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[6450-01-P]

**DEPARTMENT OF ENERGY**

**10 CFR Parts 429 and 430**

**[Docket No. EERE-2010-BT-TP-0026]**

**RIN: 1904-AC29**

**Energy Conservation Program: Test Procedures for Television Sets**

**AGENCY:** Office of Energy Efficiency and Renewable Energy, Department of Energy.

**ACTION:** Final rule.

**SUMMARY:** On January 19, 2012, the U.S. Department of Energy (DOE) issued a notice of proposed rulemaking (NOPR) to establish a new test procedure for television sets (TVs). Based on comments received in response to the January 2012 NOPR, DOE performed additional testing and proposed amendments to the TV test procedure in its March 12, 2013 supplemental notice of proposed rulemaking (SNOPR). Following the March 2013 SNOPR, DOE issues this final rule to establish a new test procedure for TVs and respond to any subsequent comments from the March 2013 SNOPR. This rule resolves issues with the October 1979 TV test procedure, repealed by DOE on October 20, 2009, by allowing for accurate measurement of the energy consumption of modern TVs.

**DATES:** The effective date of this test procedure, located in Appendix H to subpart B of 10 CFR part 430, is **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

The incorporation by reference of certain standards in this rulemaking is approved by the Director of the Office of the Federal Register as of **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].**

**ADDRESSES:** The docket, which includes Federal Register notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at regulations.gov. All documents in the docket are listed in the regulations.gov index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

A link to the docket web page can be found at:

<http://www.regulations.gov/#!docketDetail;D=EERE-2010-BT-TP-0026>. This web page will contain a link to the docket for this notice on the regulations.gov site. The regulations.gov web page will contain simple instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket, contact Ms. Brenda Edwards at (202) 586-2945 or by email: [Brenda.Edwards@ee.doe.gov](mailto:Brenda.Edwards@ee.doe.gov).

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**SUPPLEMENTARY INFORMATION:**

This final rule incorporates by reference into part 430 the following industry standards:

(1) CEA-770.3-D, Consumer Electronics Association, High Definition TV Analog Component Video Interface, approved February 2008.

CEA standards can be purchased from the Consumer Electronic Association, 1-800-699-9277, 1-734-780-8000, or <http://www.techstreet.com/info/cea.tmpl>

(2) HDMI Specification Version 1.0, High-Definition Multimedia Interface Licensing, LLC, *High-Definition Multimedia Interface Specification*, Informational Version 1.0, published September 4, 2003.

HDMI standards can be purchased from HDMI Licensing, LLC, 1140 East Arques, Suite 100 Sunnyvale, CA 94085, or <http://www.hdmi.org/contact/index.aspx>

(3) IEC Standard 933-5:1992, International Electrotechnical Commission, *Audio, video and audiovisual systems - Interconnections and matching values - Part 5: Y/C connector for video systems - Electrical matching values and description of the connector*, First Edition 1992-12.

(Note: IEC 933-5 is also known as IEC 60933-5.)

(4) IEC Standard 62087:2011, International Electrotechnical Commission, *Methods of measurement of the power consumption of audio, video, and related equipment*, Edition 3.0, 2011-04.

IEC standards can be purchased from the International Electrotechnical Commission, 3 rue de Varembé, P.O. Box 131, CH-1211 Geneva 20 – Switzerland, or <http://www.iec.ch>

(5) ITU-R BT.470-6, International Telecommunication Union, *Conventional Television Systems*, published November 1998

ITU standards are freely available from the International Telecommunication Union, <http://www.itu.int/en/ITU-T/publications/Pages/default.aspx>

(6) SMPTE 170M-2004, *SMPTE Standard for Television – Composite Analog Video Signal – NTSC for Studio Applications*, approved November 20, 2004.

SMPTE standards can be purchased from the Society of Motion Picture and Television Engineers, 3 Barker Ave. 5<sup>th</sup> Floor, White Plains, NY 10601  
<http://www.techstreet.com/products/1228846>

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## **I. Authority and Background**

### A. General

Title III of the Energy Policy and Conservation Act of 1975 (42 U.S.C. 6291, et seq.; “EPCA” or, “the Act”) sets forth a variety of provisions designed to improve energy efficiency. (All references to EPCA refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Pub. L. 112-210 (Dec. 18, 2012)). Part B of title III, which for editorial reasons was redesignated as Part A upon incorporation into the U.S. Code (42 U.S.C. 6291–6309, as codified), establishes the “Energy Conservation Program for Consumer Products Other Than Automobiles.” These include television sets, the subject of today’s final rule. (42 U.S.C. 6292(a)(12))

Under EPCA, the energy conservation program consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. The testing requirements consist of test procedures that manufacturers of covered products must use as the basis for (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA, and (2) making

representations about the efficiency of those products. Similarly, DOE must use these test procedures to determine whether the products comply with any relevant standards promulgated under EPCA.

#### B. Test Procedure Rulemaking Process

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA provides that any test procedures prescribed or amended under this section shall be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, if DOE determines that a test procedure amendment is warranted, it must publish proposed test procedures and offer the public an opportunity to present oral and written comments on them. (42 U.S.C. 6293(b)(2)) Finally, in any rulemaking to amend a test procedure, DOE must determine to what extent, if any, the proposed test procedure would alter the measured energy efficiency of any covered product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1)) If DOE determines that the amended test procedure would alter the measured efficiency of a covered product, DOE must amend the applicable energy conservation standard accordingly. (42 U.S.C. 6293(e)(2))

The Energy Independence and Security Act of 2007 (EISA 2007), Public Law 110-140 (Dec. 19, 2007) amended EPCA to require DOE to implement a standby and off mode energy consumption measurement, if technically feasible, in test procedures where not previously

present. Otherwise, DOE must prescribe a separate standby and off mode energy test procedure, if technically feasible. 42 U.S.C. 6295(gg)(2)(A). EISA 2007 also requires any final rule to establish or revise a standard for a covered product, adopted after July 1, 2010, to incorporate standby mode and off mode energy use into a single amended or new standard, if feasible. 42 U.S.C. 6295(gg)(3)(A). DOE recognizes that the standby and off mode conditions of operation apply to TVs. In response to this requirement, DOE adopts provisions in the test procedures to address standby and off mode as discussed in sections III.J and III.K of this rulemaking.

Today's rule also fulfills DOE's obligation to periodically review its test procedures under 42 U.S.C. 6293(b)(1)(A). DOE anticipates that its next evaluation of this test procedure will occur in a manner consistent with the timeline set out in this provision.

### C.Rulemaking Background

In May 2008, the Consumer Electronics Association (CEA) and the California Energy Commission (CEC) petitioned DOE to repeal its TV test procedure, promulgated on June 29, 1979, as, among other things, it was no longer appropriate for measuring the energy consumption of modern TVs.<sup>1</sup> CEC cited the Digital Transition and Public Safety Act of 2005 as a main contributor for their request to repeal the test procedure.<sup>2</sup> The act mandated that as of June 12, 2009, all TV broadcasts must be transmitted digitally, transitioning from analog broadcasts

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<sup>1</sup> See Energy Conservation Program: Repeal of Test Procedures for Televisions. 74 FR 53640 (Oct. 20, 2009). <[http://www1.eere.energy.gov/buildings/appliance\\_standards/pdfs/74fr53640.pdf](http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/74fr53640.pdf)>

<sup>2</sup> Chamberlain, William M., "Petition of the California Energy Commission to Repeal the Test Method for Television Sets in 10 C.F.R. Part 430 Subpart B." May 23, 2008. <[http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-05-15\\_workshop/other/Petition\\_Of\\_The\\_CEC\\_To\\_Repeal\\_The\\_Test\\_Method\\_For\\_Television\\_Sets\\_In\\_10\\_CFr\\_Part\\_430\\_Subpart\\_B.pdf](http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-05-15_workshop/other/Petition_Of_The_CEC_To_Repeal_The_Test_Method_For_Television_Sets_In_10_CFr_Part_430_Subpart_B.pdf)>

which were formally used for all over the air TV broadcasts.<sup>3</sup> The October 1979 test procedure relied solely on analog test signals for test content and was geared heavily for older screen technologies like cathode ray tubes (CRT) which made it increasingly obsolete. CEA also highlighted the work of the International Electrotechnical Commission (IEC) in the standard IEC 62087 Ed. 1.0 “Methods of measurement for the power consumption of audio, video, and related equipment” as a test procedure more suitable for the power consumption of modern TVs. 74 FR 53641.

On October 20, 2009, DOE repealed the TV test procedure and then began a rulemaking process designed to resolve the issues of the former test procedure. 74 FR 53640. As a first step in the rulemaking process, DOE published a request for information and request for comment document (RFI) on September 3, 2010. 75 FR 54048 (September 2010 RFI). In the September 2010 RFI, DOE evaluated current industry test procedures and requested comment from stakeholders. Following stakeholders’ initial comments, DOE published a NOPR which outlined the proposed television test procedure. 77 FR 2830 (January 19, 2012) (the January 2012 NOPR). In the January 2012 NOPR, DOE proposed power consumption tests for on mode, standby-active, high mode, standby-passive mode, and off mode, as well as a luminance test for the home and retail picture setting. In March 2013, DOE published a SNOPR to amend the proposed test procedure and to clarify the intent of the January 2012 NOPR. 78 FR 15808 (March 12, 2013) (the March 2013 SNOPR). The most notable amendments included: (1) the removal of the standby-active, high mode test, (2) the addition of the standby-active, low mode test, (3) the addition of specificity to the on mode test with automatic brightness control (ABC)

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<sup>3</sup> Digital transition mandated by Public Safety Act of 2005 <<http://www.fcc.gov/cgb/consumerfacts/digitaltv.html>>

enabled by default, and (4) the revised picture setting structure for the luminance test. DOE addresses all comments and clarifies the adopted test procedure in today's final rule.

## **II. Summary of the Final Rule**

Today's final rule adopts a new test procedure for TVs. This test procedure is designed to resolve the issues which prompted DOE to repeal the previous test procedure. This test procedure adopts tests for active (on mode), standby mode, off mode, and screen luminance measurements. The data obtained through this test procedure includes the power consumption measurements for all available modes of operation, power factor measurements in on mode, screen luminance values, and an annual energy consumption metric based on the power consumption of individual modes of operation. The adopted tests are based on stakeholder comments in response to the September 2010 RFI, January 2012 NOPR, and March 2013 SNOPR as well as DOE testing. Throughout the rulemaking process, DOE performed several rounds of testing to ensure the adopted tests are repeatable and reproducible.

## **III. Discussion**

### **A. Incorporated Industry Test Procedures**

In preparation for the March 2013 SNOPR, DOE participated as an observing member of the CEA working group meetings regarding TV energy consumption (CEA R4 WG13) to gain a better understanding of industry's position on TV test procedures. DOE based many of its proposals from the March 2013 SNOPR on Draft version 3.5 of the CEA-2037-A standard (October 11, 2012), "Determination of Television Average Power Consumption". CEA, Sharp, and Panasonic commented that DOE should incorporate by reference the draft version 3.5 of CEA-2037-A as the DOE test procedure in an effort to harmonize between DOE, industry, and

international test procedures (CEA, No. 72 at p. 2; Sharp, No. 68 at p. 1; Panasonic, No. 67 at p. 1). However, as of today, CEA-2037-A is still in draft form and has not yet been finalized. DOE believes it would not be appropriate to reference by incorporation a test method that is still undergoing changes and has not been made publically available. Therefore, while DOE continues to base its test procedure requirements on draft version 3.5 of the CEA-2037-A test method into today's final rule, DOE is not incorporating these sections by reference.

Additionally, CEA, Panasonic, and Sharp also commented that DOE should incorporate requirements from IEC 62087 Ed. 3.0 in its test procedure (CEA, No. 72 at p. A-6; Panasonic, No. 67 at p. 7; Sharp, No. 68 at p. 3). DOE agrees with these comments and incorporates many of today's requirements from IEC 62087 Ed. 3.0. DOE believes that these concepts closely align with those proposed in CEA's draft version 3.5 of CEA-2037-A and will ensure compatibility between the DOE test procedure and industry standards. DOE also recognizes the importance of harmonizing with industry and international test procedures, and takes action by incorporating many industry requirements by reference in today's final rule. DOE is aware that industry and international test procedures are in development, and DOE will consider amending this test procedure to further harmonize with these industry test procedures once any ongoing efforts are finalized.

#### B. Products Covered by the Proposed Test Procedure

Following the public meeting for the March 2013 SNOPR, California Investor Owned Utilities (CA IOU), CEA, Northwest Energy Efficiency Alliance (NEEA), Panasonic, and Sharp commented that many of the definitions in the proposed TV test procedure contained scoping

criteria and requirements that are more suitable for the scope of coverage and product configuration sections, specifically in reference to the definition for television sets (CA IOU, No. 71 at p. 2; CEA, No. 72 at p. A-4; NEEA, No. 66 at p. 2; Panasonic, No. 67 at p. 2; Sharp, No. 68 at p. 2). NEEA commented that while it agreed with this parameter, defining a TV as a product with a diagonal screen size of 15” or larger may have unintended future consequences (NEEA, No. 66 at p. 2). CEA also commented that restricting the screen size of a TV is not appropriate for a definition (CEA, No. 72 at p. A-4). CA IOU suggested that the size requirement be moved to scope of coverage rather than including it in the definition of a TV (CA IOU, No. 71 at p. 2). DOE agrees with these comments and believes that the screen size requirement should be moved from the definition of a television set and included as part of the scope of the rule, in section 1 of Appendix H to subpart B of 10 CFR part 430. This change allows for a more inclusive definition of a television set, because it is no longer limited to having a screen size of 15 inches or greater. DOE believes that updating the definition allows greater flexibility for other regulating bodies and for future use by DOE. While the definition of a television set no longer contains the provision that the screen size is 15 inches or greater, DOE updates the applicability of the test procedure adopted in today’s final rule to only those televisions having a screen size of 15 inches or greater.

In the March 2013 SNO PR, DOE also defined a TV as a product that is “designed to be powered primarily by mains power...” Following the public meeting for the March 2013 SNO PR, DOE received comment from Panasonic suggesting that “primarily” be replaced with “solely” to exclude battery powered TVs from the scope of this rulemaking (Panasonic, No. 67 at p. 2). Sharp commented that the terms ‘main battery’ and ‘auxiliary battery’ should be defined to

help clarify the product coverage of this rulemaking (Sharp, No. 68 at p. 2). DOE agrees with these comments and has added definitions for ‘main battery’ and ‘auxiliary battery’ to section 2 of Appendix H to subpart B of 10 CFR part 430. A main battery is defined as a battery capable of powering the TV to produce dynamic video without support of mains power and an auxiliary battery is defined as a battery capable of powering a clock or retaining TV settings but incapable of powering the TV to produce dynamic video. DOE clarifies that the proposed definition of a television in the March 2013 SNOPR was designed to exclude TVs capable of being powered by a main battery from the rulemaking but not to exclude TVs with auxiliary batteries. While the definition of a television set no longer contains the provision that it must be designed to be powered primarily by mains power, DOE updates the applicability of the test procedure adopted in today’s final rule to only those televisions that are powered by mains power (including TVs with auxiliary batteries but not TVs with main batteries).

