

**Appliance Standards and Rulemaking Federal Advisory Committee**  
*Commercial and Industrial Pumps Working Group*  
Term Sheet  
June 19, 2014

**Background**

On July 23, 2013, DOE issued a Notice of Intent to Establish the Commercial/Industrial Pumps Working Group To Negotiate a Notice of Proposed Rulemaking (NOPR) for Energy Conservation Standards for Commercial/Industrial Pumps. 78 FR 44036. This working group is established under the Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) in accordance with the Federal Advisory Committee Act (FACA) and the Negotiated Rulemaking Act (NRA). The purpose of the working group was to discuss and, if possible, reach consensus on a proposed rule for the energy efficiency of commercial/industrial pumps, as authorized by the Energy Policy and Conservation Act (EPCA) of 1975, as amended. The working group was to consist of representatives of parties having a defined stake in the outcome of the proposed standards, and will consult as appropriate with a range of experts on technical issues.

DOE received 19 nominations for membership. Ultimately, the working group consisted of 16 members, including one member from ASRAC and one DOE representative (see Appendix A). The working group met in-person during 7 sets of meetings held December 18-19, 2013 and January 30 – 31, March 4 – 5, March 26 – 27, April 29 – 30, May 28 – 29, and June 17– 19, 2014. The working group successfully reached consensus on proposed energy conservation standards for a specific set of pumps. This document includes the working group’s recommendations to ASRAC on determining scope of this rulemaking as well as energy conservation standards. The group also chose to provide test procedure and metric-related recommendations to the committee.

**Definition of Covered Product**

**Recommendation #1.** The covered product, a ‘pump,’ will be defined as below subject to potential edits necessary to accomplish the same intent:

- ‘**Pump**’ is a device that moves liquids (which may include entrained gases, free solids, and totally dissolved solids) by physical or mechanical action and includes a bare pump and, if included by the manufacturer, the mechanical equipment, driver, and controls.

**Vote results:** Consensus<sup>1</sup> (15 yes -1 no) on 3/4/2014

**Recommendation #2.** The components of a ‘pump’ will be defined as below:

- ‘**Bare pump**’ is a ‘pump’ excluding mechanical equipment, driver, and controls.
- ‘**Mechanical equipment**’ is any component that transfers energy from the driver to the bare pump.

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<sup>1</sup> There are 16 members of the working group. Consensus has been defined as no more than 2 no votes.

- ‘**Driver**’ is the machine providing mechanical input to drive the bare pump directly or through the mechanical equipment, and may include an electric motor, internal combustion engine, or gas/steam turbine.
- ‘**Controls**’ means any device that can be used to control the driver.

**Vote results:** Consensus (15 yes - 1 absent) on 3/4/2014

**Recommendation #3.** In this rulemaking, the metric will not cover non-electric drivers. The test procedure will specify that the bare pump rating calculations for the energy conservation standard also apply to pumps with non-electric drivers.

**Vote results:** Unanimous on 3/26/14

### **In-Scope and Out-of-Scope Pumps**

**Recommendation #4.** The scope of this rulemaking will include the following pump types:<sup>2</sup>

- End suction frame mounted/own bearings (ESFM/OH0, OH1)
- End suction close coupled (ESCC/OH7)
- Inline (IL/OH3, OH4, OH5)
- Radial split (multistage) vertical (RS-V/V8)
- Vertical turbine submersible (VT-S/V8)

**Vote results:** Consensus (15 yes - 1 abstain) on 3/26/14

**Recommendation #5A.** Circulators (CP1, CP2, CP3) will be held for additional informal negotiation between manufacturers, efficiency advocates, and other interested parties. Advocates to make initial proposal and manufacturers to respond with a goal by October. Stakeholders aim to present joint proposal to DOE by March/April 2015. Stakeholders request DOE commitment for technical support from consultants to facilitate analysis and test procedure development.

- ASRAC-approved negotiation to begin in March following joint proposal.
- Goal for NOPR publication by end of September 2015.

**Vote results:** Consensus (15 yes – 1 absent) on 6/19/14

**Recommendation #5B.** DOE should initiate a separate rulemaking on dedicated-purpose pool pumps by the end of calendar year 2014.

**Vote results:** Consensus (15 yes – 1 absent) on 6/19/14

**Recommendation #6.** This rulemaking will explicitly exclude the following types of pumps:

- Positive displacement pumps
- Axial/mixed flow pumps

**Vote results:** Unanimous on 1/31/14

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<sup>2</sup> Items in parentheses represent DOE and ANSI/HI nomenclature.

