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CA IOUs Title 20 Response to REVISED Draft Regulations_Pool Pump Motors and Portable Electric Spas 8-11-2016

Additional submitted attachment is included below.

Pool Pump Motors & Portable Electric Spas

Codes and Standards Enhancement (CASE) Initiative
Title 20 Standards Development

Comments regarding revised draft regulations:
Pool pump motors & portable electric spas

Docket # 15-AAER-02

August 11, 2016

Prepared for:



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1 Background

The California Investor Owned Utilities (CA IOUs) have been involved with pool and spa energy efficiency for over 15 years, developing and implementing pool-efficiency rebate programs, building codes and appliance standards. In 2004, the CA IOUs proposed and supported the adoption of the first-in-the-nation appliance standards for pool pump motors in California. These initial requirements set prescriptive design standards banning split-phase and capacitor start-induction run motor construction types, which took effect in 2006. These initial standards also set a requirement that all residential pool filtration pump motors greater than one total horsepower (THP) be able to operate at two or more speeds starting in 2008. Also included in these standards was a test and list requirement for pool pumps to report “Energy Factor”, a metric developed by the CA IOUs and now used by ENERGY STAR[®]. In 2008, the CA IOUs were also successful in advocating for building code language that required energy efficient equipment, plumbing, and design on all newly constructed pools in California through Part 6 of Title 24. In 2006, the California Energy Commission (CEC) also adopted a first-in-the-nation standby energy consumption standard for portable electric spas as proposed by the CA IOUs. Years later, some or all of these standards have been adopted in Arizona, Washington, Florida, Oregon and Connecticut.

In 2012, CEC initiated a pre-rulemaking to replace the prescriptive motor construction standard with a performance design standard and to adopt a label for portable electric spas. The CA IOUs have been involved in each step of the process, including the submission of a Codes and Standards Enhancement (CASE) report to update both the pool pump motor and portable electric spa test procedures, standards, labeling and reporting requirements.¹ Most recently, on July 13, 2016, the CA IOUs attended CEC’s staff workshop and presented on a number of items in the staff report. These items and more are discussed in greater detail in the comments below.

2 Summary of IOU Support of Revised Staff Report

The CA IOUs are broadly supportive of CEC’s revised staff report for pool pump motors and portable electric spas. The proposed standards are cost-effective, achievable and will lead to significant energy savings throughout California, at roughly 1,277 GWh/year after stock turnover.

For pool pump motors, CEC’s revised staff report will:

1. Clarify and simplify the test procedure and reporting requirements;
2. Extend the two-speed, multi-speed, variable speed motor design requirement to cover all pool pump motors between 1 and 5 THP; and
3. Shift the current prescriptive motor efficiency standard to a performance standard and also extend this standard to all pool pump motors less than 5 THP.

To improve the pool pump motor staff report, the CA IOUs recommend CEC:

- Require modest motor efficiency requirements for waterfall pool pump motors

¹ http://www.energy.ca.gov/appliances/2013rulemaking/documents/proposals/12-AAER-2F_Residential_Pool_Pumps_and_Replacement_Motors/California_IOUs_Response_to_the_Invitation_to_Submit_Proposals_for_Pool_and_Spas_2013-07-29_TN-71756.pdf

- Set a motor capacity limit for the integral pool pump motor timer exemption
- Strengthen the pool pump motor controller language such that every pool pump motor greater than 1 THP should be sold with an onboard controller or not be able to operate without one
- Create a test and list for pool pump motor controller standby power consumption
- Re-visit and clarify the interaction of CEC's pool pump motor standards with DOE's pending pool pump standards and any potential future DOE small motor standard

For portable electric spas, CEC's revised staff report will:

1. Clarify the definition of portable electric spas to include inflatable, exercise and combination spas;
2. Update the portable electric spa standby energy consumption standard; and
3. Require a consumer facing energy label on all portable electric spas.

