DEPARTMENT OF ENERGY

10 CFR Part 460

[Docket No. EERE-2016-BT-TP-0032]

RIN 1904-AC11

Energy Conservation Program: Test Procedures for Manufactured Housing

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

ACTION: Notice of proposed rulemaking.

SUMMARY: The U.S. Department of Energy (DOE) is publishing a proposed rule to establish test procedures for manufactured housing (MH). This test procedure would support standards DOE is directed to establish by the Energy Independence and Security Act of 2007. DOE proposes to establish test procedures applicable to manufactured homes for determining compliance with the following metrics that were included in a June 17, 2016, notice of proposed rulemaking: the R-value of insulation; the U-factor of windows, skylights, and doors; the solar heat gain coefficient of fenestration; U-factor alternatives to R-value requirements; the air leakage rate of air distribution systems; and mechanical ventilation fan efficacy. DOE will accept comments regarding this proposed rule.

DATES: DOE will accept comments, data, and information regarding this notice of proposed rulemaking (NOPR) no later than **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. See section V, "Public Participation," for details.

ADDRESSES: Any comments submitted must identify the "Test Procedures NOPR for

Manufactured Housing" and provide docket number EERE-2016-BT-TP-0032 and/or regulatory information number (RIN) number 1904-AC11. Comments may be submitted using any of the following methods:

(1) Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.

(2) E-mail: ManufacturedHousing2016TP0032@ee.doe.gov. Include the docket number and/or RIN in the subject line of the message.

(3) Mail: Mr. Joseph Hagerman, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

(4) Hand Delivery/Courier: Mr. Joseph Hagerman, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 586-2945. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

Due to potential delays in DOE's receipt and processing of mail sent through the U.S. Postal Service, DOE encourages respondents to submit electronically to ensure timely receipt.

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

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

The docket web page can be found at http://www.regulations.gov/#!docketDetail;D=EERE-2016-BT-TP-0032. The docket web page will contain simple instructions on how to access all documents, including public comments, in the docket. See section V.A for information on how to submit comments through www.regulations.gov.

For further information on how to submit a comment or review other public comments and the docket, send an email to Manufactured_Housing@ee.doe.gov.

FOR FURTHER INFORMATION CONTACT: Mr. Joseph Hagerman, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-2J, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-4549. E-mail: joseph.hagerman@ee.doe.gov.

For information on legal issues presented in this document, contact: Ms. Kavita Vaidyanathan, U.S. Department of Energy, Forrestal Building, Office of the General Counsel (GC-33), 1000 Independence Avenue, SW., Washington, DC, 20585; (202) 586-0669; kavita.vaidyanathan@hq.doe.gov.

SUPPLEMENTARY INFORMATION: DOE proposes to incorporate by reference the following industry standards into 10 CFR part 460:

(1) ANSI/NFRC[1] 100-2014, ("ANSI/NFRC 100"), Procedure for Determining Fenestration Product U-factors.

(2) NFRC 200-2014, ("NFRC 200"), Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

Copies of ANSI/NFRC 100 and NFRC 200 can be obtained from the National Fenestration Rating Council, 6305 Ivy Lane, Ste. 140, Greenbelt, MD 20770, 301-589-1776. http://www/nfrc/org/.

(3) ASTM[2] C518-15, ("ASTM C518-15"), Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

(4) ASTM C1045-07(2013), ("ASTM C1045-07"), Standard Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions.

(5) ASTM E1554-13, ("ASTM E1554-13"), Standard Test Methods for Determining Air Leakage of Air Distribution Systems by Fan Pressurization.

[1]American National Standards Institute (ANSI). National Fenestration Rating Council (NFRC).
[2] American Society for Testing and Materials. ASTM.

Copies of ASTM C518-15, ASTM C1045-07, and ASTM E1554-13 can be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, 610-832-9500. http://www.astm.org.

(6) HVI[3] Publication 916, ("HVI 916"), Air Flow Test Procedure, updated September 29, 2015.

Copies of HVI 916 can be obtained from the Home Ventilating Institute, 4915 Arendell St., Ste. J, PMB 311, Morehead City, NC 28557, 855-484-8368. http://www.hvi.org.

See section IV.M for a more detailed discussion of each of these industry standards.

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[3] Home Ventilating Institute. HVI.

I. Authority and Background

A. Authority

The Energy Independence and Security Act of 2007 (EISA, Pub. L. No. 110-140) directs the U.S. Department of Energy (DOE) to establish energy conservation standards for manufactured housing. EISA directs DOE to base the standards on the most recent version of the International Energy Conservation Code (IECC) and any supplements to that document, except where DOE finds that the IECC is not cost-effective or where a more stringent standard would be more cost-effective, based on the impact of the IECC

on the purchase price of manufactured housing and on total lifecycle construction and operating costs. See 42 U.S.C. 17071(b)(1).

Section 413 of EISA also provides that DOE may consider the design and factory construction techniques of manufactured housing; base the climate zones under the proposed rule on the climate zones established by HUD in 24 CFR part 3280 rather than the climate zones under the IECC; and provide for alternative practices that, while not meeting the specific standards established by DOE, result in net estimated energy consumption equal to or less than the specific energy conservation standards as proposed. See 42 U.S.C. 17071(b)(2). Finally, section 413 of EISA authorizes DOE to impose civil penalties on any manufacturer that violates a provision of part 460. See 42 U.S.C. 17071(c).

DOE is publishing this test procedure NOPR to implement the directive in EISA 2007 to establish energy conservation standards for manufactured housing. Test procedures are necessary to provide for accurate, comprehensive information about energy characteristics of manufactured homes and provide for the subsequent enforcement of the standards. See 42 U.S.C. 7254, 17071. The test procedure NOPR proposes applicable test methods to support the energy conservation standards for the proposed thermal envelope requirements, air leakage requirements, and fan efficacy requirements. The test procedure would therefore dictate the basis on which a manufactured home's performance is represented and how compliance with the proposed energy conservation standards, if adopted, would be determined.

B. Background

1. The International Energy Conservation Code

The IECC is a nationally recognized model code, developed under the auspices of, and published by, the International Code Council (ICC), which many state and local governments have adopted in establishing minimum design and construction requirements for the energy efficiency of residential and commercial buildings, including site-built residential and modular homes. The IECC is developed through a consensus process that seeks input from industry stakeholders and is updated on a rolling basis, with new editions of the IECC published approximately every three years. The IECC was first published in 1998, and it has been updated continuously since that time. The 2015 edition of the IECC (the 2015 IECC) was published in May 2014.

Chapter 3 of the 2015 IECC provides general requirements for the code, including referenced test procedures for determining U-factor and solar heat gain coefficient (SHGC) of fenestration, and R-values of insulation. U-factor is the measure of the rate of heat loss or gain through fenestration. A lower U-factor value represents a lower rate of heat loss or gain. SHGC is the fraction of incident solar radiation admitted through fenestration. The lower the SHGC, the less solar heat fenestration transmits. R-value is the measure of a building component's ability to resist heat flow (thermal resistance). A higher R-value represents a greater ability to resist heat flow and generally corresponds with a thicker level of insulation.

Chapter 4 of the 2015 IECC sets forth specifications for residential energy efficiency, including specifications for building thermal envelope energy conservation, thermostats, duct insulation and sealing, mechanical system piping insulation, circulating hot water system piping, and mechanical ventilation. Chapter 4 of the 2015 IECC was developed for residential buildings generally and are is not specific to manufactured housing.

The 2015 IECC references NFRC 100 to determine the U-factor of fenestration, generally, and NFRC 200 to determine the SHGC of fenestration. To measure the R-value of insulation, the 2015 IECC references the R-value rule established by the U.S. Federal Trade Commission (i.e., 16 CFR part 460). Chapter 3 of the 2015 IECC does not address test procedures for determining U-factor alternatives to R-values, air leakage rates of duct work, or mechanical ventilation fan efficacy.

2. Development of proposed energy conservation standards

On June 17, 2016, DOE published a NOPR to establish energy conservation standards for manufactured housing (hereafter the June 2016 energy conservation standards NOPR). See 81 FR 39756. The proposed standards were based upon consideration of information ascertained from consultation with HUD, state agencies, the manufactured housing industry, and the public. The NOPR also was based on consensus recommendations from a working group established under the Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) in accordance with the Federal Advisory Committee Act and the Negotiated Rulemaking Act. See 79 FR 41456; 5

U.S.C. 561-70, App. 2. The manufactured housing working group (MH working group) consisted of representatives of interested stakeholders with a directive to consult, as appropriate, with a range of external experts on technical issues in development of a term sheet with recommendations on proposed energy conservation standards. The MH working group's recommendations were based on the 2015 IECC and did not address proposed systems of compliance or enforcement. Further detail on the MH working group, stakeholder comments, and the rulemaking history was provided in the June 2016 energy conservation standards NOPR. See 81 FR 39756, 39761-39766.

