DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[EERE–2016–BT–TP–0023]

RIN 1904–AD70

Energy Conservation Program: Test Procedure for Television Sets

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

ACTION: Final rule.

SUMMARY: This final rule amends the test procedure for television sets to incorporate by reference the relevant updated industry standard. The Department of Energy (''DOE'') has determined that incorporating the updated industry standard will result in a test procedure that is more representative of the average energy use of television sets.

DATES: The effective date of this rule is April 14, 2023. The amendments will be mandatory for product testing starting September 11, 2023.

The incorporation by reference of certain materials listed in the rule is approved by the Director of the Federal Register on April 14, 2023.

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

A link to the docket web page can be found at *www.regulations.gov/docket/EERE-2016-BT-TP-0023.* The docket web page contains instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket, contact the Appliance and Equipment Standards Program staff at (202) 287–1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov.*

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SUPPLEMENTARY INFORMATION: DOE incorporates by reference the following industry standard into 10 CFR part 430:

ANSI/CTA–2037–D, ''Determination of Television Set Power Consumption,'' September 2022.

Copies of ANSI/CTA–2037–D can be obtained from: Consumer Technology Association, 1919 S Eads Street, Arlington, VA 22202. Telephone: (703) 907–7600, or by going to *www.cta.tech.*

For a further discussion of this standard, see section IV.N of this document.

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I. Authority and Background

Television sets (''TVs'') are included in the list of ''covered products'' for which DOE is authorized to establish and amend test procedures. (42 U.S.C. 6292(a)(12)) DOE's current test procedure for TVs is codified at title 10 of the Code of Federal Regulations (''CFR'') part 430, subpart B, appendix H, ''Uniform Test Method for Measuring the Power Consumption of Television Sets'' (''appendix H''). DOE has not established energy conservation standards for TVs. The following sections discuss DOE's authority to establish the test procedure for TVs and relevant background information regarding DOE's consideration of the test procedure for this product.

A. Authority

The Energy Policy and Conservation Act, Public Law 94–163, as amended (''EPCA''),[1] authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B [2] of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include TVs, the subject of this document. (42 U.S.C. 6292(a)(12))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The testing requirements consist of test procedures that manufacturers of covered products must use as the basis

[1] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 116–260 (Dec. 27, 2020), which reflect the last statutory amendments that impact Parts A and A–1 of EPCA.

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

for (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making representations about the efficiency of those consumer products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

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 requires that any test procedures prescribed or amended under this section be reasonably designed to produce test results which measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including TVs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A))

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the **Federal Register** proposed test procedures and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedures. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)) If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedures.

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption into the overall energy efficiency, energy consumption, or other energy descriptor, unless the current test procedure already incorporates the standby mode and off mode energy consumption, or if such integration is technically infeasible. (42 U.S.C. 6295(gg)(2)(A)) If an integrated test procedure is technically infeasible, DOE must prescribe separate standby mode and off mode energy use test procedures for the covered product, if a separate test is technically feasible. (*Id.*) Any such amendment must consider the most current versions of the International Electrotechnical Commission (''IEC'') Standard 62301 [3] and IEC Standard 62087 [4] as applicable. (42 U.S.C. 6295(gg)(2)(A))

DOE is publishing this final rule in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6293(b)(1)(A))

B. Background

DOE most recently amended its TV test procedure in a final rule published on October 25, 2013 (''October 2013 final rule''). 78 FR 63823. The current DOE test procedure includes methods for measuring TV power consumption in active mode (*i.e.,* on mode), standby mode, and off mode; TV screen luminance; and the annual energy consumption (''AEC'') of TVs. As part of the on mode testing, DOE adopted the use of IEC Standard 62087, Edition 3.0, 2011–04, ''Methods of measurement for the power consumption of audio, video, and related equipment'' (''IEC 62087:2011''). IEC 62087:2011 includes a video test clip on a DVD and Blu-ray Disc™ to be used when conducting on mode testing (''IEC test clip''), as well as a static, black-and-white 3-bar image for measuring screen luminance.

DOE notes that it does not currently prescribe energy conservation standards for TVs. However, DOE's test procedure for TVs provides the basis for qualification criteria established by the U.S. Environmental Protection Agency's (''EPA'') ENERGY STAR program. Additionally, DOE does not specify any certification requirements for TVs at 10 CFR 429.25. However, the Federal Trade Commission (''FTC'') requires manufacturers of TVs to submit annually a report containing the brand name; model number; screen size (diagonal in inches); power (in watts) consumed in on mode, standby-passive mode, standby-active mode, low mode, and off mode; and annual energy consumption (kWh/year) for each basic model in current production among other model identifiers. 16 CFR 305.11(3). FTC allows this information to be submitted to DOE via the Compliance and Certification Management System in lieu of submitting the required information to FTC. *Id.* Therefore, although DOE has not established energy conservation standards or certification requirements for TVs at this time, DOE's test procedure is currently used by other agencies for voluntary representations of TV energy consumption and reporting requirements for the EnergyGuide label.

On June 24, 2016, DOE published in the **Federal Register** a request for information (''June 2016 RFI'') to consider whether revisions were needed to the existing TV test procedure. 81 FR 41262. Specifically, DOE noted in the June 2016 RFI that it found certain TVs consistently demonstrated decreased power use when displaying the IEC test clip as compared to other test clips and requested comments, information, and data on: the use of the IEC test clip or other test clips; whether the current luminance test, which uses a static 3-bar image to measure screen luminance, was representative of an average cycle or period of use, or alternative luminance tests that should be considered; and the default settings of a TV and changes to the default settings and special functions by consumers. *Id.* at 81 FR 41277.

Following the publication of the June 2016 RFI, on January 19, 2017, DOE posted a pre-publication advance notice of proposed rulemaking (''January 2017 pre-publication ANOPR''),[5] which described potential amendments to the TV test procedure that would address the issues discussed in the June 2016 RFI as well as a number of other issues, including the configuration of special functions during testing, performing system updates prior to testing, and incorporating updated industry test

[3] IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011–01).

[4] IEC 62087, *Audio, video and related equipment—Methods of measurement for power consumption* (Edition 1.0, Parts 1–6: 2015, Part 7: 2018).

[5] The January 2017 pre-publication ANOPR is available at *www.energy.gov/sites/prod/files/2017/01/f34/tv_tp_anopr_2017-1-19_4.pdf.*

procedures.[6] (January 2017 pre-publication ANOPR at pp. 6–10) The January 2017 pre-publication ANOPR was intended to assist DOE in determining whether amendments were needed to ensure that the TV test procedure produces results that are representative of an average use cycle or period of use. (*Id.* at p. 5) The January 2017 pre-publication ANOPR was also intended to facilitate discussion, solicit feedback, and provide input to industry consensus standards-setting bodies regarding modifications that DOE was considering so that these other organizations can be apprised of DOE's considerations as they undertook their own revisions. (*Id.* at p. 6)

Subsequently, in October 2021, the Consumer Technology Association (''CTA'') published an update to its TV power measurement standard, ''Determination of Television Set Power Consumption,'' American National Standards Institute (''ANSI'')/CTA–2037–C (''ANSI/CTA–2037–C''). Thereafter, DOE published a notice of proposed rulemaking (''NOPR'') for the TV test procedure on March 2, 2022 (''March 2022 NOPR''), addressing comments in response to the June 2016 RFI and presenting DOE's proposals to amend its test procedure for TVs. 87 FR 11892. In the March 2022 NOPR, DOE tentatively determined that ANSI/CTA–2037–C addressed many of the concerns DOE raised in the June 2016 RFI relating to configuration of special functions and screen luminance. *Id.* at 87 FR 11895. DOE initially determined that ANSI/CTA–2037–C was consistent with the existing metrics and approach incorporated in the currently applicable TV test procedure at appendix H, while also incorporating provisions that addressed current industry trends and improved the accuracy and repeatability of the test procedure. *Id.* DOE additionally noted that ANSI/CTA–2037–C adopted several changes that were suggested in public comments submitted by interested parties in response to DOE's June 2016 RFI. *Id.* These changes related to network configuration, standby mode test, test clips, etc. DOE participated in the CTA standards development process, including providing input and participating in round robin testing to evaluate the CTA standard while under development. A test report detailing the results of the round robin testing is available at the ENERGY STAR website[7] (''round robin test report'').[8]

In the March 2022 NOPR, DOE additionally noted that the CTA–2037 working group (''CTA working group'') was reviewing ANSI/CTA–2037–C at that time to determine if any revisions were necessary. *Id.* at 87 FR 11897. DOE stated that should a revised version, ANSI/CTA–2037–D, publish prior to the publication of a final DOE TV test procedure rule, DOE would consider stakeholder feedback and incorporate by reference ANSI/CTA–2037–D in the final rule, provided that the updates in ANSI/CTA–2037–D are consistent with the provisions DOE proposed in the March 2022 NOPR or the updates are related to topics that DOE discussed and solicited comments on in the March 2022 NOPR. *Id.* Since publication of the March 2022 NOPR, CTA published an additional update to its TV power measurement standard, ANSI/CTA–2037–D, which is substantively the same as ANSI/CTA–2037–C but has some subtle differences, which are discussed throughout section III of this document. DOE has determined that ANSI/CTA–2037–D is an appropriate standard to reference to measure TV screen luminance and power consumption and incorporates ANSI/CTA–2037–D by reference in this final rule.

DOE held a public meeting related to the March 2022 NOPR on April 6, 2022 (hereafter, the ''NOPR public meeting'').

DOE received comments in response to the March 2022 NOPR from the interested parties listed in Table I.1.

TABLE I.1—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE MARCH 2022 NOPR

Commenter(s)	Reference in this final rule	Comment number in the docket	Commenter type
Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy (''ACEEE''), and the New York State Energy Research and Development Authority.	ASAP *et al*	18	Efficiency Advocacy Organizations.
ComEd and Northwest Energy Efficiency Alliance	ComEd and NEEA	20.	Utility and Efficiency Advocacy Organization.
Pacific Gas and Electric Company, San Diego Gas & Electric, and Southern California Edison; collectively, the California Investor-Owned Utilities.	CA IOUs	19	Utilities.
CTA, American Council for an Energy-Efficient Economy, and the Natural Resources Defense Council, Inc.	CTA *et al*	21	Trade Organization and Efficiency Advocacy Organizations.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[9] To the extent that interested parties have provided written comments that are substantively consistent with any oral comments provided during the NOPR public meeting, DOE cites the written comments throughout this final rule. Any oral comments provided during the webinar that are not substantively addressed by written comments are summarized and cited separately throughout this final rule.

II. Synopsis of the Final Rule

In this final rule, DOE incorporates by reference into 10 CFR 430.3 the updated industry standard, ANSI/CTA–2037–D, and adopts through reference in appendix H certain provisions of the industry standard that:

[6] The January 2017 pre-publication ANOPR was not subsequently published in the **Federal Register** due to the Regulatory Freeze Pending Review published on January 24, 2017. 82 FR 8346.

[7] ENERGY STAR V. 9.0, which went into effect in October 2022, was under development at the time of publication of the round robin test report. DOE supported EPA to revise the ENERGY STAR test method for TVs and conducted round robin testing to support this effort.

[8] Televisions Test Report, April 12, 2021. Available at *www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20TVs%20Test%20Report%20-%20April%202021.pdf.*

[9] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking for TVs. (Docket No. EERE–2016–BT–TP–0023, which is maintained at *www.regulations.gov.*) The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

• Establish definitions and symbols associated with the updates to the industry standard including those applicable to the new test equipment, TV settings, and video content (*e.g.,* high dynamic range (''HDR''), dynamic luminance, motion detection dimming (''MDD''));

• Update the specifications required for the power supply, power meter, and illuminance meter, including additional requirements to reduce the voltage and frequency fluctuations in the power supply specifically for on mode testing and requiring the calibration of the illuminance meter to a light-emitting diode (''LED'') illuminant;

• Specify the use of a camera photometer for the measurement of dynamic luminance during all on mode testing instead of the usage of a luminance meter only capable of instantaneous luminance measurements;

• Update the method for test video storage to a universal serial bus (''USB'') device rather than a Blu-ray Disc played through a media player that does not conduct any video processing;

• Specify the automatic brightness control (''ABC'') light source to be an LED lamp rather than an incandescent lamp. Additionally, specify that the ABC light source be positioned at an angle of 45 degrees (''°'') from the ABC sensor. The illuminance meter is also required to be angled at 45° pointed directly at the ABC light source;

• Specify detailed unit under test (''UUT'') installation and placement requirements, including the setup of test equipment relative to the UUT and options for placing the TV on the wall or floor, rather than a TV stand or table;

• Specify the TV to be updated to the latest firmware version and include configuration requirements for special functions such as MDD and quick start;

• Introduce on mode testing for TVs with HDR-enabled, and 4K resolution testing;

• Require all on mode and standby mode testing to be conducted with the TV connected to a wide area network (''WAN'') and additionally connected to three types of devices, over local area network (''LAN''), capable for waking the TV: a ''smart'' speaker, mobile device, and network traffic monitor;

• Include new test clips for the high dynamic range-10 (''HDR10'') format;

• Require on mode testing in three different preset picture settings: standard dynamic range (''SDR'') default, SDR brightest, and HDR10 default, rather than a single test in the default preset picture setting;

• Update the ambient light requirements for ABC-enabled testing to 140 lux, 50 lux, 17 lux, and 4 lux, each with a ± 5-percent tolerance;

• Specify a single standby mode test during which the TV is connected to a WAN and additionally connected to the three types of network devices connected via LAN. The standby test period depends on the stability of the average power consumption of the TV during the last third of the measurement period; and

• Specify the calculation of the AEC metric as a weighted average of the power consumption in on mode and standby mode, wherein on mode power consumption is the average of the on mode power in the SDR default, SDR brightest, and HDR10 default preset picture settings.

The adopted amendments are summarized in Table II.1 compared to the test procedure provision prior to the amendment, as well as the reason for the adopted change.

TABLE II.1—SUMMARY OF CHANGES IN THE AMENDED TEST PROCEDURE

DOE's test procedure prior to amendment	Amended test procedure	Attribution
Defines terms applicable to the test procedure.	References certain definitions from ANSI/CTA–2037–D.	Update to industry standard.
Requires power supply and power meter to meet specifications incorporated from IEC 62087:2011.	Updates reference to ANSI/CTA–2037–D.	Update to industry standard.
Requires a luminance meter for luminance testing of TVs.	References ANSI/CTA–2037–D, which specifies the use of a camera photometer.	Update to industry standard.
Requires illuminance meter to be accurate for ambient light measurements.	References ANSI/CTA–2037–D, which requires the illuminance meter to be calibrated to an LED illuminant.	Update to industry standard. Improve representativeness of results.
Requires the playback of specified media from a Blue-ray player via a Blu-ray Disc.	References ANSI/CTA–2037–D, which utilizes a media player and USB storage device to play the specified media.	Update to industry standard. Improve representativeness of results.
Requires the ABC light source to be an incandescent bulb for ABC testing.	References ANSI/CTA–2037–D, which uses an LED light source for ABC testing.	Update to industry standard. Improve representativeness of results.
Requires the light source to be directed at the center of the ABC sensor from 1.5 meters (''m'') away aligned directly with the center of the sensor.	References ANSI/CTA–2037–D, which directs the ABC light source at the ABC sensor at an angle of 45°.	Update to industry standard. Improve representativeness of results.
Requires the TV to be placed at least 0.5 m away from any wall surface and set up according to manufacturer's instructions.	References ANSI/CTA–2037–D, which specifies that the TV must be placed on a table, floor, or wall with a black cloth and reflective card be placed underneath the ABC sensor.	Update to industry standard.
Requires the ambient light to be measured by the illuminance meter at the ABC sensor pointing in the direction of the light source.	References ANSI/CTA–2037–D, which requires the illuminance meter to be positioned at the ABC sensor on a stand that allows it to point directly at the 45° light source.	Update to industry standard. Improve representativeness of results.
Requires TVs to be tested in the default state for all special functions, unless a forced menu is displayed requiring the configuration of special functions, in which case the most power consumption option is selected.	References ANSI/CTA–2037–D, which disables MDD, and conditionally enables ''quick start.'' When a forced menu is displayed, the most energy consumptive option is selected, with some exceptions.	Update to industry standard.
Does not conduct any testing for HDR preset picture settings.	References ANSI/CTA–2037–D, which conducts testing in SDR default, SDR brightest, and HDR10 default preset picture settings.	Update to industry standard. Improve representativeness of results.
Does not require TVs to update their system firmware prior to testing.	References ANSI/CTA–2037–D, which requires the UUT use the latest firmware update and conduct a factory reset.	Update to industry standard.

TABLE II.1—SUMMARY OF CHANGES IN THE AMENDED TEST PROCEDURE—Continued

DOE's test procedure prior to amendment	Amended test procedure	Attribution
Requires the TV to be connected to a LAN with no other devices other than the TV.	References ANSI/CTA–2037–D, which requires the UUT be connected to a WAN and additionally be connected to a smart speaker, mobile device, and a network traffic monitor over LAN. These network conditions are required for all on mode and standby mode testing.	Update to industry standard. Improve representativeness of results.
Requires the stabilization of the TV by directing the light source with at least 300 lx into the ABC sensor.	References ANSI/CTA–2037–D, which requires the TV to be stabilized by playing 5 minutes of the IEC test clip and comparing the average power between two successive runs.	Updates to industry standard.
Specifies the use of the IEC test clip (in the highest resolution (SD or HD) supported by the TV) played via a Blu-ray Disc as specified in IEC 62087:2011.	References ANSI/CTA–2037–D, which retains the IEC test clip (in SD and HD resolution) but specifies that it must be played via a USB flash drive. Additionally, specifies a new 5-minute HDR10 test clip (in HD and UHD resolution).	Updates to industry standard.
Requires the on mode test to be conducted at ambient light levels of 100, 35, 12, and 3 lux if the TV has ABC enabled by default.	References ANSI/CTA–2037–D, which conducts ABC testing for preset picture settings with ABC enabled by default at ambient light levels of 140, 50, 17, and 4 lux.	Update to industry standard.
Measures power consumption and luminance separately.	References ANSI/CTA–2037–D, which measures power consumption as well as dynamic luminance of the TV during the same test.	Update to industry standard.
Requires a luminance test to determine the brightest preset picture setting using the luminance meter and the IEC three-bar image.	References ANSI/CTA–2037–D, which determines the SDR brightest preset picture setting by playing the 5-minute IEC test clip in each preset picture setting (with ABC disabled) and determining the brightest based on the dynamic luminance during the 5-minute test period.	Update to industry standard.
Specifies standby-passive mode, standby-active mode, low mode, and off mode tests.	References ANSI/CTA–2037–D, which conducts a single standby mode test during which the UUT is connected to WAN and additionally connected to three network devices on LAN and the average power consumption is measured for a variable duration, depending on the stability of the power consumption, over a period of 40 to 240 minutes. Additionally, eliminates the off mode test.	Update to industry standard. Improve representativeness of results.
Requires the AEC to be calculated using on mode power, standby-active low power, standby-passive power, and off mode power.	References ANSI/CTA–2037–D for AEC calculation which requires the AEC to be calculated using the on mode power as the average power of SDR default, SDR brightest, and HDR10 default preset picture settings, as well as the standby mode power consumption.	Update to industry standard. Improve representativeness of results.

