



# ENERGY STAR® Program Requirements Product Specification for Televisions

## Eligibility Criteria Final Draft Version 8.0

1 Following is the Version 8.0 ENERGY STAR Product Specification for Televisions. A product shall meet  
2 all of the identified criteria if it is to earn the ENERGY STAR.

### 3 **1 DEFINITIONS**

#### 4 A) Product Types:

5 1) Television (TV)<sup>1</sup>: A product designed to produce dynamic video, contains an internal TV tuner  
6 encased within the product housing, and that is capable of receiving dynamic visual content from  
7 wired or wireless sources including but not limited to:

8 a) Broadcast and similar services for terrestrial, cable, satellite, and/or broadband transmission  
9 of analog and/or digital signals; and/or

10 b) Display-specific data connections, such as HDMI, Component video, S-video, Composite  
11 video; and/or

12 c) Media storage devices such as a USB flash drive, a memory card, or a DVD; and/or

13 d) Network connections, usually using Internet Protocol, typically carried over Ethernet or Wi-Fi.

14 2) Home Theater Display (HTD): A product with diagonal viewable screen size greater than 25  
15 inches, that is designed to produce dynamic video, that does not contain an internal TV tuner  
16 encased within the product housing, that is primarily marketed for use in home theater  
17 applications, and that is capable of receiving dynamic visual content from wired or wireless  
18 sources including but not limited to:

19 a) Display-specific data connections, such as HDMI, Component video, S-video, Composite  
20 video; and/or

21 b) Media storage devices such as a USB flash drive, a memory card, or a DVD; and/or

22 c) Network connections, usually using Internet Protocol, typically carried over Ethernet or Wi-Fi.

23 Home Theater Display does not include Computer Monitors or Signage Displays (defined in the  
24 ENERGY STAR Product Specification for Displays).

25 3) Hospitality Television/Home Theater Display: A TV or HTD product which includes the following  
26 features:

27 a) A control port for bi-directional communication (DB-9, RJ11, RJ12, RJ45, coaxial cable, or  
28 HDMI-CEC); and

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1 10 CFR 430.2

29 b) Activated hospitality protocol software (e.g., SmartPort, Meeting Professionals International  
30 (MPI), Multiple Television Interface (MTI), Serial Protocol) to provide direct access to Video-  
31 On-Demand (VOD) systems, non-video hotel services or a digital media player designed for  
32 hospitality-specific applications.

33 4) Projector: A product that is a mains-powered, optical device, for processing analog or digital video  
34 image information, in any, broadcasting, storage or networking format to modulate a light source  
35 and project the resulting image onto an external screen<sup>2</sup>.

36 B) Operational Modes:

37 1) On Mode<sup>3</sup>: The mode of operation in which the TV/HTD is connected to mains power, and is  
38 capable of producing dynamic video.

39 2) Standby-Passive Mode<sup>4</sup>: The mode of operation in which the TV/HTD is connected to mains  
40 power, produces neither sound nor picture, and can be switched into another mode with only the  
41 remote control unit or an internal signal.

42 3) Standby-Active, Low Mode<sup>5</sup>: The mode of operation in which the TV/HTD is connected to mains  
43 power, produces neither sound nor picture, can be switched into another mode with the remote  
44 control unit or an internal signal, and can additionally be switched into another mode with an  
45 external signal.

46 4) Standby-Active, High Mode<sup>6</sup>: The mode of operation in which the TV/HTD is connected to mains  
47 power, produces neither sound nor picture, is exchanging/receiving data with/from an external  
48 source, and can be switched into another mode with the remote control unit, an internal signal, or  
49 an external signal.

50 a) Download Acquisition Mode: The power mode in which the product is connected to a mains  
51 power source, produces neither sound nor picture, and is actively downloading data. Data  
52 downloads may include channel listing information for use by an Electronic Program Guide,  
53 TV/HTD setup data, channel map updates, firmware updates, monitoring for emergency  
54 messaging/communications or other network communications.

55 5) Off Mode<sup>7</sup>: The mode of operation in which the TV/HTD is connected to mains power, produces  
56 neither sound nor picture, and cannot be switched into any other mode of operation with the  
57 remote control unit, an internal signal, or external signal.

58 C) Additional Functions<sup>8</sup>: Functions that are not required for the basic operation of the device.

59  
60 Note: Additional functions include, but are not limited to, a VCR unit, a DVD unit, an HDD unit, a FM-  
61 radio unit, a memory card-reader unit, or an ambient lighting unit.

