



ENERGY STAR[®] Pool Pumps

**Draft 2 Specification,
Final Draft Test Method,
Connected Functionality**

**Stakeholder Webinar
New Orleans, LA**

November 6, 2012

Call-in Information



- Audio provided via conference call in:

Call in:	+1-877-423-6338 (in the US, Canada)
	+1-571-281-2578 (outside the US, Canada)
Code:	356609

- Phone lines will remain during the presentation to allow for open discussion
- Please keep phone lines on mute (*6) unless speaking

Agenda



- ENERGY STAR Overview
- Third Party Certification and Testing
- Draft 2 Specification Discussion
- Final Draft Test Method Discussion
- Education
- Connected Functionality Discussion
- Timeline and Next Steps

Introduction



- EPA thanks all stakeholders who have been participating in the development of the ENERGY STAR specification for Pool Pumps
- Stakeholder participation is critical to the specification development

Meeting Objectives



1. Discuss issues identified in Draft 2 specification and note boxes
2. Discuss issues identified in Final Draft test method
3. Follow up on the Connected Functionality Discussion Document for Pool Pumps

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What Is ENERGY STAR?



- Voluntary climate protection partnership with the U.S. Environmental Protection Agency (EPA)
- Strategic approach to energy management, promoting energy efficient products and practices
- Tools and resources to help save money and protect the environment

Guiding Principles



1. Significant energy savings can be realized on a national basis
2. Product performance can be maintained or enhanced with increased energy efficiency
3. Purchasers recover their investment in increased energy efficiency within a reasonable period of time
4. Energy-efficiency can be achieved through several technologies
5. Product energy consumption and performance can be measured and verified with testing
6. Labeling would effectively differentiate products and be visible for purchasers

How Does ENERGY STAR Maintain Relevancy?



Specifications are updated in response to market changes:

- High market share
- Change in Federal minimum efficiency standards
- Availability, performance, or quality concerns
- Advancements in technology
- Changes in test procedures



Important Process Elements

- Consistency
- Transparency
- Inclusiveness
- Responsiveness
- Clarity

Becoming an ENERGY STAR Partner



- Join
- Qualify
- Label
- Report
- And more.....

Joining the ENERGY STAR Program



- Join
 - The first step to manufacturing ENERGY STAR products is join the program
 - Get a Partnership Agreement from ENERGY STAR
 - Return the Partnership Agreement and Participation Form to ENERGY STAR
 - Questions about the partnership agreement process, want to verify partnership, or check on the status of your paperwork, please send an email to join@energystar.gov.

Qualifying Products



- Qualify
 - Since January 1, 2011, all new products that meet [ENERGY STAR specifications](#) must be certified by an EPA-recognized Certification Body (CB) before the product can be labeled with the ENERGY STAR mark.
 - Upon certification of a product, the CB will notify the partner that the product meets the ENERGY STAR requirements and will submit the qualified product data to EPA for listing on the ENERGY STAR website.

Labeling Products



- Label
 - Once your product is certified by an EPA-recognized Certification Body, use the [ENERGY STAR logo](#)
 - EPA provides partners with the label and information about the [ENERGY STAR Identity Guidelines](#), on products and promotional materials, and our [Web Tools](#) to differentiate your energy-efficient products..



Reporting



- ENERGY STAR manufacturing partners are required to report annually their qualified product unit shipment data.
- EPA collects unit shipment data to determine the market penetration of ENERGY STAR products and evaluate the overall performance of the program.
- www.energystar.gov/usd

And More



- Train
 - Use ENERGY STAR [training resources](#) to enhance sales rep effectiveness.
- Promote
 - ENERGY STAR offers a variety of [marketing resources](#), including [Web Tools](#) and product-specific [national campaigns](#). [Identify joint marketing opportunities](#).
- Build an Effective ENERGY STAR Strategy
 - [Develop an ENERGY STAR strategy](#) that integrates ENERGY STAR into your corporate strategy.
- Get Recognized
 - Now that you've developed your ENERGY STAR program, [apply for Partner of the Year](#).