DOE has determined that the amendments described in section III and adopted in this document will alter the measured efficiency of TVs and require retesting and recertification of TV basic models. The amended test procedure is substantively the same procedure established by industry, with certain modifications. Discussion of DOE's actions are addressed in detail in section III of this document.

The effective date for the amended test procedure adopted in this final rule is 30 days after publication of this document in the **Federal Register**. Representations of energy use or energy efficiency must be based on testing in accordance with the amended test procedure beginning 180 days after the publication of this final rule.

III. Discussion

A. General Comments

In the March 2022 NOPR, DOE requested comment on several topics including its proposal to adopt substantive provisions of ANSI/CTA–2037–C as well as the updates being considered in ANSI/CTA–2037–D. While topic-specific comments are addressed in the relevant sections, the following paragraphs summarize the general comments received in response to the March 2022 NOPR.

ASAP *et al.* supported DOE's approach for revising the TV test procedure, stating that TV technology has rapidly evolved since the October 2013 final rule. ASAP *et al.* stated that the revisions presented in the March 2022 NOPR largely address the concerns associated with advances in TV technology. (ASAP *et al.,* No. 18 at pp. 1–2)

CTA *et al.* supported the proposed test procedure, including the proposal to incorporate by reference ANSI/CTA–2037–D. (CTA *et al.,* No. 21 at p. 3; Public Meeting Transcript, No. 16 at pp. 5–7) In the NOPR public meeting, ACEEE supported DOE's proposed test method and recommended that DOE adopt ANSI/CTA–2037–D once it is published. (Public Meeting Transcript, No. 16 at pp. 7–8)

As discussed in later sections of this document, DOE is referencing ANSI/CTA–2037–D in the amended appendix H to measure TV power consumption and screen luminance. Throughout appendix H, DOE has streamlined any references to ANSI/CTA–2037–D to the extent possible.

B. Scope of Applicability

This rulemaking applies to TVs, which are products designed to produce dynamic video, contain an internal TV tuner encased within the product housing, and that are capable of receiving dynamic visual content from wired or wireless sources including but not limited to broadcast signals, display-specific data connections, media storage devices, and/or network connections. 10 CFR 430.2. Section 1, Scope, of appendix H specifies that DOE's test procedure is applicable to TVs that (1) have a diagonal screen size of at least fifteen inches; and (2) are powered by mains power (including TVs with auxiliary batteries but not TVs with main batteries). In the March 2022 NOPR, DOE did not propose to amend the scope of the current TV test procedure. 87 FR 11892, 11896.

DOE did not receive any comments regarding the scope of the TV test procedure. DOE is maintaining the scope of the current TV test procedure in the amended appendix H.

C. Updates to Industry Standards

Appendix H references IEC 62087:2011 and IEC 62301, Edition 2.0, 2011–04, ''Household electrical appliances—Measurement of standby power'' (''IEC 62301 Ed. 2.0'') for certain requirements, while the remaining requirements are specified in appendix H itself.

The IEC and CTA are two industry standards development bodies that have published standards for testing the power consumption of TVs (*e.g.,* IEC 62087 and CTA 2037, respectively). Since publication of the October 2013 final rule, both IEC 62087 and CTA 2037 have been updated more than once to keep pace with evolving TV technologies. At the time of the March 2022 NOPR, the most recent update was the publication of ANSI/CTA–2037–C in October 2021, and ANSI/CTA–2307–D was in development. Since publication of the March 2022 NOPR, the final version of ANSI/CTA–2037–D was published in September 2022.

In the March 2022 NOPR, DOE proposed to incorporate by reference ANSI/CTA–2037–C into 10 CFR 430.3 to reference the relevant sections of this industry standard in the DOE test procedure at appendix H. 87 FR 11892, 11897. Since publication of the October 2013 final rule, TV technology has evolved significantly. ANSI/CTA–2037–C addressed many of the technologies (*e.g.,* ultra-high definition (''UHD'') or ''4K'' resolution, HDR, etc.) not previously considered in the development of the current DOE test procedure and also specified configuration and setup requirements to improve the representativeness with respect to the current DOE test procedure at appendix H.

While standard definition (''SD'') and high definition (''HD'') were the predominant TV display resolutions at the time of the October 2013 final rule, UHD resolution TVs have gained prominence and 8K resolution TVs are emerging. Additionally, HDR content is more prevalent, and a majority of TVs are ''smart'' TVs (*i.e.,* they can be connected to a network connection).

In the March 2022 NOPR, DOE proposed to adopt by reference the substantive provisions of ANSI/CTA–2037–C, with some modifications to specify additional detail and test conditions in order to improve the representativeness of the test results. *Id.* at 87 FR 11897. In the March 2022 NOPR, DOE initially determined that the measurement of screen luminance and power consumption as specified in ANSI/CTA 2037–C would provide a measured result that is more representative of the average period of TV use compared to the current DOE test procedure. *Id.*

In the March 2022 NOPR, DOE also stated that it was aware that the CTA working group was reviewing ANSI/CTA–2037–C to determine if any revisions were necessary. DOE understood that should the working group make any changes to ANSI/CTA–2037–C, CTA would publish a revised standard, potentially numbered as ANSI/CTA–2037–D. *Id.* DOE participated in the working group meetings to review and revise ANSI/CTA–2037–C. While the March 2022 NOPR proposed to reference the requirements from ANSI/CTA–2037–C, it also discussed the revisions being considered under ANSI/CTA–2037–D. In the March 2022 NOPR, DOE requested comment on these revisions as well as any additional revisions under consideration in ANSI/CTA–2037–D that were not discussed in the March 2022 NOPR. *Id.* In the March 2022 NOPR, DOE stated that, should ANSI/CTA–2037–D publish prior to the publication of any DOE TV test procedure final rule, DOE would consider stakeholder feedback and consider incorporating by reference ANSI/CTA–2037–D, provided the updates in ANSI/CTA–2037–D are consistent with the provisions DOE proposed in the March 2022 NOPR or the updates are related to topics that DOE discussed and solicited comments on in the March 2022 NOPR. *Id.*

In the March 2022 NOPR, DOE requested comment on its proposal to adopt the substantive provisions of ANSI/CTA–2037–C in appendix H with certain modifications. *Id.* In response, DOE received the following comments.

CTA *et al.* recommended that DOE incorporate by reference ANSI/CTA–2037–D for the final rule, rather than ANSI/CTA–2037–C, stating that ANSI/CTA–2037–D is more accurate and representative. (CTA *et al.,* No. 21, at p. 5)

ComEd and NEEA supported the adoption of the finalized version of ANSI/CTA–2037–D. ComEd and NEEA also stated that ANSI/CTA–2037–D is an improvement over the current Federal test method. (ComEd and NEEA, No. 20 at p. 2) ComEd and NEEA stated that adopting ANSI/CTA–2037–D would enable harmonization of test methods globally. (ComEd and NEEA, No. 20 at p. 2)

DOE has reviewed ANSI/CTA–2037–D and determined it to be materially the same as the test procedure DOE proposed in the March 2022 NOPR (*i.e.,* ANSI/CTA–2037–C, including the additional modifications DOE proposed in the March 2022 NOPR), albeit with some minor revisions that further improve reproducibility and representativeness. Accordingly, in this final rule, DOE is incorporating by reference ANSI/CTA–2037–D in 10 CFR 430.3 for reference in the amended appendix H. DOE has determined that ANSI/CTA–2037–D produces measures of energy consumption that are representative of current TV use and would not be unduly burdensome to conduct.

The subsequent sections of this document discuss DOE's final amendments to appendix H to incorporate by reference ANSI/CTA–2037–D as the Federal test method.

D. Definitions

In the March 2022 NOPR, DOE noted that the definitions currently specified in appendix H are either provided directly or through adoption of certain definitions provided in IEC 62087:2011. Many of these terms are also defined in ANSI/CTA–2037–C. 87 FR 11892, 11898. Additionally, certain terms are defined in ANSI/CTA–2037–C but are not currently defined in appendix H. *Id.* at 87 FR 11897. In the March 2022 NOPR, DOE identified the terms that are currently used in appendix H and ANSI/CTA–2037–C, the similarities and differences in their respective definitions, and whether DOE proposed to adopt each definition through reference to ANSI/CTA–2037–C. *Id.* at 87 FR 11897–11899.

DOE additionally noted that while some of the defined terms in ANSI/CTA–2037–C have minor differences compared to the current definitions in appendix H, DOE had initially determined that these differences were not substantive and would not change the meaning of the defined terms or impact testing according to the proposed test procedure compared to the current test procedure. *Id.* at 87 FR 11899. Accordingly, to harmonize with the current industry standard, DOE proposed in the March 2022 NOPR to reference section 5.1 of ANSI/CTA–2037–C for the definitions of the terms used in the TV test procedure. *Id.* DOE also proposed to reference section 5.2 of ANSI/CTA–2037–C to include the relevant abbreviations that are used in the TV test procedure. *Id.* Further, for the terms that are currently defined in appendix H, but a definition does not exist in ANSI/CTA–2037–C (*e.g.,*

additional functions, auxiliary battery, retail configuration, special functions, standby-active, high mode, and standby-active, low mode), DOE proposed to remove these terms from appendix H because they are not referenced in ANSI/CTA–2037–C nor are they used anywhere in the proposed test procedure. *Id.*

DOE also noted that the CTA working group was considering revising definitions for power modes (*i.e.,* on mode, partial on mode, etc.) in ANSI/CTA–2037–D. *Id.* In particular, the CTA working group was considering updating all references to standby mode as partial on mode. In the March 2022 NOPR, DOE noted that even if the CTA working group considered using the term ''partial on mode,'' DOE would refer to this mode as ''standby mode.'' *Id.*

In the March 2022 NOPR, DOE requested comment on defining terms through reference to ANSI/CTA–2037–C and also whether DOE should consider the revisions to the power mode definitions being considered at the time for ANSI/CTA–2037–D. *Id.*

CTA *et al.* stated that the definitions proposed in appendix H excluded some definitions that are included in ANSI/CTA–2037–D, including ''television set'' and ''standby,'' which are already defined in 10 CFR 430.2, and recommended that DOE adopt these definitions from ANSI/CTA–2037–D. (CTA *et al.,* No. 21 at p. 11)

As noted in the March 2022 NOPR, DOE did not reference definitions for ''HDMI,'' ''television set,'' and ''standby mode'' from ANSI/CTA–2037–C since these terms are already defined in 10 CFR 430.2. In this final rule, DOE is maintaining its exclusion of referencing these definitions in appendix H. Additionally, DOE had not proposed to include definitions for ''stand,'' ''International System of Units,'' ''filmmaker mode,'' and ''perceptual quantization video.'' However, DOE is including these definitions by reference to ANSI/CTA–2037–D because these definitions are required to understand and implement the test procedure.

Regarding the revised definitions for power modes that were under consideration at the time of publication of the March 2022 NOPR, ANSI/CTA–2037–D does not include definitions for power mode, off mode, standby-passive mode, and standby-active mode. Additionally, partial on mode is now referred to as standby mode in ANSI/CTA–2037–D. However, as mentioned previously, DOE already defines standby mode in 10 CFR 430.2 and is not referencing ANSI/CTA–2037–D for the definition of standby mode in this final rule.

Table III.1 identifies the terms that are specified in appendix H and ANSI/CTA–2037–D, the similarities and differences in their respective definitions, and whether DOE is adopting each definition through reference to ANSI/CTA–2037–D.

TABLE III.1—TERMS CURRENTLY USED IN APPENDIX H AND ANSI/CTA–2037–D AND THE SIMILARITIES OR DIFFERENCES BETWEEN DEFINITIONS

Terms currently in appendix H	Terms currently in ANSI/CTA–2037–D	Similarities/differences between definitions in ANSI/CTA–2037–D and existing appendix H	Adopt by reference to ANSI/CTA–2037–D for appendix H?
Brightest selectable preset picture setting.	Brightest selectable preset picture setting.	Appendix H refers to the brightest picture setting within either the home or retail configuration, whereas ANSI/CTA–2037–D refers to the brightest preset picture setting only within the home configuration. ANSI/CTA–2037–D additionally specifies that this is a user-selectable preset picture setting.	Yes.
Default picture setting	Default picture setting	ANSI/CTA–2037–D specifies that this picture setting is determined using only the home configuration. Appendix H indicates the default picture setting may be decided after a forced menu, which ANSI/CTA–2037–D does not mention.	Yes.
Forced menu	Forced menu	Substantively the same definitions	Yes.
Home configuration	Home configuration	Substantively the same definitions	Yes.
Illuminance	Illuminance	Substantively the same definitions	Yes.
Luminance	Luminance	Substantively the same definitions	Yes.
Main battery	Main battery	Substantively the same definitions	Yes.
Off mode	Off mode	ANSI/CTA–2037–D provides a note that describes how some power may still be consumed when the UUT is in off mode. Appendix H does not include such a note.	Yes.
On mode	On mode	Similar definitions	Yes.
Preset picture setting	Preset picture setting	ANSI/CTA–2037–D provides a simplified definition for preset picture setting compared to appendix H.	Yes.
Standby-passive mode	Standby mode	ANSI/CTA–2037–D defines only the broader term standby mode. Standby mode is already defined in 10 CFR 430.2; therefore, it does not need to be defined in appendix H.	No.
Additional functions		No.t listed in the definitions section of ANSI/CTA–2037–D	No.
Auxiliary Battery		No.t listed in the definitions section of ANSI/CTA–2037–D	No.
Retail configuration	Retail configuration	Similar definitions	Yes.
Special functions		No.t listed in the definitions section of ANSI/CTA–2037–D. The term special functions is not used anywhere in ANSI/CTA–2037–D.	No.
Standby-active, high mode		No.t listed in the definition section of ANSI/CTA–2037–D. The term standby-active, high mode is not used anywhere in ANSI/CTA–2037–D.	No.
Standby-active, low mode		No.t listed in the definition section of ANSI/CTA–2037–D. The term standby-active, low mode is not used anywhere in ANSI/CTA–2037–D.	No.
(not defined)	AEC	This term defines the energy metric that is the output of the test procedure.	Yes.
(not defined)	Automatic brightness control	This term is used throughout ANSI/CTA–2037–D	Yes.
(not defined)	Dynamic Luminance	This term defines the TV screen's luminance as measured during the playback of dynamic video content.	Yes.
(not defined)	Energy-Efficient-Ethernet	This term is used in the Network connection hierarchy in both ANSI/CTA–2037–D and appendix H.	Yes.
(not defined)	Filmmaker Mode	This term defines a preset picture setting that has a specific configuration.	Yes.
(not defined)	Gloss Unit (GU)	This term defines a unit used to measure the reflectance of a surface	Yes.

TABLE III.1—TERMS CURRENTLY USED IN APPENDIX H AND ANSI/CTA–2037–D AND THE SIMILARITIES OR DIFFERENCES BETWEEN DEFINITIONS—Continued

Terms currently in appendix H	Terms currently in ANSI/CTA–2037–D	Similarities/differences between definitions in ANSI/CTA–2037–D and existing appendix H	Adopt by reference to ANSI/CTA–2037–D for appendix H?
(not defined)	HDR10	This term defines a specific video display format that is used to test the UUTs power consumption.	Yes.
(not defined)	High-definition multimedia interface (''HDMI®'').	This term defines a video input terminal for TVs. It is defined at 10 CFR 430.2; therefore, it does not need to be defined in appendix H.	No.
(not defined)	High Dynamic Range (''HDR'')	This term more broadly defines the video format category that HDR10 belongs to.	Yes.
(not defined)	Hybrid Log Gamma (''HLG'')	This term defines a type of HDR video and is used when describing the test signals used during testing.	Yes.
(not defined)	International System of Units	This is defined as ''The modern form of the metric system''	Yes.
(not defined)	Motion-Based Dynamic Dimming (''MDD'').	This term defines a television feature that adjusts luminance in response to motion being displayed and is disabled during TV testing.	Yes.
(not defined)	Neutral density (''ND'') filter	This term is used to define the filter that is used to accomplish the 3 lux luminance requirement for on mode testing.	Yes.
(not defined)	Partial on mode	This term defines the standby sub-modes	Yes.
(not defined)	Perceptual Quantization Video	This term defines a specific video utilized by HDR	Yes.
(not defined)	Quick start	This term defines quick start functionality, which is a special function that impacts the time it takes for a TV to transition to on mode from partial on mode.	Yes.
(not defined)	Snoot	This term defines an object used to prevent the ABC lamp light from reflecting off the UUT and interfering with the dynamic luminance data collection. It is not a required tool but may be needed for testing in specific instances.	Yes.
(not defined)	Software	This term defines code that runs on a UUT and can be updated	Yes.
(not defined)	Stand	This term defines the device used to hold the UUT upright	Yes.
(not defined)	Television set	This term is defined at 10 CFR 430.2; therefore, it does not need to be defined in appendix H.	No.
(not defined)	Wake-By-Remote-Control-App	This term defines the ability to wake a UUT using a network-connected device and is used during standby mode testing.	Yes.
(not defined)	Wake-By-Smart-Speaker	This term defines the ability to wake a UUT using a voice command via smart speaker and is used during standby mode testing.	Yes.
(not defined)	Wake-On-Cast	This term defines the ability to wake a UUT by streaming a video from a mobile device to the UUT and is used during standby mode testing.	Yes.

In summary, in this final rule, DOE is referencing section 5 of ANSI/CTA–2037–D for the definitions and abbreviations required for the TV test procedure, except for those terms which are already defined in 10 CFR 430.2.

E. Test Equipment

1. Power Supply

Sections 3.1 and 3.2 of appendix H reference section 4.3.1 of IEC 62301 Ed. 2.0 for the voltage and frequency and power supply requirements for testing TVs. The requirements specify that the voltage and frequency for each region within North America must have a voltage of 115 volts (''V'') and frequency of 60 hertz (''Hz''). IEC 62301 Ed. 2.0 additionally includes requirements for other regions around the world.

