to deliver conditioned air to an enclosed space, room, or zone.
Cooling Seasonal Performance Factor (CSPF)	the ratio of the total annual amount of heat that the equipment can remove from indoor air while operating in cooling mode to the total annual energy consumed by the

equipment during the same period. The unit of measurement is Wh/Wh.

1.3 Testing Methodology

1.2.1 The testing methodology used for air conditioner are as follows:

National testing Standard	Equivalent Standard
MS ISO 5151:2012, non-ducted air conditioners and heat pumps: Testing and rating for performance	ISO 5151:2010 Non-ducted air conditioners and heat pumps — Testing and rating for performance
None	Calculation method using ISO 16358-1:2013. Air-cooled air conditioners and air-to-air heat pumps – Testing and calculating methods for seasonal performance factors – Part1: Cooling seasonal performance factor

1.2.2 The air conditioner shall be measured at the following conditions:

(a) Climatic ambient T1, refer MS ISO 5151; and

(b) Voltage 230V, 50Hz

1.2.3 The requirements to calculate CSPF shall be as follows:

(a) the outcome of the testing shall be based on the MS ISO5151;

(b) temperature bin distribution for the purpose of calculating energy efficiency shall be based on Table 3, ISO 16358-1;

(c) the measured cooling capacity value shall not be less than 90% of rated cooling capacity;

(d) the measured power input value shall not be more than 110% of rated power input;

(e) for all type of air conditioner, test shall be conducted only under standard temperature condition without testing under cooling low temperature condition (Refer to Table 1 of ISO16358-1);

(f) For inverter air conditioner, the 50% load cooling capacity test, following tolerance shall be met:

50 % load = 100 % load capacity x 0.5 (tolerance ± 5.0 %).

Where 100 % load capacity refers to measured cooling capacity during 100 % load cooling capacity.

1.2.4 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component related to performance of the air conditioner such as fan motor, compressor, evaporator, condenser, PCB Board and other relevant component, the air conditioner shall be tested again.

1.2.5 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

1.4 Calculations of energy efficiency

(a) The calculations for Cooling Seasonal Performance Factor (CSPF) for non-inverter air conditioner shall be as follows:

$$\text{CSPF (Non} - \text{Inverter)} = 1.062 \times EER_{tested}$$

Where, $EER_{tested}(Energy\ Efficiency\ Ratio)$ is obtained from the test report

(b) The calculations for Annual Energy Consumption (kWh),A shall be as follows:

$$Annual\ Energy\ Consumption(kWh), \mathrm{A} = \frac{CSEC\ (kWh)}{1817\ hours} \times 4380 hours *$$

Where,

CSEC =Cooling Seasonal Energy Consumption (From Test Report)

*Operating hours per year =12hours per day x 365 day = 4380 hours

(c) The calculations for Percentage energy saving compared to the lowest 2-star rating, B shall be as follows:

$$B = 100\% - (100 \times \frac{CSPF_{Lowest\ 2-Star}}{CSPF_{Measured}})$$

Where,

$\mathrm{CSPF}_{\mathrm{Lowest\ 2-Star}} = 3.1$ for rated cooling capacity $< 4.5\mathrm{kW}$

$\mathrm{CSPF}_{\mathrm{Lowest\ 2-Star}} = 2.9$ for rated cooling capacity $4.5\mathrm{kW}$ to $7.1\mathrm{kW}$

$\mathrm{CSPF}_{\mathrm{Measured}} =$ Obtained from Test Report

1.5 Energy efficiency rating

The energy efficiency rating in the form of star rating shall be in accordance with Table 1 and 2.

	Effective from 1.1.2025 – 31.12.2025	**Effective from 1.1.2026 - 31.12.2029**	**Effective from 1.1.2030**
Star Rating	**Tested CSPF (Wh/Wh)**	**Tested CSPF (Wh/Wh)**	**Tested CSPF (Wh/Wh)**
5	≥5.30	≥6.09	≥7.5
4	4.60 ≤CSPF<5.30	5.40≤CSPF<6.09	7.00≤CSPF<7.50
3	3.30 ≤ CSPF<4.60	4.80 ≤ CSPF < 5.40	6.50 ≤ CSPF < 7.00
2	3.10 ≤ CSPF<3.30	4.10 ≤ CSPF < 4.80	6.09 ≤ CSPF < 6.50
1	< 3.10	< 4.10	< 6.09

Table 1 : The rated cooling capacity < 4.5kW

	Effective from 1.1.2025 – 31.12.2025	Effective from 1.1.2026 - 31.12.2029	Effective from 1.1.2030
Star Rating	**Tested CSPF (Wh/Wh)**	**Tested CSPF (Wh/Wh)**	**Tested CSPF (Wh/Wh)**
5	≥ 5.10	≥ 5.60	≥ 7.00
4	4.00≤ CSPF<5.10	5.00≤ CSPF<5.60	6.50 ≤ CSPF < 7.00
3	3.10≤ CSPF<4.00	4.40 ≤ CSPF < 5.00	6.09 ≤ CSPF < 6.50
2	2.90 ≤ CSPF<3.10	4.00 ≤ CSPF < 4.40	5.60 ≤ CSPF < 6.09
1	<2.90	<4.00	<5.60

Table 2 : 4.5kW ≤Rated Cooling Capacity ≤ 7.1kW

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PART 2 : REFRIGERATOR

2.1 Scope

2.1.1 The refrigerator which is classified as energy-using product shall have the following criteria:

(a) one door or two door as shown in Figure 1;

(b) can be connected to main power; and

(c) within the scope of MS IEC 62552-1:2016 or equivalent standard IEC 62552-1:2015

Figure 1: Example of refrigerators classified as energy-using product

2.1.2 The following products are excluded as energy-using product:

(a) mini bar or mini refrigerator which have a total volume of less than 60 litres;

(b) products that are designed exclusively for use in vehicles (e.g. mobile homes, campervans and/or rail cars) or boats and which have a total volume of less than 60 litres;

(c) products that have refrigeration function as secondary (e.g. boiling or cooled water dispensers);

(d) products that have no options for connection to a 230V to 400V, 50Hz mains electricity supply;

(e) products that cool using technologies other than the vapour compression cycle;

(f) products that are designed exclusively for built-in in house; and

(g) French door/side by side door/more than 2-door refrigerator.

2.2 Interpretation

In this part, the following terms shall have the following meanings:

Energy efficiency factor (EEF)	the ratio between the adjusted volume (in litres) and the daily energy consumption (in kWh), determined using the test methods specified in MS IEC 62552-1 and MS IEC 62552-3
$EEF_{Average}$	means the energy efficiency factor as determined by the Commission
Star rating index (SRI)	means the indication of the claimed energy efficiency of a model, where a higher SRI represents greater energy efficiency. It is calculated based on the energy efficiency factor (EEF).