Sharp also suggested that TVs with non-removable main batteries should not be tested while TVs with removable main batteries should be tested (Sharp, No. 68 at p. 2). DOE believes that testing TVs that have main batteries may result in energy consumption values that are not appropriate for these products due to a different usage profile. Main battery-powered TVs are typically designed for portability and are not intended to be used for several hours a day with their batteries removed. Additionally, these products represent a limited cross-section of the TV market. DOE believes including main battery-powered devices would create unnecessary test burden and result in atypical energy consumption measurements for these products. While DOE believes these products still meet the definition of a TV, they follow a different usage profile than products that fall under the scope of this rulemaking.

However, DOE believes TVs that have auxiliary batteries should be included within the scope of coverage of this test procedure. DOE believes that nearly all TVs have at least one auxiliary battery and this clarification does not change the scope of this rulemaking.

In today's final rule, DOE clarifies its position for TVs powered by mains and batteries as part of the scope of coverage rather than the definition of a television set. DOE also clarifies that TVs powered by main batteries shall be excluded from today's rule, while TVs with auxiliary batteries shall be included in the scope for today's rulemaking, located in section 1 of Appendix H to subpart B of 10 CFR part 430.

*Scope:* This appendix covers the test requirements used to measure the energy and power consumption of television sets that: (1) have a diagonal screen size of at least fifteen inches and (2) are powered by mains power (including TVs with auxiliary batteries but not TVs with main batteries).

### C. Definitions

#### 1. Television Sets

As discussed in section III.B of this rule, DOE has updated the scope of coverage to incorporate elements formerly proposed in the TV definition. As a result, DOE broadened the TV definition located in 10 CFR part 430.2 as follows:

*Television set or TV* means a product designed to produce dynamic video, contains an internal TV tuner encased within the product housing, and that is capable of receiving dynamic visual content from wired or wireless sources including but not limited to:

- (1) Broadcast and similar services for terrestrial, cable, satellite, and/or broadband transmission of analog and/ or digital signals; and/or
- (2) Display-specific data connections, such as HDMI, Component video, S-video, Composite video; and/or
- (3) Media storage devices such as a USB flash drive, memory card, or a DVD; and/or
- (4) Network connections, usually using Internet Protocol, typically carried over Ethernet or Wi-Fi.

The scope of coverage includes a requirement for a minimum screen size as well as an exclusion for TVs powered by a main battery. These limitations in scope are consistent with the limitations previously proposed in the TV definition in the March 2013 SNO PR. Moving these requirements to the scope of coverage allows for a broader definition of a TV that is consistent with industry practice while retaining the more narrow scope of coverage proposed under the January 2012 NOPR and the March 2013 SNO PR.

DOE also notes that the internal TV tuner requirement proposed in the March 2013 SNO PR is still appropriate for the TV definition. 78 FR 15811. In the All-Channel Receiver Act, the Federal Communication Commission (FCC) has the authority to require that all products marketed as a TV shall include a TV tuner within the product housing. 47 U.S.C 303(s). A TV

tuner is a key defining characteristic between TVs, displays, and digital picture frames, and as discussed in the January 2012 NOPR, the convergence of these products makes distinguishing their features critical for this rulemaking. Thus, DOE believes that a TV tuner is necessary for the definition of a TV. NEEA commented that they support a TV tuner requirement for the definition of a TV (NEEA, No. 66 at p. 2). As part of today's final rule, DOE adopts the updated definition of a television set in 10 CFR part 430.2 in response to comments from the March 2013 SNOPR.

## 2. On Mode

In response to the March 2013 SNOPR, Panasonic commented that the definition of on mode should be updated from "providing one or more principle functions" to "providing both picture and sound" (Panasonic, No. 67 at p. 7). Although DOE agrees that this language would clarify the intent of a 'principle function', DOE does not believe sound should be included as a principle function. DOE does not require that a TV produce sound under the scope of this rulemaking and believes this change may inadvertently exclude TVs that do not have speakers. DOE agrees with the Panasonic's intentions of clarifying the primary functions of a TV and therefore updates this language in the definition of on mode to "producing dynamic video" in section 2.14 of Appendix H to subpart B of 10 CFR part 430.

## 3. Video Inputs

In the March 2013 SNOPR, DOE proposed definitions for video inputs as a way to clearly specify the connection between the TV and the video input device. 78 FR 15812-15813. These definitions were based on industry standards and harmonized with the Set-top Box (STB)

Test Procedure NOPR. Docket No. EERE-2-12-BT-TP-0046, 78 FR 5076. Sharp provided comment on the proposed video input definitions, specifically High-Definition Multimedia Interface (HDMI), S-video, composite video, and component video. Sharp agrees with the definition for HDMI but recommends that the HDMI connection should be compatible with all HDMI versions (Sharp, No, 68 at p. 6). DOE agrees with this comment and clarifies the definition of HDMI in 10 CFR part 430.2 by requiring that the video input must at least meet HDMI Version 1.0, but accepts higher versions as they are backwards compatible. DOE recognizes that next generation versions of this format will be released, but the criteria in version 1.0 meets the minimum requirements to measure the power consumption of this test procedure. Additionally, DOE does not believe that it is necessary to require updated HDMI versions that have been updated with capabilities not tested in this procedure such as 3D and 4k resolution.

*High-definition multimedia interface or HDMI®* means an audio and video interface as defined by HDMI Specification Version 1.0 or greater.

In response to the S-video definition, Sharp commented that S-video should be defined according to IEC 60933-5 (Sharp, No, 68 at p. 7). IEC 60933-5 is consistent with DOE's definition in the March 2013 SNOPR, and including this reference can help to clarify this video input connection. DOE agrees with Sharp's comment and updates the definition of S-video in 10 CFR 420.2 to reference this standard accordingly:

*S-video* means a video display interface that transmits analog video over two channels: luma and chroma as defined by IEC 60933-5.

Sharp commented that the composite video definition should use the SMPTE 170 M standard for 60 Hz signals and ITU BT.470-6 standard for 50 Hz signals (Sharp, No, 68 at p. 6). In the March 2013 SNO PR, DOE proposed that the composite video input should use the National Television System Committee (NTSC) format for a 60 Hz signal. Although NTSC is the correct format for a 60 Hz video signal, DOE agrees that using the SMTPE is more appropriate because it is a standard. Additionally, adding a standard for a 50 Hz signal allows this test procedure to be used internationally. Thus, DOE clarifies these formats in the definition of composite video in 10 CFR part 430.2:

*Composite video* means a video display interface that uses Radio Corporation of America (RCA) connections carrying a signal defined by the Society of Motion Picture and Television Engineers' (SMPTE) standard, SMPTE 170M for regions that support a power frequency of 59.94 Hz or International Telecommunication Union's (ITU) standard, ITU BT 470-6 for regions that support a power frequency of 50 Hz.

Sharp commented that they support the definition for component video proposed in the March 2013 SNO PR, and therefore DOE retains its proposal and adopts this definition for component video in 10 CFR part 430.2 (Sharp, No. 68 at p. 6).

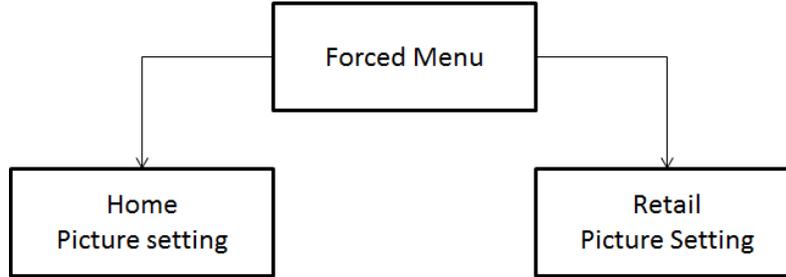
CEA also provided comment on the video input definitions, and suggested, along with Sharp, that the definition for direct video connection should be removed because it is not used in the test procedure (CEA, No. 72 at p. A-5; Sharp, No. 68 at p. 6). DOE originally proposed this definition to harmonize with the STB video input definitions proposed in the STB test procedure

NOPR. Docket No. EERE-2-12-BT-TP-0046, 78 FR 5076. Because DOE did not use the term in the TV test procedure, DOE agrees with commenters and removes the definition for direct video connection from today's final rule. DOE also clarifies that symbol definitions for videocassette recorder (VCR),  $L_{ratio}$ , and light measuring device (LMD) have been removed because these terms are no longer used in the test procedure.

#### 4. Picture Setting

In the January 2012 NOPR, DOE proposed definitions for home and retail picture settings to create a picture setting structure consistent with the ENERGY STAR Program Requirements for Televisions, Version 4.1 (ENERGY STAR v. 4.1). 77 FR 2837. These definitions established a picture setting structure as depicted in Figure 1. In preparation of the January 2012 NOPR, DOE performed testing and discovered a TV that was unable to enter the retail picture setting after selecting the home picture setting. DOE was concerned that that this issue would prevent the luminance test from being performed on certain TVs, and therefore DOE proposed that the retail picture setting luminance measurement shall be performed first, followed by the home picture setting. Additionally, the on mode test would be performed after the luminance test so that the home picture setting would not need to be changed between tests. The proposed testing order was slightly different from other industry test procedures, which tested on mode before luminance. DOE found this difference necessary to ensure that all TVs were capable of entering both the home and retail picture settings for the luminance test.

**Figure 1: Picture Setting Structure Proposed in the January 2012 NOPR**

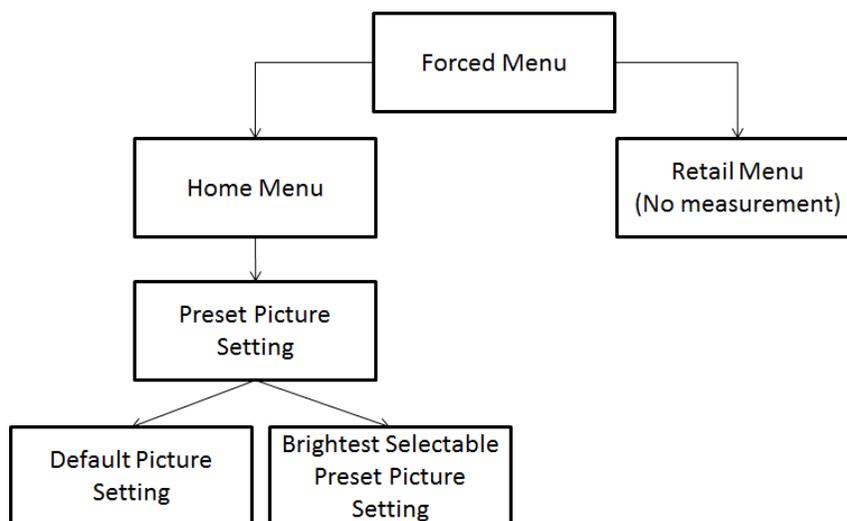


In response to the January 2012 NOPR picture setting proposals, Sharp commented that the retail picture setting may not be the brightest picture setting as defined in the January 2012 NOPR (Sharp, No. 45 at p. 2). Sharp also commented that the proposed testing order could lead to double testing for manufacturers that test their products with multiple test procedures (Sharp, No. 45 at p. 3). Panasonic suggested that either the brightest selectable picture setting or the retail picture setting should be tested as the picture setting that measures the highest luminance in on mode (Panasonic No. 50 at p. 2). NEEA recommended that the retail picture setting should be defined as the picture setting which produces the highest attainable luminance from a factory defined menu option (NEEA No. 43 at p. 2). Mitsubishi Electric Visual Solutions America, Inc. (MEVSA) commented that ‘preset picture setting’ should be defined to help clarify the retail picture setting definition (MEVSA, No. 44 at p. 5).

Based on these comments, DOE proposed a definition in the March 2013 SNO PR for the brightest selectable preset picture setting as the picture setting which produces the highest luminance during on mode. 78 FR 15813-15815. The luminance of this picture setting was also measured instead of the retail picture setting (see Figure 2). Additionally, DOE clarified that the brightest selectable preset picture setting was only available from within the home menu. Once

DOE proposed that the brightest selectable preset picture setting be measured within the home menu, ‘home picture setting’ was no longer an appropriate term for measuring the default screen luminance. DOE therefore replaced the term ‘home picture setting’ with the term ‘default picture setting’ (which maintained the same meaning as had been previously given to ‘home picture setting’) to measure the default screen luminance. DOE also proposed a definition for preset picture setting to help distinguish these picture settings within the home menu. The proposed testing structure no longer tested picture settings in the retail menu, and DOE was able to harmonize the test order with other industry procedures. Thus, the new testing order in the March 2013 SNO PR tested on mode in the default picture setting followed by the luminance test in the default and brightest selectable preset picture setting. NRDC and Sharp commented that they support the definition for brightest selectable preset picture setting (NRDC, No. 64 at p. 4; Sharp, No. 68 at p. 3). Additionally, Panasonic and Sharp commented that they support the definition for default picture setting (Panasonic, No. 67 at p. 3; Sharp, No. 68 at p. 3).

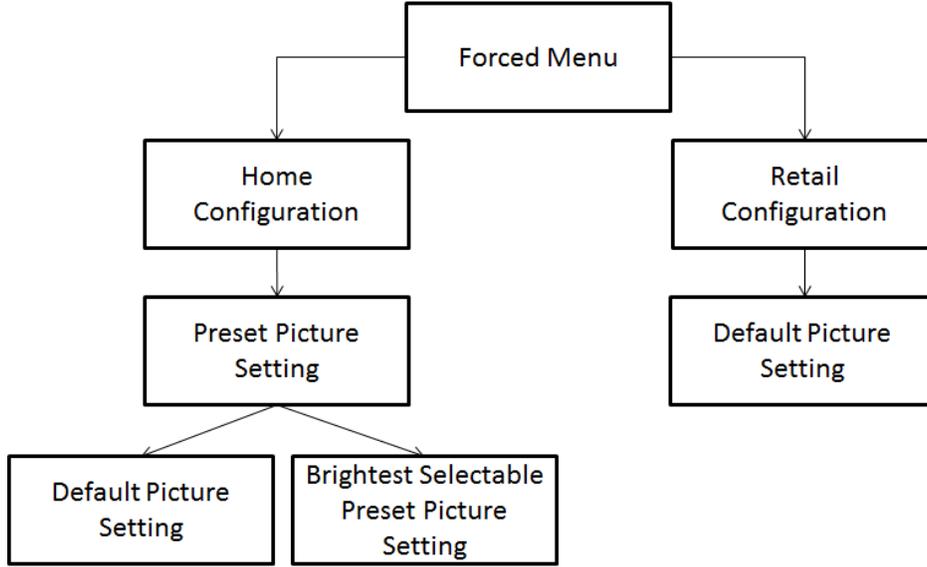
**Figure 2: Picture Setting Structure Proposed in March 2013 SNO PR**



Based on DOE's proposal in the March 2013 SNO PR, CA IOU, CEA, and NEEA recommended that DOE broaden its definition of preset picture setting to include picture settings within the retail menu (CA IOU, No. 71 at p. 3; CEA, No. 72 at p. A-7; NEEA, No. 66 at p. 2). Broadening the definition for preset picture setting allows the brightest selectable preset picture setting to be found in either the home or retail menu. Panasonic, Sharp, and CEA also commented that 'home mode', 'retail mode', and 'forced menu' should be defined to help clarify the picture setting structure (Panasonic, No. 67 at p. 3; Sharp, No. 68 at p. 3; CEA, No. 72 at p. A-8). DOE agrees with these comments and adopts definitions for 'home configuration', 'retail configuration', and 'forced menu' in today's final rule.

