



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)¹: 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

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 B) Operational Modes:

34 1) On Mode²: The mode of operation in which the TV/HTD is connected to mains power, and is
35 capable of producing dynamic video.

36 2) Standby-Passive Mode³: The mode of operation in which the TV/HTD is connected to mains
37 power, produces neither sound nor picture, and can be switched into another mode with only the
38 remote control unit or an internal signal.

39 3) Standby-Active, Low Mode⁴: The mode of operation in which the TV/HTD is connected to mains
40 power, produces neither sound nor picture, can be switched into another mode with the remote
41 control unit or an internal signal, and can additionally be switched into another mode with an
42 external signal.

43 4) Standby-Active, High Mode⁵: The mode of operation in which the TV/HTD is connected to mains
44 power, produces neither sound nor picture, is exchanging/receiving data with/from an external
45 source, and can be switched into another mode with the remote control unit, an internal signal, or
46 an external signal.

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

52 5) Off Mode⁶: The mode of operation in which the TV/HTD is connected to mains power, produces
53 neither sound nor picture, and cannot be switched into any other mode of operation with the
54 remote control unit, an internal signal, or external signal.

55 C) Additional Functions⁷: Functions that are not required for the basic operation of the device.

56 Note: Additional functions include, but are not limited to, a VCR unit, a DVD unit, an HDD unit, a FM-
57 radio unit, a memory card-reader unit, or an ambient lighting unit.
58

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

2 10 CFR 430, Subpart B, Appendix H, Section 2.14

3 10 CFR 430, Subpart B, Appendix H, Section 2.18

4 10 CFR 430, Subpart B, Appendix H, Section 2.20

5 10 CFR 430, Subpart B, Appendix H, Section 2.19,

6 10 CFR 430, Subpart B, Appendix H, Section 2.13

7 10 CFR 430, Subpart B, Appendix H, Section 2.1, which references International Electrotechnical Commission (IEC) Standard 62087 Ed. 3.

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

70 D) Special Functions⁸: Functions that are related to, but not required for, the basic operation of the
71 device.

72
73 Note: Special functions include, but are not limited to, special sound processing, power saving
74 functions (e.g., Automatic Brightness Control).

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

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

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

81 E) TV/HTD Settings and Menus:

82 1) Preset Picture Setting⁹: A preprogrammed factory setting obtained from the TV/HTD menu with
83 pre-determined picture parameters such as brightness, contrast, color, sharpness, etc. Preset
84 Picture Settings can be selected within the Home or Retail Configurations.

85 2) Default Picture Setting¹⁰: The Preset Picture Setting that the TV/HTD enters into immediately
86 after making a selection from the Forced Menu. If the TV/HTD does not have a Forced Menu, this
87 is the as-shipped Preset Picture Setting.

88 3) Brightest Selectable Preset Picture Setting¹¹: The Preset Picture Setting in which the TV/HTD
89 produces the highest screen luminance within either the Home or Retail Configuration.

90 4) Home Configuration¹²: The TV/HTD configuration selected from the Forced Menu which is
91 designed for typical consumer viewing and is recommended by the manufacturer for home
92 environments.

93 5) Retail Configuration¹³: The TV/HTD configuration selected from the Forced Menu which is
94 designed to highlight the TV/HTD's features in a retail environment. This configuration may
95 display demos, disable configurable settings, or increase screen brightness in a manner which is
96 not desirable for typical consumer viewing.

8 10 CFR 430, Subpart B, Appendix H, Section 2.17, which references IEC 62087 Ed. 3.

9 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.