2.3 Testing Methodology

2.3.1 The refrigerator shall be tested according to the testing methodology as follows:

National Standard	Equivalent International Standard
MS IEC 62552-1:2016, Household Refrigerating Appliances - Characteristics and Test Methods – Part 1: General Requirements	IEC 62552-1:2015 Household refrigerating appliances - Characteristics and test methods - Part 1: General requirements

(Second Revision) (IEC 62552-1:2015, IDT)	
MS IEC 62552-3:2016, Household Refrigerating Appliances - Characteristics and Test Methods – Part 3: Energy Consumption and Volumes (Second Revision) (IEC 62552-3:2015, IDT)	IEC 62552-3:2015 Household refrigerating appliances - Characteristics and test methods - Part 3: Energy consumption and volume

2.3.2 The testing methodology shall meet the following requirements:

(a) the energy consumption shall be determined by interpolation from the results of two tests:

(i) one giving a temperature warmer than, and
(ii) the other a temperature colder than,

the target temperature as in accordance with MS IEC 62552- 3;

(b) the refrigerating appliance shall be tested at the 230V, 50Hz;

(c) the ambient temperature of 32 ºC with humidity less than 75%;

(d) the specified auxiliaries value is determined by ambient controlled anti-condensation heaters only. Probability for temperature and humidity data are shown in Table 3.

Relative Humidity (RH)	**RH band mid-point**	**Probability at 16 ºC**	**Probability at 22 ºC**	**Probability at 32 ºC**
0 to 10 %	5 %	0.0	0.0	0.0
10 to 20 %	15 %	0.0	0.0	0.0
20 to 30 %	25 %	0.8	0.4	0.0

30 to 40 %	35 %	3.3	3.4	0.3
40 to 50 %	45 %	6.4	10.7	2.1
50 to 60 %	55 %	8.0	14.2	7.8
60 to 70 %	65 %	5.8	9.0	11.3
70 to 80 %	75 %	2.5	3.9	6.3
80 to 90 %	85 %	0.8	0.9	1.8
90 to 100 %	95 %	0.0	0.0	0.3

Table 3 : Probability for temperature and humidity data – ambient controlled anti condensation heater

(e) the load processing efficiency value is determined by using equation (57) of Annex G of MS IEC62552-3. This value is determined at ambient temperature of 32 ºC only. A regional factor to scale processing load used is 1; and

(f) the determination method for number of valid defrost and recovery period are using both option 1 and 2 of C.4 of MS IEC62552-3.

2.3.3 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component related to performance of the refrigerator such as compressor, compressor capacitor, defrost heater, defrost timer, thermostat / temperature sensor, fan motor, condenser, evaporator, inverter PCB (for inverter type) and other relevant component, the refrigerator shall be tested again.

2.3.4 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

2.4 Calculation of energy efficiency

(a) Calculation of Star Rating Index (SRI)

The Star Rating Index (SRI) is determined based on daily energy consumption obtained from test conducted in accordance with MS IEC 62552-1 and MS IEC 62552-3.

Star rating index is determined by the following equation:

$$Star\ Rating\ Index = \left[\frac{EEF_{Tested}}{EEF_{Average}} - 1\right] \times 100\%$$

Where,

$$EEF_{Average(1door)} = 1.114 \times V_{adjusted} + 79.87$$

$$EEF_{Average(2doors)} = 0.6402 \times V_{adjusted} + 64.45$$

$$EEF_{Tested} = \frac{V_{adjusted}\ (L)}{Energy\ consumptioned\ per\ day\ (kWh)}$$

Where,

$$Energy\ consumption\ per\ day = \frac{E_{Total}}{365}$$

Where,

$$E_{Total} = E_{daily32C} \times 365 + E_{aux} + \Delta E_{processing32C} \times 365$$

The adjusted volume ($V_{adjusted}$) of a refrigerating appliance is calculated by summing the adjusted volume for each compartment as per equation below:

$$V_{adj} = \sum_{i=1}^{n} K_{ci} \times V_i$$

Where,

n is number of compartments in the refrigerating appliance;

V_i is volume of compartment *i* (litres);

K_{ci} is adjustment volume factor for compartment *i* as determined in accordance with the following equation:

$$K_{ci} = \frac{[T_{ka} - T_{ti}]}{[T_{ka} - T_{tff}]}$$

Where,

T_{ka} is the environment test temperature (set at + 32 ºC);

T_{ti} is the target temperature of compartment *i* (°C) from Table 4

T_{tff} is the target temperature of a fresh food compartment (4 °C)

The volume adjustment factor (K_{ci}) for each compartment type is specified in Table 4 below.

Compartment type	Target temperature (°C)	Volume adjustment factor (K_{ci})
Pantry	17	0.54
Wine storage	12	0.71
Cellar	12	0.71
Fresh food	4	1.00
Chill	2	1.07
Zero star	0	1.14
1 star	-6	1.36
2 star	-12	1.57
3 star and 4 star	-18	1.79

Table 4 : Volume adjustment factor by compartment type

(b) Calculations for Annual Energy Consumption (kWh),A

Annual Energy Consumption (kwh)= E_{Total} (Obtained From the Test Report)

(c) Calculations for Percentage energy saving compared to the lowest 2-star rating,B

$$B=100\%-\left(\frac{EEF_{Lowest\ 2\text{-}Star}}{EEF_{Tested}}\times 100\right)$$

Where,

$EEF_{Lowest\ 2\text{-}Star}=0.7593V_{adjusted}+54.459$ (1-Door)

$EEF_{Lowest\ 2\text{-}Star}=0.4802V_{adjusted}+48.338$ (2-Door)

EEF_{Tested} can be obtained from the report.

$V_{adjusted}$ can be obtained from the report.

2.5 Energy efficiency rating

The energy efficiency rating in the form of star rating shall be in accordance with Table 5.

Star rating	Star index value
5	+ 25 % ≤ Star index
4	+ 10 % ≤ Star index < + 25 %
3	- 10 % ≤ Star index < + 10 %
2	- 25 % ≤ Star index < - 10 %
1	- 35 % ≤ Star index < - 25 %

Table 5 : Star rating index value

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PART 3 : DOMESTIC FAN

3.1 Scope

3.1.1 This guideline shall apply to domestic fan that are used in household that is connected to main power supply including—

(a) the ceiling fan with size from 48 inch up to 60 inch (1200mm up to 1500mm);

(b) the pedestal fan with size from 10 inch up to 16 inch (250mm up to 400mm);

(c) the wall fan with size from 10 inch up to16 inch (250mm up to 400mm);

(d) the desk fan with size from 10 inch up to16 inch (250mm up to 400mm); and

(e) the box/mist/moving louver fan (250mm/10inch-350mm/14 inch).