- Double suction (DS) pumps
- Multistage axially split (AS) pumps
- Multistage radial split-horizontal (RS-H) pumps
- Multistage radial split vertical immersible pumps
- Vertical turbine (non-submersible) (VT) pumps

**Vote results:** Consensus (15 yes - 1 abstain) on 3/26/14

## Scope Refinements

**Recommendation #7.** For the in-scope pump types, this rulemaking will be limited to pumps with the following characteristics:

- 1-200 Horsepower (shaft power at BEP at full impeller diameter)
  - applies to number of stages required for testing to the standard
- 25 gallons/minute and greater (at BEP at full impeller diameter)
- 459 feet of head maximum (at BEP at full impeller diameter)
- Design temperature range from -10 to 120 degrees C
- Pumps designed for nominal 3600 or 1800 rpm driver speeds
- 6 inch or smaller bowl diameter (VT-S/HI VS0)

In addition, the pump certified rating for a given model will be based on testing at full impeller diameter.<sup>3</sup>

**Vote results:** Consensus (15 yes - 1 absent) on 3/4/14

**Recommendation #8.** It has been the intent of the working group to limit the scope of this rulemaking to pumps *designed for use in pumping clean water*<sup>4</sup>. The rulemaking will explicitly exclude the following types of pumps that might otherwise meet the definition of an in-scope pump type:<sup>5</sup>

- Wastewater, sump, slurry, solids handling<sup>6</sup>
- API 610 pumps
- ASME/ISO chemical pumps
- Fire pumps
  - if compliant with NFPA 20 and UL listed or FM approved
- Self-priming pumps
- Prime-assisted pumps

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<sup>3</sup> Pump models that otherwise meet all the above characteristics will not be excluded on the basis of having a trimmed impeller. The certification rating for full diameter will also apply to other trims. Full impeller means the largest impeller diameter offered for sale for a given model.

<sup>4</sup> Intent is to use the definition of 'clean water' in the EU pump standards. (Commission Regulation (EU) No 547/2012; Article 2 (13))

<sup>5</sup> Definitions designed to maintain the intent of these exclusions will be proposed in the NOPR by DOE. Information in sub-bullets may be used to inform these definitions.

<sup>6</sup> Gray water should not be treated as part of this exclusion category.

**Vote results:** Unanimous on 1/31/14

- Nuclear pumps
  - Complies with ASME Boiler and Pressure Vessel Code Section III or 10 CFR 50; Non Code or Code/Safety Related.
- Navy pumps
  - MIL Specification Compliant (MIL-P-17639, MIL-P-17881, MIL-P-17840, MIL-P-18682, MIL-P-18472)

**Vote results:** Consensus (14 yes - 2 absent) on 3/4/14

- Sanitary pumps
  - “Hygienic” or “sanitary” pumps are typically used in food processing and pharmaceutical applications. They are designed with special parameters, specific materials and surface finish to a variety of national and international rules and regulations that will minimize the biological growth inside the pump to protect public health. These design parameters and materials may result in lower efficiencies than for standard water pumps. Certifications for hygienic or sanitary products include, but are not limited to:
    - 3-A Sanitary Standards
    - EHEDG (European Hygienic Equipment Design Group) recommendations
    - QHD (Qualified Hygienic Design)

**Vote results:** Unanimous on 3/26/14

## **Energy Conservation Standards**

**Recommendation #9.** For ESCC, ESFM, IL, and VT-S pumps in both 1800 and 3600 rpm speeds, the energy conservation standards will be set at PEI 25 (with C-values iterated to cut off as near to 25% of the pumps [in the DOE analytical team’s merged database] as possible). For RS-V pumps, energy conservation standards will be set to harmonize with the European Union No 547/2012 MEI 40 level, [with the intent that no models known to pass the EU standard would fail the US standard.] The compliance date for all equipment classes will be 4 years from the publication of the Final Rule.

**Vote results:** Consensus (15 yes – 1 absent) on 6/17/14

## **Test Procedure and Metric**

**Recommendation #10.** Pump test procedure should be in accordance with HI 40.6 for determining bare pump performance.

**Vote results:** Consensus (13 yes – 2 abstain – 1 absent) on 6/18/14

**Recommendation #11.** [The metric for assessing compliance with the standard should be PEI, which is constructed based on values of PER.]