In the March 2022 NOPR, DOE noted that section 7.1.1 of ANSI/CTA–2037–C specifies only the North American-specific requirements; however, these requirements are specified under the standby mode power supply requirements rather than on mode. 87 FR 11892, 11900. As discussed in the March 2022 NOPR, the CTA working group was considering moving these requirements under the power supply requirements for on mode in ANSI/CTA–2037–D. *Id.* DOE additionally noted that it expects that the same power supply is used to test on mode and standby mode power consumption and the specific location of where the requirement is specified would not alter the power supply that is used to test a TV. *Id.*

In the March 2022 NOPR, DOE additionally stated that given DOE's test procedure is applicable to only those TVs that are a type which, to any significant extent, are distributed in commerce in the United States for personal use or consumption by individuals (42 U.S.C. 6291(1); 42 U.S.C. 6292(a)(12); 42 U.S.C.), the North American-specific requirements specified in ANSI/CTA–2037–C are sufficient for the DOE test procedure. In the March 2022 NOPR, DOE proposed to reference section 7.1.1 of ANSI/CTA–2037–C for the alternating current (''AC'') power supply specification. *Id.*

Section 3.2 of appendix H additionally specifies that the total harmonic distortion of the supply voltage must not exceed 5 percent, inclusive to the 13th order harmonic, when the unit is under test. In the March 2022 NOPR, DOE stated that section 7.1.1 of ANSI/CTA–2037–C specifies that the total harmonic distortion must not exceed 2 percent up to and including the 13th harmonic and noted that this specification is more stringent than appendix H. Based on its internal testing and general agreement from manufacturers during the ANSI/CTA–2037–C development working group meetings, DOE had initially determined that most power supplies are capable of meeting this requirement. *Id.* Accordingly, in the March 2022 NOPR, DOE proposed to reference the power supply requirements from ANSI/CTA–2037–C. *Id.*

In the March 2022 NOPR, DOE also noted that the introductory text in Section 9 of ANSI/CTA–2037–C states that power shall be provided to the ABC lamp, camera photometer, and UUT from the specified AC power source. *Id.* However, DOE stated that using the same AC power source to power the UUT as well as the ABC lamp and camera photometer could unintentionally impact the power consumption measurement of the UUT due to ''noise'' from the ABC light source and fluctuations in power draw caused by the camera photometer and ABC light source. DOE also noted that the CTA working group was considering revising this requirement for ANSI/CTA–2037–D to specify that only the

UUT be powered using the power source specified in section 7.1.1 of the CTA–2037 standard, that the camera photometer and ABC lamp must not be powered by the same controlled power source, and that the camera photometer and ABC lamp may be powered by mains power. *Id.* Accordingly, in the March 2022 NOPR, DOE proposed to specify that TVs must be tested with only the UUT powered by the specified AC power source and the camera photometer and ABC lamp may be powered using standard mains electricity. *Id.*

In the March 2022 NOPR, DOE requested comment on referencing section 7.1.1 of ANSI/CTA–2037–C for the power supply requirements. DOE also requested comment on referencing the updated requirements that were under consideration for ANSI/CTA–2037–D, which would move the voltage and frequency requirements for the power supply from the standby mode to the on mode section within section 7.1.1 of the CTA–2037 standard. *Id.*

DOE also requested comment on its proposal to connect only the UUT to the specified AC power source during testing and to specify that the camera photometer and ABC lamp may be powered via mains power. DOE also requested feedback on whether the camera photometer and ABC lamp should be connected to additional specified AC power sources and the burden versus benefit of such an approach. *Id.* In response, DOE received the following comments.

CTA *et al.* recommended DOE adopt ANSI/CTA–2037–D, which includes voltage and frequency requirements specified for both the on mode power supply and the standby mode power supply. CTA *et al.* also stated that ANSI/CTA–2037–D requires the TV to be powered by the controlled power source and the camera photometer and the ABC lamp may be powered by mains power. (CTA *et al.,* No. 21 at p. 11)

As noted by CTA *et al.,* the CTA working group revised the power supply requirements in ANSI/CTA–2037–D to specify that only the UUT is powered using the power source specified in section 7.1.1 of ANSI/CTA–2037–D. Additionally, the published version of ANSI/CTA–2037–D specifies that the power supply supplying mains power to the UUT shall be configured to deliver sufficient power at 115 V and 60 Hz to power the UUT. These requirements are applicable to both on mode and standby mode tests.

The power supply requirements specified in section 7.1.1 of ANSI/CTA–2037–D are the same as those specified in the March 2022 NOPR. For the reasons discussed in the preceding paragraphs and the March 2022 NOPR, DOE is amending the power supply requirements in appendix H to reference section 7.1.1 of ANSI/CTA–2037–D.

2. Power Meter

In the March 2022 NOPR, DOE noted that the power meter requirements specified in section 3.3 of appendix H are the same as the requirements specified in section 7.1.2 of ANSI/CTA–2037–C, which includes the specification of a wattmeter as well as the allowable uncertainty in measurement. 87 FR 11892, 11900. DOE stated that ANSI/CTA–2037–C additionally specifies calibration requirements for the power meter, the current crest factor, and the lower bound on the current range. Accordingly, in the March 2022 NOPR, DOE proposed to reference section 7.1.2 of ANSI/CTA–2037–C for the power meter requirements because it includes the requirements currently specified in appendix H, and the additional requirements specified would ensure that the power meter remains within bounds and calibrated to ensure the results obtained are valid and representative. *Id.*

DOE requested comment on its proposal to reference the power meter requirements from ANSI/CTA–2037–C. Specifically, DOE requested feedback on the potential burden, if any, to meet the more stringent requirements specified in ANSI/CTA–2037–C. *Id.*

CTA *et al.* commented that the power meter requirements in section 7.1.2 of ANSI/CTA–2037–D are appropriate, and that DOE should adopt them. (CTA *et al.,* No. 21 at p. 11)

The power meter requirements in ANSI/CTA–2037–D include a sampling rate of the power meter. Specifically, ANSI/CTA–2037–D requires the power meter to have a sampling rate of at least 1 kilo hertz (''kHz''), and optionally have a sampling rate of at least 10 kHz. DOE's experience with conducting TV testing, as well as testing of other consumer products, indicates that this additional sampling requirement should have no impact on the burden of sourcing a power meter, as the equipment previously used should continue to meet the power meter requirements in ANSI/CTA–2037–D. Accordingly, for the reasons discussed in the preceding paragraph and in the March 2022 NOPR, DOE amends the power meter requirements in appendix H to reference section 7.1.2 of ANSI/CTA–2037–D.

3. Luminance Meter

Section 3.4 of appendix H specifies the accuracy requirements for a luminance meter, which is used to measure screen luminance in the default and brightest preset picture settings as well as the default retail picture setting. The current luminance measurement is performed using the static, 3-bar black-and-white image from IEC 62087:2011. This static black-and-white image does not result in representative luminance measurements because TVs are rarely used to display static images (*i.e.,* the content played on TVs is almost always dynamic, or in motion) and pure white color is rarely displayed on a TV screen (*i.e.,* most scenes displayed on a TV screen are a mix of various colors); therefore, measuring luminance using the black-and-white image is not representative of typical consumer use.

In the March 2022 NOPR, DOE proposed to measure dynamic screen luminance (*i.e.,* luminance of the screen when playing dynamic video content such as the IEC test clip) as specified in ANSI/CTA–2037–C to ensure that a TV's screen luminance is measured at the same time as its power consumption, which would provide consumers a direct relationship for TV brightness (*i.e.,* luminance) as a function of its power consumption. 87 FR 11892, 11900. In the March 2022 NOPR, DOE initially determined that a dynamic screen luminance measurement would provide results that are more representative of the real world in comparison to the currently specified static black-and-white image. *Id.*

DOE additionally noted in the March 2022 NOPR that a luminance meter cannot measure dynamic screen luminance; instead, ANSI/CTA–2037–C specifies use of a camera photometer to measure the dynamic luminance of the TV screen during each on mode test. *Id.* DOE explained that the camera photometer captures the light from the TV screen while displaying video content, and the average of the light entering the camera photometer's sensor in each frame is translated into the average luminance of the TV screen. In conjunction with the proposal to measure dynamic screen luminance, in the March 2022 NOPR, DOE proposed to remove the existing luminance meter requirements specified in section 3.4 of appendix H and instead reference section 7.1.4 of ANSI/CTA–2037–C, which specifies the requirements for the camera photometer's uncertainty, resolution, sample area, and data rate. *Id.* at 87 FR 11900–11901.

DOE additionally noted in the March 2022 NOPR that the CTA working group

was considering specifying an additional requirement in ANSI/CTA–2037–D that the camera used for testing should be calibrated against a traceable light source that more closely matches the spectral power density of LED/OLED [10] TVs than does standard illuminant A (*e.g.,* D65, LED–RGB1). *Id.* at 87 FR 11901. This requirement has since been finalized in ANSI/CTA–2037–D.

DOE requested comment on its proposal to measure dynamic screen luminance and to specify use of a camera photometer to measure dynamic screen luminance. In particular, DOE requested comment on any concerns with the burden associated with using a camera photometer as specified by ANSI/CTA–2037–C to measure screen luminance. *Id.*

DOE also requested comment on the additional calibration requirement that was under consideration for ANSI/CTA–2037–D and whether DOE should include this requirement for its TV test procedure. *Id.*

The CA IOUs recommended that DOE establish criteria for obtaining reproducible and repeatable results using an off-the-shelf camera photometer and manually capturing measurements as opposed to using a customized camera photometer paired with a proprietary software tool. The CA IOUs also recommended that DOE develop specific guidelines regarding the data capture process to ensure both off-the-shelf and NEEA-supplied camera photometers produce results that meet DOE's test tolerance requirements. (CA IOUs, No. 19 at pp. 5–6)

ComEd and NEEA supported the camera photometer requirements in ANSI/CTA–2037–D and stated that the requirements would ensure accurate results while maximizing design flexibility to encourage the development of camera systems by multiple vendors. (ComEd and NEEA, No. 20 at p. 3)

CTA *et al.* commented that DOE should reference the requirement that dynamic screen luminance be measured as specified in section 11.1 of ANSI/CTA–2037–D using a camera photometer as specified in section 7.1.4 of ANSI/CTA–2037–D. (CTA *et al.,* No. 21 at pp. 11–12)

DOE has reviewed the specifications for the camera photometer in ANSI/CTA–2037–D and determined that the requirements provide sufficient level of detail to ensure repeatable and reproducible results, while still allowing for flexibility in sourcing a camera photometer that meets the defined requirements.

[10] Organic light emitting diode.

Additionally, in response to the CA IOUs, DOE notes that ANSI/CTA–2037–D updates the minimum resolution requirement to be a minimum pixel requirement, which allows more variety in the camera photometers that are capable of meeting the specified camera photometer requirements. ANSI/CTA–2037–D additionally includes a clarification that the camera photometer must be capable of capturing the entire UUT screen, which was implicitly understood to be the requirement in ANSI/CTA–2037–C but was not specifically stated.

For the reasons discussed in the preceding paragraphs and in the March 2022 NOPR, DOE amends the camera photometer requirements in appendix H to reference section 7.1.4 of ANSI/CTA–2037–D.

4. Illuminance Meter

Section 3.5 of appendix H specifies accuracy requirements for the illuminance meter, which is used to measure the room illuminance levels at the ABC sensor for tests that are conducted with ABC functionality enabled. In the March 2022 NOPR, DOE stated that section 7.1.3 of ANSI/CTA–2037–C specifies the same accuracy requirements for an illuminance meter and additionally specifies calibration requirements for the illuminance meter. Additionally, DOE noted that ANSI/CTA–2037–C specifies certain requirements if the illuminance meter is neither a spectroradiometer nor calibrated against an illuminant replicating the spectral emissions of LEDs but that the CTA working group was re-evaluating these requirements to ease test burden by clarifying that only specific requirements of the calibration standard must be met. 87 FR 11892, 11901. As stated in the March 2022 NOPR, these requirements were for the illuminance meter accuracy and relative spectral response. The CTA working group was also considering an additional requirement which would require the center of the cosine receptor to be ≤ 40mm in depth. *Id.*

In the March 2022 NOPR, DOE initially determined that the illuminance meter requirements specified in section 7.1.3 of ANSI/CTA–2037–C were appropriate because DOE proposed that an LED lamp be used for ABC testing rather than an incandescent lamp as specified currently in appendix H. Accordingly, in the March 2022 NOPR, DOE proposed to reference section 7.1.3 of ANSI/CTA–2037–C for the illuminance meter requirements. *Id.*

In the March 2022 NOPR, DOE requested comment on its proposal to reference the illuminance meter requirements, including the calibration requirements, from ANSI/CTA–2037–C. DOE also requested comment on the updated illuminance meter requirements under consideration for ANSI/CTA–2037–D, whether DOE should consider referencing the updated requirements when finalized, and the reason(s) for doing so. *Id.*

CTA *et al.* commented that DOE should reference the requirements for the illuminance photometer described in section 7.1.3 of ANSI/CTA–2037–D. CTA *et al.* additionally commented that DOE should adopt the updated requirements for the illuminance photometer described in section 7.1.3 of ANSI/CTA–2037–D, which include a maximum depth for the light reception dome (*i.e.,* integrating sphere) that would help ensure that the sensor will not be too far away from the TV's ABC sensor when illuminance measurements are taken. (CTA *et al.,* No. 21 at p. 12)

DOE notes that the finalized ANSI/CTA–2037–D does not include the cosine receptor depth requirement that was under consideration by the CTA working group. Additionally, it removes the requirements that were specified for illuminance meters that are neither a spectroradiometer nor calibrated against an illuminant replicating the spectral emission of LEDs.

DOE has determined that these changes to the illuminance meter requirements from ANSI/CTA–2037–C to CTA–2037–D improve clarity and repeatability of test results, while not increasing test burden. In this final rule, DOE amends the illuminance meter requirements in appendix H to reference section 7.1.3 of CTA–2037–D.

5. Video Input Device

Section 3.6 of appendix H contains video input device requirements that specify the use of a Blu-ray player and requires that the video input device manufacturer be different from the manufacturer of the UUT. In the March 2022 NOPR, DOE noted that ANSI/CTA–2037–C specifies the use of a USB flash drive [11] to play the IEC test clips. Specifically, sections 7.1.5 through 7.1.7 of ANSI/CTA–2037–C specify the use of a USB 3.0 flash drive that stores the test clips for playback and a separate media player that contains a USB port to send media to the UUT via an HDMI cable. ANSI/CTA–2037–C specifies that the media player must have a video setting that does not perform any video processing (*e.g.,* noise reduction, upscaling, or adjustment of color, hue, contrast, or brightness). ANSI/CTA–

[11] ANSI/CTA–2037–C refers to a USB flash drive as a ''USB thumb drive'' and a ''USB stick.''

2037–C does not include the requirement that the manufacturers for the media player and UUT must be different. 87 FR 87892, 87901.

ANSI/CTA–2037–C additionally requires that all media must be stored and played from a FAT32 or ExFAT [12]-formatted USB flash drive via the USB port in the media player. ANSI/CTA–2037–C requires that the test clips stored on the USB flash drive are played via a USB port on a media player instead of the designated USB port on a UUT. *Id.* In the March 2022 NOPR, DOE proposed to reference the video media player requirements from ANSI/CTA–2037–C. *Id.*

In the March 2022 NOPR, DOE requested comment on its proposal to reference the media player and USB flash drive requirements from ANSI/CTA–2037–C. *Id.* DOE also requested comment on whether DOE should maintain the current requirement that the media player and UUT must not be from the same manufacturer. *Id.*

CTA *et al.* recommended DOE adopt ANSI/CTA–2037–D and stated that there is no need to require that the media player and TV not be from the same manufacturer, as the requirements in ANSI/CTA–2037–D stipulate that the media player have a video setting that performs no video processing. CTA *et al.* stated that because of these requirements, the characteristics of the video played during testing will be the same regardless of who manufactured the video player. (CTA *et al.,* No. 21 at p. 12)

DOE agrees that ANSI/CTA–2037–D addresses the concern about the media player and TV not being from the same manufacturer by requiring that the media player have a video setting that performs no video processing. By removing any video processing, there is no concern about media players interacting differently with TVs from the same manufacturer. ANSI/CTA–2037–D clarifies that the HDMI cable must be a Certified Ultra High Speed HDMI Cable instead of just HDMI 2.0 or greater. As most HDMI 2.0 cables are ultra-high speed, this clarification explicitly specifies a requirement that was previously implicit. The clarification ensures that the HDMI cable is capable of transferring signal at the desired rate.

For the reasons discussed in the preceding paragraph and in the March 2022 NOPR, DOE is finalizing its proposal from the March 2022 NOPR to remove the requirement that the UUT and media player be from different manufacturers and instead specifies that the media player and USB flash drive requirements in appendix H be as specified in sections 7.1.5 through 7.1.7 of ANSI/CTA–2037–D.

6. Light Source for ABC Testing

For conducting tests for TVs with ABC enabled by default, appendix H requires the use of a lamp to alter the amount of light that is directed to the ABC sensor of the TV. Section 7.1.3.3 of appendix H specifies that the ABC lamp must be a standard spectrum, halogen incandescent aluminized reflector lamp and also includes specifications for the lamp diameter, beam angle, and center beam candlepower. Such a light source is used in conjunction with a variable transformer to control the brightness of the lamp, which in turn controls the illuminance at the ABC sensor. This setup measures TV power consumption at different room ambient conditions, reflecting TV usage that is sometimes in a bright room (*e.g.,* during the day) and other times in a dark room (*e.g.,* at night or with room lights turned off).

In the March 2022 NOPR, DOE stated that section 7.1.9 of ANSI/CTA–2037–C specifies the ABC light source requirements, namely that an LED reflector lamp with dimmer switch must be used to provide the specified room illuminance levels. Section 7.1.9 of ANSI/CTA–2037–C additionally specifies the diameter, rated beam angle, correlated color temperature, and color rendering index of the lamp. Further, it specifies a 1-percent allowable tolerance in illuminance measurement and the use of a neutral density (''ND'') filter to reach illuminance levels less than 10 lux, which are consistent with the current requirements in appendix H. 87 FR 11892, 11901–11902. In the March 2022 NOPR, DOE proposed to reference section 7.1.9 of ANSI/CTA–2037–C for the ABC light source requirements. *Id.* at 87 FR 11902.

In the March 2022 NOPR, DOE requested comment on its proposal to reference section 7.1.9 of ANSI/CTA–2037–C for the light source required for conducting tests with ABC enabled. *Id.*

CTA *et al.* commented that DOE should adopt the requirements in section 7.1.9 of ANSI/CTA–2037–D that describe the ABC light source. (CTA *et al.,* No. 21 at p. 13) ANSI/CTA–2037–D specifies that the selected lamps must be compatible only with leading-edge dimmers (*i.e.,* the lamp must not be a retrofit) and additionally specifies that the lamp shall be stabilized for 15 minutes immediately prior to conducting measurements. While testing was already conducted according to these requirements under ANSI/CTA–2037–C, these clarifications were included in ANSI/CTA–2037–D to improve the clarity and repeatability of the ABC lamp configuration.

From its experience conducting TVs testing, DOE has determined that the lamp specifications in ANSI/CTA–2037–D are consistent with current requirements in appendix H but are updated to use a more representative light source (*i.e.,* LEDs). DOE has conducted testing using such an LED lamp and did not find any substantive differences in the test conduct compared to using an incandescent lamp. DOE also agrees with the new requirements specified in ANSI/CTA–2037–D regarding a stabilization period and requiring that the lamp must not be retrofit because these requirements improve the repeatability of the test method. From its testing experience, DOE has determined that the light source specifications in ANSI/CTA–2037–D are an improvement to appendix H in representativeness and do not significantly increase burden.