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Program Integrity Update



- Third party certification in place across all 65 product categories
- Requirements for the qualification and verification program were built around existing, established international standards
- Accreditation Bodies (AB), Certification Bodies (CB), and Labs must meet EPA criteria
- To date, 28 ABs, 22 CBs, and 418 Labs worldwide are recognized by the program
- More than 47,000 products have been third-party certified to the ENERGY STAR requirements since January 2011
- On-going verification by CBs of a percentage of all ENERGY STAR products ramping up now

ENERGY STAR's Third-Party Certification Process



January 2011: ENERGY STAR Labeled Products Program moved from self certification to third party certification.

Entities apply to become EPA-recognized laboratories, certification bodies, or accreditation bodies



Manufacturers test products with EPA-recognized laboratory or manufacturer lab (W/SMTL)



EPA-recognized certification body reviews data & certifies performance



EPA lists qualified models on website and partners market as ENERGY STAR qualified

Details available at www.energystar.gov/3rdpartycert

Certification Body (CB) Role Under ENERGY STAR Third-Party Certification



While the specification is under development, an interested CB can:

- Participate in the specification development process
- Review the test method and data reporting requirements
- Begin working with first-party labs under the CB's W/SMTL program
- Review the CB requirements for EPA-recognition
- Update internal procedures as necessary

Once the spec is finalized, EPA will grant recognition to CBs that meet the CB requirements.

Manufacturer first-party (in-house) Testing Options while the specification is under development



Pursue ISO 17025 accreditation

- Review the test method and data reporting requirements
- Update internal procedures as necessary
- Communicate intent to obtain or expand scope of accreditation from an EPA-recognized accreditation body (AB)

Participate in a CB's W/SMTL program

- Review the test method and data reporting requirements
- Begin working with CB under the CB's W/SMTL program
- Schedule internal audits as necessary

Utilize a third-party accredited lab

Third-party labs should:

- Review the test method and data reporting requirements
- Update internal procedures as necessary
- Communicate intent to obtain or expand scope of accreditation from an EPA-recognized accreditation body (AB)

Manufacturer first-party (in-house) Testing Options once the specification is finalized



Pursue ISO 17025 accreditation

- Once the spec is finalized, EPA will grant recognition to labs accredited to ISO 17025
- May begin testing products

Participate in a CB's W/SMTL program

- Once the spec is finalized, EPA will grant recognition to CBs that meet the CB requirements.
- EPA-recognized CBs may enroll in-house labs in its W/SMTL program
- May begin testing products

Utilize a third-party accredited lab

- Once the spec is finalized, EPA will grant recognition to labs accredited to ISO 17025
- May begin testing products

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Specification Development Process – To Date



- EPA has been investigating pool pumps as a possible ENERGY STAR labeled product class since 2007
- In Fall 2011, launched a specification development effort.

Framework Document and Draft 1 Test Method to Stakeholders	November 29, 2011
Framework Document and Draft 1 Test Method Webinar	December 20, 2011
Draft 1 Version 1.0 Specification, Draft 2 Test Method, Connected Functionality to stakeholders	August 30, 2012
Draft 1 Version 1.0 Specification, Draft 2 Test Method, Connected Functionality comments due to EPA	September 25, 2012
Draft 1 Version 1.0 Specification, Draft 2 Test Method, Connected Functionality Webinar	September 28, 2012
Draft 2 Version 1.0 Specification, Final Draft Test Method to stakeholders	November 2, 2012
Draft 2 Version 1.0 Specification, Final Draft Test Method Webinar	November 6, 2012

Overview of Draft 2 Specification



- **Draft 2 contains**
 - **Changes**
 - **Continuation of Draft 1 proposals**
 - **Requests for more feedback**
- **Based on**
 - Stakeholder feedback
 - Additional EPA research

Overview of Draft 2 Specification



- **Draft 2 major changes**
 - Definition additions/changes
 - #1 - Pump Controls
 - #2 - Pool Pump
 - #3 - Variable-flow
 - #4 - Standby Mode
 - #5 - Product family approach added
 - #6 - Single-phase requirement added