3.1.2 The following types of fans are excluded from these Guidelines:

(a) the ventilating fan;

(b) the battery operated fan; and

(c) the bladeless fan.

3.2 Interpretation

In this part, the following terms shall have the following meanings:

coefficient of performance (COP)	means the air delivery in cubic metres per minute divided by electrical power input to the fan in watts at the voltage and frequency specified for the test. In the event of the fan comprising an oscillating mechanism, the electrical input in watts is measured with the fan under normal full speed conditions, which is with the oscillating mechanism in action, whereas the air delivery is

determined with the oscillating mechanism out of action.

3.3 Testing Methodology

3.3.1 The fan shall be tested according to the testing methodology as stated below:

National Standard	Equivalent International Standard
MS 1220:2010 Performance and Construction of Electric Circulating Fans and Regulators	IEC 60879:1986 (With Modification) Performance and construction of electric circulating fans and regulators

3.3.2 The fan shall be tested with electricity supply voltage and frequency at 240V and 50Hz respectively.

3.3.3 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component such as motor, motor capacitor value, regulator capacitor value, PCB design/layout and other relevant component related to performance of the domestic fan, the domestic fan shall be tested again.

3.3.4 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

3.4 Calculation of energy efficiency

(a) Calculation of coefficient of performance (COP)

$$COP = \frac{\text{Measured Air Delivery } (\frac{\text{m}^3}{min})}{\text{Input Power(W)}}$$

Where Measured Air Delivery and Input Power can be obtained from the test report.

(b) Calculation of Annual Energy Consumption, A

A (kWh) = 365 x 8 x Input Power obtained from test report (kW)

Where Input Power is measured during air delivery test.

(c) Calculation of Percentage Energy Saving Compared to Lowest 2-Star Rating,B:

$$B = 100\% - (100 \times \frac{A}{Energy\ Consumption\ of\ \ lowest\ 2-star\ rating})$$

Where

Energy Consumption of lowest 2-star for ceiling fan:

$$= \frac{365 \times 8 \times \frac{\text{Tested air delivery capacity}(\text{m}^3/\text{min})\text{from test report}}{2.58}}{1000}$$

Energy Consumption lowest 2-star for pedestal, wall and desk fan:

$$= \frac{365 \times 8 \times \frac{\text{Tested air delivery capacity}(m^3/\text{min})\text{from test report}}{1.01}}{1000}$$

3.5 **Energy efficiency rating**

The energy efficiency rating in the form of star rating shall be in accordance with the tables below:

(a) wall fan, desk fan and pedestal fan

Star Rating	COP (m^3/min/W)
5	≥1.20
4	1.12 to 1.19
3	1.08 to 1.11
2	1.01 to 1.07
1	0.93 to 1.00

Table 6 : Star Rating Table for wall fan, desk fan and pedestal fan

(b) Ceiling fan

Star Rating	COP (m^3/min/W)
5	≥3.00
4	2.74 to 2.99
3	2.66 to 2.73
2	2.58 to 2.65
1	2.50 to 2.57

Table 7 : Star Rating table for ceiling fan

(c) Box/mist/moving louver fan (250mm/10inch-350mm/14 inch)

Star Rating	COP (m^3/min/W)
2	≥0.50

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PART 4 : LAMP

4.1 Scope

4.1.1 The types of lamp shall have the following criteria:

(a) T5 and T8 double capped fluorescent lamps;

(b) self-ballasted single-capped lamps (compact fluorescent lamps (CFL)) for general lighting services;

(c) single-capped fluorescent lamps (non-integrated compact fluorescent lamps) and circular fluorescent lamps for general lighting services;

(d) self-ballasted Light Emitting Diode (LED) lamps for general lighting services with lamp cap E14, E27, GU10, B22d and G13; and

(e) filament tungsten incandescent lamps.

4.1.2 These Guidelines shall not apply to the lamp with the following criteria:

(a) lamps which are operated with supply below than 50V DC or AC;

(b) LED stripes, dies or chips;

(c) products that have a built-in lamp or light source that is integral to the product's function;

(d) High-Intensity Discharge (HID) light sources with Correlated Color Temperature (CCT) > 7000 K and intended for use in applications requiring such a high CCT;

(e) incandescent light sources (not including halogen light sources) intended for use in special application including the following:

(i) components in electrical appliances;

(ii) medical, research and lab equipment;

(iii) internal decoration, shows and exhibition;

(iv) safety and signaling;

(v) conservation of animals and as repellant for insects;

(vi) heating and testing;

(vii) cleanliness and health;

(viii) beauty treatment;

(ix) lamps that cannot be directly replaced with other type of lamp; and

(x) incandescent lamp for other purposes deemed suitable by the Commission to be excluded.

(f) lamp designed and marketed specifically for scene-lighting use in film-studios, TV-studios and locations, and photographic-studios and locations, or for stage-lighting use in theatres, during concerts or other entertainment events;

4.2 Interpretation

In this part, the following terms shall have the following meanings:

efficacy	Efficacy (lm/W) is the amount of light emitted measured in lumen (lm) by a lamp for each watt (W) of power consumed.

4.3 Testing Methodology

4.3.1 The lamp shall be tested according to the testing methodology as follows:

(a) T5 and T8 double capped fluorescent lamps

(i) testing standard MS IEC 60081:2003 or IEC 60081:2003; and

(ii) the endurance parameters tested shall not be less than 80 % of the initial lumen output value and the failure rate of not more than 10 % of sample population after 2000 h operation;

(b) self-ballasted compact fluorescent lamps (CFL) for general lighting services

(i) testing standard MS IEC 60969:2006 or IEC 60969:2001; and

(ii) the endurance parameters tested shall be not less than 80 % of the initial lumen output value and the failure rate of not more than 10 % of sample population after 2000 h operation;

(c) single-capped fluorescent lamps (non-integrated compact fluorescent lamps) and circular fluorescent lamps for general lighting services

(i) testing standard MS IEC 60901:2003 or IEC 60901:1996; and

(ii) the endurance parameters tested shall be not less than 80 % of the initial lumen output value and the failure rate of not more than 10 % of sample population after 2000 h operation;

(d) self-ballasted Light Emitting Diode (LED) lamps for general lighting services—

(i) testing standard MS IEC 62612:2021 or IEC 62612:2015;

(ii) for LED lamps shall be tested for 6000 hours, with minimum 70 % of the initial lumen output value and the failure rate of not more than 10 % of sample population;

(iii) the endurance parameters for testing as with i), shall be not less than 80 % of the initial lumen output value and the failure rate of not more than 10 % of sample population after minimum 1000 h operation; and

(iv) For Light Emitting Diode (LED) Lamps, the Lumens maintenance test will be carried out every 1,000 hours until the completion of 6,000 hours. An interim report will be issued after completing the first 1,000 hours. The interim report can be used for Certificate of Energy Efficiency (COE) application. The test will be continued to complete the 6,000 hours. A final full test report will then be issued to supersede the interim report; and

(e) incandescent

Testing standard MS IEC 60064:2006 or IEC 60064:2006;

4.3.3 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component such as LED module/package, Transformer, PCB design and diffuser, lamp cover and other relevant component related to performance of the lamp, the lamp shall be tested again.