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

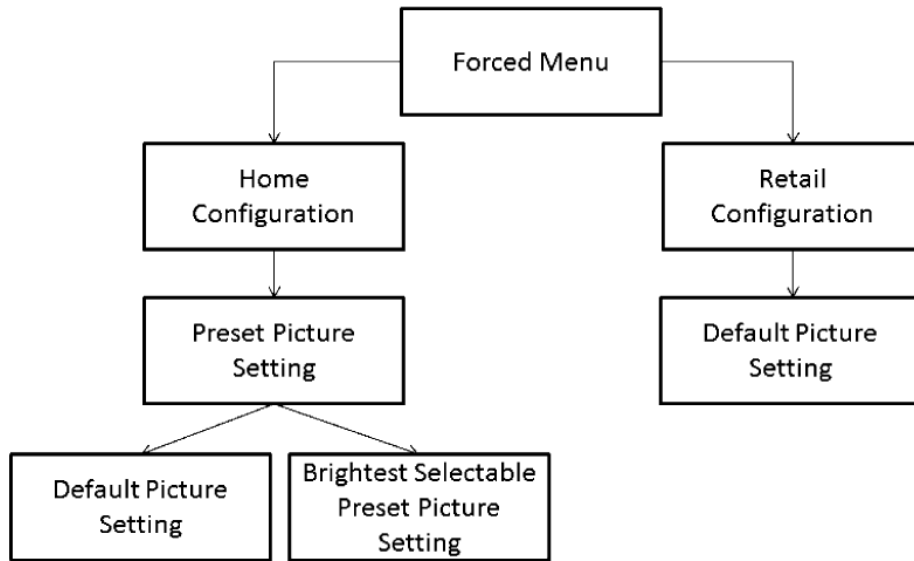
11 10 CFR 430, Subpart B, Appendix H, Section 2.3

12 10 CFR 430, Subpart B, Appendix H, Section 2.6

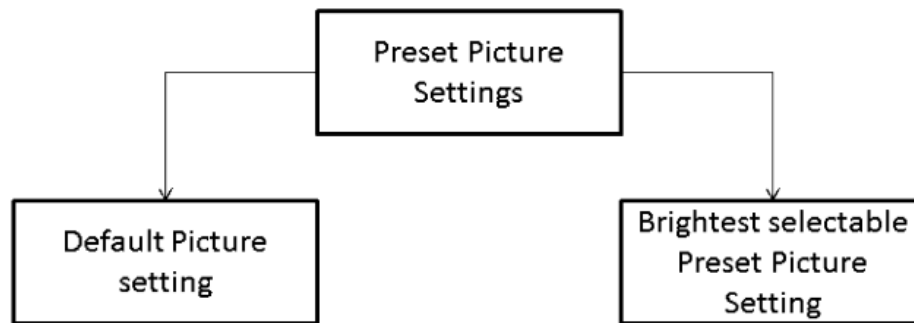
13 10 CFR 430, Subpart B, Appendix H, Section 2.16

- 97 6) High Dynamic Range (HDR) Upscaling: A user-selectable Special Function that extends the
 98 luminance of the brightest scene elements and apparent saturation of colors of standard-dynamic
 99 range content in a manner similar to those provided by HDR 10 or Dolby Vision encoding.
- 100 7) Forced Menu¹⁴: A series of menus which require the selection of initial settings before allowing
 101 the user to utilize primary functions. Within these menus contains an option to choose the viewing
 102 environment between Retail and Home Configurations.
- 103 8) Electronic Program Guide (EPG): An interactive on-screen menu of TV/HTD program information
 104 downloaded from an external source or embedded interstitially in broadcast video streams (e.g.,
 105 program time, date, and descriptions).

106 **Figure 1: Illustration of Picture Settings for TV/HTDs with a Forced Menu** ¹⁵



107
 108 **Figure 2: Illustration of Picture Settings for TV/HTDs without a Forced Menu**¹⁶



109 ¹⁴ 10 CFR 430, Subpart B, Appendix H, Section 2.5

¹⁵ U.S. Department of Energy, Energy Conservation Program: Test Procedures for Television Sets; Final rule, *Federal Register*, October 25, 2013, 78 FR 63828.

¹⁶ U.S. Department of Energy, Energy Conservation Program: Test Procedures for Television Sets; Final rule, *Federal Register*, October 25, 2013, 78 FR 63829.