In the March 2013 SNO PR, although DOE did not include definitions for 'home mode' and 'retail mode', these terms were discussed in the preamble as 'home menu' and 'retail menu'. DOE intentionally avoided using the term 'mode' to prevent confusion with the modes of operation. Although this is still a concern, DOE believes that defining similar terms would be beneficial by clearly describing the picture setting structure. DOE therefore adopts the terms "home configuration", "retail configuration", and "forced menu" in sections 2.6, 2.16, and 2.5 respectively of Appendix H to subpart B of 10 CFR part 430. The picture setting structure adopted in today's final rule can also be seen in Figure 3. When developing this picture setting structure, DOE determined that 'configuration' would be more appropriate to describe the function of the 'home' and 'retail' than the term 'menu', since these selections do not present their own sub-menus.

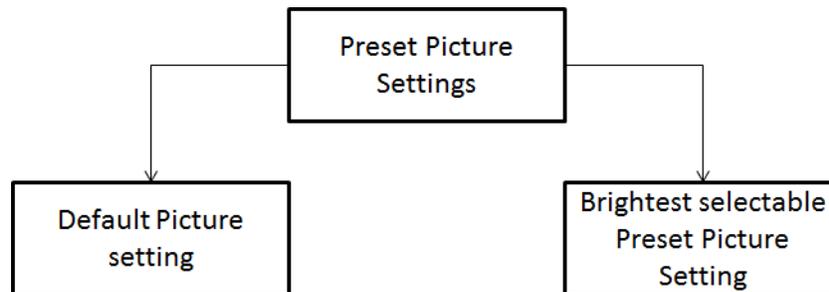
**Figure 3: Final Rule Picture Setting Structure**



Throughout this rulemaking, DOE has received many comments highlighting the difficulties of defining a single picture setting that exhibits the highest screen luminance value for all TVs. To mitigate this issue, DOE adopts a picture setting structure which defines both the brightest selectable preset picture setting within the home configuration and the default picture setting within the retail configuration. This structure is designed to measure the brightest picture setting of the TV regardless of whether it is in the home or retail configuration. Thus, DOE adopts the definitions for the brightest selectable preset picture setting and the default picture setting in sections 2.3 and 2.4 respectively of Appendix H to subpart B of 10 CFR part 430. DOE also notes that the picture setting structure depicted in Figure 3 only applies to TVs that have a forced menu, rather than all TVs. For TVs with a forced menu, the luminance test measures the screen luminance of three defined picture settings. For TVs that do not have a forced menu, the luminance test measures the screen luminance of two defined picture settings, as shown in Figure

4. The adopted luminance test can be found in section 7.4 of Appendix H to subpart B of 10 CFR part 430.

**Figure 4: Final Rule Picture Setting Structure without Forced Menu**



#### 5. Definitions Incorporated by IEC 62087 Ed. 3.0

In the March 2013 SNO PR, DOE proposed that the definitions and configuration requirements for additional and special functions be incorporated by reference from IEC 62087 Ed. 3.0. 78 FR 15812. Panasonic and Sharp agreed with these proposals, and therefore DOE adopts definitions for additional and special functions in sections 2.1 and 2.17 respectively of Appendix H to subpart B of 10 CFR part 430 (Panasonic, No. 67 at p. 3; Sharp, No. 68 at p. 2).

DOE clarifies that the definition of “TV combination unit” has been removed as part of today’s final rule. This term was not used in the test procedure and is already included under the definition of additional functions as part of section 2.1 of Appendix H to subpart B of 10 CFR part 430. CEA also recommended that this definition be removed (CEA, No. 72 at p. A-8).

#### D. Measurement Equipment

##### 1. Power Meter Requirements

In the January 2012 NOPR, DOE proposed power meter requirements based on section 5.1.5 of IEC 62087 Ed. 3.0. 77 FR 2838. These requirements specify the type of meter, the measured uncertainty, and resolution of the measurements. DOE's proposal differed from IEC 62087 Ed. 3.0 in that it required the sampling rate of at least 1 measurement per second and it required power factor to be measured simultaneous to real power. DOE maintained this proposal in the March 2013 SNOPR, and, in response, CEA commented that it agrees with these requirements (CEA, No. 72 at p. A-9). In today's final rule, DOE adopts these power meter requirements as proposed in the March 2013 SNOPR.

## 2.Luminance Meter Requirements

In the January 2012 NOPR, DOE proposed requirements for luminance and illuminance meters under a single requirement for light measurement devices. 77 FR 2838-2839. These requirements included an accuracy of  $\pm 2\% \pm 2$  digits of resolution, a repeatability of  $0.4\% \pm 2$  digits of resolution, and an acceptance angle of 3 degrees or less. In response to this proposal, Sharp commented that it was in support of these tolerance requirements, while MEVSA and NEEA requested that DOE clarify these tolerance requirements (Sharp, No. 45 at p. 3; MEVSA, No. 44 at p. 29; NEEA, No. 43 at p. 2). In the March 2013 SNOPR, DOE included an example in the rule language to clarify the accuracy requirement of a light measurement device. Additionally, DOE reevaluated the overall tolerance requirements and determined that a repeatability requirement may not be appropriate for all measurement equipment. Thus, in the March 2013 SNOPR, DOE removed the repeatability requirement. DOE also determined that it could be misinterpreted in the proposed text that the acceptance angle requirement applied to

both luminance and illuminance meters, which was not the intent. Thus, DOE clarified that the acceptance angle requirement is only applicable for luminance meters. 78 FR 15815-15816.

In response to the March 2013 SNOPR, Panasonic commented they were in support of the accuracy requirement. (Panasonic, No. 67 at p. 3). Sharp also commented during the SNOPR public meeting that including both luminance and illuminance specifications together may be confusing, especially when attempting to make a distinction between the two (Sharp, No. 65 at p. 173). DOE agrees with these comments and separates the light measurement device specification into two individual requirements for luminance and illuminance meters in sections 3.4 and 3.5 respectively of Appendix H to subpart B of 10 CFR part 430. DOE also notes that these separate requirements maintain the accuracy requirement proposed in the March 2013 SNOPR.

Additionally, Sharp and CEA commented that the acceptance angle specification for luminance meters should only apply to non-contact meters (Sharp, No. 68 at p. 3; CEA, No. 72 at p. A-10). DOE agrees with these comments because a contact luminance meter measures screen luminance while making contact with the screen and eliminates any concern with accepting unwanted light. DOE therefore clarifies that the acceptance angle specification for luminance meters is only applicable to non-contact luminance meters in today's final rule.

## E. General Test Set-up

### 1. Nominal Voltage and Frequency of the Region

In the January 2012 NOPR, DOE proposed the voltage and frequency requirements of 115 V  $\pm$  1%, 60 Hz  $\pm$  1%, and a total harmonic distortion (THD) of less than 5%. 77 FR 2838. Panasonic recommended that section 5.1.1 of IEC 62087 Ed. 3.0 be referenced to include a voltage and frequency tolerance of  $\pm$  2% and a THD of less than 5% (Panasonic, No. 50 at p. 2).

DOE believed that the tolerance levels set in the January 2012 NOPR were appropriate, but also agreed that incorporating a requirement from an industry test procedure would be beneficial. Therefore, in the March 2013 SNO PR, DOE proposed that the voltage and frequency specifications be incorporated by reference from section 4.3.1 of IEC 62301 Ed. 2.0. 78 FR 15815. Although Panasonic recommended incorporating section 5.1.1 of IEC 62087 Ed. 3.0, DOE incorporated IEC 62301 Ed. 2.0 to maintain the same requirements as the January 2012 NOPR. DOE also harmonized with IEC 62301 Ed. 2.0 because it includes a table which specifies the nominal voltage and frequency by region to allow for international adoption. Additionally, DOE clarified that the THD requirement remains the same as the January 2012 NOPR proposal, at less than 5%.

Based on this proposal in the March 2013 SNO PR, Sharp recommended that DOE use the term “rated voltage and frequency” rather than “nominal voltage and frequency” as this was the intention of IEC in IEC 62301 Ed. 2.0 (Sharp, No. 68 at p. 3). DOE agrees with this recommendation and updates the voltage and frequency requirement to specify the rated values of the region and incorporates section 4.3.1 of IEC 62301 Ed. 2.0 in section 3.1 of Appendix H to subpart B of 10 CFR part 430.

## 2. International Unit Harmonization

To further harmonize with international standards, Sharp suggested that distance be measured in metric rather than imperial units, and offered a recommendation of  $1.5 \pm 0.1$  meters (m) for the on mode with ABC enabled test set-up (Sharp, No. 68 at p. 5). DOE agrees with Sharp’s comment because using metric units will limit manufacturer burden when testing

multiple procedures. DOE also agrees with Sharp's distance recommendation of 1.5 m because it is roughly 4.92 feet (ft) and falls within the proposed tolerance for the previous 5 ft requirement. DOE therefore adopts the use of metric units for all distance requirements in today's final rule.

### 3. Dark Room Conditions

In response to the January 2012 NOPR, MEVSA recommended that DOE clarify dark room conditions (MEVSA, No. 44 at p. 2). Panasonic also noted that wall reflectivity of a room may play a role in illuminance measurements (Panasonic, No. 50 at p. 4). In response to these comments, DOE performed testing to help provide additional clarification. In the March 2013 SNOPR, DOE proposed a definition for a dark room that the room illuminance shall not exceed 1.0 lux (lx) measured at the ABC sensor. 78 FR 15813. DOE also proposed that the ABC sensor shall be at least 2 ft from any wall surface.

Based on these requirements, CEA agreed with DOE's proposal to measure the room illuminance at the ABC sensor (CEA, No. 72 at p. A-6). Sharp commented that the requirements for dark room conditions are embedded in the definition for a dark room (Sharp, No. 68 at p. 7). DOE agrees with Sharp's comment and removes the definition for dark room in favor of a requirement for ambient light conditions, located in section 4.3 of Appendix H to subpart B of 10 CFR part 430. DOE clarifies that this change is purely stylistic and maintains a requirement of no more than 1.0 lx measured at the ABC sensor and that the ABC sensor shall be no less than 2 ft from any wall surface. DOE also clarifies that 'wall surfaces' specified in this requirement do not include the surface on which the TV stand rests upon nor the rear wall which the back of the TV faces. Panasonic supported this proposal (Panasonic, No. 67 at p. 3). Additionally, based on

comments addressed in section III.E.2, DOE updates the distance requirement in this section from 2 ft to 0.5 m to adhere with metric units.

#### 4. Automatic Brightness Control Sensor Configuration

In the March 2013 SNO PR, DOE proposed a requirement to disable the ABC sensor for the luminance measurement. 78 FR 15832. Panasonic and Sharp commented that some TVs do not have the option to disable the ABC sensor from a settings menu, and should be disabled by directing at least 300 lx into the sensor (Panasonic, No. 67 at p. 4; Sharp, No. 68 at p. 3). DOE agrees with these comments and clarifies in section 7.4.1.2 of Appendix H to subpart B of 10 CFR part 430 that if the ABC sensor cannot be disabled through a settings menu, at least 300 lx shall be directed into the ABC sensor.

In the March 2013 SNO PR, DOE also proposed that at least 300 lx shall be directed into the ABC sensor during the on mode stabilization test. 78 FR 15817. Unlike the luminance test, DOE believes that the ABC sensor should not be disabled through the TV menu because it would need to be re-enabled in the subsequent on mode test. Sharp commented that saturating the ABC sensor by directing at least 300 lx into it would achieve repeatable results for all TVs, regardless of whether some TVs have the option to disable ABC through a settings menu (Sharp, No. 68 at p. 3). DOE agrees with Sharp's comment because it promotes a repeatable test set-up and avoids the potential for undesired TV menu selections. DOE therefore adopts an ABC configuration requirement that directs at least 300 lx shall of light into the ABC sensor for the on mode stabilization test in section 7.1 of Appendix H to subpart B of 10 CFR part 430.

## 5. Network Connection

In the March 2013 SNO PR, DOE proposed a network hierarchy (see Table 1) for the standby-active, low mode test. 78 FR 15824. In response to this proposal, Panasonic and Sharp commented that only Wi-Fi and Ethernet connections are appropriate for network-enabled TVs (Panasonic, No. 67 at p. 6; Sharp, No. 68 at p. 7). DOE reevaluated these connections and determined that 75-ohm coaxial cable and RJ-11 are commonly used for only hospitality TV networks and are not appropriate for network-enabled TV testing. Based on the comments by Panasonic and Sharp, DOE adopts a network connection hierarchy which includes only Wi-Fi and Ethernet connections (see Table 2) in section 5.10.2 of Appendix H to subpart B of 10 CFR part 430.

**Table 1: March 2013 SNO PR Network Connection Hierarchy**

Priority	Connection Type
1	Wi-Fi (Institution of Electrical and Electronics Engineers - IEEE 802.11- 20072)
2	Ethernet (IEEE 802.3). If the TV supports Energy Efficient Ethernet (IEEE 802.3az-20103), then it shall be connected to a device that also supports IEEE 802.3az.
3	75-ohm Coaxial Cable
4	RJ-11
5	Other

**Table 2: Network Connection Hierarchy**

Priority	Connection Type
1	Wi-Fi (Institution of Electrical and Electronics Engineers - IEEE 802.11- 20072)
2	Ethernet (IEEE 802.3). If the TV supports Energy Efficient Ethernet (IEEE 802.3az-20103), then it shall be connected to a device that also supports IEEE 802.3az.

Additionally, DOE clarifies that this network connection hierarchy shall also be used for on mode connections. In the March 2013 SNO PR, DOE did not explicitly state that a network shall be connected during on mode, and therefore DOE clarifies this requirement in section 5.10.2 of Appendix H to subpart B of 10 CFR part 430. Network-enabled TVs shall be connected to a network during on mode according to the network hierarchy in Table 2.

## 6. Configuration of Special Functions

During the public meeting for the January 2012 NOPR, the National Resources Defense Council (NRDC) brought to the Department's attention a product that consumed less than 1 W of power in standby-passive mode, but when a quick start function was enabled, it consumed 24 W in standby-passive mode (NRDC, No. 40 at p. 4). The quick start function is designed to significantly decrease the latency between standby mode and on mode by keeping the TV in a heightened power state. DOE responded to this comment in the March 2013 SNO PR by clarifying that quick start is considered to be a special function and therefore would be configured as such. 78 FR 15823-15824. Under the special functions configuration requirement, if quick start was enabled by default it would be tested but if it was disabled by default it would not be tested. In response to the March 2013 SNO PR, Panasonic commented that they support treating quick start as a special function (Panasonic, No. 67 at p. 6).

During the public meeting for the March 2013 SNO PR, NRDC clarified their previous comments on quick start by elaborating that a specific TV prompted the user to configure the quick start function from a menu, rather than just being embedded in a settings menu (NRDC, No. 64 at p. 3). By requesting a user response, the quick start function is more likely to be

enabled by the user than if the TV is shipped with this function disabled. NEEA, Appliance Standards Awareness Project (ASAP), and CA IOU also commented that the quick start function should be tested (NEEA, No. 66 at p. 4; ASAP, No. 69 at p. 2; CA IOU, No. 71 at p. 5). Sharp suggested language which would capture the power consumption of such functions but avoid the possibility of gaming menus (Sharp No. 68 at p. 5). DOE believes that the presence of the quick start function in a user prompt changes the way a user will treat this function, making it more likely that it will be enabled. This scenario with the quick start function prompt can be expanded to other special functions, such as an image processing function that increases power consumption during on mode. Although special function setting options have existed in TV menus for some time, DOE believes it is unlikely that a consumer will divert from the default settings unless they are prompted by the TV. As such, DOE agrees with stakeholder comments and adopts a requirement in section 5.5 of Appendix H to subpart B of 10 CFR part 430 that would configure special functions in the most power consumptive state when a configuration prompt is displayed:

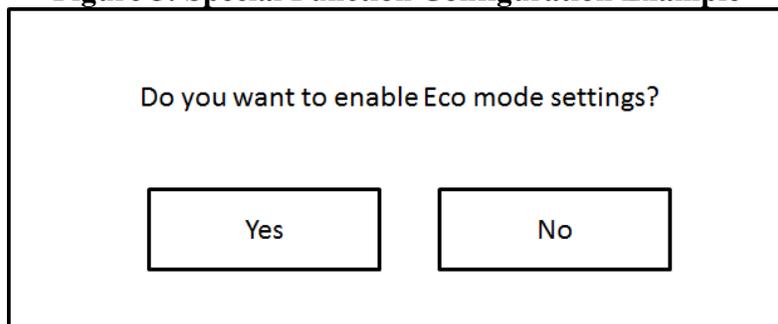
*Special Function Configuration.* If at any time during on mode operation a message prompt is displayed requesting the configuration of special functions, the most power consumptive configuration shall be selected. If it is unknown which configuration yields the most power consumptive state, verify the selection by measuring the power consumption of each possible configuration.