62 1) Thin Client Capability: The ability of the TV/HTD to receive, decrypt, and display encrypted  
63 content provided by a Multichannel Video Programming Distributor (MVPD) over the Local Area  
64 Network via a server device co-located on the customer premises without the need for a client  
65 device at the TV/HTD.

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2 AEA, Building on the Eco-design Directive, EuP Group Analysis: ENTR Lot 3 Sound and Imaging Equipment Task 1-7 Report,

<http://ec.europa.eu/DocsRoom/documents/10198/attachments/1/translations/en/renditions/pdf>.

3 10 CFR 430, Subpart B, Appendix H, Section 2.14

4 10 CFR 430, Subpart B, Appendix H, Section 2.18

5 10 CFR 430, Subpart B, Appendix H, Section 2.20

6 10 CFR 430, Subpart B, Appendix H, Section 2.19,

7 10 CFR 430, Subpart B, Appendix H, Section 2.13

8 10 CFR 430, Subpart B, Appendix H, Section 2.1, which references International Electrotechnical Commission (IEC) Standard 62087 Ed. 3.

66 2) Full Network Connectivity: The ability of the TV/HTD to maintain network presence while in  
67 Standby-Active, Low mode. Presence of the TV/HTD, its network services, and its applications, is  
68 maintained even if some components of the TV/HTD are powered down. The TV/HTD can elect  
69 to change power states based on receipt of network data from remote network devices, but  
70 should otherwise stay in Standby-Active, Low mode absent a demand for services from a remote  
71 network device. Full network connectivity is not limited to a specific set of protocols. Also referred  
72 to as “network proxy” functionality and described in the Ecma-393 standard.

73 D) Special Functions<sup>9</sup>: Functions that are related to, but not required for, the basic operation of the  
74 device.

75  
76 Note: Special functions include, but are not limited to, special sound processing, power saving  
77 functions (e.g., Automatic Brightness Control).

78 1) Automatic Brightness Control (ABC): The self-acting mechanism that controls the brightness of a  
79 display as a function of ambient light.

80 2) Gesture Recognition: Ability to recognize non-verbal communication through a movement of the  
81 body, head, or limbs to express or emphasize an idea, sentiment, or command.

82 3) Voice Recognition: Ability to recognize spoken words or phrases and to convert said  
83 communication into text or commands to which meaning has been assigned.

84 E) TV/HTD Settings and Menus:

85 1) Preset Picture Setting<sup>10</sup>: A preprogrammed factory setting obtained from the TV/HTD menu with  
86 pre-determined picture parameters such as brightness, contrast, color, sharpness, etc. Preset  
87 Picture Settings can be selected within the Home or Retail Configurations.

88 2) Default Picture Setting<sup>11</sup>: The Preset Picture Setting that the TV/HTD enters into immediately  
89 after making a selection from the Forced Menu. If the TV/HTD does not have a Forced Menu, this  
90 is the as-shipped Preset Picture Setting.

91 3) Brightest Selectable Preset Picture Setting<sup>12</sup>: The Preset Picture Setting in which the TV/HTD  
92 produces the highest screen luminance within either the Home or Retail Configuration.

93 4) Home Configuration<sup>13</sup>: The TV/HTD configuration selected from the Forced Menu which is  
94 designed for typical consumer viewing and is recommended by the manufacturer for home  
95 environments.

96 5) Retail Configuration<sup>14</sup>: The TV/HTD configuration selected from the Forced Menu which is  
97 designed to highlight the TV/HTD's features in a retail environment. This configuration may  
98 display demos, disable configurable settings, or increase screen brightness in a manner which is  
99 not desirable for typical consumer viewing.

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9 10 CFR 430, Subpart B, Appendix H, Section 2.17, which references IEC 62087 Ed. 3.

10 10 CFR 430, Subpart B, Appendix H, Section 2.15, with the exception of “Home or Retail Configurations”; Section 2.15 uses “home or retail mode” instead.

