[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE-2017-BT-TP-0047-0001]

Energy Conservation Program: Test Procedures for Electric Motors and Small Electric Motors

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

ACTION: Notice of petition and request for public comments.

SUMMARY: This notice announces receipt and publishes petitions from the National Electrical Manufacturers Association (NEMA) and UL LLC (UL) requesting that the U.S. Department of Energy (DOE) incorporate the IEC 60034-2-1:2014 (2014) test methods 2-1-1A and 2-1-1B as alternative test methods in addition to the existing test methods referenced in its regulations for determining the energy efficiency of certain electric motors and small electric motors: Institute of Electrical and Electronics Engineers (IEEE) standards 112-2004 Method B (2004) and 114-2010 (2010); and Canadian Standards Association standards (CSA) C390-10 (2010) and C747-09 (2009). NEMA found IEC 60034-2-1:2014 Method 2-1-1B to be equivalent to IEEE 112-2004 Method B (subpart B of 10 CFR 431) and CSA C390-10 (subpart B of 10 CFR 431). UL testing found IEC 60034-2-1:2004 Method 2-1-1B results to be in close agreement with those of CSA C390-10, and noted that the respective methodologies of IEC 60034-2-1:2014

Method 2-1-1A and CSA C747 were also in accord. DOE solicits comments, data, and information concerning NEMA's and UL's petitions.

DATES: Written comments and information are requested and will be accepted on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *http://www.regulations.gov*. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE-2017-BT-TP-0047-0001, by any of the following methods:

1. *Federal eRulemaking Portal*: *http://www.regulations.gov*. Follow the instructions for submitting comments.
2. *E-mail*: to *SmallElectricMotors2017TP0047@ee.doe.gov*. Include docket number EERE-2017-BT-TP-0047-0001 in the subject line of the message.
3. *Postal Mail*: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-6636. If possible, please submit all items on a compact disc ("CD"), in which case it is not necessary to include printed copies.
4. *Hand Delivery/Courier*: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 586-6636. If possible,

please submit all items on a CD, in which case it is not necessary to include printed copies.

No telefacsimilies (faxes) will be accepted. For detailed instructions on submitting comments and additional information on this process, see section IV of this document.

*Docket***:** The docket for this activity, which includes the two petitions, *Federal Register* notices, comments, and other supporting documents/materials, is available for review at *http://www.regulations.gov*. Specifically, the petition and supporting documentation from NEMA is available at *https://www.regulations.gov/document?D=EERE-2017-BT-TP-0047-0028* and the petition from UL is available at *https://www.regulations.gov/document?D=EERE-2017-BT-TP-0047-0029*. All documents in the docket are listed in the *http://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 *https://www.regulations.gov/docket?D=EERE-2017-BT-TP-0047*. The docket web page contains simple instructions on how to access all documents, including public comments, in the docket. See section IV for information on how to submit comments through *http://www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: Mr. Jeremy Dommu, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202)586-9870. E-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

Ms. Mary Greene, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-1817. E-mail: *mary.greene@hq.doe.gov*.

For further information on how to submit a comment or review other public comments and the docket, contact the Appliance and Equipment Standards Program staff at (202) 586-6636 or by e-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Authority and Background

Electric motors are included in the list of "covered equipment" for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6311(1)(A)). Additionally, EPCA directed DOE, subject to a determination of feasibility and justification, to establish energy conservation standards and test procedure for small electric motors. (42 U.S.C. 6317(b)) DOE's test procedures for electric motors are prescribed at appendix B to subpart B of part 431. DOE's test procedures for small electric motors are prescribed at 10 CFR part 431, subpart X.

DOE test procedures reference IEEE 112-2004 Method B[1] and CSA C390-10[2] as the approved test methods for determining the energy efficiency of polyphase electric motors with a horsepower greater than or equal to 1 hp; and for determining the energy efficiency of polyphase small electric motors with a horsepower greater than 1 hp. Both industry standards are incorporated by reference at 10 CFR 431.15 and 10 CFR 431.443.

Additionally, DOE's small electric motors test procedures at subpart X of part 431 reference: (1) IEEE 114-2010[3] and CSA C747-09[4] as the approved test methods for determining the energy efficiency of single-phase small electric motors, and (2) IEEE 112-2004 Method A[5] and CSA C747-09 as the approved test methods for determining the

[1] IEEE Std 112-2004, Test Procedure for Polyphase Induction Motors and Generators, approved February 9, 2004, Section 6.4, Efficiency Test Method B, Input-Output with Loss Segregation.
[2] CSA C390-10, Test methods, marking requirements, and energy efficiency levels for three-phase induction motors, March 2010.
[3] IEEE Std 114-2010, Test Procedure for Single-Phase Induction Motors, approved September 30, 2010.
[4] CSA C747-09, Energy efficiency test methods for small motors, October 2009.
[5] IEEE Std 112-2004, Test Procedure for Polyphase Induction Motors and Generators, approved February 9, 2004, Section 6.3, Efficiency Test Method A, Input-Output.

energy efficiency of polyphase small electric motors with a horsepower less than or equal to 1.