To improve the portable electric spa staff report, the CA IOUs recommend CEC:

- Use the original portable electric spa label design proposed in the January 2016 Staff Report
- Require spa covers to be marked with their manufacturer name and model number
- Require combination spas best tested and labeled as one unit as opposed to being tested as an exercise spa and a portable electric spa separately
- Make a change to the label language as to when the label can be removed from the portable electric spa

We commend CEC staff for their thoughtful and thorough proposal, and offer the following detailed comments and specific recommendations to improve the revised staff report.

3 Specific Comments on Pool Pump Motors

3.1 Test Procedure & Test Point Changes

The CA IOUs support CEC's revised staff report to switch to the Canadian Standards Association (CSA) C747-09 test procedure and the testing points shown below in Table 1. In 2014, the CA IOUs recognized that the current IEEE-114-2001 test procedure was not well suited for testing motors at multiple speeds or for testing motors with integral drives. As a result, the CA IOUs reached out to various pool pump and motor manufacturers to identify a proper test procedure, test points and reporting requirements to allow for a fair and accurate characterization of pool pump motor performance. After collectively working through a number of the issues with the manufacturers, the CA IOUs formally docketed these recommendations to CEC in a Revised Data Request Response on September 30, 2014.²

² CA IOU Revised Data Request Response; TN 73792; Docketed Oct 3, 2014

Table 1: CA IOUs Proposed Testing Criteria

Source: CA IOU Revised Data Request Response

CA IOU Proposed Standards Applicability Overview				
Motor Design/ Speed	Full Speed	3/4 Speed	1/2 Speed	1/4 Speed
	3450 RPM*	2600 RPM*	1725 RPM*	900 RPM*
Single Speed				
Dual Speed				
Variable Speed				
Multi-Speed**				
* Tolerance of +/- 50 RPMs				
** If no preset speeds exist within range then test to nearest preset speed.				
	Test/ List Only			
	Test/ List & Minimum Efficiency Requirement			
	No Test/ List or Minimum Efficiency Requirement			

3.2 Expanding the Motor Design Requirement

The CA IOUs support CEC in proposing to extend the current motor design requirement to all pool pump motors between 1 and 5 THP. The current standard, which first took effect in 2008, requires that all pool pump motors used in residential filtration applications greater or equal to 1 THP be two-speed, multi-speed or variable speed. For example, under the current standard a 2.5 horsepower single-speed pump and motor combination is compliant in a commercial pool filtration application, but non-compliant in a residential pool filtration application. The application specific nature of this standard is confusing for installers and homeowners, and is also difficult for CEC to enforce.

CEC staff has proposed extending the requirement so that all pool pump motors between 1 and 5 THP must be two-speed, multi-speed or variable speed. Meeting this standard is achievable and cost-effective; since this requirement first took effect, we understand the market has shifted significantly with the small commercial and multi-family sectors increasingly utilizing variable speed pool pump motors. Additionally, variable speed pumps and variable speed replacement motors are now offered in many different sizes and at increasingly affordable prices, making this energy saving technology accessible and cost-effective for nearly all pool pump motor applications between 1 and 5 THP.

CEC's requirement will also lead to significant savings for pressure cleaner booster pump motors. According to a 2009 evaluation study on PG&E's pool pump rebate program, roughly 60% of in-ground pools in PG&E's territory have a pressure cleaner booster pump to operate a pool cleaner.³ As described in CEC's revised staff report, booster pumps are often oversized and provide more hydraulic energy than is needed to properly operate in-ground pool cleaners. Excess pressure

³ Process Evaluation of 2006-2008 PG&E Mass Markets Program Portfolio and CFL, Swimming Pool Market Characterizations; KEMA, 2009. http://www.calmac.org/publications/PGE_Mass_Market_Report_FINAL.pdf

