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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 Televisions Sets

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

ACTION: Supplemental notice of proposed rulemaking.

SUMMARY: On January 19, 2012, the U.S. Department of Energy (DOE) issued a notice of proposed rulemaking (NOPR) in which DOE proposed a new test procedure for television sets (TVs). To address comments in response to the NOPR, DOE conducted additional research and analysis, which is incorporated in today's supplemental notice of proposed rulemaking (SNOPR). DOE also incorporated elements from the draft Consumer Electronics Association (CEA) standard "CEA-2037-A, Determination of Television Average Power Consumption" into the SNOPR. In today's SNOPR, DOE proposes to update the input power requirements in the TVs test procedure NOPR by referencing International Electrotechnical Commission (IEC) Standard 62301 Ed. 2.0, "Household electrical appliances – Measurement of standby power." The SNOPR also proposes to include example accuracy tolerance calculations for light measuring devices (LMD). Additionally, DOE proposes to update the video source input cable

hierarchy in the test procedure, as well as specify the TV input terminal for testing. Further, today's SNOPR clarifies TV warm-up and stabilization prior to testing, removes the standby-active, high mode test, includes a test for standby-active, low mode, updates the test order, and provides details for testing TVs shipped with Automatic Brightness Control (ABC) enabled. Finally, today's SNOPR adds rounding requirements to the TV test procedure NOPR that provide guidance for any calculated values used for representation in multiple metric outputs, including an annual energy consumption metric. The multiple metric outputs will also be subject to a sampling plan in today's SNOPR. DOE will hold a public meeting to receive and discuss comments on the proposal.

DATES: DOE will hold a public meeting on April 4, 2013, from 9a.m. to 4 p.m., in Washington, DC. The meeting will also be broadcast as a webinar. See section V, "Public Participation," for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

DOE will accept comments, data, and information regarding this supplemental notice of proposed rulemaking (SNOPR) submitted no later than [**INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**]. See section V, "Public Participation," for details.

ADDRESSES: The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 8E-089, 1000 Independence Avenue, SW, Washington, DC 20585. To attend, please notify Ms. Brenda Edwards at (202) 586–2945. Please note that foreign nationals visiting

DOE Headquarters are subject to advance security screening procedures. Any foreign national wishing to participate in the meeting should advise DOE as soon as possible by contacting Ms. Edwards to initiate the necessary procedures. Please also note that those wishing to bring laptops into the Forrestal Building will be required to obtain a property pass. Visitors should avoid bringing laptops, or allow an extra 45 minutes. Persons can attend the public meeting via webinar. For more information, refer to the Public Participation section near the end of this notice.

Any comments submitted must identify the Television Set Test Procedure SNOPR, and provide docket number EERE-2010–BT–TP–0026 and/or Regulatory Information Number (RIN) 1904- AC29. Comments may be submitted using any of the following methods:

1. Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.
2. E-mail: Televisions-2010-TP-0026@ee.doe.gov. Include docket number EERE-2010-BT-TP-0026 and/or RIN 1904-AC29 in the subject line of the message.
3. Postal Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE-2J, 1000 Independence Avenue, SW, Washington, DC, 20585-0121. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.
4. Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza, SW, Suite 600, Washington, DC, 20024.

Telephone: (202) 586-2945. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section V of this document (Public Participation).

Docket: The docket, which includes Federal Register notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at www.regulations.gov. All documents in the docket are listed in the www.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;rpp=10;po=0;D=EERE-2010-BT-TP-0026. This web page contains a link to the docket for this notice on the www.regulations.gov site. The www.regulations.gov web page contains instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through www.regulations.gov.

For further information on how to submit a comment, review other public comments and the docket, or participate in the public meeting, contact Ms. Brenda Edwards at (202) 586-2945 or by email: Brenda.Edwards@ee.doe.gov.

FOR FURTHER INFORMATION CONTACT:

Mr. Jeremy Dommu, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE-2J, 1000 Independence Avenue, SW, Washington, DC, 20585-0121. Telephone: (202) 586-9870. E-mail: Televisions@ee.doe.gov.

Ms. Celia Sher, U.S. Department of Energy, Office of the General Counsel, GC-71, 1000 Independence Avenue, SW, Washington, DC, 20585-0121. Telephone: (202) 287-6122. E-mail: Celia.Sher@hq.doe.gov.

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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[1] of title III of EPCA (42 U.S.C. 6291–6309, as codified) established the "Energy Conservation Program for Consumer Products Other Than Automobiles." The program includes TVs, the subject of today's notice. (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 when testing to determine whether the products comply with any relevant standards promulgated under EPCA. For a further description of the basic nature of the program, see section I.A of the TVs test procedure NOPR that DOE published in this rulemaking. 77 FR 2830, 2831 (Jan. 19, 2012) (the January 2012 NOPR).

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 in relevant part 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

[1] For editorial reasons, Part B was redesignated as Part A upon codification in the U.S. Code.

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))

EISA 2007 amended EPCA to require DOE to integrate a standby and off mode energy consumption measurement into test procedures where no such measurement is already included, if technically feasible. Otherwise, DOE must prescribe a separate standby and off mode energy test procedure, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)) DOE recognizes that the standby and off mode conditions of operation apply to TVs.

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))

C.Rulemaking Background

DOE adopted a test procedure for TVs on June 29, 1979, codified at 10 CFR part 430, subpart B, Appendix H. 44 FR 37938. In May 2008, the California Energy Commission (CEC) and the Consumer Electronics Association (CEA) each petitioned DOE to repeal this test procedure. CEC's petition stated that the 1979 test procedure was not capable of accurately measuring the energy consumption of modern TVs because TV broadcasting is no longer transmitted via an analog signal. CEA petitioned for DOE's adoption of the International

Electrotechnical Commission (IEC) test procedure IEC 62087 Ed. 2.0, "Method of measurement for the power consumption of audio, video and related equipment." 74 FR 53641. DOE agreed that the 1979 test procedure was largely obsolete for today's products and repealed the test procedure on October 20, 2009. 74 FR 53640.

As the first step in establishing a new test procedure for TVs, DOE published a Request for Information on September 3, 2010 (the 2010 RFI) requesting information and views from stakeholders on a range of issues it had identified based on its review of various TV standards and test procedures, including: (1) IEC 62087 Ed. 2.0; (2) the ENERGY STAR Program Requirements for Televisions, Version 4.1 (ENERGY STAR v. 4.1), and (3) CEA's TV test procedure, "Determination of Television Average Power Consumption," CEA-2037 (March 2010). 75 FR 54049. Using the information gathered in the 2010 RFI, DOE issued a TV test procedure NOPR on January 19, 2012, which proposed the adoption of a new TV test procedure to accurately measure the energy consumption of today's TVs. 77 FR 2830 (the January 2012 NOPR). The proposed test procedure was based on updated versions of the IEC, ENERGY STAR and CEA test procedures, namely, IEC 62087 Ed. 3.0, ENERGY STAR v. 5.3, and CEA-2037 (March 2010). In addition, the January 2012 NOPR incorporated by reference certain provisions of IEC 62087 Ed. 3.0[2] and IEC 62301 Ed. 2.0[3].

The January 2012 NOPR proposed test procedures for measuring screen luminance and determining power consumption for on mode, standby-passive mode, standby-active, low mode,

[2] IEC 62087 Ed 3.0 "Method of Measurement of the Power Consumption of Audio, Video, and Related Equipment". April 13, 2011.

[3] IEC 62301 Ed 3.0 "Household Electrical Appliances – Measurement of Standby Power". January 27, 2011.

and off mode. DOE requested written comments on the NOPR and held a public meeting on March 22, 2012[4]. Commenters to the January 2012 NOPR generally supported DOE's proposed approach for determining the luminance and power consumption of TVs but suggested that DOE do its best to use industry-led standards in the creation of its test procedure.

Based on comments received from interested parties on the January 2012 NOPR, additional research and testing performed by DOE, the draft version of CEA 2037-A, Determination of Television Average Power Consumption[5], and the updated version of ENERGY STAR Program Requirements for Televisions, Version 6.0 (ENERGY STAR v. 6.0), this SNOPR proposes amendments to the following issues:

(1) Method for measuring screen luminance,

(2) Testing multiple illuminance values,

(3) Method for generating illuminance,

(4) The best possible signal source and connection to that signal source,

(5) Stabilization time for luminance and power measurements,

(6) Measuring energy consumption in Download Acquisition mode (DAM),

(7) Measuring power consumption while connected to a network, and

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[4] Public Meeting Transcript. (Last accessed November 30, 2012) <http://www.regulations.gov/#!documentDetail;D=EERE-2010-BT-TP-0026-0051>. The material from this website is available in Docket #EERE-2010-BT-TP-0026 at regulations.gov.

[5] CEA's working group initiated a revision to CEA-2037-A on February 28th, 2011; This revision process is still underway.

(8) Measuring power consumption on TVs with power saving technologies, such as sensors, display power management systems (DPMS), and high-definition multimedia interface™ with consumer electronic controls (HDMI™).

In addition, this SNOPR proposes sampling and rounding provisions, which were not addressed in the January 2012 NOPR.

For further details on the background of this rulemaking prior to issuance of the January 2012 NOPR, see section I.C of that document, 77 FR 2830, 2821-32.

II.Summary of the Supplemental Notice of Proposed Rulemaking

In today's SNOPR, DOE proposes: (1) to amend the January 2012 NOPR based on comments received from interested parties and data collected by DOE during round robin and other additional testing; and (2) to adopt a metric to calculate the annual energy consumption (AEC) of a TV. DOE notes that comments previously made by stakeholders that are not addressed in today's SNOPR will be addressed by DOE in the final rule.

In the January 2012 NOPR, DOE proposed definitions for "retail picture setting" and "home picture setting." In today's SNOPR, DOE proposes to replace these terms with "brightest-selectable preset picture setting" and "default picture setting", respectively. DOE feels that these new terms will provide clarity for on mode and luminance testing. DOE also proposes to modify the definition of a television set to ensure the scope of coverage clearly differentiates between televisions and displays which are typically used with a computer. Additionally, DOE proposes to include definitions for the following terms, not included in the January 2012 NOPR:

“component video”, “composite video”, “HDMI”, “S-video”, “special functions”, “preset picture settings”, and “dark room”. DOE believes these additional definitions will provide clarity to the test procedure.

In addition, DOE is proposing to modify the Accuracy and Precision of Measurement Equipment section as well as the Test Conditions section of the January 2012 NOPR. In the NOPR, DOE proposed using a 115 V, 60 Hz input power supply for testing TVs. In today’s SNOPR, DOE is proposing to incorporate by reference the power supply requirements specified in section 4.3.1 of IEC 62301 Ed. 2.0 which would allow the DOE test procedure to be more easily adopted by international regulating bodies. DOE also proposes to clarify instrument accuracy requirements by providing examples for calculating light measuring device (LMD) tolerance.

In the January 2012 NOPR, DOE proposed a hierarchy for selecting the video source input cable used for testing TVs. Today, DOE proposes to update that hierarchy by removing Video Graphics Array (VGA) and Digital Visual Interface (DVI) cables. VGA and DVI are typically used as display input video sources, which do not meet the scope of coverage for the proposed test procedure, and are not appropriate for TV testing. DOE is also proposing to add a section to the test procedure which specifies the appropriate input terminal that should be used during testing. Specifying the input terminal connection will help ensure all TVs are connected in the same manner during testing.

Today’s SNOPR also proposes to further clarify the TV test procedure by: (1) updating the stabilization requirements outlined in the January 2012 NOPR; (2) incorporating by reference

the stabilization section of IEC 62087 Ed. 3.0; (3) including a test for standby-active, low mode; (4) removing the test for standby-active, high mode; and (5) revising the test order outlined in the January 2012 NOPR.

In the January 2012 NOPR, DOE proposed including a separate test method for TVs with ABC enabled by default. In today's SNOPR, DOE is proposing to provide clarification to the testing of TVs with ABC enabled by default. This SNOPR updates the light source specifications to allow for new lamp[6] requirements based on amended energy conservation standard levels. DOE is specifying the location and set-up of the light source, the illuminance values at which measurements are taken, and the weighting for each measurement when calculating overall on mode power consumption. DOE's proposals in today's SNOPR are based on data collected during round robin and additional testing, as well as public comment received on the January 2012 NOPR. This information, found on regulations.gov[7], includes the following:

(1) Round Robin Test Report

(2) IR/ND Testing Filter Test Results

(3) Room Testing Conditions Test Results

(4) Analysis of Nielsen Data

(5) Input Terminal Test Results

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[6] Lamp is an industry term used for what is commonly referred to outside the television industry as a "light bulb".

[7] This material is available in Docket #EERE-2010-BT-TP-0026 at http://www.regulations.gov.

Today's SNOPR also includes a proposed metric to calculate the AEC of a TV from the rated power consumption in the on, standby, and off modes of operation. The proposed metric combines the rated power consumption values of the TV in the different modes of operation into a single metric based on the expected time spent in each mode of operation such that it is representative of the TV's annual energy use. Providing an approach for calculating AEC will ensure harmonization of reported values across different voluntary, incentive, and State programs applicable to TVs.

Finally, today's SNOPR proposes sampling requirements that must be used to represent power consumption values for on mode, standby-active, low mode and standby-passive mode. DOE is also proposing rounding provisions for these metrics.

The specific amendments proposed in today's SNOPR represent the only changes to the January 2012 NOPR. For the reader's convenience, DOE has reproduced in this SNOPR the entire body of proposed regulatory text from the January 2012 NOPR, amended as appropriate to incorporate today's proposed changes. DOE's supporting analysis and discussion on the portions of the proposed regulatory text not affected by this SNOPR may be found in the January 2012 NOPR. 77 FR 2830.

DOE seeks comments from interested parties on the proposed TV test procedure amendments in today's notice. DOE will consider modifications that improve the accuracy, precision of language, or other elements of the procedure and/or decrease the testing burden. In submitting comments, interested parties should state the nature of the recommended modification

and explain how it would improve upon the test procedure proposed in this SNOPR. Interested parties should also submit data, if any, to support their positions.

III.Discussion

A. Industry Test Procedures

DOE primarily focused on the draft CEA-2037-A standard, Determination of Television Average Power Consumption, to develop the test procedure for TVs that is proposed in today's SNOPR. The draft CEA-2037-A standard specifies the test conditions and test setup at which power consumption of the TV should be measured. These include the modes of operation of the TV, test room and equipment requirements, and measurement tests for determining the power consumption in each mode of operation. CEA is a leading organization that connects consumer electronics manufacturers, retailers, and other interested parties to develop industry accepted electronics product test procedures. The CEA Technology & Standards program is CEA's standard making body that is accredited by ANSI (American Nation Standards Institute).[8] CEA-2037-A is currently under development in the CEA R4 Video Systems Committee. In response to the January 2012 NOPR, CEA urged DOE to work with the CEA R4 team (CEA, No.47 at p. 6). DOE representatives have observed the development of CEA-2037-A, attended conference call meetings between TV manufacturers and energy advocates discussing draft revisions of the standard, and have been included on all notes and documentation from the CEA R4 WG13 TV

[8] "ANSI-Accredited Standard Developers." (Last accessed November 30, 2012) <www.ansi.org/about_ansi/accredited_programs/overview.aspx?menuid=1>

Energy Consumption working group. DOE has incorporated elements of the draft CEA-2037-A standard into today's SNOPR.