On July 31, 2017, DOE published a request for information (the "July 2017 RFI") initiating a data collection process to consider whether to amend DOE's test procedure for small electric motors and electric motors, and whether new test procedures are needed for motors beyond those subject to the existing Federal test procedures. 82 FR 35468. The petitions of NEMA and UL request modifications to the current test procedures for small electric motors and electric motors, and accordingly, DOE is entering this petition into the same docket that houses the July 2017 RFI. The docket is available at: *https://www.regulations.gov/docket?D=EERE-2017-BT-TP-0047*.

II. Petitions of NEMA and UL

A. Petition of NEMA for incorporating IEC 60034-2-1:2014 Method 2-1-1B

NEMA submitted a petition letter requesting that DOE incorporate the IEC 60034-2-1:2014 Method 2-1-1B [6] test method as an alternative to the existing IEEE 112-2004 Method B and CSA C390-10 approved test methods of appendix B to subpart B of part 431. The petition further includes a "work paper" that summarizes an evaluation conducted by the NEMA Motor and Generator Section technical committee which found the IEC 60034-2-1:2014 Method 2-1-1B test method to be equivalent to the IEEE 112-

[6] IEC 60034-2-1:2014 Method 2-1-1B (2014), "Rotating Electrical Machines – Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)," "Summation of losses, additional load losses according to the method of residual loss."

2004 Method B and CSA C390-10 test methods.[7] This evaluation relied on: (1) a comparison of instrumentation accuracy, test method, and calculation approach among the IEC, IEEE, and CSA industry standards, (2) analysis of test results from over 500 motors tested at the Hydro-Quebec Research Institute, and (3) reference to one scientific research paper (the "Angers et al. paper") which also concluded that all three methods[8] were equivalent.[9]

NEMA's petition letter claimed that the results of the Hydro-Quebec Research Institute testing typically showed a loss deviation of less than ± 2 percent. The NEMA petition letter also stated a loss difference of 2 percent is: (1) within the variation of two tests performed using the same motor and test equipment but with different operators and at different times of day; and (2) well below the typical variation of 10 percent of losses when different labs are used to test the same motor.

[7] The NEMA petition and work paper are available *at https://www.regulations.gov/document?D=EERE-2017-BT-TP-0047-0028.*

[8] The paper compared 2013 draft updates of IEEE 112-2004 and IEC 60034-2-1:2007 (not the 2014 version the NEMA petition requests that DOE reference).

[9] Pierre Angers-Hydro-Québec's Research Institute, Andrew Baghurst- CalTest Laboratory, Martin Doppelbauer - Karlsruhe Institute of Technology (KIT), *Review of Energy Efficiency Measurement Standards for Induction Motors in the Context of the IECEE Global Efficiency Labeling Initiative.* EEMODS conference 2013. Available at : *https://e3p.jrc.ec.europa.eu/publications/proceedings-8th-international-conference-eemods2013-energy-efficiency-motor-driven*

B. Petition of UL for incorporating IEC 60034-2-1:2014 Methods 2-1-1B and 2-1-1A

UL submitted a petition letter[10] requesting that DOE incorporate two IEC 60034-2-1:2014 IEC test methods in its test procedures for electric motors and certain small electric motors.

1. IEC 60034-2-1:2014 Method 2-1-1B

First, UL requested that IEC 60034-2-1:2014 test method 2-1-1B be approved for appendix B to subpart B of part 431 and section 431.444 of subpart X of part 431 (as an alternative to CSA C390-10). Regarding the first request, the petition further included two papers comparing the respective test standards.

The first paper,[11] which is the same paper (Angers et al.) cited in NEMA's petition's attachment, compared IEEE 112-2004, Method B (a 2013 year draft version), CSA C390-10, and IEC 60034-2-1, Method 2-1-1B (a 2013 year draft version). The comparison focused on instrumentation accuracy, test method, and calculation approach among the IEC, IEEE, and CSA industry standards and concluded that all three methods[12] were equivalent.

[10] The UL petition and supporting documentation is available at *https://www.regulations.gov/document?D=EERE-2017-BT-TP-0047-0029*

[11] Pierre Angers-Hydro-Québec's Research Institute, Andrew Baghurst- CalTest Laboratory, Martin Doppelbauer - Karlsruhe Institute of Technology (KIT), *Review of Energy Efficiency Measurement Standards for Induction Motors in the Context of the IECEE Global Efficiency Labeling Initiative.* EEMODS conference 2013. Available at : *https://e3p.jrc.ec.europa.eu/publications/proceedings-8th-international-conference-eemods2013-energy-efficiency-motor-driven*

[12] The paper compared 2013 draft updates of IEEE 112-2004 and IEC 60034-2-1:2007.