A public meeting regarding the manufactured housing energy conservation standards was held on July 13, 2016, and the June 2016 energy conservation standards NOPR provided for a comment period ending August 16, 2016. Comments provided to the June 2016 energy conservation standards NOPR and prior opportunities for comment, and the transcript from the public meeting, are available for public viewing at the regulations.gov web page.[4]

In the June 2016 energy conservation standards NOPR, DOE proposed two compliance options for building thermal envelope requirements: a prescriptive option and a performance option. See 81 FR 39765, 39804. Under the prescriptive option DOE proposed minimum R-value requirements for ceiling, wall, and floor insulation; maximum U-factors for windows, skylights, and doors; and maximum SHGC requirements for glazed fenestration. The proposed prescriptive option also would

[4] See http://www.regulations.gov/#!docketDetail;D=EERE-2009-BT-BC-0021.

provide manufacturers with the option of relying on U-factor alternatives to the R-value requirements. Under the performance option, DOE proposed a maximum U_o (i.e., overall thermal transmittance) for the building thermal envelope allowing manufacturers to optimize the performance of the various components of the manufactured house to meet the standards presumably with the least cost.

In the June 2016 energy conservation standards NOPR, DOE did not propose test procedures for determining R-value, U-factor, or SHGC, for use under the prescriptive or performance option.[5] DOE did propose to reference the test procedure incorporated in the current HUD regulations for determining U-factor alternatives under the performance option, i.e., "Overall U-Values and Heating/Cooling Loads-Manufactured Home." Conner, C.C., Taylor, Z.T., Pacific Northwest Laboratory, published February 1, 1992 (Battelle Method). However, DOE did not propose a test procedure for determining U-factor alternatives under the prescriptive option.

DOE also proposed standards for the maximum air leakage rate for duct systems and minimum mechanical ventilation system fan efficiencies. 81 FR 39756, 39806. DOE did not include test procedures for these proposed requirements.

[5] The June 2016 energy conservation standards NOPR proposes prescriptive default values for the U-factor and SHGC of certain fenestration products and doors.

II. Synopsis of the Notice of Proposed Rulemaking

In this NOPR, DOE proposes test procedures to support the proposed manufactured housing thermal envelope requirements, air leakage requirements, and fan efficacy requirements proposed in a new part of the Code of Federal Regulations (CFR) under 10 CFR part 460. See 81 FR 39756. The proposed test procedures are used as the basis for manufacturers to show compliance with the energy conservation standards, once finalized and compliance is required. This notice describes a method of test for each energy-related metric, how manufacturers select units for testing, the method by which representations are developed for each model, and the potential impacts of the proposed test procedures. Representations refer to any instance in which a manufacturer describes the ratings associated with the energy efficiency metric(s) are measured by the DOE test procedure.

While DOE has proposed test methods for manufactured housing, DOE has not included or proposed any additional compliance or enforcement provisions at this time. DOE anticipates that it will address issues related to certification, compliance, and enforcement of the proposed standards in a separate rulemaking. DOE will address any associated costs resulting from the compliance or enforcement as part of that rulemaking.

DOE's proposed actions relating to the test procedure are addressed in detail in the following sections of this notice.

III. Discussion of Proposed Test Procedures

The following sections focus on DOE's test procedure proposal, including metrics being measured, industry standards incorporated by reference, and effective date.

A. Applicability to All Manufactured Home Designs and Construction

To support the June 2016 energy conservation standards NOPR, this test procedure applies to all manufactured homes meeting the proposed definition of manufactured home. In June 2016 energy conservation standards NOPR, DOE defined manufactured home as a structure, transportable in one or more sections, which in the traveling mode is 8 body feet or more in width or 40 body feet or more in length or which when erected on-site is 320 or more square feet, and which is built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air conditioning, and electrical systems contained in the structure. *See* 81 FR 39756 at 39799, 39780 (June 17, 2016) for the full proposed definition of manufactured home.

Typically, manufactured homes are one-story, single- or multi-section homes. However, multi-story manufactured homes can be manufactured, and other less common constructions may also exist or be possible to manufacture. DOE requests comment on whether the proposed test procedures in section III.C apply to all constructions and designs of manufactured homes, and whether alternative test procedures are needed for certain manufactured housing constructions or designs. See section V.B for a list of issues on which DOE seeks comment.

B. Energy Efficiency Metrics

In this test procedure NOPR, DOE proposes test methods to determine the represented values for the proposed energy efficiency metrics in the manufactured housing energy conservation standards. See 81 FR 39756. Table III-1, Table III-2, Table III-3, Table III-4, and Table III-5 summarize the proposed energy conservation standards that would require test methods. MH manufacturers have the option of either using the prescriptive or performance path when designing a compliant manufactured home. All homes must follow the duct air leakage, hot water pipe insulation, and mechanical ventilation fan efficacy requirements. Additional prescriptive installation requirements (that do not involve testing) and other limitations are also outlined in the energy conservation standard NOPR. See 81 FR 39756.

Table III-1 Prescriptive Path

Climate Zone	Ceiling R-value	Wall R-value	Floor R-value	Window U-factor	Skylight U-factor	Door U-factor	Glazed Fenestration SHGC[6]
1	30	13	13	0.35	0.75	0.40	0.25
2	30	13	13	0.35	0.75	0.40	0.33
3	30	21	19	0.35	0.55	0.40	0.33
4	38	21	30	0.32	0.55	0.40	No Rating

Table III-2 U-factor Alternatives for Prescriptive Path

Climate Zone	Ceiling U-factor[7]	Wall U-factor	Floor U-factor

[6] The SHGC requirements listed in this table also apply to the performance path.
[7] The U-factor alternatives can be used in place of the R-values listed in Table III-1.

1	0.0446	0.0943	0.0776
2	0.0446	0.0943	0.0776
3	0.0446	0.0628	0.0560
4	0.0377	0.0628	0.0322

Table III-3 Performance Path

Climate Zone	Single-Section U_o	Multi-Section U_o
1	0.087	0.084
2	0.087	0.084
3	0.070	0.068
4	0.059	0.056

Table III-4 Mechanical Ventilation Fan Efficacy

Fan Type Description	Minimum Efficacy (cubic feet per minute [cfm]/Watt)
Range hoods (all air flow rates)	2.8
In-line fans (all air flow rates)	2.8
Bathroom and utility room fans (10 cfm ≤ air flow rate < 90 cfm)	1.4
Bathroom and utility room fans (air flow rate ≥ 90 cfm)	2.8

Table III-5 Other Energy Conservation Standards

Requirement Description	Minimum Requirement
Duct Air Leakage	4 cubic feet per minute per 100 square feet of conditioned floor area
Hot Water Pipe Insulation	R-3

The test methods that are proposed in this NOPR are for the following metrics: (1) R-value of insulation, (2) U-factor of fenestration, (3) U_o value performance path, (4) Alternate U-factor of insulation, (5) SHGC of fenestration, (6) Duct air leakage, and (7) Mechanical ventilation fan efficacy.

C. Incorporation by Reference of Industry Standard(s) for Proposed Metrics

To determine represented values for the proposed energy efficiency metrics described in section III.A, DOE proposes to incorporate by reference industry-accepted test standards. Additionally, as described in section I.A, EISA directs that the proposed

energy conservation standards be based on the most recent version of the IECC. Therefore, to align this test procedure with the proposed energy conservation standards, DOE has aligned the test methods in this test procedure with those specified by the 2015 IECC while accounting for the unique aspects of manufactured housing design and construction. Also, by aligning with industry-accepted test methods, it is expected that the DOE test procedures will be less burdensome than if DOE were to establish new test procedures for manufactured housing manufacturers (MH manufacturers).

While the MH manufacturer would be responsible for complying with the proposed energy conservation standards, if finalized, DOE expects that MH manufacturers would choose to get the testing data from the entities manufacturing the components for manufactured homes. For the R-value of insulation, U-factor and SHGC of fenestration, and the mechanical ventilation fan efficacy, DOE anticipates that MH manufacturers would be able to rely on testing performed by and data supplied by the component manufacturers, DOE does not expect these particular proposed testing procedures to have a large cost impact on manufactured home entities. Instead, this specifies a pathway to demonstrate compliance with the proposed energy conservation standards. This NOPR proposes test methods to determine represented values for each of these energy efficiency metrics, based on current industry practice. As such, DOE anticipates that MH manufacturers would be able to rely on values currently being determined by component manufacturers and that are provided as part of the component specification sheets. DOE does expect that the MH manufacturer would have to perform the calculations to determine the U_o value if following the performance path (in proposed section § 460.102(c)), and the alternate U-factor of insulation, in addition to having to

perform the test for the total duct air leakage as this depends on the manufactured home design as a whole and not just the individual components.