The CEA-2037-A standard is currently in a 30 day voting period, which is expected to end on March 4, 2013. Once the CEA-2037-A standard is published it will be available on CEA's website at http://www.ce.org/Standards/Standard-Listings.aspx.

B.Scope of Rulemaking

In the January 2012 NOPR, DOE proposed that a television set be defined as "A product designed to be powered primarily by mains power having a diagonal screen size of fifteen inches or larger that is manufactured with a TV tuner, …". 77 FR 2864. However, in the January 2012 NOPR preamble, DOE uses both "*manufactured* with a TV tuner" and "*sold* with a TV tuner" in its discussion of the TVs definition. 77 FR 2836. In response to this inconsistency, Energy Solutions (ES) requested clarification on what DOE meant by "manufactured with" (Public Meeting Transcript, No. 51 at p. 23). In order to eliminate any confusion, DOE is proposing to simplify the definition of TV in the test procedure scope by requiring that the TV tuner is physically incorporated into the TV and removing any mention of the tuner being manufactured or sold with the TV. DOE believes that requiring the TV tuner to be located internal to the TV housing clarifies the scope and definitively separates TVs from displays, as defined in ENERGY STAR v. 6.0.

In addition, within the television set definition, DOE has modified the January 2012 NOPR language of "…and that is capable of displaying dynamic visual information…" to

"…and that is capable of displaying dynamic visual content…". DOE believes changing "information" to "content" provides a clearer description of a television set's primary function.

The revised definition of a television set, as proposed in today's SNOPR, is "a product designed to be powered primarily by mains power, having a diagonal screen size of fifteen inches or larger, that contains an internal TV tuner encased in a single housing, and that is capable of displaying dynamic visual content from wired or wireless sources including but not limited to:…". DOE seeks comment from interested parties on DOE's proposed TV definition, and on whether the revised definition provides sufficient clarity on the TV test procedure scope of coverage (Section V.B.1).

C.Sampling Plan and Rounding Requirement

DOE is proposing the following sampling plan and rounding requirements for TVs to enable manufacturers to make representations of power consumption in the on, standby-active, low, and standby-passive modes of operation. A sampling plan and rounding requirement were not proposed in the January 2012 NOPR, however, DOE believes they will improve consistency of results reported for regulatory and voluntary programs. The represented power consumption values shall be used to calculate the AEC metric, which shall be rounded according to the requirements proposed below. The sampling requirements are included in the proposed section 429.25 of Subpart B of 10 CFR Part 429.

For consistency with other consumer products regulated under EPCA, DOE is proposing that a minimum of two units of a TV basic model be tested to develop a representative rating, as

prescribed in 10 CFR 429.11. However, manufacturers may test more units of a TV basic model, if desired. Additionally, DOE is proposing that any represented power consumption values of a TV basic model shall be greater than or equal to the higher of the mean of the sample or the 95 percent upper confidence limit (UCL) of the true mean divided by 1.05.

The mean of the sample is calculated as follows:

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

Where:

x = the sample mean,

n = the number of samples, and

x_i = the ith sample.

The UCL is calculated as follows:

$$UCL = x + t_{0.95}\frac{s}{n}$$

Where:

x = the sample mean

s = the sample standard deviation,

n = the number of samples, and

$t_{0.95}$ = the t statistic for a 95 percent one-tailed confidence interval with n-1 degrees of freedom.

DOE testing indicates that the on mode power consumption test procedure, for TVs without an ABC sensor or with ABC disabled by default, is repeatable to within one percent. Test procedure repeatability for TVs with ABC enabled by default varies from 0.4 to 3.6 percent,

depending on the TV model tested, with an average repeatability of 1.1 percent and a median of 0.6 percent.[9] On mode repeatability is based on testing a unit at multiple test labs and includes test equipment variation. DOE is therefore proposing in today's SNOPR for on mode power consumption, that the UCL value be divided by 1.05 for on mode power consumption to provide a conservative allowance for test procedure variation.[10]

DOE is also proposing a 1.10 divisor for standby mode power consumption and for other power consumption measurements other than on mode. Due to the relatively small power consumption values for standby modes , a small change in tested values can result in significant variation. For instance, standby mode power consumption varied by up to 10 percent for a unit, which included test equipment variation, when tested at multiple labs. Therefore, DOE is proposing that any represented value of standby-active, low mode power consumption and standby-passive mode power consumption, or other power consumption value that is not on mode, of a TV basic model for which consumers would favor lower values shall be greater than or equal to the higher of the mean of the sample or the 90 percent UCL of the true mean divided by 1.10.

DOE is therefore proposing to incorporate this sampling plan into 10 CFR 429.25. DOE requests comment from interested parties regarding its proposed sampling plan for on mode

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[9] Round Robin Test Report. (Last accessed February 26, 2013). This material is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.
[10] Id.

power consumption, which specifies a divisor of 1.05, and for standby mode and other power consumption measurments other than on mode, which specifies a divisor of 1.10 (See Section V.B. 2).

Finally, DOE proposes that only the mean and the UCL of the samples tested shall be rounded, while all calculations to determine the mean and UCL shall be performed with unrounded values. The proposed rounding requirements for the rated power consumption values are included in section 5.3 (Calculation of Average and Rated Power Consumption) of the proposed Appendix H to Subpart B of 10 CFR Part 430.

Once the rated power consumption values for the on, standby mode, and other power consumption values that are not on mode are calculated and rounded, DOE proposes that these rated values shall be used to calculate the AEC metric. To round the AEC metric from the rated power consumption values, DOE proposes the following: if the AEC is 100 kWh or less, the value shall be rounded to the nearest tenth of a kWh. If the AEC is greater than 100 kWh, the value shall be rounded to the nearest kWh. DOE requests comment on the proposed rounding requirements for representing a TV's on mode, standby mode and other power consumption modes that are not on mode.

D.Definitions

1.General

In the January 2012 NOPR, DOE proposed incorporating definitions for the TV test procedure from IEC 62087 Ed. 3.0 and ENERGY STAR v. 5.3. DOE also proposed new definitions for "home picture setting" and "retail picture setting" for on mode and luminance

testing. 77 FR 2830, 2836, 2837. In response to the January 2012 NOPR, Mitsubishi Electric Visual Solutions America (MEVSA) and Sharp recommended including the following terms in the DOE test procedure: “special functions”, “preset picture setting”, and “dark room”. (MEVSA, No. 2 at p. 2; Sharp, No 45 at p. 2) MEVSA also recommended that DOE provide further clarification for dark room conditions. (MEVSA, No. 2 at p. 2) DOE believes that adding definitions for “special functions,” “preset picture setting” and “dark room” will provide added clarity to the luminance and on mode tests and DOE is therefore proposing to add such definitions to the test procedure.

Interested parties also indicated that the definition for “retail picture setting” was confusing due to the ambiguity over which modes could be interpreted as the “retail picture setting”. Specifically, Sharp, MEVSA, Pacific Gas and Electric Company (PG&E), Northwest Energy Efficiency Alliance (NEEA), and Panasonic noted confusion with the definition and recommended that it be modified. (Sharp, No. 45 at p. 2; MEVSA, No. 44 at p. 5; PG&E, No. 46 at p. 3; NEEA, No. 43 at p. 2; Panasonic, No. 50 at p. 2) Given interested party feedback, and to clarify the test procedure, DOE proposes to remove the “retail picture setting” term and definition from the test procedure and replace it with “brightest-selectable preset picture setting”. Similarly, DOE proposes to remove the “home picture setting” term and definition and replace it with “default picture setting”. The following sections discuss the modified and additional definitions proposed in today’s SNOPR.

2.Definitions Incorporated From IEC 62087 Ed. 3.0

In response to the January 2012 NOPR, Sharp recommended that DOE include the IEC 62087 Ed. 3.0 definition for “special functions”. (Sharp, No. 45 at p. 2) Sharp also commented that additional functions should be disabled during testing while special functions should remain in their default configuration (Sharp No. 45 at p. 2). DOE notes that many TVs are now equipped with a variety of “special functions”, such as “quick start” power on, ABC, and other power saving features, which are not standard among different manufacturers and models. DOE proposes to define such “special functions” in the TV test procedure as functions that shall remain enabled during testing if they are enabled by default (i.e., if they are enabled as-shipped). This definition is in contrast to DOE’s definition for “additional functions”, proposed in the January 2012 NOPR, which are to be disabled for testing regardless of their status as-shipped. Incorporating a definition for “special functions” helps to clearly define which functions shall be enabled during testing. DOE believes that the definition for “special functions” from IEC 62087 Ed. 3.0 is appropriate because it is a clear, concise and widely accepted definition. For these reasons, DOE is proposing to incorporate by reference this term, from section 3.1.18 of IEC 62087 Ed. 3.0, in section 2.12 (Special Functions) of Appendix H to subpart B of 10 CFR part 430. Specifically, DOE proposes to define “special functions” as "functions that are related to, but not required for, the basic operation of the device”. Additionally, DOE proposes to incorporate the definition for “additional funtions” from section 3.1.1 of IEC 62087 Ed. 3.0 in section 2.1 (Additional Functions) of Appendix H to subpart B of 10 CFR part 430. DOE notes that this definition has not changed from the definition proposed in the January 2012 NOPR, but is incorporated by reference to be consistent with existing industry test procedures. DOE requests comment from interested parties on incorporating by reference the IEC definitions for “additional functions” and “special functions” in today’s SNOPR (Section V.B.4).

3.New Definitions

In response to the January 2012 NOPR, Sharp and MEVSA proposed adding definitions for “preset picture setting” and “dark room” respectively. (Sharp, No. 45 at p. 2; MEVSA, No. 44 at p. 3) Additionally, in written comments to the January 2012 NOPR, Sharp commented that an abbreviation for Blu-ray Disc™ should be included. (Sharp, No. 45 at p. 3) Based on interested party feedback, DOE is proposing to define “component video”, “composite video”, “HDMI”, “S-video”, “preset picture setting”, and “dark room”, and add the abbreviation “BD” for Blu-ray Disc in today’s SNOPR.

a. Input Connections

In order to further aid in defining the scope of coverage of this rulemaking DOE would like to harmonize its definitions for input connections with other DOE rules such as the set-top box rulemaking published on January 23, 2013. 78 FR 5076. Thus, DOE proposes to include definitions for component video, composite video, HDMI, and S-video in the test procedure. DOE proposes to incorporate by reference two industry standards that are used to define the component video and HDMI connections. DOE proposes to incorporate by reference CEA-770.3-D, “High Definition TV Analog Component Video Interface” for the definition of component video, and HDMI Specification Version 1.0, “High-Definition Multimedia Interface Specification, Informational Version 1.0” for the definition of HDMI. DOE believes these standards provide the appropriate information for defining the component video and HDMI connections.

b. Dark Room

MEVSA agreed with the testing conditions outlined in the January 2012 NOPR but believes that dark room conditions are underspecified. (MEVSA, No. 44 at p. 2) MEVSA suggested the following dark room definition: "All luminance testing (with a non-contact meter) and on mode testing (with ABC enabled by default) shall be performed in dark room conditions, meaning the display screen illuminance measurement in off mode must be less than or equal to 1.0 lux, and in a room or an enclosure with dark, non-reflective walls." (MEVSA, No. 44 at p. 3) DOE conducted on mode testing while varying room wall color (black, beige) and wall reflectance (fabric, matte paint, glossy paint and white-backed window), while ensuring room illuminance values were less than 1.0 lux at the sensor. DOE observed a difference in power consumption of less than 2 percent with these room variations[11]. Since on mode power measurements and luminance results were minimally impacted by these variations in room conditions, DOE tentatively concludes that specifying a maximum illuminance value of 1.0 lux measured at the TV ABC sensor or bottom of the TV bezel is sufficient for defining a dark room. Including a definition for dark room conditions provides clarity to the test procedure since it may be necessary for the luminance test and on mode test with ABC enabled by default to be performed in a dark room. Given interested party feedback from the January 2012 NOPR, DOE is proposing to define the term dark room in section 2.3 (Dark Room) of Appendix H to subpart B of 10 CFR part 430.

[11] Room Testing Conditions Test Results. This report is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.

Even though DOE testing indicated that room conditions have a minimal impact on test results, DOE proposes to specify that the ABC sensor remain at least 2 feet from any wall surface (i.e. wall, ceiling, and floor). Maintaining a distance of at least 2 feet away from all wall surfaces increases test set-up repeatability. DOE clarifies that this specification does not include surfaces on which the TV may be placed or the room surface closest to the back of the TV. Additionally, this requirement is only necessary for TV's with ABC sensors enabled by default. DOE requests comment from interested parties on requiring the ABC sensor to be at least 2 feet from any room surface (See Section V.B.5).

c. Picture Settings

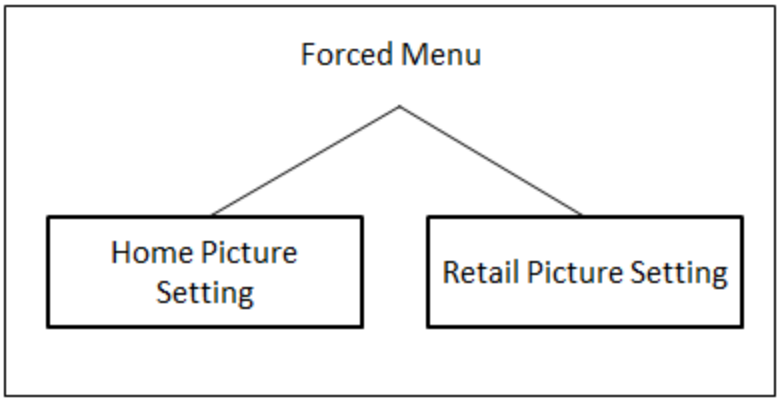
In the January 2012 NOPR, DOE proposed to define "retail picture setting" as the "preset picture setting" in which the TV produces the highest luminance in on mode. 77 FR 2830, 2837. Sharp, MEVSA, PG&E, NEEA, and Panasonic all stated that the term and definition were confusing and proposed alternative definitions or changes to the term.

NEEA stated that DOE should change the definition for "retail picture setting" and could define it as "the mode with the highest brightness level attainable by a factory defined menu option." Otherwise, NEEA recommended changing the term to something other than "retail picture setting". (NEEA, No. 43 at p. 2) MEVSA recommended the following definition: "Retail picture setting is the television configuration when the 'retail' forced menu is selected (if available), or the preset picture setting in which the TV produces the highest luminance during the on mode conditions." (MEVSA, No. 44 at p. 6) PG&E suggested an alternative term,

"brightest picture setting, which is the picture setting in which the TV produces the highest luminance during on mode." (PG&E, No. 46 at p. 2) Sharp urged DOE to define "retail picture setting" as "the picture setting which is recommended for retail use by the manufacturer from the initial set up menu." (Sharp, No. 45 at p. 2) Further, Panasonic recommended changing the definition for "retail picture setting" to the following: "Retail picture setting (or the brightest-selectable preset picture setting) is the preset picture setting in which the TV produces the highest luminance during the on mode conditions." (Panasonic, No. 50 at p. 3) Sharp also indicated that manufacturers may have brighter preset settings than the retail picture setting. (Public Meeting Transcript, No. 51 at p. 41)

In ENERGY STAR v. 6.0, EPA requires that a forced menu is displayed when the TV is powered on for the first time, providing users with a choice of "home" or "retail" (see Figure 1). Once a consumer chooses the home menu, multiple pre-programmed viewing options are provided, such as "standard", "vivid", "movie", "sports", and "game", which adjust the brightness, contrast and other settings to modify the picture depending on the user's preference. In general, the TV will default to one of the pre-programmed settings once the "home" menu is selected. From the list above, the default setting would likely be the "standard" viewing setting.