4.3.4 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

4.4 Calculation of energy efficiency

The calculation of energy efficiency for lamp shall be in the form of efficacy based on the following equation:

$$Efficacy(lm/W) = \frac{lumen\ output}{watt}$$

4.5 Energy efficiency rating

The energy efficiency rating in the form of star rating shall be in accordance with tables below.

(a) T5 and T8 double capped fluorescent lamps

Star rating	Type	Lamp rating (W)	Minimum efficacy (lm/W)
2 star	T8	≥ 18 to < 31	70
		≥ 31	80
	T5	≥ 14 to < 15	75
		≥ 15	80

(b) self-ballasted compact fluorescent lamps (CFL) for general lighting services

Star Rating	Lamp rating (W)	Minimum efficacy (lm/W)
2 star	< 9	46
	≥ 9 to < 15	52
	≥ 15 to < 25	55
	≥ 25	62

(c) single-capped fluorescent lamps (non-integrated compact fluorescent lamps) and circular fluorescent lamps for general lighting services

Star rating	Lamp rating (W)	Minimum efficacy (lm/W)
2 star	< 10	46
2 star	≥ 10 to < 19	55
2 star	≥ 19 to < 27	59
2 star	≥ 27	70

(d) self-ballasted Light Emitting Diode (LED) lamps for general lighting services

Star rating	Lamp cap type (as in MS IEC 60061-1)	Minimum efficacy (lm/W)
2 star	G13	75
2 star	GU10	50
2 star	E27 or B22d	60
2 star	E14	60

(e) incandescent lamp

Star rating	Lamp type	Minimum efficacy (lm/W)
2 star	incandescent	60

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PART 5 : TELEVISION

5.1 Scope

5.1.1 This Guide shall apply to the following types of television with size up to or equal to 177.8 cm (70 inch):

(a) plasma;
(b) liquid crystal display (LCD);
(c) light emitting diode (LED);
(d) cathode ray tube (CRT); and
(e) any other display type with similar function.

5.1.2 However, if the above television has following criteria, it shall be excluded:

(a) television sets powered solely by batteries;
(b) front and rear projection display devices;
(c) type 8K and above televisions;

5.2 Interpretation

In this part, the following terms shall have the following meanings:

8K	means a television with minimum resolution with 7680 x 4320 pixel;
Active Standby Mode	A television being on either “standby-active low” or “standby-active high” sub-modes as described in Table 1 of MS IEC 62087-3:2017;
On mode	A television being on “On” mode as described in Table 1 of MS IEC 62087-3:2017;
Passive standby mode	A television being on “standby-passive” mode as described in Table 1 of MS IEC 62087-3:2017;

Standby mode	A television being on “Partial On” mode as described in Table 1 of MS IEC 62087-3:2017.

5.3 Testing Methodology

5.3.1 The television shall be tested according to the testing methodology as follows:

National Standard	Equivalent International Standard
MS IEC 62301:2012 Household electrical appliances - Measurement of standby power.	IEC 62301:2011 Household electrical appliances - Measurement of standby power.
MS IEC 62087-3:2017 Audio, video and related equipment - Determination of power consumption - Part 3: Television sets.	IEC 62087-3:2015 Audio, video and related equipment - Determination of power consumption - Part 3: Television sets.

5.3.2 Testing of power measurement shall be conducted in the following manner:

(a) power measurement at a time when the device is on On Mode; and

(b) power measurement at a time when the device is on Standby Mode

5.3.3 The On Mode power consumption shall have the following specific conditions:

(a) supply voltage and frequency: 230V, 50Hz;

(b) configuration and picture setting: home configuration (clause 3.1.9 of MS IEC 62087-3:2017) or default picture setting (clause 3.1.7 of MS IEC 62087-3:2017);

(c) light source for disabling the ABC feature: ABC sensor disabled by means of control setting or light source control (clause 5.6.5 of MS IEC 62087-3:2017);

(d) networking equipment: no networking connectivity applies (clause 5.6.6 of MS IEC 62087-3:2017);

(e) sound level adjustments: Volume control adjusted to obtain 50 mW at the loudspeaker terminal (Clause 6.3.10.7 of MS IEC 62087-3:2017);

(f) power measurement: Dynamic broadcast-content video signal applies during measurement (Clause 6.4.5 of MS IEC 62087-3:2017); and

(g) peak luminance measurement: Box and outline video signal applies during measurement (Clause 4.2.2.2 of MS IEC 62087-2:2017).

5.3.4 The Standby Mode power consumption shall be measured according to MS IEC 62301:2012.

5.3.5 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component such as LCD/LED display panel, power supply unit, transformer and AC-DC adapter and other relevant component related to performance of the television shall be tested again.

5.3.6 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

5.4 Calculation of energy efficiency

(a) The calculation of energy efficiency for television shall have the following requirement:

i. the maximum power consumption during Passive Standby Mode shall be 1W; and

ii. the minimum peak luminance ratio shall be 60%.

(b) Failure to meet the requirements in (a) will render the product ineligible for rating.

(c) The calculation of energy efficiency shall be in a form of Star Rating Index (SRI) and calculated in accordance with the following formula:

$$Star\ Rating\ Index = \left(\frac{EEF_{tested}}{EEF_{average}} - 1\right) x100\%$$

Where:

The value of $EEF_{average}$ shall be obtained from the test report which calculated in accordance with the following formula:

$$EEF_{average} = 0.0045 \times Screen\ Area\ (cm^2) + 27.355$$

The value of EEF_{tested} shall be calculated in accordance with the following formula:

$$EEF_{tested} = \frac{Screen\ Area\ (cm^2)}{Annual\ Energy\ Consumption\ (kWh), \mathrm{A}}$$

Where:

$$Annual\ Energy\ Consumption\ (kWh),\ A = 0.365\ [(Pon\ x\ 5) + Pps(19 - Tas) + (Pas\ x\ Tas)]$$

Where:

Pon = Power at On Mode (in W)

Pps = Power at Passive Standby Mode (in W)

Pas = Power at Active Standby Mode (in W)

Tas = Time on Active Standby Mode (in hour)

(d) Calculation of Percentage Energy Saving Compared to Lowest 2-Star Rating, B:

$$B = 100\% - (\frac{EEF_{lowest\ 2star}}{EEF_{tested}}) \times 100$$

Where

$$EEF_{lowest\ 2star} = 0.003 \times \text{Screen Area } (\text{cm}^2) + 14.421$$

5.5 Energy efficiency rating

The energy efficiency rating in the form of star rating shall be in accordance with Table 8 below.