The second paper[13] (the "Cao paper") compared the respective methodologies of IEEE 112-2004, Method B and IEC 60034-2-1:2007, Method 2-1-1B and also conducted comparison testing, applying both standards' test methods to the same six motors of varied output power. The resulting efficiency values were found to be closely aligned, with respective maximum and mean deviations of 0.1 and 0.03 percentage points.

UL's petition letter claimed that the test results of the Cao paper testing aligned with UL's own, firsthand testing experience using the same methods. UL's own comparison testing found a difference in calculated efficiency of less than 0.1 percentage points, when using measurements from a single test to reduce variability.

2. IEC 60034-2-1:2014 Method 2-1-1A

Second, UL requested that IEC 60034-2-1:2014 test method 2-1-1A be approved for section 431.444 of subpart X of part 431 (as an alternative to CSA C747-09). UL stated that the IEC and CSA standards use the same method, but that the IEC equipment specifications are more rigorous. UL did not provide a quantitative test result comparison to support the similarity between the standards.

III. Request for Comments

DOE solicits comments from interested parties on any aspect of the petition. In particular, DOE seeks comment on the matters described in this section.

[13] Cao, W. Comparison of IEEE 112 and new IEC standard 60034-2-1. *IEEE Transactions on Energy Conversion*. 2009. 24(3): pp. 802-808.

DOE seeks comment on the differences among IEC 60034-2-1:2014 Method 2-1-1B, IEEE 112-2004 Method B, and CSA C390-10, and data characterizing the degree to which choice of test procedure alters measured efficiency.

DOE seeks comment on the differences among IEC 60034-2-1:2014 Method 2-1-1A, IEEE 114-2010, and CSA C747-09 and data characterizing the degree to which choice of test procedure alters measured efficiency.

DOE seeks comment regarding whether IEC 60034-2-1:2014 Method 2-1-1B should be considered as an alternate for testing certain small electric motors under 10 CFR part 431, subpart X. DOE also seeks comment on whether the comparison test results presented in the petitions, which concern the test procedures under 10 CFR part 431, subpart B, would also apply to testing of certain small electric motors under Subpart X of 10 CFR 431.

DOE seeks comment on NEMA's claims: (1) that the Hydro-Quebec test results support a typical loss deviation between IEEE 112-2004 Method B and IEC 60034-2-1:2004 Method 2-1-1B of less than ±2 percent, (2) that a 2 percent loss deviation is characteristic of substituting a test operator with the test equipment unchanged, and (3) that a 10 percent loss deviation is characteristic of testing the same motor at different laboratories.

DOE seeks comment on whether Angers et al. paper's findings of similarity between IEEE 112-2004 (2013 draft revision) and IEC 60034-2-1:2007 (2013 draft revision) would hold for the latest adopted versions of those standards: IEEE 112-2004 and IEC 60034-2-1:2014.

DOE seeks comment on UL's claims that the difference in calculated efficiency between IEC 60034-2-1:2014 Method 2-1-1B and IEEE 112-2004 method B is less than 0.1 percentage points, if using measurements from the same test.

DOE seeks comment regarding similarity in methods, differences in equipment specifications, and expected efficiency percentage point differences between the test results of IEEE 114-2010, CSA C747-09, and IEC 60034-2-1:2004, Method 2-1-1A.

IV. Submission of Comments

DOE invites all interested parties to submit in writing by [**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], comments and information on matters addressed in this notice and on other matters relevant to DOE's consideration of amended test procedures for electric and small electric motors. These comments and information will aid in the development of a test procedure NOPR for electric and small electric motors if DOE determines that amended test procedures may be appropriate for these products.

Submitting comments via *http://www.regulations.gov*. The *http://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 *http://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 *http://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 *http://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 *http://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 *http://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).

DOE considers public participation to be a very important part of the process for developing test procedures and energy conservation standards. DOE actively encourages the participation and interaction of the public during the comment period in each stage of this process. Interactions with and between members of the public provide a balanced discussion of the issues and assist DOE in the process. Anyone who wishes to be added to the DOE mailing list to receive future notices and information about this process should contact Appliance and Equipment Standards Program staff at (202) 586-6636 or via e-mail at *ApplianceStandardsQuestions@ee.doe.gov*.

Issued in Washington, D.C., on October 19, 2017.

David Nemtzow
Director
Building Technologies Office
Energy Efficiency and Renewable Energy