11 10 CFR 430, Subpart B, Appendix H, Section 2.4

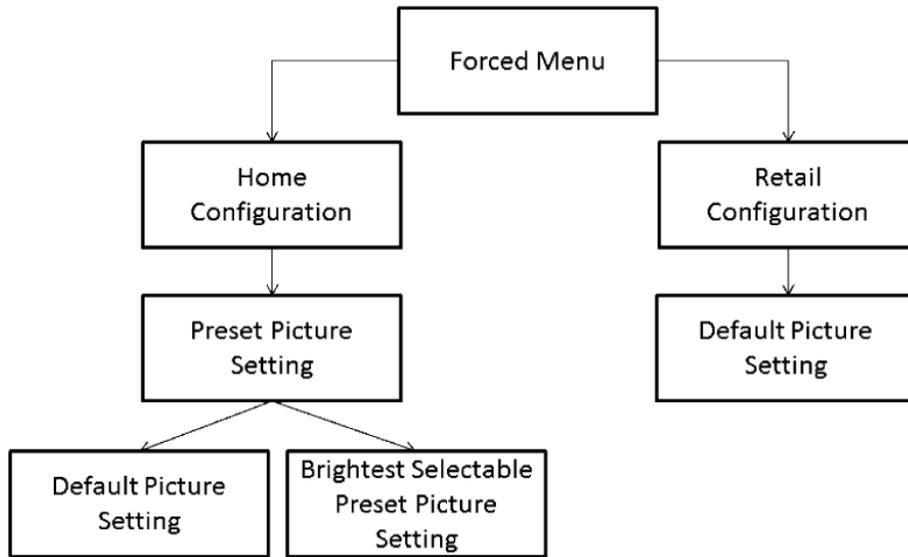
12 10 CFR 430, Subpart B, Appendix H, Section 2.3

13 10 CFR 430, Subpart B, Appendix H, Section 2.6

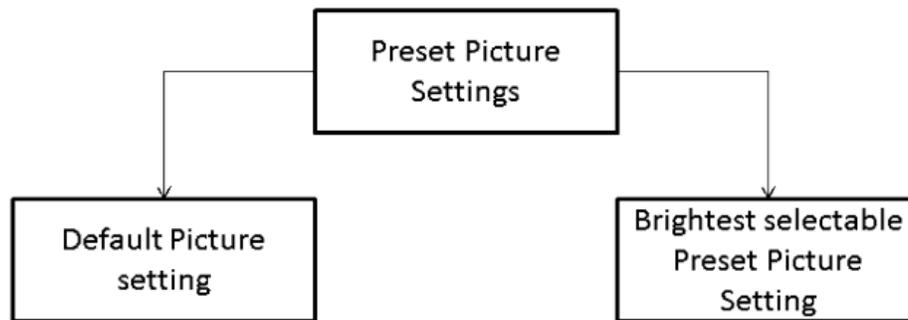
14 10 CFR 430, Subpart B, Appendix H, Section 2.16

- 100 6) High Dynamic Range (HDR) Upscaling: A user-selectable Special Function that extends the  
 101 luminance of the brightest scene elements and apparent saturation of colors of standard-dynamic  
 102 range content in a manner similar to those provided by HDR 10 or Dolby Vision encoding.
- 103 7) Forced Menu<sup>15</sup>: A series of menus which require the selection of initial settings before allowing  
 104 the user to utilize primary functions. Within these menus contains an option to choose the viewing  
 105 environment between Retail and Home Configurations.
- 106 8) Electronic Program Guide (EPG): An interactive on-screen menu of TV/HTD program information  
 107 downloaded from an external source or embedded interstitially in broadcast video streams (e.g.,  
 108 program time, date, and descriptions).

109 **Figure 1: Illustration of Picture Settings for TV/HTDs with a Forced Menu** <sup>16</sup>



110  
 111 **Figure 2: Illustration of Picture Settings for TV/HTDs without a Forced Menu**<sup>17</sup>



112 <sup>15</sup> 10 CFR 430, Subpart B, Appendix H, Section 2.5

<sup>16</sup> U.S. Department of Energy, Energy Conservation Program: Test Procedures for Television Sets; Final rule, *Federal Register*, October 25, 2013, 78 FR 63828.

<sup>17</sup> U.S. Department of Energy, Energy Conservation Program: Test Procedures for Television Sets; Final rule, *Federal Register*, October 25, 2013, 78 FR 63829.

