Portable Electric Spas

Codes and Standards Enhancement (CASE) Initiative
For PY 2012: Title 20 Standards Development

Analysis *of* Standards Proposal for
Portable Electric Spas

Docket # 12-AAER-2G

CASE Report
May 15, 2014

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This report was prepared by the California Statewide Utility Codes and Standards Program and funded by the California utility customers under the auspices of the California Public Utilities Commission.

*A*cknowledgements

We would like thank and acknowledge Jess Tutor of CoverPlay Inc., Energy Trust of Oregon's Spa Cover Rebate team and Association of Pool and Spa Professionals-14 Committee for their valuable contributions and commitment to spa energy efficiency.

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1 Executive Summary

The Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), Southern California Gas Company (SCG), and San Diego Gas & Electric Company (SDG&E) Codes and Standards Enhancement (CASE) Initiative Project seeks to address energy efficiency opportunities through development of new and updated Title 20 standards. Individual reports document information and data helpful to the California Energy Commission (CEC) and other stakeholders in the development of these new and updated standards. The objective of this project is to develop CASE reports that provide comprehensive technical, economic, market, and infrastructure information on each of the potential appliance standards. This CASE report covers updates portable electric spas standards, revisions to the test procedure, small requirements for spa covers and also proposes requiring a consumer facing energy label for all portable electric spas sold in California. Since portable electric spa standards became effective on January 1, 2006, the energy efficiency of products available has changed and improved. The California Investor Owned Utilities (CA IOUs) have been working closely with the Association of Pool and Spa Professionals Committee (APSP-14), a key spa industry organization, in the development of these recommendations.

The key recommendations discussed in this report include:

- Updating the maximum allowable standby power consumption standard for portable electric spas.
- Updating the test procedure to reference the ANSI/APSP/ICC-14-2011 test procedure.
- Adding a clarifying requirement that new spas be sold with a cover approved by the spa manufacturer which performs at least as well as the cover the spa was tested and listed to the CEC.
- Requiring that portable electric spas be marked with a consumer facing label displaying their energy efficiency performance and certification of compliance with Title 20.
- Reporting and listing of manufacturer approved spa covers.

The CA IOUs estimate that, if adopted, the spa standards will conservatively achieve electric energy and demand savings of 6 gigawatt-hours (GWh) and 1 megawatt (MW) in the first year, and 64 GWh and 12 MW after full stock turnover in 10 years. It will create a statewide net present value of $11 million in the first year and $117 million after full stock turnover in 10 years.

2 Products Description

Portable electric spas are aboveground, self-contained, factory-built spas or hot tubs, with equipment to heat and circulate water. The term "portable" refers to the fact that these units are aboveground, not permanently installed. Portable electric spas typically range in size from 120 gallons upwards of 800 gallons in volume. The average spa size in CEC's Online Database (referred to as "Database" throughout this report) is 336 gallons (CEC 2014a). New portable electric spas have an average life of 10 years, including the motor and controls, while the spa cover averages 5 years. (DEG & ES 2004)

Like a pool, a portable electric spa uses one or more water pumps to circulate water for circulation, filtration, heating and jet action. While water is flowing across the heater, electric resistance heating elements are energized to provide heat to meet the thermostat set point.

2.1 Current Market Situation

According to the 2009 Residential Appliance Saturation Survey (RASS), 10 percent of California residences own a spa or hot tub (portable and non-portable); 92 percent of these (approximately 1.0 million spas) are located in single-family homes. Of these, about 50 percent are heated by natural gas and 45 percent are heated by electricity, with the remainder heated by a combination of solar power, natural gas or bottled gas. About 46 percent (0.46 million units) are outdoor aboveground, 47 percent are outdoor in-ground, and the remainder are indoors. (KEMA 2010) The market reality is that almost all aboveground spas are portable electric spas, which run on either 120 or 240 volts. Assuming a 10-year product life, it can be estimated that roughly 50,000 portable electric spas are sold each year. It should be noted that the recommendations within this CASE study apply only to portable electric spas.

2.2 Spa Systems Overview

2.2.1 Spa Heating Systems

Heating systems account for a majority of overall spa standby energy consumption. Most portable electric spas use electric resistance heaters to heat their water, though a few models use the waste heat from pump motors to fully or partially add heat to the spa water. These technologies are discussed in greater detail in Section 4.4. While electric resistance heaters alone are very energy efficient (upwards of 98 percent), there are significant efficiency opportunities to improve the spa cavity, cover and insulation to help retain this heat in the water.

