

**American Council for an Energy-Efficient Economy  
Appliance Standards Awareness Project  
Northwest Power and Conservation Council  
Northwest Energy Efficiency Alliance**

September 13, 2017

Mr. Jeremy Dommu  
U.S. Department of Energy  
Office of Energy Efficiency and Renewable Energy  
Building Technologies Office  
1000 Independence Ave., SW  
Washington DC 20585-0121

Re: EERE–2017–BT–TP–0047

Dear Mr. Dommu:

This letter constitutes the comments of the American Council for an Energy-Efficient Economy, the Appliance Standards Awareness Project, and the Northwest Power and Conservation Council in response to the Request for Information on Test Procedure for Small Electric Motors and Electric Motors [EERE–2017–BT–TP–0047] (82 FR 35468). We appreciate that DOE has opened this docket to review electric motor test methods and begin the process of developing improved procedures.<sup>1</sup> In these comments, we review the benefits of DOE’s existing test methods, we respond to DOE’s outlined approach for potentially expanding the scope of DOE test procedures and we respond to a few specific issues raised in the RFI. In particular, we are very supportive of DOE’s intent to explore test procedures that account for efficiency at multiple load points and speed control; to address air-over and dedicated-purpose pool pump motors; to consider motors with gear boxes and to ensure motor horsepower ratings are reliable. We also urge prompt Federal Register publication of the January 11, 2017 motors certification, compliance and enforcement final rule.

**Benefits of existing DOE motor test procedures**

Existing DOE motor test procedures are based on IEEE and CSA test procedures, which are consensus documents developed by professional associations. A critical benefit of DOE test methods, for motors or any other product, is uniformity. When DOE has published a test method, manufacturers must use that method for making energy consumption or energy efficiency representations. A uniform test method ensures motor buyers have access to comparable information on their motor choices, enabling informed decision making. DOE’s uniform test procedures have also provided a strong foundation for many voluntary initiatives that have provided significant energy savings to motor purchasers, such as NEMA

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<sup>1</sup> As DOE acknowledges in the RFI, review of the small motors test procedure was legally due by July 7, 2016.

Premium<sup>2</sup> and Motor Decisions Matter.<sup>3</sup> In addition, the test procedures undergird minimum standards that are delivering very large energy bill savings for businesses and industry throughout the U.S. The combination of test methods and minimum standards has served to increase the scale of production of energy-efficient choices, thereby lowering up-front costs of compliant motors and increasing net economic savings for buyers. Standards have also helped spur manufacturer investments in new, higher-performing products in order to offer differentiated products to the market. Motor buyers have far more choices of motor types today than ever before. Finally, the uniform test procedures provide a level playing field for manufacturers that operate in a global market. The DOE test procedure, coupled with active agency monitoring of manufacturer claims, helps ensure that manufacturers who provide accurate, credible information to their customers are not undercut by unscrupulous or careless competitors claiming performance based on inaccurate or incomplete test procedures or information.

### **DOE should take an expansive approach to revised test procedures**

In general, we support the approach that DOE has outlined for electric motor test procedures in the RFI. This approach envisions broad coverage based on technical and physical characteristics of motors (rather than applications or marketing or design intent).

We offer the following principles to further guide DOE as it considers expanding the scope of its electric motor test procedures. Test procedures for motors should:

- Be applied to as broad a range of motor technologies, designs and categories as possible, so as to enable buyers to make fair comparisons;
- Produce accurate efficiency comparisons among motor designs and types;
- Be based on existing consensus test procedures when possible; and
- Reflect the relative power consumption over a range of load points.

As documented in the RFI, many types of electric motors are not currently subject to DOE test procedures, yet consensus, industry- or professional association-developed procedures exist (82 FR 35476, Table II-6). These test methods represent enormous effort on the part of industry professionals and provide a strong basis for potential DOE test procedures.

With respect to the motor categories for which DOE test procedures should be established, we encourage DOE to establish a wide-ranging scope as described in Table II-1 of the RFI. We support DOE's consideration of all motor topologies included in Table II-2. We support DOE's focus on continuous-duty motors and the consideration of all enclosure constructions. We also specifically encourage DOE to consider test procedures that would apply to DC motors, which are becoming increasingly popular. We agree with DOE that frame size should not be a limiting factor for test method applicability.

We appreciate that DOE has already identified several motor categories of particular interest due to sales volume, availability of existing test procedures and energy consumption. These are listed in Table II-3 of the RFI. DOE should prioritize modification and additions to the test procedure to include these motors. Motor types included in this table have enormous differences in energy efficiency performance.

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<sup>2</sup> For information please see: <https://www.nema.org/Policy/Energy/Efficiency/Pages/NEMA-Premium-Motors.aspx>

<sup>3</sup> <https://www.cee1.org/content/motoring-along-higher-efficiency>

DOE test procedures that enable buyers to make fair comparisons among various electric motors will be extremely valuable to the marketplace.

We note that some of the motor designs in Table II-3 did not even exist when the original test procedures for motors were adopted. Many of the advanced motor technologies and designs in the table bring substantial efficiency and customer utility benefits in many applications when compared with traditional motors. Test procedures, by enabling new products to distinguish themselves in a fair manner, help manufacturers differentiate new technologies in the marketplace. To the extent possible, DOE's test procedures should provide a basis for any new motor technology to be rated on a fair basis with existing motor technologies.