created from the booster pump is often reduced with a combination of pressure reduction disks and/ or pressure relief valves until the desired operation of the pool cleaner is reached (often by measuring wheel RPMs). Current booster pumps on the market have an average motor capacity of 1.15 THP. The CA IOUs believe that for manufacturers to comply with the 1.0 THP “tipping point”, booster pumps could be manufactured with smaller single-speed pool pump motors (less than 1.0 THP) or with variable speed motors should the motor capacity need to be greater than 1.0 THP. The CA IOUs have conducted testing and found nearly 54%- 67% energy savings by removing pressure reduction disks and pressure relief valves from the hydraulic system and then reducing the speed of the variable speed booster pump motor to the desired pressure needed to operate the pool cleaner.⁴ According to CEC’s analysis, booster pumps currently use over 1,200 kWh/year, which is nearly as much energy as many filtration pool pumps. The CA IOUs strongly support CEC’s proposal to apply the motor design requirement to all pool pump motors, including booster pump motors as we believe it is technically feasible and cost-effective.

In summary, the CA IOUs are supportive of this expansion of the motor design requirement, which will lead to increased compliance with the existing standard and also expand savings to applications other than residential filtration applications.

3.3 Shifting from Prescriptive to Performance Motor Efficiency Standards

The CA IOUs support CEC’s proposal to shift the current prescriptive motor efficiency standard to a performance-based motor efficiency standard. The CA IOUs believe the standard levels CEC proposed are strong, achievable and will lead to significant energy savings while not excluding any motor construction types.

3.3.1 Product Classes

The CA IOUs support CEC’s proposal to treat two-speed, multi-speed or variable speed the same in the standards proposal. The CA IOUs had originally proposed separate standards for two-speed products and multi-speed/variable speed products; however, we now believe there is no distinct utility between these products, therefore, does not warrant separate product classes.

3.3.2 Standard Levels

The CA IOUs also support CEC’s proposed motor efficiency standard levels. The previous January 2016 CEC staff report had proposed two tiers for motor efficiency; however, we believe the currently proposed single tier will capture savings sooner and lead to less confusion for the market. We also support CEC in acknowledging diverse stakeholder feedback and working to create a strong proposal that also provides some relief to very small pool pump motors. We believe the January 1, 2019 compliance date is reasonable as there are already numerous products on the market that meet the proposed standards, which can be seen below in Figure 1 from CEC’s revised staff report.

⁴ CA IOU presentation to DOE on March 21st about booster pump savings potential:
<https://www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0061>

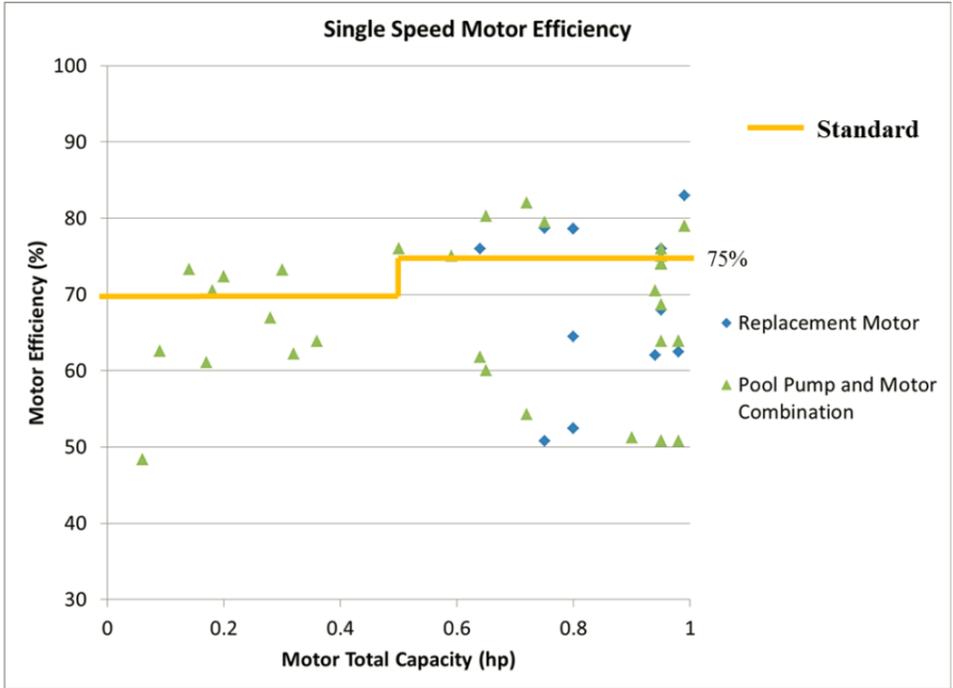


Figure 1: CEC’s Proposed Motor Efficiency Standards for Single Speed Motors
 Source: CEC Revised Staff Report, 2016