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



Since most, if not all, power consumption will occur in the "home" menu for a given TV purchased by a consumer, DOE believes that on mode power consumption values should be representative of the viewing options available from the "home" menu rather than from the "retail" menu. DOE is therefore proposing to remove the definitions for "retail picture setting" and "home picture setting" proposed in the January 2012 NOPR and replace these definitions with the following new terms: "preset picture setting", "brightest-selectable preset picture setting", and "default picture setting". DOE believes these changes clarify the picture settings for testing and provide a more representative power consumption value.

DOE received feedback from the January 2012 NOPR requesting clarification of the term "preset picture setting", as it is used in the definition of "retail picture setting". Neither IEC 62087 Ed. 3.0 nor ENERGY STAR v. 6.0 provide a definition for this term; therefore, DOE proposes to define "preset picture setting" in today's SNOPR. MEVSA and PG&E suggested that DOE clarify what is meant by the term "preset picture setting". (MEVSA, No. 44 at p. 5; PG&E, No. 46 at p. 2) DOE believes that defining "preset picture setting" will improve test repeatability and reproducibility, and minimize confusion when selecting picture settings for on mode and luminance testing. DOE proposes to define "preset picture setting" in section 2.11

(Preset Picture Setting) of Appendix H to subpart B of 10 CFR part 430 as "a pre-programmed factory setting obtained from the TV menu with pre-determined picture parameters such as brightness, contrast, color, sharpness, etc. Preset picture settings are selected within the home menu after the initial set-up selection from the forced menu, if a forced menu is present". DOE requests comment on the need to define "preset picture setting", as well as DOE's proposed definition (Section V.B.6).

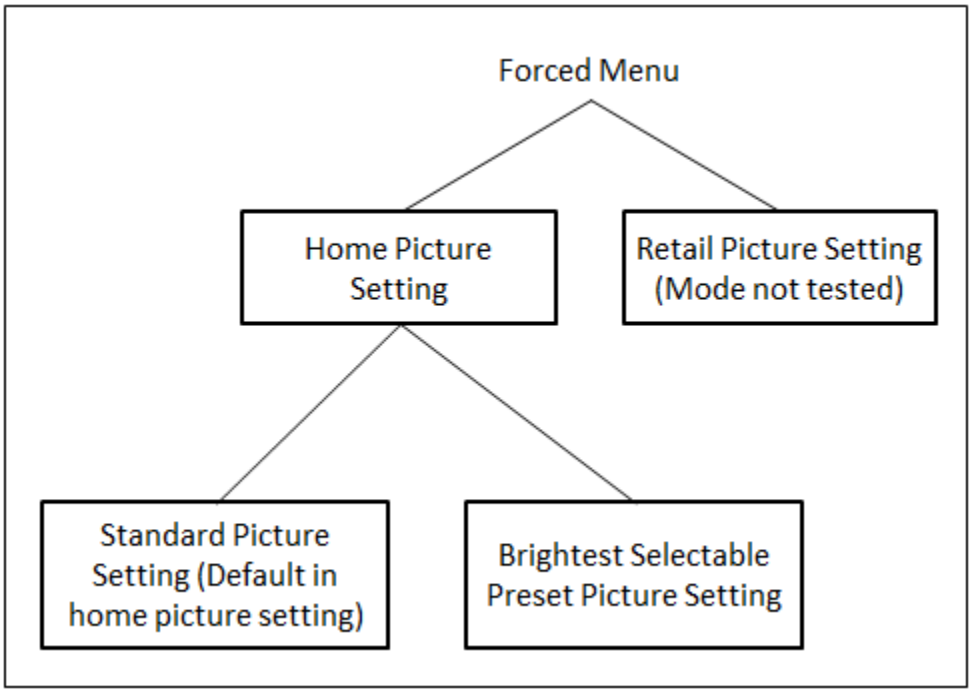
Based on comments from interested parties, DOE is proposing to remove the term "retail picture setting" and define "brightest selectable preset picture setting" in section 2.2 (Brightest - selectable preset picture setting) of Appendix H to subpart B of 10 CFR part 430 as "the preset picture setting in which the television produces the highest luminance during on mode". To determine the "brightest selectable preset picture setting", each "preset picture setting" must be tested according to the luminance test in section 5.5 (Luminance Test) of Appendix H to subpart B of 10 CFR part 430. DOE requests comment from interested parties on the use of the term "brightest selectable preset picture setting" and its proposed definition (Section V.B.7).

Although Sharp commented that it agrees with the current definition for "home picture setting" (Sharp, No. 45 at p. 2), DOE no longer feels this term and its associated definition is appropriate given its association with the forced menu requirements in ENERGY STAR v. 6.0. DOE is therefore proposing to remove the term and definition for "home picture setting" and replace it with "default picture setting". DOE proposes to define "default picture setting", in section 2.4 (Default picture setting) of Appendix H to subpart B of 10 CFR part 430, as the picture setting the TV enters into immediately following the selection of the home menu from

the forced menu. If the TV does not have a forced menu, the as-shipped picture setting shall be the "default picture setting". DOE requests comment from interested parties on the proposed term, "default picture setting" (Section V.B.8).

DOE believes that the addition of "brightest selectable preset picture setting" and "default picture setting" clarifies how picture settings should be selected and used for testing. Determining the luminance values of the available "preset picture settings" should require little time and is the most definitive way to determine the "brightest selectable preset picture setting" (see figure 1). DOE also believes that excluding any picture settings derived from the "retail" forced menu setting (see figure 2), as specified in ENERGY STAR v. 6.0, will result in representative picture settings for determining on mode power consumption. Figure 2 illustrates the concept of picture settings as proposed in today's SNOPR.

Figure 2: Picture Setting Structure Proposed in Today's SNOPR



E.Testing Conditions and Accuracy and Precision of Measurement Equipment

1.Power Supply Measurements

In the January 2012 NOPR, DOE proposed adopting the IEC 62087 Ed. 3.0 power supply specifications with several modifications. 77 FR 2830, 2838. DOE proposed to limit the input voltage and frequency to 115 V at 60 Hz, rather than including the general requirement that the TV be tested at "the nominal voltage of the region." DOE also proposed restricting the voltage fluctuation supplied to the TV during testing to be within ± 1 percent, rather than the ± 2 percent specified in IEC 62087 Ed. 3.0. 77 FR 2830, 2838.

In response to DOE's proposal, Panasonic recommended adopting IEC 62087 Ed 3.0 Section 5.1.1 (Power Supply) requirements, which specify that the nominal voltage and frequency of the region be used and provide tolerances for voltage, frequency, and harmonics. (Panasonic, No. 50 at p. 2) Although DOE agrees with Panasonic's comments in support of a nominal voltage requirement, DOE is proposing to adopt power specifications from IEC 62301 Ed. 2.0 rather than from IEC 62087 Ed. 3.0. IEC 62301 Ed. 2.0 is consistent with DOE's proposal in the January 2012 NOPR of a voltage and frequency tolerance of ± 1% while still specifying the nominal voltage and frequency of the country. This allows the DOE test procedure to be used by other regulating bodies while still specifying the same criteria proposed in the January 2012 NOPR. IEC 62301 Ed. 2.0 also provides a table for the nominal voltage and frequency values by country which is consistent with the NOPR proposal of 115 volts at a frequency of 60 Hz for the United States. This table explicitly states the nominal voltage of the

United States to avoid any confusion while listing other regions so the DOE test procedure may easily be adapted by other regions and regulating bodies. DOE proposes to modify section 3.1.1 (Power Supply Requirements) to Appendix H to subpart B of 10 CFR part 430, and incorporate by reference section 4.3.1 (Supply Voltage and Frequency) of IEC 62301 Ed. 2.0.

Additionally, it has come to DOE's attention that the proposed language in the January 2012 NOPR for measuring power factor may be confusing. DOE clarifies that for proposed section 3.1.2.2 to Appendix H to subpart B of 10 CFR part 430, both power factor and real power shall be measured and reported for all on mode tests.

DOE wishes to retain the total harmonic distortion (THD) requirement that was proposed in the January 2012 NOPR as additional clarification to the power supply requirement referenced in IEC 62301 Ed. 2.0. DOE did not receive comment on its proposal and feels that a tolerance of 5% is sufficient without being a test burden.

2.Light Measurement Device

In the January 2012 NOPR, DOE proposed that either a contact or a non-contact Light Measurement Device (LMD) could be used for measuring TV screen luminance. 74 FR 2838-39. DOE believes the January 2012 NOPR proposal may have incorrectly implied that LMD specifications only referred to luminance meters. In this SNOPR, DOE clarifies that LMD specifications are designed to be used for both luminance and illuminance LMDs. DOE also proposed, in the January 2012 NOPR, an accuracy of ± 2 percent (± 2 digits) of the digitally displayed value, and repeatability within 0.4 percent (± 2 digits) of the display value for all

LMDs used during the test. 77 FR 2830, 2838−39. PG&E agreed with allowing both a contact and distance luminance meter for measuring screen luminance (PG&E, No. 46 at p. 2), and Sharp agreed with DOE's proposed LMD specifications. (Sharp, No. 45 at p. 3) NEEA urged DOE to clarify the accuracy of the luminance meters in the test procedure. (NEEA, No. 43 at p. 2) MEVSA also asked DOE to provide more clarification on the LMD tolerance specification. (Public Meeting Transcript, No. 51 at p. 29) Given interested party feedback, DOE is proposing to update section 3.1.3 (Light Measurement Device) of Appendix H to subpart B of 10 CFR part 430 by providing examples for calculating LMD tolerance and adding language to clarify the scope of this requirement. However, DOE has removed the repeatability requirement as it may not be appropriate for all LMDs. DOE seeks comment from interested parties on the clarification of the LMD accuracy requirement and the removal of the LMD repeatability requirement (Section V.B.9).

3. Input Cable

In the January 2012 NOPR, DOE proposed adopting High-Definition Multimedia Interface (HDMI)/Digital Video Interface (DVI), Video Graphics Array (VGA), component video, separate video (S-Video), and composite video input cables for conducting on mode power consumption testing. 77 FR 2830, 2839−40. Panasonic, Sharp, and MEVSA indicated that VGA and DVI inputs should be excluded from TV testing because those formats are designed for displays. Sharp also noted that video input should be tested in the following order: HDMI, Component Analog, S-Video, and Composite Analog. (Sharp, No. 45 at p. 6) MEVSA suggested the following input hierarchy: "Testing shall be performed using an HDMI input. If the TV does not have an HDMI input, the following inputs shall be used in the following order: component,

S-Video, and composite. If the TV has none of these inputs, an appropriate interface shall be used." (MEVSA, No. 44 at p. 3) Panasonic commented that VGA and DVI should be excluded from the input hierarchy. (Panasonic, No. 50 at p. 2) NEEA also commented on the input and signal sources, indicating that DOE should align the signal source and generation section with IEC 62087 Ed. 3.0. (NEEA, No. 43 at p. 2) IEC 62087 Ed. 3.0 does not specify a particular input cable or input cable hierarchy, but rather indicates that only one set of input cables be used. DOE believes that specifying a particular hierarchy of input cables will avoid confusion and improve test repeatability.

Given interested party feedback, and that VGA and DVI input cables are specific to displays, DOE is proposing to remove VGA and DVI from section 4.5 (Input Cable) of Appendix H to subpart B of 10 CFR part 430, resulting in the following input cable hierarchy: HDMI, component video, S-video, and composite video. DOE requests comment from interested parties on the proposed input cable hierarchy and the removal of VGA and DVI from this hierarchy (Section V.B.10).

4. Input Terminal

In the January 2012 NOPR, DOE did not propose to specify a particular input terminal when connecting the signal source and the TV. DOE is aware that some TVs have multiple HDMI input terminals designed for specific signal sources such as video game consoles and personal computers. Different input terminals may affect the picture setting the TV assigns to a particular component. For example, an input terminal designed for video game consoles may default to a picture setting designed for video games; this may not be the picture setting designed

for typical on mode viewing or with a Blu-ray Disc player. Given that some TVs have multiple input terminals and some of those inputs are not designed for a typical on mode signal source, DOE is proposing to include section 4.6 (Input Terminal) to Appendix H to subpart B of 10 CFR part 430, to specify that the primary input terminal (or any input that maintains the same TV characteristics as the primary input, as specified by the owner's manual) shall be used to conduct testing. Such input terminals are designed to be used with Blu-ray disc players and set-top boxes. DOE requests comment from interested parties on the proposal to perform testing using the primary input terminal (Section V.B.11).

5.Video Input Device

During testing, DOE observed that power consumption differences can arise when the Blu-ray Disc (BD) player used in testing is made by the same manufacturer as the television. DOE has observed that these power consumption differences can be as high as 29.7%, which may result in test procedure reproducibility issues[12]. Since the TV power consumption in on mode can vary significantly based on the BD player used for testing, DOE proposes additional specificity for BD players.

DOE believes that these power consumption differences in the TV arise because TVs and BD players can communicate by utilizing the consumer electronic eontrol function on the HDMI terminal. Consumer electronic control functionality can automatically perform operations for the

[12] Video Input Terminal Test Results. This report is available in Docket #EERE-2010-BT-TP-0026 at regulations.gov.

customer, such as powering on or off the other device, adjusting volume on the TV when the BD player volume is adjusted, or defaulting to a different picture setting. While this functionality can provide a better user experience, DOE observed two situations in which this communication can result in the television automatically changing to a different picture setting when connected to a BD player made by the same manufacturer as the TV. The picture setting and energy consumption differences observed when using different manufacturer BD players with TV1, manufacturered by Manufacturer A is shown in Table 1 through Table 4. Although Table 1 shows constant power consumption for TV1 across all BD player manufacturers, BD player A (same manufacturer as TV A) exhibited a proprietary picture setting by default, which was not seen with the other BD players. When the picture setting was changed to the standard picture setting, consistent with the other BD players, DOE observed an average power consumption decrease for TV1 of 21.2% (Table 2). Table 3 shows another TV from manufacturer A, TV2, that also entered the proprietary picture setting when using BD player A, but the power consumption of TV2 was on average 29.7% higher than when using the other BD players. When the picture setting was changed to the standard picture setting seen with the other BD players, the power consumption of TV2 decreased to a value similar to the other players (Table 4). DOE tested both TV1 and TV2 with four BD players made by other manufacturers and did not observe any changes to the picture setting or power consumption. To prevent such interaction between the TV and BD player, DOE is proposing that all TVs shall be tested with a BD player of a different manufacturer than the TV. For example, Manufacturer A's TV may be tested with any BD player other than one manufactured by Manufacturer A.

Additionally, DOE believes that the video input device may interact with the TV in standby modes as well as in on mode. To ensure that no data are transferred between the video input device and the TV, DOE proposes that all video input devices be disconnected from the TV during standby-passive mode and standby-active, low mode testing. DOE requests comment from interested parties on the proposed additional specifications for video input devices (See Section III.E.**Error! Reference source not found.**).