For the reasons discussed in the preceding paragraph and in the March 2022 NOPR, DOE amends the light source for ABC testing requirements in appendix H to reference section 7.1.9 of ANSI/CTA–2037–D.

F. Test Room Setup

1. Room Ambient Conditions

Sections 4.1 and 4.2 of appendix H specify the ambient temperature and relative humidity conditions of the test room, respectively. The temperature conditions reference section 11.4.1 of IEC 62087:2011, which specifies a requirement of 23 degrees Celsius (''°C'') ± 5 °C. Section 4.2 of appendix H specifies that the ambient relative humidity must be maintained between 10 percent and 80 percent.

In the March 2022 NOPR, DOE stated that section 7.3 of ANSI/CTA–2037–C specifies the same ambient test room and relative humidity requirements as those currently specified in appendix H. 87 FR 11892, 11902. In the March 2022 NOPR, DOE proposed to reference these requirements from ANSI/CTA–2037–C. *Id.*

DOE requested comment on whether the specified ambient temperature and humidity requirements are adequate or whether the temperature and relative humidity specifications should include additional specification regarding the precision and/or accuracy of the instruments used to verify that the required ambient conditions are maintained. *Id.*

[12] FAT32 and ExFAT refer to file allocation formatting systems for storage devices such as USB flash drives. FAT32 means 32-bit version of FAT file allocation table system. exFAT means extensible file allocation table.

CTA *et al.* stated that the environmental conditions specified in section 7.3 of ANSI/CTA–2037–D are adequate and it is not necessary to include additional specifications regarding the precision or accuracy of the instruments used to verify the ambient conditions. CTA *et al.* stated that the additional specifications might make it considerably more difficult or expensive to obtain the measurement instruments without improving test results to any significant degree. (CTA *et al.,* No. 21 at p. 13)

ANSI/CTA–2037–D specifies the ambient relative humidity to be 45 percent ± 35 percent (non-condensing). This requirement is effectively the same as the requirement specified in ANSI/CTA–2037–C, which specifies the ambient relative humidity to be between 10 and 80 percent. ANSI/CTA–2037–D also specifies the ambient temperature to be 23°C ± 5°C, which is the same as the requirement specified in ANSI/CTA–2037–C and the current appendix H.

Given the ambient relative humidity and ambient temperature requirements specified in ANSI/CTA–2037–D are effectively the same as the requirements specified in the current appendix H, DOE amends the room ambient conditions in appendix H to reference section 7.3 of ANSI/CTA–2037–D.

2. Room Illuminance Level

Section 4.3 of appendix H specifies that all luminance and on mode testing must be performed in a room with an illuminance level less than or equal to 1.0 lux measured at the UUT's ABC sensor while the TV is in off mode or standby mode. In the March 2022 NOPR, DOE stated that section 7.4 of ANSI/CTA–2037–C specifies the same requirement but includes an additional requirement regarding the positioning of the illuminance meter used for this measurement (*i.e.,* the illuminance meter must be positioned at the ABC sensor in the same manner as it would be positioned during luminance and power measurement tests). 87 FR 11892, 11902. As this requirement is generally the same between appendix H and ANSI/CTA–2037–C, but with additional specificity regarding meter placement, which would further ensure repeatability and reproducibility of the test results, in the March 2022 NOPR, DOE proposed to reference section 7.4 of ANSI/CTA–2037–C for the room illuminance level. *Id.*

In the March 2022 NOPR, DOE requested comment on its proposal to reference section 7.4 of ANSI/CTA–2037–C for the room illuminance level and requirement to position the illuminance meter in the same manner as it would be positioned during luminance and power measurement tests. *Id.*

CTA *et al.* commented that DOE should adopt the requirements in section 7.4 of ANSI/CTA–2037–D, which specify the room illuminance level and the position of the illuminance meter when the room illuminance level is measured. (CTA *et al.,* No. 21 at p. 13)

The published ANSI/CTA–2037–D specifies the same requirements for room illuminance level as those specified in ANSI/CTA–2037–C. Because these requirements further ensure repeatability and reproducibility of the test results, DOE amends the room illuminance level in appendix H to reference section 7.4 of ANSI/CTA–2037–D.

3. UUT Installation and Placement

Section 4.4 of appendix H specifies that the UUT must be installed in accordance with manufacturer's instructions. Additionally, section 4.5 of appendix H includes requirements for TV placement, which specifies that TVs tested with ABC enabled must be placed at least 0.5 meters away from any wall surface and that all four corners of the face of the TV must be placed equidistant from a vertical reference plane.

In the March 2022 NOPR, DOE noted that many manufacturers provide instructions for multiple installation configurations for the TV, such as stand mounted and wall mounted, and do not specify a single method as a recommended or preferred approach. 87 FR 11892, 11902.

In the March 2022 NOPR, DOE stated that section 8 of ANSI/CTA–2037–C specifies the installation and setup requirements for the UUT as well as all other test equipment relative to the placement of the TV. Specifically, sections 8.2. 8.2.2, and 8.2.3 of ANSI/CTA–2037–C provide instructions on installing a UUT for testing, including a preference for installing a TV using a stand mount if possible; if not, using a wall mount; and if the UUT is neither stand-mounted nor wall-mounted (*e.g.,* permanently mounted in a wheeled furniture stand), special case installation instructions are specified in which the UUT assembly (including whatever support mechanisms or furniture that are part of the UUT) are positioned on a floor. Section 8.2.4 of ANSI/CTA–2037–C specifies requirements for positioning the ABC sensor relative to the UUT for cases where the UUT has an ABC sensor that is not permanently mounted on the display (*e.g.,* in an external enclosure or sound bar). *Id.*

Additionally, in the March 2022 NOPR, DOE noted that ANSI/CTA–2037–C describes the requirements for the placement of the LED lamp, camera photometer, and illuminance meter relative to the UUT. Section 8.1.1 of ANSI/CTA–2037–C specifies placing the LED lamp at a 45° angle, with a tolerance of 2°, pointed at the ABC sensor and also specifies requirements to ensure that light is not reflected off the TV screen. *Id.* In the March 2022 NOPR, DOE tentatively found that positioning the lamp at an angle rather than directly in front of the sensor would be more representative of real-world conditions, as lighting is generally not placed such that a lamp shines directly towards the ABC sensor; instead, any light reaching the sensor is generally directed at the TV screen at an angle, either from overhead lighting or floor lamps. *Id.* Accordingly, in the March 2022 NOPR, DOE proposed to adapt the requirements specified in ANSI/CTA–2037–C regarding lamp setup. *Id.*

In the March 2022 NOPR, DOE also stated that section 8.1.2 of ANSI/CTA–2037–C specifies that the illuminance meter must be oriented at an angle of 45° to be aimed directly at the light source, which is also oriented at 45° relative to, and pointing towards, the ABC sensor. ANSI/CTA–2037–C also requires a firm stationary mount for the illuminance meter to allow for consistent measurement of the illuminance. In the March 2022 NOPR, DOE proposed to reference these additional requirements for the illuminance meter setup within revised section 3 (Test Setup) of appendix H. *Id.*

In the March 2022 NOPR, DOE also stated that section 8.2.5 of ANSI/CTA–2037–C specifies detailed instructions for the placement and setup of the camera photometer, which is used for dynamic luminance measurement. The placement of the camera photometer is dependent on the size of the UUT. The distance between the camera photometer and the TV is proportional to the width of the TV, and the height of the camera photometer is always in the center of the height of the TV. The orientation is 0° with respect to the TV screen, with a 5° tolerance. Section 8.2.5 of ANSI/CTA–2037–C also provides instructions for how to prevent the moiré effect [13] by defocusing the camera

[13] The moiré effect refers to a visual perception that occurs when viewing the dots of the LEDs in the UUT superimposed on the pixels captured from the camera photometer. The overlapped patterns

Continued

photometer appropriately. DOE has conducted testing using this setup and has found this setup provides for a measurement of screen luminance in a repeatable manner. In the March 2022 NOPR, DOE proposed to reference the ANSI/CTA–2037–C requirements for the placement and setup of the camera photometer. *Id.* at 87 FR 11902–11903.

In the March 2022 NOPR, DOE stated that sections 7.1.10 and 8.2.1 of ANSI/CTA–2037–C include additional requirements regarding the table surface on which the UUT is placed for testing. This includes the specifications for covering the table with black, non-reflective cloth and placing a reflective card directly underneath the ABC sensor of the UUT. The reflective card is used to better redirect light from the ABC lamp into the ABC sensor, given the 45° angle of the ABC lamp. In the March 2022 NOPR, DOE proposed to reference these requirements in the test room setup section of appendix H. *Id.* at 87 FR 11903. DOE additionally noted that while it proposed to reference these requirements, the CTA working group was considering amending this requirement to specify that a ''minimally reflective cloth'' (such as black felt) rather than a ''non-reflective cloth'' be used for testing, since no material is truly non-reflective. *Id.* The published ANSI/CTA–2037–D has since finalized this requirement. In the March 2022 NOPR, DOE requested comment on its proposal to reference all the requirements specified in section 8 of ANSI/CTA–2037–C for the test room setup. These include the setup of the UUT, illuminance meter, camera photometer, table surface, and reflective card. DOE also requested comment on whether it would be appropriate to specify that the table surface must be covered with black, non-reflective cloth or whether DOE should specify a ''minimally reflective'' cloth instead. *Id.*

CTA *et al.* commented that DOE should adopt the requirements in section 8 of ANSI/CTA–2037–D regarding the physical setup of the test. CTA *et al.* also stated that DOE should adopt the requirements in section 8.2.1 of ANSI/CTA–2037–D, which differ from ANSI/CTA–2037–C by specifying ''minimally reflective'' cloth instead of ''nonreflective'' cloth. (CTA *et al.,* No. 21 at p. 13)

ANSI/CTA–2037–D specifies UUT setup requirements that are substantively the same as those specified in ANSI/CTA–2037–C, with two minor updates. First, ANSI/CTA–2037–D specifies that the table surface must be covered with black, minimally reflective cloth, as discussed in the March 2022 NOPR. Second, ANSI/CTA–2037–D specifies that the illuminance meter's position along the x-axis shall be minimized and shall be less than 95 millimeters. This requirement is effectively the same as that stated in ANSI/CTA–2037–C, which specified that the base of the dome (of the illuminance meter) must be placed on the bezel of the TV. The requirement in ANSI/CTA–2037–D includes a quantitative distance, which should improve repeatability in placing the illuminance meter consistently, but does not materially change the placement compared to ANSI/CTA–2037–C. For the reasons discussed in the preceding paragraphs and in the March 2022 NOPR, DOE amends the UUT installation and placement in appendix H to reference sections 7.1.10 and 8 of ANSI/CTA–2037–D.

G. Test Configuration

1. Configuration of Special Functions

Section 5 of appendix H specifies configuration requirements for various TV functions such as: additional functions and special functions; the setup of the TV when presented with forced menu prompts; a connection priority to be used for connecting the TV to the video input device; the selection of the preset picture setting for on mode tests; video aspect ratio; frame rate; sound level; and network connection configuration. For many of these requirements, appendix H references the requirements specified in relevant sections of IEC 62087:2011. The requirements specified in appendix H are also consistent with earlier versions of the ANSI/CTA–2037 standard.

In the March 2022 NOPR, DOE noted that as TV technology has evolved, the configuration requirements currently specified in appendix H may not be as representative of current TV use. 87 FR 11892, 11903. DOE additionally noted that special functions such as MDD often trigger a more significant decrease in power consumption when testing with the IEC test clip compared to other real-world media content. *Id.* DOE additionally stated that ANSI/CTA–2037–C provides setup requirements for functions including quick start, MDD, and forced menus. Section 9.1 of ANSI/CTA–2037–C specifies that the UUT must operate on the latest manufacturer-supplied firmware and requires a factory reset to ensure the TV is configured with the most recent firmware update. Section 9.2 of ANSI/CTA–2037–C specifies instructions for the initial configuration of the UUT, including how to adjust according to initial setup and forced menu prompts that may have multiple configurations from which to choose. DOE stated that ANSI/CTA–2037–C specifies disabling accessibility settings intended for vision or hearing-impaired viewers as well as choosing the configuration that does not include the addition of content such as applications (*i.e.,* ''apps'') or TV stations. Other than these exceptions, in the March 2022 NOPR, DOE stated that ANSI/CTA–2037–C specifies that the most power-consumptive configuration must be selected, and the selection must be verified via a test if the most power-consumptive configuration is unknown. *Id.*

In the March 2022 NOPR, DOE additionally stated that section 9.7 of ANSI/CTA–2037–C requires all testing to be completed with MDD disabled. Further, section 9.9 of ANSI/CTA–2037–C provides criteria that are used to determine whether quick start is enabled or disabled during testing. Specifically, quick start is enabled during testing if it is enabled by default or if the wake time of the TV is greater than or equal to 10 seconds when quick start is disabled. In the latter scenario, quick start is enabled to provide the shortest possible resume time. To determine the wake time of the TV for the quick start configuration, ANSI/CTA–2037–C specifies connecting the UUT to LAN without any other devices connected, playing the SDR IEC test clip, turning off the TV for 20 minutes, and turning it back on such that it is configured to turn on to the HDMI input connection that is playing the IEC test clip. The time between turning on the TV to content being displayed is determined to be the wake time of the TV for the configuration of quick start function. *Id.* at 87 FR 11903–11904.

In the March 2022 NOPR, DOE proposed to adopt through reference sections 9.1, 9.2, 9.7, and 9.9 of ANSI/CTA–2037–C. *Id.* at 87 FR 11904. DOE tentatively determined that adopting these sections would address stakeholder comments in response to the June 2016 RFI, would make the DOE test procedure consistent with the industry standard for the configuration of these settings, and would ensure that the DOE test procedure is measuring power consumption in a representative and repeatable manner. *Id.* While DOE proposed to reference these requirements, DOE noted in the March 2022 NOPR that the most power consumptive configuration of a special function may not be readily identified, as required in section 9.2 of ANSI/CTA–2037–C, particularly because ANSI/CTA–2037–C specifies on mode testing

can cause a glare in the recorded image, which can impact results if not corrected.

at three preset picture settings. DOE noted that ANSI/CTA–2037–C does not address which configuration should be selected if a given special function impacts power consumption differently when testing the different preset picture settings or power modes. Additionally, DOE noted in the March 2022 NOPR that the CTA working group was considering updating this requirement to specify that the most energy consumptive configuration of a special function must be selected if a forced menu is displayed requiring the configuration of special functions. *Id.*

DOE also acknowledged in the March 2022 NOPR that the CTA working group was considering changing how the most consumptive state is determined. Specifically, the working group was considering changing this requirement to specify that the option that is more likely to increase energy consumption be selected. As an example, if a UUT has a prompt for enabling or disabling location sharing, this special function is unlikely to use a significant amount of additional energy, but it is more likely that enabling it will result in higher energy consumption than disabling it, and therefore, location sharing should be enabled during testing, according to the language under consideration by the CTA working group. *Id.* DOE additionally stated that the CTA working group was considering other alternate language to eliminate subjective configuration of special functions from forced menu prompts. In particular, the working group was considering specifying that if it is unknown which configuration yields the most energy consumptive state, then the configuration that enables more functionality should be selected, such as location sharing, data reporting, or data backup. However, if a forced menu is displayed requesting the configuration of features that would reduce or save energy, the configuration that consumes maximum energy should be selected (*e.g.,* smart viewing modes or energy saving functionality). The ultimate goal of such a requirement would be to select the configuration that consumes the most energy, and it is expected that, generally, enabling more functionality would consume more energy. The CTA working group was also considering selecting the option that is highlighted or pre-selected when a given forced menu prompt appears on the screen. *Id.*

At the time of the March 2022 NOPR, the CTA working group was also considering specifying that the TV must be tested in the default settings for all functions other than those that require configuration when a forced menu prompt appears on the screen. Further, the working group was considering specifying that the tester must not log into any services if prompted by a forced menu during initial setup, unless it is required for the setup of any other functionality noted in the standard (*e.g.,* smart wake functionality setup via a smart speaker). *Id.* The working group also intended to clarify certain requirements for quick start. In particular, to measure the quick start wake time, ANSI/CTA–2037–C specifies that the test must be conducted on LAN, without WAN connection. The working group intended to remove this requirement for ANSI/CTA–2037–D, so that the quick start wake time check is conducted under the same settings as the rest of the test (*i.e.,* on WAN). Additionally, ANSI/CTA–2037–C specifies that the wake time must be measured when the UUT wakes to the HDMI input. However, it does not state how the wake time should be measured if the UUT does not wake to the HDMI input. For ANSI/CTA–2037–D, the working group was considering specifying that if the UUT does not wake to displaying video content from the HDMI port, then the wake time measurement period would end as soon as an HDMI input port can be selected to play content. *Id.*

In the March 2022 NOPR, DOE requested comment on whether it should consider requiring that if a forced menu is displayed requesting the configuration of specific features, then the most energy consumptive configuration, as represented by AEC, must be selected (rather than the most power consumptive configuration). Additionally, if stakeholders supported the use of the most power consumptive configuration, DOE requested comment on whether it should specify that the power consumption measurement is averaged over the duration of the test. *Id.* at 87 FR 11905.

DOE also requested comment on any approaches that were under consideration for ANSI/CTA–2037–D by the CTA working group for the initial setup of the TV, the configuration of forced menu options, or the requirements for the quick start wake time measurement test. *Id.*

CTA *et al.* recommended that DOE adopt ANSI/CTA–2037–D, including the requirements in section 9.2 of ANSI/CTA–2037–D, which stipulate that, if a forced menu is displayed, then the menu selection(s) which result in the most energy consumptive state shall be selected. CTA *et al.* also stated that the most energy consumptive state does not need to be determined by running complete tests and calculating AEC for each configuration. Instead, if the most energy consumptive state is not obvious, then the configuration that results in the most functionality should be selected. (CTA *et al.,* No. 21 at p. 13)

CTA *et al.* also commented that DOE should adopt the requirements in section 9.11 of ANSI/CTA–2037–D for quick start functionality, which requires that quick start wake time be measured to determine if it should be enabled during testing. (*Id.* at p. 14) ANSI/CTA–2037–D includes some updates in the introductory text of section 9 and sections 9.1, 9.2, 9.7, and 9.10 (which is the new section number for quick start requirements, compared to section 9.9 in ANSI/CTA–2037–C). Specifically, the introductory text of section 9 specifies explicitly that the UUT must be configured and tested in the home configuration,[14] while this same requirement is specified in section 9.2 of ANSI/CTA–2037–C. Accordingly, DOE is adopting the introductory text in section 9 of ANSI/CTA–2037–D in this final rule.