Additionally, there are numerous two-speed and variable speed products that meet the proposed standard, as shown below in Figure 2 from CEC’s revised staff report.

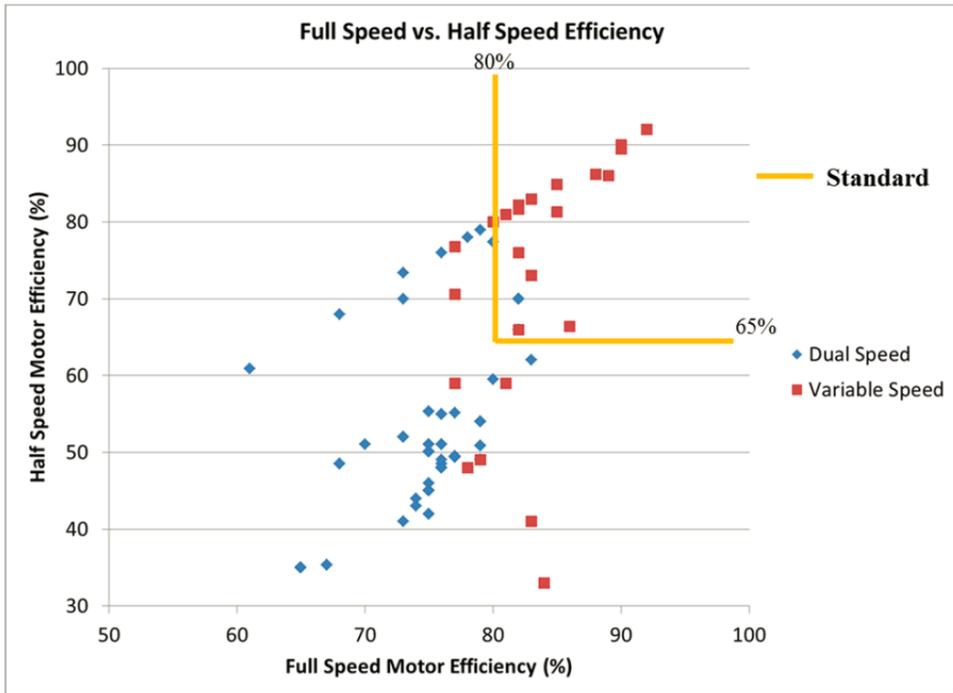


Figure 2: CEC’s Proposed Motor Efficiency Standards for Multiple Speed Motors
 Source: CEC Revised Staff Report, 2016

Recommendation: The CA IOUs support CEC clarifying that integral pool pump motors are part of the scope of this regulation. We believe the proposed prescriptive standards, which allow these integral pool pump motors to not meet the motor efficiency standards so long as they are sold with an integral timer, are reasonable. However, while to date these products have been small in capacity, ranging from 0.06 to 0.72 THP, should these integral products become much larger, we believe they should need to comply with the motor efficiency requirements. In other words, we want to ensure a loophole is not created that would allow larger integral pool pump motors to add a timer and become exempt from motor efficiency requirements. We encourage CEC to consider a 0.75 THP upper limit for this prescriptive standard.

Recommendation: The CA IOUs encourage CEC to require waterfall pumps that are only able to operate at 1,725 RPMs to meet the same motor efficiency standard level as other pool pump motors (dual-speed, multi-speed or variable speed) which have an efficiency standard of 65% at 1,725 RPMs. This requirement is reasonable, and will ensure these products are moderately energy efficient.

