

18th March, 2021

Schedule 26

Ultra-High Definition Televisions

1. Scope

This schedule specifies the requirement for participating in the star labelling program for Ultra-High Definition (UHD) televisions of Liquid Crystal Display with LED backlighting, OLED displays, QLED displays, Micro-LED displays, that may be utilised to make and sell UHD televisions in the Indian market having native resolution of 3,840 x 2,160 pixels (4K) and 7,680 x 4,320 pixels (8K) which can be powered only by an external power supply at a voltage not exceeding 250 V ac, 50 Hz being manufactured, imported and commercially purchased or sold in India.

This schedule however excludes televisions that includes a non-removable main battery and computer monitors.

2. Referred Standards

This schedule shall be read in conjunction with the following standards for the purpose of star labelling program:

Reference Standard	Title of the Standard
IEC 62087-3, 2015, Edition 1.0 (with all amendment as on date)	Audio, video, and related equipment – Determination of power consumption-Part 3: Television sets
IS 616: 2017 /IEC 60065:2014 Edition 8.0 (with all amendment as on date)	Audio, video and similar electronic apparatus - Safety requirements

3. Terminology

For the purpose of this schedule, the following definitions in addition to those given in IS 616, IEC 62087 shall apply. However, for any disputes, the definitions given in the respective standard shall prevail.

- 3.1 Annual Energy Consumption:** Annual energy consumption is the typical on-mode power consumption and standby power consumption based on an average hour of usage of watching TV a day and multiplied by 365 days a year.
- 3.2 Analog TV:** The television sets having the provisions of National Television Standards Committee (NTSC), Phase Alternating Line (PAL), or Sequential colour with Memory (SECAM) tuner and may have analog video inputs (e.g., composite video, component video, S-video, RGB).
- 3.3 Automatic Brightness Control (ABC):** A feature that senses ambient light conditions and changes display luminance, accordingly, possibly reducing power consumption.
- 3.4 Colour Television (TV):** Equipment for the reception and display of television broadcast and similar services for terrestrial, cable, satellite, and broadband network transmission of analogue and/or digital signals.
- 3.5 Digital TV:** Digital televisions include at least one digital tuner or at least one digital video input (e.g., High Definition Media Interface - HDMI). Products with an analog tuner and both analog and digital inputs should be considered digital products.
- 3.6 Disconnected:** The state where all connections to mains power source of energy using product are removed or interrupted and is not in low power mode.
- 3.7 External Power Supply:** A Flexible cord, for supply purposes that is fixed to the appliances and designed to convert line voltage AC input from the mains to lower DC voltage(s) for the purpose of powering the television.
- 3.8 Label:** Any written, printed, marked, stamped or graphic matter affixed to, or appearing upon the UHD Televisions.