Additionally, section 9.1 of ANSI/CTA–2037–C specifies that the UUT must operate on the latest manufacturer-supplied firmware. Section 9.1 of ANSI/CTA–2037–D specifies the same requirements but changes the term ''firmware'' to ''software;'' *i.e.,* the UUT must operate on the latest manufacturer-supplied software. As discussed previously, ANSI/CTA–2037–D also includes a definition for ''software,'' which specifies, in part, that code that might be classified as ''firmware'' elsewhere is classified as ''software'' in ANSI/CTA–2037–D. Overall, it is DOE's understanding that while ANSI/CTA–2037–C and ANSI/CTA–2037–D use different terminologies, the intent of the requirement is the same. Accordingly, DOE is adopting section 9.1 of ANSI/CTA–2037–D for the UUT software update requirements.

Section 9.2 of ANSI/CTA–2037–C and ANSI/CTA–2037–D specify the initial steps to configurate the TV prior to conducting tests. However, in the published ANSI/CTA–2037–D, the CTA working group finalized each of the items that were discussed as being under consideration in the March 2022 NOPR. These include configuration of features required via forced menu prompts using the most energy consumptive state rather than the most power consumptive state. ANSI/CTA–2037–D also specifies that the most energy consumptive state is selected

[14] Home configuration is the configuration designed for typical consumer viewing and is recommended by the manufacturer for home environments. It is typically selected from the forced menu wherein a selection needs to be made for ''home'' vs. ''retail'' configurations.

based on the configuration that enables more functionality unless the feature would reduce or save energy, in which case the configuration that consumes maximum energy is selected, as discussed in the March 2022 NOPR. Section 9.2 of ANSI/CTA–2037–D also specifies that the tester must not log into any services if prompted by a forced menu during initial setup, unless it is required for the setup of any other functionality noted in the standard (*e.g.,* smart wake functionality setup via a smart speaker), as discussed in the March 2022 NOPR. These clarifications are intended to improve repeatability and reproducibility while configuring the initial TV settings. Accordingly, DOE is adopting section 9.2 of ANSI/CTA–2037–D for the initial configuration requirements. DOE notes that ANSI/CTA–2037–D also includes a new section 9.2.1 to specify network configuration requirements. These requirements were previously specified in section 9.10 of ANSI/CTA–2037–C. DOE discusses networking requirements in section III.G.6 of this document.

Section 9.7 of ANSI/CTA–2037–D specifies the same requirements as those specified in section 9.7 of ANSI/CTA–2037–C and discussed in the March 2022 NOPR for the configuration of MDD for SDR preset picture settings. Since MDD is not known to impact power consumption of HDR10 preset picture settings when tested with the HDR10 IEC test clip, the configuration of MDD in the HDR10 preset picture setting is not expected to impact results. Accordingly, DOE is adopting section 9.7 of ANSI/CTA–2037–D for the MDD setup.

Finally, for the quick start requirements specified in section 9.10 of ANSI/CTA–2037–D, the CTA working group adopted each of the requirements that were discussed as being under consideration in the March 2022 NOPR. The updated quick start requirements are intended to reduce burden by removing the requirement to wait for displayed content to appear, which is sometimes not repeatable, and improve representativeness by clarifying that the TV be connected to LAN and WAN. Accordingly, DOE is adopting section 9.10 of ANSI/CTA–2037–D for the quick start requirements.

2. Media Player Setup and Connection

Sections 5.2 and 5.3 of appendix H require the use of an HDMI input cable and the HDMI input terminal that is designed for viewing live TV or dynamic content from a Blu-ray Disc player or set-top-box. However, appendix H does not provide additional instructions regarding the settings that must be selected for the media player (*e.g.,* noise reduction, upscaling, etc.).

In the March 2022 NOPR, DOE stated that section 9.3 of ANSI/CTA–2037–C specifies requirements for playing video test files using the media player. Specifically, this section specifies that for all UUT setup and test tasks requiring video play, video test files stored on a USB flash drive shall be played from the media player by inserting the USB flash drive into the media player, connecting the media player to the UUT using an HDMI cable, and selecting the HDMI input on the UUT associated with the media player. On the media player, a video setting shall be selected that performs no video processing (*e.g.,* no noise reduction, no upscaling, no adjustment of color, hue, contrast, or brightness). 87 FR 11892, 11905.

Accordingly, in the March 2022 NOPR, DOE proposed to incorporate by reference section 9.3 of ANSI/CTA–2037–C for the media player setup and connection. *Id.* DOE received no comments specific to this topic in response to the March 2022 NOPR.

The published ANSI/CTA–2037–D specifies the same requirements in section 9.3. Accordingly, DOE amends appendix H by referencing the media player setup and connection requirements in section 9.3 of ANSI/CTA–2037–D.

3. Test Clips

Appendix H currently specifies use of the IEC 62087:2011 Blu-ray Disc dynamic broadcast-content video signal (*i.e.,* the IEC test clip) for all on mode testing. Section 5.7 of appendix H requires the video aspect ratio of the video signal to fill the entire screen, and section 5.8 of appendix H requires the frame rate and resolution of the video signal to match the highest available format signal capable of the UUT.

In the March 2022 NOPR, DOE noted that stakeholders have collaborated during both IEC and CTA working groups to identify an appropriate test clip for TV testing. As a result of these meetings, the SDR IEC test clip continues to be used for testing the SDR preset picture settings. Additionally, an adapted HDR10 test clip (referred to as the ''HDR10 IEC test clip'' elsewhere in this document), has been developed by the Collaborative Labeling and Appliance Standards Program (''CLASP''), for testing HDR10 preset picture settings. Members of the IEC and CTA working groups have agreed to use this HDR10 test clip for testing HDR10 preset picture settings in the respective industry standards. 87 FR 11892, 11905–11906

In the March 2022 NOPR, DOE stated that ANSI/CTA–2037–C specifies use of the SDR IEC test clip for SDR preset picture settings and the HDR10 IEC test clip for HDR10 preset picture settings, while providing similar direction as appendix H for the aspect ratio, resolution, and frame rate of the video signal. *Id.* at 87 FR 11906. Additionally, ANSI/CTA–2037–C specifies that the test clips be played via a USB flash drive rather than a Blu-ray Disc. *Id.*

Accordingly, in the March 2022 NOPR, DOE proposed to reference sections 7.2 and 9.5 of ANSI/CTA–2037–C for the test clip provisions. Section 7.2 of ANSI/CTA–2037–C specifies the video files that should be used for determination of on mode power consumption and states that the file with the highest resolution supported by the UUT shall be used. Four test clips are specified in ANSI/CTA–2037–C, two of which are used for SDR preset picture settings and two of which are used for HDR10 preset picture settings. Section 9.5 of ANSI/CTA–2037–C additionally specifies that the aspect ratio of the video content must fill the entire screen without being cropped to ensure all TV pixels are activated during testing. *Id.*

In the March 2022 NOPR, DOE requested comment on its proposal to reference the SDR and HDR10 IEC test clips specified in ANSI/CTA–2037–C for testing TVs in the default, brightest, and HDR10 preset picture settings. *Id.*

ASAP *et al.* stated that the proposed IEC test clips have abnormally short scenes and lack TV viewing-related sounds, such as human voices, that are found in typical TV content. ASAP *et al.* encouraged DOE to develop a new test clip that is more representative of real-world video and sound as part of a future rulemaking. (ASAP *et al.,* No. 18 at p. 2)

DOE recognizes that the SDR IEC test clip may not be entirely representative of current real-world video content. However, DOE has determined that certain other requirements specified in this final rule (*e.g.,* configuration of special functions, preset picture settings selected for on mode testing, dynamic luminance measurement, etc.) address many of the identified shortcomings of the SDR IEC test clip, particularly related to the short scenes. DOE additionally notes that the HDR10 IEC test clip specified by this final rule is more representative of real-world video content.

In addition, DOE believes that IEC is the most suitable forum to build international consensus on the development of a future test clip to be used for TV energy testing. If a new test

clip were to be developed through international consensus, DOE would evaluate the clip and, if appropriate, consider it for the DOE test procedure. DOE would welcome participation in any such international effort.

ANSI/CTA–2037–D includes the same requirements regarding test clips as those discussed in the March 2022 NOPR. Additionally, the published standard includes the websites at which each of the test clips can be accessed. For the reasons discussed above, and in the March 2022 NOPR, DOE adopts the requirements for the test clips in appendix H as referenced in sections 7.2 and 9.5 of ANSI/CTA–2037–D.

4. Preset Picture Settings for On Mode Tests

Appendix H requires on mode testing only in the default preset picture setting. In the March 2022 NOPR, DOE specified that ANSI/CTA–2037–C requires on mode testing using three preset picture settings, based on the functionality of the TV: default SDR, brightest SDR, and the default HDR10 preset picture settings. 87 FR 11892, 11907. In the March 2022 NOPR, DOE explained that these preset picture settings are determined as specified in sections 9.6 and 9.8 of ANSI/CTA–2037–C. Specifically, section 9.6 of ANSI/CTA–2037–C requires the tester to play the SDR IEC test clip to identify the SDR default preset picture setting and the HDR10 IEC test clip to identify the HDR10 default preset picture setting. If ABC is enabled by default in these preset picture settings, the on mode test is conducted with ABC enabled. Section 9.8 of ANSI/CTA–2037–C instructs the tester to identify the brightest preset picture setting using the SDR IEC test clip, which is played for 5 minutes while the camera photometer collects the dynamic luminance of the UUT in each preset picture setting. The preset picture setting with the highest dynamic luminance is determined to be the brightest preset picture setting and is used during on mode testing. Section 9.8 of ANSI/CTA–2037–C also includes details such as how to determine the brightest preset picture setting if the dynamic luminance of each considered preset picture setting is very similar and specifies certain preset picture settings that are specifically excluded, such as ''PC'' or ''Game.'' *Id.* Additionally, DOE stated in the March 2022 NOPR that the CTA working group was considering explicitly stating that the brightest preset picture setting must be identified with ABC disabled. *Id.*

In the March 2022 NOPR, DOE had tentatively determined the methodology specified in ANSI/CTA–2037–C addressed many of the issues in appendix H pertaining to testing only a single preset picture setting; and that the methodology specified in ANSI/CTA–2037–C—capturing a range of preset picture settings that are reflective of different resolutions and brightness settings that consumers may choose among—would produce test results that are more representative of average TV use than the current requirements of appendix H. *Id.*

Accordingly, in the March 2022 NOPR, DOE proposed to reference sections 9.6 and 9.8 of ANSI/CTA–2037–C to identify the preset picture settings that must be selected for testing. DOE additionally proposed to specify that the brightest preset picture setting must be identified with ABC disabled.

In the March 2022 NOPR, DOE also noted that it was aware of certain preset picture settings being introduced on recent TVs that are known to adapt the TV's configuration based on the content, usage pattern, and the environment in which the TV operates. These TVs use artificial intelligence technology to adapt and adjust these settings and such a preset picture setting is sometimes available in addition to Filmmaker mode (defined in section III.C of this document). *Id.* While DOE did not propose any requirement around such a preset picture setting in the March 2022 NOPR, it requested additional information about such preset picture settings and whether DOE should consider excluding such preset picture settings when selecting the default SDR, brightest SDR, and default HDR10 preset picture settings that are required for testing on mode power consumption. *Id.*

In the March 2022 NOPR, DOE requested comment on its proposal to reference the requirements in ANSI/CTA–2037–C for the selection of the preset picture settings that must be used for testing and additionally specifying that the brightest preset picture setting be identified with ABC disabled. *Id.*

In the March 2022 NOPR, DOE also requested information on preset picture settings that can adapt the TV's configuration based on content, usage pattern, environment, etc. DOE also requested comment on whether such preset picture settings should be excluded from testing, even if they are one of the default SDR, brightest SDR, or default HDR10 preset picture settings. If stakeholders support excluding such a preset picture setting from testing, DOE requested comment on which preset picture setting(s) should be used for testing instead, particularly if the intelligent preset picture setting is a default SDR or default HDR10 preset picture setting. *Id.*

CTA *et al.* commented that DOE should adopt the requirements in section 9.6 of ANSI/CTA–2037–D for the identification of the default SDR and HDR10 preset picture settings. CTA *et al.* also recommended adopting the requirements in section 9.8 of ANSI/CTA–2037–D for the selection of the brightest preset picture setting. (CTA *et al.,* No. 21 at p. 14)

ComEd and NEEA stated there is insufficient information about adaptive picture settings to include them in the test procedure and 2019 NEEA field research showed little use of these settings. (ComEd and NEEA, No. 20 at p. 4)

DOE notes that adaptive picture settings may cause repeatability and reproducibility issues by altering the TVs configuration during testing. Therefore, DOE agrees with ComEd and NEEA that adaptive picture settings should be excluded from the test procedure.

Sections 9.6 and 9.8 of the published ANSI/CTA–2037–D specify the same requirements as those proposed in the March 2022 NOPR, including determining the brightest preset picture setting with ABC off. As no other changes have been made to the preset picture selection between ANSI/CTA–2037–C and ANSI/CTA–2037–D, DOE amends the preset picture settings for on mode testing to reference sections 9.6 and 9.8 of ANSI/CTA–2037–D.

5. Sound Level

Section 5.9 of appendix H specifies that the TV sound level shall be configured in accordance with section 11.4.11 of IEC 62087:2011. Section 11.4.11 of IEC 62087:2011 specifies that the volume control shall be adjusted to a level at which the sound output is audible. DOE understands this instruction to mean starting with the volume control at zero and increasing the volume until an audible level is achieved.

In the March 2022 NOPR, DOE stated that section 9.4 of ANSI/CTA–2037–C specifies that the volume control shall be adjusted to a level greater than zero that is closest to 2 percent of the maximum (*e.g.,* a TV with a maximum level of 30 would have its volume set to 1). As this requirement is more objective than the current requirement specified in IEC 62087:2011, while resulting in comparable sound levels, in the March 2022 NOPR, DOE proposed to reference section 9.4 of ANSI/CTA–2037–C for the sound level requirements in appendix H. 87 FR 11892, 11907.

ASAP *et al.* encouraged DOE to consider measuring power consumption using more representative TV sound

levels as part of a future rulemaking and encouraged DOE to conduct testing at different sound levels to determine the relationship between TV volume and power consumption. (ASAP *et al.,* No. 18, at p. 2)

In the NOPR public meeting, NEEA and Pacific Crest Lab (''PCL'') commented that the current test clips have 1 kilohertz (''kHz'') sine waves as the sound on the test clips and the test clips would need to be redesigned to accommodate more representative sound. Associated with the update to the test clip, NEEA and PCL stated that testing laboratories would also need to be redesigned, with soundproofing for instance, if a more representative sound is used on the test clip. NEEA and PCL additionally stated that it would be a longer-term goal to change the sound requirements for the TV test procedure. (Public Meeting Transcript, No. 16 at p. 43–44)

DOE has determined that the sound level configuration specified in ANSI/CTA–2037–D (which is same as the requirement in ANSI/CTA–2037–C) ensures a repeatable and reproducible sound level by specifying the volume be set to a percentage of the maximum volume rather than relying on the audibility of the sound. Accordingly, DOE is adopting this requirement in this final rule. Should additional data become available regarding the impact of sound level on measured power use, or a representative sound level for conducting testing, DOE may consider a different sound level in a future test procedure rulemaking.

For reasons discussed here and, in the March 2022 NOPR, DOE amends the sound level configuration to reference section 9.4 of ANSI/CTA2037–D.

6. Network Configuration

Section 5.10 of appendix H specifies the network connection configuration to which the UUT must be connected. Section 5.10.2 of appendix H requires the UUT to be connected to a LAN both in on mode and prior to being placed in standby mode, if the TV is network enabled. The LAN shall allow devices to ping other devices on the network but must not allow access to a WAN. Section 5.10.2 of appendix H also provides a network connection hierarchy table prioritizing that the UUT be connected via Wi-Fi, then Ethernet if Wi-Fi is not supported by the UUT.

Sections 7.1.8, 9.9, 9.10, and 9.11 of ANSI/CTA–2037–C include requirements for network-related equipment and configuration of network connections, and configuration of specified networking devices. Specifically, section 7.1.8.1 of ANSI/CTA–2037–C specifies that the internet network connection shall support download speeds of at least 25 megabytes per second (''MBps'') and upload speeds of at least 3 Mbps. Sections 7.1.8.2 and 7.1.8.3 specify the use of a smart speaker that shall be used to conduct the wake-by-smart-speaker test and the use of a mobile device that is used for remote control and casting applications. Section 7.1.8.4 of ANSI/CTA–2037–C specifies that a network traffic generator shall be configured to output multicast discovery packets to the LAN every 1 second. The packets include requests to the UUT typical of everyday use [15] that can be responded to over LAN by the UUT. 87 FR 11892, 11907–11908. Section 9.10 of ANSI/CTA–2037–C requires that for UUTs that are network enabled, both the on mode and standby mode tests be conducted with the UUT connected to WAN as well as up to three additional devices (*i.e.,* the smart speaker, mobile device, and network traffic generator) connected via the LAN. Section 9.10 also requires that the LAN network include no other networking devices besides the devices required to conduct the test (*i.e.,* the smart speaker, mobile device, and network traffic generator). Section 9.11 of ANSI/CTA–2037–C specifies that for TVs that are advertised to support wake-by-remote-control-app (''WbRA''), wake-on-cast (''WoC''), or wake-by-smart-speaker (''WbS''), enable as many of the supported smart wake features as possible. Any devices used to configure these features (*e.g.,* mobile device, smart speaker, etc.) should be connected to the same LAN as the UUT. Section 9.11 of ANSI/CTA–2037–C further specifies that the goal is to configure the UUT to wake with as many of the three identified smart wake features as possible.

DOE stated in the March 2022 NOPR, that the CTA working group was considering explicitly specifying the following additional requirements: (a) the LAN must not include other networking devices besides the devices required to conduct the test; (b) internet connectivity must be confirmed (*e.g.,* by streaming media); (c) if the UUT does not support Wi-Fi or Ethernet connectivity then it shall not be connected to other possible forms of network connection (*e.g.,* MoCA); and, (d) the three smart wake features must be enabled before performing any of the on or standby mode tests. *Id.*

DOE's analysis of the market indicates that most TVs currently on the market are equipped with the capability to connect to the network. The growing availability of streaming services and video content via digital media suggests that a growing percentage of TVs are connected to an active internet connection when installed in a consumer's home. Additionally, the growth in the market for connected devices, particularly mobile devices and smart speakers, suggests that these devices are also becoming more prevalent in consumer homes.

Based on an analysis of the market and the requirements specified in ANSI/CTA–2037–C and those under consideration at the time for ANSI/CTA–2037–D, in the March 2022 NOPR, DOE tentatively concluded that the network configuration requirements specified in ANSI/CTA–2037–C—which require an active internet connection for the TV and the configuration of three different types of devices connected to the same local network—are more representative of TVs currently sold on the market than the requirements currently specified in appendix H. Therefore, in the March 2022 NOPR, DOE proposed to reference the network connection requirements specified in sections 7.1.8, 9.10, and 9.11 of ANSI/CTA–2037–C. *Id.*

DOE additionally noted that it had found through its testing that configuring the specified network devices, especially the smart speaker, to communicate with the TV was challenging for some TV models due to inadequate setup instructions. Further, DOE experienced challenges pairing certain TV models with smart speakers, noting that some TV models could only connect to certain smart speaker brands, but not others. *Id.*

In the March 2022 NOPR, DOE requested comment on its proposal to reference sections 7.1.8, 9.10, and 9.11 of ANSI/CTA–2037–C for the network configuration requirements. DOE also requested comment on the updates being considered by the CTA working group for ANSI/CTA–2037–D as they pertain to the WAN and LAN connection requirements and the connection requirements for smart wake features. *Id.*

DOE also requested feedback on its observed challenges with pairing certain TV models with smart speakers. *Id.*

CTA *et al.* stated that DOE should adopt the requirements in sections 7.1.8, 9.9, and 9.10 of ANSI/CTA2037–D [16] regarding network configuration

[15] For example, the packets include commands sent to the Google and Spotify internet servers.