- 110 F) Power Devices:
- 111 1) External Power Supply (EPS)¹⁷: Also referred to as External Power Adapter. An external power
 112 supply circuit that is used to convert household electric current into dc current or lower-voltage ac
 113 current to operate a consumer product.
- 114 2) Main Battery¹⁸: A battery capable of powering the TV/HTD to produce dynamic video without the
 115 support of mains power.
- 116 G) Product Characteristics:
- 117 1) Luminance¹⁹: The photometric measure of the luminous intensity per unit area of light traveling in
 118 a given direction, expressed in units of candelas per square meter (cd/m²).
- 119 2) Screen Area: The viewable screen area of the product, calculated by multiplying the viewable
 120 image width by the viewable image height. For curved screens, the measurements shall be made
 121 along the curvature on the face of the screen rather than along a straight line/chord.
- 122 3) Native Vertical Resolution: The number of visible physical lines along the vertical axis of the
 123 TV/HTD (e.g., a TV/HTD with a screen resolution of 1920 x 1080 (horizontal x vertical) would
 124 have a Native Vertical Resolution of 1080).
- 125 H) Basic Model²⁰: All units of a given type of product (or class thereof) manufactured by one
 126 manufacturer, having the same primary energy source, and which have essentially identical electrical,
 127 physical, and functional characteristics that affect energy consumption and energy efficiency.
- 128 I) Multichannel Video Programming Distributor (MVPD)²¹: A person such as, but not limited to, a cable
 129 operator, a multichannel multipoint distribution service, a direct broadcast satellite service, or a
 130 television receive-only satellite program distributor, who makes available for purchase, by subscribers
 131 or customers, multiple channels of video programming.
- 132 J) Unit Under Test (UUT): The unit currently undergoing testing.

133 2 SCOPE

134 2.1 Included Products

- 135 2.1.1 Products that are: (1) marketed to the consumer as a TV/HTD (i.e., TV/HTD is the primary
 136 function); (2) capable of being powered from a wall outlet or with an external power supply; and
 137 (3) meet one of the following product type definitions, are eligible for ENERGY STAR certification,
 138 with the exception of products listed in Section 2.2:
- 139 i. TVs
 140 ii. Hospitality TV/HTDs
 141 iii. Home Theater Displays

17 10 CFR 430.2

18 10 CFR 430, Subpart B, Appendix H, Section 2.12

19 10 CFR 430, Subpart B, Appendix H, Section 2.11

20 10 CFR 430.2, with references to water consumption and other specific covered products removed.

21 As defined in 47 USC § 522(13)

142 **2.2 Excluded Products**

143 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for
144 certification under this specification. The list of specifications currently in effect can be found at
145 www.energystar.gov/specifications.

146 2.2.2 Products that satisfy one or more of the following conditions are not eligible for ENERGY STAR
147 certification under this specification:

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

152 **3 CERTIFICATION CRITERIA**

153 **3.1 Significant Digits and Rounding**

154 3.1.1 All calculations shall be carried out with directly measured (unrounded) values. Only the final
155 result of a calculation shall be rounded.

156 3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using exact
157 values without any benefit from rounding.

158 3.1.3 Annual Energy Consumption (AEC) values less than 100 kWh shall be rounded to the nearest
159 tenth of a kWh; otherwise, they shall be rounded to the nearest kWh, as specified in Section 8.2
160 of Appendix H to 10 CFR Part 430, for reporting on the ENERGY STAR website.

161 3.1.4 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR
162 website shall be rounded to the nearest significant digit as expressed in the corresponding
163 specification limit.

164 **3.2 General Requirements**

165 3.2.1 External Power Supplies (EPSs): Single- and Multiple-voltage EPSs shall meet the Level VI or
166 higher performance requirements under the International Efficiency Marking Protocol when tested
167 according to the Uniform Test Method for Measuring the Energy Consumption of External Power
168 Supplies, Appendix Z to Subpart B of 10 CFR Part 430.

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

172 3.2.2 General User Information: The product shall ship with consumer informational materials located in
173 either (1) the hard copy or electronic user manual, or (2) a package or box insert. These materials
174 shall include:

- 175 i. Information about the ENERGY STAR program,
- 176 ii. Information on the energy consumption implications of changes to default as-shipped
177 TV/HTD configuration and settings, and
- 178 iii. Notification that enabling certain optional features and functionalities (e.g., instant-on), may
179 increase energy consumption beyond the limits required for ENERGY STAR certification, as
180 applicable.

181 3.2.3 Energy Saving Features: A TV/HTD may not be certified with any detectable or undetectable
182 energy saving features (e.g., Motion Detection Dimming) that are enabled when tested according
183 to Appendix H to Subpart B of 10 CFR Part 430 unless that feature provides comparable energy
184 savings during typical viewing experiences (i.e., the duration of a variety of popular
185 programming). This prohibition applies irrespective of whether the function's primary or intended
186 purpose is energy savings.

