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CA IOUs Response to Draft Title 20 Regulations_Pool Pump Motors & Portable Electric Spas 2-29-2016

Additional submitted attachment is included below.

Pool Pump Motors & Portable Electric Spas

Codes and Standards Enhancement (CASE) Initiative
For PY 2016: Title 20 Standards Development

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

Docket # 15-AAER-02

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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 various 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 filtration 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 which 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 indicated that they wanted to replace the prescriptive motor construction standard with a performance design standard and to adopt a label for portable electric spas. In July of 2013, the CA IOUs submitted a Codes and Standards Enhancement (CASE) report to CEC to update both the pool pump motor and portable electric spa test procedures, standards, labeling and reporting requirements.[1] On February 18th, 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 Staff Proposal

The CA IOUs are broadly supportive of CEC's staff proposal for pool pump motors and portable electric spas which, after stock turnover, will save 1,320 GWh/year. The proposed standards are cost effective, achievable and will lead to significant energy savings throughout California.

For pool pump motors, CEC's staff proposal 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.

For portable electric spas, CEC's staff proposal will:

1. Clarify the definition of portable electric spas to include inflatable, exercise and combination spas;

[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

2. Update the portable electric spa standby energy consumption standard; and
3. Require a consumer facing energy label on all portable electric spas.

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

3 Specific Comments on Pool Pump Motors

3.1 Test Procedure & Test Point Changes

The CA IOUs support CEC's staff proposal 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, the CA IOUs formally docketed these recommendations to CEC in a Revised Data Request Response on September 30th, 2014. [2]

Table 1: Proposed Testing Criteria

Source: CA IOU Revised Data Request Response

CA IOU Proposed Standards Applicability Overview				
Motor Design/ Speed	Full Speed 3450 RPM*	3/4 Speed 2600 RPM*	1/2 Speed 1725 RPM*	1/4 Speed 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 than 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

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

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. We believe this is achievable; since this requirement first took effect, 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 applications between 1 and 5 THP.

In summary, the CA IOUs are supportive of this change which will lead to increased compliance with the existing standard and also expand savings to applications other than residential filtration applications. To improve and enhance CEC's staff report the CA IOUs encourage CEC to consider the following recommendations:

Recommendation: The CA IOUs recommend CEC clarify on page 45 in the staff report that the expansion of the two-speed, multi-speed or variable speed requirement to all applications between 1 and 5 THP will not take place until January 1st, 2018. Currently, the code change is written so that this expansion is retroactively in effect, which we understand is not the intention of this proposed code change.

Recommendation: The CA IOUs recommend CEC re-calculate the energy savings from shifting single-speed pool pump motors between 1 and 5 THP to two-speed, multi-speed or variable speed. Currently, the staff report only calculates savings for these products from the motor efficiency improvements. However, given that all of these 1 to 5 THP single speed products will no longer be offered for sale, but instead will likely be variable speed, it is overly conservative and less accurate to calculate savings from improved motor efficiency only. In reality, commercial pools can benefit from variable speed pumps from being "tuned" to the proper flow, but more importantly from operating at reduced flows during in-operable hours. The Center for Disease Control's Model Aquatic Health Code (MAHC) allows for a 25% flow turn-down when a commercial pool is not occupied.[3] With assumptions of typical operating hours, the "turn-down" savings from small commercial applications would be fairly simple to calculate and would more accurately account for these savings. In summary, the CA IOUs encourage CEC to use the MAHC standard to calculate savings for single speed products which are currently between 1 and 5 THP in commercial 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

[3] https://cmahc.org/index.php

products and multi-speed/variable speed products; however we now believe there is no distinct utility between these products which warrant separate product classes.

3.3.2 Standard Levels

The CA IOUs also support CEC's proposed Tier 1 and Tier 2 standard levels. The Tier 1 standards are similar to the original standard levels the CA IOUs proposed in the July 2013 CASE report. The Tier 2 standards go beyond the Tier 1 standards; however CEC has proposed to allow significant time to achieve these levels (until January 1st, 2021). Additionally, there are already numerous products on the market which meet the Tier 1 and Tier 2 standards. For example, as can be seen below in Figure 1, there are currently numerous products in the CEC and Association of Pool and Spa Professional (APSP) databases which can meet the Tier 2 standard for single speed motors less than 1 THP.