- 113 F) Power Devices:
- 114 1) External Power Supply (EPS)<sup>18</sup>: Also referred to as External Power Adapter. An external power  
 115 supply circuit that is used to convert household electric current into dc current or lower-voltage ac  
 116 current to operate a consumer product.
- 117 2) Main Battery<sup>19</sup>: A battery capable of powering the TV/HTD to produce dynamic video without the  
 118 support of mains power.
- 119 G) Product Characteristics:
- 120 1) Luminance<sup>20</sup>: The photometric measure of the luminous intensity per unit area of light traveling in  
 121 a given direction, expressed in units of candelas per square meter (cd/m<sup>2</sup>).
- 122 2) Screen Area: The viewable screen area of the product, calculated by multiplying the viewable  
 123 image width by the viewable image height. For curved screens, the measurements shall be made  
 124 along the curvature on the face of the screen rather than along a straight line/chord.
- 125 3) Native Vertical Resolution: The number of visible physical lines along the vertical axis of the  
 126 TV/HTD (e.g., a TV/HTD with a screen resolution of 1920 x 1080 (horizontal x vertical) would  
 127 have a Native Vertical Resolution of 1080).
- 128 H) Basic Model<sup>21</sup>: All units of a given type of product (or class thereof) manufactured by one  
 129 manufacturer, having the same primary energy source, and which have essentially identical electrical,  
 130 physical, and functional characteristics that affect energy consumption and energy efficiency.
- 131 I) Multichannel Video Programming Distributor (MVPD)<sup>22</sup>: A person such as, but not limited to, a cable  
 132 operator, a multichannel multipoint distribution service, a direct broadcast satellite service, or a  
 133 television receive-only satellite program distributor, who makes available for purchase, by subscribers  
 134 or customers, multiple channels of video programming.
- 135 J) Unit Under Test (UUT): The unit currently undergoing testing.

## 136 2 SCOPE

### 137 2.1 Included Products

- 138 2.1.1 Products that are: (1) marketed to the consumer as a TV/HTD (i.e., TV/HTD is the primary  
 139 function); (2) capable of being powered from a wall outlet or with an external power supply; and  
 140 (3) meet one of the following product type definitions, are eligible for ENERGY STAR certification,  
 141 with the exception of products listed in Section 2.2:
- 142 i. TVs  
 143 ii. Hospitality TV/HTDs  
 144 iii. Home Theater Displays

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18 10 CFR 430.2

19 10 CFR 430, Subpart B, Appendix H, Section 2.12

20 10 CFR 430, Subpart B, Appendix H, Section 2.11

21 10 CFR 430.2, with references to water consumption and other specific covered products removed.

22 As defined in 47 USC § 522(13)

145 **2.2 Excluded Products**

146 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for  
147 certification under this specification. The list of specifications currently in effect can be found at  
148 [www.energystar.gov/specifications](http://www.energystar.gov/specifications).

149 2.2.2 Products that satisfy one or more of the following conditions are not eligible for ENERGY STAR  
150 certification under this specification:

- 151 i. Projectors.
- 152 ii. TV/HTDs with a Main Battery that enables operation without connected mains power.
- 153 iii. Products with a computer input port (e.g., VGA), that are marketed and sold primarily as  
154 computer monitors or other displays, and that do not contain an integrated TV tuner encased  
155 within the product housing.

156 **Note:** Based on inquiries from stakeholders, EPA has specifically listed projector products as an excluded  
157 product type.

158 **3 CERTIFICATION CRITERIA**

159 **3.1 Significant Digits and Rounding**

160 3.1.1 All calculations shall be carried out with directly measured (unrounded) values. Only the final  
161 result of a calculation shall be rounded.

162 3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using exact  
163 values without any benefit from rounding.

164 3.1.3 Annual Energy Consumption (AEC) values less than 100 kWh shall be rounded to the nearest  
165 tenth of a kWh; otherwise, they shall be rounded to the nearest kWh, as specified in Section 8.2  
166 of Appendix H to 10 CFR Part 430, for reporting on the ENERGY STAR website.

167 3.1.4 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR  
168 website shall be rounded to the nearest significant digit as expressed in the corresponding  
169 specification limit.

170 **3.2 General Requirements**

171 3.2.1 External Power Supplies (EPSs): Single- and Multiple-voltage EPSs shall meet the Level VI or  
172 higher performance requirements under the International Efficiency Marking Protocol when tested  
173 according to the Uniform Test Method for Measuring the Energy Consumption of External Power  
174 Supplies, Appendix Z to Subpart B of 10 CFR Part 430.

- 175 i. Single- and Multiple-voltage EPSs shall include the Level VI or higher marking.
- 176 ii. Additional information on the Marking Protocol is available  
177 at <http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218>.

178 3.2.2 General User Information: The product shall ship with consumer informational materials located in  
179 either (1) the hard copy or electronic user manual, or (2) a package or box insert. These materials  
180 shall include:

- 181 i. Information about the ENERGY STAR program,
- 182 ii. Information on the energy consumption implications of changes to default as-shipped  
183 TV/HTD configuration and settings, and

184 iii. Notification that enabling certain optional features and functionalities (e.g., instant-on), may  
185 increase energy consumption beyond the limits required for ENERGY STAR certification, as  
186 applicable.