3.4 Other Recommendations

See below for a list of other observations and recommendations for improving the staff report for pool pump motors:

- The CA IOUs encourage CEC to modify the current pump controls standards such that any pool pump motor greater or equal to 1 THP be sold with an onboard controller or only be able to operate with the presence of a controller.
- The CA IOUs encourage CEC to collect standby energy consumption data for pool pump motor controllers similar to how ENERGY STAR collects and reports this data.
- The CA IOUs request that CEC re-visit and clarify the interaction of CEC's pool pump motor standards with DOE's pending pool pump standards and any potential future DOE small motor standard.

4 Specific Comments on Portable Electric Spas

4.1 Clarification of Definition & Scope

The CA IOUs are supportive of CEC clarifying the scope and definition of portable electric spas to include inflatable spas, exercise spas and combination spas.

Inflatable spas are the ultimate “portable” electric spa and they use a significant amount of energy compared to traditional portable electric spas of the same size (gallons). Moreover, the utility is not sufficiently different from traditional portable electric spas as to warrant a separate product class.

We also commend CEC for clarifying that exercise and combination spas are included in this rulemaking. For years manufacturers have been testing these products to the existing Title 20 standard and submitting this test data to CEC's database. CEC's revised staff report assumes exercise/ combination spas to be greater than 900 gallons and as of July 25, 2016, there were 67 exercise/ combination spas from 15 different manufacturers in CEC's database. All of these products currently meet the existing portable electric spa standard. Additionally, the Association of Pool and Spa Professionals (APSP) has specifically included exercise and combination spas as part of

their APSP-14-2011 voluntary standard and the updated APSP-14-2014 voluntary standard, which largely mirrors CEC’s Title 20 standard.

CEC proposes to treat these larger “exercise” portable electric spas the same as portable electric spas less than 900 gallons with regards to the proposed energy efficiency standard, where maximum allowable standby power = $40+3.75*Volume^{(2/3)}$ watts. However, CEC’s proposal would allow exercise spas to be tested at 85°F, as APSP-14-2014 states, which reflects their typical operating temperature.⁵ By applying the same proposed standard level, roughly half of exercise spas would already be compliant (47.7%).

Table 2: Compliance Rates of Portable Electric Spas

Source: CEC Revised Staff Report, 2016

Table 16-1: Compliance Rate of Portable Electric Spas

	Zones	Compliant (%)	Non-Compliant (%)
Portable Spas	1AB to 3	72.5	27.5
Exercise Spas	4 to 8	47.7	52.3
All Certified Units	1AB to 8	71.3	28.7

Source: MAEDBS, California Energy Commission

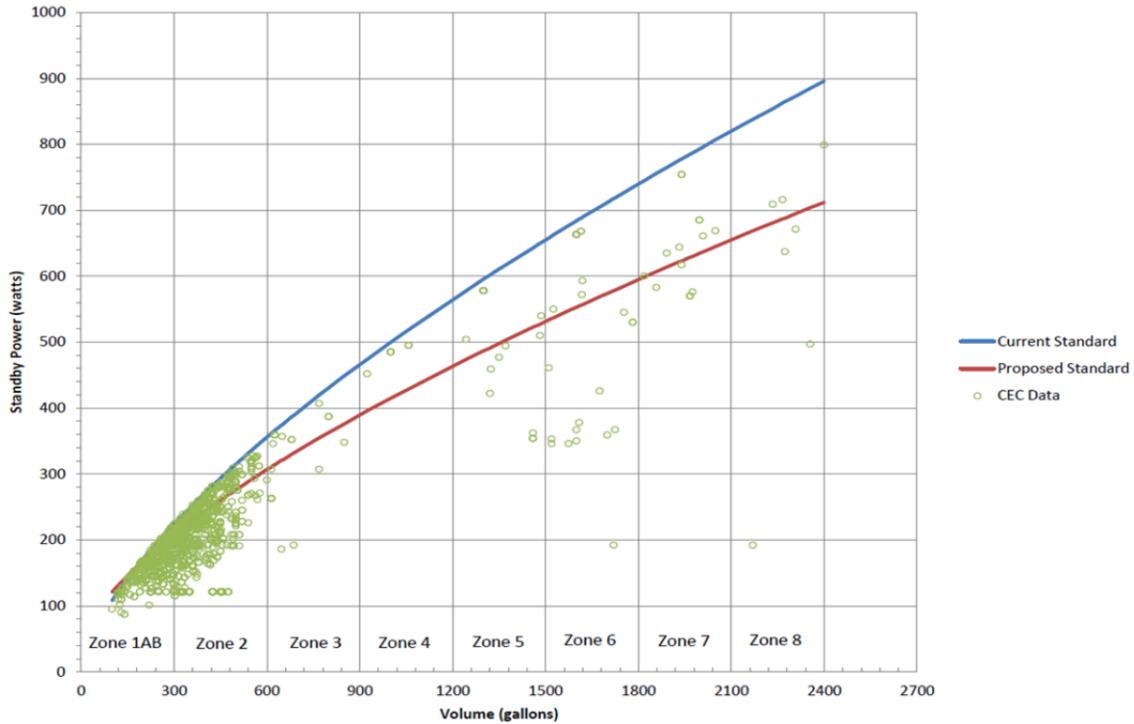
In summary, the CA IOUs support CEC’s proposal to expand the scope of coverage to include combination and exercise spas under the proposed maximum allowable standby power level of $40+3.75*Volume^{(2/3)}$ watts.