- 3.9 Label Period:** It is the label validity period of the annual energy consumption standards provided under the star rating plan.
- 3.10 Luminance:** The photometric measure of the luminous intensity per unit area of light travelling in a given direction where luminance describes the amount of light that passes through or is emitted from a particular area, and falls within a given solid angle and is expressed in candela per square meter (cd/m²).
- 3.11 Family of models:** it is range of models of one particular brand, to which a single set of test reports is applicable and where each of the models has the same physical characteristics, annual energy consumption, energy efficiency rating and performance characteristics
- 3.12 Native Resolution:** It can be defined as the physical size of the screen - measured by the number of pixels.
- 3.13 Operational Modes:**
- 3.13.1 **On Mode:** The television set is connected to an external power source and provides picture and, if possible, sound.
 - 3.13.2 **Off Mode:** The television set is connected to an external power source and does not produce picture or sound and does not provide any other function that depends on an external power source. The television set cannot be switched into any other mode with the remote-control unit, or an external or internal signal. Note that some power may be consumed if an EMC filter or other components exist on the source side of the power switch
 - 3.13.3 **Standby Passive Mode:** The television set is connected to an external power source and does not provide picture or sound. The television set can be switched into another mode with the remote-control unit or an internal signal, but not with an external signal.
 - 3.13.4 **Standby Active, High Mode:** The television set is connected to an external power source and does not provide picture or sound. The television set can be switched into another mode with the remote-control unit, an internal signal, or an external signal. Additionally, the television set is exchanging/ receiving data with/from an external source.
 - 3.13.5 **Standby Active, Low Mode:** The television set is connected to an external power source and does not provide picture or sound. The television set can be switched into another mode with the remote-control unit or an internal signal and can additionally be switched into another mode with an external signal.
- NOTE:** When in Standby-active, low mode, a television may be able to be switched into the On mode, the Off mode, the Standby passive, or the Standby-active, high mode.
- 3.14 Permittee:** Means an individual and/or an organization to whom permission has been granted to affix label.
- 3.15 Star rating or star level:** The number of stars displayed on the energy label. The available stars are between a minimum of one and a maximum of five shown in one-star interval. The star rating is calculated from the Star Rating Band. The star level of the colour televisions shall be determined on the basis of annual energy consumption (AEC) in kilo Watt hours(kWh) per annum, which shall be obtained by substituting screen size in square centimetre in equations as specified in section "Star Rating Plan" of this schedule depending on the year of manufacturing or commercial purchase or sale.
- 3.16 Trader or seller:** In relation to any labelled colour television means a person who sells or distributes any such colour television and includes the shopkeeper, trader, manufacturer and permittee who has been given permission to affix label on such colour television.
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4. Schedule of Tests

All the tests such shall be conducted as per the latest versions of the following testing parameters:

On Mode Power Consumption	The test shall be carried out as per IEC 62087 -3
Standby Mode Power Consumption (Measurement of power consumption in the Off mode, Standby Passive mode, Standby Active Low mode, Standby Active High mode)	
Peak Luminance Ratio	
Safety Requirements	The test shall be carried out as per IS 616

5. Test Parameters

5.1 Prequalification Criteria: The product should meet the following requirements as specified in clause 4 of this schedule to participate in BEE labelling program.

- a) Peak illuminance ratio
- b) Off mode power consumption
- c) Power factor
- d) Partial ON mode power consumption
 - i. Standby passive
 - ii. Standby active, low mode (for product having Wi-Fi capabilities)
- e) Safety requirements

NOTE: In the case of safety requirements, the product should be certified under BIS compulsory Registration Scheme effective from 01 October 2020 supported by valid document regarding conformity of the product as per IS 616 under CRS scheme.

5.2 Annual Energy Consumption: The Annual Energy Consumption is a function of the On Mode the Standby Mode, and Off Mode power consumption and will be determined using the following formula:

$$AEC = (P_a \times 6 + P_s \times 12) \times 0.365 \text{ kWh/ annum}$$

Where:

P_a is the On-Mode Power Consumption in watts on daily use of 6 hours

P_s is the Standby Mode Power Consumption (Off mode, Standby Passive mode, Standby Active Low mode in watts on daily use of 12 hours

Annual energy consumption shall be calculated using the typical on-mode, off mode and standby power consumption based on an average hour of watching TV a day and multiplied by 365 days a year without taking into consideration the screen size. The calculation of AEC based on screen size is given in 8 of this schedule.

Measurements of power of 0.5 Watt or greater shall be made with a relative uncertainty of less than or equal to 2%. at the 95% confidence level and the measurements of power of less than 0.5 Watt shall be made with an uncertainty of less than or equal to 0.01 W at the 95% confidence level.

5.3 Test Conditions:

- a. Supply Voltage: The requirements given in clause 5.1.1.5 and 5.1.1.6 of IEC 62087-1 shall be followed. The test voltage shall be the declared voltage ± 1 % and the test frequency shall be the rated frequency ± 1 %.