187 3.2.3 Energy Saving Features: A TV/HTD may not be certified with any detectable or undetectable  
188 energy saving features (e.g., Motion Detection Dimming) that are enabled when tested according  
189 to Appendix H to Subpart B of 10 CFR Part 430 unless that feature provides comparable energy  
190 savings during typical viewing experiences (i.e., the duration of a variety of popular  
191 programming). This prohibition applies irrespective of whether the function's primary or intended  
192 purpose is energy savings.

193 3.2.4 Forced Menu: Any product that includes a Forced Menu upon initial start-up shall:

- 194 i. Provide users with a choice of Home Configuration or Retail Configuration. Partners may use  
195 alternative terminology if approved by the U.S. Environmental Protection Agency (EPA).
- 196 ii. Upon selection of Retail Configuration at initial start-up, either (1) display a second prompt  
197 requiring the user to confirm the choice of Retail Configuration, or (2) display information on  
198 the start-up menu that the Home Configuration is the setting in which the product qualifies for  
199 ENERGY STAR. If option (2) is selected, additional detail about ENERGY STAR certification  
200 and energy consumption expectations shall be included in printed product literature and on  
201 the product information page on the Partner's website.

202 3.2.5 Preset Picture Setting Menu: For any product where consumers have the option of selecting  
203 different picture settings from a preset menu at any time:

- 204 i. The product shall display on-screen information that the Default Picture Setting reflects the  
205 setting under which the product qualifies for the ENERGY STAR. For example, such  
206 information may be indicated by including an electronic ENERGY STAR mark alongside the  
207 name or description of that picture setting or in the form of a message displayed each time  
208 any setting other than the Default Picture Setting is selected.
- 209 ii. For products with an energy saving feature (e.g., ABC) enabled in the Default Picture Setting,  
210 the product will display on-screen information that the energy saving feature is being disabled  
211 when another Preset Picture Setting is selected that does not also have the energy saving  
212 feature enabled by default.
- 213
- 214 iii. For each Preset Picture Setting with energy saving feature(s) (e.g., ABC) enabled by default,  
215 the energy saving feature(s) shall default back to being enabled whenever the user selects  
216 that preset picture setting.
- 217
- 218 iv. The TV shall not contain favorable subjective language to name or describe a Preset Picture  
219 Setting other than the Default Picture Setting (e.g., optimal or preferred).

220 3.2.6 Manual Adjustments to TV Parameters: For products with an energy saving feature (e.g., ABC)  
221 enabled in the Default Picture setting, the feature's functionality must remain enabled during  
222 manual adjustments to any of the TV's picture parameters, such as screen brightness, backlight,  
223 and contrast ratio.

224 3.2.7 Special Functions: The TV/HTD shall alert the user anytime the activation of any Special Function  
225 disables an energy saving feature.

226 3.2.8 Standby-Passive Mode and Standby-Active, Low Mode Settings: If users can select and enable  
227 Standby-Passive Mode or Standby-Active, Low Mode functions from a display prompt in On  
228 Mode or a settings menu other than a Forced Menu, and if these functions may alter power  
229 consumption from the default, as-tested Home Configuration:

- 230 i. The product shall display on-screen information that the default as-shipped settings reflect  
 231 the settings under which the product qualifies for the ENERGY STAR. For example, such  
 232 information may be indicated by including an electronic ENERGY STAR mark alongside the  
 233 name or description of the default as-shipped settings or in the form of a message displayed  
 234 each time any setting other than the default as-shipped setting is selected.
- 235 ii. Products with a physical ENERGY STAR mark affixed to the front or top of the TV/HTD may  
 236 alternatively display on-screen information that enabling settings other than the default as-  
 237 shipped settings may change the energy consumption of the product.

238 3.2.9 Thin Client Capability and MVPD-ready Information: Products that have Thin Client Capability as-  
 239 shipped or are otherwise MVPD-ready shall:

- 240 i. Report the presence of Thin Client Capability and supporting information including, but not  
 241 limited to, interoperability protocols, decryption, and decoding functions for display on the  
 242 ENERGY STAR certified products list; and
- 243 ii. Inform the consumer in the user manual and/or on-screen prompt that the TV/HTD may be  
 244 capable of operating without a set-top box from an MVPD.