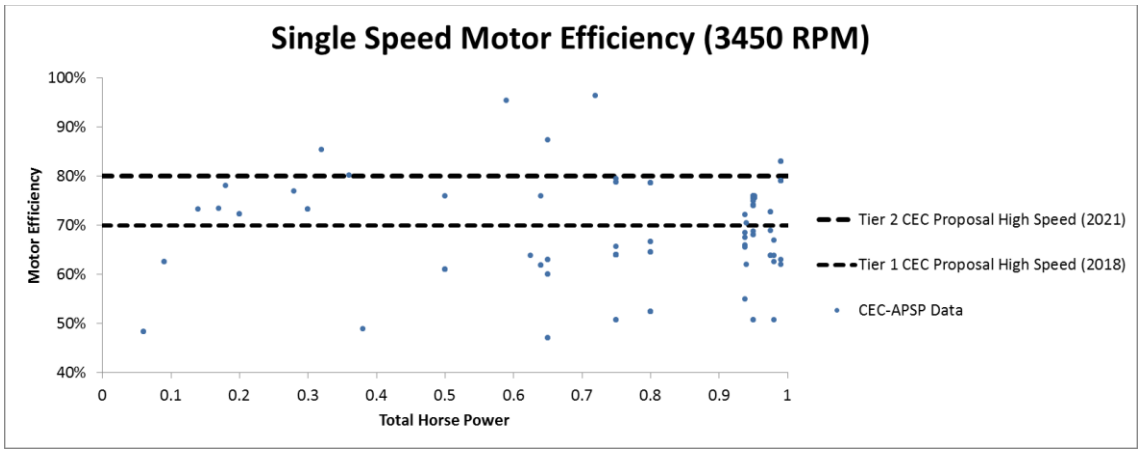

Figure 1: Single Speed Motor Efficiency

Source: CEC & APSP Pool Pump Motor Databases; Accessed February 2016

Additionally, there are numerous two-speed and variable speed products which meet both the Tier 1 and Tier 2 standards, as shown below in Figure 2 from CEC's staff proposal.

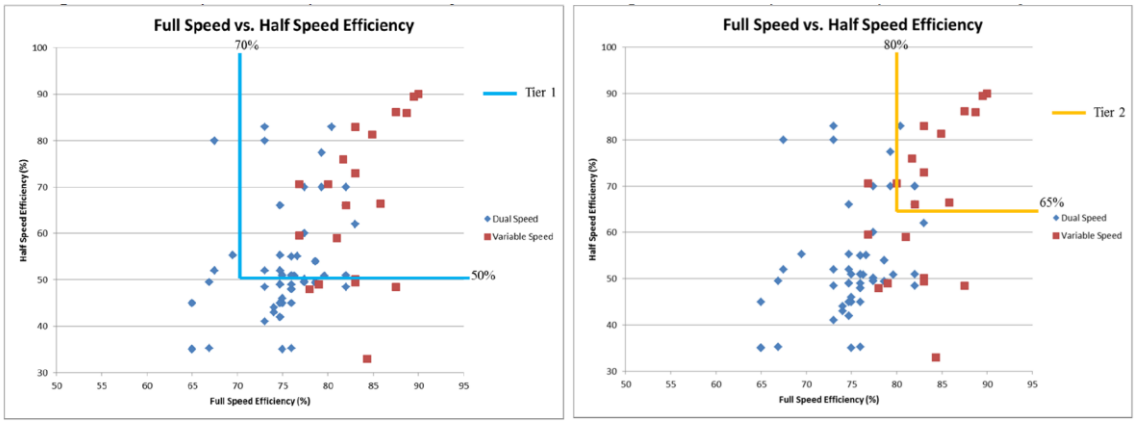

Figure 2: Tier 1 & Tier 2 Proposed Standards Multiple Speed Pool Pump Motors

Source: CEC Staff Report

Recommendation: The CA IOUs are aware that at the February 18th, 2016, staff workshop many manufacturers asserted that many of their motor efficiency data points were inaccurate and needed

to be re-submitted to CEC. After this data is re-submitted to CEC, we recommend that CEC make available through the public docket the list of products to be used in their analysis. Parties can then comment on the accuracy of the data and will be able to perform analysis on the same dataset.