Note: The selection of the home or retail configuration within the forced menu is exempt from this requirement.

DOE clarifies that the selection of the home or retail configuration within the forced menu is not considered a special functions prompt and shall be configured according to the

picture setting configuration criteria in section 5.5 of Appendix H to subpart B of 10 CFR part 430. Additionally, special functions that may be configured within a forced menu should be configured according to today's requirement for special functions, which specifies that the most power consumptive configuration be selected. In this instance, there is no default configuration since the user is prompted to either enable or disable the function from a forced menu, and therefore, additional guidance is required to configure quick start or other special functions that are selected from a forced menu. In cases where it is unknown which configuration uses more power, every possible configuration is required to be tested. For example, in Figure 5, testing would not be required with Eco mode both enabled and disabled because not enabling Eco mode is known to consume more power. Similarly, if it is known that enabling a special function, such as quick start, is more power consumptive, then that function could be enabled without the need to measure the power consumption in each possible menu configuration.

**Figure 5: Special Function Configuration Example**



## 7. Video Input Device Configuration

In the March 2013 SNO PR, DOE proposed that the TV shall be tested with a video input device of a different manufacturer to avoid device communication that can alter the power consumption of the TV. 78 FR 15816-15817. This requirement was based off the discovery that

certain TV and Blu-ray disc players of the same manufacturer have the ability to communicate with one another. Communication between devices changed menu settings and resulted in power variations which increased the potential for unrepeatable results. In response to this proposal, CEA and Panasonic commented that they are in support of this requirement (CEA, No. 72 at p. A-10; Panasonic, No. 67 at p. 4). DOE believes that requiring different manufacturers for the TV and the video input device will promote a repeatable test procedure, and therefore DOE adopts the March 2013 SNO PR proposal for video input devices in section 3.6 of Appendix H to subpart B of 10 CFR part 430.

#### 8. Requirements Incorporated from IEC 62087

In response to the January 2012 NOPR, DOE received comment from Sharp recommending that DOE include requirements for additional and special functions (Sharp, No. 45 at p. 2). Similarly, DOE received comment from Panasonic and Sharp that the stabilization requirement from section 11.4.2 of IEC 62087 Ed. 3.0 should be used to ensure that the TV reaches a steady power state for the on mode test (Panasonic No. 50 at p. 2; Sharp No. 45 at p. 3). In the March 2013 SNO PR, DOE proposed general requirements for on mode testing by incorporating section 11.4 of IEC 62087 Ed. 3.0. 78 FR 15832. Although this requirement included specifications for stabilization, additional functions, and special functions, DOE subsequently included individual references for sections 11.4.2 (stabilization), 11.4.5 (additional functions), and 11.4.6 (special functions) in the March 2013 SNO PR to help clarify its position. In response to the March 2013 SNO PR proposals, Sharp commented that a frame rate requirement should be included that is compatible with the region (Sharp No. 68 at p. 6). While reevaluating the on mode requirements, DOE noted that section 11.4 of IEC 62087 Ed. 3.0 also

included a requirement for frame rate that aligned with Sharp's recommendation. Based on comments from the January 2012 NOPR and the March 2013 SNO PR, DOE concluded that the general on mode requirements incorporated from section 11.4 of section 62087 Ed. 3.0 may have confused stakeholders and should be clarified in today's final rule.

DOE clarifies these requirements by removing the general reference to section 11.4 of IEC 62087 Ed. 3.0 and only referencing individual subsections. Based on comments received from the January NOPR and March 2013 SNO PR, DOE will continue to reference sections 11.4.2 (stabilization), 11.4.5 (additional functions), and 11.4.6 (special functions) in sections 5.1, 5.4, and 7.1 of Appendix H to subpart B of 10 CFR part 430. Additionally, DOE agrees with Sharp's comment on video frame rate and incorporates section 11.4.10 (frame rate) by reference in section 5.8 of Appendix H to subpart B of 10 CFR part 430. DOE did not receive comment on the remaining subsections of section 11.4 of IEC 62087 Ed. 3.0 and therefore discusses the impact of these subsections on today's final rule.

Section 11.4.1 of IEC 62087 Ed. 3.0 specifies ambient temperature for on mode testing. In the January 2012 NOPR, DOE proposed these same requirements to align with industry accepted testing conditions. 77 FR 2839. DOE wishes to continue harmonizing with IEC 62087 Ed. 3.0 and therefore adopts section 11.4.1 of IEC 62087 Ed. 3.0 in section 4.1 of Appendix H to subpart B of 10 CFR part 430. DOE clarifies that this reference maintains the same ambient temperature conditions proposed in the January 2012 NOPR and March 2013 SNO PR.

Sections 11.4.3 and 11.4.4 of IEC 62087 Ed. 3.0 specify configuration requirements for low noise block power supplies and conditional access modules. These functions are not covered as part of this rulemaking and therefore do not need to be configured. DOE therefore does not incorporate by reference these sections as part of today's final rule.

Sections 11.4.7 and 11.4.8 of IEC 62087 Ed. 3.0 specify configuration requirements for the ABC sensor and picture setting requirements. DOE has worked with stakeholders to fine tune its requirements for the ABC sensor and picture setting structure and believes that the adopted requirements ensure repeatable measurements. DOE therefore does not incorporate by reference sections 11.4.7 and 11.4.8 from today's final rule.

Sections 11.4.9 and 11.4.11 of IEC 62087 Ed. 3.0 specify aspect ratio and sound level requirements for on mode testing. DOE agrees that these requirements contribute to a repeatable configuration for video and sound and therefore incorporates these requirements by reference sections 5.7 and 5.9 of Appendix H to subpart B of 10 CFR part 430.

Finally, section 11.4.12 of IEC 62087 Ed. 3.0 specifies the accuracy of input signal levels. This requirement is not appropriate for today's test procedure because only video input devices such as Blu-ray disc™ and DVD players are used to provide the input video signal. This requirement is therefore not incorporated by reference in today's final rule.

DOE reiterates that section 11.4 of IEC 62087 Ed. 3.0 was originally incorporated by reference in the March 2013 SNO PR for general on mode requirements. To clarify this

requirement, DOE removes the general reference and instead incorporates the following individual subsections from 11.4: 11.4.1 (environmental conditions), 11.4.2 (stabilization), 11.4.5 (additional functions), 11.4.6 (special functions), 11.4.9 (aspect ratio), 11.4.10 (frame rate), and section 11.4.11 (sound level).

#### F. Steady State Requirement for On Mode Power Measurements

In the January 2012 NOPR, DOE proposed a stabilization test to ensure that the TV has reached a steady state in order to produce a consistent and repeatable on mode power consumption measurement. This test required that all TVs display the IEC dynamic broadcast-content video signal for a period of 1 hour and compare each consecutive 10-minute segment. The TV must meet the stabilization criteria, incorporated from section 11.4.2 of IEC 62087 Ed. 3.0, that the final two consecutive 10-minute segments have a percent difference of less than 2%. 77 FR 2843. In response to this proposal, Panasonic suggested that the stabilization time may be reduced if the TV can be shown to stabilize in less than an hour as this is included in the IEC stabilization guidelines (Panasonic, No. 50 at p. 2). This would potentially reduce the stabilization time by up to 40 minutes, requiring that at least two 10-minute segments be compared to ensure a stable power measurement. DOE agreed with this comment, and in the March 2013 SNOPR proposed that the stabilization time could be reduced to only the time required to meet the stabilization criteria. 78 FR 15817. In response to the March 2013 SNOPR proposal, Panasonic and Sharp expressed their support for this update (Panasonic, No. 67 at p. 4; Sharp, No. 68 at p. 3). In section 7.1 of Appendix H to subpart B of 10 CFR part 430, DOE adopts its proposal from the March 2013 SNOPR that the stabilization period can be ended once the TV has met the stabilization criteria.

### G. On Mode

In the January 2012 NOPR, DOE proposed that on mode be tested with the Blu-ray disc version of the IEC dynamic broadcast-content video signal for a duration of 10 minutes. 77 FR 2839-2840. DOE also specified a video input connection hierarchy which tested HDMI/ digital visual interface (DVI), video graphics array (VGA), component video, S-video, and composite video in this order of priority. 77 FR 2838-2839. Panasonic, Sharp, and MEVSA commented that DVI and VGA are computer inputs and inappropriate for testing televisions (Panasonic, No. 50 at p. 2; Sharp, No. 45 at p. 6; MEVSA, No. 44 at p. 3). DOE agreed with these comments and removed DVI and VGA from the connection hierarchy in the March 2013 SNOPR. 78 FR 15816. In response to this proposal, Panasonic and Sharp commented that they are in support of this hierarchy (Panasonic, No. 68 at p. 3; Sharp, No. 67 at p. 4). DOE adopts the proposed video input connection hierarchy of HDMI, component video, S-Video, and composite video in section 5.2 of Appendix H to subpart B of 10 CFR part 430. Additionally, DOE adopts the use of the Blu-ray disc version of the IEC dynamic broadcast-content video signal for the test content in today's final rule.

In the March 2013 SNOPR, DOE also proposed that the TV be tested using the primary video input terminals as opposed to input terminals with an alternate designation such as 'game' or 'DVI'. 78 FR 15816. Panasonic and Sharp commented that they are in support of this requirement (Panasonic, No. 67 at p. 4; Sharp, No. 68 at p. 3). DOE therefore adopts this requirement for video input terminals in section 5.3 of Appendix H to subpart B of 10 CFR part 430.

In the March 2013 SNO PR, DOE required that power factor shall be measured and recorded for all on mode power measurements. 78 FR 15825. Panasonic recommended that the power factor measurement be based on a single measurement during the luminance test (Panasonic, No. 67 at p. 7). DOE believes that a single measurement during the luminance test may result in increased test burden and unrepeatable measurements as the luminance test displays the IEC three vertical bar signal for only a brief period of time and does not require the use of power measurement equipment. Measuring the power factor during on mode results in no additional test time and allows for multiple measurements over the 10 minute test duration to increase accuracy. CA IOU supported the measurement of power factor and recommended that the CEC procedure be used or a method which produces an accurate measurement that is not unduly burdensome (CA IOU, No. 71 at p. 6). The CEC test method specifies that the reported value shall be the average value of measurements taken at an interval once per minute simultaneous to the on mode power measurement. DOE agrees with this method but believes that the sampling rate should be once per second to be consistent with the on mode power measurement. DOE therefore adopts a power factor measurement taken once per second, simultaneous to the on mode power consumption measurement in section 3.3.2 of Appendix H to subpart B of 10 CFR part 430.

#### H. On Mode with ABC Enabled

##### 1. ABC Illuminance Values

In the January 2012 NOPR, DOE proposed measuring the on mode power consumption with ABC enabled at 10, 50, 100 and 300 lx. 77 FR 2850-2853. CEA, MEVSA, Panasonic, and

Sharp all agreed with testing at four illuminance values but had slightly differing opinions on which values should be measured (CEA, No. 47 at p. 5; MEVSA, No. 44 at p. 7; Panasonic, No. 50 at p. 5; Sharp, No. 45 at p. 4). DOE also evaluated research performed by the Collaborative Labeling and Appliance Standards Program (CLASP) in “Further Analysis of Background Lighting Levels during Television Viewing”<sup>4</sup>. Based on stakeholder comments and research performed by CLASP, DOE proposed values of 100, 35, 12, and 3 lx in the March 2013 SNO PR. 78 FR 15822-15823. Panasonic, Sharp, NRDC, NEEA, ASAP, and CA IOU all agreed with this proposal as they believe they are representative of actual TV viewing (Panasonic, No. 67 at p. 5; Sharp, No. 68 at p. 5; NRDC, No. 64 at p. 1; NEEA, No. 66 at p. 3; ASAP, No. 69 at p. 1; CA IOU, No. 71 at p. 3). ams AG proposed four different illuminance values at 5, 15, 45, and 100 lx, however DOE considers this proposal to be sufficiently close to the illuminance values proposed in the March 2013 SNO PR (ams AG, No. 70 at p. 3). In section 7.3.1 of Appendix H to subpart B of 10 CFR 430, DOE adopts the March 2013 SNO PR proposal of measuring on mode when ABC is enabled at 100, 35, 12, and 3 lx.

## 2. Test Set-up

In the March 2013 SNO PR, DOE proposed a test set-up which required the lamp be positioned 5 ft from the ABC sensor at a perpendicular angle and the TV be positioned no more than 2 ft from any room surface with all 4 corners of the TV equidistant from a vertical reference plan. 78 FR 15822. DOE also required that the illuminance values be obtained by varying the input voltage to the lamp. 78 FR 15821-15822. Panasonic commented that they agree with

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<sup>4</sup> Jones, Keith. *Further Analysis of Background Lighting Levels during Television Viewing*. CLASP. March 29, 2012. [http://www.clasponline.org/en/Resources/Resources/StandardsLabelingResourceLibrary/2012/~/\\_media/Files/SLDocuments/2012/2012-3\\_FurtherAnalysisOfBackgroundLightingLevelsDuringTelevisionViewing.pdf](http://www.clasponline.org/en/Resources/Resources/StandardsLabelingResourceLibrary/2012/~/_media/Files/SLDocuments/2012/2012-3_FurtherAnalysisOfBackgroundLightingLevelsDuringTelevisionViewing.pdf)

DOE's proposal that the TV shall be aligned equidistant from a vertical reference plane (Panasonic, No. 67 at p. 5). DOE adopts these test set-up requirements in sections 4.5, 7.3.1, and 7.3.4 of Appendix H to subpart B of 10 CFR part 430. Additionally, as discussed in section III.E.2, DOE has updated these distance requirements to harmonize with international units.

### 3. Infrared and Ultraviolet Blocking Filter

In the March 2013 SNOPR, DOE proposed that the ABC test set-up use an infrared and ultraviolet (IR/UV) blocking filter to ensure that only the visible light spectrum enter the ABC sensor. 78 FR 15822. DOE proposed this requirement after evaluating the light spectrum produced by the ABC test set-up. DOE found that dimming the lamp increases the amount of IR light produced even though illuminance is only determined by the amount of visible light received by the illuminance meter. As a result, a TV that is sensitive to IR light may exhibit increased power consumption because it senses both the visible and IR portions of the light. Alternately, TVs which use ABC sensors that interpret light based on the visible human response are not affected by the increased levels of IR light at low illuminance values.