245 3.2.10 Standby-Active, High Mode Capability: TV/HTDs with Standby-Active, High Mode shall  
 246 automatically return to the default as-tested Standby-Active, Low Mode or Standby-Passive Mode  
 247 following a manufacturer firmware update or other maintenance operation in Standby Active, High  
 248 Mode within a period less than or equal to 15 minutes from the completion of said  
 249 update/maintenance operation.

250 **3.3 On Mode Requirements**

251 3.3.1 For all TV/HTDs, On Mode power, as determined per Section 7.1.2 *On Mode Test for TVs without*  
 252 *ABC Enabled by Default* or Section 7.1.3.2 *On Mode Power Calculation* (for TVs with ABC  
 253 Enabled by Default) in Appendix H shall be less than or equal to the Maximum On Mode Power  
 254 Requirement ( $P_{ON\_MAX}$ ) and high resolution allowance, as shown in Equation 1, subject to the  
 255 following requirement:

- 256 i. For TVs with ABC or any other energy saving feature enabled by default: TVs with up to four  
 257 Preset Picture Settings shall have one or fewer Preset Picture Setting without ABC and any  
 258 other energy saving feature enabled by default, and TVs with more than four Preset Picture  
 259 Settings shall have two or fewer Preset Pictures Settings without ABC and any other energy  
 260 saving feature enabled by default. If the TV does not meet these requirements, it is not  
 261 eligible for qualification with the energy saving feature enabled by default. In TVs that offer  
 262 both Home and Retail configurations, only the total number of Preset Picture Settings  
 263 available under the Home configuration under test conditions shall be considered.

264 **Equation 1: On Mode Power Requirement for All TV/HTDs**

$$P_{ON} \leq P_{ON\_MAX} + P_{HR}$$

265 Where:

- 266 ▪  $P_{ON}$  is On Mode Power in watts;
- 267 ▪  $P_{ON\_MAX}$  is the Maximum On Mode Power requirement in watts, calculated in Equation 2; and
- 268 ▪  $P_{HR}$  is a high resolution allowance in watts, as applicable, calculated in Equation 3.

269 3.3.2 The Maximum On Mode Power Requirement ( $P_{ON\_MAX}$ ) in watts shall be calculated per Equation  
 270 2.

271 **Equation 2: Maximum On Mode Power Requirement for All TV/HTDs**

$$P_{ON\_MAX} = 78.5 \times \tanh[0.0005 \times (A - 140) + 0.038] + 14$$

272 Where:

- 273 ▪  $P_{ON\_MAX}$  is the maximum allowable On Mode Power consumption in watts;
- 274 ▪  $A$  is the viewable Screen Area of the product in square inches; and



316 **Note:** Stakeholders noted that EPA’s requirement that the average screen luminance for room  
 317 illuminances at 3, 12, 35, and 100 lux be 50 percent of the luminance in the Brightest Selectable Preset  
 318 Picture Setting would result in screen luminances that are too bright for consumer preferences for TVs  
 319 with high maximum screen luminances. Thus, to avoid creating an unintended scenario where TVs ship  
 320 too bright, EPA is modifying the requirement for TVs with Brightest Selectable Preset Picture Settings  
 321 greater than or equal to 300 cd/m<sup>2</sup> such that they are only required to reach an average screen luminance  
 322 of 150 cd/m<sup>2</sup>.

323 3.6.4 For products that certify to the On Mode requirements with ABC enabled by default, the  
 324 luminance at 3 lux in the Default Picture Setting, with ABC enabled, shall be greater than or equal  
 325 to 100 cd/m<sup>2</sup>, as measured per Section 4.4 *Luminance Test for TVs with ABC Enabled by*  
 326 *Default.*

327 **Note:** Three manufacturers noted that EPA’s screen luminance requirement of 125 cd/m<sup>2</sup> at 3 lux was still  
 328 too bright, despite the Imaging Science Foundation (ISF) findings on consumer preferences for screen  
 329 brightness of 150 cd/m<sup>2</sup> in dark room viewing conditions. EPA has subsequently become aware of the  
 330 SMPTE ST 2080 Standard for content editing on HDTVs, which calls for a 100 cd/m<sup>2</sup> screen  
 331 luminance. In the absence of industry-wide consensus on optimal brightness for dark room viewing, and  
 332 given this additional point of reference, EPA is lowering the requirement for luminance at 3 lux to greater  
 333 than or equal to 100 cd/m<sup>2</sup>.