Star Rating	Star Index
5	+70%≤ **Star Index**
4	+25%≤ **Star Index** <+70%
3	-22%≤ **Star Index** <+25%
2	-55%≤ **Star Index** <-22%
1	**Star Index** <-55%

Table 8 : Star Rating for Television

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PART 6 : WASHING MACHINE

6.1 Scope

6.1.1 These Guidelines shall apply to washing machine for households use, with or without heating devices utilizing cold or hot water supply.

6.1.2 The following washing machine is excluded from the scope of these Guidelines:

(a) washing machine capacity of more than 16kg;

(b) washer-dryer (washing machine with drying function usually by heating and tumbling);

(c) manual washing machine (a machine that requires user intervention at one or more points during the program to enable the machine to proceed to the next operation i.e twin tub/semi auto); and

(d) mini washer or twin washer which cannot operate on its own (stand-alone mini washer which requires to be installed with its main washer)

6.2 Interpretation

In this part, the following terms shall have the following meanings:

Energy efficiency factor (EEF)	Ratio of the total energy consumption for a complete Program to the rated capacity in kilogram(kg). The unit for EEF is Wh/kg.
Top Loading (Vertical Axis) washing machine	Washing machine in which the load is placed in a drum which rotates around the axis which is vertical or close to vertical. Vertical axis is where the angle of the axis of rotation is more than 45 degrees to horizontal.

Front Loading (Horizontal Axis) washing machine	Washing machine in which the load is placed in a drum which rotates around the axis which is horizontal or close to horizontal. Horizontal axis is where the angle of axis is less than or equal to 45 degrees to horizontal.
Rated capacity	Maximum mass in kg of dry textiles of a particular type which the manufacturer declares can be treated in the washing machine on the default program.
Program	Series of operations which are pre-defined within the washing machine and which are declared by the manufacturer as suitable for washing certain textile types.

6.3 Testing Methodology

6.3.1 The washing machine shall be tested according to the testing methodology as follows:

National Standard	Equivalent International Standard
MS IEC 60456: 2012, Clothes Washing Machines for household use – Methods for measuring the performance	IEC 60456: 2010, Clothes Washing Machines for household use – Methods for measuring the performance; or

6.3.2 The requirements for testing methodology shall be as follows:

(a) the washing machine shall be tested at 230V, 50Hz.

(b) soft water shall be used with the total water hardness of 0.5 ± 0.2 mmol/litre

(c) cold water shall be used with the temperature of 20 ± 2 degree Celsius

(d) the water level of the washing machine shall be set at maximum level.

(e) cotton base load shall be used during the test.

(f) the washing machine shall be tested using the standard program of the washing machine. The standard program for each type of washing machine are explained as below:

(i) Top load washing machine without heater

Standard program means auto, normal or default program that does not require user's intervention to set the program. The water level shall be set at maximum.

(ii) Top load washing machine with heater

Standard program means auto, normal or default program that does not require user's intervention to set the program. The temperature shall be set at least 60°C and the water level shall be set at maximum.

(iii) Front load washing machine

Standard program means cotton (fabric type) selection program. If there is no fabric type program, the standard program means auto, normal or default program that does not require user intervention to set the program. The temperature shall be set at least 60°C for both program.

(g) Other options/features/functions such as prewash, eco, energy saver and etc. shall be disabled when the testing is conducted.

(h) The standard Program shall meet the minimum requirement as stated in Table 9 below. In the event that the standard Program selection is unable to fulfil the requirement under Table 9, manual selection shall be made to fulfil the requirement.

Type	Main Wash (Minimum time, Minutes)	Rinse* (Quantity)	Spin (Minimum time)
Top Loading	1 time, 5 minutes	2	5 minutes
Front Loading	1 time ,10 minutes	2	5 minutes

Table 9 : Minimum Requirement on Washing Machine Programme

Note:(*) The water volume should be identical at rinse 1 and rinse 2 (Normal rinse).

(i) The information on the selected Program shall be clearly stated in the test report.

(j) Other conditions which are not stated in these Guidelines shall follow the standard MS IEC 60456:2012 or equivalent standard IEC 60456:2010.

6.3.3 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component such as main motor, drain pump/ circulation pump/drain retractor, water inlet valve, Pressure sensor, PCB board, motor capacitor, heating element and other relevant component related to performance of the washing machine, the washing machine shall be tested again.

6.3.4 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

6.4 Calculation of energy efficiency

(a) Calculation of Energy Efficiency Ratio, EER (Wh/kg):

$$\text{Energy Efficiency Ratio, EER (Wh/kg)} = \frac{\text{Measured Energy Consumption(Wh)}}{\text{Rated Capacity (kg)}}$$

Where;

Measured Energy Consumption (kwh) and Rated Capacity (kg) can be obtained from test report

*Note: Measured Energy Consumption conversion unit : 1 kwh = 1000Wh

(b) Calculation of Annual Energy Consumption (kWh), A:

$$\text{A(kWh)} = 365 \times Energy\ Consumption\ from\ the\ test\ report\ (kWh)$$

(c) Calculation of Percentage Energy Saving Compared to Lowest 2-Star Rating, B:

$$\text{B=100\%-(100}\times\frac{\text{A(kWh),}}{Annual\ Energy\ Consumption\ for\ Lowest\ 2-star}\text{)}$$

Where;

$$\text{The annual energy consumption for lowest 2-Star rating model (kWh)} = \frac{365 \times EER_{lowest\ 2star} \times Rated\ Capacity}{1000}$$

EER lowest 2-Star = 22.5 Wh/kg for top loading washing machine

EER lowest 2-Star = 220.0 Wh/kg for front loading washing machine

6.5 Energy efficiency rating

The energy efficiency rating in the form of star rating shall be in accordance to Table 10 and Table 11 respectively.

Top Loading Washing Machine ≤ 16kg

Star Rating	Energy Efficiency Ratio (Wh/kg)
5	<6.0
4	6.0≤ EER <10.0
3	10.0≤ EER <17.0
2	17.0≤ EER <22.5
1	≥22.5

Table 10 : Star Rating Table for Top Loading Washing Machine

Front Loading washing machine ≤ 16kg

Star Rating	Energy Efficiency Ratio (Wh/kg)
5	< 70.0
4	70.0 ≤ EER < 90.0
3	90.0 ≤ EER < 140.0
2	140.0≤ EER <220.0
1	≥220.0

Table 11 : Star Rating Table for Front Loading Washing Machine

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PART 7 : MICROWAVE OVEN

7.1 Scope

These Guidelines shall apply to the following functions of microwave oven with size up to or equal to 32 Litre:

(a) solo;

(b) combination;

(c) convection; and

(d) any other microwave oven with similar function;.