4.2 Updated Standby Energy Consumption Standard

The CA IOUs support the standard level CEC staff has proposed (seen below in Figure 3) which reflects the standard level in the CASE report that the CA IOUs submitted to CEC.⁶ This standard will lead to a market-weighted savings of approximately 8% over the baseline standby energy consumption.

⁵ For testing combination spas, APSP-14-2014, Section 5.5.3, states the following: “The water temperature of the spa or spa portion of a combination swim spa shall be a minimum of 100°F (38°C) for the duration of the test. The water temperature of the swim spa or swim portion of a combination swim spa shall be a minimum of 85°F (29°C), for the duration of the test.”

⁶ http://www.energy.ca.gov/appliances/2013rulemaking/documents/12-AAER-2G/comments/Portable_Electric_Spas_Final_CASE_Report_12-AAER-2G_2014-05-15_TN-73027.pdf



Source: MAEDBS, California Energy Commission

Figure 3: Current and Proposed Maximum Allowable Standby Power Consumption

Source: CEC Revised Staff Report, 2016

4.3 Consumer Facing Energy Label

The CA IOUs broadly support the labeling scheme CEC staff has proposed (seen below in Figure 4) which reflects the work between the CA IOUs and the APSP-14 committee in the spring of 2014. This label design was also recommended as part of the CASE report that the CA IOUs submitted to CEC on May 15, 2014, and in the publication of the APSP-14-2014 voluntary standard. This label will provide valuable information to consumers and lead to more energy efficient purchasing decisions. We commend CEC for developing label concepts for exercise and combination spas.