[16] DOE observes that while CTA *et al.* commented that the relevant network configuration requirements are specified in sections 7.1.8, 9.9, and 9.10 of ANSI/CTA–2037–D, the requirements are in fact specified in sections 7.1.8, 9.2.1, and 9.9 of ANSI/CTA–2037–D.

requirements. CTA *et al.* additionally stated that, at the time of filing the comments, the CTA working group was still discussing appropriate wording for section 7.1.8 and its subsections, which describe the network activity to be generated during testing. (CTA *et al.,* No. 21 at p. 14) CTA *et al.* additionally commented that DOE should adopt the requirements from ANSI/CTA–2037–D, including section 9.10 [17] which describes how to configure a TV to be woken using smart speakers and how to address situations where a smart speaker is unable to wake the TV. CTA *et al.* noted that, according to CTA *et al.,* ANSI/CTA–2037–D addressed the issues pertaining to pairing certain TVs with certain smart speakers. (*Id.* at p. 15) CTA *et al.* commented that DOE should not include any additional specifications beyond those specified in ANSI/CTA–2037–D. (*Id.*)

ANSI/CTA–2037–D generally includes the same networking requirements as those specified in ANSI/CTA–2037–C. While DOE referenced sections 7.1.8, 9.10, and 9.11 of ANSI/CTA–2037–C for the networking requirements in the March 2022 NOPR, these same requirements are specified in sections 7.1.8, 9.2.1, and 9.9 of ANSI/CTA–2037–D. Additionally, section 7.1.8 of ANSI/CTA–2037–D removes the requirement regarding additional packet generation as specified in ANSI/CTA–2037–C. Based on DOE's ongoing participation in the CTA standard development process, DOE understands that the reason for removing this requirement is that the wake features utilized during the on mode and standby testing already generate packets that are representative of average household usage, and that any additional packets generated artificially via a packet generator would not be representative.

Additionally, the requirements in section 9.9 of ANSI/CTA–2037–D are generally the same as those in section 9.11 of ANSI/CTA–2037–C, except that section 9.9 of ANSI/CTA–2037–D removes the test specified in ANSI/CTA 2037–C to confirm at the end of a standby mode test that the TV can be powered on via a smart wake feature. Instead, section 9.9 of ANSI/CTA–2037–D specifies that to reduce test burden, the test method does not require testers to confirm [via a separate test] that they have configured smart wake features to persist throughout the entire standby test period; however, testers should confirm that they understand how to achieve this result for all UUT brands or platforms tested.[18] Section 9.9 of ANSI/CTA–2037–D additionally provides guidance for the tester if any of the smart wake functions do not work. This includes testing with a different smart speaker brand and suggesting enabling quick start, which is a common setting that must be enabled for smart wake features to function and mitigates the challenges that DOE observed when testing according to a draft version of ANSI/CTA–2037–C associated with pairing the smart speaker with the TV. The smart wake devices are also required to stay configured to the UUT even if the 5-second check is not successful. These requirements generally ensure that testing is conducted in the same environment as that specified in ANSI/CTA–2037–C.

DOE found that the additional instructions for configuring and connecting the smart speaker provided by ANSI/CTA–2037–D are helpful for informing testers of the common missteps made while configuring the smart speaker and would help improve repeatability and reproducibility across test labs. Additionally, the updated network requirements in ANSI/CTA–2037–D are more representative of modern TVs and home network environments. For the reasons discussed here and, in the March 2022 NOPR, DOE amends the network configuration requirements to reference sections 7.1.8, 9.2.1, and 9.9 of ANSI/CTA–2037–D.

H. Test Conduct

Section 7 of appendix H specifies the tests for measuring on mode power consumption, luminance, standby mode power consumption, and off mode power consumption. The following sections describe the amendments DOE proposed to each of these tests in the March 2022 NOPR as well as the final requirements adopted in this final rule.

1. On Mode Test

As discussed in previous sections, in the March 2022 NOPR, DOE proposed to adopt the testing requirements specified in ANSI/CTA–2037–C, which specifies a new method to measure dynamic screen luminance at the same time as on mode power consumption. Accordingly, the on mode test specified in ANSI/CTA–2037–C specifies requirements for camera configuration, UUT stabilization, and measurement of luminance and power consumption. 87 FR 11892, 11908.

Section 10 of ANSI/CTA–2037–C specifies the camera configuration and UUT stabilization procedure. First, the camera photometer must be configured to ensure that the UUT's screen border fits in the camera's field of view. Additionally, the color correction factors must be identified, if necessary, per the camera manufacturer's instructions. The UUT is then stabilized by playing the first 5 minutes of the IEC SDR test clip multiple times until the average power level between successive runs of the clip is within 2 percent. The procedure specifies that final camera configuration is performed just before on mode testing so that the UUT remains stabilized during the transition from this step to on mode testing. In the March 2022 NOPR, DOE proposed to reference section 10 of ANSI/CTA–2037–C in appendix H to specify the UUT and camera photometer stabilization requirements.

Section 11.1 of ANSI/CTA–2037–C specifies the on mode test conduct, which as discussed, specifies measuring power consumption and dynamic luminance simultaneously. ANSI/CTA–2037–C specifies conducting on mode testing in the SDR default, SDR brightest, and HDR10 default preset picture settings. All UUTs are tested with ABC off at the default backlight in each preset picture setting. In ANSI/CTA–2037–C, any preset picture setting with ABC off by default is additionally tested with the backlight level set to 20 percent of its maximum backlight level. As specified in ANSI/CTA–2037–C, any preset picture setting with ABC on by default is additionally tested at 140 lux, 50 lux, 17 lux, and 4 lux room illuminance levels. These room illuminance levels are not identical, but are in practice equivalent, to the room illuminance levels specified in the current appendix H (*i.e.,* 100 lux, 35 lux, 12 lux, and 3 lux) for the following reason. Appendix H requires the lamp to be placed directly in front of the ABC sensor to set room illuminance levels at 100 lux, 35 lux, 12 lux, and 3 lux. Given that ANSI/CTA–2037–C specifies the lamp to be placed at an angle of 45° from the ABC sensor, the room illuminance levels are slightly higher to ensure that the light at the ABC sensor is equivalent to the current room illuminance values with the lamp placed directly in front of the ABC sensor.

In the March 2022 NOPR, DOE proposed to reference these requirements for the on mode power and luminance measurements in the default SDR, brightest SDR, and default HDR10 preset picture settings. However, for the brightest SDR preset picture setting, in the March 2022 NOPR DOE proposed to only utilize the on mode

[17] These requirements are specified in section 9.9 of ANSI/CTA–2037–D.

[18] Section 9.9 of ANSI/CTA–2037–D further states that, for example, it is common that the Quick Start feature must be enabled in order to enable persistent smart wake features.

power consumption with ABC disabled for the calculation of AEC, regardless of the default ABC setting. This is because the selection of the brightest preset picture setting is performed with ABC disabled [as discussed in section III.G.4 of this document]. If ABC were then enabled during the on mode measurement test, it would be inconsistent with how the preset picture setting was selected and may not truly capture the intended brightest preset picture setting's luminance and power. 87 FR 11892, 11908.

In the March 2022 NOPR, DOE requested comment on its proposal to reference section 10 of ANSI/CTA–2037–C for the camera photometer and stabilization requirements. DOE also requested comment on its proposal to reference section 11.1 of ANSI/CTA–2037–C for the on mode dynamic luminance and power measurement. Specifically, DOE requested comment on using the brightest preset picture setting measurement with ABC turned off for the AEC calculation, regardless of its default setting. *Id.*

Additionally, in the NOPR public meeting, DOE discussed that the CTA working group was considering specifying certain additional requirements for the on mode tests. Specifically, DOE noted that the working group was considering specifying that ABC-enabled tests that are conducted at each room illuminance level should include a 1-minute stabilization period at each room illuminance level. (*See* Public Meeting Transcript, No. 16 at p. 26) DOE additionally noted that for preset picture settings with ABC disabled by default, the CTA working group was considering replacing the measurement point at 20 percent of the maximum backlight level with two measurement points, *i.e.,* the minimum backlight level and a second measurement point that is halfway between the minimum and default backlight level. (*Id.* at p. 27) DOE also noted that the working group was considering including requirements that if the minimum backlight level is too dim to view the IEC test clip's countdown timer, the backlight level can be increased until the countdown timer is visible. Additionally, the working group was considering specifying that if a backlight setting is not available, then the backlight is adjusted via the brightness or the luminance setting. *Id.*

In response to the March 2022 NOPR, CTA *et al.* commented that DOE should adopt the requirements in section 10 of ANSI/CTA–2037–D regarding configuration of the camera and stabilization of the TV. CTA *et al.* also commented that DOE should adopt the requirements in section 11.1 of ANSI/CTA–2037–D regarding on mode testing, including using the test results with ABC on for the brightest preset picture setting if ABC is on by default, because CTA *et al.* does not expect consumers to manually change the ABC setting when using a TV's brightest preset picture setting. (CTA *et al.,* No. 21 at p. 15)

The CA IOUs recommended that DOE test the brightest SDR preset picture setting in the default ABC setting during the on mode test, rather than always disabled because the ABC feature reduces power consumption and would encourage manufactures to support the ABC feature and enable it by default. (CA IOUs, No. 19 at p. 4; Public Meeting Transcript, No. 16 at p. 32–33)

ComEd and NEEA supported testing the brightest preset picture setting with ABC disabled to avoid circumvention of the brightest preset picture setting test. (ComEd and NEEA, No. 20 at p. 4)

While CTA *et al.* and the CA IOUs commented that the on mode power consumption of the brightest preset picture setting should be determined with ABC enabled, if ABC is enabled by default in the brightest preset picture setting, DOE notes that ANSI/CTA–2037–D calculates the on mode power consumption of the brightest preset picture setting at the ABC disabled measurement point in Annex A of the standard. DOE is adopting this approach (as discussed in section III.1 of this document) because DOE has determined that if the brightest preset picture setting is identified with ABC disabled, then, for consistency, its representative power consumption in on mode must also be measured with ABC disabled. Further, the on mode test requirements specified in ANSI/CTA–2037–D state that for preset picture settings with ABC enabled, on mode power consumption can be measured at each of the room illuminance levels, in addition to the ABC off measurement point. Should stakeholders be interested in the power consumption with ABC enabled, these values will be determined as part of the test procedure, but for the calculation of average on mode power consumption and AEC, DOE is specifying that only the ABC off measurement point be used for the brightest preset picture setting. Section III.I of this document discusses the on mode power consumption and AEC calculations for all other preset picture settings and power modes, respectively.

Section 10 of ANSI/CTA–2037–D specifies the same requirements as those specified in section 10 of ANSI/CTA–2037–C for the camera configuration and UUT stabilization but additionally specifies that the camera photometer must be powered on for at least 30 minutes prior to the final camera configuration. Based on its participation in the CTA standards development process, DOE understands that this requirement is intended to improve repeatability and reproducibility, as the camera requires a period of time to ''warm up.''

Additionally, as discussed during the NOPR public meeting, section 11.1 of ANSI/CTA–2037–D specifies on mode test requirements, some of which are similar to those specified in section 11.1 of ANSI/CTA–2037–C while other requirements have been updated to those that were under consideration at the time of the NOPR public meeting. Specifically, ANSI/CTA–2037–D specifies that the UUT must be stabilized by playing the first 5 minutes of the IEC test clip until the average power is within 2 percent of the previous run. ANSI/CTA–2037–D additionally specifies that for tests conducted with ABC enabled, the UUT shall have 1 minute to stabilize after the room illuminance level has been configured before starting each ABC enabled test. Additionally, all preset picture settings are tested at the default backlight level with ABC disabled. For preset picture settings with ABC enabled, tests are conducted at room illuminance levels of 140 lux, 50 lux, 17 lux, and 4 lux. For preset picture settings with ABC disabled, tests are conducted at the minimum backlight and a backlight level that is approximately halfway between default and minimum backlight, as discussed during the NOPR public meeting. Finally, ANSI/CTA–2037–D also finalized the requirement that if the minimum backlight level is too dim to view the IEC test clip's countdown timer, the backlight level can be increased until the countdown timer is visible and specifies that if a backlight setting is not available, then the backlight is adjusted via the brightness or the luminance setting, as discussed during the NOPR public meeting.

Based on its experience with testing TVs, DOE has determined that the additional stabilization period specified in ANSI/CTA–2037–D at each room illuminance level is crucial for repeatability of test results as TVs typically require some time to adjust to changes in room illuminance and is not unduly burdensome. DOE also expects the clarifications specified regarding how to adjust the backlight level will ensure that a TV unit under test is configured consistently during testing. Accordingly, for the reasons discussed here and, in the March 2022 NOPR,

DOE amends the on mode test to reference sections 10 and 11.1 of ANSI/CTA–2037–D.

2. Luminance Test

Section 7.2 of appendix H specifies the procedures for measuring the luminance of the UUT by playing the static IEC 3-bar, black-and-white image and measuring the instantaneous luminance. As discussed, ANSI/CTA–2037–C specifies measuring the dynamic luminance concurrently with on mode power consumption in each preset picture setting utilizing a camera photometer, which provides more representative results compared to a single instantaneous luminance. As such, in the March 2022 NOPR, DOE proposed to reference ANSI/CTA–2037–C for the on mode power consumption and dynamic luminance measurement and remove the separate luminance test currently specified in section 7.2 of appendix H. 87 FR 11892, 11909.

The CA IOUs recommended that DOE address the significantly reduced dynamic luminance values measured using the camera photometer method compared to the current Federal test method's spot measurements. The CA IOUs also recommended that DOE include luminance measurement using both dynamic test clips and the existing 3-bar black-and-white test pattern, stating that it is a better representation of peak luminance. (CA IOUs, No. 19 at p. 4)

DOE is aware that the dynamic luminance values are lower than the values measured by the instantaneous 3-bar luminance method. This is because dynamic luminance measures the luminance of the TV screen when playing the test clips, which includes many different scenes with movement and images that include a wide range of different colors. Whereas, the static 3-bar image displays a static pattern of pure white and pure black bars, and screen luminance at the location of the pure white bar is measured. The luminance of the static 3-bar image is generally greater than the dynamic luminance measurement because pure white has the highest luminance compared to any other color. However, during representative consumer use, TV screens do not display a static, pure-white image. Therefore, even though the dynamic luminance values are lower, this measurement is more representative of consumer use. Furthermore, the dynamic luminance yields a measurement of power consumption that directly corresponds to the luminance of the screen during the test. For these reasons, DOE is specifying that dynamic luminance be measured concurrently with on mode power consumption in lieu of performing a separate static luminance measurement test using the static 3-bar image.

For the reasons discussed here and, in the March 2022 NOPR, DOE is finalizing the removal of the luminance test specified in appendix H and referencing ANSI/CTA–2037–D for on mode power consumption and dynamic luminance measurement.

3. Standby Mode Test

Section 7.3 of appendix H specifies the procedures for measuring the power consumption of TVs in standby mode, which encompasses standby-passive mode and standby-active, low mode.

For conducting these tests, appendix H specifies using the methodology prescribed in section 5.3.1 of IEC 62301 Ed. 2.0, which states that standby mode power consumption shall be determined using one of three methods—sampling method, average reading method, or direct meter reading method. Specifically, IEC 62301 Ed. 2.0 specifies that the UUT must be energized for not less than 15 minutes; data recorded in the second two-thirds of the total test duration is used to determine stability. For input powers less than or equal to 1 watt, stability is established when a linear regression through all power readings for the second two-thirds of the data has a slope of less than 10 milli-watts per hour (''mW/h''); for input powers of more than 1 watt, stability is established when a linear regression through all power readings for the second two-thirds of the data has a slope of less than 1 percent of the measured input power per hour. The test duration is extended up to a maximum of 3 hours until the stability criteria are met. If stability cannot be achieved within 3 hours, IEC 62301 Ed. 2.0 specifies assessing the raw data for periodic or cyclic patterns to meet different criteria specific to cyclic or irregular power consumption patterns. IEC 62301 Ed. 2.0 also specifies additional requirements for different scenarios, such as modes with cycle, non-cyclic, unstable, or irregular power consumption.

Section 11.2 of ANSI/CTA–2037–C specifies the procedures for performing the standby mode test. As part of the overall setup and configuration requirements, the UUT is connected to WAN, and up to three devices (*i.e.,* smart speaker, mobile device, and network traffic generator) are connected to the same LAN, as discussed previously in section III.G.6 of this document. Section 11.2 of ANSI/CTA–2037–C specifies that the standby-active and standby-passive measurements shall be conducted by powering down the UUT from the SDR default preset picture setting configuration. After the UUT is powered down, power consumption is measured at intervals of 1 second or shorter, and the test concludes when the cumulative average of all data points taken in the last third of the measurement period falls within ± 1 percent or ± 10 milliwatts (''mW'') of the average of the last two-thirds of the total measurement period. The total measurement period cannot be less than 60 minutes nor greater than 240 minutes. The standby power measurement is the average power reading during the last two-thirds of the total measurement period. If a UUT does not meet the stability criteria at the end of 240 minutes, ANSI/CTA–2037–C specifies reviewing the power trace for any signs of unusual behavior, such as an automatic update, and requires repeating the test if atypical behavior was observed. Depending on the network capabilities of the UUT, the measurement performed during the standby test is recorded as either a standby-active mode [19] measurement or a standby-passive mode [20] measurement.

Accompanying the standby mode test, section 9.11 of ANSI/CTA–2037–C additionally requires a series of ''wake'' commands to be sent from the specified networking devices to the TV to verify that the TV is properly connected to the LAN and properly configured to communicate with other devices on the network. Section 9.11 of ANSI/CTA–2037–C specifies how to wake the TV using three possible wake commands: WbRA, WoC, or WbS. To start the test, the UUT is first powered down for 5 seconds and then powered on via one of the three wake commands according to the following hierarchy: WbS if available, otherwise WoC, otherwise WbRA (hereafter referred to as the ''5-second check test''). The standby test is then performed, as described in the previous paragraph. Subsequently, at the end of the standby mode test, the TV must be woken using the same hierarchy as was used during the initial 5-second check test.

[19] Section 5.1 of ANSI/CTA–2037–C defines standby-active mode as a partial on mode power mode in which the UUT is connected to an external power source and does not provide picture or sound. The UUT can be switched into another power mode with the remote control unit, an internal signal, or an external signal.