7.2 Interpretation

In this part, the following terms shall have the following meanings:

Combination	A microwave oven that combines microwave functionality with additional heating method;
Convection	A microwave oven using fan to force the air movement and heat up the full interior of the microwave oven;
On Mode	Means the microwave oven set is connected to an external power source and provides display;
Solo	Means microwave with one heating method only;
Standby Mode	Means an any microwave oven that connected to main power source and have one or more of the functions as prescribed in the MS IEC 62301:2012;

7.3 Testing Methodology

7.3.1 The microwave oven shall be tested according to the testing methodology as follows:

National Standard	Equivalent International Standard
None	IEC 60705:2010, Household microwave ovens- Methods for measuring performance.
MS IEC 62301:2012, Household electrical appliances - Measurement of standby power.	IEC 62301:2011 Household electrical appliances - Measurement of standby power

7.3.2 Testing of power measurement shall be carried out under following conditions:

(a) Power measurement at a time when the device is on On Mode; and

(b) Power measurement at a time when the device is on Standby Mode.

7.3.3 The On Mode power consumption shall have the following specific conditions:

(a) Supply voltage and frequency: 230V, 50Hz.

(b) Magnetron filament heating-up time shall be provided by the manufacturers.

7.3.4 The Standby Mode power consumption shall be measured according to MS IEC 62301:2012.

7.3.5 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component such as fan motor, high voltage capacitor value, high voltage transformer value, magnetron, PCB design/layout and other relevant component related to performance of the microwave oven, the microwave oven shall be tested again.

7.3.6 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

7.4 Calculation of energy efficiency

The efficiency shall be calculated in accordance with the following formula:

$$\eta = \frac{P \times t}{W_{in}} \times 100\%$$

Where:

η= is the efficiency in percentage rounded to the nearest whole number

t = is the heating time in seconds excluding the magnetron filament heating-up time

W_{in} = is including the magnetron filament heating up energy consumption in watts second.

P = is the calculated microwave power output (in Watt)

(a) Calculation of Annual Energy Consumption (kWh), A

$$Annual\ Energy\ Consumption\ (kWh), A = 0.365 \times 3 \times \frac{W_{in}}{3600}$$

Where 3 is referring to 3 times usage per day.

(b) Calculation of Percentage Energy Saving Compared to Lowest 2-Star Rating, B:

$$B = 100\% - \left(100 \times \frac{\eta_{lowest\ 2-star\ model}}{\eta_{tested}}\right)$$

7.5 Energy efficiency rating

The energy efficiency rating in the form of star rating shall be in accordance with Table 12 below:

Star Rating	Efficiency,η (%)
5	65 ≤ η
4	58≤ η <65
3	53≤ η <58
2	45≤ η <53
1	η <45

Table 12 : Star Rating for microwave oven

The maximum power consumption during Standby Mode shall be 1 W.

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PART 8 : RICE COOKER

8.1 Scope

8.1.1 Subject to paragraph 2.3, this Guide shall apply to the rice cooker as following:

(a) maximum rice cooking capacity: 1.0L ≤ Capacity ≤ 3.6L; and
(b) rated power: 400W ≤ P ≤ 1600W

8.1.2 A multi cooker with the function of cooking rice shall also be tested. The following equipment and technologies are excluded from these Guidelines:

(a) induction heating rice cooker; and
(b) any rice cooker model(s) that have been granted exemption by the Commission.

8.2 Testing Methodology

8.2.1 The testing methodology reference is MS 2024:2020 Electric Rice Cooker for household use – Method of measuring the performance.

8.2.2 The testing shall be done at the following conditions:

(a) Supply voltage and frequency: 230V, 50Hz; and
(b) Water volume shall be 80% of the maximum rated water capacity
(c) Test conducted at normal rice cooking mode.

8.2.3 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component such as heater, thermostat / temperature limiter, inner

pot material, PCB (for fuzzy logic type) and other relevant component related to performance of the rice cooker, the rice cooker shall be tested again.

8.2.4 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

8.3 Calculation of energy efficiency

The efficiency shall be calculated in accordance with the following formula:

$$\eta = \frac{1.16 \times G \times (T_2 - T_1)}{E} \times 100$$

Where

η = is the energy efficiency , in % , rounded to one decimal

G = is the mass of water before test, in kilogram (kg)

T_1 = is the initial water temperature before test, in °C

T_2 = is the highest temperature after test, in °C

E = is the energy consumption , in Wh

(a) Calculation of Annual Energy Consumption (kWh), A

$$\text{Annual Energy Consumption, a(kWh)} = \frac{365 \times 2 \times E}{1000}$$

Where E is energy consumption can be obtained from the test report in Wh.

(b) Calculation of Percentage Energy Saving Compared to Lowest 2-Star Rating, B:

$$B = 100\% \times \left(\frac{\eta_{lowest\ 2-star\ model}}{\eta_{tested}}\right)$$

Rated Power (W)	η Lowest 2 Star Model (%)
P ≤ 400	70
400 < P ≤ 600	71
600 < P ≤ 800	72
800 < P ≤ 1000	73
1000 < P ≤ 2000	74

Table 13 : η Lowest 2 Star for each rated power

8.4 Energy efficiency rating

The energy efficiency rating in the form of star rating shall be in accordance Table 14 below.

Rated power, P (W)	Efficiency, η (%)				
	1-star	2-star	3-star	4-star	5-star
P ≤ 400	≥ 65	≥ 70	≥ 75	≥ 80	≥ 85
400 < P ≤ 600	≥ 66	≥ 71	≥ 76	≥ 81	≥ 87
600 < P ≤ 800	≥ 67	≥ 72	≥ 77	≥ 82	≥ 89
800 < P ≤ 1000	≥ 68	≥ 73	≥ 78	≥ 83	≥ 91
1000 < P ≤ 2000	≥ 69	≥ 74	≥ 79	≥ 84	≥ 93

Table 14 : Star Rating for rice cooker

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PART 9 : FREEZER

9.1 Scope

Thes Guidelines shall apply to the following function of freezer with size up to or equal to 320 L, chest type with solid door.

9.2 Interpretation

In this part, the following terms shall have the following meanings:

EEF	Energy efficiency factor is a ratio between adjusted volume in litres and energy consumption per day in kWh obtained using the test method as in IEC 62552- 3:2015/AMD1:2020
Star Index	An indication of the claimed energy efficiency of a model. A higher SRI indicates higher energy efficiency. It is derived from the energy efficiency factor (EEF).