The fluctuation of the voltage supplied shall not exceed $\pm 2\%$. The frequency fluctuation and the harmonic components of the supplied power shall not exceed $\pm 2\%$ and 5% respectively

- b. Total Harmonic Distortion: The requirements given in clause 5.1.1.6 of IEC 62087-1 shall apply.

The total harmonic content of the source voltage when supplying the unit under test in the specified mode shall not exceed 2% (up to and including the 13th harmonic); harmonic content is defined as the root-mean-square (r.m.s.) summation of the individual components using the fundamental as 100% .

- c. Ambient Temperature: The requirements given in 5.1.2 of IEC 62087-1 shall apply.

The ambient temperature of the test room shall be $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, unless otherwise specified in this series of standards. The ambient temperature shall be reported.

- d. Luminance measuring Device: When directed to measure display luminance a luminance measuring device (LMD), which may be of either the contact or non-contact type, shall be used. The LMD shall have an acceptance (or measuring) angle in the range of 1° to 3° , inclusive. For contact LMDs, the measuring area shall have a diameter of 25 mm or more. The LMD shall have an accuracy of $\pm 2\% \pm 2$ digits of the digitally displayed value or better.
- e. Illuminance measuring instrument: When directed to illuminate one or more ABC sensors, an illuminance measuring instrument shall be used to adjust the light level to the specified value. The illuminance measuring instrument shall have an accuracy of $\pm 2\% \pm 2$ digits or better.
- f. Ambient light conditions: For determining On mode power consumption for television sets with ABC enabled, $\leq 1\text{ lx}$ shall be confirmed at the surface of the ABC sensor assembly with the light sources (clause 5.6.4, 5.6.5 of IEC 62087-3:2015) off and the UUT in the Off or Disconnected mode.

For determining the peak luminance ratio with a non-contact LMD, $\leq 5\text{ lx}$ shall be confirmed at the nominal centre of the display area of the UUT in Off or Disconnected mode. This requirement applies whether or not a light source (5.6.5) is applied to disable the ABC feature.

A dark room and/or shroud may be necessary in order to achieve the required ambient light conditions.

5.4 Power consumption:

- a. Shall be measured as per the reference test standards and expressed in 'Watts'.
- b. The values of power consumption will be represented as P_a (in Watts) for on mode' and P_s (in Watts) for 'Standby Passive mode and Standby Active Low Mode.
- c. Annual energy consumption calculated based on P_a and P_s , shall not be more than 5% of the rated value.
- d. For the 'on mode' power consumption measurement shall be made in the default picture mode (home viewing mode), however, if this mode is unavailable, energy consumption shall be measured for brightest selectable pre-set picture mode.
- e. 'On mode' power consumption shall be measured only after disabling Automated Brightness Control (ABC) function for televisions with ABC sensors.
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6. Test Report

Test reports from manufacturers' own test laboratories, or independent third party test laboratories duly accredited by an accrediting agencies such as NABL in India or any other accreditation bodies who are signatory to MRA with APAC and/or ILAC in India as well as overseas/other countries. The results of test shall be reported in the prescribed format as given in Annexure A of this schedule.

7. Tolerance Limit

There shall be no negative tolerance for the star rating levels and all tested equipment shall meet the minimum threshold for each star rating level; and the scope for manufacturing tolerance and other variations shall be accounted by the manufacturer when determining the star rating, keeping in view the following points for rounding; namely:

- The values of annual energy consumption (kWh/annum), shall be rounded off and recorded to two decimal places.
- The values of power consumption (W) shall be rounded and recorded to three decimal places.
- The values of screen size (centimetre) shall be rounded and recorded to two significant figures.
- All the values shall be rounded off to respective decimal places, as per IS 2:1960 or any editions that may supersede this standard.