Based on these findings, DOE proposed in the March 2013 SNOPR that an IR/UV blocking filter be used to eliminate these portions of the light so the ABC sensor only receives light in the visible spectrum. In response to the March 2013 SNOPR, Sharp commented that an IR/UV blocking filter would not produce conditions typical of a real world scenario and that dimmed residential light has components of IR as well (Sharp, No. 68 at p. 4). NEEA commented that sunlight includes components of the UV spectrum and further justification would be needed to filter out this light (NEEA, No. 66 at p. 3). DOE agrees that it is impossible

to determine the typical light spectrum that consumers use to watch TV. Since DOE did not perform extensive testing using IR/UV filters, ASAP, Panasonic, NRDC, and CA IOU recommended that further testing be conducted to evaluate the repeatability of such filters (ASAP, No. 69 at p. 1; Panasonic, No. 67 at p. 5; NRDC No. 64 at p. 1; CA IOU, No. 71 at p. 4). DOE believes that an IR/UV blocking filter has the potential to make the test procedure more repeatable because small variations in light would have less of an impact on TV power consumption. However, some IR/UV blocking filters may block different wavelengths than others, resulting in more variation. DOE did not perform additional testing to determine the repeatability of various IR/UV blocking filters, because even if testing did produce repeatable results, it would be impossible to determine if the test wavelengths correspond to typical viewing conditions.

Additionally, ams AG commented that while a gradual backlighting response to ambient light is optimal for a TV viewing at various room illuminance levels, some ABC sensors use a crude implementation which results in a poor picture quality (ams AG, No. 70 at p. 5). ams AG commented that the ABC sensor should be accurate at low illuminance levels by rejecting IR and UV light and providing a photometric response near to the eye (ams AG, No. 70 at p. 5). Ultimately, ams AG discouraged the use of IR/UV blocking filters for ABC testing (ams AG, No. 70 at p. 5). DOE agrees with ams AG's comment and believes that removing the IR/UV filter requirement would provide manufacturers the incentive to update their ABC sensor technology. Based on these comments, DOE no longer believes that an IR/UV blocking filter would be appropriate and excludes this requirement in today's final rule.

#### 4. Neutral Density Filter

In the March 2013 SNOPR, DOE proposed two methods for simulating a 3 lx illuminance value at the ABC sensor. The first method varied the light source until 3 lx was measured at the ABC sensor. However, the second method used a neutral density (ND) filter to uniformly block light received by the ABC sensor, resulting in a 3 lx measurement. 78 FR 15823. In the IR and ND filter supporting document<sup>5</sup>, DOE testing showed that both methods resulted in the same power consumption values when used in conjunction with an IR/UV blocking filter. Alternatively, when an ND filter was tested without an IR/UV blocking filter, the TV power consumption varied. Now that DOE is no longer using the IR/UV blocking filter as part of the ABC test set-up, allowing two methods to simulate the 3 lx illuminance value is no longer appropriate as it would result in repeatability issues.

In response to the March 2013 SNOPR, Panasonic and Sharp expressed support for using the ND filter (Panasonic, No. 67 at p. 6; Sharp, No. 68 at p. 5). To ensure a repeatable 3 lx power consumption measurement, DOE adopts the ND filter as the only method acceptable for simulating the 3 lx illuminance value. DOE believes this method is more repeatable because it ensures greater accuracy at low illuminance levels. Panasonic also commented that the ND filter should include further specification to increase test repeatability (Panasonic, No. 67 at p. 6). DOE agrees with Panasonic's comment and clarifies in section 7.3.1 of Appendix H to subpart B of 10 CFR part 430 that the ND filter must be a 2 F-stop filter which uniformly filters 75% of the light.

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<sup>5</sup> IR and ND Supporting Document. This material is available in Docket #EERE-2010-BT-TP-0026 at [www.regulations.gov](http://www.regulations.gov).

## 5. Lamp Specification

In the March 2013 SNO PR, DOE proposed that the lamp be a 1000-lumen standard spectrum halogen incandescent parabolic aluminized reflector (PAR) 30S. DOE also noted in the March 2013 SNO PR that standard spectrum is any incandescent reflector lamp that does not meet the definition of modified spectrum as defined in 10 CFR 430.2 78 FR 15821-5822. DOE believes that requiring a standard spectrum lamp is necessary to avoid lamps that contain spectrum modifying qualities such as an IR coating.

Although stakeholders agreed that these lamp requirements were helpful to create a repeatable test set-up, Sharp and Panasonic expressed concerns about the international availability of PAR 30S lamp (Panasonic, No. 67 at p. 5; Sharp, No. 68 at p. 4). DOE evaluated the lamp market and reached a similar conclusion that the specified lamp can be difficult to find internationally. In order to maintain a repeatable lamp requirement, DOE updates this specification by using more general language to avoid international naming differences. DOE adopts a standard spectrum halogen incandescent aluminized reflector with a beam angle of  $30 \pm 10$  degrees, a lamp diameter of  $95 \pm 10$  mm, and a center beam candle power (CBCP) of  $1500 \pm 500$  candelas (cd). For additional clarity, DOE adds a note to the lamp requirements that lamps that contain spectrum modifying qualities, such as an IR coating, are not considered to meet a standard spectrum. DOE shifts away from a lumen-based requirement because the CBCP is a better approximation of the light that the ABC sensor receives during illuminance testing. The ABC sensor primarily receives light from the center beam of the lamp to determine illuminance values and therefore this rating is more representative of the lamp's output under these circumstances. The new CBCP requirement corresponds to a slightly lower lumen range, but spot testing indicates that lamps within this range continue to meet the illuminance values needed

for ABC testing. DOE therefore adopts these lamp requirements in section 7.3.3 of Appendix H to subpart B of 10 CFR part 430.

#### I. Luminance Test

In the NOPR, DOE evaluated many different test patterns for the luminance test but ultimately proposed the IEC three vertical bar signal. 77 FR 2841-2842. NEEA, PG&E, Panasonic, and Sharp all supported the use of this test pattern and DOE therefore adopts the IEC three vertical bar signal in today's final rule (NEEA, No. 43 at p. 3; PG&E, No. 46 at p. 3; Panasonic, No. 50 at p. 3; Sharp, No. 45 at p. 4).

In today's final rule DOE adopts a new picture setting structure that measures the luminance of up to three picture settings. As discussed in section III.C.4, DOE received comments on both the January 2012 NOPR and the March 2013 SNOPR that when only one high-luminance picture setting is measured between the retail configuration and home configuration, there is a possibility that the picture setting in the alternate configuration is brighter. To resolve this issue, DOE clarifies that luminance shall be measured in the brightest selectable preset picture setting in the home configuration as well as the default picture setting within the retail configuration.

DOE clarifies that certain cases may make measuring all three picture settings impossible, such as when a TV does not have a forced menu prompting the selection of either home configuration or retail configuration. Figure 4 in section III.C.4 indicates that only the brightest selectable preset picture setting and the default picture setting shall be measured in this

case. DOE also identifies similar cases, such as when the retail configuration is no longer available after entering the home configuration or when it displays tickers or demos that are incapable of being disabled. Under these circumstances, only the default and brightest selectable preset picture settings would be measured within the home mode.

With this picture setting structure, DOE no longer believes that a luminance ratio should be the output metric but rather that all measured luminance values should be recorded. This aligns with comments provided by NEEA, NRDC, and PG&E in response to the January 2012 NOPR, suggesting that DOE output the absolute luminance values rather than a ratio (NEEA, No. 43 at p. 3; NRDC, No. 40 at p. 6; PG&E, No. 46 at p. 2).

DOE also notes that in the March 2013 SNOPR, the brightest selectable preset picture setting was measured prior to the default picture setting, even though the testing order was updated so that on mode was tested before the luminance test. 78 FR 15817-15818. Because the on mode test is performed in the default picture setting, measuring the luminance in the default picture setting first would minimize unnecessary picture setting changes. Therefore, DOE clarifies, in section 7.4.1.1 of Appendix H to subpart B of 10 CFR part 430, that the screen luminance is measured in the default picture setting prior to measuring the screen luminance in the brightest selectable preset picture setting in order to decrease test burden and increase repeatability.

Additionally, measuring screen luminance after on mode on TVs with ABC enabled may lead to stabilization issues. These TVs are tested in on mode at 3 lx immediately prior to the

luminance test, at which point the ABC function is disabled. This transition is likely to cause a significant increase in screen luminance. Sharp and Panasonic commented that the TV should undergo a stabilization period following the on mode test to ensure consistent luminance measurements (Sharp, No. 68 at p. 4; Panasonic, No. 67 at p. 4). DOE agrees with this comment and adopts a 10-minute re-stabilization period using the IEC dynamic broadcast-content video signal in section 7.4.1.3 of Appendix H to subpart B of 10 CFR part 430.

Following the re-stabilization, the IEC three vertical bar signal shall be selected and displayed. Immediately after the signal is displayed on the screen, the luminance shall be measured to avoid the activation of anti-image retention functions. MEVSA commented on this language in the January 2012 NOPR and suggested the DOE should clarify what is meant by “immediately” (MEVSA, No. 44 at p. 6). Sharp also commented that the luminance measurement should be made within 30 seconds of being displayed (Sharp, No. 68 at p. 4). DOE recognizes that this measurement period is slightly vague and clarifies in section 7.4.1 of Appendix H to subpart B of 10 CFR part 430 that the measurement shall be made within 5 seconds of the IEC three vertical bar signal being displayed. Although Sharp suggests that the image can be displayed for up to 30 seconds, DOE believes waiting such a long time may result in some TVs activating anti-image retention functions which affect the brightness levels, departing from the original intent of measuring the screen brightness during on mode. Measuring the screen luminance with a static image is currently the only way to measure brightness during on mode, and therefore should be measured as soon as possible to avoid the initiation of anti-image retention functions. DOE believes 5 seconds is a reasonable amount of time to make a measurement and avoids the activation of anti-image retention functions. DOE also believes that

this timeframe will allow for repeatable measurements without burden to manufacturers and test labs.

#### J. Standby Mode

In accordance with section 310 of the Energy Independence and Security Act of 2007 (EISA 2007), today's final rule is required to incorporate a test for standby mode if it is technically feasible. In the January 2012 NOPR, DOE proposed definitions for standby-active, high, standby-active, low, and standby-passive mode based on Table 1 of IEC 62087 3.0 and adopts these definitions in today's final rule. 77 FR 2836-2837.

*Standby-passive mode* means the mode of operation in which the TV is connected to mains power, produces neither sound nor picture, and can be switched into another mode with only the remote control unit or an internal signal.

*Standby-active, low mode* means the mode of operation in which the TV is connected to mains power, produces neither sound nor picture, 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.

*Standby-active, high mode* means the mode of operation in which the TV is connected to mains power, produces neither sound nor picture, is exchanging/receiving data with/from an external source, and can be switched into another mode of operation with the remote control unit, an internal signal, or an external signal.

At the public meeting for the March 2013 SNO PR, it was brought to the Department's attention that discrete modes of operation may be interpreted differently and therefore DOE clarifies the modes of operation for standby mode.

### 1. Standby-Passive Mode

The standby-passive mode test is designed to measure the power consumption of the TV when it is connected to mains power and can only be switched into a different mode of operation by an internal signal or a remote control unit. In the January 2012 NOPR, DOE proposed that standby-passive mode be measured using section 5.3.1 of IEC 62087 Ed. 2.0. 77 FR 2857. This requirement is adopted as part of today's final rule in section 7.5.2 of Appendix H to subpart B of 10 CFR part 430.

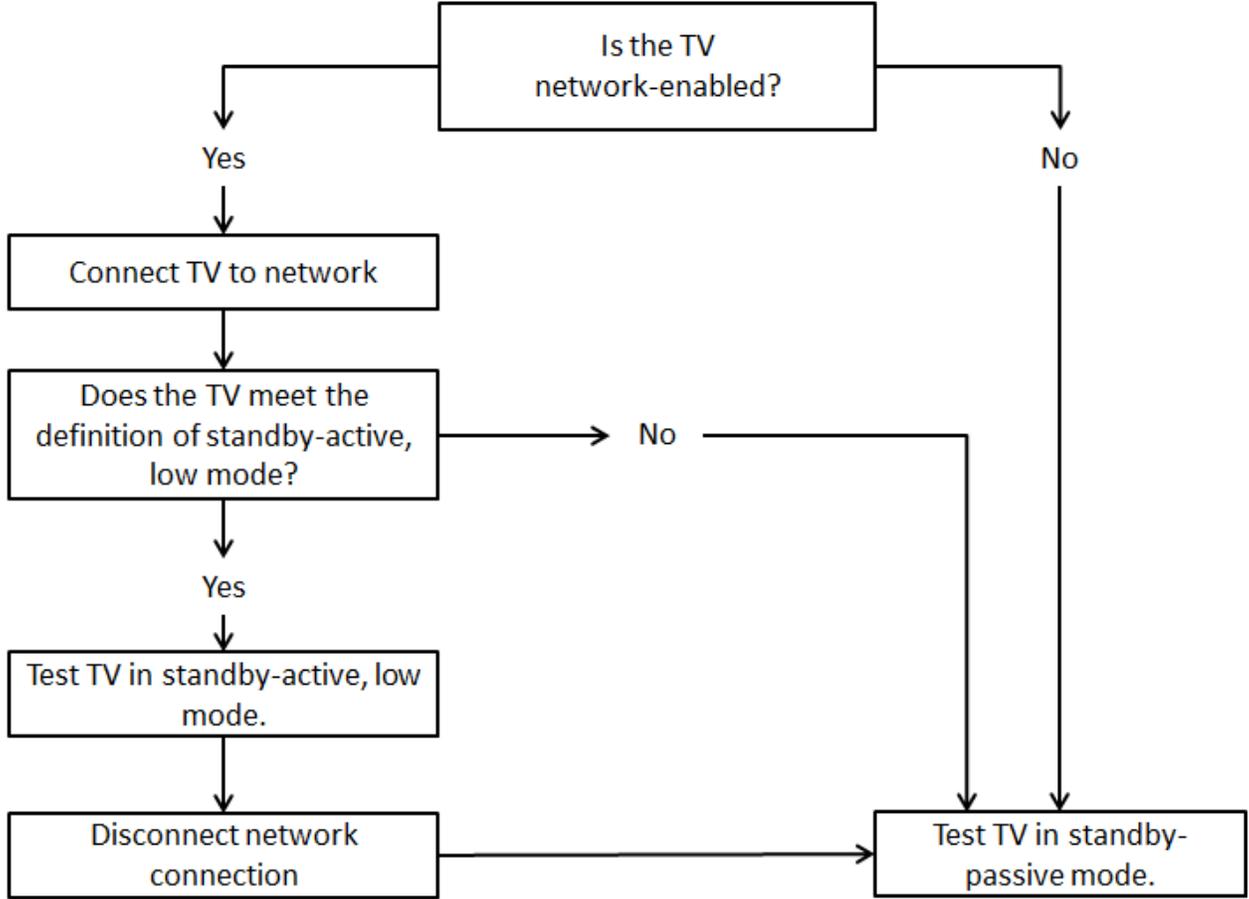
DOE clarifies that the standby-passive mode test shall be conducted with the TV disconnected from any external sources, as they may be capable of providing an external signal capable of switching the TV into a different mode of operation. Additionally, this test can be conducted on all TVs regardless of the TV's features and capabilities. As part of today's final rule, DOE adopts this test to measure the power consumption of the TV in standby-passive mode.