9.3 Testing Methodology

9.3.1 The testing methodology reference are as follows:

(a) IEC 62552-1:2015/AMD1:2020
Household refrigerating appliances –Characteristics and test methods -Part 1 : General requirements

(b) IEC 62552-3:2015/AMD1:2020
Household refrigerating appliances – Characteristics and test methods -Part 3 : Energy consumption and volume

9.3.2 The testing methodology shall meet the following requirements:

(a) **General**

The energy consumption shall be determined by interpolation from the results of two tests: one giving a temperature warmer than, and the other a temperature colder than, the target temperature as in accordance with IEC 62552-3:2015/AMD1:2020.

(b) **Electricity Supply**

The refrigerating appliance shall be tested at the 230V, 50Hz.

(c) **Ambient Temperature and Humidity**

Ambient temperature of 32 ±0.5 ºC ,with humidity less than 75%.

(d) **Load processing efficiency**

This value is determined by using equation (57) of Annex G of IEC 62552- 3:2015/AMD1:2020. This value is determined at ambient temperature of 32±0.5 ºC only. A regional factor to scale processing load used is 1.

9.3.3 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component such as motor, motor capacitor value, regulator capacitor value, PCB design/layout, compressor, compressor capacitor, thermostat / temperature sensor, inverter PCB (for inverter type)) and other relevant component related to performance of the freezer, the freezer shall be tested again.

9.3.4 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

9.4 Calculation of energy efficiency

(a) Star index is determined based on daily energy consumption obtained from test conducted in accordance with IEC 62552-1:2015/AMD1:2020 and IEC 62552-3:2015/AMD1:2020.

(b) Star Index is determined by the following equation:

$$Star\ Index = \left(\frac{EEF_{tested}}{EEF_{average}} - 1\right) \times 100\%$$

Where

$$EEF_{average} = 0.386 \times V_{adj} + 147.5$$

$$EEF_{tested} = \frac{V_{adj}\,(L)}{Energy\ Consumption\ per\ day\ (kWh)}$$

Where

$$Energy\ Consumption\ per\ day\ (kWh) = \frac{E_{total}}{365}$$

Where

$$E_{total} = E_{daily32c} \times 365 + \Delta E_{processing3} \times 365$$

The adjusted volume $V_{adjusted}$ of a refrigeration is calculated by summing the adjusted volume for each compartment as per equation below:

$$V_{adj} = \sum_{I=1}^{n} K_{ci} \times V_i$$

Where

n is number of compartments in the refrigerating appliance

Vi is volume of compartment *i* (litres)

Kci is adjustment volume factor for compartment *i* as determined in accordance with the following equation.

$$K_{ci} = \frac{T_{ka} - T_{ti}}{T_{ka} - T_{tff}}$$

Where,

Tka is the environment test temperature (set at + 32±0.5 ºC);

Tti is the target temperature of compartment *i* (°C) from Table 2

Ttff is the target temperature of a fresh food compartment (4 °C)

The volume adjustment factor (Kci) for each compartment type is specified in Table 15 below.

Compartment type	Target temperature (°C)	Volume adjustment factor (*Kci*)
1 star	-6	1.36
2 star	-12	1.57
3 star and 4 star	-18	1.79

Table 15 : Volume adjustment factor

(c) Calculation of Annual Energy Consumption (kWh), A

Annual Energy Consumption (kWh)= can also obtained from the test report

(d) Calculation of Percentage Energy Saving Compared to Lowest 2-Star Rating, B:

$$B = 100\% - 100 \times \left(\frac{\left(0.1642 \times V_{adj}(L)\right) + 139.75}{EEF_{tested}} \right)$$

9.5 Energy efficiency rating

The star rating shall be in accordance with Table 16 below.

Star rating	Star index value
5	+ 35 % ≤ Star index
4	+ 15 % ≤ Star index < + 35 %
3	- 20 % ≤ Star index < + 15 %
2	- 37 % ≤ Star index < - 20 %
1	Star index < - 37 %

Table 16 : Star Rating for Freezer

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PART 10 : ELECTRIC OVEN

10.1 Scope

10.1.1 These Guidelines shall apply to portable or built-in type electric oven with the following function mode:

(a) conventional mode;
(b) convectional mode;
(c) conventional and convectional mode; and
(d) conventional, convectional and steam mode.

10.1.2 The following products and technologies are excluded from this Guideline:

(a) oven using energy sources other than electricity;
(b) oven offering a 'microwave heating' function;
(c) small cavity oven below than 10L usable volume;
(d) large cavity oven more than 90L useable volume;
(e) free standing oven with hob;
(f) oven with clearance height less than 120 mm and clearance width or depth less than 250 mm;
(g) heat storage oven;
(h) oven without adjustable temperature control; or
(i) oven which are heated with steam as a primary heating function or only with steam mode;

10.2 Interpretation

In this part, the following terms shall have the following meanings:

Built-in Electric Oven means an electric oven that is designed as a built-in equipment as stated in the IEC 60350-1:2016;

Portable Electric Oven	means the type of electric oven that can be moved from one place to another and not designed for built-in installation.
Conventional mode	means the operation function of an oven only using natural convection for circulation of heated air inside the cavity of the oven;
Convectional mode	means the operation function of an oven with forced air circulation when a built-in fan circulates heated air inside the cavity of the oven.
Steam mode	means the operation function of an oven when heat transmission by condensation of steam with a temperature > 100 °C.
cavity	means the enclosed compartment of electric oven in which the temperature can be controlled for preparation of food;
EEI	means the Energy Efficiency Index for each cavity of an electric oven;

10.3 Testing Methodology

10.3.1 The electric oven shall be tested according to the testing methodology as follows:

(a) IEC 60350-1:2016 - Household electric cooking appliances - Part 1: Ranges, ovens, steam ovens and grills - Methods for measuring performance.

(b) The minimum test condition shall be tested as follows in accordance to the various function mode of the electric oven:

Function	Minimum test data
Conventional mode only	Conventional mode
Convectional mode only	Convectional mode
Conventional and convectional mode	Convectional mode
Conventional, convectional and steam mode	Convectional mode

(c) Other options/features/functions such as eco, energy saver and etc. shall be disabled when the testing is conducted.

(d) The electric oven shall be tested at the voltage of 230V and the frequency of 50Hz.