8. Star Rating plan

The star rating plan shall be based on Annual Energy Consumption (AEC) measured as per the procedure given in section 5.2 of this schedule and the corresponding screen area of as particular model. The AEC corresponding to the screen area shall be calculated using the following equation:

$$AEC = (X \times A) + Y$$

Where:

AEC (in kWh/year) = Annual Energy consumption

A (in square centimetres) = the effective/viewable screen area calculated by multiplying the display/ screen width by the display/ screen height

X (in kWh/year/sq.cm) = On Mode power consumption in watts x hours of operation in 'On Mode' x 365/1000

Y (in kWh/year) = Standby Mode power consumption in watts x hours of operation in 'Standby Passive Mode' x 365/1000 + Standby Mode power consumption in watts x hours of operation in 'Standby active, low Mode' x 365/1000.

Note: Standby active low mode is applicable if the UHD TV has the Wi-Fi capabilities. Similarly, standby active, high mode is applicable if additional network is available.

8.1 The Annual Energy Consumption (AEC) thresholds for UHD 4K Televisions are specified in Table 1.

Table 1

Star Rating Band – UHD 4K Televisions - Voluntary Phase (Valid from 01 January 2021 to 31 December 2021)			
1 Star	$0.0271 \times A + 6.226$	$<AEC \leq$	$0.0325 \times A + 6.226$
2 Star	$0.0217 \times A + 6.226$	$<AEC \leq$	$0.0271 \times A + 6.226$
3 Star	$0.0174 \times A + 6.226$	$<AEC \leq$	$0.0217 \times A + 6.226$
4 Star	$0.0139 \times A + 6.226$	$<AEC \leq$	$0.0174 \times A + 6.226$
5 Star		$AEC \leq$	$0.0139 \times A + 6.226$



8.2 The Annual Energy Consumption (AEC) thresholds for UHD 8K Televisions are specified in Table 2.

Table 2

Star Rating Band – UHD 8K Televisions - Voluntary Phase (Valid from 01 January 2021 to 31 December 2021)			
1 Star	$0.051 \cdot A + 122.16$	$<AEC \leq$	$0.061 \cdot A + 122.16$
2 Star	$0.040 \cdot A + 122.16$	$<AEC \leq$	$0.051 \cdot A + 122.16$
3 Star	$0.032 \cdot A + 122.16$	$<AEC \leq$	$0.040 \cdot A + 122.16$
4 Star	$0.026 \cdot A + 122.16$	$<AEC \leq$	$0.032 \cdot A + 122.16$
5 Star		$AEC \leq$	$0.026 \cdot A + 122.16$

8.3 Standby Power Consumption:

8.3.1 The Standby Power Consumption for all televisions will be sum of the Off-mode power consumption, the Standby passive mode power consumption and the Standby active low mode power consumption.

Note: Standby active low mode is applicable if the UHD TV has the Wi-Fi capabilities. Similarly, standby active, high mode is applicable if additional network is available.

8.3.2 Standby Power Consumption will be measured as per IEC 62087-3, Household electrical appliances – Measurement of standby power as specified under point 2 (“Normative References”) of IEC 62087-3.

8.3.3 **Standby Power Consumption for all televisions must be ≤ 0.4 watts.**

8.4 The star level plan shall be reviewed after every two years.

8.5 Measurements of power of 0.5 W or greater shall be made with an uncertainty of less than or equal to 2% at the 95% confidence level. Measurements of power of less than 0.5 W shall be made with an uncertainty of less than or equal to 0.01 W at the 95% confidence level. The power measuring instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W;
- 1 W or better for power measurements of greater than 100 W.

For equipment connected to more than one phase, the power measuring instrument shall be equipped to measure the total power of all phases connected.

NOTE For more information about the determination of uncertainty of measurement, refer to IEC 62301:2011, Annex D.

9. Fees

9.1 For the purpose of registration with BEE, every brand would be required to deposit a refundable label security fee of INR 1,00,000/- (Rupees One Lakh Only), payable by only electronic mode in favour of the Bureau of Energy Efficiency, New Delhi. In case of small-scale industry, the label security fee shall be INR 25,000/- (Rupees Twenty-five thousand only).