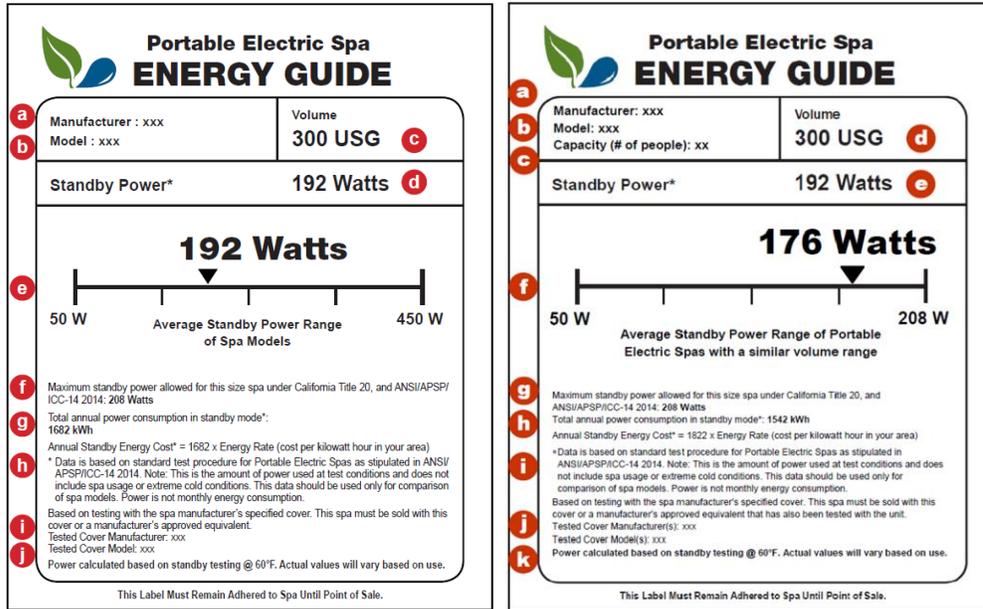


Figure 4: CEC's Original and Currently Proposed Label for Portable Electric Spas

Source: CEC Revised Staff Report, 2016 / APSP-14-2014

We also commend CEC staff for working to find a solution to ensure that proper and compliant spa covers are sold with new portable electric spas. CEC's proposed standard would also allow higher efficiency covers to be sold with spas, but they must be listed as a separate entry in the CEC appliance database. Prior to this change, allowing manufacturers to sell spas in California with a cover other than with the cover that they tested with and were certified to CEC would have misrepresented the performance of the product and not been in compliance with Title 20 regulations. Additionally, we commend CEC and industry for working on a labeling scheme, which ensures that the energy consumption displayed on the label will be the least efficient and compliant spa cover/ portable electric spa combination. Not only will this allow retailers to sell higher efficiency covers to customers, but will also ensure that the *standard* spa cover's performance is represented on the label, thereby providing assurance that the spa will at least perform to these standards.

Recommendation: The CA IOUs encourage CEC to use the original proposed design relating to the upper boundary for standby power on the label. In the January 2016 staff report and in APSP-14-2014 the upper boundary for standby power was fixed (See 450 watts in Figure 4). In this revised staff report, CEC proposed to make the upper boundary a function of the maximum allowable standby power (See 208 watts in Figure 4). While we understand CEC's intent to display how a given spa compares to the standard for its given size (gallons), ultimately we prefer the original design that consumers can quickly recognize and compare the relative energy consumptions between spas. CEC's recently proposed design makes all spas look similar with their arrow being pushed far to the right as most spas are clustered closer to their maximum allowable power as compared to 50 watts. Maintaining a fixed upper and lower limit will allow customers to more easily visualize the relative energy consumption of spas when viewing many spas on a showroom floor. It may also lead customers to consider smaller spas as they inherently use less energy.

Recommendation: The CA IOUs propose that spa covers should be marked with their manufacturer and model number so that it can be verified that the spa is being sold with the proper spa cover.

Recommendation: The CA IOUs propose that combination spas be tested and labeled per APSP-14-2014 as one unit. CEC's revised staff report proposes to test the exercise spa and the portable electric spa separately and list their respective energy performance values separately on the same label. However, we encourage CEC to follow the APSP-14-2014 test procedure that provides direction for testing the combination spas as one unit with the exercise portion heated to 85°F and the spa portion to 100°F. If the two are tested separately, their performance values could be skewed as they share a common structural wall where heat could transfer through from one body of hot water to the other. In summary, we encourage CEC to adopt the test procedure language in APSP-14-2014 and to require a single label for combination spas.

Recommendation: The CA IOUs propose the language on the bottom of the proposed label be changed to indicate that the label must remain on the portable electric spa until "time" of sale to the consumer as compared to the "point" of sale. The "point" of sale could be misconstrued to mean the location of sale, such a spa dealership. To avoid this potential confusion, we encourage CEC to change the language as follows: "This Label Must Be Adhered to Spa Until ~~Point~~ Time of Sale to Consumer".