334 **3.7 Download Acquisition Mode (DAM) Requirements for Hospitality TV/HTDs**

335 3.7.1 A product may automatically exit Standby-Passive Mode or Standby-Active, Low Mode and enter  
 336 Download Acquisition Mode according to a predefined schedule, in order to:

- 337 i. Download channel listing information for use by an electronic programming guide,
- 338 ii. Monitor for emergency messaging/communications, or
- 339 iii. Communicate via a network protocol.

340 3.7.2 DAM energy consumption for all DAM states (E<sub>DAM</sub>), as measured per the CEA Procedure for  
 341 DAM Testing, shall be less than or equal to 40 watt-hours per day (0.04 kWh/day).

342 **Note:** Products intended for sale in the US market are subject to minimum toxicity and recyclability  
 343 requirements. Please see ENERGY STAR Program Requirements for Televisions: Partner Commitments  
 344 for details.  
 345

346 **4 TESTING**

347 **4.1 Test Methods**

348 4.1.1 Test methods identified in Table 1 shall be used for certification.

349 **Table 1: Test Methods for ENERGY STAR Certification**

Product Type	Test Method
All Ac Mains-powered TV/HTDs	Uniform Test Method for Measuring the Energy Consumption of Television Sets incorporated in Appendix H to Subpart B of 10 CFR Part 430.

350

351 **4.2 Average Power Consumption Test for TV/HTDs with HDR Upscaling**

352 4.2.1 For products with HDR Upscaling, one of the following additional tests is required for ENERGY  
353 STAR certification:

- 354 i. For products with HDR Upscaling as a Special Function selectable from within the Default  
355 Picture Setting, enable this feature and record the average power consumption value over a  
356 10-minute period following the guidance in Section 7.1.2 of Appendix H to Subpart B of 10  
357 CFR Part 430 and record the luminance following Sections 7.2.1.2 through 7.2.3 of Appendix  
358 H to Subpart B of 10 CFR Part 430; or  
359 ii. For products with a separate Preset Picture Setting with built-in HDR Upscaling that is not the  
360 Default Picture Setting or Brightest Selectable Preset Picture Setting, choose that Preset  
361 Picture Setting and record the average power consumption over a 10-minute period following  
362 the guidance in Section 7.1.2 of Appendix H to Subpart B of 10 CFR Part 430 and record the  
363 luminance following Sections 7.2.1.2 through 7.2.3 of Appendix H to Subpart B of 10 CFR  
364 Part 430.

365 **Note:** EPA has added a clarification to section 4.2.1.i. that the luminance must be recorded in both cases  
366 of how TVs implement HDR.

367

368 **4.3 DAM Test for Hospitality TV/HTDs**

369 4.3.1 DAM energy consumption of Hospitality TV/HTDs shall be measured using the following method  
370 in Table 2:

371 **Table 2: Method for Hospitality TV/HTDs**

Product Type	Method
Hospitality TV/HTDs	CEA Procedure for DAM Testing: For TVs, Rev. 0.3, Sept. 2010

372 **4.4 Luminance Test for TVs with ABC Enabled by Default**

373 4.4.1 The test method outlined below shall be used for luminance testing of products with ABC enabled  
374 by default:

- 375 i. The TV shall be in the default picture setting within the home configuration, with the ABC  
376 sensor enabled.  
377 ii. Set-up the luminance test per Sections 7.2.1.3 through 7.2.2 of Appendix H to Subpart B of  
378 10 CFR Part 430.  
379 iii. Direct 100 lx ( $\pm 5$  lx) lux into the ABC sensor.  
380 iv. Display the International Electrotechnical Commission (IEC) 62087 Ed. 3.0 three vertical bar  
381 signal found in section 11.5.5 of IEC 62087 Ed. 3.0 for no more than 5 seconds and take the  
382 luminance measurement.  
383 v. Repeat the above measurement at 35 lx ( $\pm 2$  lx), 12 lx ( $\pm 1$  lx), and 3 lux ( $\pm 1$  lx).  
384

385

386 **4.5 Full Network Connectivity Test for TV/HTDs with Standby-Active, Low Mode**

387 4.5.1 The following method in Table 3 shall be used for TV/HTDs with a Standby-Active, Low mode:

**Table 3: Methods for TV/HTDs with Standby-Active, Low**

Product Type	Method
TV/HTDs with Standby-Active, Low Mode	CEA-2037-A, Determination of Television Set Power Consumption

389 i. If the TV/HTD is network-enabled and tested in Standby-Active, Low per Appendix H, the  
 390 presence of Full Network Connectivity shall be tested using the following method: Perform all  
 391 procedures specified in Section 6.7.5 *Standby-active, Low* of CEA-2037-A with the additional  
 392 preconditions:

393 1) Place the UUT in On Mode as tested per Section 7.1.1 *On Mode Test* of Appendix H and  
 394 momentarily press the power button on the remote control; and  
 395 2) Wait 5 minutes after pressing the power button before beginning the Section 6.7.5  
 396 procedures in CEA-2037-A.