2.2.2 Spa Insulating Methods

One of the largest opportunities for spa energy efficiency is to reduce heat loss from the spa, as a majority of heat is lost through evaporation. The largest opportunity is the increased adoption of high R-Value quality spa covers with a strong seal around the spa shell, which can significantly reduce the evaporation heat loss, and therefore reduce the amount of time the heater needs to operate. Many manufacturers and/or sellers of spas also sell floating covers which reduce heat loss as well (see Figure 2.1).

Figure 2.1 Floating spa covers combined with a standard cover can help save energy

Source:http://www.cheappoolproducts.com/Floating~Spa~Cover~Saver~3~Sizes_98_9991~product.html

Most manufacturers already insulate the shell and base of the spa using a combination of foam or fiberglass insulation, radiant barriers or construction techniques that use the siding/bottom of the spa fully enclose the spa cavity to retain heat. According to the Database, over 99 percent of spas sold in California are "fully-insulated." (CEC 2014a)

2.2.3 Cleaning and Filtration Systems

Most portable electric spas have at least one pump to provide filtering, circulation and to run the jets when the user turns them on. Other spa models include a separate, small pump for filtration and circulation duties, which can save a significant amount of energy over the low-speed option of a larger pump. Less expensive or smaller spas generally tend to have one multi- or two-speed pump that both runs the circulation and filtration system, and powers the jets when needed. Most spas use paper cartridge filters as a filter medium, combined with other chemical or ozone treatments to maintain water clarity and sanitation.

3 Manufacturing and Market Channel Overview

3.1 Portable Electric Spas

There are a few main market channels for portable electric spas to be sold in California. The most common method is a dealer model in which a local spa retailer is an authorized dealer to sell a certain brand of spa. These spas are typically some of the larger spa brands such as Cal Spas, Jacuzzi, Sundance, Master Spas, Hot Springs, etc. Additionally, many big box stores such as Costco, Wal-Mart, Lowe's and Home Depot sell many of the same brands such as Home and Garden Spas, LifeSmart Spas and QCA spas. Lastly, some spa brands can be bought factory direct or online such as Stellar Spas, Island Spas and Dream Maker Spas. There is also a growing market for refurbished or factory blemished spas online.

3.2 Spa Covers

Insulating spa covers are sold with the purchase of a new spa. However, spa covers may not necessarily be made or shipped by the same manufacturer as the spa itself. While spa manufacturers often sell their own covers with their spas, they often do not *require* their dealers to buy their OEM covers.[1] Spa dealers or sellers therefore sometimes purchase covers from a third party spa cover manufacturer, generally to save cost. Some manufacturers specify the minimum R-value among other spa cover features for their dealers to ensure the spa performs to the level to which it was designed and certified to CEC. However, while some manufacturers do this, the fact that a lower quality, less energy efficient spa cover could be sold by a dealer with a spa tested (and certified to CEC) by the manufacturer with a higher performance cover presents a potential loophole to the existing Title 20 standards.

The CA IOUs propose to require manufacturers to state on an energy label the make and model of spa cover which was used when the spa was tested and certified with CEC. Spa manufacturers would also report the OEM cover's make and model to the Database along with other third party covers which they certify to perform to an equivalent level. The intent of this requirement would be that all spas are sold with a cover which performs at least as well as the cover for which the manufacturer tested and certified the spa with the CEC. This label is discussed further in Section 6.

4 Energy Usage

4.1 Test Methods

4.1.1 Current Test Methods

Title 20 Section 1604(g): Portable electric spas are tested according section 1604 (g) and regulated under section 1605.3 (g) of the current Title 20 regulations, with normalized standby power (Watts) and other basic information reported to the CEC.

APSP-14-2011: The Association of Pool and Spa Professionals-14 committee developed a test procedure which is very identical to the CEC test procedure.

C374-11: The Canadian Standards Association has also developed a spa test procedure based on the CEC test procedure, but modified for colder conditions.

Below is a comparison of the three known spa test procedures.