187 3.2.4 Forced Menu: Any product that includes a Forced Menu upon initial start-up shall:
188 i. Provide users with a choice of Home Configuration or Retail Configuration. Partners may use
189 alternative terminology if approved by the U.S. Environmental Protection Agency (EPA).
190 ii. Upon selection of Retail Configuration at initial start-up, either (1) display a second prompt
191 requiring the user to confirm the choice of Retail Configuration, or (2) display information on
192 the start-up menu that the Home Configuration is the setting in which the product qualifies for
193 ENERGY STAR. If option (2) is selected, additional detail about ENERGY STAR certification
194 and energy consumption expectations shall be included in printed product literature and on
195 the product information page on the Partner's website.

196 3.2.5 Preset Picture Setting Menu: For any product where consumers have the option of selecting
197 different picture settings from a preset menu at any time:
198 i. The product shall display on-screen information that the Default Picture Setting reflects the
199 setting under which the product qualifies for the ENERGY STAR. For example, such
200 information may be indicated by including an electronic ENERGY STAR mark alongside the
201 name or description of that picture setting or in the form of a message displayed each time
202 any setting other than the Default Picture Setting is selected.
203 ii. For products with an energy saving feature (e.g., ABC) enabled in the Default Picture Setting,
204 the product will display on-screen information that the energy saving feature is being disabled
205 when another Preset Picture Setting is selected that does not also have the energy saving
206 feature enabled by default.
207
208 iii. For each Preset Picture Setting with energy saving feature(s) (e.g., ABC) enabled by default,
209 the energy saving feature(s) shall default back to being enabled whenever the user selects
210 that preset picture setting.
211
212 iv. The TV shall not contain favorable subjective language to name or describe a Preset Picture
213 Setting other than the Default Picture Setting (e.g., optimal or preferred).

214 **Note:** In response to stakeholder concerns that users would be prompted to select settings where energy
215 savings features are disabled, EPA proposes additional language in Section 3.2.5.iv. to guard against
216 users being encouraged to select non-default Preset Picture settings for general viewing. EPA's intent is
217 to allow consumer choice while encouraging the setting under which the TV qualifies for the ENERGY
218 STAR.

219 3.2.6 Manual Adjustments to TV Parameters: For products with an energy saving feature (e.g., ABC)
220 enabled in the Default Picture setting, the feature's functionality must remain enabled during
221 manual adjustments to any of the TV's picture parameters, such as screen brightness, backlight,
222 and contrast ratio.

223 3.2.7 Special Functions: The TV/HTD shall alert the user anytime the activation of any Special Function
224 disables an energy saving feature.

225 3.2.8 Standby-Passive Mode and Standby-Active, Low Mode Settings: If users can select and enable
226 Standby-Passive Mode or Standby-Active, Low Mode functions from a display prompt in On
227 Mode or a settings menu other than a Forced Menu, and if these functions may alter power
228 consumption from the default, as-tested Home Configuration:

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

237 3.2.9 Thin Client Capability and MVPD-ready Information: Products that have Thin Client Capability as-
238 shipped or are otherwise MVPD-ready shall:

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

244 3.2.10 Standby-Active, High Mode Capability: TV/HTDs with Standby-Active, High Mode shall
245 automatically return to the default as-tested Standby-Active, Low Mode or Standby-Passive Mode
246 following a manufacturer firmware update or other maintenance operation in Standby Active, High
247 Mode within a period less than or equal to 15 minutes from the completion of said
248 update/maintenance operation.

249 3.3 On Mode Requirements

250 3.3.1 For all TV/HTDs, On Mode power, as determined per Section 7.1.2 *On Mode Test for TVs without*
251 *ABC Enabled by Default* or Section 7.1.3.2 *On Mode Power Calculation* (for TVs with ABC
252 Enabled by Default) in Appendix H shall be less than or equal to the Maximum On Mode Power
253 Requirement (P_{ON_MAX}) and high resolution allowance, as shown in Equation 1, subject to the
254 following requirement:

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

263 **Note:** EPA has rephrased the above requirement for clarity, but has not changed it substantively. In
264 reviewing TV models currently on the market, EPA found that 1) there is typically at least one preset
265 picture setting where ABC is not enabled by default and 2) HDR upscaling is in some cases a separate
266 picture. As such, EPA proposes to retain its proposal from Draft 2. For TVs with up to four Preset Picture
267 Settings, such products would be allowed one Preset Picture Setting without ABC enabled, and for TVs
268 with more than four Preset Picture Settings, such products would be allowed up to two Preset Picture
269 Settings without ABC enabled. EPA believes that this proposal allows manufacturers flexibility regarding
270 modes in which ABC is enabled.