3.4 Other Recommendations

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

- Throughout the staff proposal, it is important that THP be used in all references throughout the staff report, especially within the actual code language. Otherwise, unintended loopholes may be created. For example, on page 44, "Single-Speed (up to 1 hp)" is referenced within the standards table. This should be changed to "Single-Speed (up to 1 THP)" as we believe this was the staff's intention.

- As of February 22nd, 2016, over 200 pool pump and motor combinations and replacement pool pump motors have been added to CEC's database. CEC performed their analysis from data downloaded in June 2015. We encourage CEC to update their analysis with the most current data available.

- On page 43 in the code language, the "Pool Pump Controller" language is not listed. (Section 1605.3(g)(5)(B)(2)) This language, while most pertinent to two-speed pumps, exists to ensure compliant controllers are sold with pump and motor combinations. We want to ensure that this language has not been removed, but in fact remains in effect.

- The CA IOUs encourage CEC to clarify the reporting requirements for nameplate horsepower. For example, many manufacturers currently report the nameplate HP size of "0.125" (due to the affinity laws) when the motor is listed at ½ speed (1725 RPMs), when in actuality it is a 1 HP nameplate motor. This leads to confusion in reviewing the data set and also makes it difficult to perform analysis. One solution could be to add a new field such as "Rated Horsepower" in addition to nameplate HP which would vary with different speeds. Alternatively, CEC could provide direction that the nameplate HP should be the same for all speeds and users could calculate the equivalent of a "Rated Horsepower" if they need. Either of these changes would help provide significant clarity to all users of CEC's pool pump motor data set.

- The CA IOUs encourage CEC to collect standby energy consumption for pool pump motor controllers similar to how ENERGY STAR collects and reports this data.

- The CA IOUs propose that CEC require reporting power factor for all pool pump and motor combinations and replacement pool pump motors at all currently proposed test speeds. This information will help utilities and CEC understand the broader energy impacts (reactive power) of these motors on the electric grid. This recommendation was also included in the CA IOU Revised Data Request Response.

- On page 24 in the "Scope" section, there is a typo: *"Staff proposes to cover pool pump and motor combinations (pump and motor sold together) and replacement pool pump motors (~~pumps~~ motors sold alone) that are used for filtration and circulation, to run water features and waterfalls, and as booster pumps."*

4 Specific Comments on Portable Electric Spas

4.1 Clarification of Definition & Scope

The CA IOUs are supportive of CEC expanding the scope and definition of portable electric spas to include inflatable spas, exercise spas and combination spas. We believe that inflatable spas are the ultimate "portable" electric spa and that they use a significant amount of energy. We also do not believe that the utility is sufficiently different from traditional portable electric spas so as to warrant a separate product class.

We commend CEC for clarifying that exercise and combination spas are included in this rulemaking. For many years manufacturers have been testing these products to the existing Title 20 standard and submitting this test data to CEC's database. CEC's staff proposal assumes exercise/ combination spas to be greater than 900 gallons and as of February 22nd, 2016, there were 54 exercise/ combination spas from 9 different manufacturers in CEC's database. All of these products currently meet the existing portable electric spa standard. Additionally, 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$^{\wedge(2/3)}$ watts. However, CEC's proposal would also allow for exercise spas to be tested at 85°F, as APSP-14-2014 states, which reflects their typical operating temperature.[4] By applying the same proposed standard level, roughly the same number of exercise spas would be compliant (69.7%) as traditional smaller portable electric spas (72.2% compliant). However, adopting the APSP-14-2014 standard, as currently written, would lead to no energy savings for these exercise spas and combination spas as the current standard for these products in APSP-14-2014 is less stringent with the maximum allowable standby power = 5*Volume$^{\wedge(2/3)}$.

Table 2: Compliance Rates of Portable Electric Spas

Source: CEC Staff Proposal

Table 25: Compliance Rate of Portable Electric Spas

	Zones	Compliant (%)	Non-Compliant (%)
Portable Spas	1AB to 3	72.2	27.8
Exercise Spas	4 to 8	69.7	30.3
All Certified Units	1AB to 8	72.1	27.9

Compliance rate of the proposed standard for certified portable electric spas.