Table 1: TV1 Manufacturer A On Mode Power Consumption Measured with Five BD Players

TV1 - Manufacturer A	Blu-ray Disc Player Manufacturer				
	A	B	C	D	E
Default picture setting	Proprietary	Standard	Standard	Standard	Standard
Power Consumption (W)	50.72	50.72	51.95	51.99	50.82

Table 2: TV1 Manufacturer A On Mode Power Consumption in Standard Picture Setting

TV1 - Manufacturer A	Blu-ray Disc Player Manufacturer				
	A	B	C	D	E
Power Consumption (W)	40.46	50.72	51.95	51.99	50.82

Table 3: TV2 Manufacturer A On Mode Power Consumption Meaured with Five BD Players

TV2 - Manufacturer A	Blu-ray Disc Player Manufacturer				
	A	B	C	D	E
Default picture	Proprietary	Standard	Standard	Standard	Standard

setting					
Power Consumption (W)	273.5	212.9	209.1	209.9	211.9

Table 4: TV2 Manufacturer A On Mode Power Consumption in Standard Picture Setting

TV2 - Manufacturer A	Blu-ray Disc Player Manufacturer				
	A	B	C	D	E
Power Consumption (W)	209.8	212.9	209.1	209.9	211.9

6.Stabilization

In the January 2012 NOPR, DOE proposed section 5.2 (Warm-up), which included warming up the TV using the IEC 62087 Ed. 3.0 dynamic broadcast-content video signal. 77 FR 2830, 2842−43. In response to this proposal, interested parties indicated that DOE should reference IEC 62087 Ed. 3.0 for stabilization criteria. While Panasonic is in favor of the 2 percent stabilization criteria proposed in the NOPR, they recommended that DOE adopt the stabilization criteria used by IEC 62087 Ed 3.0. This allows the stabilization period to end once the TV has reached the 2 percent stabilization criteria, rather than the mandatory 1 hour period proposed in the January 2012 NOPR for all TVs. (Panasonic, No. 50 at p. 2) Sharp indicated that IEC 62087 Ed. 3.0 should be used for stabilization criteria. (Sharp, No. 45 at p. 3)

DOE believes that it is appropriate to incorporate IEC 62087 Ed. 3.0 Section 11.4.2 (Stabilization) by reference, since it is similar to section 5.2 (Warm-up) which DOE proposed in the January 2012 NOPR. 77 FR 2830, 2842−43. The specifications in IEC 62087 Ed. 3.0 ensure that the TV reaches stabilization, as proposed in the January 2012 NOPR, but it may reduce test time if a TV stabilizes in less than an hour. For this reason, DOE proposes to remove section 5.2 (Warm-up) as proposed in the January 2012 NOPR and replace it with a revised section 5.2 (Stabilization) of Appendix H to subpart B of 10 CFR part 430, which incorporates by reference section 11.4.2 (Stabilization) of IEC 62087 Ed. 3.0. DOE requests comment from interested parties on incorporating by reference the stabilization requirements in section 11.4.2 of IEC 62087 Ed. 3.0 (Section V.B.12).

Additionally, DOE would like to provide guidance for stabilization specifications incorporated from IEC 62087. DOE proposes that the TV stabilization shall be performed in the "default picture setting" and all TVs shipped with the ABC sensor enabled by default shall be stabilized with the ABC sensor enabled. The TV settings are configured in the same manner for on mode testing as they are for the stabilization, in order to decrease the risk that other settings may be modified when enabling or disabling functions or settings. DOE also proposes that at least 300 lux of light shall enter the TV ABC sensor during the stabilization period, allowing the sensor to remain active and engaged. A light level of at least 300 lux shall be applied in accordance with section 5.5 of Appendix H. DOE believes that the TV should be stabilized under the same conditions used during on mode testing. DOE would like to ensure that the TV settings remain in the default picture setting throughout testing. DOE requests comment from interested parties on (1) stabilizing the TV in the default picture setting and (2) stabilizing the TV

with the ABC sensor enabled and 300 lux entering the sensor, when the ABC sensor is enabled by default (See Section V.B.14).

7.Test Order

In the January 2012 NOPR, DOE proposed conducting testing in the following order: luminance, on mode, standby mode, and off mode. 77 FR 2830, 2841−42. DOE proposed testing luminance before on mode since "brightest selectable preset picture setting" could have been interpreted as the retail mode from the forced menu, using the definitions in the January 2012 NOPR. Thus, if the on mode test is performed before luminance testing, some TVs may not be capable of being placed into the "retail picture setting" for luminance testing once the TV has been placed in the "home picture setting". To address this potential issue, DOE proposed testing luminance prior to on mode in the January 2012 NOPR.77 FR 2830.

NEEA supported DOE's proposal to test luminance before testing on mode. (NEEA, No. 43 at p. 3) Panasonic urged DOE to place the luminance test after the on mode test as the on mode test may not be as repeatable when it does not immediately follow the stabilization period. (Panasonic, No. 50 at p. 3) Panasonic indicated that if a TV could not switch back to the "retail picture setting" after being in "home picture setting" a revised test procedure could be used that includes an additional stabilization period between the luminance and on mode tests to ensure that it is repeatable. (Panasonic, No. 50 at p. 3) Sharp noted that changing the order of luminance testing might require double testing for products that need to be tested with IEC 62087 Ed. 3.0. (Sharp, No. 45 at p. 3)

As discussed earlier, DOE is proposing to add the defined term "brightest selectable preset picture setting" and remove the definition of "retail picture setting", initially proposed in the January 2012 NOPR. Since the "brightest selectable preset picture setting" can be readily accessed within the home mode from a forced menu, DOE is proposing to revise the test order to the following: on mode, luminance, standby mode, and off mode. This is consistent with the comments received from Panasonic and Sharp and is also consistent with the current test order specified by IEC 62087 Ed. 3.0 and ENERGY STAR v. 6.0. DOE requests comment from interested parties regarding the proposed change to the testing order (Section V.B.12).

The January 2012 NOPR proposed that the luminance test be performed immediately following the initial warm-up period. MEVSA agreed with DOE's proposed warm-up period but suggested that DOE clarify what was meant by "immediately after the warm-up period" to measure the luminance (MEVSA, No. 44 at p. 6). Panasonic suggested that an additional 10 minute warm-up period is needed before each luminance measurement (Panasonic, No. 50 at p. 3). Today's SNOPR proposes that the on mode test follow the initial stabilization period with the luminance test conducted immediately following the on mode test. As discussed in the stabilization section of the SNOPR (Section III.E.5), DOE is proposing to incorporate by reference the requirements in section 11.4.2 (Stabilization) of IEC 62087 Ed. 3.0, which states that the luminance measurement should occur "before the activation of any image retention prevention features". Prior to the January 2012 NOPR, DOE found that stabilizing the TV for any length of time resulted in activation of anti-image retention features and therefore proposed

in the January 2012 NOPR that the screen luminance be measured immediately after the TV is warmed-up[13]. Based on a comment received from MEVSA, DOE has revised section 5.5.1 (Luminance Test) in Appendix H to clarify that the luminance test be conducted immediately following the on mode test and the screen shall not be allowed to stabilize. This clarification aligns with the stabilization language incorporated from section 11.5 of IEC 62087 Ed 3.0 which states that measurements "shall be made before the activation of image retention prevention features". DOE requests comment from interested parties on the transition between the on mode power consumption test and the luminance test (Section V.B.16).

F. Automatic Brightness Control Test Set-up

1. General

In the January 2012 NOPR, DOE proposed incorporating a test procedure for TVs with ABC enabled by default. 77 FR 2850. NEEA agreed that TVs with ABC enabled by default should be tested differently than TVs without ABC or without ABC enabled by default. (NEEA No. 8 at p. 4) Appliance Standards Awareness Project (ASAP) supported a robust test procedure that captures the effect of ABC on energy consumption for TVs with ABC enabled by default. (ASAP No. 1 at p. 1) Based on interested party feedback, DOE has maintained its initial proposal to incorporate a test procedure for TVs with ABC enabled by default in today's SNOPR but wishes to modify the specification of this procedure to make it more repeatable and reproducible.

[13] Television Luminance Stabilization Period Data. This material is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.

2.Set-up for Generating and Measuring Illuminance

a. Direct Light Source

In the January 2012 NOPR, DOE proposed to evaluate ABC sensor response by directing light from a halogen incandescent lamp into the TV's ABC sensor. 77 FR 2853-54. NEEA supported using a direct light source to generate the illuminance values, as diffused light may not be repeatable. (NEEA No. 9 at p. 5) PG&E agreed with using a direct light source but recommended allowing different lighting types. (PG&E No. 5 at p. 4) Panasonic supported creating illuminance with a direct light source. (Panasonic No. 9 at p. 7) Sharp agreed that halogen incandescent is a proper lamp for ABC testing. (Sharp No. 8 at p. 6) Sharp further suggested directing light into the ABC sensor at an angle that results in the maximum power consumption. (Sharp No. 8 at p. 6) Additionally, National Resource Defense Council (NRDC) recommended that DOE provide clear guidance on how to create the illuminance values. (NRDC, No. 2 at p. 4) While DOE has maintained its proposal to generate illuminance values using a direct light source, DOE proposes to clarify the light source set-up in response to stakeholder comment.

Neither IEC 62087 Ed. 3.0 nor ENERGY STAR v. 5.3[14] specifies the particular location of the light source with respect to the TV and ABC sensor. DOE recognizes that there are many ways to create direct illuminance and therefore believes that specifying the exact location of the light source will provide a more repeatable test procedure. DOE evaluated two methods for

[14]ENERGY STAR v. 6.0 references the January 2012 NOPR, therefore ENERGY STAR v. 5.3 is being referenced.

directly illuminating the ABC sensor; a "distance" test set-up and an "adjacent" test set-up. DOE evaluated both of these methods to determine the effect of distance between the light source and ABC sensor and the impact of lamp set-up on TV performance and repeatability. The evaluation consisted of a round robin where four labs performed testing with each method on eight different TVs[15]. Based on this evaluation, DOE is proposing the method outlined by the "distance" test set-up. DOE further explains both test set-ups below, and the results obtained from each.

The "distance" test set-up requires only a light source that is placed at a distance of 5 feet (± 3 inches) from the center of the ABC sensor. The center of the lamp is aligned at the same height as the center of the ABC sensor with respect to the floor, resulting in a perpendicular angle with respect to the center of the sensor. All four corners of the TV face are equidistant from a vertical reference wall (e.g., fixed position room wall). The light source is positioned ensuring the center focal point of the lamp is perpendicular to the center of the ABC sensor, and the vertical reference wall. A side view of the "distance" test set-up is shown in Figure 3; a bird's eye view of the "distance" test set-up is shown in Figure 4.

[15] Round Robin Test Report. This report is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.

Figure 3. "Distance" Test Set-up (side view)