Overview of Draft 2 Specification



- **Continuation of Draft 1 proposals**
 - Include single-speed pumps
 - Size limit range
 - Exclusion of manually controlled pumps
 - Exclusion of external pump controls

Overview of Draft 2 Specification



- **Further feedback requested**
 - Future scope expansions
 - above ground pool pumps
 - commercial inground pumps
 - replacement motors

Change #1

“Pool Pump” Definition



Draft 1 Proposal:

Pool Pump Definition: *A mechanical assembly consisting of a “wet-end,” which houses the impeller, and a motor. **There usually is a leaf strainer before the impeller.** The pump increases the “head” and “flow” of the water.*

Comments Received:

- Remove the leaf strainer language (red text) from the Pool Pump Definition.
- Rationale: it does not further clarify the definition for purposes of determining scope under this specification.

Change #1

“Pool Pump” Definition



Draft 2 Proposal:

EPA agreed and removed the leaf strainer language.

Feedback Requested:

- Are there any unintended consequences to removing the leaf strainer language?

Change #2

“Variable-flow Pump” Definition



Comments Received:

- Add Variable-flow pumps to scope

Draft 2 Proposal

- *Variable-flow Pump: a pump which has an electric motor that can operate at continuously variable speeds, with added controls that automatically adjusts speed to control flow.*
- Rationale: Variable-speed and flow pumps are equivalent mechanically, offer similar savings, listed by CEC

Request for Feedback:

- Does the definition accurately define the product subtype?

Change #3

“Pump Controls” Definition



Draft 2 Proposal

- *Pump Controls: A switch or variable frequency drive, either external to, or onboard the pump that controls the motor speed.*
- Rationale: Provides consistent terminology throughout the specification.
- Comment at webinar: Programmable not needed in definition – not all have timers
- Response: EPA agrees – already in 24 hour override section.

Request for Feedback:

- Does the definition accurately define the product pump controls?

Change #4

“Standby Mode” Definition



Comments Received:

- Clarify the standby Mode definition

Draft 1 Proposal

*Standby Mode: A reduced power state, **in multi-speed and variable speed pumps**, in which the unit is connected to an ac main, but the motor remains idle, and no water is being pumped through the system.*

Draft 2 Proposal

- *Standby Mode: A reduced power state in which the unit is connected to an ac main **power source and pump controls/timers remain On**, but the motor remains idle, and no water is being pumped through the system.*

Change #4

“Standby Mode” Definition



Rationale

- Removed sub-type because any pump could theoretically have pump controls.
- Clarified it as when pump controls/timers remain On but not pumping water

Request for Feedback:

- Are there any further clarifications for Standby Mode definition needed?

Change #5

Product Family



Comments Received:

- Products are offered in variations having no effect on energy performance (i.e. color)
- Testing all variations will have an undue burden on manufacturers
- CEC accepts family approach

Draft 2 Proposal

- Added a product family allowance

Request for Feedback

- To accurately define the product family, what other product variations are offered having no impact on energy or water pump performance (i.e. color)?

Change #6

Single Phase



Comments Received:

- Limit to single phase pumps. No residential pumps are three phase.

Draft 2 Proposal

- Added in the Scope section that only single phase pumps are included in the program
- Rationale: Combined with 4 Total HP, single phase excludes commercial pool pumps

Request for Feedback

- Are there any other features that can help to differentiate residential pool pumps from commercial?

Continuation of Draft 1 Proposals

- Including single-speed pumps
 - Rationale: Technology neutral approach
- Size limit range
 - Rationale: 4 Total HP largest pump listed by CEC
- Exclusion of manually controlled pumps
 - Rationale: Must be sold ready
- Exclusion of external pump controls
 - Rationale: Outside of scope

Further Feedback Needed

Comment Received: Future revisions should expand scope to include the following

- above ground pool pumps
- commercial inground pumps
- replacement motors

Feedback Requested

- Should above ground pool pumps be tested as a full predesigned piping and filter system?
- What test methods are appropriate for three phase pumps?
- How to account for replacement motors being paired with various wet-ends? Is energy factor the right metric?