Source: MAEDBS, California Energy Commission

[4] 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."

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 the CA IOUs submitted to CEC.[5] This standard will lead to a market-weighted savings of roughly 8% over baseline standby energy consumption.

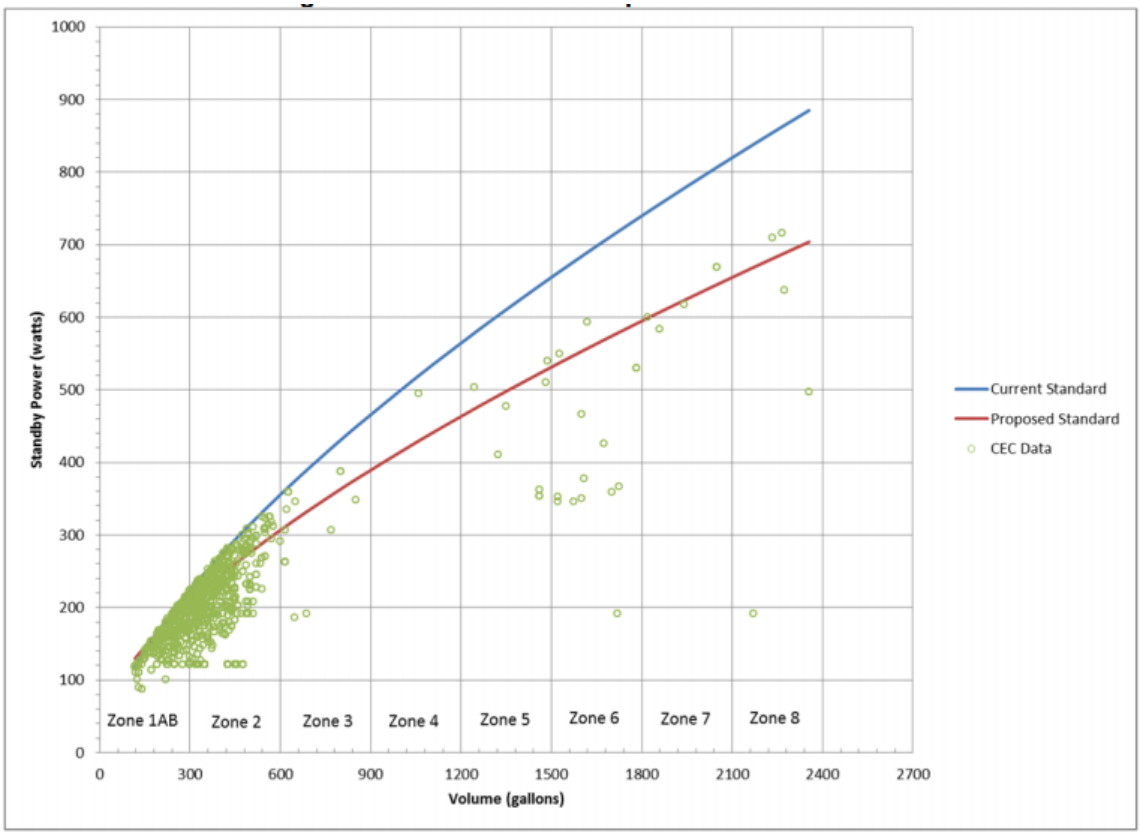

Figure 3: Current and Proposed Maximum Allowable Standby Power Consumption
Source: CEC Staff Report

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 the CA IOUs submitted to CEC on May 15th, 2014, and in the publication of the APSP-14-2014 voluntary standard. We believe this label will provide valuable information to consumers and also lead to more energy efficient purchasing decisions. However, we also recommend CEC propose a second label for

[5] 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

exercise/combination spas which adjusts the upper (450 W) and lower (50 W) power ratings to account for these larger products. Doing so should be fairly easy as no other changes would need to be made to the label.