In the following sections, DOE describes the industry test standards being proposed to be incorporated by reference in this NOPR to determine represented values for the proposed energy efficiency metrics. DOE proposes that the regulatory text for the test procedure NOPR is inserted within the same sections of the proposed regulatory text from the energy conservation standards.

1. R-value of insulation

DOE proposes to cross-reference U.S. Federal Trade Commission (FTC) regulations at 16 CFR part 460 ("FTC R-value rule") to determine the R-value of insulation, with certain exceptions. The FTC R-value rule references industry standards for testing insulation, which are specific to the type of insulation and intended use. The rule is required for the labeling and advertising of home insulation. As such, the FTC R-value rule is widely used in industry to determine R-value of insulation. Additionally, FTC requires maintenance of records of the test procedures relied upon for compliance with the FTC R-value rule. See 16 CFR 460.9. Furthermore, the 2015 IECC references the same FTC R-value rule in section R303.1.4 for determination of R-value of insulation.

The FTC R-value rule provides a specification to test the insulation at a mean temperature of 75 degrees Fahrenheit and with a temperature differential of 50 degrees

Fahrenheit plus or minus 10 degrees Fahrenheit. DOE proposes to test at the same conditions in this NOPR.

The exceptions to the FTC R-value rule that DOE is proposing include the following:

(1) For all types of insulation except aluminum foil, heat flux would be measured only in accordance with ASTM C518-15, with the heat meter apparatus in the horizontal orientation. R-value would be calculated in accordance with ASTM C1045-07 (based upon heat flux measured according to ASTM C518-15,

(2) In the case that uniform ceiling insulation thickness is not possible due to the truss heel height at the eaves of the roof, the ceiling insulation R-value would be the R-value listed on the insulation manufacturer's label (developed in accordance with 16 CFR 460.12(b)(2)) corresponding to the minimum weight or number of bags of insulation installed by the manufactured home manufacturer.

The following sections provide further discussion on each of the exceptions. In general, DOE requests comment on the percentage of insulation models used by the MH market that are already rated using the proposed test procedures, the cost of transitioning to these test procedures for those models that have not been tested in accordance with the proposed test procedure, and to what alternative test procedure these insulation models are testing in accordance with.

a. R-value for all types of insulation except aluminum foil

DOE is proposing to include the following exception for measuring the heat flux to calculate R-value for all types of insulation except aluminum foil: for all types of insulation except aluminum foil, heat flux would be measured only in accordance with ASTM C518-15, with the heat meter apparatus in the horizontal orientation. Then, R-value would be calculated in accordance with ASTM C1045-07 based upon heat flux measured according to ASTM C518-15.

The FTC R-value rule provides a number of industry standards as options for testing all types of insulation except aluminum foil. They include the following: ASTM C177-04, "Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus"; ASTM C518-04, "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus."; ASTM C1114-00, "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Thin-Heater Apparatus."; and, ASTM C1363-97, "Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus."[8]

DOE reviewed each of the industry standards to determine the differences between the standards, and whether any one of the standards could be used to test all types of insulation except aluminum foil. The primary difference among the industry

[8] The FTC regulations cite specific versions of the ASTM test methods; however, the FTC regulations also require use of any updates to the referenced ASTM test methods unless a person affected by the change can petitions the FTC not to adopt the change. See 16 CFR 460.7.

standards is with respect to the apparatus used for measuring heat flow through the insulation sample, which could lead to slightly different measured values. Based on a review of specification sheets of insulation from multiple manufacturers, DOE determined that insulation manufacturers most commonly use ASTM C518 to test insulation for heat flux measurement. DOE understands that this is because ASTM C518-15 is comparable with the other listed test procedures, but is more cost-effective, and less time consuming. DOE's understanding was supported by a discussion with a test lab that performs insulation testing. In addition, the same test lab informed DOE that it uses ASTM C518-15 more often than any other standard to test insulation. Therefore, it is DOE's understanding that ASTM C518-15 is the most widely-used industry standard to test all types of insulation except aluminum foil. To minimize the potential test burden on MH manufacturers, and reduce potential for variation in measured heat flux to calculate R-value for DOE's compliance or enforcement process, DOE is proposing to cross-reference the FTC R-value rule, but specify the use of the ASTM C518-15 option only.

Within ASTM C518, there are provisions to use the heat meter apparatus either in the horizontal or vertical orientation. Based on discussions with the test lab, DOE proposes to test only in the horizontal orientation, as this orientation is what is widely used in the industry. Additionally, it is DOE's understanding that the horizontal orientation provides a more conservative R-value result because in a horizontal position, convective heat flow within the sample will make the sample less resistant to heat transfer, leading to a lower R-value than a vertical test.

DOE seeks comment on the proposal to incorporate by reference only ASTM C518-15 for determinations of R-value of insulation for all types of insulation except aluminum foil. In addition, DOE also seeks comment regarding testing only using the horizontal orientation. See section V.B for a list of issues on which DOE seeks comment.

b. Ceiling insulation R-value

In the case that uniform ceiling insulation thickness is not possible due to the truss heel height at the eaves of the roof, DOE proposes that the ceiling insulation R-value for loose-fill insulation would be the R-value listed on the insulation manufacturer's label (developed in accordance with 16 CFR 460.12(b)(2)) corresponding to the minimum weight or number of bags of insulation installed by the manufactured home manufacturer. To calculate the minimum weight of insulation, DOE proposes the MH manufacturer multiply the minimum weight per square foot of insulation for the required ceiling insulation R-value (developed in accordance with 16 CFR 460.12(b)(2)) by the surface area of the ceiling in square feet. To calculate the number of bags of insulation, DOE proposes the MH manufacturer multiply the number of bags of insulation per 1,000 square feet for the required ceiling insulation R-value (developed in accordance with 16 CFR 460.12(b)(2)) by the surface area of the ceiling in square feet divided by 1,000 square feet.

In the June 2016 energy conservation standards NOPR, DOE proposed that ceiling insulation must have either a uniform thickness or a uniform density. 81 FR 39756, 39804. However, DOE understands that there might be instances, specifically

near the truss heel at the eaves of the roof, where uniform thickness might not be possible. The FTC R-value rule does not address determining the R-value in such an application-specific instance. Therefore, in this case, DOE proposes to determine the ceiling insulation R-value corresponding to the mass or number of bags of insulation installed by the MH manufacturer. The FTC labeling requirements in 16 CFR 460.12(b)(2) require this information to be provided by insulation manufacturers.

DOE seeks comment on the proposed exception that if uniform ceiling insulation thickness is not possible due to the truss heel height at the eaves of the roof, the ceiling insulation R-value is based on the R-value listed on the insulation manufacturer's label corresponding to the mass or number of bags of insulation installed by the manufactured home manufacturer. See section V.B for a list of issues on which DOE seeks comment.

The test procedure for the determination of R-value of insulation is proposed in 10 CFR 460.102(d)(1) of the regulatory text.

2. U-factor of fenestration

DOE proposes to incorporate by reference ANSI/NFRC 100 to determine the U-factor of fenestration. ANSI/NFRC 100 is an industry-accepted standard, which is based on simulation software to measure energy performance ratings. This standard provides specifications for simulation and testing, which include temperature, wind speed and solar irradiance. If simulation does not apply to a particular fenestration product, ANSI/NFRC 100 requires that NFRC 102 be used as a testing alternative to determine the

tested total fenestration product U-factor.[9] NFRC 102 measures the thermal transmittance of fenestration systems mounted vertically in the thermal chamber.

Under ANSI/NFRC 100, an NFRC accredited laboratory is required to perform the simulation. For simulation under ANSI/NFRC 100, accredited laboratories must attend a certification workshop and pass examinations to achieve the status of NFRC Certified Simulator. In addition, NFRC accredited laboratories must maintain their simulation certification every year by participating in annual inter-laboratory comparison and by attending mandatory training workshops.

NFRC standards are widely used by industry, in a variety of capacities. Many component manufacturers affix an NFRC label to their fenestration products, which includes the U-factor, SHGC, visible transmittance and air leakage values. While component manufacturers are not required to certify using the NFRC test standard, the NFRC program has a large number of participants (more than 500 manufacturers), and NFRC-certified products are frequently used to comply with local energy code requirements. In addition, a fenestration product must be NFRC-certified to meet the criteria for becoming an ENERGY STAR product. Lastly, the 2015 IECC references ANSI/NFRC 100 in section R303.1.3 for fenestration product rating.