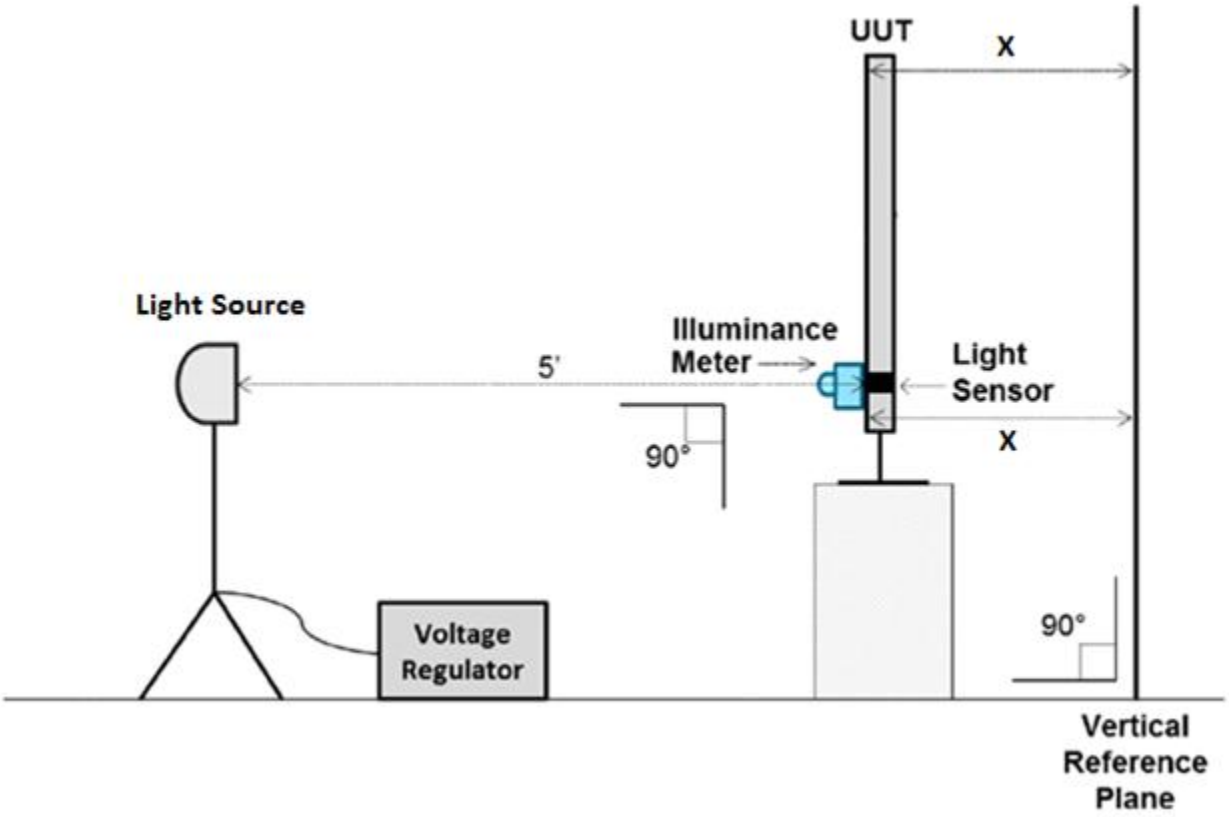
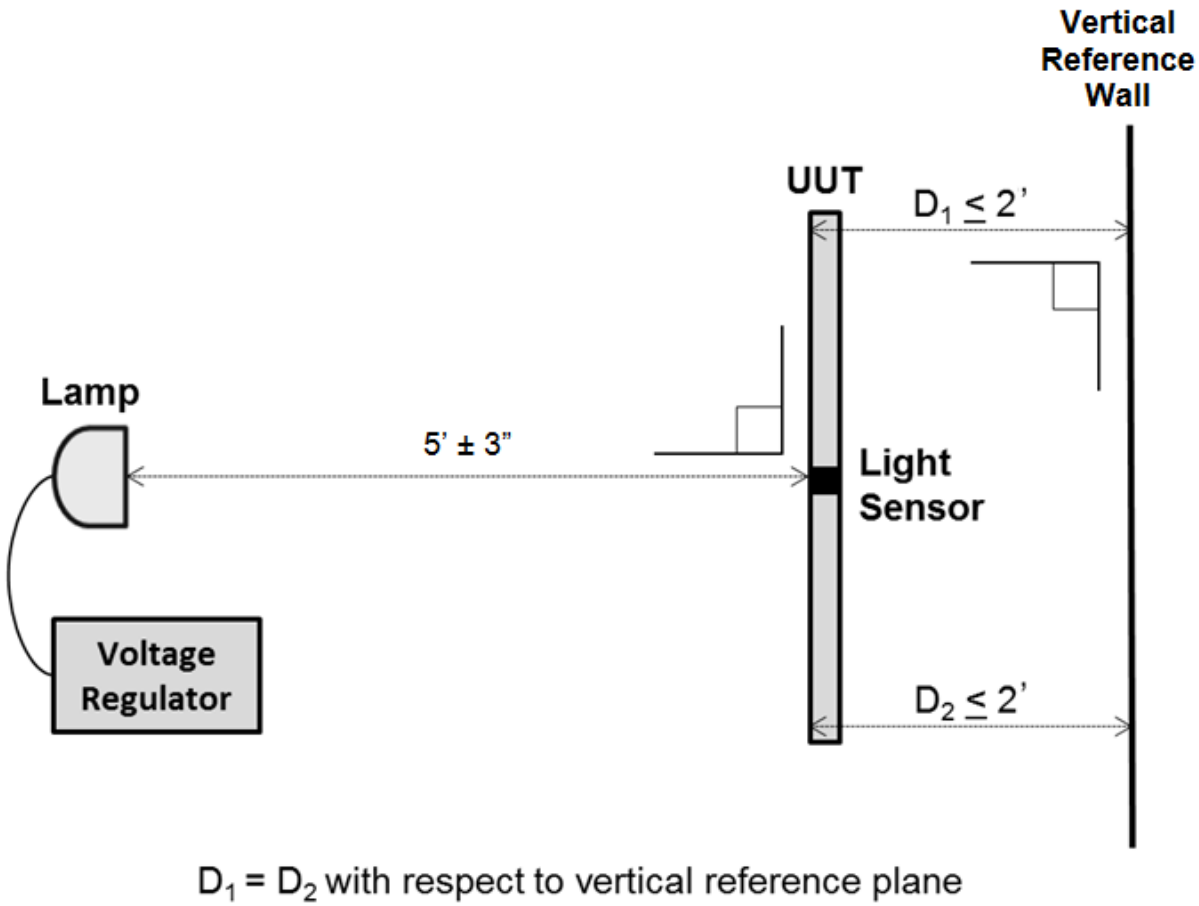
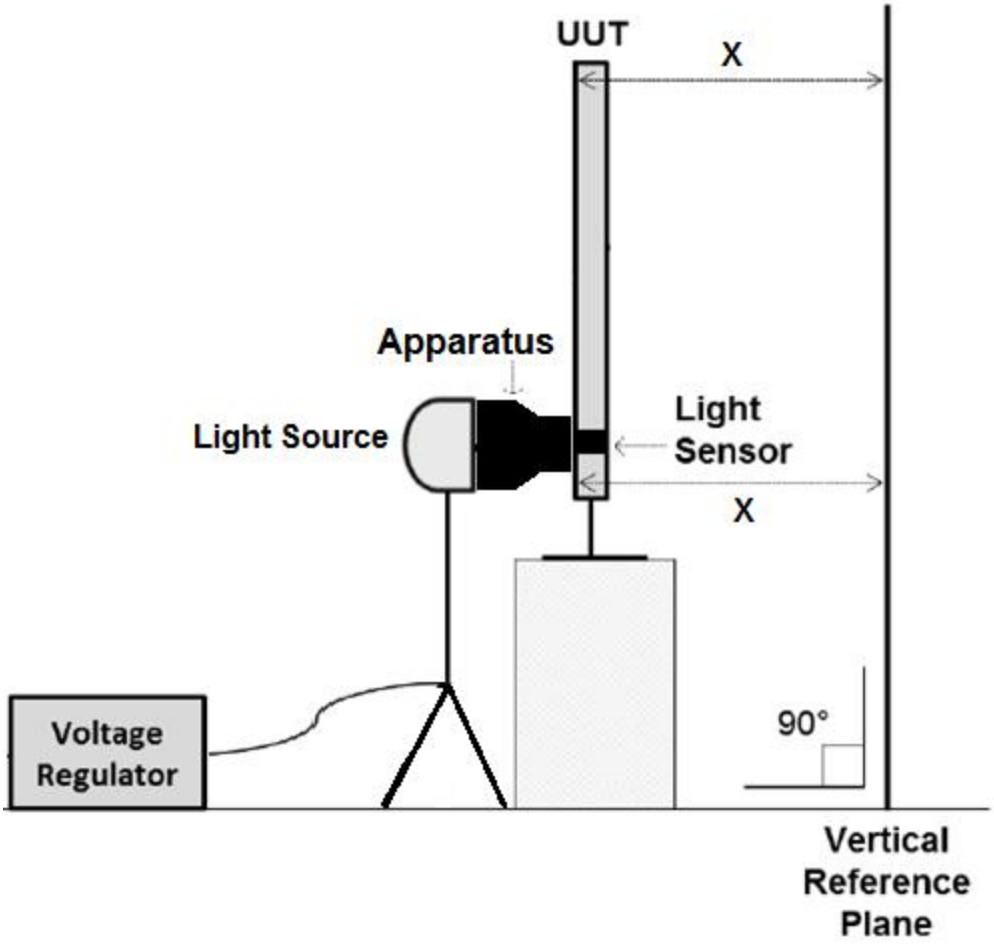


Figure 4. —Distance Test Set-up (birds eye view)



The "adjacent" test set-up requires a lamp and a cylindrical apparatus with a diameter at one end large enough to fit completely around the lamp and a diameter at the other end of 2 inches. The light source is secured flush against the large diameter end of the apparatus so that no light escapes between the lamp and apparatus. The 2 inch diameter end of the apparatus is then placed flush against the bezel of the TV, completely covering the ABC sensor. The center of the lamp is aligned at the same height as the center of the ABC sensor with respect to the floor, resulting in a perpendicular angle with respect to the center of the sensor. The "adjacent" test set-up is shown in Figure 4.

Figure 3. "Adjacent" Test Set-up



In the January 2012 NOPR DOE proposed using a 100 W halogen incandescent lamp to create illuminance values. While no stakeholders expressed objection to the proposed 100 W halogen incandescent lamp, DOE now has an incandescent reflector lamp efficacy standard in place[16], which affects the halogen incandescent lamp specified in the January 2012 NOPR. As part of this standard, 100W halogen incandescent lamps will be phased out and replaced by

[16]Energy conversation standards for Incandescent Relector Lamps. 77 FR 4203. January 31, 2013. http://www.regulations.gov/#!documentDetail;D=DOE-HQ-2012-0001-0039

higher efficacy lamps. To accommodate these lighting standards, DOE is proposing to use a standard spectrum halogen parabolic aluminized reflector (PAR) short neck lampwith a rated light output of 1000 lumens (± 5 percent). Specifying lumens allows for lamps with a range of wattages to be used for testing, ensuring that lamps meeting the above requirements can be easily obtained. Standard spectrum is any incandescent reflector lamp that does not meet the definition of modified spectrum as defined in 10 CFR 430.2. DOE's proposal allows for lamp efficacy to improve, while retaining the brightness necessary to perform ABC testing on TVs.

b. Lamp Specifications

Both the "distance" and "adjacent" test set-up discussed in the previous section utilized a 1000 lumen PAR 30S halogen incandescent lamp in the round robin testing instead of a 100 W lamp. For both set-ups, target illuminance values are obtained by varying the light source input voltage, with the illuminance measured at the ABC sensor. To compare these test set-ups, DOE conducted round robin testing on eight different TV models at four separate test labs to determine the repeatability and reproducibility of both test set-ups. Each lab tested all eight TVs[17] a total of six times, three times using the "distance" test set-up and three times using the "adjacent" test set-up. Each test comprised measurements taken at multiple illuminance values ranging from 0 to 300 lux.

[17]One TV was tested at only three labs as it sustained damage during set-up, prior to testing, at the final lab; DOE did not test this TV since it was not clear how the damage may have affected the TV's performance.

Analysis of the round robin testing results indicates that the "distance" test set-up provides more repeatable results at the target illuminance values[18]. For this testing DOE selected illuminance values at 0, 10, 12, 35, 50, 75, 100 and 300 lux to test a wide range of values. The power consumption coefficient of variation at each target illuminance value is lower for the "distance" test set-up when comparing results from all four labs for each TV tested. Results also show that TVs exhibit maximum power consumption (saturate) at significantly lower illuminance values, in some cases below 35 lux, with the "adjacent" test set-up. DOE does not believe ABC sensor saturation at these illuminance values are representative of actual operation.

c. Infrared Light

During round robin testing, DOE observed different power consumption values for the "distance" and "adjacent" test set-ups when testing at the same illuminance values. To further understand this concept, DOE conducted an investigation which evaluated light intensity as a function of wavelength at multiple illuminance values using the "distance" set-up. The "distance" test set-up requires a greater light intensity output compared to the "adjacent" set-up to compensate for the increased distance from the ABC sensor. Results show that the ratio of infrared (IR) to visible light increased significantly as illuminance values decreased, especially at illuminance values less than 35 lux[19]. To further evaluate the impact of IR on ABC sensor response, DOE used the "distance" test set-up to evaluate the power consumption on multiple TVs while placing a 67 millimeter (mm) diameter IR and ultraviolet (UV) blocking filter over

[18]Round Robin Test Report. This report is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.

[19]IR/ND Filter Test Results. This report is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.

the ABC sensor. DOE then compared power consumption results obtained with the IR/UV blocking filter to the round robin results to better understand how IR and UV light may impact TV sensor response. Results show decreased power consumption when testing with the IR/UV blocking filter regardless of TV or illuminance values[20]. As a lamp is dimmed to simulate lower illuminance values, the IR to visible spectrum ratio is altered and the sensor receives more IR light that may result in higher power consumption. The LMD does not register the increased IR level. The "adjacent" test set-up most likely resulted in higher power consumption due to the increased amount of IR caused by substantially dimming the lamp. Therefore, DOE is proposing to use an IR/UV blocking filter to remove the IR entering the ABC sensor.

DOE is proposing to use a 67 mm diameter IR/UV blocking filter because it is a common size used in photography and can be easily obtained. DOE is proposing to place the filter directly in front of the ABC sensor because it provides a safer, simpler, more repeatable method. Although DOE is proposing to use an IR/UV filter placed in front of the TV's sensor during ABC on mode testing with the "distance" test set-up, DOE is also considering using this test set-up without an IR/UV filter.

d. Summary of Test Set-up

In summary, DOE performed round robin testing to evaluate the repeatability of two test set-ups for specifying the location of the light source in response to interested party feedback requesting detailed instructions on how to generate direct illuminance values. Results show that

[20] Id.

the “distance” test set-up is more repeatable than the “adjacent” test set-up. Additional testing using an IR/UV blocking filter, with the “distance” test set-up resulted in more realistic ABC sensor responses than when no filter was used. Based on interested party feedback and recent test results, DOE is proposing the following set up requirements for determining on mode power consumption for TVs with ABC enabled by default: (1) light source shall be a standard spectrum halogen PAR short neck lampwith a rated brightness of 1000 lumens (± 5 percent); (2) lamp assembly shall be set-up using the “distance” test set-up (Figure 3), with the lamp 5 feet (± 3 inches) from the sensor and the center focal point of the lamp perpendicular to the center of the ABC sensor; (3) each corner of the TV face shall be aligned equidistant to a vertical reference wall; (4) all illuminance measurements shall be taken at the ABC sensor; and (5) a 67 mm diameter IR/UV blocking filter shall be placed in front of the ABC sensor in a way that allows no unfiltered light to pass into the sensor during testing. The full round robin test report and additional testing data are provided on regulations.gov

DOE requests comment from interested parties on each of the five proposed test set-up specifications for determining on mode power consumption for TVs with ABC enabled by default (Section V.B.17).

3.Test Illuminance Values

In the January 2012 NOPR, DOE proposed testing TVs with ABC enabled by default at four distinct illuminance values: 10, 50, 100, and 300 lux. 77 FR 2850-52. ASAP, CEA, MEVSA, NEEA, NRDC, PG&E, and Sharp all agreed that testing should be performed at multiple illuminance values and also proposed specific values at which testing should be done.

ASAP supported testing at four different illuminance values, in particular at both 50 and 100 lux. (ASAP No. 1 at p. 1) Sharp suggested illuminance values of 0, 12, 35, and 300 lux and stated that no testing should be performed at an illuminance level near 100 lux as manufacturers may dim brightness above 100 lux, potentially leading consumers to disable ABC. (Sharp No. 8 at p. 4) NEEA supported DOE's proposed illuminance values of 10, 50, 100, and 300 lux but would prefer testing at 150 lux instead of 100 lux, as 150 lux would act as a better saturation point. (NEEA No. 8 at p. 5-6) NRDC also preferred testing at 150 lux instead of 100 lux. (NRDC No. 2 at p. 3) MEVSA recommended levels of 0, 12, and 300 lux, as "23% of viewership occurs between 0 lux and 6 lux, 70% between 6 and 156 lux, and 7% greater than 156 lux." (MEVSA No. 5 at p. 7) PG&E suggested setting illuminance values at 5, 15, 45, and 135 lux. (PG&E No. 5 at p. 4) Panasonic provided a prioritized list of illuminance values for testing as follows: (1) 0 and 300 lux; (2) 0, 12, and 300 lux; (3) 0, 35, and 300 lux; (4) 0, 12, 35, and 300 lux. (Panasonic No. 8 at p. 5)

In response to the January 2012 NOPR, CEA recommended that the illuminance values for testing should be 0, 12, and 300 lux, with the possibility of an additional point at 35 lux. (CEA No. 5 at p. 5)While multiple interested parties recommended testing at 0 lux, an ambient lighting level of 0 lux is impossible to achieve in practice and is typically achieved in the lab by covering the ABC sensor during testing. NEEA commented that a 0 lux value does not add value to this test since it is not representative of real world conditions. (NEEA, No.43 at p.4) ASAP also stated that a 0 lux illuminance value is not representative of real world conditions, but that a value under 10 lux may be appropriate. (ASAP, No.46 at p.2) DOE agrees and believes that an

illuminance value just above 0 lux should be tested to measure the lowest possible power consumption with ABC enabled and is therefore proposing to test at 3 lux. DOE feels that it is necessary to have another low illuminance value due to the high viewership that takes place under low illuminance conditions. As such, DOE is proposing to also test at 12 lux, which aligns with many industry advocates including CEA, MEVSA, Panasonic and Sharp. (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 proposed testing at the 10 lux value in the January 2012 NOPR; however, since round robin results indicate little difference between power consumption at 10 and 12 lux[21], and 12 lux aligns with interested parties' recommendations, DOE is proposing 12 lux in today's SNOPR.

Additionally DOE is proposing 100 lux as a maximum illuminance value. DOE proposed both 150 and 300 lux in the January 2012 NOPR. However, based on DOE's round robin testing[22], stakeholder feedback to the NOPR, and data from reports like the Collaborative Labeling and Appliance Standards Program (CLASP) study[23], DOE no longer feels that 150 or 300 are appropriate test values. The CLASP study indicates that the majority of TV viewership occurs when ambient light conditions are between 0 and 100 lux at the ABC sensor and that most TVs reach saturation near the 100 lux value. Testing at 100 lux is also supported by ASAP. (ASAP, No. 46 at p. 1) The CLASP study also reports that 76 percent of viewing occurs at room

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[21] Round Robin Test Report. This report is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.
[22] Id.