### 2. Standby-Active, Low Mode

In the March 2013 SNO PR, DOE proposed a test to measure the power consumption of network-enabled TVs in standby-active, low mode. 78 FR 15824. Sharp commented that this test does not necessarily test standby-active, low mode because the TV must be able to switch to a

different mode of operation through an external signal (Sharp, No. 68 at p. 5). Sharp's main concern was that a TV would only meet this definition if it could switch from standby-active, low mode to on mode by an external signal. DOE clarifies that standby-active, high mode is considered another mode of operation in comparison to standby-active, low mode. Thus, if an external signal can prompt a television to begin exchanging/receiving data with/from an external source (standby-active, high mode), then the TV is considered to be capable of switching into another mode of operation by an external signal. This TV would therefore meet the definition for standby-active, low mode. DOE believes that nearly all network-enabled televisions would be capable of entering standby-active, low mode, based on this definition. Figure 6 outlines a method for determining the test capabilities of a TV in standby mode.

**Figure 6: Standby mode selection chart**



In the March 2013 SNOPR, DOE proposed a test for standby-active, low mode based on section 8.6.5.8 of IEC 62087 Ed. 3.0, which measures the power consumption of STBs in standby-active, low mode, and is adapted for TVs. 78 FR 15824. This procedure uses a 30-minute stabilization period followed by a 10-minute power measurement. Panasonic and Sharp commented that the specified stabilization period of 30 minutes is unnecessary and suggested that it be reduced to 10 minutes (Panasonic, No. 67 at p. 6; Sharp, No. 68 at p. 5). Panasonic also commented that the same standby mode test should be used for standby-active, low and standby-passive mode (Panasonic, No. 67 at p. 6). DOE agrees that a stabilization time of 30 minutes is unnecessary for this testing and adopts the same measurement procedure as standby-passive and

off mode in section 7.5.3 of Appendix H to subpart B of 10 CFR part 430, which is incorporated by reference from section 5.3.1 of IEC 62301 Ed. 2.0. DOE clarifies that this test requires a minimum of 5 minutes to stabilize the TV but this period may be extended for products that require additional time.

### 3. Standby-Active, High Mode

In the January 2012 NOPR, DOE proposed testing standby-active high mode by incorporating the CEA Test Procedure for Download Acquisition Mode (DAM) Testing from the Version 4.1 ENERGY STAR Test Procedure for Televisions. 77 FR 2858. After further evaluation, DOE determined that the DAM test procedure does not accurately assess the power consumption of network-enabled TVs because this procedure was designed for hospitality TVs. DOE is not aware of any workloads used to simulate network traffic for network-enabled TVs, let alone one that would be comparable across all manufacturer platforms. Therefore, in the March 2013 SNOPR, DOE proposed to remove the test for standby-active, high mode altogether. Panasonic and Sharp supported the removal of the DAM test for standby-active high mode (Panasonic, No. 67 at p. 6; Sharp, No. 68 at p. 5). In today's final rule, DOE continues to exclude a test for standby-active, high mode but retains the definition from IEC 62087 Ed. 3.0 to be consistent with industry procedures.

### K. Off Mode

In the January 2012 NOPR, DOE proposed a definition for off mode based on Table 1 of IEC 62087 Ed. 3.0. 77 FR 2836.

*Off mode* means the mode of operation in which the TV is connected to mains power, produces neither sound nor picture, and cannot be switched into any other mode of operation with the remote control unit, an internal signal, or external signal.

During the rulemaking process, DOE has observed TVs that have a manual off switch which, by definition, places the TV in off mode. A test for off mode is technically feasible and therefore must be included in accordance with the requirements of EISA 2007. DOE adopts a test for off mode in section 7.6 of Appendix H to subpart B of 10 CFR part 430 using the measurement procedure from IEC 62301 Ed. 2.0.

#### L. Sampling Plan

In the March 2013 SNO PR, DOE proposed a sampling plan to ensure consistent and repeatable results for all output metrics. 78 FR 15811-15812. The sampling plan requires that at least two products of a basic model be tested to develop a representative rating, which is consistent with other consumer products regulated under EPCA. Sharp recommended that instead of determining the confidence interval of two or more units, one unit should be randomly selected and tested (Sharp, No. 68 at p. 2) Sharp also expressed concern that using divisors of 1.05 and 1.10 could result in conservative energy ratings by manufactures (Sharp, No. 68 at p. 2). Panasonic commented that energy representations shall be performed using only one product (Panasonic No. 67 at. p. 2). DOE believes that using one product to determine an output metric may lead to unrepresentative output values. Variation among units within a basic model along with test variation is taken into consideration by the sampling plan, and is the reason that two or more products are used for any represented value. A minimum of two units are needed to establish a confidence level, which increases the accuracy of the represented value. Additionally,

the use of 1.05 and 1.10 divisors allows for variation among units and allows manufacturers to accurately represent the efficiency of each basic model without the need for conservative representation values. DOE believes that the proposed sampling plan ensures an accurate and representative value and therefore DOE adopts this sampling plan in 10 CFR 429.25.

#### M. Output metrics

In the January 2012 NOPR, DOE proposed a multiple metric output but also considered an annual energy consumption (AEC) metric. The proposed metrics included on mode, standby-active, high mode, standby-passive mode, and off mode. 77 FR 2859. In the March 2013 SNOPR, DOE updated these outputs to correspond to test changes resulting from the new proposals. The proposed multiple metrics in the March 2013 SNOPR included on mode, standby-active, low mode, standby-passive mode, off mode, and AEC. 78 FR 15825-15826. One of the main differences between the January 2012 NOPR and March 2013 SNOPR proposal was the inclusion of the AEC metric. In response to the AEC as proposed in the March 2013 SNOPR, CA IOU, CEA, NEEA, and NRDC expressed concern that the weighted values for the modes of operation may shift and no longer be representative (CA IOU, No. 71 at p. 6; CEA, No. 72 at p. 7; NEEA, No. 66 at p. 5; NRDC, No. 64 at p. 5). However, Panasonic supported the proposed output metrics (Panasonic, No. 67 at p. 6). DOE believes that TV viewing habits have not significantly changed but will closely monitor these trends to ensure a representative value for the AEC. While it is possible for the duty cycle to change, the proposed weighting will provide a representative AEC for consumers, and a consistently weighted metric over time allows for energy consumption comparisons between past and future TV models. DOE therefore adopts an AEC metric in section 8 of Appendix H to subpart B of 10 CFR part 430.

DOE believes that output values for on mode, standby mode, off mode, and AEC provide a sufficient representation of the TV's power and energy usage and therefore adopts these metrics in today's final rule.

#### N. Represented Power Values

In the March 2013 SNO PR, DOE proposed that the rated power consumption in on, standby, and off modes that are output from Appendix H to subpart B of 10 CFR part 430 shall be determined by first applying the sampling plan and statistical requirements proposed for 10 CFR 429.25. The AEC metric would then be calculated using these rated power consumption values. 78 FR 15811-15812. Because this proposal required the sampling plan to be performed before calculating the rated power consumption values, multiple units would need to be tested to calculate and output the rated power consumption or AEC in Appendix H to subpart B of 10 CFR part 430. In order to ensure that this appendix provides a methodology for testing and calculating the power consumptions and AEC of a single unit and that 10 CFR 429.25 provides a methodology for determining the represented rating of multiple tested units, DOE is altering both the sampling plan in 10 CFR 429.25 and outputs of Appendix H to subpart B of 10 CFR part 430 as part of today's final rule. Appendix H to subpart B of 10 CFR part 430 will output the power consumption for each mode of operation and the AEC for a single tested unit. 10 CFR 429.25 would then calculate the represented power values by applying the sampling plan and statistical requirements for multiple tested units. The represented power values would then be used to calculate a represented AEC. DOE is also adopting rounding requirements for all four represented values in part 429. DOE believes that this approach will provide a clearer methodology for testing a single unit and calculating the represented power values and

represented AEC of multiple units. Therefore, DOE is adopting these requirements as part of today's final rule.

#### O. Annual Energy Consumption Metric

##### 1. On Mode

In the March 2013 SNOPR, DOE proposed an on mode weighting of 5 hours based on DOE's analysis of Neilson data. 78 FR 15825-15826. Sharp expressed support for a 5 hour weighting in on mode (Sharp No. 68 at p. 6). DOE believes that 5 hours is a representative weighting for typical on mode usage and therefore adopts this AEC weighting in section 8.3 of Appendix H to subpart B of 10 CFR part 430.

##### 2. Standby Mode

In the March 2013 SNOPR, DOE proposed a weighting structure for standby mode that is dependent on whether the TV is network-enabled. 78 FR 15825-15826. DOE clarifies that although most network-enabled TVs would meet the definition of standby-active, low mode, having a network connection is not necessarily the only condition for this requirement. DOE believes that the definition for standby-active, low mode should be used as the criterion to determine how the TV receives a standby mode weighting. If the TV is capable of entering standby-active, low mode, this test is performed and the TV receives a 19 hour weighting for standby-active, low mode. Sharp commented that it supports a 19 hour weighting for standby mode (Sharp, No. 68 at p. 6).

NRDC expressed concern that a 19 hour standby-active, low mode and 0 hour standby-passive mode would result in unmeasured power for the quick start function (NRDC, No. 64 at p.

4). NRDC also commented that the quick start function is independent of a network connection (NRDC, No. 64 at p. 4). DOE clarifies that the power consumption associated with the quick start function will be included in both the standby-passive and standby-active, low mode metrics when available. As discussed in section III.E.5, this function will be enabled when it is made available through a display prompt regardless of the TV's network connection capabilities. DOE believes that the adopted implementation of quick start will alleviate NRDC's concerns for the standby mode weighting and, based on stakeholder support, DOE adopts a 19 hour standby mode weighting for the AEC in section 8.3 of Appendix H to subpart B of 10 CFR part 430.

### 3. Off Mode

In the March 2013 SNOPR, DOE proposed a test for off mode and a 0 hour weighting for the AEC. 78 FR 15825-15826. Sharp commented that this test should be removed because only a few TVs are equipped with this feature (Sharp, No. 45 at p. 7). To comply with the requirements of EISA 2007, however, DOE is required to include an off mode test when it is technically feasible and so includes this test in today's final rule. Although some TVs may be equipped with a manual off switch which is necessary for off mode, this feature is increasingly less prevalent on new TVs and when it is present on TVs, it is virtually never used. Therefore, DOE adopts a weighting of 0 hours in off mode in section 8.3 of Appendix H to subpart B of 10 CFR part 430.

## **IV. Procedural Issues and Regulatory Review**

### **A. Review Under Executive Order 12866**

The Office of Management and Budget (OMB) has determined that test procedure rulemakings do not constitute "significant regulatory actions" under section 3(f) of Executive

Order 12866, Regulatory Planning and Review, 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was not subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in OMB.

#### B. Review under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) requires preparation of a regulatory flexibility analysis (RFA) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel’s website: <http://energy.gov/gc/office-general-counsel>.

DOE reviewed today’s final rule under the provisions of the Regulatory Flexibility Act and the policies and procedures published on February 19, 2003. This rule prescribes a test procedure to be used to develop and implement future energy conservation standards for TVs. DOE certifies that this rule will not have a significant impact on a substantial number of small entities. The factual basis for this certification is as follows.

The Small Business Administration (SBA) considers an entity to be a small business, if, together with its affiliates, it employs less than a threshold number of workers specified in 13 CFR part 121. The thresholds set forth in these regulations are based on size standards and codes

established by the North American Industry Classification System (NAICS)<sup>6</sup>. TV manufacturers are classified under NAICS code 334220, “Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing,” and are considered small entities if they employ 750 employees or less.

DOE determined that most manufacturers of TVs are large multinational corporations. To develop a list of domestic manufacturers, DOE reviewed the Hoover database<sup>7</sup> and other publicly available data, including the Energy Star qualified TVs database. As a result of its review, DOE determined that there were no TV manufacturers who would qualify as small entities. DOE also notes that manufacturers are already required to use a test procedure similar to DOE’s adopted test procedure to make energy representations under the Federal Trade Commission’s (FTC) EnergyGuide labeling program. 76 FR 1038. DOE’s adopted test procedure can be conducted concurrently with FTC testing without significant additional burden.

Based on the above, DOE certifies that today’s rule would not have a significant economic impact on a substantial number of small entities and has not prepared an RFA for this rulemaking. DOE transmitted the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the SBA for review under 5 U.S.C. 605(b).

### C. Review Under the Paperwork Reduction Act of 1995

There is currently no information collection requirement related to the test procedure for TVs. In the event that DOE proposes an energy conservation standard with which manufacturers

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<sup>6</sup> For more information visit: <http://www.sba.gov>. The size standards are available at <http://www.sba.gov/content/small-business-size-standards>.

<sup>7</sup> Hoovers. Web 12 Dec 2011. <http://www.hoovers.com>.

must demonstrate compliance, DOE will seek OMB approval of such information collection requirement.

DOE has established regulations for the certification and recordkeeping requirements for certain covered consumer products and commercial equipment. 76 FR 12422 (March 7, 2011). The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (PRA). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 20 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

As stated above, in the event DOE proposes an energy conservation standard for TVs with which manufacturers must demonstrate compliance, DOE will seek OMB approval of the associated information collection requirement. DOE will seek approval either through a proposed amendment to the information collection requirement approved under OMB control number 1910-1400 or as a separate proposed information collection requirement.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

#### D. Review Under the National Environmental Policy Act of 1969

In this final rule, DOE adopts a new test procedure for TVs. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, this rule establishes a new test procedure without affecting the amount, quality or distribution of energy usage, and, therefore, will not result in any environmental impacts. Thus, this rulemaking is covered by Categorical Exclusion A5 under 10 CFR part 1021, subpart D, which applies to any rulemaking that does not result in any environmental impacts. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

#### E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE examined this final rule and determined that it will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA

governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of today's final rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

#### F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, "Civil Justice Reform," 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; (3) provide a clear legal standard for affected conduct rather than a general standard; and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this final rule meets the relevant standards of Executive Order 12988.

#### G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. No. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a regulatory action resulting in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed “significant intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at <http://energy.gov/gc/office-general-counsel>. DOE examined today’s final rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of \$100 million or more in any year, so these requirements do not apply.

#### H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. Today’s final rule will not have any impact on the autonomy or

integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

#### I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights” 53 FR 8859 (March 18, 1988) that this regulation will not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

#### J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB’s guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE’s guidelines were published at 67 FR 62446 (Oct. 7, 2002). DOE has reviewed today’s final rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

#### K. Review Under Executive Order 13211

Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any significant energy action. A “significant energy action” is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that: (1) is a significant regulatory action under

Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the regulation is implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

Today's regulatory action to establish a test procedure for measuring the power consumption of TVs is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

#### L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95-91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; FEAA) Section 32 essentially provides in relevant part that, where a rule authorizes or requires use of commercial standards, the rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (FTC) concerning the impact of the commercial or industry standards on competition.

The final rule incorporates testing methods contained in certain sections of the IEC standards 60933-5 Ed. 1.0, 62087 Ed. 3.0, and 62301 Ed. 2.0 as well as CEA 770.3-D, SMPTE 170M, ITU BT.470-6, and HDMI Version 1.0. DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (i.e. whether it was developed in a manner that fully provides for public participation, comment, and review.) DOE has consulted with both the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in these standards and has received no comments objecting to their use.

#### M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of today's rule before its effective date. The report will state that it has been determined that the rule is not a "major rule" as defined by 5 U.S.C. 804(2).

V. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this final rule.

**List of Subjects**

**10 CFR Part 429**

Confidential business information, Energy conservation, Household appliances, Imports, Reporting and recordkeeping requirements.