[9] Section 4.1.2 of NFRC 100 states that if an individual product cannot be simulated in accordance with section 4.3.1, the testing alternative [NFRC 102] shall be used. Section 4.5 states that an accredited laboratory will have to state in the simulation report that it cannot simulate an individual product to a reasonable accuracy. Section 4.1.2 of NFRC 100 provides some examples of products that cannot be simulated, including non-planar products, for example, domed skylights without frames or flashing, and certain complex glazed products.

The test procedure for the determination of U-factor of fenestration is proposed in 10 CFR 460.102(d)(3) of the regulatory text.

DOE seeks comment on whether ANSI/NFRC 100 is an appropriate industry standard to determine the U-factor of fenestration. DOE also requests comment on the percentage of fenestration models used by the MH market that are already rated using the proposed test procedures, the cost of transitioning those fenestration models that have not been tested in accordance with the proposed test procedure, and to what alternative test procedure these fenestration models are testing in accordance with . DOE notes that any fenestration redesign cost for complying with the proposed MH fenestration requirements is addressed as part of the energy conservation standard. 81 FR 39756 (June 17, 2016). See section V.B for a list of issues on which DOE seeks comment.

3. U_o value, performance path

In the June 2016 energy conservation standards NOPR, DOE proposed that U_o[10] would be determined in accordance with the Battelle Method. 81 FR 39756, 39804. The Battelle Method currently is referenced in the HUD Code for calculation of overall thermal transmittance. See 24 CFR 3280.508. In this test procedure NOPR, DOE continues to propose the Battelle Method, but with certain exceptions.

The Battelle Method requires several inputs to calculate U_o, which include the R-value of insulation and the U-factor of fenestration products. In sections III.C.1 and

[10] U_o is a measurement of the heat loss or gain rate through the building thermal envelope of a manufactured home; therefore, a lower U_o corresponds with a more insulated building thermal envelope.

III.C.2, DOE proposes to incorporate by reference certain industry test standards to measure the R-value of insulation and the U-factor of fenestration products, respectively. In this NOPR, DOE continues to propose that U_o must be determined in accordance with the Battelle Method. However, to provide consistency between the prescriptive option and performance option, DOE proposes that for the U_o calculation, the R-value of insulation must be determined as proposed in section III.C.1, and the U-factor of fenestration products must be determined as proposed in section III.C.2. The methods in proposed sections III.B.1 and III.B.2 would be used instead of the methods referenced by the Battelle Method.

The additional instructions for the calculation of U_o are proposed in 10 CFR 460.102(e)(1)(i)-(ii) of the regulatory text.

4. U-factor alternatives to R-value of insulation

DOE proposes to calculate the U-factor alternatives to R-value requirements in accordance with section 3.1 from the Battelle Method, with the additional instructions described in section III.C.3. Section 3.1 of the Battelle Method provides a step-by-step method to calculate the component U-factors. In Step 1, the Battelle method states that window U-factors must be determined according to sections 4.2.1 and 4.2.2, and Step 3 requires determining R-value for each material of each heat flow path. As discussed in section III.C.3, DOE is proposing reliance on the test methods for determining U-factor and R-values referenced in the proposed regulation in place of the test methods used in the Battelle method. Therefore, DOE is proposing the same approach to calculate the U-factor alternatives to R-value requirements.

The calculation of the U-factor alternatives to R-value of insulation is proposed in 10 CFR 460.102(d)(5) of the regulatory text.

DOE seeks comment on whether section 3.1 from Overall U-Values and Heating/Cooling Loads – Manufactured Homes is appropriate to calculate the U-factor alternative to R-value of insulation. See section V.B for a list of issues on which DOE seeks comment.

5. SHGC of fenestration

DOE proposes to incorporate by reference NFRC 200 to determine the SHGC for fenestration. Similar to ANSI/NFRC 100, NFRC 200 is also an industry-accepted standard, which is based on simulation software to measure energy performance ratings. This standard provides specifications for simulation and testing conditions. Under NFRC 200, an NFRC accredited laboratory is required to perform the simulation. The NFRC laboratory accreditation process is described in section III.C.2. If simulation cannot be performed to a reasonable accuracy, as determined by the NFRC accredited laboratory, NFRC 200 requires that NFRC 201 be used as a testing alternative to determine the component or total fenestration product SHGC. NFRC 201 measures the fenestration SHGC installed in a solar calorimeter.

The NFRC test standards are also used for the NFRC label, which includes the U-factor, SHGC, visible transmittance and air leakage values. Further details regarding the NFRC label is provided in section III.C.2. Furthermore, the 2015 IECC references NFRC 200 in section R303.1.3 for fenestration product rating.

The test procedure for the determination of the SHGC of fenestration is proposed in 10 CFR 460.102(d)(7) and 10 CFR 460.102(e)(2) of the regulatory text.

DOE seeks comment on whether NFRC 200 is an appropriate industry standard to determine the SHGC of fenestration. DOE also requests comment on the percentage of fenestration models used by the MH market that are already rated using the proposed test procedures, the cost of transitioning to these test procedures for fenestration models not already following the proposal, and to what alternative test procedure these fenestration models are testing in accordance with. DOE notes that any fenestration redesign cost for complying with the proposed MH fenestration requirements is addressed as part of the energy conservation standard. 81 FR 39756 (June 17, 2016). See section V.B for a list of issues on which DOE seeks comment.

6. Duct air leakage

DOE proposes to incorporate by reference ASTM E1554-13 to determine the total air leakage standard for duct systems. In this NOPR, DOE proposes that duct air leakage per 100 square feet of conditioned floor area ($Q_{\text{duct leakage,total}}$) would be determined according to the following equation:

$$\boldsymbol{Q_{duct\ air\ leakage}} = \frac{\boldsymbol{Q_{duct\ leakage,total}}}{\boldsymbol{A_{floor,conditioned}}} \times \mathbf{100}$$

Where:

$Q_{duct\ air\ leakage}$ = duct air leakage per 100 square feet of conditioned floor area, (cubic feet per minute per 100 square feet of conditioned floor area)

$Q_{duct\ leakage,total}$ = measured total air leakage of the duct system, determined in accordance with ASTM E1554-13, Test Method D, as calculated in section 9.4 (cubic feet per minute)

$A_{floor,conditioned}$ = total conditioned floor area (square feet)

ASTM E1554-13 is the industry standard for measuring duct air leakage via pressurization.[11] ASTM E1554-13 prescribes four test methods for measuring air leakage from a duct system (Test Methods A through D). Test Methods A, B, and C determine air leakage only to the outside of the building, while Test Method D measures total air leakage, including leakage to the inside of the building. Of the methods provided in ASTM E1554-13, DOE has initially determined that Test Method D produces the ratings needed to determine total air leakage. Further, Test Method D is consistent with the test conditions described in section R403.3.3 of the 2015 IECC (the basis of the proposal in the June 2016 energy conservation standards NOPR), which calls for measurement of total air leakage of the duct system. The 2015 IECC describes certain test conditions for duct testing to determine total air leakage from the duct system (pressure differential of 0.1 inch w.g. [25 Pa] and sealing all registers during testing). However, the 2015 IECC does not prescribe a specific procedure for duct testing. Therefore, DOE proposes that duct air leakage per 100 square feet of conditioned floor area be determined in

[11] "Field Test Best Practices – Duct Pressurization Testing." National Renewable Energy Laboratory Building Research. https://buildingsfieldtest.nrel.gov/duct_pressurization_testing

accordance with Test Method D of ASTM E1554, as calculated in section 9.4 of the ASTM standard.

DOE expects that testing will be performed by the MH manufacturer in the factory before being installed in the field for both single- and multi-section homes. For multi-section homes, in many cases it will be impractical and/or costly to assemble the homes (by connecting the duct systems). For this reason, DOE proposes that the MH manufacturer test each section of the multi-section home separately. As with single section homes, the manufacturer would follow ASTM E1554-13, Test Method D, and seal all interior air vents and registers. In addition, the manufacturer would seal any duct openings that are intended to connect ducts between sections of the home, unless that duct opening is being used as an inlet to pressurize the duct system. The MH manufacturer would then compute the total duct air leakage for the entire home based on the summation of the leakage measured for each section.

The test procedure for determination of total duct air leakage is proposed in 10 CFR 460.201(b) of the regulatory text.

DOE seeks comment on whether ASTM E1554-13, Test Method D, is an appropriate industry standard to determine total duct air leakage for both single- and multi-section homes. DOE also seeks comment on its proposal for determining the total duct air leakage of multi-section homes by measuring the duct air leakage of each section separately, and whether alternative methods should be considered. See section V.B for a list of issues on which DOE seeks comment.