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Final Draft Test Method - Review



- Published November 2, 2012
 - Comments due December 3, 2012
- Includes three major revisions
 - Input Power Requirements
 - Measurement Requirements
 - Flow Rate Measurements
- Changes based on:
 - Stakeholder feedback
 - Additional DOE research

Revision #1

Input Power Requirements



- Draft 2 Proposal: Test using one of the following voltage/frequency combinations

Voltage	Frequency
115 V ac	60 Hz
230 V ac	50 Hz
100 V ac	50 Hz/60 Hz

- Comment Received:
 - Pool Pumps rated for use at 230 V ac, 60 Hz in U.S.
 - Update language to address pumps with a nameplate rated voltage not listed

Revision #1

Input Power Requirements



- Final Draft Proposal: Test using provided voltage for the intended market
 - Use voltage closest to the nameplate rated voltage
 - Use highest voltage if rated for multiple voltages

Market	Voltage	Frequency
North America, Taiwan	115 V ac or 230 V ac	60 Hz
Europe, Australia, New Zealand	230 V ac	50 Hz
Japan	100 V ac	50 Hz or 60 Hz

Revision #1

Input Power Requirements



- Rationale:
 - Accommodates pumps with nameplate rated voltages not included in able
 - Provides correct voltage/frequency combinations for U.S. market
 - Allows for ENERGY STAR Test Method use outside the U.S.

Revision #2

Measurement Requirements



- Draft 2 Proposal:
 - Reported values – Average at least 30 measurements taken over at least 10 seconds
 - Individual measurements within $\pm 3\%$ of average value to be valid
- Comment Received: Measurement requirements make testing overly burdensome

Revision #2

Measurement Requirements



- Additional data analysis from December 2011 validation testing
 - Evaluated how measurement fluctuations impact average values
 - Evaluated power, flow rate, and total head while pump operated at steady state* at multiple speeds

*** DOE defined a pump as being in steady state if the average rate of flow did not change more than ± 2 gallons per minute (GPM) over the course of the specified period**

Revision #2

Measurement Requirements



- Measurement fluctuations did not impact reported values of power, total head, or flow rate
 - Reported values varied less than 2% at high speeds and less than 3% at low speeds
 - Measurements taken over 30 minutes
- To meet Draft 2 proposed requirements
 - Necessary test time varied from 30 seconds at high speeds to 10 minutes at low speeds
 - Measurements taken at rate of 1 per second

Revision #2

Measurement Requirements



- Final Draft proposal:
 - Measurements shall be taken over at least 1 minute at a rate greater than or equal to 1 per second
 - Reported values shall be an average of these measurements

- Rationale:
 - Taking measurements over 1 minute provides accurate results while reducing test burden
 - Draft 2 measurement requirements more burdensome without providing additional accuracy

Revision #3

Flow Rate Measurements



- Draft 2 proposal: Take measurements at fixed flow rate increments from dead head to maximum flow
- Comment Received: Measurement error may affect reported values using this approach

Revision #3

Flow Rate Measurements



- Final Draft proposal: Test only at the intersection of the Pump Performance Curve and each of the three Pool Curves (A, B, and C)
- Rationale:
 - Reduces possibility of measurement error affecting reported values
 - Provides results more relevant to the Qualification Criteria in the Specification
 - Reduces test burden by decreasing the number of flow rates at which measurements are taken

Summary of Proposed Changes



Topic	Draft 2 Test Method	Final Draft Test Method
Input Power Requirements	<ul style="list-style-type: none"> • Provided three voltage/frequency combinations for testing 	<ul style="list-style-type: none"> • Provided voltage/frequency combinations for testing based on intended market
Measurement Requirements	<ul style="list-style-type: none"> • Reported values average of 30 measurements taken over 10 seconds • Measurements fluctuation less than 3% of average 	<ul style="list-style-type: none"> • Reported values average of measurements taken over at least 1 minute at a rate greater or equal to 1 per second
Flow Rate Measurements	<ul style="list-style-type: none"> • Discrete increments starting from dead head through Q_{Max} 	<ul style="list-style-type: none"> • Each of the three Pool Curves (A, B, and C)

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Education



- EPA is interested in helping to provide consumers and pool professionals educational content on best practices
 - Installation, Maintenance, Programming/scheduling, System design
 - Examples: Savings calculators, guides, case studies
- Leverage existing content (linking to outside sources) or work with stakeholders to develop new materials.