**Pump Energy Index (PEI) CL and VL:**  $PER_{CL}$  and  $PER_{VL}$ , for a given pump model (at full impeller diameter), over the  $PER_{CL}$  for a minimally compliant pump ( $PER_{STD}$ ) serving the same hydraulic load:

$$PEI_{CL} = \left[ \frac{PER_{CL}}{PER_{STD}} \right]$$

$$PEI_{VL} = \left[ \frac{PER_{VL}}{PER_{STD}} \right]$$

**Pump Energy Rating (PER) CL and VL:** equally weighted average electric input power to the ‘pump’ measured (or calculated) at the driver input or, when present, controls input, over a specified load profile:

$$PER_{CL} = \sum_i \omega_i (P^{in}_i)$$

$$PER_{VL} = \sum_i \omega_i (P^{in}_i)$$

Where:

- $w_i$  = weight at each load point  $i$
- $P^{in}_i$  = power input to the “pump” at the driver, inclusive of the controls if present, (hp)
- $i$  = Percentage of flow at the best efficiency point (BEP) of the pump
- $i$  = 110%, 100%, 75% of Best Efficiency Point (BEP) flow at nominal speed for uncontrolled pumps
- $i$  = 25%, 50%, 75%, and 100% of BEP flow at nominal speed for pumps sold with motors and controls

**Vote results:** Consensus (14 yes – 1 abstain – 1 absent) on 6/18/14

## Labeling Requirements

**Recommendation #12.** Pumps are labeled based on the configuration in which they are sold. The following information would be required to be included on a pump nameplate:

Bare Pump	Bare Pump + Motor	Bare Pump + Motor + Controls
PEI <sub>CL</sub>	PEI <sub>CL</sub>	PEI <sub>VL</sub>
Model number	Model number	Model number
Impeller diameter for each unit	Impeller diameter for each unit	Impeller diameter for each unit

**Vote results:** Consensus (14 yes – 1 abstain – 1 absent) on 6/18/14

## Certification Reporting Requirements

**Recommendation #13.** Recommended data to be included in certification reports/database:

- Manufacturer name
- Model number(s)
- Equipment class
- PEI<sub>CL</sub> or PEI<sub>VL</sub> as applicable
- BEP flow rate and head
- Rated speed
- Number of stages tested
- Full impeller diameter (in.)
- Whether the PEI<sub>CL</sub> or PEI<sub>VL</sub> is calculated or tested
- Input power to the pump at each load point  $i$  ( $P^{in}_i$ )

**Vote results:** Consensus (14 yes – 1 abstain – 1 absent) on 6/18/14

**Recommendation #14.** Certification for RS-V and VT-S pumps shall be based on testing with the following number of stages:

- RS-V: 3 stages
- VT-S: 9 stages
- If a model is not available with that specific number of stages in the given scope, the model will be tested and certified with the next closest<sup>7</sup> number of stages offered for sale by the manufacturer.

**Vote results:** Consensus (15yes– 1 absent) on 6/18/14

*This term sheet has been approved by the ASRAC pumps working group by consensus (15 yes – 1 absent) on 6/19/14.*

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<sup>7</sup> If only fewer than the required number of stages are available, rate with the highest number of stages offered for sale. If only more than the required number of stages are available, rate with the lowest number of stages offered for sale.

## **Appendix A—Members**

### **U.S. Department of Energy—ASRAC Commercial and Industrial Pumps Negotiated Rulemaking Working Group**

Lucas Adin	U.S. Department of Energy
Tom Eckman	Northwest Power and Conservation Council (ASRAC Member)
Robert Barbour	TACO, Inc.
Charles Cappelino	ITT Industrial Process
Greg Case	Pump Design, Development and Diagnostics
Gary Fernstrom	Pacific Gas & Electric Company, San Diego Gas & Electric Company, Southern California Edison, and Southern California Gas Company
Mark Handzel	Xylem Corporation
Albert Huber	Patterson Pump Company
Joanna Mauer	Appliance Standards Awareness Project
Doug Potts	American Water
Charles Powers	Flowserve Corporation, Industrial Pumps
Howard Richardson	Regal Beloit
Steve Rosenstock	Edison Electric Institute
Louis Starr	Northwest Energy Efficiency Alliance
Greg Towsley	Grundfos USA
Meg Waltner	Natural Resources Defense Council