### **Test procedures should account for efficiency at multiple load points and the benefits of speed control**

The current test procedures for motors are based on performance at full load. However, motors typically operate at loads that are significantly less than full load. DOE estimates that the average motor load for four typical applications (air compressors, fans, pumps, and material handling) ranges from 59% to 72% of full load.<sup>4</sup> Therefore, motor ratings at full load are not representative of performance in typical applications. Further, as noted by DOE, "Variable or multi-speed capability provides the ability to save energy by more closely matching motor output to a varying load" (82 FR 35472). And yet existing motor test procedures do not provide any ability for variable- or multi-speed products to achieve a rating that demonstrates their superior performance.

Other DOE test procedures include mechanisms for capturing performance over a range of operating conditions and reflecting the energy savings achieved with speed control. For example, the pumps test procedure calculates weighted-average power consumption at either three or four operating points. The pumps test procedure also captures the significant energy savings associated with being able to reduce speed for pumps sold with speed controls. Certified performance at multiple load points can also be valuable for motor buyers in order to have sufficient information to appropriately select a motor for a particular application and load profile. We strongly support DOE's efforts to develop motor test procedures that account for efficiency over a range of operating points and the benefits of motors that provide variable- or multi-speed capability.

### **Air-over motors**

We support DOE's consideration of test procedures for air-over motors. As DOE notes in the RFI, there are no clear differences in physical construction between air-over motors and non-air-over motors (82 FR 35472). We understand that there are many applications where either an air-over motor or a currently-regulated motor could be used, and yet there is no way to reliably compare the performance of the two options since there is no DOE test procedure for air-over motors. A test procedure for air-over motors would allow purchasers to make informed decisions when considering both air-over and non-air-over motor options.

### **Dedicated-purpose pool pump motors**

We are pleased that DOE has initiated a process to consider potential energy conservation standards for dedicated-purpose pool pump motors. As DOE notes in the RFI, pool pump and motor manufacturers

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<sup>4</sup> <https://www.regulations.gov/document?D=EERE-2010-BT-STD-0027-0108>. p. 7-8.

and other stakeholders have urged DOE to establish standards for dedicated-purpose pool pump motors to complement the newly-established standards for dedicated-purpose pool pumps (DPPPs). Standards for DPPP motors would help protect both pool pump manufacturers and the energy savings from the DPPP standards by ensuring that the efficiency of replacement pool pump motors is similar to that of motors used in new pool pumps.

### **Certification, compliance and enforcement**

DOE issued a final rule concerning certification, compliance and enforcement (CCE) of motors and small motors on January 11, 2017. This rule will complete the CCE framework for small motors and will clarify and improve the CCE rules for all motors by integrating them with those for all other products. Although DOE decided to defer elements of the proposed rule to which manufacturers objected, the final rule still streamlines the regulations and contains important improvements. We understand that DOE has maintained an ongoing dialogue with manufacturers on the CCE final rule. We urge DOE to publish the final rule in the Federal Register as soon as possible so that motor manufacturers have clear and up-to-date instructions for how to demonstrate compliance with existing motor standards and both manufacturers and buyers have the assurance of a reliable certification, compliance and enforcement system.

### **Motor boundary and motors with gear boxes**

We support the concept of including all necessary components for motor operation in a test. We also support DOE's intent to explore how motors with gear boxes should be tested and rated. Gear box efficiency can vary greatly,<sup>5</sup> and DOE test procedures that capture that variation would provide valuable market information. Because the efficiency of gear boxes frequently declines at part load, it would be useful for a test procedure to enable fair comparisons between variable-speed motors and motor-gearbox combinations.

### **Rated horsepower**

Because efficiency requirements vary by horsepower, how manufacturers determine horsepower matters. We support DOE efforts to ensure that horsepower ratings are developed in a consistent, fair manner. DOE may be able to incorporate existing industry methods and conventions for determining horsepower ratings into the DOE test procedures. Consistent horsepower ratings by all manufacturers will help ensure a level playing field for competition and protect manufacturers that provide realistic ratings from any competitor who might under-rate products.

### **Summary**

DOE test procedures that cover most types of motors will have significant market benefits, regardless of whether DOE ever establishes minimum efficiency standards for additional categories of motors. These test procedures will ensure comparable information that helps motor specifiers and buyers to make informed decisions. The procedures also enable energy efficiency programs to be able to fairly compare the performance of different types or designs of motors. Finally, they provide a reliable set of rules that

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<sup>5</sup> Steven Nadel, et al. 2002. *Energy-Efficient Motor Systems: A Handbook on Technology, Program, and Policy Opportunities, 2nd Ed.*, Washington, D.C.: American Council for an Energy Efficient Economy, <http://aceee.org/ebook/energy-efficient-motor-systems>.

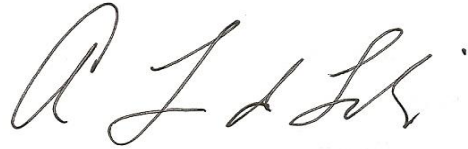
create a level playing field, thereby protecting manufacturers against deceptive, unscrupulous competitors.

Thank you for the opportunity to provide input.

Sincerely,



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