[1] Based on conversations with APSP-14 spa manufacturers on April 25, 2014

Table 4.1 Comparison of Portable Electric Spa Test Procedures

	CEC Title 20	APSP-14-2011	CSA C374-11
Spa Cover Used in Test	"The standard cover that comes with the unit shall be used during the test."	"The Manufacturer's specified cover shall be used through the test"	"The manufacturer-supplied top cover (not the floating cover) included with the spa shall be used throughout the duration of the test"
Test Chamber Floor	Not specified.	Insulated w/ 2 in. r-13 polyisocyanurate with radiant barrier on both sides, sheathed with minimum 1/2 inch thick plywood.	A wooden platform, designed to imitate a deck shall be used, providing 150 mm (5.91 in) of free air space beneath the deck.
Water Temperature	102°F, ± 2°F	102°F ± 2°F (39°C ± 1°C)	102°F (39 °C)
Air Temperature	60°F, ± 3°F	Maximum of 63°F	45°F (7°C)
Humidity Requirements?	No	No	No
Addresses Swim Spas?	No	Yes	No
Maximum Allowable Power (Standard)	$P_{max} = 5 \times V^{(2/3)}$	$P_{max} = 5 \times V^{(2/3)}$	$P_{max} = (2.3 \times V^{2/3}) + (11.6 \times V^{1/4})$
Units	IP (gallons, feet, Fahrenheit)	IP (gallons, feet, Fahrenheit)	SI (Liters, Meters, Celsius)
Enforcement/ Sampling Plan	No	No	Yes
Reporting Requirements	Volume, Standby Watts, Voltage, manufacturer, brand, model, capacity (# of persons), Fully Insulated (Y/N)	None	Volume, Standby Watts, Voltage, Tested Ambient Air Temp, manufacturer, brand, model, spa dimensions (L, W, H), Annual Energy Consumption (kWh)
Label Requirements	None	Standby Watts, Maximum Allowable Standby Watts	Volume, Standby Watts

4.1.2 Proposed Test Methods

The three existing spa test procedures referenced above are all very similar, however slight differences exist between them which can potentially lead to different results for the same spa. Below are a summary of issues the CA IOUs propose should be addressed in CEC's test procedure.

- **Test Chamber Floor:** The CA IOUs support APSP-14's test chamber floor requirements. The test chamber floor used in APSP-14 and in the original Cal Poly spa testing used an insulated w/ 2 in. r-13 polyisocyanurate with radiant barrier on both sides, sheathed with minimum 1/2 inch thick plywood. From conversations with various manufacturers, this is already widely being used to test spas to CEC standards, but the CASE Team seeks to add clarity to the CEC test procedure by aligning with APSP-14-2011.
- **Certified Lab Requirements:** The CA IOUs propose CEC adopt Section 4: "Qualification of Testing Laboratories and Certifications Bodies" of APSP-14 to ensure that each manufacturer tests their spas in a certified testing facility. This will ensure a level playing field and reduce error in testing.
- **Exercise Spas:** The CA IOUs propose CEC exclude exercise spas (swim spas) from being tested or reported. In the original 2004 CASE effort, it was never intended to include swim spas. However, some manufacturers have submitted data for swim spas to the Database. The CA IOUs propose adding clarity to Title 20 that exercise spas are not to be tested or reported to the Database as there is no standard or CEC test procedure which applies to exercise spas at this time.

In summary, after reviewing the existing test procedure, the CA IOUs proposed that CEC adopt the ANSI/APSP/ICC-14-2011 test procedure in its entirety with the exception of Section 6.3 (Maximum allowable power/standard level) and 7 (Label Requirements). APSP-14-2011 was created following CEC's test procedure and provides much greater detail and clarity in the test procedure than CEC's current test procedure. It also provides details on requiring manufacturers to have a third party certified lab to test their products.

4.2 Portable Electric Spa Standards

4.2.1 Key Data Sources

Below are the key data sources used in the standards analysis of this CASE report.

CEC Appliance Database
http://www.appliances.energy.ca.gov/

In 2006, the CEC began requiring all spas sold in California to submit the following information: manufacturer name, brand name, model number, volume, voltage, persons capacity, whether the spa is fully insulated or not and standby power consumption. As of March 2014, there were over 1,200 portable electric spas in Database. This database is the only known database of portable electric spa energy usage.

California Sales Data by Spa Size
The CASE Team received California sales-weighted data by spa size from the APSP-14 Committee's survey of manufacturers.