[20] Section 5.1 of ANSI/CTA–2037–C defines standby-passive mode as a partial on mode power mode in which the UUT is connected to an external power source and does not provide picture or sound. The UUT can be switched into another power mode with the remote control unit or an internal signal, but not with an external signal.

As discussed in the March 2022 NOPR, the CTA working group was considering certain revisions to the test method for measuring power consumption in standby mode. The following paragraph enumerates the revisions that were under consideration by the working group for the standby mode test. 87 FR 11892, 11910.

First, the CTA working group was considering removing the requirement that the UUT must be woken using the smart wake devices at the end of the standby mode test. Instead, the 5-second check test is performed only once when the UUT is first powered down for 5 seconds. If any or all of the configured smart wake features fail the 5-second check test, then they must remain configured for the duration of the test. Additionally, the working group was considering three different parameters to record the standby mode power consumption, depending on the level of functionality provided by the UUT in standby mode. For UUTs with at least one smart wake feature enabled, the power consumption is recorded as ''partial on mode with smart wake enabled.'' For UUTs with no advertised or enabled smart wake features, the power consumption is recorded as ''partial on mode power with internet connection'' and for non-internet connected UUTs, the power consumption is recorded as ''partial on mode power without internet connection.'' Finally, the working group was considering removing the wake time test provisions since this measurement is not repeatable because it is dependent on how the TV is woken. *Id.* In the March 2022 NOPR, DOE stated its concerns that if a TV cannot be consistently woken at the end of the standby mode test, the measurement would not be representative of real-world use. *Id.*

Overall, DOE noted in the March 2022 NOPR that in some instances, neither the standby mode measurement nor the wake test was repeatable. Lacking additional data, DOE proposed to reference the requirement specified in ANSI/CTA–2037–C, which specifies that the wake test must be performed at the end of the standby mode measurement. *Id.*

Specifically, in the March 2022 NOPR, DOE proposed to reference section 9.11 of ANSI/CTA–2037–C for the instructions to wake the UUT from standby mode using network connected devices, and section 11.2 of ANSI/CTA–2037–C to conduct the standby mode test. Specifically, DOE proposed that at the end of the standby mode test, the UUT must be woken using the smart wake features (as is specified in section 9.11 of ANSI/CTA–2037–C) in the following order of preference: WbS, WoC, and WbRA. If the UUT can be powered on using any one of these methods, its standby mode power should be recorded as ''standby power with smart wake enabled.'' However, if the UUT cannot be powered on using any of the three specified methods either during the 5-second check test or at the end of the standby mode test, the measured standby mode power consumption would be recorded as ''standby power with internet connection and without smart wake enabled.'' *Id.*

Similarly, DOE proposed that if the UUT was powered on during the 5-second check test but is unable to be powered on via any of the network connected devices at the end of the standby mode test, the measured power consumption would be recorded as ''standby power with internet connection and without smart wake enabled.'' Additionally, TVs that do not have network capability would be required to record the measured standby power consumption as standby-passive mode measurement. *Id.*

Additionally, section 11.2 of ANSI/CTA–2037–C specifies that if a UUT does not meet the stability criteria at the end of the 240-minute measurement period, the tester should review the logged data for any signs of unusual behavior—like that associated with the TV performing an automatic update—and redo the test if atypical behavior was observed. *Id.* at 87 FR 11910–11911. In the March 2022 NOPR, DOE noted that section 11.2 of ANSI/CTA–2037–C did not provide instruction for how to proceed if review of the logged data does not show any signs of unusual behavior. *Id.* at 87 FR 11911.

DOE additionally stated in the March 2022 NOPR that, during testing, it had observed that some TVs do not meet the stability criteria after 240 minutes despite not exhibiting any unusual behavior.

To accommodate TVs that do not achieve stability after the end of the specified 240-minute measurement period, DOE proposed in the March 2022 NOPR that the stability requirement be waived if the full 240 minutes conclude without meeting the stability criteria. In such cases, DOE proposed that the average power during the last two-thirds of the measurement period would be recorded as the standby-active mode measurement. *Id.*

Finally, section 11.2 of ANSI/CTA–2037–C includes instruction to measure the wake time when performing the wake procedure following completion of the standby mode test. In the March 2022 NOPR, DOE noted that the CTA working group was evaluating whether the wake time test should be eliminated from ANSI/CTA–2037–D. DOE proposed to exclude the measurement of wake time from the DOE test procedure, because DOE tentatively concluded that ''wake time'' is a performance-related feature that does not impact the energy consumption of the UUT. *Id.*

DOE requested comment on several topics pertaining to the standby mode test requirements in the March 2022 NOPR. DOE requested stakeholders to provide any additional data and information regarding the repeatability of the standby mode test when connected to smart wake functions, the ability to consistently wake the UUT using smart wake functionality, and the representativeness of the standby mode test, if a wake test is not included at the end of the standby mode duration. *Id.* at 87 FR 11910.

DOE also requested comment on its proposal to reference section 11.2 of ANSI/CTA–2037–C to measure the power consumption in standby mode with some additional specifications. DOE also requested comment on its proposal to reference section 9.11 of ANSI/CTA–2037–C for conducting the wake tests at the completion of standby mode. Additionally, DOE requested comment on the revisions that are under consideration for the standby mode test by the CTA working group. *Id.*

DOE also requested comment on whether it is appropriate to differentiate the standby mode power consumption of TVs that can be powered on using any of the three specified methods versus those that cannot be powered on using the smart wake features. DOE also requested comment on whether there would be any benefit to differentiating between the power consumption of such TVs. DOE requested comment on whether the parameters ''standby smart wake'' and ''standby internet'' are appropriate or if it should consider other parameters, such as ''standby-active, high'' and ''standby-active, low,'' respectively. *Id.*

Finally, for TVs that do not meet the stability criteria of the standby mode measurement, DOE requested comment on measuring power consumption for 240 minutes and using the average power consumption over the last two-thirds of the measurement period as the standby-active mode measurement. *Id.* at 87 FR 11911.

In the NOPR public meeting, NEEA and PCL presented standby mode test data to support reducing the standby mode test time. Specifically, NEEA and PCL presented data showing that most TVs achieved stability within 40

minutes and recommended reducing the minimum test time from 60 minutes to 40 minutes. (Public Meeting Transcript, No. 16 at p. 61–63) NEEA and PCL additionally agreed with DOE's proposal to not retest a unit if it does not meet the stability criteria at the end of the 240-minute test duration. (Public Meeting Transcript, No. 16 at p. 64)

In response to the March 2022 NOPR, ASAP *et al.* encouraged DOE to monitor standby testing results to ensure that standby power measurements are both repeatable and representative and encouraged DOE to consider any necessary modifications to the standby testing methods as part of a future rulemaking. (ASAP *et al.,* No. 18 at p. 2) ComEd and NEEA stated that ANSI/CTA–2037–D addresses the significant increase in energy consumption driven by smart wake features and, therefore, supported the adoption of ANSI/CTA–2037–D in the DOE test method. (ComEd and NEEA, No. 20 at p. 2)

CTA *et al.* stated they are not aware of any issues related to the repeatability of the standby mode test when connected to smart wake functions, the ability to consistently wake the UUT using smart wake functionality, or the representativeness of the standby mode test when a wake test is not included at the end of the standby mode duration. (CTA *et al.,* No. 21 at pp. 15–16)

CTA *et al.* commented that DOE should adopt the test procedure for measuring standby power described in section 11.2 of ANSI/CTA–2037–D. CTA *et al.* stated that DOE should not require that wake tests be conducted at the completion of standby mode tests because the quick start test specified in section 9.11 of ANSI/CTA–2037–D runs a wake time test and this test is completed before standby mode and on mode testing because quick start is configured for these tests. (*Id.* at p. 16)

CTA *et al.* recommended that DOE adopt ANSI/CTA–2037–D, including the revisions made to the standby mode test. CTA *et al.* also stated that these revisions shorten the minimum test period and widen the tolerance used to determine if standby power consumption is stable. (*Id.*) CTA *et al.* additionally commented that DOE should adopt the requirement in Annex B of ANSI/CTA–2037–D that the smart wake capability of the TV be reported along with its standby power, asserting that this would help consumers compare between TVs. CTA *et al.* commented that DOE should include the parameters specified in ANSI/CTA–2037–D to define the measured standby power. These include ''standby with smart wake enabled,'' ''standby with internet connection,'' or ''standby without internet connection.'' (*Id.*)

CTA *et al.* also commented that using the average power consumption of the last two-thirds of the measurement period in cases where the required stability was not achieved is appropriate but that at the time of filing comments, the CTA working group had not yet addressed this topic. (*Id.* at pp. 16–17)

ComEd and NEEA agreed with the exclusion of the wake time test because, according to ComEd and NEEA, the test is problematic, time consuming, and could yield misleading results. (ComEd and NEEA, No. 20 at p. 4).

The CA IOUs recommended that DOE include a wake time measurement as specified in ANSI/CTA–2037–C to encourage consumer adoption of smart wake features. (CA IOUs, No. 19 at p. 4)

Section 11.2 of ANSI/CTA–2037–D specifies some updates to conduct the standby mode measurement compared to section 11.2 of ANSI/CTA–2037–C. As noted by CTA *et al.,* ANSI/CTA–2037–D widens the tolerance to determine if standby power consumption is stable from ± 1 percent or ± 10 mW to ± 1 percent or ± 50 mW, whichever is greater. Given that the measured standby mode power consumption of many TVs is 1 watt or less, DOE does not expect this change to significantly impact measured results; additionally, it is likely to reduce test burden for units that have generally stable standby mode power consumption.

Further, ANSI/CTA–2037–D reduces the shortest total measurement period from 60 minutes to 40 minutes, as recommended by NEEA and PCL during the NOPR public meeting and by CTA *et al.* in its comments. This requirement does not change the measured standby power; rather, it only reduces the test duration for TVs that achieve stability prior to 60 minutes, thereby reducing test burden.

Additionally, ANSI/CTA–2037–D aligns with DOE's proposal in the March 2022 NOPR to not retest a unit if it does not achieve the specified stability requirements at the end of the standby mode test. Specifically, ANSI/CTA–2307–D specifies that if the stability criteria is not achieved at 240 minutes, which is the end of the standby mode measurement period, then the data collected shall be used for determining average power, as if the UUT had met the stability criteria at the 240th minute. In this final rule, DOE is adopting section 11.2 of ANSI/CTA–2037–D for the standby mode test conduct.

Similar to ANSI/CTA–2037, accompanying the standby mode test, section 9.9 of ANSI/CTA–2037–D specifies the smart wake functionality that must be configured during both on mode and standby mode tests. While the general smart wake configuration requirements between ANSI/CTA–2037–C and ANSI/CTA–2037–D are the same, ANSI/CTA–2037–D removes the wake test at the end of the standby mode test, which DOE had proposed to include in the March 2022 NOPR. However, as discussed in section III.G.6 of this document, section 9.9 of ANSI/CTA–2037–D explains that testers should confirm that they understand how to configure smart wake features to persist throughout the entire standby mode test period for all UUT brands or platforms that are tested. The requirements in section 9.9 of ANSI/CTA–2037–D generally ensure that testing is conducted in the same environment as that specified in ANSI/CTA–2037–C.

Additionally, as proposed in the March 2022 NOPR, ANSI/CTA–2037–D specifies three different parameters to record standby mode power consumption, depending on the level of functionality provided by the UUT in standby mode. For UUTs with at least one advertised smart wake feature, the power consumption is recorded as ''standby with smart wake enabled.'' This label is even used for those TVs that may not be able to wake using smart wake features because, as discussed in section 9.9 of ANSI/CTA–2037–D, this connection is maintained during both on mode and standby mode. For UUTs with no advertised or enabled smart wake features, the power consumption is recorded as ''standby with internet connection'' and for non-internet connected UUTs, the power consumption is recorded as ''standby without internet connection.'' In this final rule, DOE is adopting section 9.9 of ANSI/CTA–2037–D for the smart wake features configuration and setup.

Finally, ANSI/CTA–2037–D does not include the wake time test. DOE is also not including the wake time test in this final rule because ''wake time'' is a performance related feature that does not impact the energy consumption of the UUT.

Although ANSI/CTA–2037–D does not reference IEC 62301 Ed. 2.0, the standby power measurement procedure is consistent with the method outlined in section 5.3 of IEC 62301 Ed. 2.0, with the stability requirements adjusted specifically for TVs and an additional specification for minimum and maximum test duration based on expected TV behavior. Accordingly, DOE has determined that the standby power test method specified in ANSI/CTA–2037–D is consistent with EPCA's

requirement under 42 U.S.C. 6295(gg)(2)(A) which specifies that DOE must consider the most current versions of IEC 62301 and IEC 62087 for the standby power requirements. Therefore, in this final rule DOE amends the standby mode requirements in appendix H to sections 9.9 and 11.2 of ANSI/CTA–2037–D.

4. Off Mode Test

Section 7.4 of appendix H references IEC 62301 Ed. 2.0 for measuring the off mode power consumption of TVs. In the March 2022 NOPR, DOE stated that while ANSI/CTA–2037–C specifies the same methodology to measure off mode power consumption as that specified for standby mode, the CTA working group was considering removing the off mode test. 87 FR 11892, 11911.

In the March 2022 NOPR, DOE proposed removing the existing off mode test specified in appendix H because TVs generally do not have an off mode that is distinct from standby mode. *Id.* DOE noted that even when a TV is powered off using a remote, it typically has some functionality operational to be able to receive a signal from the remote control or other device to turn back on, which meets the definition of standby mode rather than off mode. *Id.* In the March 2022 NOPR, DOE requested comment on its proposal to remove the off mode test from appendix H.

CTA *et al.* agreed that an off mode test was not necessary and stated that ANSI/CTA–2037–D does not include such a test. (CTA *et al.,* No. 21 at p. 17)

For the reasons discussed here and, in the March 2022 NOPR, DOE is removing the off mode test from appendix H.

I. Calculation of Annual Energy Consumption

Section 8 of appendix H specifies the calculation and rounding requirements for AEC using the on and standby mode power consumption measurements. ANSI/CTA–2037–C does not contain an equivalent section for the calculation of AEC. Therefore, in the March 2022 NOPR, DOE proposed to retain the current AEC calculation requirements in appendix H but proposed certain modifications consistent with the proposed amendments to the on mode, standby mode, and off mode tests. 87 FR 11892, 11911.

In the March 2022 NOPR, DOE proposed that the average on mode power consumption be calculated as the average of the on mode power in the three preset picture settings: SDR default, SDR brightest, and HDR10 default. If ABC is enabled for the SDR or HDR10 default preset picture settings, the power consumption at each of the four room illuminance levels would be used to determine the average power consumption of the preset picture setting. The equations below detail the calculation of on mode power consumption and AEC proposed in the March 2022 NOPR. The calculation of AEC is different from the current calculation in appendix H primarily in the value used for P_{On}. Given that appendix H specifies testing only the default preset picture setting in on mode, P_{On} reflects the average power consumption in that default preset picture setting. However, in the March 2022 NOPR, DOE proposed testing three preset picture settings for on mode power consumption; therefore, P_{On} would be the average of the power consumption in the tested preset picture settings. *Id.*

$P_{on} = (P_{Default} + P_{Brightest} + P_{HDR10})/3$

Where:

$P_{Default}$ = the measured average power consumption in the default SDR preset picture setting, if ABC is disabled

Or

$P_{Default} = (P_{Default\_140} + P_{Default\_50} + P_{Default\_17} + P_{Default\_4})/4$

if ABC is enabled by default in the default SDR preset picture setting and, $P_{Default\_140}$, $P_{Default\_50}$, $P_{Default\_17}$, and $P_{Default\_4}$ are the average power consumption values at room illuminance levels of 140, 50, 17, and 4 lux, respectively

$P_{Brightest}$ = the measured average power consumption in the brightest SDR preset picture setting

P_{HDR10} = the measured average power consumption in the default HDR10 preset picture setting, if ABC is disabled

Or

$P_{HDR10} = (P_{HDR10\_140} + P_{HDR10\_50} + P_{HDR10\_17} + P_{HDR10\_4})/4$

if ABC is enabled by default in the default HDR10 preset picture setting and, P_{HDR10_140}, P_{HDR10_50}, P_{HDR10_17}, and P_{HDR10_4} are the average power consumption values at room illuminance levels of 140, 50, 17, and 4 lux, respectively

For standby mode, DOE proposed to retain the same hours per day spent in standby mode, but instead of standby-active and standby-passive, as currently specified in appendix H, DOE proposed to use standby power with smart wake, standby power with internet connection, and standby-passive, corresponding to the parameters DOE proposed in the March 2022 NOPR. *Id.* DOE chose to use these parameters because standby-active does not encompass the multiple different standby states that modern TVs have.

Additionally, in the March 2022 NOPR, DOE proposed to retain the AEC equation currently specified in appendix H but to remove the off mode parameter. Given that the current AEC equation assigns 0 hours to off mode, DOE proposed to retain the same weighting factors for on and standby modes.

The AEC equation proposed in the March 2022 NOPR is presented below:

$AEC = 365 * (P_{on} * H_{on} + P_{standby\_smart\_wake} * H_{standby\_smart\_wake} + P_{standby\_internet} * H_{standby\_internet} + P_{standby\_passive} * H_{standby\_passive})/1000$

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

And values for H_m are as specified in Table III.2. *Id.*

TABLE III.2—HOURLY WEIGHTINGS

	H_{on}	$H_{standby\_smart\_wake}$	$H_{standby\_internet}$	$H_{standby\_passive}$
Standby smart wake	5	19	0	0
Standby internet	5	0	19	0
Standby-passive	5	0	0	19

In the NOPR public meeting, DOE additionally clarified that it proposed to include similar equations for calculating average dynamic luminance as the equations for calculating on mode power consumption. (Public Meeting Transcript, No. 16 at p. 47) DOE additionally clarified that the on mode power consumption is an average of the

power consumption values for the tested preset picture settings. That is, if a TV does not support HDR10 and is not tested in the HDR10 default preset picture setting, then the on mode power consumption would be the average of the default and brightest preset picture settings. (*Id.* at p. 32)

In the March 2022 NOPR, DOE requested comment on its proposed calculations for the average on mode power consumption and AEC. 87 FR 11892, 11912.