7. Mechanical ventilation fan efficacy

DOE proposes to incorporate by reference HVI 916 to determine the mechanical ventilation fan efficacy. HVI 916 is published by the Home Ventilating Institute (HVI), and used for HVI-certified ratings programs. DOE has initially determined that the HVI 916 air flow test procedure establishes uniform methods for laboratory testing of powered home ventilating equipment for airflow rate (in cubic feet per minute per Watt, or cfm/W). HVI 916 describes the test equipment and the test methods for specific HVI classification groups.

DOE also sought to propose a fan efficacy test procedure consistent with the basis of the proposed energy conservation standard. While the 2015 IECC (the basis of the proposed fan efficacy standards) does not provide any specific test methods to determine fan efficacy, the prescribed efficacy levels in the 2015 IECC are based on the current ENERGY STAR specifications. HVI 916 is one of the referenced test methods for ENERGY STAR, so through incorporating by reference HVI 916, DOE ensures that the test procedure produces ratings on which the energy conservation standard is based.

ENERGY STAR provides another test method to determine airflow rating in addition to HVI 916, i.e., ANSI/Air Movement and Control Associations International, Inc. (AMCA) 210-07, ("ANSI/AMCA 210-07"), "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating".[12] ANSI/AMCA 210-07 provides general test methods to determine airflow rate for several different types of fans, not just home

[12] Energy Star Ventilation Fans Key Product Criteria. https://www.energystar.gov/products/heating_cooling/fans_ventilating/key_product_criteria

ventilation fans. However, this NOPR is focused only with the mechanical ventilation fan efficacy requirement, and HVI 916 is a test standard that is specific to home ventilation fans. Additionally, HVI 916 references ANSI/AMCA 210 as the primary standard for HVI airflow test and calculation within the standard. Therefore, because HVI 916 is specific to home ventilation fans and also references the general fan test standard, incorporating by reference HVI 916 is sufficient to determine mechanical ventilation fan efficacy.

DOE is also proposing to use test conditions specified by ENERGY STAR instead of the corresponding test conditions specified in HVI 916. DOE is specifying these test conditions to keep consistent with how the industry is currently testing fans to certify to ENERGY STAR (for consistency with the basis of DOE's proposed fan efficacy standard). Specifically, ENERGY STAR includes test conditions specifying test static pressures, test speeds, and testing configurations when using HVI 916. The test conditions that DOE proposes in this test procedure are the following:

(1) Bathroom and utility room fans with more than one speed that are vented externally, and in-line fans with more than one speed, must be tested and meet the performance criteria at each speed. A fan of this type that has a rotary speed dial or similar mechanism that allows for a theoretically infinite number of speeds must be tested and meet the applicable efficacy of this specification at its minimum and maximum speeds.

(2) Fans must be tested at the following static pressures to determine the airflow and efficacy: For ducted fans, conduct tests at 0.1 inch water gauge static pressure; for

direct discharge (non-ducted) fans, conduct tests at 0.03 inch water gauge static pressure; for in-line fans,[13] conduct tests at 0.2 inch water gauge static pressure.

(3) Test range hood fans at working speed, as specified in HVI 916 (incorporated by reference; see 10 CFR 460.3), to determine the airflow and efficacy. Range hoods must meet the minimum efficacy requirements in each possible configuration (horizontal and vertical) at working speed.

(4) When calculating efficacy, only measure the fan motor electrical energy consumption. Energy used for other fan auxiliaries (e.g., lights, sensors, heaters, timers, or night lights) is not included in the determination of fan efficacy. Therefore, to measure fan power, switch off all fan auxiliaries.

DOE is also aware that ENERGY STAR includes a qualification criteria beyond efficacy requirements for the installed fan performance, with the exception of in-line, direct discharge fans and range hood models. This qualification criteria requires that ducted products be tested at 0.25 inch water gauge static pressure in addition to 0.1 inch water gauge static pressure, and that the airflow delivered at 0.25 inch water gauge static pressure shall be equal to or greater than 70 percent of tested airflow delivered at 0.1 inch water gauge static pressure. This additional qualification criteria was added to ENERGY STAR specifications to allow for quality assurance of installed efficacy. DOE has only

[13] An in-line fan is a fan designed to be located within the building structure and that requires ductwork on both intake and exhaust.

included testing at 0.1 inch water gauge static pressure because the energy conservation standard is based on fan performance at 0.1 inch water gauge static pressure.

The test procedure for determination of mechanical ventilation fan efficacy is proposed in 10 CFR 460.204(c) of the regulatory text.

DOE seeks comment on incorporating by reference only HVI 916 to determine mechanical ventilation fan efficacy. In addition, DOE seeks comment on the number of speeds, and the static pressures being proposed. DOE also requests comment on the percentage of mechanical ventilation fan units used by the MH market that are already rated using the proposed test procedures, the cost of transitioning to these test procedures for manufacturers not already following the proposal, and to what alternative test procedure these mechanical ventilation fan units are testing in accordance with. See section V.B for a list of issues on which DOE seeks comment.

D. Sampling Plan and Represented Value

As previously discussed, DOE potentially will address the certification requirements[14] for MH manufacturers in a separate rulemaking. DOE is considering that for some of the requirements, the basis on which a manufactured home's performance is represented and how the manufactured home's performance would be compared to energy conservation standards would be the average of values generated from testing at least one unit. In this notice, DOE proposes that to the extent that a represented value for

[14] Certification requirements refer to the administrative process of demonstrating compliance to DOE. This process would rely on data generated in accordance with this proposed test procedure, including the sampling plan.

the purpose of certification is based on an average value, the represented value must be based on a sample size of at least one tested unit. DOE is requesting comments on the certification costs and requirements associated with conducting these manufactured home performance test(s). The represented value would be the arithmetic mean of the test values and that testing of at least one sample would be required. Samples for testing would be required to be selected at random.

For testing applicable to components, DOE is proposing that the individual components tested would not be required to be selected from components actually installed by the MH manufacturer in a manufactured home. DOE is not proposing to require that a MH manufacturer directly perform the testing of components. DOE expects that MH manufacturers would be able to rely on testing performed by the component manufacturer. DOE expects that the tests can be performed on components prior to installation in the home. As such, DOE is proposing that the individual components selected for testing be representative of the components installed in the manufactured home.

DOE is further proposing that any representation made by a MH manufacturer of the performance of a manufactured home or a component, as compared to an energy conservation standard established by DOE, could not be more favorable than the mean value derived from sampling. For example, if a MH manufacturer were to make a representation of the efficacy of a mechanical ventilation fan, for which a minimum standard is proposed, the MH manufacturer would be prohibited from representing the fan as more efficient than the mean value calculated from sampled units, and as less

efficient than the energy conservation standard. DOE is also clarifying that the proposed energy conservation standards should also be computed with the mean values for those standards that are expressed as functions.

DOE requests comment on the proposed sampling plan and method for calculating a represented value. DOE is particularly seeking comment on the proposed minimum sample size.

E. Test Procedure Effective Date

If adopted, the effective date for this manufactured housing test procedure would be 30 days after publication of the test procedure final rule in the Federal Register.

IV. Procedural Issues and Regulatory Review

A. Review under Executive Order 12866

The Office of Management and Budget (OMB) has determined that this test procedure rulemaking is a "significant regulatory actions" under section 3(f) of Executive Order 12866, Regulatory Planning and Review, 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget.

B. Review under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) requires preparation of an initial regulatory flexibility analysis (IFRA) for any rule that by law must be proposed for

public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, "Proper Consideration of Small Entities in Agency Rulemaking," 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website: http://energy.gov/gc/office-general-counsel.

DOE reviewed the proposals for testing various categories of manufactured homes as proposed in this NOPR under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. DOE preliminarily certifies that the proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities. The factual basis for this certification is set forth in the following paragraphs. DOE will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the SBA for review under 5 U.S.C. 605(b).

1. Review of Manufactured Housing Manufacturers

For the manufacturers of manufactured homes, 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. 13 CFR part 121. The size standards are listed by NAICS code and industry

description and are available at http://www.sba.gov/content/table-small business-size-standards. The covered manufacturers are classified under NAICS 321991, ''Manufactured Home (Mobile Home) Manufacturing.'' The SBA sets a threshold of 1,250 employees or less for an entity to be considered as a small business for this category.

To assess the potential impacts of this rulemaking on small entities, DOE conducted a focused inquiry of the companies that could be small business manufacturers of manufactured homes. During its market survey, DOE used available public information to identify potential small manufacturers. DOE's research involved individual company Web sites and market research tools (e.g., Hoovers reports[15]) to create a list of companies that manufacture homes covered by this rulemaking. DOE also asked stakeholders and industry representatives if they were aware of any other small manufacturers.