Spa Cost/ Attribute Data
The CASE Team collected online price, construction type and number of jets for 107 different spas from 17 different manufacturers in March 2014.

Experimental Study of Portable Electric Spa Standby Power

PG&E and APSP jointly worked with California Polytechnic State University Mechanical Engineering Department to test 27 portable electric spas in 2008 and the results were used to support the original CEC standard. This data remains the only publically available third party tested data on portable electric spas known to the CASE Team.

4.2.2 Existing Spa Standards

In 2004, the CA IOUs submitted a proposal to CEC to set the first-in-the-nation test procedure and standards for portable electric spas. (DEG & ES 2004) CEC adopted this proposal and it went into effect in 2006. Since then, the states of Oregon, Washington, Connecticut and Arizona have adopted the California Standards for portable electric spas. Florida has also adopted APSP-14, which is an identical standard. CEC and APSP-14 Standards currently set a maximum allowable standby power consumption based on volume as is shown below in Equation 4.1.

Equation 4.1 Current CEC/ APSP-14 Spa Standard

$$Maximum\ \ Allowable\ Standby\ Power\ =\ 5 \times Volume^{2/3}$$

This standard equation was designed to be neutral to spa volume and require spas of different sizes to be equally efficient. To do this, volume was raised to the (2/3) power to reflect the surface area of a spa as spa standby energy consumption is strongly related to heat loss from the surface area, not volume. This allows the maximum allowable power consumption to increase approximately linearly with total spa surface area.

The Canadian Standards Association's C374-11 Standard, developed after CEC's Standard, uses a slightly different approach to calculating maximum allowable power consumption and is shown below in Equation 4.2.

Equation 4.2: CSA C374-11 Standard

$$Maximum\ \ Allowable\ Standby\ Power\ = (2.3 \times Volume^{2/3}) + (11.6 \times Volume^{1/4})$$

(Note: The equation above uses SI units, including liters and is tested at an air temperature of 7 degrees Celsius.)

This standard gives a slight benefit to smaller spas from the addition of a constant multiplied by the volume raised to the (1/4) power, and also tightens the standards slightly for larger spas.

4.2.3 Proposed Spa Standards

Based on significant research, analysis and collaboration with spa manufacturers, the CA IOUs propose that CEC modify the maximum allowable standby power as is shown in Equation 4.3:

Equation 4.3: Proposed Portable Electric Spa Standard

$$Maximum\ \ Allowable\ Standby\ Power\ = (3.75 \times Volume^{\ 2/3}) +\ 40$$

The CASE Team believes this proposed standard will save a size-weighted average of 8 percent of energy consumption when compared to the existing products in the Database. The CASE Team selected this standard level after working with spa manufacturers and the APSP-14 Committee. Based on conversations with various spa manufacturers, while heat loss is proportional to the surface area of a spa, there is a baseline of energy consumption needed to run pumps, controls, etc., regardless of spa size. We believe this proposed standard addresses industry's concerns of smaller spas being disproportionally impacted by a potential updated standard, while significantly tightening the standard on larger spas. Therefore, the CA IOUs support a modified standard equation which will save energy for all spa sizes over 200 gallons (G), with significant savings coming from larger models. With the proposed standard, roughly 71 percent of spas in the CEC Database already qualify, with 93% of manufacturers already making theses efficient models. Table 4.2 below show how spas of different sizes will be impacted by the proposed standard.

Table 4.2 Qualifying Products by Spa Size

Spa Size (Gallons)	% of Qualifying Products
<199	99%
200-299	74%
300-399	68%
400-499	65%
>500	55%
Total	71%

Source: CEC 2014a, APSP 2014

Below in Figure 4.1, the proposed standard is plotted along with the existing standard, all of the spas in the Database as well as the California Polytechnic State University third party tested data. As can be seen, 15 of the 27 spas (56 percent) tested at California Polytechnic State University in 2008 would meet the proposed Standard.