[23]Jones, Keith. *Further Analysis of Background Lighting Levels during Television Viewing*. CLASP. March, 29, 2012. http://www.clasponline.org/en/ResourcesTools/Resources/StandardsLabelingResourceLibrary/2012/Further-Analysis-Background-Lighting-Levels

illuminance values less than or equal to 50 lux[24]. DOE believes that it is important to have an additional illuminance value between 12 and 50 and is therefore proposing to test at 35 lux. CEA, MEVSA, Panasonic, and Sharp all provided comments supporting 35 lux as an illuminance test value. (CEA, No. 47 at p. 5; MEVSA, No. 44 at p. 7; Panasonic, No. 50 at p. 5; Sharp, No. 45 at p. 4) Therefore, DOE is proposing to determine on mode power consumption for TVs with ABC enabled by default at 3 ± 1, 12 ± 1, 35 ± 2, and 100 ± 5 lux.

DOE is also proposing to measure illuminance from the brightest value to the dimmest value. The TV will already be warmed up at brighter levels and specifying the test order will ensure test repeatability. DOE seeks comment from interested parties on the proposed illuminance values and the order in which the values are tested (Section V.B.18).

DOE originally selected the 0 lux illuminance value because it could be easily simulated by completely blocking the sensor. Now that DOE is proposing a 3 lux illuminance point, there may be some measurement equipment accuracy concerns for stakeholders because this 3 lux value is so low. To mitigate some of these concerns for stakeholders, DOE is proposing to allow the 3 lux illuminance value to be simulated with a neutral density (ND) filter. ND filters work by uniformly reducing the light intensity entering the ABC sensor across the full spectrum (both visible and invisible). For example, 12 lux could be measured at the ABC sensor, but when a 2-stop ND filter is placed in front of the sensor, 75% of the light is blocked and the sensor would

[24]Id.

read 3 lux. This approach was created for labs that may not have illuminance meters capable of accurately reading 3 lux. An ND filter is not required for ABC testing, but may be used to simulate the 3 lux value.

DOE performed testing to verify that similar power consumption values are measured whether or not an ND filter is used when testing at 3 lux. DOE observed that the power consumption in some TVs decreased by as much as 12 percent[25] with the use of an ND filter compared to testing without a filter. DOE believes that by dimming a lamp from 12 lux to 3 lux, the IR to visible spectrum ratio increases and the ABC sensor interprets that it is receiving more visible light than it actually receives. Even though the ND filter is blocking 75% of the light, it does so uniformly across all wavelengths, allowing IR to pass through the filter. To verify this theory, DOE tested ND filters in conjunction with the IR/UV blocking filter and compared the results to testing at 3 lux with the IR/UV blocking filter only. DOE observed a difference of less than 1 percent for all cases and therefore believes that using both filters together would be preferable[26].

In addition, DOE evaluated illuminance meters that are currently available on the market and found that with the accuracy specified in section 3.1.3 (Light Measurement Device) of the proposed test procedure, LMDs should have the tolerance to accurately measure 3 lux. Although

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[25]IR/ND Filter Test Results. This report is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.

[26] Id.

DOE believes that the LMD accuracy specifications are sufficient to accurately measure 3 lux at the ABC sensor, DOE is proposing to allow the option to use a ND filter to obtain 3 lux at the sensor provided that DOE moves forward with its proposal to also require the use of an IR/UV blocking filter. DOE notes that it is only proposing to allow an ND filter when also using an IR/UV blocking filter. DOE seeks comment from interested parties on the use of a ND filter (section V.B.19).

4.Illuminance Weighting Scale

In the January 2012 NOPR, DOE discussed combining the power consumption measured at the four illuminance values using a weighted average, with equal weighting factors to determine ABC power consumption for TVs with ABC enabled by default. 77 FR 2854. DOE ultimately decided not to propose a specific weighting approach in the January 2012 NOPR and requested additional feedback from interested parties.

Sharp, NRDC, and ASAP all agreed with assigning equal weight to the power consumption at each illuminance value. (Sharp No. 45 at p. 6; NRDC No. 40 at p. 3; ASAP No. 46 at p. 2) NEEA preferred that power consumption be reported for each of the four illuminance values instead of reporting an average. However, NEEA suggested weightings of 33 percent, 33 percent, 17 percent, and 17 percent for each of the illuminance values, respectively, if a weighting system were used. (NEEA No. 8 at p. 4-5) Panasonic commented that the higher illuminance values should be weighted less, as viewership occurs less at those levels. (Panasonic No. 8 at p. 5-6) Given that 76 percent of viewership occurs at or below 50 lux, DOE believes that the three lower illuminance values proposed (3, 12, and 35 lux) should comprise the majority of

the overall power consumption average. Based on interested party feedback, DOE is proposing to weight each illuminance value equally when calculating a TV's overall power consumption. DOE requests comment from interested parties on equally weighting the illuminance values to determine on mode power consumption for TVs with ABC enabled by default (Section V.B.20).

G.Standby Modes

1.Standby-Passive Mode

In comments to the January 2012 NOPR, NRDC expressed concerns with "quick start" options that may be available on some TVs. NRDC suggested that DOE require network-capable TVs be attached to a live internet connection with "quick start" features enabled and power consumption measured over 15 minutes. (NRDC, No. 40 at p. 4-5) While DOE understands that there may be an increase in power consumption associated with this feature, DOE does not believe the TV needs to be connected to a network for this feature to be active. The additional power consumed is most likely keeping components active to reduce the latency of powering on the TV, rather than downloading content. In addition, DOE believes that "quick start"-type functions would be classified as "special functions". As discussed in Section III.D.2, DOE proposes to incorporate the definition for "special functions" from IEC 62087 Ed. 3.0 by reference, where "special functions" shall remain enabled during testing if they are enabled by default (i.e., if they are enabled as-shipped). As such, functions such as "quick start" would be tested in the standby-passive mode or standby-active, low test (as proposed below) if they are

enabled as-shipped. DOE requests comment from interested parties on testing "quick start" functionality, and if it is adequately covered under the proposed test procedure (Section V.B.21).

2.Standby-Active, Low Mode

In the January 2012 NOPR, DOE discussed potentially testing standby while connected to a network, as standby-active, low mode. DOE ultimately decided not to propose this test in the January 2012 NOPR because testing revealed little to no increase in power consumption when the TV was connected to a network input (e.g. Wi-Fi or Ethernet)[27]. However, the ENERGY STAR v. 6.0 TV specifications incorporates a test for standby-active, low mode. To ensure testing consistency between voluntary and State programs applicable to TVs, DOE reconsidered including the standby-active, low mode into its TV test procedure.

In today's SNOPR, DOE is proposing to incorporate the ENERGY STAR v. 6.0 standby-active, low mode test into the DOE test procedure. DOE expects the market share of network-capable TVs to grow[28], and believes that additional features will be introduced that will increase power consumption in standby-active, low mode. DOE wants to ensure that this increased power consumption is captured during testing. A standby-active, low mode test will measure the power consumption associated with a TV's network capabilities with no data transfer. While this

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[27] Television Internet Standby Data. This material is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.

[28] Connected TV Shipments to Exceed 138 Million Units in 2015. DisplaySearch. July 5, 2011. http://www.displaysearch.com/cps/rde/xchg/displaysearch/hs.xsl/110705_connected_tv_shipments_to_exceed_138_million_units_in_2015.asp

proposed test requires a local area network (LAN) connection, there is no data exchange to and from the TV, so no LAN connection specifications are necessary.

DOE also proposes that standby-active, low mode is tested using a hierarchy of network inputs, as follows: Wi-Fi, Ethernet (if the TV supports an Energy Efficient Ethernet, it shall be tested using that connection), Coax, RJ11 and other. DOE believes that using the aforementioned hierarchy will increase testing repeatability and reproducibility by ensuring that a network-capable TV is tested using the same network connection regardless of who is administering the test. The addition of this test is expected to increase the overall test time by approximately 40 minutes, 30 minutes for stabilizing the TV while in the standby-active, low mode and 10 minutes for measuring the power consumption. The proposed additional testing will add approximately 17 percent to the testing time assuming that each test (on mode, standby-passive mode, standby-active, low mode, and luminance) takes approximately 10 minutes to perform. DOE does not believe that this test adds a significant amount of test burden compared to the entire test procedure proposed for TVs. Including a test to measure the energy consumption associated with standby-active, low mode would allow consumers to understand the increased cost and energy consumption associated with the TV while it is in that mode. Furthermore, including a standby-active, low mode test as part of the TV test procedure will ensure a consistent test set-up that other programs, such as ENERGY STAR, can reference. For these reasons, DOE is proposing to add section 5.6.2 (Standby-Active, Low Mode Test) to Appendix H to subpart B of 10 CFR part 430 to include a standby-active, low mode test that requires the TV be connected to a LAN input while the TV is in standby mode. DOE requests comment from interested parties on the addition

of a standby-active, low mode power measurement test in addition to the proposed network hierarchy (Section V.B.22).

3.Standby-Active, High Mode

In the January 2012 NOPR, DOE incorporated several definitions from IEC 62087 Ed. 2.0, including standby-active, high mode. This mode is defined as a period when the TV provides neither audio nor video output, may be switched into another mode by a user initiated input, and is actively exchanging data with an external source. DOE also proposed to adopt the "CEA Procedure for testing DAM: For TVs" (CEA DAM test procedure)[29] to test standby-active, high mode. The CEA DAM test procedure includes two measurement methods: a "practical approach" and an "ideal approach." The practical approach measures the TV's instantaneous power while performing a download. To determine the daily energy consumption (DEC), the instantaneous power value is multiplied by the total duration over which the TV performs downloads in 24 hours. The download duration time must be provided by the manufacturer for each basic model. If a laboratory does not know the download duration time for a given model, the ideal approach must be performed. The ideal approach is a 24 hour test that cycles the TV on and off while measuring the instantaneous power for the entire duration and DEC is reported.

[29] CEA Procedure for DAM Testing: For TVs. (Last Accessed December 1, 2012) http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/television/CEA_DAM_Test_Procedure.pdf

PG&E voiced their support to include the CEA DAM test procedure, but indicated that DOE should clarify that all TVs require DAM testing. (PG&E, No. 46 at p. 5) Panasonic recommended that DOE should include the ENERGY STAR guidance document for the CEA DAM test procedure, which specifies that the test may be performed using the "practical approach". (Panasonic, No. 50 at p. 7)

While DOE proposed to include the CEA DAM test procedure in the January 2012 NOPR, further investigation has revealed that the DAM test requires significant manufacturer involvement during testing. First, laboratories must use a hardware module specific to the make and model of the TV under test. The hardware module must correspond to the preloaded software on the TV in order for data to be sent and received by the TV. It is impossible for the TV to enter into DAM without this external source; however, this approach is not explicitly stated in the CEA DAM test procedure. Second, each manufacturer must specify the workload the hardware module sends to the TV. The CEA DAM test procedure only states that the workload shall be “representative of frequent downloads”. Without a specific and consistent workload applied to all tested units, it is likely impossible to obtain a reliable evaluation of a TV’s performance in DAM that can be compared to other TVs available on the market.

DOE has also discovered that the CEA DAM test procedure may not be applicable for all network-capable TVs. The CEA DAM test procedure was originally designed to capture the energy associated with hospitality TVs. Hospitality TVs, as defined by ENERGY STAR v. 6.0, operate similarly to a set-top box and frequently receive updates while they are in standby mode. Hospitality TVs are different from many network-capable TVs in that they are designed to

communicate with a specific hardware module to update program guide information and download pay-per-view movies. As network-capable TVs have become more prevalent, energy advocates have supported DAM testing on all TVs. However, firmware and application updates, which are the most common downloads for network-capable TVs, are not typically included in the daily energy calculation under the CEA DAM test procedure because they are considered to be infrequent downloads. Section 4 of the CEA DAM test procedure states that if a total download duration is less than 24 hours in a one-year period, it is considered to be an infrequent download and it is not to be included in the daily energy calculation[30]. Finally, even if an internet download were to meet the CEA definition of a frequent download, DOE is not aware of a method for producing a consistent workload that can be used to evaluate all network-capable TVs.

Accordingly, DOE is proposing to remove the reference to the CEA DAM test procedure in today's SNOPR. As discussed above, there are currently no accepted approaches for producing a consistent network workload that could be used to evaluate and compare the power consumption of all TVs when in standby-active, high mode. Therefore, DOE does not plan to specify a test procedure for determining TV power consumption in standby-active, high mode at this time. However, DOE will maintain the proposed definition for standby-active, high mode in section 2.14 (Standby-Active, High Mode) of Appendix H to subpart B of 10 CFR part 430 to help distinguish between all TV standby modes. DOE requests comment from interested parties

[30] Id.

on the removal of the CEA DAM test procedure, while maintaining a definition for standby-active, high mode (Section V.B. 23).

H.Energy Efficiency Metrics for Televisions

In the January 2012 NOPR, DOE proposed multiple output metrics. These metrics included luminance ratio, on mode power consumption, standby mode power consumption, and off mode power consumption. In addition to proposing multiple output metrics, DOE also requested comment on the energy efficiency metrics in general and, more specifically, including the use of an annual energy consumption metric. 77 FR 2830, 2859. In today's SNOPR, DOE maintains its proposal from the January 2012 NOPR to include metrics for luminace ratio, on mode power consumption and standby mode power consumption, and also proposes a metric to estimate the annual energy consumption.

1. Multiple Output Metrics

CEC, NEEA, NRDC, MEVSA, PG&E, Sharp and Panasonic all indicated that reporting individual metrics is critical. MEVSA commented that a single metric would not be helpful and it would force changes elsewhere in the industry. (MEVSA, No. 44 at p. 7) PG&E urged DOE to require separate power consumption outputs and not a single metric. (PG&E, No. 46 at p. 5) Sharp noted that a single metric would be helpful but reporting on individual modes is critical. (Sharp, No. 45 at p. 7) Panasonic urged for reporting individual metrics. (Panasonic, No. 50 at p. 7) NEEA suggested that the output of the test procedure should be the average power (in watts) of each mode tested. (NEEA, No. 43 at p. 7) NRDC also recommended that the test procedure

output the power values in each mode rather than a combined metric. This would allow other policy makers to determine which metrics to include in a calculation of total energy consumption. (NRDC, No. 40 at p. 1) Given interested party feedback, DOE is maintaining multiple output metrics in the test procedure but is proposing that the standby mode power consumption metric be separated into two output metrics: standby-passive mode and standby-active, low mode. DOE also proposes to include an additional metric to the test procedure for calculating annual energy consumption, discussed in Section **Error! Reference source not found.** below.

DOE received additional comments pertaining to the output metrics in general. NRDC noted that the test procedure should output the on mode power consumption associated with both two and three dimensional (2D and 3D, respectively) pictures and allow policy makers to determine how these values would be utilized. (NRDC, No. 40 at p. 6) PG&E voiced their support for DOE to include a power factor measurement as part of the output metric. (PG&E, No. 46 at p. 5) NEEA suggested that the test procedure require reporting the power consumption at each illuminance level, in addition to annual kilowatt-hours. (NEEA, No. 43 at p. 5) NEEA stated that "the use of the power values (in watts) from the television test procedure, while the minimum efficiency ratings are specified in annual kilowatt-hours, would effectively be no different." (NEEA, No. 43 at p. 7)

DOE is proposing to require the following output metrics in the test procedure: luminance ratio, on mode power consumption (watts), standby-passive mode power consumption (watts), standby-active, low mode power consumption (watts), and power factor during testing.