271

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

272

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

273

274

Where:

275

- P_{ON} is On Mode Power in watts;

276

- P_{ON_MAX} is the Maximum On Mode Power requirement in watts, calculated in Equation 2; and

277

- P_{HR} is a high resolution allowance in watts, as applicable, calculated in Equation 3.

278

279

3.3.2 The Maximum On Mode Power Requirement (P_{ON_MAX}) in watts shall be calculated per Equation 2.

280

281

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

282

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

283

Where:

284

- P_{ON_MAX} is the maximum allowable On Mode Power consumption in watts;

285

- A is the viewable Screen Area of the product in square inches; and

286

- \tanh is the hyperbolic tangent function.

287

3.3.3 TV/HTDs with Native Vertical Resolution greater than or equal to 2160 lines are eligible for a high resolution On Mode Power Allowance (P_{HR}) as calculated per Equation 3.

288

289

Equation 3: Calculation of On Mode Power Allowance for TV/HTDs with Native Vertical Resolution Greater than or Equal to 2160 lines

290

291

292

$$P_{HR} = 0.5 \times P_{ON_MAX}$$

293

Where:

294

- P_{HR} is the high resolution On Mode Power Allowance in watts; and

295

- P_{ON_MAX} is the maximum allowable On Mode Power consumption in watts, calculated in Equation 2.

296

3.3.4 All TV/HTDs shall continue to meet the On Mode requirements in this section following the installation of software updates, as demonstrated per testing in Section 4.5.2 of this specification.

297

298

Note: In response to stakeholder concerns that software updates at initial set up may impact a TV's energy consumption, such that it would no longer meet the power consumption requirements, EPA is requiring that TVs demonstrate that they meet these requirements after updates have completed

299

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301

3.4 Standby-Passive Mode Requirements

302

3.4.1 Standby-Passive Mode power ($P_{STANDBY-PASSIVE}$), as measured per Section 7.3.2 *Standby-Passive Mode* of Appendix H, shall be less than or equal to 0.5 W.

303

304

3.5 Standby-Active, Low Mode Requirements

305

3.5.1 Standby-Active, Low Mode power ($P_{STANDBY-ACTIVE-LOW}$), as measured per Section 7.3.3 *Standby-Active, Low Mode* of Appendix H, shall be less than or equal to 3.0 W.

306

307

3.5.2 All TV/HTDs shall continue to meet the Standby-Active, Low Mode requirements in this section following the installation of software updates, as demonstrated per testing in Section 4.5.2 of this specification.

308

309

310

Note: In response to stakeholder concerns that software updates at initial set up may impact a TV's energy consumption, such that it would no longer meet the power consumption requirements, EPA is requiring that TVs demonstrate that they meet these requirements after updates have completed.

311

312

313 **3.6 Luminance Requirements**

314 3.6.1 For products with a luminance in the Brightest Selectable Preset Picture Setting (the greater
 315 value of $L_{\text{DEFAULT_RETAIL}}$ or $L_{\text{BRIGHTEST_HOME}}$) less than 350 cd/m², luminance in the Default Picture
 316 Setting ($L_{\text{DEFAULT_HOME}}$) shall be greater than or equal to 65% of the luminance in the Brightest
 317 Selectable Preset Picture Setting, as per Appendix H to Subpart B of 10 CFR Part 430

318 3.6.2 For products with a luminance in the Brightest Selectable Preset Picture Setting greater than or
 319 equal to 350 cd/m², luminance in the Default Picture Setting shall be greater than or equal to
 320 228 cd/m², as per Appendix H to Subpart B of 10 CFR Part 430

321 3.6.3 For products that certify to the On Mode requirements with ABC enabled by default, the average
 322 luminance at the illuminance conditions of 3, 12, 35, and 100 lux with ABC enabled shall be
 323 greater than or equal to 50% of the TV's luminance in the Brightest Selectable Preset Picture
 324 Setting, as measured per Section 4.4 *Luminance Test for TVs with ABC Enabled by Default*.