Request for Feedback

- What resources, tools, and references could be included or linked to on the ENERGY STAR website?

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Connected Functionality for ENERGY STAR Pool Pumps



To help advance the market for products with intelligent features in ways that deliver immediate consumer benefit as well as support a low-carbon electricity grid over the long term.

- EPA is pursuing the development of connected functionality criteria in a number of ENERGY STAR product categories.
 - Appliances, Pool Pumps, Climate Controls
- Key Elements of Approach:
 - Define near term functionality of interest to consumers (e.g., convenience, alerts, remote control) and future oriented demand response/smart grid capabilities. Involves insuring consumers retain control (e.g., overrides).
 - ID-ing ENERGY STAR products with connected functionality on the website to provide consumers, rebate programs and others a way to identify and advance those products into the market.

Connected Criteria for Pool Pumps



- Initial discussion document for connected functionality in pool pumps was provided to stakeholders in August 2012.
 - Connected functionality would be *optional* – not required for ENERGY STAR qualification.
- Next Steps:
 - Further engagement between EPA and manufacturer, utilities and other stakeholders, on the opportunity associated with ‘connected’ for pool pumps.
 - Pursue in parallel to the Version 1.0 ENERGY STAR pool pump specification development effort – timeline is independent to the goal to finish V1.0 spec in Feb. 2013.
- Some key items for discussion:
 - To support demand response/smart grid interconnection, would it be beneficial to develop a set of minimum demand response capabilities for pool pumps beyond just on/off control? (see refrigerator example on next slide)
 - Manufacturers: what additional capabilities could pool pumps offer?
 - Utilities: what capabilities would be most useful? What is the value for utilities?
 - Safety considerations around pump on/off control.

Example: Proposed Connected Criteria for Refrigerators



- **Connected refrigerator-freezer system**
- **Communications**
- **Open access**
- **Minimum capabilities:**
 - **Energy Consumption Feedback**
 - **Remote Management**
 - **Operational Status, User Settings & Messages**
 - **Delay Defrost Capability**
 - **Demand Response**
- **Information to consumers**

Example: Proposed Refrigerator Demand Response (DR) Functionality



Connected refrigerator system is able to receive, interpret and act on consumer-authorized signals by automatically adjusting operation based on signal contents and settings from consumers.

- And at a minimum, provide at least two capabilities:
 - **Delay Appliance Load Capability:** curtail/shift energy use (defrost cycle + 13% of average load or ice making) for at least 4 hours
 - **Temporary Appliance Load Reduction Capability:** more aggressively curtail energy use (at least 50%) for at least 10 minutes
- Consumers have the option to override response

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Specification Development Timeline



Draft 1 Version 1.0 Specification to stakeholders	August 30, 2012
Draft 1 Version 1.0 Specification comments due to EPA	September 25, 2012
Draft 1 Version 1.0 Specification Webinar	September 28, 2012
Draft 2 Version 1.0 Specification to stakeholders	November 2, 2012
Draft 2 Version 1.0 Stakeholder In-person Meeting at the International Pool, Spa, Patio Expo, New Orleans	November 6, 2012
Draft 2 Version 1.0 Specification comments due to EPA	December 3, 2012
Draft Final Version 1.0 Specification to stakeholders	Dec 2012
Draft Final Version 1.0 Specification comments due to EPA	Jan 2013
Final Version 1.0 Specification	Feb 2013

Test Method Development Timeline



Pool Pump Launch Webinar	December 20, 2011
Deadline for Written Comments on Framework document and initial Test Method Issues	January 20, 2012
Draft 2 Version 1.0 Test Method to stakeholders	August 2012
Draft 2 Version 1.0 Test Method comments due	September 2012
Final Draft Version 1.0 Test Method to stakeholders	November 2, 2012
Final Draft Version 1.0 Test Method comments due	December 3, 2012
Final Version 1.0 Test Method	January 2013

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