DOE is not proposing to include a 3D metric because it does not currently intend to include a 3D on mode power consumption test in the test procedure. DOE is also not proposing to report the power consumption at each illuminance value. DOE feels that it may be confusing for consumers if power consumption was reported at each illuminance. Therefore, DOE believes that it is sufficient to only report the on mode power consumption as a calculated value for TVs with ABC enabled by default.

2. Annual Energy Consumption

In addition to the metric outputs discussed above, DOE is proposing to include an annual energy consumption (AEC) metric, calculated from the test procedure values for on mode, standby modes and off mode power consumption. The AEC uses standard TV viewing hours over a 24 hour period and extrapolates to a yearly kilowatt-hour value. A standard approach for calculating AEC will harmonize different voluntary, incentive, and State programs applicable to TVs.

The proposed equation to calculate annual energy consumption (kWh/year) is:

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

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

In the January 2012 NOPR, DOE considered using a similar metric which weighted 7 hours for on mode (typical TV viewing hours represented by H_{on}), 17 hours for standby-passive mode ($H_{standby\text{-}passive}$), and 0 hours for Off Mode (H_{off}). DOE received several comments from interested parties on this proposal. NEEA commented that the biggest issue with generating a single metric is the lack of good data on viewing hours in each mode. (NEEA, No. 43 at p. 7) NEEA believed that a blended average of 5.5 hours (combining the average of primary and non-primary TVs) for on mode energy consumption is more appropriate than the 7 hours suggested in the NOPR. (NEEA, No. 43 at p. 7) Panasonic recommended assigning 5 hours to on mode power consumption to remain consistent with ENERGY STAR and the Federal Trade Commission (FTC); this is also the on mode hours associated with a blended average. (Panasonic, No. 50 at p. 8) Sharp indicated that a 7 hour period in on mode is acceptable. (Sharp, No. 45 at p. 7)

Given interested party feedback and DOE's revised analysis of Nielson data of typical TV viewing hours[31], DOE is proposing to revise the time associated with on mode energy consumption to 5 hours. DOE's revised analysis of the Nielson data indicates that both primary and non-primary TVs average 5 hours in on mode per day, compared to the 7 hours which DOE originally considered in the January 2012 NOPR. While the analysis DOE used in the January

[31]Analysis of Nielsen Data. This material is available in Docket #EERE-2010-BT-TP-0026 at www.regulations.gov.

2012 NOPR only included primary TVs, DOE believes that this revised analysis provides a more representative average by using both primary and non-primary TVs.

In today's SNOPR, DOE is also proposing to assign 0 hours to off mode for those TVs equipped with a hard off switch. DOE believes that consumers will not use this mode as it does not allow for powering the TV on using a remote. As such, DOE is proposing to distribute the remaining 19 hours in which the TV is not in on mode among standby-active, low mode and standby-passive mode depending on the features specific to the TV. For TVs that are network-capable, DOE is proposing to assign all 19 remaining hours to standby-active, low mode, as this is the only other power consuming mode.

After publication of the January 2012 NOPR, DOE considered additional weighting criteria for TVs with network connectivity enabled by default, but no longer feels this method is appropriate. The network connection for these TVs needs to be configured before network access is granted and therefore cannot be enabled by default. While this set-up can typically be performed from a menu when the TV is initially powered on, this can take several minutes and frequently offers a skip option. Additionally, this set-up requires information like the wireless access point name and password which are unique to each network connection. Even wired connections that require very little set-up, prompt the user to check the network connection with a connection test prior to completing the network set-up.

DOE believes that most users will connect network-capable TVs, regardless of the set-up required, in order to take advantage of the additional capabilities. However, DOE cannot

determine the appropriate hourly average that a network-capable TV spends in standby-active, low mode without market data. Therefore, DOE is assuming that all network-capable TVs will be connected to a network. When placed in standby, any network capable TV will enter standby-active, low mode and not standby-passive mode. Therefore, DOE proposes in today's SNOPR that a network-capable TV will have 19 hours assigned to standby-active, low mode.

In Table 5, DOE has outlined the proposed hourly weightings associated with an AEC metric for each power mode. DOE believes that these values are representative of consumer use, based on data from Nielsen[32], and will ensure consistent representation of energy usage. DOE requests comment from interested parties on the annual energy consumption metric and its proposed hourly weighting in addition to the other multiple metric outputs discussed above (Section III.H.1).

Proposed values for hourly weightings are summarized in Table 1.

Table 5: Proposed Hourly Weightings

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

[32] Id.

I. Technical Corrections

In section 2.15 (Symbol Usage) of the January 2012 NOPR, DVD was identified as "digital visual disc". After receiving a comment from Sharp indicating that DVD stands for Digital Versatile Disc™ (Sharp, No. 45 at p. 3), DOE proposes to revise section 2.16 (Symbol Usage) of the test procedure to indicate that DVD stands for Digital Versatile Disc™.

IV. Procedural Issues and Regulatory Review

DOE has concluded that the determinations made pursuant to the various procedural requirements applicable to the January 2012 NOPR remain unchanged for this SNOPR. These determinations are set forth in the NOPR. 77 FR 2830, 2859-62. An update to its Review under Section 32 of the Federal Energy Administration Act of 1974, section IV.L of the January 2012 NOPR, is set forth below.

A. 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 proposed rule authorizes or requires use of commercial standards, the notice of proposed 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.

Today's SNOPR incorporates testing methods contained in the following standards: CEA-770.3-D, High Definition TV Analog Component Video Interface, HDMI Specification Version 1.0, High-Definition Multimedia Interface Specification, and Section 3.1.1, 3.1.18, 11.4.2, and 11.4.5 from International Electrotechnical Commission Standard 62087, Methods of measurement of the power consumption of audio, video, and related equipment (Edition 3.0, 2011-05). 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., that they were developed in a manner that fully provides for public participation, comment, and review). DOE will consult with the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

V. Public Participation

A. Attendance at Public Meeting

The time, date and location of the public meeting are listed in the DATES and ADDRESSES sections at the beginning of this document. If you plan to attend the public meeting, please notify Ms. Brenda Edwards at (202) 586-2945 or Brenda.Edwards@ee.doe.gov. As explained in the ADDRESSES section, foreign nationals visiting DOE Headquarters are subject to advance security screening procedures.

In addition, you can attend the public meeting via webinar. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website http://www1.eere.energy.gov/buildings/appliance_standards/residential/set_top_boxes.html. Participants are responsible for ensuring their systems are compatible with the webinar software.

B.Procedure for Submitting Prepared General Statements for Distribution

Any person who has plans to present a prepared general statement may request that copies of his or her statement be made available at the public meeting. Such persons may submit requests, along with an advance electronic copy of their statement in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format, to the appropriate address shown in the ADDRESSES section at the beginning of this notice. The request and advance copy of statements must be received at least one week before the public meeting and may be emailed, hand-delivered, or sent by mail. DOE prefers to receive requests and advance copies via email. Please include a telephone number to enable DOE staff to make a follow-up contact, if needed.

C.Conduct of Public Meeting

DOE will designate a DOE official to preside at the public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the public meeting. After the public meeting, interested parties may submit further

comments on the proceedings as well as on any aspect of the rulemaking until the end of the comment period.

The public meeting will be conducted in an informal, conference style. DOE will present summaries of comments received before the public meeting, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will allow, as time permits, other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly and comment on statements made by others. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this rulemaking. The official conducting the public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the public meeting.

A transcript of the public meeting will be included in the docket, which can be viewed as described in the Docket section at the beginning of this notice. In addition, any person may buy a copy of the transcript from the transcribing reporter.

D.Submission of Comments

DOE will accept comments, data, and information regarding this SNOPR no later than the date provided in the **DATES** section at the beginning of this notice. Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this notice.

Submitting comments via www.regulations.gov. The www.regulations.gov web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable, except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to www.regulations.gov information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as

Confidential Business Information (CBI)). Comments submitted through www.regulations.gov cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through www.regulations.gov before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that www.regulations.gov provides after you have successfully uploaded your comment.

Submitting comments via email, hand delivery, or mail. Comments and documents submitted via email, hand delivery, or mail also will be posted to www.regulations.gov. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. Email submissions are preferred. If you submit via mail or hand delivery, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies. No facsimiles (faxes) will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English, and are free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: one copy of the document marked "confidential" including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include: (1) A description of the items; (2) whether and why such items are

customarily treated as confidential within the industry; (3) whether the information is generally known by or available from other sources; (4) whether the information has previously been made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person which would result from public disclosure; (6) when such information might lose its confidential character due to the passage of time; and (7) why disclosure of the information would be contrary to the public interest.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

E.Issues on Which DOE Seeks Comment

Although comments are welcome on all aspects of this rulemaking, DOE is particularly interested in receiving comments and views of interested parties on the following issues:

1. Television Set Definition - DOE seeks comment from interested parties on DOE's proposed TV definition, and on whether the modified definition provides clarification on the scope of coverage (See Section III.B).

2. Sampling Plan – DOE requests comment from interested parties regarding its proposed sampling plan for on mode power consumption, which specifies a divisor of 1.05, and for standby mode and other power consumption values that are not on mode, which specifies a divisor of 1.10 (See Section III.C).

3. Rounding – DOE requests comment on the proposed rounding requirements for representing a TV's on mode, standby-active, low mode, and standby-passive mode power consumption (See Section III.C).

4. Special Functions - DOE requests comment from interested parties on incorporating by reference the IEC definitions for "additional functions" and "special functions" in today's SNOPR (See Section III.D.2).

5. Distance from Room Surface - DOE requests comment from interested parties on requiring the ABC sensor to be at least 2 feet from any room surfaces (See Section III.D.3.a).

6. Preset Picture Setting - DOE requests comment on adding a definition for "preset picture setting" (See Section III.D.3.c).

7. Brightest Selectable Preset Picture Setting - DOE requests comment from interested parties on discontinuing the use of the term "retail picture setting" and using the term "brightest selectable preset picture setting" and its proposed definition (See Section III.D.3.c).

8. Default Picture Setting - DOE requests comment from interested parties on discontinuing the use of the term “home picture setting” and instead using the proposed term and definition “default picture setting” (See Section III.D.3.c).

9. Light Measurement Devices - DOE seeks comment from interested parties on the clarification for the LMD accuracy requirement and the removal of the LMD repeatability requirement (See Section III.E.2).

10. Video Input Cable - DOE requests comment from interested parties on the proposed input cable hierarchy and the removal of VGA and DVI from this hierarchy (See Section III.E.3).

11. Input Terminal - DOE requests comment from interested parties on the proposal to perform testing using the primary input terminal (See Section III.E.4).

12. Video Input Device - DOE requests comment from interested parties on the additional specifications for video input devices (See Section III.E.5).

13. Stabilization - DOE requests comment from interested parties on incorporating by reference the stabilization requirements in section 11.4.2 of IEC 62087 Ed. 3.0 (See Section III.E.5).

14. Guidance to Stabilization - DOE requests comment from interested parties on stabilizing the TV with the ABC sensor enabled and 300 lux entering the sensor when the ABC sensor is enabled by default (See Section III.E.5).

15. Testing Order - DOE requests comment from interested parties regarding the proposed change to the testing order (See Section III.E.7).

16. Test Transition - DOE requests comment from interested parties on the transition between the on mode power consumption test and the luminance test (See Section III.E.7).

17. ABC Test Set-up - DOE requests comment from interested parties on each of the five proposed test set-up specifications, (1) a 1000 lumen halogen incandescent PAR 30S type lamp shall be used to generate light for testing, (2) the test set-up shall be configured as seen in Figure 3replicating the "distance" test set-up, (3) all four corners of the TV shall be aligned equidistant to a vertical reference plane (4) illuminance values shall be measured at the sensor, and (5) a 67mm IR/UV blocking filter shall be placed in front of the ABC sensor to only allow visible light to enter (See Section III.F.2).

18. Illuminance Values - DOE seeks comment from interested parties on the proposed illuminance values of 3 ± 1 lux, 12 ± 1 lux, 35 ± 2 lux, and 100 ± 5 lux (See Section III.F.3).

19. ND Filter - DOE is also proposing the option to use an ND filter to obtain 3 lux. DOE seeks comment from interested parties on the use of an ND filter only with the use of an IR/UV blocking filter (See Section III.F.2.d).

20. Illuminance Value Weighting - DOE requests comment from interested parties on equally weighting the illuminance values to determine on mode power consumption for TVs with ABC enabled (See Section III.F.4).

21. Quick Start - DOE requests comment from interested parties on testing "quick start" functionality and if it is adequately covered under the proposed test procedure (See Section III.G.1III.G.1).

22. Standby-active, low mode – DOE requests comment from interested parties on the addition of a standby-active, low mode power measurement test. DOE also requests comments on the proposed network hierarchy (See Section III.G.2).

23. Standby-active, high mode - DOE requests comment from interested parties on the removal of the CEA DAM test, while maintaining a definition for standby-active, high mode (See Section III.G.3).

24. Energy Efficiency Metrics - DOE requests comment from interested parties on the multiple metric outputs (see Section IIII.H.1), including the annual energy

consumption metric. DOE also requests comment on its proposed hourly weighting for the annual energy consumption metric (See Section III.H.2).

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this supplemental notice of proposed rulemaking.

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 February 28, 2013.

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

For the reasons stated in the preamble, DOE is proposing to amend parts 429 and 430 of Chapter II of Title 10, Subchapter D of the 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:

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

and, x is the sample mean; n is the number of samples; and x_i is the ith sample;

Or,

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

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

And 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:

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

And 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) Reserved.

(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 the definitions "Component Video", "Composite Video", "Direct 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 that meets the specification in CEA-770.3-D (incorporated by reference; see §430.3).

Composite Video means a video display interface that uses a Radio Corporation of America (RCA) connection to transmit National Television System Committee (NTSC) analog video.

* * * * *

Direct video connection means any connection type that is one of the following: High-Definition Multimedia Interface (HDMI), Component Video, S-Video, Composite Video, or any other video interface that may be used to output video content.

* * * * *

High-Definition Multimedia Interface or HDMI means an audio/video interface that meets the specification in HDMI Specification Version 1.0 (incorporated by reference; see §430.3).

* * * * *

S-Video means a video display interface that transmits analog video over two channels: luminance and color.

* * * * *

Television set (also referred to as "TV") means a product designed to be powered primarily by mains power, having a diagonal screen size of fifteen inches or larger, that contains an internal TV tuner encased in a single housing, and that is capable of displaying 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.

A TV may contain, but is not limited to, one of the following display technologies: liquid crystal display (LCD), organic light-emitting diode (OLED), cathode ray tube (CRT), or plasma display panel (PDP). TV also includes TV Combination units that DOE has further defined in Appendix H to subpart B of this part.

* * * * *

5. Section 430.3 is amended by:

a. Redesignating paragraphs (i) through (k) as (j) through (l), and (l) through (p) as (n) through (r), respectively;

b. Redesignating paragraphs (o)(1) and (2) as (o)(2) and (3), respectively;

c. Adding paragraphs (i), (m) and (o)(1);

d. Amending newly designated paragraph (o)(2) by adding "appendix H" after "appendix F";

e. Amending newly designated paragraph (o)(3) 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-770.3-D, High Definition TV Analog Component Video Interface, approved 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 Version 1.0, High-Definition Multimedia Interface Specification, Informational Version 1.0, approved September 4, 2003; IBR approved for § 430.2.