325 3.6.4 For products that certify to the On Mode requirements with ABC enabled by default, the
 326 luminance at 3 lux in the Default Picture Setting, with ABC enabled, shall be greater than or equal
 327 to 125 cd/m², as measured per Section 4.4 *Luminance Test for TVs with ABC Enabled by*
 328 *Default*.

329 **3.7 Download Acquisition Mode (DAM) Requirements for Hospitality TV/HTDs**

330 3.7.1 A product may automatically exit Standby-Passive Mode or Standby-Active, Low Mode and enter
 331 Download Acquisition Mode according to a predefined schedule, in order to:

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

335 3.7.2 DAM energy consumption for all DAM states (E_{DAM}), as measured per the CEA Procedure for
 336 DAM Testing, shall be less than or equal to 40 watt-hours per day (0.04 kWh/day).

337
 338 **Note:** Products intended for sale in the US market are subject to minimum toxicity and recyclability
 339 requirements. Please see ENERGY STAR Program Requirements for Televisions: Partner Commitments
 340 for details.

341 **4 TESTING**

342 **4.1 Test Methods**

343 4.1.1 Test methods identified in Table 1 shall be used for certification.

344 **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.

345

346 **4.2 Average Power Consumption Test for TV/HTDs with HDR Upscaling**

347 4.2.1 For products with HDR Upscaling, one of the following additional tests is required for ENERGY
348 STAR certification:

- 349 i. For products with HDR Upscaling as a Special Function selectable from within the Default
350 Picture Setting, enable this feature and record the average power consumption value over a
351 10-minute period following the guidance in Section 7.1.2 of Appendix H to Subpart B of 10
352 CFR Part 430; or
- 353 ii. For products with a separate Preset Picture Setting with built-in HDR Upscaling that is not the
354 Default Picture Setting or Brightest Selectable Preset Picture Setting, choose that Preset
355 Picture Setting and record the average power consumption over a 10-minute period following
356 the guidance in Section 7.1.2 of Appendix H to Subpart B of 10 CFR Part 430 and record the
357 luminance following Sections 7.2.1.2 through 7.2.3 of Appendix H to Subpart B of 10 CFR
358 Part 430.

359 **4.3 DAM Test for Hospitality TV/HTDs**

360 4.3.1 DAM energy consumption of Hospitality TV/HTDs shall be measured using the following method
361 in Table 2:

362 **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

363 **4.4 Luminance Test for TVs with ABC Enabled by Default**

364 4.4.1 The test method outlined below shall be used for luminance testing of products with ABC enabled
365 by default:

- 366 i. The TV shall be in the default picture setting within the home configuration, with the ABC
367 sensor enabled.
- 368 ii. Set-up the luminance test per Sections 7.2.1.3 through 7.2.2 of Appendix H to Subpart B of
369 10 CFR Part 430.
- 370 iii. Direct 100 lx (± 5 lx) lux into the ABC sensor.
- 371 iv. Display the International Electrotechnical Commission (IEC) 62087 Ed. 3.0 three vertical bar
372 signal found in section 11.5.5 of IEC 62087 Ed. 3.0 for no more than 5 seconds and take the
373 luminance measurement.
- 374 v. Repeat the above measurement at 35 lx (± 2 lx), 12 lx (± 1 lx), and 3 lux (± 1 lx).

375 **Note:** EPA has added luminance test instructions to clarify for testers how to validate performance
376 against Sections 3.6.3 and 3.6.4 of the specification.

377

378 **4.5 Full Network Connectivity Test for TV/HTDs with Standby-Active, Low Mode**

379 4.5.1 The following method in Table 3 shall be used for TV/HTDs with a Standby-Active, Low mode:

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

Product Type	Method
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- 381 i. If the TV/HTD is network-enabled and tested in Standby-Active, Low per Appendix H, the
382 presence of Full Network Connectivity shall be tested using the following method: Perform all
383 procedures specified in Section 6.7.5 *Standby-active, Low* of CEA-2037-A with the additional
384 preconditions:
- 385 1) Place the UUT in On Mode as tested per Section 7.1.1 *On Mode Test* of Appendix H and
386 momentarily press the power button on the remote control; and
387 2) Wait 5 minutes after pressing the power button before beginning the Section 6.7.5
388 procedures in CEA-2037-A.
- 389 ii. TV/HTDs for which availability can be confirmed with one of the methods in Section 6.7.5.2
390 *Availability* of CEA-2037-A shall be reported as having Full Network Connectivity.
- 391 4.5.2 TV/HTDs with Standby-Active, Low Mode shall use the following method to demonstrate that they
392 continue to meet the ENERGY STAR requirements after software updates:
- 393 Connect TV/HTD to the wide-area network (i.e., the Internet).
- 394 i. Download and install any available software updates either by acknowledging a prompt or by
395 requesting an update through a menu selection.
396 ii. Wait until all software updates have been installed.
397 iii. Conduct the On Mode Test per Section 7.1 of Appendix H to Subpart B of 10 CFR Part 430.
398 iv. Conduct the Standby-Active, Low Mode Test per Section 7.3.3 of Appendix H to Subpart B of
399 10 CFR Part 430.
400 v. Conduct the Additional Required Test for TV/HTDs with HDR Upscaling per Section 4.2 of
401 this specification.

402 **Note:** EPA has added test instructions to help testers validate performance against the requirements in
403 Sections 3.3.4 and 3.5.2 of this specification.

404 **4.6 Number of Units Required for Testing**

- 405 4.6.1 One of the following sampling plans shall be used to test for ENERGY STAR certification:
- 406 i. A single representative unit shall be selected for testing the Basic Model;
407 ii. Units shall be selected for testing per the sampling requirements defined in 10 CFR 429.25,
408 which references 10 CFR 429.11.

409 **4.7 International Market Certification**

- 410 4.7.1 Products shall be tested for certification at the relevant input voltage/frequency combination for
411 each market in which they will be sold and promoted as ENERGY STAR.

412 **5 USER INTERFACE**

- 413 5.1.1 Partners are encouraged to design products in accordance with the user interface standard IEEE
414 1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in
415 Office/Consumer Environments. For details, see <http://eetd.LBL.gov/Controls>.

416 **6 EFFECTIVE DATE**

417 6.1.1 Effective Date: The Version 8.0 ENERGY STAR Televisions specification shall take effect on
418 **April, 16 2018**. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR
419 specification in effect on its date of manufacture. The date of manufacture is specific to each unit
420 and is the date on which a unit is considered to be completely assembled.

421 6.1.2 Future Specification Revisions: EPA reserves the right to change this specification should
422 technological and/or market changes affect its usefulness to consumers, industry, or the
423 environment. In keeping with current policy, revisions to the specification are arrived at through
424 stakeholder discussions. In the event of a specification revision, please note that the ENERGY
425 STAR certification is not automatically granted for the life of a product model.

426 **7 CONSIDERATIONS FOR FUTURE REVISIONS**

427 7.1.1 Standby-Active, High Mode: EPA and DOE are interested in learning more about Standby-Active,
428 High Mode. EPA anticipates exploring this issue and potential power limits and duty cycle
429 requirements in the next specification revision.

430 7.1.2 Trends and Improvements in Energy Efficiency: EPA anticipates continued gains in energy
431 efficiency to be achieved in the next few years with advances in technology such as LED efficacy,
432 the addition of reflective polarizing film, power supply improvements, lower screen reflectance,
433 improved backplanes (Low Temperature Polysilicon and Indium Gallium Zinc Oxide), quantum
434 dot technology, and next generation Organic Light Emitting Diodes (OLED). As such, EPA
435 anticipates an opportunity for proposing further limits on power consumption in future revisions.

436 7.1.3 ABC Performance Across All Preset Picture Settings: EPA is interested in better understanding
437 how ABC performs across all Preset Picture Settings. EPA anticipates exploring this issue once
438 ABC is implemented in and persistent across more Preset Picture Settings.

439 7.1.4 UHD Allowance: EPA anticipates modifying the UHD allowance in the next revision to account for
440 UHD gains in efficiency.

441 7.1.5 HDR Allowance: EPA will monitor the market to assess the extent to which an opportunity exists
442 to improve the energy efficiency of the HDR upscaling feature and televisions displaying native
443 HDR content in a future revision.

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