DOE identified thirty-seven manufacturers of manufactured homes. Of the thirty-seven, DOE identified thirty-one manufacturers that qualified as domestic small businesses.

2. Burden of Conducting the Proposed DOE MH Test Procedure

DOE currently does not have a test procedure for manufactured housing. As described in the preamble, this test procedure proposes test methods for the following

[15] Hoovers. http://www.hoovers.com/.

metrics: (1) R-value of insulation, (2) U-factor of fenestration, (3) U_o value, performance path, (4) Alternate U-factor of insulation, (5) SHGC of fenestration, (6) Duct air leakage, and (7) Mechanical ventilation fan efficacy.

For the R-value of insulation, U-factor and SHGC of fenestration, and mechanical ventilation fan efficacy, DOE anticipates that MH manufacturers would be able to use values currently provided by component manufacturers as part of the component specification sheets (because DOE's proposed test procedure matches current industry practice). Insulation manufacturers are required to test and label the R-value of insulation under the FTC R-value rule. It is DOE's understanding based on a review of the market that fenestration manufacturers routinely provide the U-factor and SHGC values of their products. Similarly, DOE understands that manufacturers of mechanical ventilation fans routinely provide the fan efficacy of their products consistent with the test procedures proposed in this notice. Therefore, DOE does not anticipate added test costs for MH manufacturers related to these metrics.

For the U_o value - performance path and the alternate U-value of insulation calculations, DOE proposes using the Battelle Method, which is currently referenced in the HUD Code for calculation of overall thermal transmittance. Because MH manufacturers are already required to perform these calculations for the HUD Code, DOE believes there would be no added test cost for these calculations as proposed in this NOPR. Therefore, in this IRFA, DOE is only assessing the potential impacts of duct air leakage test method on small manufacturers.

To determine the costs of the duct air leakage, DOE obtained input from the MH working group and estimates from publically available literature. During discussions of the MH working group, manufacturers expressed a view they would likely test every home's duct leakage to minimize risk of non-compliance with duct leakage standards. See 9/22/2014 WG Transcript, EERE-2009-BT-BC-0021-0102 at pp. 318-338. Hammon and Modera estimated a testing cost range of $131 to $163 per home in 1996, derived from a survey of 12 builders and 19 HVAC subcontractors.[16] For this analysis, DOE used the high limit of this range, $163 per home in 1996 dollars, inflated to $233 per home in 2015 dollars using the GDP price deflator from the United States Bureau of Economic Analysis.

DOE estimated the average number of homes produced per small manufacturer to be 682 homes. DOE determined this based on manufacturer interviews, manufactured housing shipments per year, and number of small manufacturers. Based on interviews, DOE determined that the top five large manufacturers control 70 percent of the market. Therefore, DOE assumed that the small manufacturers represented the remainder of the market, which is 30 percent. Based on the manufacturer housing institute (MHI) shipment data for 2015, there were 70,519 manufactured home shipments for that year. Therefore, the total number of manufactured homes produced by small manufacturers is 21,156. Based on thirty-one small manufacturers, DOE calculated the average number of homes

[16] Hammon, R.W. and Modera, M.P. "Improving the Energy Efficiency of Air Distribution Systems in New California Homes." *Proceedings of the 1996 ACEEE Summer Study on Energy Efficiency in Buildings*. Vol. 2. 1996.

produced per small manufacturer to be 682 homes. Therefore, to test each home at a cost of $233 per unit, the average total cost of testing is $158,906 per manufacturer.

DOE requests comment on the estimate of duct testing costs of $233 per home and any costs data or information on the duct testing cost for all types of manufactured housing covered by the rule including single section, multi-section, and multi-story manufactured housing. DOE also requests comment on testing burden specific to small MH manufacturers, and whether testing alternatives are available to reduce testing burden for all manufacturers. See section V.B for a list of issues on which DOE seeks comment.

C. Review under the Paperwork Reduction Act of 1995

This rulemaking does not include any information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.).

D. Review under the National Environmental Policy Act of 1969

In this notice, DOE proposes test procedures that it expects will be used for energy conservation standards for manufactured homes. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) and DOE's implementing regulations at 10 CFR part 1021. Specifically, this proposed rule would establish test procedures without affecting the amount, quality or distribution of energy usage, and, therefore, would not result in any environmental impacts. Thus, this rulemaking is covered by Categorical Exclusion A6 under 10 CFR part 1021, subpart D,

which applies to any rulemaking that is strictly procedural. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review under Executive Order 13132

Executive Order 13132, "Federalism," 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735.

DOE has examined this action and has determined that it would not pre-empt State law. This action impacts testing procedures applicable to energy efficiency requirements for manufacturers of manufactured homes. 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, the proposed rule meets the relevant standards of Executive Order 12988.

G. Review under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. No. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that

estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed "significant intergovernmental mandate," and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at http://energy.gov/gc/office-general-counsel. DOE examined this proposed 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 rulemaking would 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 proposed regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). DOE has reviewed this proposed 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 proposed 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 proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the

proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action to establish test procedures for measuring the energy efficiency of manufactured housing is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

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

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; FEAA) Section 32 essentially provides in relevant part that, where a 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 test procedures for manufactured homes proposed in this document incorporate testing methods contained in certain sections of the following commercial standards: ANSI/NFRC 100-2014, Procedure for Determining Fenestration Product U-

factors; NFRC 200-2014, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; ASTM C518-15, Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; ASTM C1045-07(2013), Standard Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions; ASTM E1554-13, Standard Test Methods for Determining Air Leakage of Air Distribution Systems by Fan Pressurization; and HVI Publication 916, Air Flow Test Procedure, updated September 29, 2015.

DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (i.e., whether they were developed in a manner that fully provides for public participation, comment, and review.) DOE will consult with both the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

M. Description of Materials Incorporated by Reference

In this NOPR, DOE proposes to incorporate by reference the test standard published by National Fenestration Rating Council, titled ANSI/NFRC 100-2014, ("ANSI/NFRC 100"), Procedure for Determining Fenestration Product U-factors. ANSI/NFRC 100 is an industry-accepted test procedure that measures the U-factor of fenestration and doors. Copies of ANSI/NFRC 100 be obtained from the National Fenestration Rating Council, 6305 Ivy Lane, Ste. 140, Greenbelt, MD 20770, or by going to http://www/nfrc/org/.

In this NOPR, DOE also proposes to incorporate by reference the test standard published by National Fenestration Rating Council, titled NFRC 200-2014, ("NFRC 200"), Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence. NFRC 200 is an industry-accepted test procedure that measures the solar heat gain coefficient of fenestration. Copies of NFRC 200 be obtained from the National Fenestration Rating Council, 6305 Ivy Lane, Ste. 140, Greenbelt, MD 20770, or by going to http://www/nfrc/org/.

Additionally, DOE proposes to incorporate by reference the test standard published by the American Society for Testing and Materials, titled ASTM C518-15, ("ASTM C518"), Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus. ASTM C518 is an industry-accepted test procedure for measuring values used to calculate the R-value of insulation that is typically used in manufactured homes. Copies of ASTM C518 may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, or by going to http://www.astm.org.

Also proposed to be incorporated by reference is the test standard published by the American Society for Testing and Materials, titled ASTM C1045-07(2013), ("ASTM C1045"), Standard Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions. ASTM C1045 is an industry-accepted test procedure for calculating the R-value of insulation that is typically used in manufactured homes. Copies of ASTM C1045 may be obtained from the American Society for Testing and Materials,

100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, or by going to http://www.astm.org.

DOE also proposes to incorporate by reference Method D, as calculated in section 9.4, of the test standard published by the American Society for Testing and Materials, titled ASTM E1554-13, ("ASTM E1554"), Standard Test Methods for Determining Air Leakage of Air Distribution Systems by Fan Pressurization. ASTM E1554 is an industry-accepted test procedure for measuring air leakage of air distribution systems (e.g., duct work employed in manufactured homes). Copies of ASTM C1554 may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, or by going to http://www.astm.org.

Finally, DOE is proposing to incorporate by reference the test standard published by the Home Ventilating Institute, titled HVI Publication 916, ("HVI 916"), Air Flow Test Procedure, updated September 29, 2015. HVI 916 is an industry-accepted test procedure for determining mechanical ventilation fan efficacy. Copies of HVI 916 may be obtained from the Home Ventilating Institute, 4915 Arendell St., Ste. J, PMB 311, Morehead City, NC 28557, or by going to http://www.hvi.org.

V. Public Participation

A. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule no later than the date provided in the **DATES** section at the beginning of this proposed rule.

Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this notice.