9.2 Application fee payable for a new model registration shall be INR 2000/- (Rupees Two thousand only), payable by only electronic mode in favour of the Bureau of Energy Efficiency, New Delhi.

9.3 Application fee payable on application for renewal of authority to affix labels is INR 1000/- (Rupees One Thousand only) as per BEE norms.

9.4 Labelling fee for affixation of label on each piece of colour television is INR 30/- (Rupees thirty only).



10. Label Design and Manner of Display

10.1 Label contents: On every UHD television, the following particulars shall be displayed on its label, namely: -

- a. Logo of the Bureau of Energy Efficiency
- b. Name of manufacturer or importer and brand
- c. Screen size measured diagonally across the screen in centimetre
- d. Model number and year of manufacturing or import
- e. Equipment type
- f. Annual energy consumption in kWh per year
- g. Star level
- h. Label period; and
- i. Unique series code.

10.2 Material and Placement of label:

The label shall be self –adhesive or non-sticky and shall be designed as specified in this Schedule. All UHD television must display the label at the point of sale. The label shall be,

- a) Non-sticky level pop type affixed on the front side, and
- b) Self –adhesive affixed on the back side, and
- c) Self –adhesive affixed on the packaging box.



10.3 Dimension and Shape

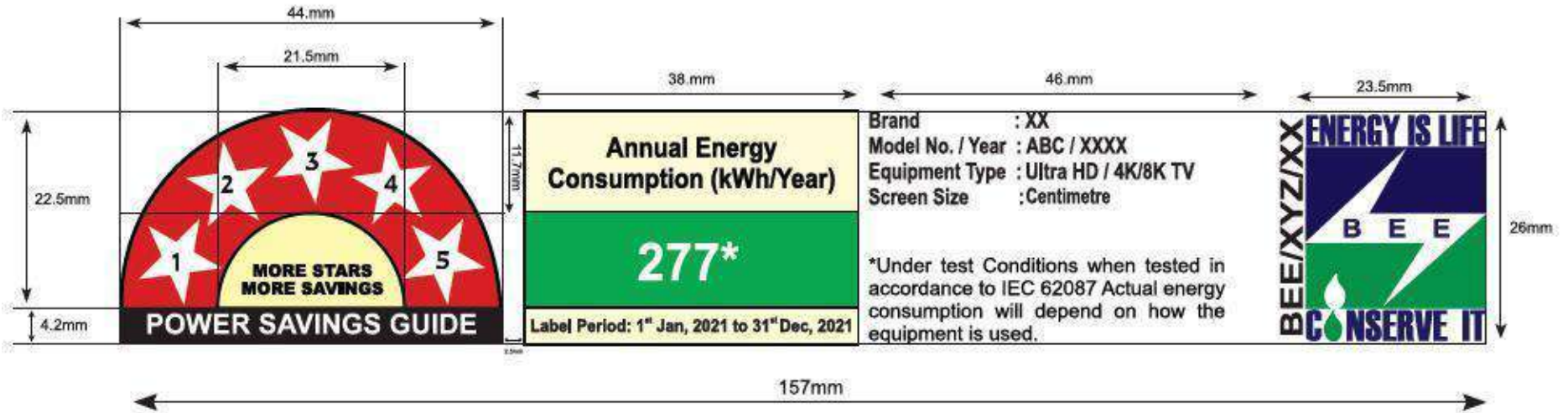


Figure 1: Dimensions for UHD TV Star Label

10.4 Colour scheme

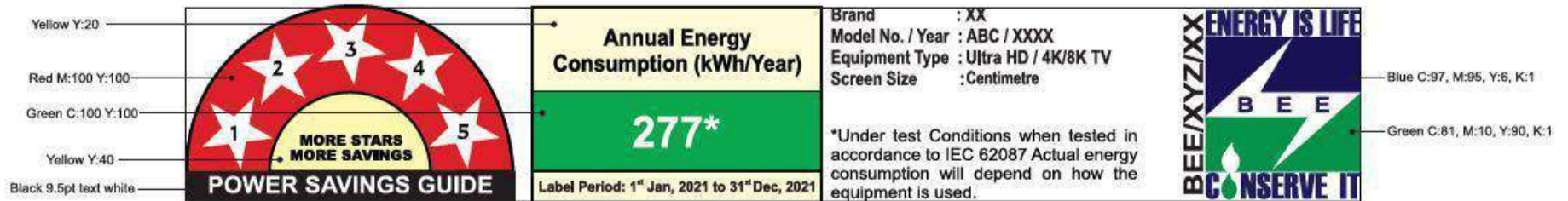


Figure 2: Colour scheme for UHD TV Star Label



10.5 Sample Label

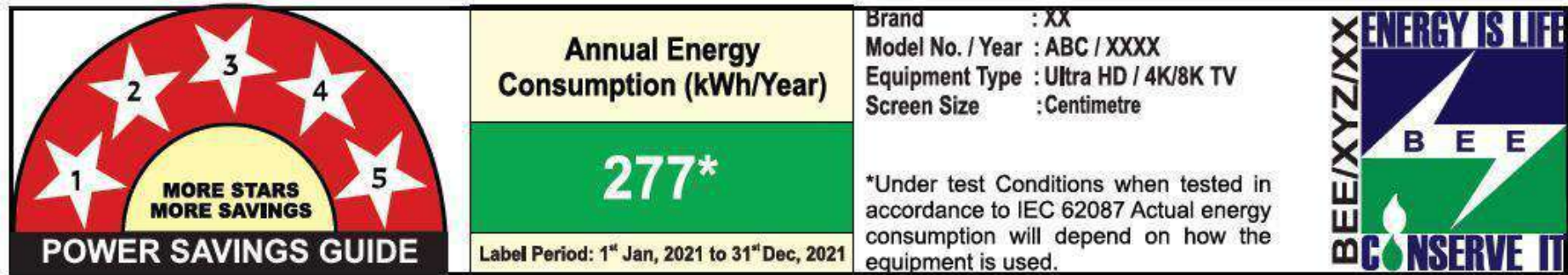


Figure 3: An example of a printed star label to be affixed on the UHD TV model

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