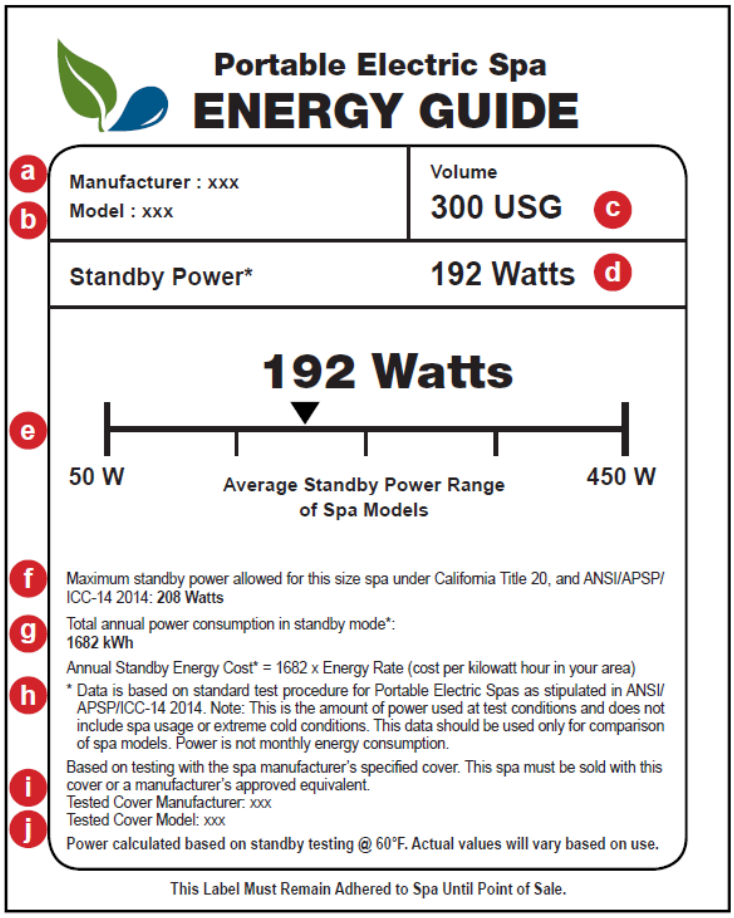

Figure 4: Proposed Label for Portable Electric Spas
Source: CEC Staff Proposal/ APSP-14-2014

Nevertheless, we recommend that the language on spa covers (See "i" in above label) be changed to indicate that only the cover for which the spa was tested with can be sold with the spa. A spa with a different cover is an entirely different product as it will perform differently. Allowing manufacturers to sell spas in California with a cover other than with the cover that they tested with and certified to CEC would be misrepresenting the performance of the product and not be in compliance with Title 20 regulations. We propose that if a manufacturer wants to sell the same spa with a different cover, then they should test the spa separately with each cover and submit them as two separate products in CEC's database. Accordingly, we propose that the language on the label be modified to reflect that only the spa cover for which the spa was tested with can be sold with the spa.

Additionally, in order to verify that the proper spa cover is being sold with the spa, we propose that all spa covers sold with new portable electric spas be marked with the manufacturer's name and model number. This way a customer (and CEC) can see that the cover being sold with the spa matches the cover listed on the label and will perform as the label claims.

Recommendation: The CA IOUs encourage CEC to specify a separate label for exercise and combination spas with different lower and upper limits for standby watts since these products use significantly more than the current upper limit of 450 standby watts.

Recommendation: The CA IOUs propose the portable electric spa label (as shown in Figure 4) be modified to reflect that only the spa cover for which the spa was tested with can be sold with the spa.

> *Based on testing with the spa manufacturer's specified cover. This spa must be sold with* *the* ~~*this*~~ *cover listed below* ~~*of a manufacturer's approved equivalent*~~*:*
>
> ~~*Tested*~~ *Cover Manufacturer: xxx*
>
> ~~*Tested*~~ *Cover Model: xxx*

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.

4.4 Other Recommendations

See below for a list of other observations and recommendations for improving the staff report for portable electric spas.

- On page 93, there is a typo in the following sentence: *"All portable electric spas manufactured on or after January 1, 2018, shall be tested in accordance with ANSI/APSP/ICC-14 2014, with the exception of Section 6.3.1"* We understand CEC meant "Section 6.3.1", not "Section 6.3".
- The CA IOUs propose CEC add a reporting requirement as a "Yes/No" field if the spa is an exercise spa and also a "Yes/No" field if it is a combination spa as defined in the staff report.