(e) The minimum clearance height less than 120 mm shall be measured from the floor of the lowest shelf to the lowest point on the ceiling, as illustrated in Figure 2:

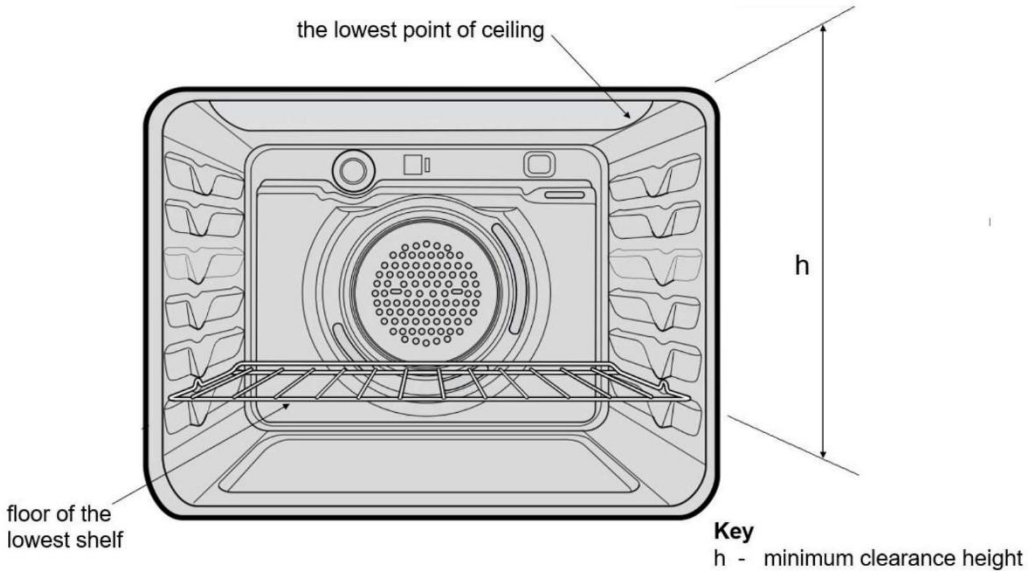

Figure 2 : Minimum Clearance Height

10.3.2 The relevant information shall be declared by the manufacturer and shall be stated in the product user instruction manual or product literature. The relevant information are as follows:

(a) the type of the electric oven;
(b) the total rated power of the electric oven;
(c) the useable volume as defined in the testing standard of the electric oven; and
(d) the dimension of useable internal dimension (height x width x depth) of the electric oven.

10.3.3 The Test Report shall only be issued by CAB and includes

(a) coloured photographs showing the name plate, exterior, interior and critical components of the electric oven;

(b) the critical components list with technical specification and description of the components of the electric oven; and

(c) the data and calculation sheet of the electric oven based on energy consumption for heating a load as per Annex E in IEC 60350-1:2016.

10.3.4 The components in the performance test report shall be the same as the safety test report. In the case of major changes to any component such as heater, thermostat / temperature sensor, fan motor, PCB (if temperature sensor is used) and other relevant component related to performance of the electric oven, the electric oven shall be tested again.

10.3.5 A complete Test Report shall contain an attachment with photos of the product taken including the photos of major components marking listed as per clauses above.

10.4 Calculations of energy efficiency

(a) The energy consumption per cycle corresponding to the best performing mode (conventional mode or convectional mode) shall be used to determine the EEI. For each cavity of an oven, the EEI shall be calculated according to the following formula:

$$EEI_{cavity} = \frac{EC_{electic\ cavity}}{SEC_{electic\ cavity}} \times 100$$

Where

EEI_{cavity} is EEI for each cavity of an electric oven, in %, rounded to the first decimal place,

$EC_{electic\ cavity}$ is Energy consumption required to heat a standardized load in a cavity of an electric oven during a cycle, expressed in kWh, rounded to the second decimal place

$SEC_{electic\ cavity}$ is Standard Energy Consumption (electricity) required to heat a standardized load in a cavity of an electric oven during a cycle, expressed in kWh, rounded to the second decimal place, and determined as following calculation depending on the type of an electric oven:

For Built in Electric Oven :

$$SEC_{electic\ cavity} = 0.0105 \times \mathrm{V} + 0.1436$$

For Portable Electric Oven :

$$SEC_{electic\ cavity} = 0.0126 \times \mathrm{V} + 0.3439$$

Where

V is the volume of the cavity of the electric oven in litres (L) rounded to the nearest integer.

(b) Calculation of Annual Energy Consumption (kWh), A

$$\text{Annual Energy Consumption (kWh), A} = \text{Energy Consumption (kWh)} \times 365$$

Where Energy Consumption (kWh) can be obtained from the test report.

(c) Calculation of Percentage Energy Saving Compared to Lowest 2- Star Rating, B:

$$B = 100 - 100 \times \left(\frac{EEI_{cavity}}{EEI_{lowest\ 2star}}\right)$$

10.5 Energy efficiency rating

The energy efficiency rating in the form of star rating shall be in accordance with Table 17 and Table 18.

Star rating	EEI (%)
5	EEI < 82
4	82 ≤ EEI < 92
3	92 ≤ EEI < 115
2	115 ≤ EEI < 140
1	140 ≤ EEI

Table 17 : Star Rating for built-in oven

Star rating	EEI (%)
5	EEI < 85
4	85 ≤ EEI < 95
3	95 ≤ EEI < 110
2	110 ≤ EEI < 120
1	120 ≤ EEI

Table 18 : Star Rating for portable electric oven

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CHAPTER 2 : ENERGY EFFICIENCY RATING LABEL

In accordance with the Energy Efficiency and Conservation Act, any equipment that meets all the requirements of efficient use of electricity shall be affixed with an efficiency rating label. It shall be the responsibility of the manufacturer or importer to affix such label. Information to be included in the label is as per Figure 3 .

Figure 3 : Energy Efficiency Label

Label in Figure 3 shall applicable to all energy using product except for Lamp. The label for lamp shall has following information in the label:

(a) For LED Lamp after completing first 1,000 hours of test

Efficacy value : 55 lm/W

This product has been tested up to 1,000 hours

Suruhanjaya Tenaga
Energy Commission

(b) For LED Lamp after completing 6,000 hours of test

Efficacy value : 55 lm/W

This product has been tested up to 6,000 hours

Suruhanjaya Tenaga
Energy Commission

(c) For other type of lamps

Efficacy value : 55 lm/W

Suruhanjaya Tenaga
Energy Commission

Size Specification

The size of the energy efficiency label is as per figure below.

Figure 4 : Label size for rice cooker, microwave and fan

Figure 5 : Label size specification for washing machine, refrigerator, air conditioner, freezer, and television

Figure 6 : Label size specification for Electric Oven

Font and Colour Specifications :

Figure 7 : Font and Colour Specifications

QR Code

(a) The QR code shall be downloaded from https://edik.st.gov.my/ with reference to the COE approval number and the printed QR code shall be readable by a QR code scanner.

(b) Design specification: The designs for the energy efficiency label for each star rating are as per Figure 8.

Figure 8 : Label design for 2-star to 5-star

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