11. Check Testing

The Bureau shall from time to time carry out verification process to ensure that the labelled UHD Televisions conform to the star level and other related information displayed on its label and that it complies with the other terms and conditions of permission. All the tests shall be conducted by the BEE, or its authorized representative for the purpose of verification and check testing.

The check testing of the product shall be carried out as described in the Guidelines for Permittee of BEE's S&L program wherein the overall procedure shall be the same as followed for Colour Televisions.



Annexure A Test Report Form

Test Report No:

Date of Test Report:

Date of Testing:

Date of Receipt of Test Samples:

1. UHD TV Product Details.

- a. Brand:
- b. Type:
- c. Model name: (if applicable)
- d. Model number:
- e. Rated input voltage or voltage range:
- f. Rated Screen Size:
- g. Rated Screen Area:
- h. Rated Energy Consumption:

2. UHD TV Configuration

S. No.	Test	Measured Value /Remarks
1	Input Terminal	
2	Contrast/ Brightness	
3	Power saving functions	
4	Sound Level	
5	Period (Dynamic signal)	
6	Calculated Area (sq. cm)	

3. Test Set Up

General condition requirements for Power Source

S. No.	Test	Measured Value /Remarks
1	Main battery connection	
2	External power supplies	
3	Mains power	
4	Power from other than the mains	
5	Power source, On mode	
6	Power source, Partial On and Off modes	

Initial activities

S. No.	Test	Measured Value /Remarks
1	Cool down	
2	Main batteries	
3	Plug-in module	
4	Installation	
5	Application of input signals	
6	Luminance measuring device setup	
7	Light source setup	
8	Power on	
9	TV settings: Default settings	
10	TV settings: Input source selection	