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

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

Do not submit to www.regulations.gov information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (CBI)). Comments submitted through www.regulations.gov cannot be claimed as CBI. Comments received

through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

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

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

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

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII)

file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

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

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

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include (1) a description of the items, (2) whether and why such items are customarily treated as confidential within the industry, (3) whether the information is generally known by or available from other sources, (4) whether the information has previously been made available to others without obligation concerning its confidentiality, (5) an explanation of the competitive injury to the submitting person

which would result from public disclosure, (6) when such information might lose its confidential character due to the passage of time, and (7) why disclosure of the information would be contrary to the public interest.

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

B. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

1) DOE requests comment on whether the proposed test procedures apply to all constructions and designs of manufactured homes including multi-section and multi-story homes, and whether alternative test procedures should be considered for certain MH constructions or designs. See section III.A.
2) DOE seeks comment on the proposal to incorporate by reference only ASTM C518-15 for determination of the R-value of insulation for all types of insulation except aluminum foil. In addition, DOE also seeks comment regarding testing only using the horizontal orientation. See section III.C.1.a.
3) DOE seeks comment on the proposed exception that if uniform ceiling insulation thickness is not possible due to the truss heel height at the eaves of the roof, the ceiling insulation R-value is based on the R-value listed on the

insulation manufacturer's label corresponding to the mass or number of bags of insulation installed by the manufactured home manufacturer. See section III.C.1.c.

4) DOE requests comment on the percentage of insulation materials used by the MH market that are already rated using the proposed test procedures; the cost of transitioning to these test procedures for manufacturers not already following the proposal; to what alternative test procedure these insulation models are testing in accordance with; and other potential test procedure options.
5) DOE seeks comment on whether ANSI/NFRC 100 is an appropriate industry standard to determine the U-factor of fenestration. DOE also requests comment on the percentage of fenestration units used by the MH market that are already rated using the proposed test procedures; the cost of transitioning to these test procedures for manufacturers not already following the proposal; to what alternative test procedure these fenestration models are testing in accordance with; and other potential test procedure options. See section III.C.2.
6) DOE seeks comment on whether section 3.1 from Overall U-Values and Heating/Cooling Loads – Manufactured Homes is appropriate to determine the U-factor alternative to R-value of insulation. See section III.C.4.
7) DOE seeks comment on whether NFRC 200 is an appropriate industry standard to determine the SHGC of fenestration. DOE also requests comment on the percentage of fenestration units used by the MH market that are already

rated using the proposed test procedures; the cost of transitioning to these test procedures for manufacturers not already following the proposal; to what alternative test procedure these fenestration models are testing in accordance with; and other potential test procedure options. See section III.C.5.

8) DOE seeks comment on whether ASTM E1554-13, Test Method D, is an appropriate industry standard to determine total duct leakage requirements for both single- and multi-section homes. DOE also requests comment on the cost of carrying out the duct leakage test procedure on a per-home basis for both single-section, multi-section, and multi-story homes. See section III.C.6.

9) DOE seeks comment on the proposal to sum the measured duct air leakage of each section of a multi-section home to calculate the total duct air leakage for multi-section homes. DOE also seeks comment on other alternative assemblies for determining total duct air leakage testing for multi-section homes. See section III.C.6.

10) DOE seeks comment on incorporating by reference only HVI 916 to determine mechanical ventilation fan efficacy. In addition, DOE seeks comment on the number of speeds, and the static pressures being proposed. DOE also requests comment on the percentage of mechanical ventilation fan units used by the MH market that are already rated using the proposed test procedures; the cost of transitioning to these test procedures for manufacturers not already following the proposal; to what alternative test procedure these mechanical ventilation fan units are testing in accordance with; and other potential test procedure options. See section III.C.7.

11) DOE seeks comment on the proposed sampling plan and method for calculating a represented value. DOE is particularly seeking comment on the proposed minimum sample size. See section III.D.

12) DOE requests comment on the tentative conclusion that the proposed test procedure will not have a significant economic impact on a substantial number of small entities. See section IV.B.

13) DOE requests comment on the estimate of duct testing costs of $233 per home. See section IV.B.

14) DOE requests comment on any duct leakage testing alternatives that are available to reduce testing burden for all manufacturers as well as any burden reducing alternatives for the other proposed test requirements. See section V.B.

VI. Approval of the Office of the Secretary

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

List of Subjects in 10 CFR Part 460

Administrative practice and procedure, Buildings and facilities, Energy conservation, Housing standards, Incorporation by reference, Reporting and recordkeeping requirements.

Issued in Washington, DC, on October 21, 2016.

Kathleen B. Hogan,

Deputy Assistant Secretary for Energy Efficiency,

Energy Efficiency and Renewable Energy.

For the reasons stated in the preamble, DOE is proposing to amend part 460, as proposed to be added at 81 FR 39756 (June 17, 2016), of chapter II of title 10, Code of Federal Regulations as set forth below:

PART 460—Energy Conservation Standards for Manufactured Homes

1. The authority citation for part 460 continues to read as follows:

Authority: 42 U.S.C. 17071; 42 U.S.C. 7101 et seq.

2. Section 460.3 is amended by:

a. Redesignating paragraph (c) as paragraph (d);

b. Adding a new paragraph (c); and

c. Adding paragraphs (e) and (f).

The additions read as follows:

§ 460.3 Materials incorporated by reference.

* * * * *

(c) ASTM. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, 610-832-9500, or *http://www.astm.org*.

(1) ASTM C518-15, ("ASTM C518-15"), Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus. IBR approved for § 460.102 of subpart B.

(2) ASTM C1045-07 (2013), ("ASTM C1045-07"), Standard Practice for Calculating Thermal Transmission Properties under Steady-State Conditions. IBR approved for § 460.102 of subpart B.

(3) ASTM E1554-13, ("ASTM E1554-13"), Standard Test Methods for Determining Air Leakage of Air Distribution Systems by Fan Pressurization. IBR approved for § 460.204 of subpart C.

* * * * *

(e) HVI. Home Ventilating Institute, 4915 Arendell St., Ste. J, PMB 311, Morehead City, NC 28557, 855-484-8368, or *http://www.hvi.org*.

(1) HVI Publication 916, ("HVI 916"), Air Flow Test Procedure, Updated September 29, 2015. IBR approved for § 460.201 of subpart C.

(2) [Reserved]

(f) NFRC. National Fenestration Rating Council, 6305 Ivy Lane, Ste. 140, Greenbelt, MD 20770, 301-589-1776, or http://www.nfrc.org/.

(1) ANSI/NFRC 100-2014, ("ANSI/NFRC 100"), Procedure for Determining Fenestration Product U-factors. IBR approved for § 460.102 of subpart B.

(2) NFRC 200-2014, ("NFRC 200"), Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence. IBR approved for § 460.102 of subpart B.

3. Section 460.102 is amended by:
   a. Adding paragraphs (d)(1), (2), (4), and (5);
   b. Revising paragraph (d)(3) and (d)(6);
   c. Adding paragraph (d)(7);
   d. Revising paragraph (d)(8);
   e. Adding paragraphs (e)(1)(i) and (ii), and (e)(2);
   f. Revising paragraph (e)(3).

The revisions and additions read as follows:

§ 460.102 Building thermal envelope requirements.

* * * * *

(d) Determination of compliance with § 460.102(b).

(1) The R-value of insulation must be determined in accordance with the FTC R-value rule at 16 CFR part 460, in units of $h \cdot ft^2 \cdot °F/Btu$, with the following exceptions:

(i) For all types of insulation except aluminum foil, heat flux would be measured only in accordance with ASTM C518-15 (incorporated by reference; see §460.3), with the heat meter apparatus in the horizontal orientation. Calculate R-value of insulation except aluminum foil in accordance with ASTM C1045-07 (incorporated by reference; see §460.3) based upon heat flux measured according to ASTM C518-15.

(ii) In the case that uniform ceiling insulation thickness is not possible due to the truss heel height at the eaves of the roof, the ceiling insulation R-value would be the R-value listed on the insulation manufacturer's label (developed in accordance with 16 CFR 460.12(b)(2)) corresponding to the minimum weight or number of bags of insulation installed by the manufactured home manufacturer. To calculate the minimum weight of insulation, multiply the minimum weight per square foot of insulation for the required ceiling insulation R-value (developed in accordance with 16 CFR 460.12(b)(2)) by the surface area of the ceiling in square feet. To calculate the number of bags of insulation, multiply the number of bags of insulation per 1,000 square feet for the required ceiling insulation R-value (developed in accordance with 16 CFR 460.12(b)(2)) by the surface area of the ceiling in square feet divided by 1,000 square feet.

(2) To show compliance with paragraph (b) of this section for R-value of insulation:

(i) Randomly select a sample of insulation of at least one unit.

(ii) Test the insulation in accordance with the test procedure at paragraph (d)(1) of this section.