397 ii. TV/HTDs for which availability can be confirmed with one of the methods in Section 6.7.5.2  
 398 *Availability* of CEA-2037-A shall be reported as having Full Network Connectivity.

399 4.5.2 Following all other tests conducted, TV/HTDs with Standby-Active, Low Mode shall use the  
 400 following method to demonstrate that they continue to meet the ENERGY STAR requirements  
 401 after software updates:

402 Connect TV/HTD to the wide-area network (i.e., the Internet).

- 403 i. Download and install any available software updates either by acknowledging a prompt or by  
 404 requesting an update through a menu selection.
- 405 ii. Wait until all software updates have been installed.
- 406 iii. Conduct the On Mode Test per Section 7.1 of Appendix H to Subpart B of 10 CFR Part 430.
- 407 iv. Conduct the Standby-Active, Low Mode Test per Section 7.3.3 of Appendix H to Subpart B of  
 408 10 CFR Part 430.
- 409 v. Conduct the Additional Required Test for TV/HTDs with HDR Upscaling per Section 4.2 of  
 410 this specification.

#### 411 **4.6 Number of Units Required for Testing**

412 4.6.1 One of the following sampling plans shall be used to test for ENERGY STAR certification:

- 413 i. A single representative unit shall be selected for testing the Basic Model;
- 414 ii. Units shall be selected for testing per the sampling requirements defined in 10 CFR 429.25,  
 415 which references 10 CFR 429.11.

#### 416 **4.7 International Market Certification**

417 4.7.1 Products shall be tested for certification at the relevant input voltage/frequency combination for  
 418 each market in which they will be sold and promoted as ENERGY STAR.

### 419 **5 USER INTERFACE**

420 5.1.1 Partners are encouraged to design products in accordance with the user interface standard IEEE  
 421 1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in  
 422 Office/Consumer Environments. For details, see <http://eetd.LBL.gov/Controls>.

423 **6 EFFECTIVE DATE**

424 6.1.1 Effective Date: The Version 8.0 ENERGY STAR Televisions specification shall take effect on  
425 **July 1, 2018**. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR  
426 specification in effect on its date of manufacture. The date of manufacture is specific to each unit  
427 and is the date on which a unit is considered to be completely assembled.

428 6.1.2 Future Specification Revisions: EPA reserves the right to change this specification should  
429 technological and/or market changes affect its usefulness to consumers, industry, or the  
430 environment. In keeping with current policy, revisions to the specification are arrived at through  
431 stakeholder discussions. In the event of a specification revision, please note that the ENERGY  
432 STAR certification is not automatically granted for the life of a product model.

433 **7 CONSIDERATIONS FOR FUTURE REVISIONS**

434 7.1.1 Standby-Active, High Mode: EPA and DOE are interested in learning more about Standby-Active,  
435 High Mode. EPA anticipates exploring this issue and potential power limits and duty cycle  
436 requirements in the next specification revision.

437 7.1.2 Trends and Improvements in Energy Efficiency: EPA anticipates continued gains in energy  
438 efficiency to be achieved in the next few years with advances in technology such as LED efficacy,  
439 the addition of reflective polarizing film, power supply improvements, lower screen reflectance,  
440 improved backplanes (Low Temperature Polysilicon and Indium Gallium Zinc Oxide), quantum  
441 dot technology, and next generation Organic Light Emitting Diodes (OLED). As such, EPA  
442 anticipates an opportunity for proposing further limits on power consumption in future revisions.

443 7.1.3 ABC Performance Across All Preset Picture Settings: EPA is interested in better understanding  
444 how ABC performs across all Preset Picture Settings. EPA anticipates exploring this issue once  
445 ABC is implemented in and persistent across more Preset Picture Settings.

446 7.1.4 UHD Allowance: EPA anticipates modifying the UHD allowance in the next revision to account for  
447 UHD gains in efficiency.

448 7.1.5 HDR Allowance: EPA will monitor the market to assess the extent to which an opportunity exists  
449 to improve the energy efficiency of the HDR upscaling feature and televisions displaying native  
450 HDR content in a future revision.

451