11	TV settings: Satellite feature	
12	TV settings: Additional functions	
13	TV settings: Special functions	
14	TV settings: Video size, aspect ratio, and resolution	
15	TV settings: Sound level adjustments	
16	TV settings: Networking	

4. Measuring Equipment for Luminance testing and power measurements

S. No.	Nomenclature (Description of the Measuring Equipment)	Make	Model	Resolution/ Accuracy	Calibration validity Date
1	Power measurement				
	a Wattmeter				
	b Wattmeter with averaging function				
	c Watthour meter				
2	luminance measuring device (LMD)				
3	Illuminance measuring instrument				

5. Test Results: Measurement method used IEC 62087:2015 (to be submitted for each of 3 units tested)

a. Luminance Testing

S. No.	Test	Measured Value
1	Peak luminance, default picture setting, $L_{DEFAULT}$	
2	Determination of power factor	
3	Determination of brightest selectable preset picture setting	
4	Peak luminance, brightest selectable preset picture setting, $L_{BRIGHTEST_SELECTABLE}$	
5	Peak luminance, retail picture setting, L_{RETAIL}	
6	Peak luminance, overall brightest pre-set picture setting, $L_{BRIGHTEST}$	
7	Peak luminance ratio, $L_{DEFAULT} / L_{BRIGHTEST}$	

b. Standby Mode Power Consumption Testing

S. No.	Test	Measured Value
1	Off mode	
2	Standby Passive mode	
4	Standby Active Low mode	
5	Total	



c. On-Mode Power Consumption Testing: On mode Power Measurement using Static, Dynamic, and Internet Content Video Signal

i. Preparation

S. No.	Test	Measured Value
1	Power Source Voltage and Frequency (IEC 62087-3 6.2.2),	
2	Input Terminals (IEC 62087-3 6.2.3)	
3	Video Signal, On Mode Power Consumption Procedure (IEC 62087-3 6.2.4)	
4	Video Signal, Peak Luminance Ratio Procedure (IEC 62087-3 6.2.5)	
5	Video Format (IEC 62087-3 6.2.6)	
6	Automatic Brightness Control Capabilities (IEC 62087-3 6.2.3)	
7	Automatic Brightness Control Levels (IEC 62087-3 6.2.7)	
8	Network Connection Capabilities (IEC 62087-3 6.2.8)	
9	Default Settings (IEC 62087-3 6.3.10.1)	
10	Input source selection (IEC 62087-3 6.3.10.2)	
11	Satellite feature (IEC 62087-3 6.3.10.3)	
12	Additional functions (IEC 62087-3 6.3.10.4)	
13	Special functions (IEC 62087-3 6.3.10.5)	
14	Video size, aspect ratio, and resolution (IEC 62087-3 6.3.10.6)	
15	Sound level adjustments (IEC 62087-3 6.3.10.7)	
16	Networking (IEC 62087-3 6.3.10.8)	

ii. Determination of power consumption, On mode

S. No.	Test	Measured Value
1	On Mode Power Measurements using static video signals (IEC 62087-3 6.4.5.2)	
2	On Mode Measurements using the dynamic broadcast-content video signal (IEC 62087-3 6.4.5.3)	
3	On Mode Measurements using the Internet-content video signal (IEC 62087-3 6.4.5.4)	

6. Test Summary

S. No	Test/.	Declared/ Rated value			Observed value		
		Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
1	Off mode power consumption						



2	Partial ON mode (standby passive, active low power consumption)						
3	Power factor						
4	Peak luminance ratio						
5	ON mode power consumption						
6	Annual Energy consumption						
7	Pa	<Average of three results>					
8	Ps				<Average of three results>		

Calculations: Annual Energy Consumption (AEC) = [(6 x Pa) + (12 X Ps)] x 0.365 kWh/year