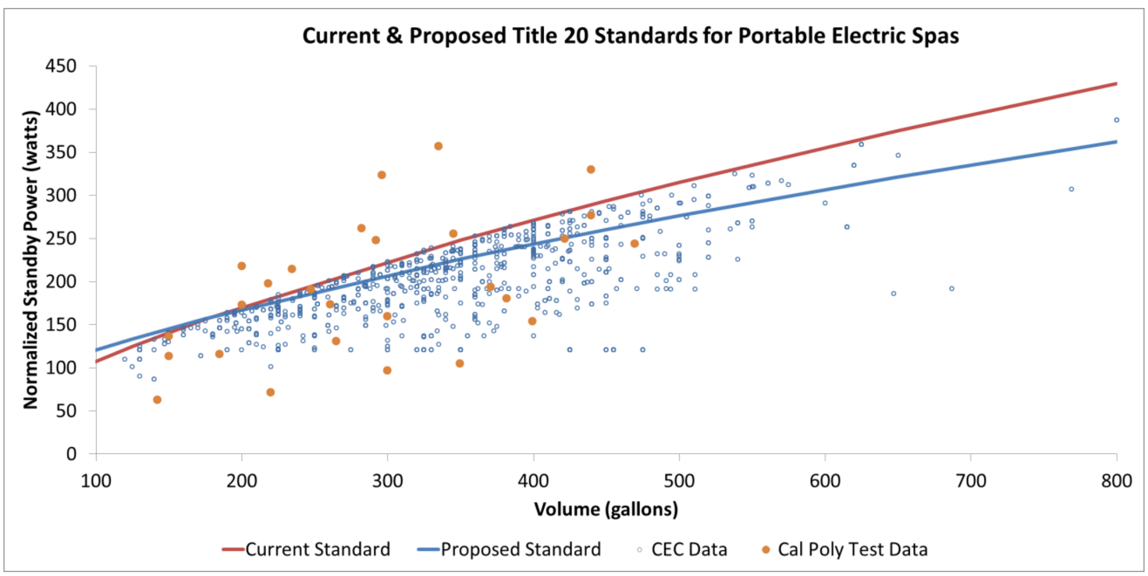


Figure 4.1 Current and Proposed Portable Electric Spa Standards

Source: CEC 2014a, CALPOLY 2008

4.3 Unit Energy Consumption: Standby Energy Use per Spa

This section presents the average energy use for non-qualifying and qualifying spas. Standby energy consumption can be determined from multiplying the reported standby power demand by the number of hours of operation in a year.

For simplicity in this report, the Unit Energy Consumption (UEC) for non-qualifying and qualifying spas refers only to standby energy consumption, as this is what the current standard addresses. Additionally, active mode energy consumption is highly variable depending on usage. This aligns with the CA IOUs 2004 CASE report as well.

Annual standby hours used in the UEC calculation are 8,760 hours, or year-round operation. This was determined based on conversations with various spa manufacturers who recommended leaving spas filled and "on" year-round.

4.3.1 Energy Use for Non-Qualifying Products

Figure 4.2 below shows the non-qualifying products which are in the Database as of March 17, 2014. With the proposed standard level there are 369 products in the Database which would not qualify, which is roughly 29 percent of the products in the Database.