The CA IOUs recommended that DOE consider adopting a weighted luminous efficacy metric to show consumers how efficiently a TV converts power into luminance. (CA IOUs, No. 19 at p. 2; Public Meeting Transcript, No. 16 at p. 45) The CA IOUs also recommended a weighted average for the on mode power consumption and provided data from a market survey of 100 California residents that showed that 26 percent of TV operating hours were in the standard preset picture setting and 48 percent of TV operating hours were in the non-standard preset picture setting (*i.e.,* vivid/dynamic, natural, game, custom/calibrated/user, other), which usually have brighter displays.[21] Based on a market survey they conducted, the CA IOUs recommended setting the weight factors for luminance efficacy at 25 percent for standard preset picture setting, 50 percent for brightest preset picture setting, and 25 percent for HDR preset picture setting. (CA IOUs, No. 19 at p. 2)

CTA *et al.* commented that DOE should adopt the requirement in Annex B of ANSI/CTA–2037–D, which specifies the same AEC calculation as that provided in the March 2022 NOPR. (CTA *et al.,* No. 21 at p. 17)

In this final rule, DOE has determined not to specify a luminous efficacy metric. DOE has determined that a luminous efficacy metric would not easily accommodate the combining of on mode power consumption and standby mode power consumption into a single integrated metric, as required by EPCA if technically feasible. (42 U.S.C. 6295(gg)(2)(A)) Additionally, use of a luminous efficacy metric may not encourage the use of ABC, which reduces power consumption during representative consumer use, because the luminous efficacy of a TV with or without ABC enabled would likely be the same. This could have the unintended consequence of increasing overall TV energy consumption. Accordingly, DOE is specifying an AEC metric and dynamic luminance metric, as discussed.

Additionally, DOE is specifying a simple average to calculate on mode power consumption as opposed to a weighted average, as recommended by the CA IOUs. At this time, it is not explicitly clear if the non-default preset picture settings specified by the CA IOUs do in fact consume more power compared to the default preset picture setting (which the brightest preset picture setting is expected to do). In the absence of any additional data regarding power consumption of the non-default SDR preset picture settings as well as consumer usage of HDR10 preset picture settings, DOE is adopting the simple average calculation for on mode power consumption and dynamic luminance.

Finally, as noted by CTA *et al.,* Annex A [22] of ANSI/CTA–2037–D includes the same equations to calculate average on mode power consumption and AEC as those proposed by DOE in the March 2022 NOPR. Additionally, Annex A of ANSI/CTA–2037–D includes an equation to calculate dynamic luminance, which is the same equation as that specified to calculate average on mode power consumption using dynamic luminance values for each preset picture setting.

In this final rule, DOE amends the AEC calculation in appendix H, to reference Annex A of ANSI/CTA–2037–D.

J. Updates to the Regulatory Text at Appendix H

In the March 2022 NOPR, DOE's proposed amendments to appendix H in the CFR referenced ANSI/CTA–2037–C while retaining the overall structure and headings from the current appendix H. 87 FR 11892, 11919–11921.

CTA *et al.* recommended that DOE delete appendix H and revise 10 CFR 430.23 to reference only ANSI/CTA–2037–D. (CTA *et al.,* No. 21 at p. 6) CTA *et al.* also commented that DOE should include section 6 of ANSI/CTA–2037D and the introductory texts in the relevant sections of ANSI/CTA–2037–D. (CTA *et al.,* No. 21 at p. 8)

As discussed in the preceding sections, DOE is amending appendix H to replace the current regulatory text and reference the relevant sections of ANSI/CTA–2037–D in its place. Accordingly, in this final rule, DOE is modifying the overall structure of appendix H to simplify the references to ANSI/CTA–2037–D and to better match the structure of ANSI/CTA–2037–D. Additionally, because ANSI/CTA–2037–D does not explicitly specify the rounding requirements for standby mode power consumption and dynamic luminance, DOE is specifying these requirements in section 4 of appendix H.

K. Test Procedure Costs

In this final rule, DOE amends the existing test procedure for TVs by referencing ANSI/CTA–2037–D to measure on mode dynamic screen luminance and power consumption as well as standby mode power consumption. ANSI/CTA–2037–D has several differences in testing TVs compared to the current test method at appendix H. Key differences include testing three preset picture settings as opposed to a single default picture setting; measuring dynamic screen luminance over the entire duration of the test clip using a camera photometer at the same time as on mode power consumption measurement; using an LED lamp setup at an angle of 45° for testing TVs with ABC enabled by default; and, testing on and standby mode with an active internet connection (*i.e.,* WAN) and additionally connecting the TV to other devices on LAN to wake the TV from standby mode to on mode.

EPCA requires that test procedures proposed by DOE not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) The following sections discuss DOE's evaluation of estimated costs associated with the amendments.

Given the new equipment, setup, and testing requirements specified in ANSI/CTA–2037–D, DOE estimated that TV testing would have a one-time equipment investment cost, a one-time re-testing cost, and additional annual testing costs for the TVs covered by the amended test procedure.

To determine the potential costs manufacturers would incur due to the amended test procedure, DOE used data from DOE's publicly available Compliance Certification Database (''CCD'') to estimate the number of unique basic models that are currently covered by the existing DOE test procedure. Based on data from DOE's CCD,[23] DOE estimated there are approximately 4,285 unique basic models currently on the market. DOE also estimated the amount of time it would take manufacturers to test a single TV unit to the amended test

[21] It is DOE's understanding that ''standard preset picture setting'' refers to the default preset picture setting and ''non-standard preset picture setting'' refers to all other preset picture settings on the TV.

[22] While CTA *et al.* referenced Annex B in its comments, the calculations are specified in Annex A of ANSI/CTA–2037–D.

[23] U.S. Department of Energy's Compliance Certification Database. Television Sets. *See https://www.regulations.doe.gov/certification-data/CCMS-4-Television_Sets.html#q=Product_Group_s%3A%22Television%20Sets%22.* Last accessed on November 11, 2022.

procedure, as well as the amount of time it currently takes manufacturers to test a single TV unit to the existing DOE test procedure. In the March 2022 NOPR, DOE estimated that the existing DOE test procedure requires an average of 2.9 hours to conduct (ranging from 2.6 to 3.1 hours, depending on the specific features of the TV), whereas the proposed test procedure, which referenced ANSI/CTA–2037–C, would require an average of 4.4 hours to conduct (ranging from 3.3 to 5.3 hours). 87 FR 11892, 11912

In response to the March 2022 NOPR, CTA *et al.* commented that, compared to the existing method for measuring TV power consumption, ANSI/CTA–2037–D requires new equipment and more time for conducting the test. CTA *et al.* also commented they have not found the changes to be unduly burdensome, especially given that ANSI/CTA–2037–D reasonably and more accurately reflects modern TV products and their energy use. (CTA *et al.,* No. 21 at p. 17)

The amended test procedure references ANSI/CTA–2037–D, which is largely the same as ANSI/CTA–2037–C that was proposed in the March 2022 NOPR. ANSI/CTA–2037–D specifies a 1-minute stabilization period for on mode ABC testing, which would increase test duration. However, ANSI/CTA–2037–D also eliminates the wake time test and decreases the minimum standby test duration compared to ANSI/CTA–2037–C. These updates are expected to, on balance, not substantively alter the overall test duration compared to the estimates provided in the March 2022 NOPR. Accordingly, DOE's test procedure cost estimates for this amended test procedure are the same as those initially estimated in the March 2022 NOPR, updated to reflect current wages and rates, as well as additional models from the CCD.

Based on data from the Bureau of Labor Statistics' (''BLS's'') Occupational Employment and Wage Statistics, the mean hourly wage for an electronics technician is $33.21.[24] Additionally, DOE used data from BLS's Employer Costs for Employee Compensation to estimate the percentage that wages comprise of the total compensation for an employee. DOE estimated that wages make up 70.5 percent of the total compensation for private industry employees.[25] Therefore, DOE estimated that the total hourly compensation (including all fringe benefits) of a technician performing the testing is $47.11.[26] Using these labor rates and time estimates, DOE estimated that it would cost TV manufacturers on average approximately $205.87 to conduct a single test on a TV unit in accordance with the amended test procedure.[27] DOE estimated that this is, on average, approximately $70.19 more than TV manufacturers are incurring to conduct a single test on a TV in accordance with the existing DOE test procedure.[28]

TV manufacturers are required to test at least two units per basic model. Therefore, DOE estimates that it would cost manufacturers approximately $411.64 per basic model to test in accordance with the amended test procedure, which is on average approximately $140.38 more per basic model than TV manufacturers are currently incurring to test a TV basic model.

In addition to these testing costs, DOE assumed that manufacturers would need to purchase camera photometers to conduct the amended test procedure. DOE estimated that a camera photometer costs approximately $10,000.

The burden associated with amending appendix H to reference ANSI/CTA–2037–D is necessary in order to update the test procedure to the industry standard, which measures both power and luminance simultaneously while connected to a representative network.

In this final rule, DOE finalizes its determination that the changes in test duration and cost due to the amendments adopted in the final rule are not unduly burdensome.

L. Effective and Compliance Dates

The effective date for the adopted test procedure amendment will be 30 days after publication of this final rule in the **Federal Register**. EPCA prescribes that, if DOE amends a test procedure, all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with that amended test procedure, beginning 180 days after publication of such a test procedure final rule in the **Federal Register**. (42 U.S.C. 6293(c)(2))

EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. (*Id.*)

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866 and 13563

Executive Order (''E.O.'') 12866, ''Regulatory Planning and Review,'' as supplemented and reaffirmed by E.O. 13563, ''Improving Regulation and Regulatory Review, 76 FR 3821 (Jan. 21, 2011), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (''OIRA'') in the Office of Management and Budget (''OMB'') has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this final

[24] DOE used the mean hourly wage of the ''17–3023 Electrical and Electronic Engineering Technologists and Technicians'' from the most recent BLS Occupational Employment and Wage Statistics (May 2021) to estimate the hourly wage rate of a technician assumed to perform this testing. *See www.bls.gov/oes/current/oes173023.htm.* Last accessed on November 10, 2022.

[25] DOE used the June 2022 ''Employer Costs for Employee Compensation'' to estimate that for ''Private Industry Workers,'' ''Wages and Salaries'' are 70.5 percent of the total employee compensation. *See www.bls.gov/news.release/pdf/ecec.pdf.* Last accessed on November 10, 2022.

[26] $33.21 ÷ 0.705 = $47.11.

[27] 4.37 hours × $47.11 = $205.87.

[28] $205.87 − (2.88 hours × $47.11) = $70.19.

regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit ''significant regulatory actions'' to OIRA for review. OIRA has determined that this final regulatory action does not constitute a ''significant regulatory action'' under section 3(f) of E.O. 12866. Accordingly, this action was not submitted to OIRA for review under E.O. 12866.

B. Review Under the Regulatory Flexibility Act

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

DOE has recently conducted a focused inquiry into small business manufacturers of the products covered by this rulemaking. For manufacturers of TVs, the Small Business Administration (''SBA'') has set a size threshold, which defines those entities classified as ''small businesses'' for the purposes of the statute. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. (See 13 CFR part 121.) The size standards are listed by North American Industry Classification System (''NAICS'') code and industry description and are available at *www.sba.gov/document/support—table-size-standards.* Manufacturing TVs is classified under NAICS 334220, ''radio and television broadcasting and wireless communications equipment manufacturing.'' The SBA sets a threshold of 1,250 employees or fewer for an entity to be considered as a small business for this category.

DOE used available public information to identify potential small manufacturers. DOE accessed the Compliance Certification Database [29] to create a list of companies that import or otherwise manufacture the products covered by this proposal. DOE identified 33 unique companies that manufacture TVs sold in the domestic market. DOE screened out companies that do not meet the SBA definition of a small business and also those that are entirely or largely foreign-owned and operated. All 33 companies have more than 1,250 employees or are owned and operated outside the United States.

Therefore, DOE concludes that the cost effects accruing from the final rule would not have a ''significant economic impact on a substantial number of small entities,'' and that the preparation of a FRFA is not warranted. DOE has submitted a certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of TVs must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including TVs. (*See* generally 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (''PRA''). This requirement has been approved by OMB under OMB control number 1910–1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

There is currently no energy conservation standard for TVs. As such, the amended test procedure adopted by this final rule does not establish a reporting requirement. In the event that DOE proposes an energy conservation standard for TVs with which manufacturers must demonstrate compliance, DOE will seek OMB approval of the associated information collection requirement. DOE will seek approval either through a proposed amendment to the information collection requirement approved under OMB control number 1910–1400 or as a separate proposed information collection requirement.

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

D. Review Under the National Environmental Policy Act of 1969

In this final rule, DOE establishes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for TVs. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

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

[29] U.S. Department of Energy Compliance Certification Management System, available at *www.regulations.doe.gov/ccms.*

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

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (''UMRA'') requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Public Law 104–4, sec. 201 (codified at 2 U.S.C. 1531). For a regulatory action resulting in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at *www.energy.gov/gc/office-general-counsel.* DOE examined this final rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of $100 million or more in any year, so these requirements do not apply.

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

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This final rule will not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

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

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M–19–15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at *www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf.* DOE has reviewed this final rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,'' 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the regulation is implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This regulatory action is not a significant regulatory action under Executive Order 12866. Moreover, it will not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

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

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; ''FEAA'') Section 32 essentially provides in relevant part that, where a 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.

The modifications to the test procedure for TVs adopted in this final rule incorporate testing methods contained in certain sections of the following commercial standard: ANSI/CTA–2037–D. DOE has evaluated this standard and is unable to conclude whether it fully complies with the requirements of section 32(b) of the FEAA (*i.e.,* whether it was developed in a manner that fully provides for public participation, comment, and review.) DOE has consulted with both the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in these standards and has received no comments objecting to their use.

M. Congressional Notification

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

N. Description of Materials Incorporated by Reference

ANSI/CTA–2037–D is an industry accepted test standard that measures on mode and standby mode TV power consumption. Specifically, the test procedure codified by this final rule references ANSI/CTA–2037–D for testing the on mode and standby mode of TVs. ANSI/CTA–2037–D is reasonably available from CTA (*www.cta.tech*).

V. Approval of the Office of the Secretary

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

List of Subjects

10 CFR Part 429

Administrative practice and procedure, Energy conservation, Household appliances, Intergovernmental relations, Reporting and recordkeeping requirements, Small businesses.

10 CFR Part 430

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

Signing Authority

This document of the Department of Energy was signed on February 21, 2023, by Francisco Alejandro Moreno, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on February 22, 2023.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

For the reasons stated in the preamble, DOE amends parts 429 and 430 of chapter II of title 10, Code of Federal Regulations as set forth below:

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

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

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 2. Amend § 429.25 by revising paragraphs (a)(2)(ii) and (a)(2)(iii)(A) and (B) to read as follows:

§ 429.25 Television sets.

(a) * * *

(2) * * *

(ii) Any represented annual energy consumption of a basic model shall be determined by applying the AEC calculation in section 4 of appendix H to subpart B of part 430 of this chapter to the represented values of power consumption as calculated pursuant to paragraph (a)(2)(i) of this section.

(iii) * * *

(A) For power consumption in the on and standby modes, the represented value shall be rounded according to the requirements specified in sections 4.1 and 4.3 of appendix H to subpart B of part 430 of this chapter.

(B) For annual energy consumption, the represented value shall be rounded according to the requirements specified in section 3.4 of appendix H to subpart B of part 430 of this chapter.

* * * * *

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. Amend § 430.3 by:

■ a. Redesignating paragraphs (n) through (w) as paragraphs (o) through (x), respectively;

■ b. Adding new paragraph (n);

■ c. Removing newly redesignated paragraph (q)(5) and redesignating paragraphs (q)(6) through (10) as paragraphs (q)(5) through (9), respectively; and

■ d. In newly redesignated paragraph (q)(6), removing the text ''G, H, I'' and adding in its place ''G, I''.

The addition reads as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(n) CTA. Consumer Technology Association, 1919 S. Eads Street, Arlington, VA 22202; 703–907–7600; *www.cta.tech*.

(1) ANSI/CTA–2037–D, Determination of Television Set Power Consumption, September 2022; IBR approved for appendix H to subpart B.

(2) [Reserved]

* * * * *

■ 5. Amend § 430.23 by revising 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 and standby modes, shall be determined in accordance with sections 3 and 4 of appendix H of this subpart respectively. The annual energy consumption, expressed in kilowatt-hours per year, shall be determined in accordance with section 4 of appendix H of this subpart.

* * * * *

■ 6. Revise Appendix H to subpart B of part 430 to read as follows:

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

Note: On or after April 14, 2023 and prior to September 11, 2023, any representations made with respect to the energy use or

energy efficiency of a television must be based upon results generated under this appendix as it appeared in 10 CFR part 430 edition revised as of January 1, 2023, or this appendix. Beginning September 11, 2023 any representations made with respect to the energy use or efficiency of a television must be based upon results generated under this appendix. Given that beginning September 11, 2023, representations with respect to the energy use or efficiency of televisions must be made in accordance with tests conducted pursuant to this appendix, manufacturers may wish to begin using this test procedure as soon as possible.

0. Incorporation by Reference

DOE incorporated by reference in § 430.3, ANSI/CTA–2037–D in its entirety. However, only enumerated provisions of ANSI/CTA–2037–D are applicable to this appendix, as follows:

0.1 ANSI/CTA–2037–D

(a) Section 5 as referenced in section 2 of this appendix;

(b) Sections 6 and 8 through 11 as referenced in section 3 of this appendix;

(c) Section 7 as referenced in sections 3 and 4 of this appendix; and

(d) Annex A as referenced in section 4 of this appendix.

0.2 [Reserved]

1. Scope

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

2. Definitions and Symbols

2.1. *Definitions.* The following terms are defined according to section 5.1 of ANSI/CTA–2037–D.

(a) Annual energy consumption
(b) Automatic brightness control
(c) Brightest selectable picture setting
(d) Default preset picture setting
(e) Dynamic Luminance
(f) Energy-Efficient-Ethernet
(g) Filmmaker Mode
(h) Forced menu
(i) Gloss Unit (GU)
(j) HDR10
(k) High Dynamic Range
(l) Home configuration
(m) Hybrid Log Gamma (HLG)
(n) Illuminance
(o) International System of Units
(p) Luminance
(q) Main battery
(r) Motion-Based Dynamic Dimming
(s) Neutral density filter
(t) Off Mode
(u) On Mode
(v) Perceptual Quantization Video
(w) Preset picture setting
(x) Quick start
(y) Retail Configuration
(z) Snoot
(aa) Software
(ab) Wake-By-Remote-Control-App
(ac) Wake-By-Smart-Speaker
(ad) Wake-On-Cast

2.2. *Symbol usage.* The symbols and abbreviations in section 5.2 of ANSI/CTA–2037–D apply to this test procedure.

3. Test Conduct

Determine the dynamic luminance and on mode and standby mode power consumption of TVs by following the procedure specified in sections 6 through 11 of ANSI/CTA–2037–D.

4. Calculation of Measured Values

Calculate the on mode power consumption, dynamic luminance, standby mode power consumption, and annual energy consumption as specified in Annex A of ANSI/CTA–2037–D. The following additional requirements are also applicable.

4.1. Round on mode power value as specified in Annex A of ANSI/CTA–2037–D.

4.2. Round dynamic luminance to the nearest tenth.

4.3. Round standby mode power as specified in section 7.1.2 of ANSI/CTA–2037–D.

4.4. Round annual energy consumption as specified in Annex A of ANSI/CTA–2037–D.

[FR Doc. 2023–03986 Filed 3–14–23; 8:45 am]

BILLING CODE 6450–01–P