**10 CFR Part 430**

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, Small businesses.

Issued in Washington, DC, on September 30, 2013.



Kathleen B. Hogan  
Deputy Assistant Secretary for Energy Efficiency  
Energy Efficiency and Renewable Energy

For the reasons stated in the preamble, DOE amends part 429 and 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

**PART 429—CERTIFICATION, COMPLIANCE, AND ENFORCEMENT FOR  
CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT**

1. The authority citation for part 429 continues to read as follows:

**Authority:** 42 U.S.C. 6291–6317.

2. Section 429.25 is added to read as follows:

§ 429.25 Television sets.

(a) *Sampling plan for selection of units for testing.*

(1) The requirements of § 429.11 are applicable to televisions; and

(2) For each basic model of television, samples shall be randomly selected and tested to ensure that—

(i) Any represented value of power consumption of a basic model for which consumers would favor lower values shall be greater than or equal to the higher of:

(A) The mean of the sample, where:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

and  $\bar{x}$  is the sample mean;  $n$  is the number of samples; and  $x_i$  is the  $i^{\text{th}}$  sample;

Or,

(B) For on mode power consumption, the upper 95 percent confidence limit (UCL) of the true mean divided by 1.05, where:

$$UCL = \bar{x} + t_{0.95} \left( \frac{s}{\sqrt{n}} \right)$$

and  $\bar{x}$  is the sample mean;  $s$  is the sample standard deviation;  $n$  is the number of samples; and  $t_{0.95}$  is the t-statistic for a 95% one-tailed confidence interval with  $n-1$  degrees of freedom (from Appendix A of this subpart).

And

(C) For standby mode power consumption and power consumption measurements in modes other than on mode, the upper 90 percent confidence limit (UCL) of the true mean divided by 1.10, where:

$$UCL = \bar{x} + t_{0.90} \left( \frac{s}{\sqrt{n}} \right)$$

and  $\bar{x}$  is the sample mean;  $s$  is the sample standard deviation;  $n$  is the number of samples; and  $t_{0.90}$  is the t-statistic for a 90% one-tailed confidence interval with  $n-1$  degrees of freedom (from Appendix A of this subpart).

(ii) Any represented annual energy consumption of a basic model shall be determined by applying the AEC calculation in section 8.2 of Appendix H to subpart B of 10 CFR part 430 to the represented values of power consumption as calculated pursuant to paragraph (a)(2)(i) of this section.

(iii) *Rounding Requirements.* The represented value of power consumption and the represented annual energy consumption shall be rounded as follows:

(A) For power consumption in the on, standby, and off modes, the represented value shall be rounded according to the accuracy requirements specified in section 3.3.3 of Appendix H to subpart B of 10 CFR part 430.

(B) For annual energy consumption, the represented value shall be rounded according to the rounding requirements specified in section 8.3 of Appendix H to subpart B of 10 CFR part 430.

(b) [Reserved]

## **PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS**

3. The authority citation for part 430 continues to read as follows:

**Authority:** 42 U.S.C. 6291–6309; 28 U.S.C. 2461 note.

4. Section 430.2 is amended by:

- a. Removing the definitions “Color television set” and “Monochrome television set”;
- b. Adding, in alphabetical order, the definitions “Component video”, “Composite video”, “High-definition multimedia interface”, and “S-video”; and

c. Revising the definition for “Television set”.

The additions and revisions read as follows:

§ 430.2 Definitions.

\* \* \* \* \*

*Component video* means a video display interface as defined in the Consumer Electronics Association’s (CEA) standard, CEA–770.3–D (incorporated by reference; see § 430.3).

\* \* \* \* \*

*Composite video* means a video display interface that uses Radio Corporation of America (RCA) connections carrying a signal defined by the Society of Motion Picture and Television Engineers’ (SMPTE) standard, SMPTE 170M-2004 (incorporated by reference; see § 430.3) for regions that support a power frequency of 59.94 Hz or International Telecommunication Union’s (ITU) standard, ITU-R BT 470-6 (incorporated by reference; see § 430.3) for regions that support a power frequency of 50 Hz.

\* \* \* \* \*

*High-definition multimedia interface or HDMI®* means an audio and video interface as defined by HDMI® Specification Informational Version 1.0 or greater (incorporated by reference; see § 430.3).

\* \* \* \* \*

*S-video* means a video display interface that transmits analog video over two channels: luma and chroma as defined by IEC 60933-5 Ed. 1.0 (incorporated by reference; see § 430.3).

\* \* \* \* \*

*Television set or TV* means a product designed to produce dynamic video, contains an internal TV tuner encased within the product housing, and that is capable of receiving dynamic visual content from wired or wireless sources including but not limited to:

- (1) Broadcast and similar services for terrestrial, cable, satellite, and/or broadband transmission of analog and/ or digital signals; and/or
- (2) Display-specific data connections, such as HDMI, Component video, S-video, Composite video; and/or
- (3) Media storage devices such as a USB flash drive, memory card, or a DVD; and/or
- (4) Network connections, usually using Internet Protocol, typically carried over Ethernet or Wi-Fi.

\* \* \* \* \*

5. Section 430.3 is amended by:

- a. Redesignating paragraphs (i) through (k) as (j) through (l), (l) through (m) as (n) through (o), (n) through (o) as (q) through (r), and (p) as (t), respectively;
- b. Further redesignating newly designated paragraphs (o)(1) and (2) as (o)(3) and (4), respectively;
- c. Adding paragraphs (i), (m), (o)(1), (o)(2), (p), and (s);
- d. Amending newly designated paragraph (o)(4) by adding “H,” after “G,”;

The additions read as follows:

§ 430.3 Materials incorporated by reference.

\* \* \* \* \*

(i) *CEA*. Consumer Electronics Association, Technology & Standards Department, 1919 S. Eads Street, Arlington, VA 22202, 703-907-7600, or go to *www.CE.org*.

(1) CEA Standard, CEA-770.3-D, *High Definition TV Analog Component Video Interface*, published February 2008; IBR approved for § 430.2.

(2) [Reserved]

\* \* \* \* \*

(m) *HDMI*®. High-Definition Multimedia Interface Licensing, LLC, 1140 East Arques Avenue, Suite 100, Sunnyvale, CA 94085, 408-616-1542, or go to *www.hdmi.org*.

(1) HDMI Specification Informational Version 1.0, *High-Definition Multimedia Interface Specification*, published September 4, 2003; IBR approved for § 430.2.

(2) [Reserved]

\* \* \* \* \*

(o) *IEC*. \* \* \*

(1) IEC Standard 933-5:1992, (“IEC 60933-5 Ed. 1.0”), *Audio, video and audiovisual systems - Interconnections and matching values - Part 5: Y/C connector for video systems - Electrical matching values and description of the connector*, First Edition, 1992-12; IBR approved for § 430.2. (Note: IEC 933-5 is also known as IEC 60933-5.)

(2) IEC Standard 62087:2011, (“IEC 62087 Ed. 3.0”), *Methods of measurement for the power consumption of audio, video, and related equipment*, Edition 3.0, 2011-04, Sections 3.1.1, 3.1.18, 11.4.1, 11.4.2, 11.4.5, 11.4.6, 11.4.8, 11.4.9, 11.4.10, 11.4.11, 11.5.5, and annex.3; IBR approved for Appendix H to subpart B.

\* \* \* \* \*

(p) *ITU*. International Telecommunication Union, Place des Nations, 1211 Geneva 20, Switzerland, +41-22-730-5111, or go to <http://www.itu.int/en>.

(1) ITU-R BT.470-6, Conventional Television Systems, published November 1998; IBR approved for § 430.2.

(2) [Reserved]

\* \* \* \* \*

(s) *SMPTE*. Society of Motion Picture and Television Engineers, 3 Barker Ave., 5th Floor, White Plains, NY 10601, 914-761-1100, or go to <http://standards.smpte.org> .

(1) SMPTE 170M-2004, (“SMPTE 170M-2004”), *SMPTE Standard for Television – Composite Analog Video Signal – NTSC for Studio Applications*, approved November 30, 2004; IBR approved for § 430.2.

(2) [Reserved]

\* \* \* \* \*

6. Section 430.23 is amended by adding paragraph (h) to read as follows:

§ 430.23 Test procedures for the measurement of energy and water consumption.

\* \* \* \* \*

(h) *Television sets*. The power consumption of a television set, expressed in watts, including on mode, standby mode, and off mode power consumption values, shall be measured in accordance with sections 7.1, 7.3, and 7.4 of appendix H of this subpart respectively. The annual energy

consumption, expressed in kilowatt-hours per year, shall be measured in accordance with section 8 of appendix H of this subpart.

\* \* \* \* \*

7. Appendix H to subpart B of part 430 is added to read as follows:

**Appendix H to Subpart B of Part 430— Uniform Test Method for Measuring the Power Consumption of Television Sets**

Note: After [INSERT DATE 180 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER], any representations made with respect to the energy use or efficiency of televisions must be made in accordance with the results of testing pursuant to this appendix.

Given that after [INSERT DATE 180 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER] representations with respect to the energy use or efficiency of televisions must be made in accordance with tests conducted pursuant to this appendix, manufacturers may wish to begin using this test procedure as soon as possible.

1. Scope

This appendix covers the test requirements used to measure the energy and power consumption of television sets that:

- (i) Have a diagonal screen size of at least fifteen inches; and
- (ii) Are powered by mains power (including TVs with auxiliary batteries but not TVs with main batteries).

2. Definitions and Symbols

2.1. *Additional functions* shall be defined using the additional functions definition in section 3.1.1 of IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3).

- 2.2. *Auxiliary Battery* means a battery capable of powering a clock or retaining TV settings but is incapable of powering the TV to produce dynamic video.
- 2.3. *Brightest selectable preset picture setting* means the preset picture setting in which the television produces the highest screen luminance within either the home or retail configuration.
- 2.4. *Default picture setting* means the preset picture setting that the TV enters into immediately after making a selection from the forced menu. If the TV does not have a forced menu, this is the as-shipped preset picture setting.
- 2.5. *Forced menu* means a series of menus which require the selection of initial settings before allowing the user to utilize primary functions. Within these menus contains an option to choose the viewing environment between retail and home configurations.
- 2.6. *Home configuration* means the TV configuration selected from the forced menu which is designed for typical consumer viewing and is recommended by the manufacturer for home environments.
- 2.7. *IEC 62087 Ed. 3.0* means the test standard published by the International Electrotechnical Commission, entitled “Methods of measurement of the power consumption of audio, video, and related equipment,” IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3).
- 2.8. *IEC 62087 Ed. 3.0 Blu-ray Disc™ Dynamic Broadcast-Content Video Signal* means the test video content published by the International Electrotechnical Commission, entitled “IEC 62087 Ed. 3.0, video content\_BD, video content for IEC 62087 Ed. 3.0 on Blu-ray™ Disc,” IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3).

- 2.9. *IEC 62301 Ed. 2.0* means the test standard published by the International Electrotechnical Commission, entitled “Household electrical appliances— Measurement of standby power,” IEC 62301 Ed. 2.0 (incorporated by reference, see § 430.3).
- 2.10. *Illuminance* means the luminous flux per unit area of light illuminating a given surface, expressed in units of lux (lx).
- 2.11. *Luminance* means the photometric measure of the luminous intensity per unit area of light traveling in a given direction, expressed in units of candelas per square meter ( $\text{cd/m}^2$ ).
- 2.12. *Main battery* means a battery capable of powering the TV to produce dynamic video without the support of mains power.
- 2.13. *Off mode* means the mode of operation in which the TV is connected to mains power, produces neither sound nor picture, and cannot be switched into any other mode of operation with the remote control unit, an internal signal, or external signal.
- 2.14. *On mode* means the mode of operation in which the TV is connected to mains power, and is capable of producing dynamic video.
- 2.15. *Preset picture setting* means a preprogrammed factory setting obtained from the TV menu with pre-determined picture parameters such as brightness, contrast, color, sharpness, etc. Preset picture settings can be selected within the home or retail mode.
- 2.16. *Retail configuration* means the TV configuration selected from the forced menu which is designed to highlight the TV’s features in a retail environment. This configuration may display demos, disable configurable settings, or increase screen brightness in a manner which is not desirable for typical consumer viewing.

2.17. *Special functions* shall be defined using the definition in section 3.1.18 of IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3).

2.18. *Standby-passive mode* means the mode of operation in which the TV is connected to mains power, produces neither sound nor picture, and can be switched into another mode with only the remote control unit or an internal signal.

2.19. *Standby-active, high mode* means the mode of operation in which the TV is connected to mains power, produces neither sound nor picture, is exchanging/receiving data with/from an external source, and can be switched into another mode of operation with the remote control unit, an internal signal, or an external signal.

2.20. *Standby-active, low mode* means the mode of operation in which the TV is connected to mains power, produces neither sound nor picture, 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.

2.21. *Symbol usage*. The following identity relationships are provided to help clarify the symbols used throughout this test procedure.

ABC—Automatic Brightness Control

AEC—Annual Energy Consumption

BD—Blu-ray Disc™

DVD—Digital Versatile Disc™

DVI—Digital Visual Interface

HDMI®—High Definition Multimedia Interface

$L_{\text{brightest}}$ —Screen luminance in brightest selectable preset picture setting within the home configuration

$L_{\text{default}}$ —Screen luminance in default picture setting within the home configuration

$L_{\text{default\_retail}}$ —Screen luminance in default picture setting within the retail configuration

LAN—Local Area Network

$P_{\text{on}}$ —Power consumed in on mode

$P_3$ —Average power consumed in on mode, ABC enabled, 3 lx

$P_{12}$ —Average power consumed in on mode, ABC enabled, 12 lx

$P_{35}$ —Average power consumed in on mode, ABC enabled, 35 lx

$P_{100}$ —Average power consumed in on mode, ABC enabled, 100 lx

$P_{\text{standby-passive}}$ —Power consumption in standby-passive mode

$P_{\text{standby-active, low}}$ —Power consumption in standby-active, low mode

$P_{\text{off}}$ —Power consumption in off mode

STB—Set-top Box

THD—Total Harmonic Distortion

TV—Television Set

USB—Universal Serial Bus

$W_3$ —Percent weighting for on mode, ABC enabled, 3 lx

$W_{12}$ —Percent weighting for on mode, ABC enabled, 12 lx

$W_{35}$ —Percent weighting for on mode, ABC enabled, 35 lx

$W_{100}$ —Percent weighting for on mode, ABC enabled, 100 lx

WAN—Wide Area Network

### 3. Accuracy and Precision of Measurement Equipment

- 3.1. *Voltage and Frequency.* Set the test voltage and frequency to the rated electrical supply values of the region in accordance with Table 1 in section 4.3.1 of IEC 62301 Ed. 2.0
- 3.2. *Power Supply Requirements.* The TV power use shall be measured using a power supply that meets the specifications found in section 4.3.1 of IEC 62301 Ed. 2.0 (incorporated by reference, see § 430.3). The THD of the supply voltage shall not exceed 5%, inclusive to the 13th order harmonic, when the unit is under test.
- 3.3. *Power Meter Requirements.* The power measurement shall be carried out directly by means of a wattmeter, a wattmeter with averaging function, or a watt-hour meter by dividing the reading by the measuring time. For TVs where the input video signal varies over time, use a wattmeter with an averaging function to carry out the measurement.
- 3.3.1. The sampling rate of the watt-hour meter or wattmeter with averaging function shall be one measurement per second or more frequent.
- 3.3.2. The power measurement instrument shall measure and record the power factor and the real power consumed during all on mode tests at the same sampling rate.
- 3.3.3. Power measurements of 0.5 W or greater shall be made with an uncertainty of less than or equal to 2 percent (at the 95 percent 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 percent confidence level). The power measurement 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.