(2) [Reserved]

* * * * *

(o) *IEC*. * * *

(1) International Electrotechnical Commission (IEC) Standard 62087, ("IEC 62087 Ed. 3.0"), Methods of measurement of the power consumption of audio, video, and related equipment (Edition 3.0, 2011-05), Section 3.1.1, 3.1.18, 11.4.2, 11.4.5, 11.5.5, 11.5.6, and 11.6 and annex c.3 , IBR approved for Appendix H to subpart B.

* * * * *

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-active low mode, and standby-passive mode power consumption values, shall be measured in accordance with section 5 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

1. *Scope*

This appendix covers the test requirements used to measure the power consumption of television sets.

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. Brightest selectable preset picture setting is the preset picture setting in which the television produces the highest luminance during on mode conditions.

2.3. Dark room is the condition when the room illuminance at the automatic brightness control sensor measures less than or equal to 1.0 lux while the TV is in off mode or standby-passive mode.

2.4. Default picture setting is the preset picture setting that the TV enters into immediately after selecting the home menu from the forced menu. If the TV does not have a forced menu, this is the as-shipped preset picture setting.

2.5. 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.

2.6. IEC 62087 Ed. 3.0 Blu-ray Disc™ Dynamic Broadcast-Content Video Signal means the test clip 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).

2.7. 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).

2.8. Luminance is 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 (cd/m^2).

2.9. Off mode is the power mode where the TV is connected to a power source, produces neither sound nor picture and cannot be switched into any other mode with the remote control unit, an external or internal signal.

2.10. On mode is the power mode in which the TV is connected to a mains power source, has been activated, and is providing one or more of its principal functions.

2.11. Preset picture setting is a pre-programmed factory setting obtained from the TV menu with pre-determined picture parameters such as brightness, contrast, color, sharpness, etc. Preset picture settings are selected within the home menu after the initial set-up selection from the forced menu if a forced menu is present.

2.12. 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).

2.13. Standby-passive mode is the power mode in which the TV is connected to a power source, produces neither sound nor picture but can be switched into another mode with the remote control unit or an internal signal.

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

2.15. Standby-active, low mode is the power mode in which the TV is connected to a power source, produces neither sound nor picture but 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.

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

ABC – Automatic Brightness Control

BD – Blu-ray Disc™

DVD – Digital Versatile Disc™

DVI – Digital Visual Interface

HDD – Hard Disk Drive

HDMI – High Definition Multimedia Interface

IR - Infrared

$L_{brightest}$ – Luminance of TV in brightest selectable preset picture setting

$L_{default}$ – Luminance of TV in default picture setting

L – Ratio of $L_{default}$ to $L_{brightest}$

LMD – Light Measurement Device

LAN – Local Area Network

ND – Neutral Density (Filter)

P_{on} – Power consumed in on mode with ABC disabled

P_3 - Average power consumed in on mode, ABC enabled, 3 lux, with a direct light source

P_{12} - Average power consumed in on mode, ABC enabled, 12 lux, with a direct light source

P_{35} - Average power consumed in on mode, ABC enabled, 35 lux, with a direct light source

P_{100} - Average power consumed in on mode, ABC enabled, 100 lux, with a direct light source

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

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

P_{off} – Power consumption in off mode

THD – Total Harmonic Distortion

TV – Television Set

UCL – Upper Confidence Level

USB – Universal Serial Bus

UV – Ultraviolet

VCR – Videocassette Recorder

W_3 – Percent weighting for on mode, ABC enabled, 3 lux

W_{12} – Percent weighting for on mode, ABC enabled, 12 lux

W_{35} – Percent weighting for on mode, ABC enabled, 35 lux

W_{100} – Percent weighting for on mode, ABC enabled, 100 lux

WAN – Wide Area Network

2.17. TV combination unit is a TV in which the TV and one or more additional devices (e.g., DVD player, Blu-ray Disc™ (BD) player, Hard Disk Drive) are combined into a single enclosure, and which meets the following criteria: (a) it is not possible to measure the power of the individual components without removing the product housing; and (b) the product connects to a wall outlet via a single power cord.

3. Accuracy and Precision of Measurement Equipment

3.1. Electrical Power Supply

3.1.1. Power Supply Requirements. The TV power use shall be measured using a power supply that meets the specifications found in section 4.3.1. (Power Supply) 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.

3.1.2. 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.

3.1.2.1. The sampling rate of the watt-hour meter or wattmeter with averaging function shall be one measurement per second or more frequent.

3.1.2.2. The power measurement instrument shall measure and record the power factor and the real power consumed during all on mode tests.

3.1.2.3. 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.

3.1.3. Light Measurement Device. All LMDs shall have an accuracy of ±2 percent ±2 digits of the digitally displayed value. Luminance meters shall also have an acceptance angle of 3 degrees or less. This specification covers all types of luminance meters, both contact and non-contact, as well as illuminance meters.

Example 1: If the LMD displays "300", then 2 percent is ±6 cd/m^2. The least significant digit is the tenths place, which adds an additional ±2 cd/m^2 to the overall tolerance. Therefore, the accuracy of the LMD at "300" must be within ±8 cd/m^2.

Example 2: If the LMD displays "10.00", then 2 percent is ±0.2 cd/m^2. The least significant digit is the hundreds place, which adds an additional ±0.02 cd/m^2 to the overall tolerance. Therefore, the accuracy of the LMD at "10.00" must be within ±0.22 cd/m^2.

4. Test Room and Set-up Criteria.

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

4.2. Ambient Temperature Conditions. For all testing, maintain ambient temperature conditions between 23˚C ± 5˚C.

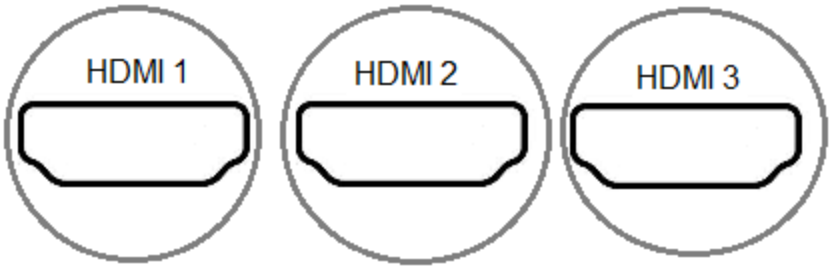
4.3. Ambient Relative Humidity Conditions. For all testing, maintain the ambient relative humidity between 10 and 80 percent.

4.4. Luminance Conditions. All luminance testing (with a non-contact meter) and on mode testing (with ABC enabled by default) shall be performed in a Dark Room.

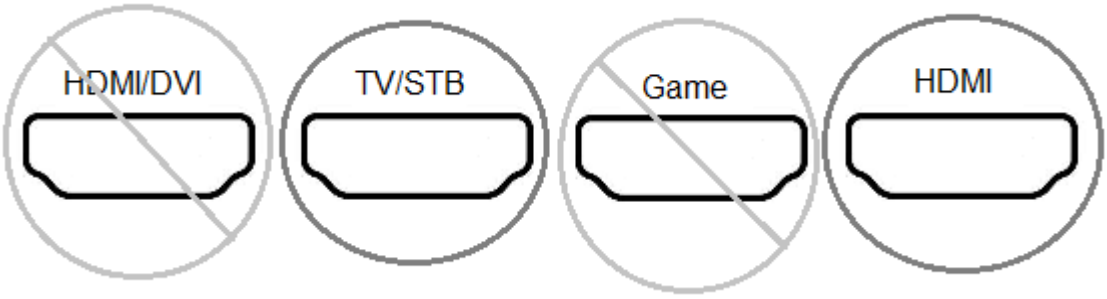
4.5. Input Cable. Testing shall be performed using a HDMI input cable. If the TV does not have a HDMI input, the following inputs shall be used, in the following order: Component Video, S-Video, and Composite Video.

4.6. Input Terminal. If the TV has multiple input terminals of the same type (i.e. HDMI 1, HDMI 2), testing shall be performed using any input terminal designed for viewing live TV or dynamic content from a BD player or set-top box.

Example 1: All acceptable input terminals to use for testing



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



4.7. Input Voltage and Frequency. Select the voltage frequency that is in accordance with the nominal voltage frequency of the region.

4.8. Installation. Install the TV in accordance with manufacturer's instructions.

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

4.10. TV Placement. TVs which have an ABC sensor enabled by default shall measure at least 2 feet 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. 2D Testing Signal Source. The signal source shall be able to generate a Blu-ray signal.

5.1. Video Input Device. The video input device (i.e. Blu-ray Disc player) manufacturer shall be different from the manufacturer of the TV under test to prevent device interaction.

5.2. Test Measurements. For on mode and luminance testing, connect the signal source generator to the TV via the input cable.

5.3. Stabilization. The TV shall be stabilized prior to testing using section 11.4.2 of IEC 62087 Ed. 3.0 (incorporated by reference, see §430.3). If the TV has an ABC sensor enabled by default, direct 300 lux or greater into the ABC sensor in accordance with sections 5.4.2, 5.4.3, and 5.4.4.

5.4. Calculation of Average Rated Power Consumption.

5.4.1. 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:

5.4.1.1. 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 $P_i = E_i/T_i$.

5.4.1.2. 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).

5.4.2. The rated power consumption in the on, standby, and off modes shall be determined as follows:

5.4.2.1. Apply the sampling and statistical requirements described in 10 CFR 429.25 to the average power consumption values of each mode of operation.

5.4.2.2. The resulting rated power consumption value for each mode of operation shall be rounded according to the accuracy requirements specified in section 3.1.2.3.

5.5. <u>On Mode Test for TVs without ABC Enabled By Default</u>.

5.5.1. <u>General Measurement Procedure for On Mode</u>. On mode power consumption shall be tested under the conditions outlined in section 11.4 of IEC 62087 Ed. 3.0 (incorporated by reference, see §430.3).

5.5.2. <u>Testing.</u> On mode testing shall be performed with the TV in its "default picture setting" while displaying the full 10-minute duration of IEC 62087 Ed. 3.0 Blu-ray Disc™ dynamic broadcast-content video signal (incorporated by reference, see §430.3). Measure the instantaneous power and record the average value over the test duration as

5.6. 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:

5.6.1. Illuminance Values. On mode testing shall be performed with the TV in its "default picture setting", while displaying IEC 62087 Ed. 3.0 Blu-ray Disc™ dynamic broadcast-content video signal for one 10 minute interval (incorporated by reference, see §430.3) with 100 lux (± 5 lux) entering the ABC sensor. Measure the instantaneous power consumption and record the average value over the test duration as P_{100}. Repeat the measurements with 35 lux (± 2 lux), 12 lux (± 1 lux), and 3 lux (± 1 lux) entering the ambient light sensor and record the values as P_{35}, P_{12}, and P_3 respectively. Testing shall be performed from brightest to dimmest room illuminance and values shall be changed by varying the input voltage to the light source.

5.6.2. 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

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

5.6.3. Lamp Requirements. A 1000 lumen (± 5 %) standard spectrum PAR 30S halogen incandescent lamp shall be positioned in front of the ABC sensor so that the light is directed into the sensor. A 67 mm infrared and ultraviolet light blocking filter shall be placed over the ABC sensor ensuring that only filtered light reaches the ABC sensor.

5.6.4. Light Source Set-up. The center of the lamp shall measure 5 feet (± 3 inches) from the center of the ABC sensor. The light source shall be aligned ensuring that the center focal point of the lamp is perpendicular with the center of the ABC sensor.

5.6.5. 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 annex c.3.

5.6.6. Neutral Density Filter. A neutral density (ND) filter is allowed as an optional method for creating the 3 lux illuminance value. The ND filter shall be placed on top of the IR/UV blocking filter and shall be appropriately calibrated to allow 3 lux to enter the ABC sensor.

Example: A 2-stop ND filter uniformly blocks 75% of the light from entering the ABC sensor. For an ABC sensor to receive 3 lux, 12 lux of light needs to reach the sensor prior to applying the ND filter. After applying the ND filter the TV will only interpret 3 lux of light entering the sensor.

5.7. Luminance Test.

5.7.1. Luminance Test. The luminance test shall be performed immediately following the on mode test prior to the activation of anti-image retention features. The luminance test shall first be performed with the TV in the "brightest selectable preset picture setting", followed by the TV in the "default picture setting". The "brightest selectable preset picture setting" shall be determined using the Three

Bar Video Signal Measurement in section 5.5.1.2. The ABC sensor must be disabled during this test.

5.7.1.1. Luminance Meter Set-up. Align the LMD perpendicular to the center of the TV screen. If a non-contact meter is being used for testing, the LMD shall be at a distance capable of achieving the specifications outlined in section 3.1.3.

5.7.1.2. Three Bar Video Signal Measurement. The TV luminance shall be measured in both the "default picture setting" and "brightest-selectable preset picture setting" using the IEC 62087 Ed. 3.0 Three Bar Video signal found in section 11.5.5 of IEC 62087 Ed. 3.0 (incorporated by reference, see § 430.3). Record the luminance immediately after the Three Bar Video signal is displayed in the "brightest-selectable preset picture setting", as $L_{brightest,}$ followed by the "default picture setting", as $L_{default.}$

5.7.1.3. Luminance Ratio Calculation. Calculate the Luminance ratio, L, as the ratio of $L_{default}$ to $L_{brightest}$.

5.8. Standby Mode Tests.

5.8.1. Video Input Device. The video input device shall be disconnected from the TV during standby-passive mode and standby-active, low mode testing.

5.8.2. Standby-Passive Mode. The standby-passive mode test shall be performed according to section 5.3.1 of IEC 62301 Ed. 2.0 standby mode test (incorporated by reference, see §430.3). Measure the instantaneous power and record the average value over the test duration of 10 minutes as $P_{standby\text{-}Passive}$.

5.8.3. Standby-Active, Low Mode.

5.8.3.1. Network Connection 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 or 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.

5.8.3.2. Peripherals and Network Connections. If a physical network connection is present, network connectivity is listed in the TV menu, or network connection capabilities are listed in the user manual, the TV network capabilities shall be activated and the TV shall be connected to a Local Area Network (LAN) 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 wide area network (WAN) . If the TV has multiple network connections (e.g., Wi-Fi, Ethernet, other), the TV shall be configured and connected to a single network source in accordance with the hierarchy of connections listed in Table 1.

5.8.3.3. Measurement Procedure. After the TV is placed into standby-active, low mode, allow the TV to stabilize in standby-active, low mode for a minimum of 30 minutes. Measure the instantaneous power and record the average value over at least a 10 minute duration as $P_{standby\text{-}active,\ low}$.

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.
3	75 ohm Coaxial Cable (i.e. RG-6, RG-59/U)
4	RJ-11
5	Other

5.9. Off Mode Test.

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

6. Annual Energy Consumption.

6.1. The annual energy consumption (AEC) of the TV shall be calculated using on mode and standby mode power consumption values as calculated pursuant to section 5.4

6.2. Compute the AEC of the TV using the equation below. The computed AEC value shall be rounded as follows:

6.2.1. If the computed AEC value is 100 kWh or less, the rated value shall be rounded to the nearest tenth of a kWh.

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

6.3. Calculate AEC expressed in kilowatt-hours per year, according to the following: AEC = 365 * (P_{on} * H_{on} + $P_{standby\text{-}active,\ low}$ * $H_{standby\text{-}active,\ low}$ + $P_{standby\text{-}passive}$ * $H_{standby\text{-}passive}$ + P_{off} * H_{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

Proposed values for H_m (in hours/day) are specified in Table 1:

Table 2: Hourly Weightings

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