(iii) Determine the represented value of R-value by calculating the arithmetic mean of the sample (x_1), calculated as follows:

$$x_1 = \frac{1}{n_1}\left(\sum_{i=1}^{n_1} x_i\right)$$

where x_i is the measured R-value of unit i and n_1 is the total number of units.

Round representations of R-value calculated in this paragraph (d)(3)(iii) to the nearest whole number. Calculations of represented values must be rounded only after the calculation is completed.

(iv) The represented value of R-value must be equal to or greater than the value calculated under paragraph (d)(3)(iii) of this section, and equal to or greater than the standard described in §460.204(a).

(v) If multiple layers of insulation are used, the total R-value is the sum of the R-value of each layer of insulation that comprise

the component (as calculated in paragraphs (d)(2)(i) through (iii) of this section).

(3) Determine the U-factor of fenestration products and doors in accordance with ANSI/NFRC 100 (incorporated by reference; see §460.3) in units of Btu/ h·ft^2 ·°F. Alternatively, use the prescriptive default values specified for the corresponding fenestration products and doors in Tables 460.102-4 and 460.102-5.

(4) To show compliance with paragraph (b) of this section for U-factor of fenestration products and doors:

(i) Randomly select a sample of fenestration products or doors of at least one unit.

(ii) Test the fenestration product or door (or use the prescriptive default value) in accordance with the test procedure at this paragraph (d)(4).

(iii) Determine the represented value of U-factor by calculating the arithmetic mean of the sample. Round representations of U-factor calculated in paragraph (d)(5)(iii) of this section to two significant digits. Calculations of represented values must be rounded only after the calculation is completed.

(iv) The represented value of U-factor must be equal to or greater than the value calculated under paragraph (d)(5)(iii) of this section, and equal to or less than the standard described in paragraph (b) of this section.

(5) Calculate the U-factor alternatives to R-value Requirements in accordance with section 3.1 from Overall U-Values and Heating/Cooling Loads – Manufactured Homes (incorporated by reference; see §460.3) with the exceptions provided in paragraph (e)(1) of this section, in units of Btu/h·ft^2 ·°F.

(6) To show compliance with the U-factor alternatives to R-value Requirements (if this alternative is used):

(i) Randomly select a select a sample of manufactured homes (at least one home).

(ii) Calculate the U-factor alternatives in accordance with the test procedure at this paragraph (d)(6).

(iii) Determine the represented value of U-factor alternative by calculating the arithmetic mean of the sample. Round representations of U-factor alternative calculated in paragraph (d)(7)(iii) of this section to two significant digits. Calculations of represented values must be rounded only after the calculation is completed.

(iv) The represented value of the U-factor alternatives must be equal to or greater than the value calculated under paragraph (c)(3) of this section, and equal to or less than the standard described in paragraph (b) of this section.

(7) Determine the SHGC of glazed fenestration products in accordance with NFRC 200 (incorporated by reference; see §460.3). Alternatively, use the prescriptive

glazed fenestration SHGC default values specified for the corresponding glazed fenestration in Tables 460.102 through 460-106.

(8) To show compliance with paragraph (b) of this section with respect to glazed fenestration SHGC:

(i) Randomly select a sample of glazed fenestration products of at least one unit.

(ii) Test the glazed fenestration products in accordance with paragraph (d)(6) of this section.

(iii) Determine the represented value of SHGC by calculating the arithmetic mean of the sample. Round representations of SHGC calculated in paragraph (d)(7)(iii) of this section to two significant digits. Calculations of represented values must be rounded only after the calculation is completed.

(iv) The represented value of SHGC must be equal to or greater than the value calculated under paragraph (d)(7)(iii) of this section, and equal to or less than the standard described in paragraph (b) of this section.

(e) * * *

(1) * * *

(i) Determine the represented value of R-value of insulation in accordance with paragraphs (d)(3)(i) through (iii) of this section.

(ii) Determine the represented value of U-factor of fenestration products and doors in accordance with paragraphs (d)(5)(i) through (iii) of this section.

(2) To show compliance with paragraph (c) of this section with respect to U_o:

(i) Randomly select a sample of manufactured homes (at least one home).

(ii) Determine the U_o of each home in accordance with paragraph (e)(1) of this section.

(iii) Determine the represented value of U_o by calculating the arithmetic mean of the sample. Round representations of U_o calculated in paragraph (e)(2)(iii) of this section to two significant digits. Calculations of represented values must be rounded only after the calculation is completed.

(iv) The represented value of U_o must be equal to or greater than the value calculated under paragraph (e)(2)(iii) of this section, and equal to or less than the standard described in paragraph (c) of this section.

(3) Determine the represented value of SHGC of glazed fenestration products in accordance with paragraphs (d)(8)(i) through (iii) of this section.

4. Section 460.201 is amended by adding paragraphs (b) and (c) to read as follows:

§ 460.201 Duct system.

* * * * *

(b) Determine the total air leakage per 100 square feet of conditioned floor area according to the following equation:

$$Q_{duct\ air\ leakage} = \frac{Q_{duct\ leakage,total}}{A_{floor,conditioned}} \times 100$$

Where:

$Q_{duct\ air\ leakage}$ = total air leakage per 100 square feet of conditioned floor area, (cubic feet per minute per 100 square feet of conditioned floor area)

$Q_{duct\ leakage,total}$ = measured total air leakage of the duct system, determined in accordance with ASTM E1554-13, Method D, as calculated in section 9.4 (cubic feet per minute) (incorporated by reference; see §460.3)

$A_{floor,conditioned}$ = total conditioned floor area (square feet)

(1) For multi-section homes, $Q_{duct\ leakage,total}$ is the summation of the air leakage of the duct system for each section of the manufactured home measured individually.

(2) When measuring the duct leakage of an individual section of a multi-section manufactured home, follow ASTM E1554-13, Method D, and

also seal any duct openings used to connect ducts between the sections of the home, unless the duct opening is being used as the inlet to pressurize the duct system.

(c) To show compliance with paragraph (a) of this section:

(1) Randomly select a sample of manufactured homes (at least one home).

(2) Test the manufactured home duct system in accordance with the test procedure at paragraph (b) of this section.

(3) Determine the represented value of total air leakage per 100 square feet of conditioned floor area by calculating the arithmetic mean of the sample. Round representations of total air leakage per 100 square feet of conditioned floor area calculated in paragraph (c)(3) of this section to one significant digit. Calculations of represented values must be rounded only after the calculation is completed.

(4) The represented value must be equal to or less than the value calculated under paragraph (c)(3) of this section, and equal to or greater than the standard described in §460.204(a).

5. Section 460.204 is amended by adding paragraphs (c) and (d) to read as follows:

§460.204 Mechanical ventilation fan efficacy.

* * * * *

(c) Determine the fan airflow (cfm) and efficacy (cfm/W) in accordance with HVI 916 (incorporated by reference; see §460.3), with the following exceptions.

(1) Bathroom and utility room fans with more than one speed, and in-line fans with more than one speed, must be tested and meet the performance criteria at each speed. A fan of this type that has a rotary speed dial or similar mechanism that allows for a theoretically infinite number of speeds must be tested and meet the applicable efficacy of this specification at its minimum and maximum speeds.

(2) Fans must be tested at the following static pressures to determine the airflow and efficacy: For ducted fans, conduct tests at 0.1 inch water gauge static pressure; for direct discharge (non-ducted) fans, conduct tests at 0.03 inch water gauge static pressure; for in-line fans, conduct tests at 0.2 inch water gauge static pressure.

(3) Test ducted range hood fans at working speed, as specified in HVI 916 (incorporated by reference; see §460.3), to determine the airflow and efficacy. Range hoods must meet the minimum efficacy requirements in each possible configuration (horizontal and vertical) at working speed.

(4) When calculating efficacy, only measure the fan motor electrical energy consumption. Energy used for other fan auxiliaries (e.g., lights, sensors, heaters, timers, or night lights) is not included in the determination of fan efficacy. Therefore, to measure fan power, switch off all fan auxiliaries.

(d) To show compliance with paragraph (a) of this section:

(1) Randomly select a sample of whole-house mechanical ventilation system fan(s) of at least one unit.

(2) Test the whole-house mechanical ventilation system fan(s) in accordance with the test procedure at paragraph (c) of this section.

(3) Determine the represented value of fan efficacy by calculating the arithmetic mean of the sample. Round representations of fan efficacy calculated in paragraph (c)(3) of this section to two significant digits. Calculations of represented values must be rounded only after the calculation is completed.

(4) The represented value must be equal to or less than the value calculated under paragraph (d)(3) of this section, and equal to or greater than the standard described in paragraph (a) of this section.

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