- 3.4. *Luminance Meter Requirements.* Contact or non-contact luminance meters shall have an accuracy of  $\pm 2$  percent  $\pm 2$  digits of the digitally displayed value. Non-contact meters are also required to have an acceptance angle of 3 degrees or less.
- 3.5. *Illuminance Meter Requirements.* All illuminance meters shall have an accuracy of  $\pm 2$  percent  $\pm 2$  digits of the digitally displayed value.
- 3.6. *Video Input Device.* The video input device (i.e. BD player) shall be capable of decoding a BD signal. The video input device manufacturer shall be different from the manufacturer of the TV under test to prevent device interaction.

#### 4. Test Room Set-up

- 4.1. *Ambient Temperature Conditions.* For all testing, maintain ambient temperature conditions in accordance with in section 11.4.1 of IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3).
- 4.2. *Ambient Relative Humidity Conditions.* For all testing, maintain the ambient relative humidity between 10 and 80 percent.
- 4.3. *Room Illuminance Level.* All luminance testing (with a non-contact meter) and on mode testing (with ABC enabled by default) shall be performed in a room which measures less than or equal to 1.0 lx measured at the ABC sensor while the TV is in off or a standby mode. If the TV does not have an ABC sensor, measure at the bottom center of the TV bezel.
- 4.4. *Installation.* Install the TV in accordance with manufacturer's instructions.
- 4.5. *TV Placement.* TVs which have an ABC sensor enabled by default shall be placed at least 0.5 meters away from any wall surface (i.e. wall, ceiling, and floor). This does not

include the furnishings which the TV may be placed on or the wall which the back of the TV faces. All four corners of the face of the TV shall be placed equidistant from a vertical reference plane (e.g. wall).

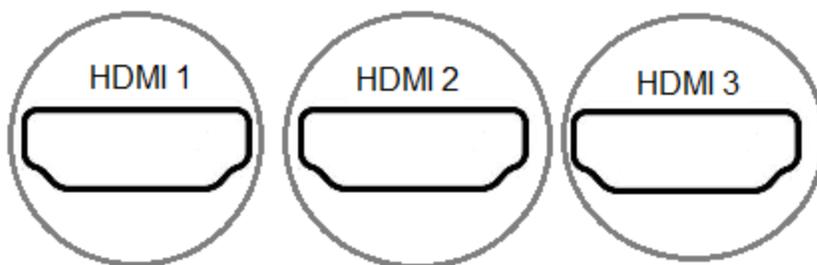
## 5. TV and Video Signal Configuration.

5.1. *Additional Functions.* The TV shall be set up according to the requirements in section 11.4.5 of IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3).

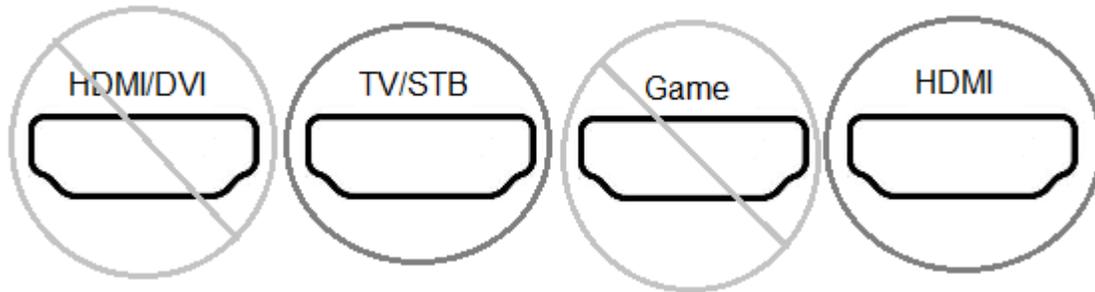
5.2. *Video Connection Priority.* The TV and the video input device shall be connected using an HDMI input cable. If the TV does not have an HDMI input terminal, the specified input terminals shall be used in the following order: Component video, S-video, and Composite video.

5.3. *Input Terminal.* If the TV has multiple input terminals of the same type (i.e. HDMI 1, HDMI 2), testing shall only be performed using any input terminal designed for viewing live TV or dynamic content from a BD player or STB, not from an input designed for an alternative purpose. Examples 1 and 2 provide visual explanations of this requirement.

*Example 1:* All input terminals present are acceptable for testing



*Example 2:* Only TV/STB and HDMI are acceptable input terminals for testing



5.4. *Special Functions*. The TV shall be set up according to the requirements in section 11.4.6 of IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3).

5.5. *Special Function Configuration*. If at any time during on mode operation a message prompt is displayed requesting the configuration of special functions, the most power consumptive configuration shall be selected. If it is unknown which configuration yields the most power consumptive state, verify the selection by measuring the power consumption of each possible configuration.

Note: The selection of the home or retail configuration within the forced menu is not considered the configuration of a special function, and is therefore exempt from this requirement.

5.6. *On Mode Picture Setting*. Ensure that the TV is in the default picture setting within the home configuration for all on mode tests. This picture setting shall only be changed as instructed by the luminance test.

5.7. *Video Aspect Ratio*. The input video signal shall be configured in accordance with section 11.4.9 of IEC 62087 Ed. 3.0 (incorporated by reference; see § 430.3)

5.8. *Frame Rate*. The video frame rate shall be selected in accordance with section 11.4.10 of IEC 62087 Ed. 3.0 (incorporated by reference; see § 430.3)

5.9. *Sound level.* The TV sound level shall be configured in accordance with section 11.4.11 of IEC 62087 Ed. 3.0 (incorporated by reference; see § 430.3)

5.10. *Network Connection Configuration.*

5.10.1. *Network Connections and Capabilities.* Network connections should be listed in the user manual. If no connections are specified in the user manual, verify that the TV does not have network capabilities by checking for the absence of physical connections and the absence of network settings in the menu. If the TV has the capability to be connected to a network but was not shipped with a required piece of hardware (e.g. wireless adapter), that connection type shall not be tested.

5.10.2. *Network Configuration.* If the TV is network enabled, connect it to a LAN in on mode and prior to being placed into standby mode. The LAN shall allow devices to ping other devices on the network but will not allow access to a WAN. If the TV has multiple network connections (e.g., Wi-Fi and Ethernet), the TV shall be configured and connected to a single network source in accordance with the hierarchy of connections listed in Table 1 of this section.

TABLE 1—NETWORK CONNECTION HIERARCHY

Priority	Network Connection Type
1	Wi-Fi (Institution of Electrical and Electronics Engineers - IEEE 802.11-20072)
2	Ethernet (IEEE 802.3). If the TV supports Energy Efficient Ethernet (IEEE 802.3az-20103), then it shall be connected to a device that also supports IEEE 802.3az.

6. Calculation of Average Power Consumption.

6.1. *Average Power Calculation.* For all tests in the on, standby-active, low, and standby-passive modes, the average power shall be calculated using one of the following two methods:

6.1.1. Record the accumulated energy ( $E_i$ ) in kilo-watt hours (kWh) consumed over the time period specified for each test ( $T_i$ ). The average power consumption is calculated as  $P_i = E_i/T_i$ .

6.1.2. Record the average power consumption ( $P_i$ ) by sampling the power at a rate of at least 1 sample per second and computing the arithmetic mean of all samples over the time period specified for each test ( $T_i$ ).

The resulting average power consumption value for each mode of operation shall be rounded according to the accuracy requirements specified in section 3.3.3 of this section.

## 7. Test Measurements.

### 7.1. *On Mode Test.*

7.1.1. *On Mode Stabilization.* If the TV has an ABC sensor enabled by default, direct at least 300 lx into the ABC sensor. The TV shall be stabilized prior to testing on mode using the IEC 62087 Ed. 3.0 Blu-ray Disc™ dynamic broadcast-content video signal in accordance with section 11.4.2 of IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3).

7.1.2. *On Mode Test for TVs without ABC Enabled by Default.* The following test shall be performed if the TV is shipped with ABC disabled by default or the ABC function is unavailable. Display the IEC 62087 Ed. 3.0 Blu-ray Disc™ dynamic broadcast-content video signal for one 10-minute period (incorporated by reference, see §

430.3). Measure and record the average power consumption value over the test duration as  $P_{on}$ .

7.1.3. *On Mode Test for TVs with ABC Enabled by Default.* The following test shall be performed if the TV is shipped with ABC enabled by default:

7.1.3.1. *Illuminance Values.* Display the IEC 62087 Ed. 3.0 Blu-ray Disc™ dynamic broadcast-content video signal for one 10-minute period (incorporated by reference, see § 430.3) with 100 lx ( $\pm 5$  lx) entering the ABC sensor. Measure and record the average power consumption value over the test duration as  $P_{100}$ . Repeat the measurements with 35 lx ( $\pm 2$  lx), 12 lx ( $\pm 1$  lx), and 3 lux ( $\pm 1$  lx) entering the ABC sensor and record the values as  $P_{35}$ ,  $P_{12}$ , and  $P_3$  respectively. Testing shall be performed from the brightest to dimmest illuminance value and the values shall be changed by varying the input voltage to the light source.

NOTE: The 3 lx illuminance value shall be simulated using a 67 mm 2 F-stop neutral density filter. 12 lx is measured at the ABC sensor prior to the application of the neutral density filter.

7.1.3.2. *On Mode Power Calculation.* All illuminance values shall be weighted equally when calculating the on mode power for a TV with ABC enabled by default and shall be determined by the following equation:

$$P_{on} = P_{100} * W_{100} + P_{35} * W_{35} + P_{12} * W_{12} + P_3 * W_3$$

Where:

$$W_{100} = W_{35} = W_{12} = W_3 = 0.25$$

7.1.3.3. *Lamp Requirements.* A standard spectrum, halogen incandescent aluminized reflector lamp with a lamp diameter of 95 mm ( $\pm 10$  mm), a beam angle of 30 degrees ( $\pm 10$

degrees), and a center beam candlepower of 1500 cd ( $\pm$  500 cd) shall be positioned in front of the ABC sensor so that the light is directed into the sensor.

Note: Lamps with spectrum modifying qualities, such as an IR coating, are not considered to meet a standard spectrum.

7.1.3.4. *Light Source Set-up.* The center of the lamp shall measure 1.5 m ( $\pm$  0.1 m) from the center of the ABC sensor. The light source shall be aligned ensuring that the center focal point of the lamp is perpendicular to the center of the ABC sensor.

7.1.3.5. *Illuminance Measurement.* The room illuminance shall be measured at the sensor in the direction of the light source while the TV is on and displaying the first menu from the IEC 62087 Ed. 3.0 Blu-ray Disc™ dynamic broadcast-content video signal.

## 7.2. *Luminance Test.*

### 7.2.1. *Luminance Test Set-up.*

7.2.1.1. *Picture Setting Set-up.* When transitioning from the on mode power consumption test to the luminance test, the TV shall remain in the default picture setting within the home configuration for the first luminance measurement.

7.2.1.2. *ABC Configuration.* The ABC sensor shall be disabled at all times during the luminance test. If the ABC sensor is incapable of being disabled through the TV settings menu, direct at least 300 lx of light into the ABC sensor.

7.2.1.3. *Stabilization.* Prior to the first luminance measurement, the TV must undergo a 10-minute re-stabilization period using the IEC 62087 Ed. 3.0 Blu-ray Disc™ dynamic broadcast-content video signal.

7.2.2. *Luminance Meter Set-up.* Align the luminance meter perpendicular to the center of the TV screen. If a non-contact luminance meter is used to measure the screen

luminance, the luminance measurement shall be taken at a distance capable of meeting the meter specifications outlined in section 3.1.3, and in accordance with the meter's user manual.

- 7.2.3. *Three Vertical Bar Signal Measurement.* The IEC 62087 Ed. 3.0 three vertical bar signal found in section 11.5.5 of IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3) shall be displayed for no more than 5 seconds when each luminance measurement is taken. The luminance measurement taken in the default picture setting within the home configuration shall be recorded as  $L_{\text{Default\_Home}}$ .
- 7.2.4. *Luminance in the Brightest Selectable Preset Picture Setting.* Using the IEC 62087 Ed. 3.0 three vertical bar signal, determine the brightest selectable preset picture setting within the home configuration. Measure and record the screen luminance in the brightest selectable preset picture setting as  $L_{\text{Brightest\_Home}}$ .
- 7.2.5. *Retail Configuration Luminance Measurement.* If the TV has a retail configuration and the retail configuration is acceptable for making a luminance measurement, measure and record the screen luminance in the default picture setting within the retail configuration as  $L_{\text{Default\_Retail}}$ . A retail configuration is considered acceptable for a luminance measurement if the TV does not display a demo or ticker which alters the screen content, or if such features are present, they must be capable of being disabled for the entire re-stabilization period and measurement.

### 7.3. *Standby Mode Test.*

- 7.3.1. *Video Input Device.* The video input device shall be disconnected from the TV for all testing in standby mode.

7.3.2. *Standby-Passive Mode.* The standby-passive mode test shall be performed according to section 5.3.1 of IEC 62301 Ed. 2.0 (incorporated by reference, see § 430.3).

Measure and record the average power consumption value over the test duration as

$P_{\text{standby-passive}}$ .

7.3.3. *Standby-Active, Low Mode.* The standby-active, low mode shall only be tested if the TV is capable of connecting to a network and is capable of entering this mode of operation. The standby-active, low mode test shall be performed according to section 5.3.1 of IEC 62301 Ed. 2.0 (incorporated by reference, see § 430.3). Measure and record the average power consumption value over the test duration as  $P_{\text{standby-active,low}}$ .

#### 7.4. *Off Mode Test.*

7.4.1. The off mode test shall be performed according to section 5.3.1 of IEC 62301 Ed. 2.0 (incorporated by reference, see § 430.3). Measure and record the average power consumption value over the test duration as  $P_{\text{off}}$ .

### 8. Annual Energy Consumption.

8.1. *Input Value.* The annual energy consumption (AEC) of the TV shall be calculated using on mode, standby mode, and off mode power consumption values as measured pursuant to section 7.1, 7.3, and 7.4 respectively.

8.2. *Rounding.* Calculate the AEC of the TV using the equation below. The calculated AEC value shall be rounded as follows:

If the calculated AEC value is 100 kWh or less, the rated value shall be rounded to the nearest tenth of a kWh;

If the calculated AEC value is greater than 100 kWh, the rated value shall be rounded to the nearest kWh.

8.3. *Calculations.* Express the AEC in kWh per year, according to the following:

$$\text{AEC} = 365 * (P_{\text{on}} * H_{\text{on}} + P_{\text{standby-active, low}} * H_{\text{standby-active, low}} + P_{\text{standby-passive}} * H_{\text{standby-passive}} + P_{\text{off}} * H_{\text{off}}) / 1000$$

Where:

$P_m$  = power measured in a given mode  $m$  (in Watts)

$H_m$  = hours per day spent in mode  $m$

365 = conversion factor from daily to yearly

1000 = conversion factor from watts to kilowatts

Values for  $H_m$  (in hours/day) are specified in Table 2 of this section:

TABLE 2—HOURLY WEIGHTINGS

Standby-active, low mode	$H_{\text{on}}$	$H_{\text{standby-active, low}}$	$H_{\text{standby-passive}}$	$H_{\text{off}}$
Yes	5	19	0	0
No	5	0	19	0