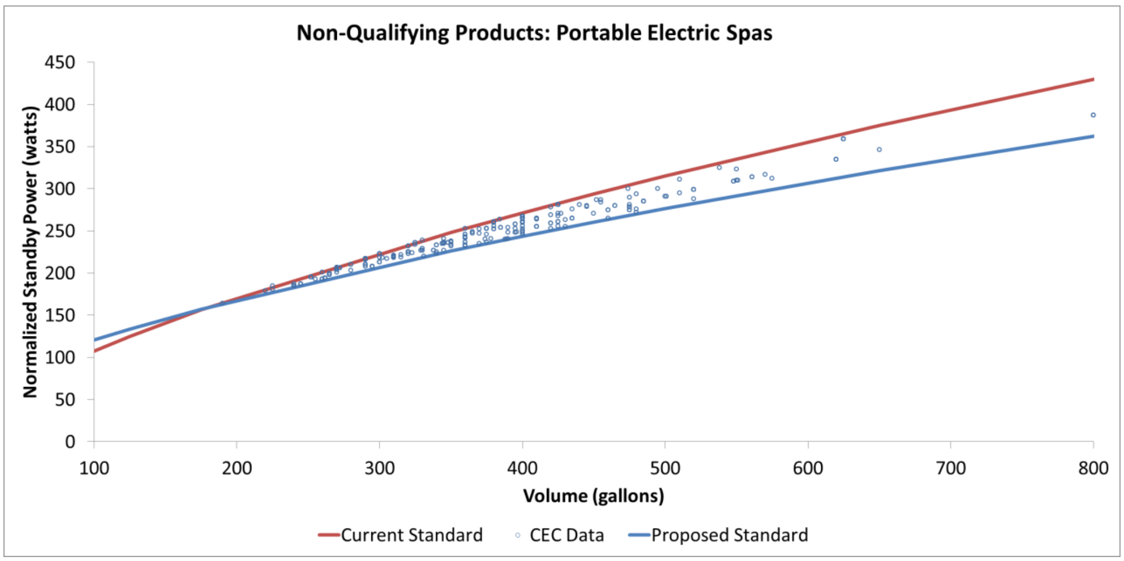


Figure 4.2 Non-Qualifying Portable Electric Spas

Source: CEC2014a

The equation below describes how Unit Energy Consumption (UEC) is calculated for non-qualified products.

$$kWh_{non-stds} = (Average\ Standby\ Watts_{non-stds}/1000) \times Hours\ Standby$$

Where:
$kWh_{non-stds}$ = Kilowatt hours consumption of non-qualified product in one year
Hours $_{Standby}$ = Number of hours in standby mode, 8,760 hours per year
Average Standby Watts$_{Non-stds}$ = Sales weighted normalized standby power draw

Based on proposed standard level in this report, the average normalized standby power consumption of non-qualifying products is 218 watts, the UEC would be calculated as follows:

$kWh_{non\text{-}stds}$ = (Standby Watts $_{Non\text{-}stds}$/1000) * Hours $_{Standby}$

$kWh_{non\text{-}stds}$ = (218 Watts/1000)* 8760 hours/ year
$kWh_{non\text{-}stds}$ = 1,910 kWh/ year

4.4 Efficiency Measures

Below are some of the energy efficiency measures which can help spas meet the proposed Standard level. All of these technologies are commercially available and are already being used in many spas throughout California.

Combined Heat and Power Pump

Waste heat from the pump motor can be used to heat the water. For example, Softub Inc. uses waste heat from the circulating pump as the primary heat source for their spas. This allows their products to be very energy efficient as there is no separate electric heating element. While this type of technology may not be able to be the exclusive source of heat for every spa, especially larger spas, it can be used to supplement electric resistance heating, providing for significant savings. Certain Cal Spas models use "Friction Heat" which claims energy saving by using a baffle system to capture waste heat from the motor and transfer the heat to the water to reduce electric water heating demand.

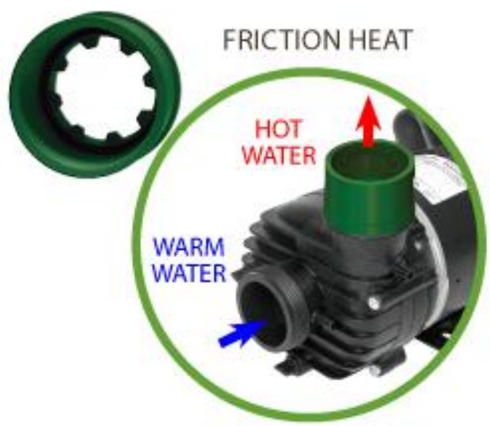


Figure 4.3Waste heat from the motor is used as the exclusive source of heat for Softubs (left) and as a supplemental source of heat for some Cal Spas models (right)

Sources: http://softubdirect.com/softub-parts-c-31.html?sort=3d&page=1
http://calspas.com/genesis/genesis-gr730l/equipment/

Improved Insulation

Improved insulation in and around the spa cavity can help reduce heat loss. Most manufacturers already use a combination of closed cell foam and radiant barriers. Some less efficient spas use fiberglass insulation, which if gets wet, essentially loses all insulating properties.

Sundance Spas offers a factory installed optional "EcoWrap®" for a number of their spas lines, which according to their own advertised testing using the CEC test procedure, can save around 25 percent of energy consumption. Jacuzzi offers a similar product called “SmartSeal®” with similar energy saving estimate claims.

Figure 4.4 Sundance Spas’ EcoWrap® option claims energy savings up to 25%

Source: http://thepoolshoppe.ca/products/spas/sundance-spas-energy-efficiency.asp

Circulator Pumps

Using small circulator pumps instead of a low-speed level on a two-speed pump can save a significant amount energy. Circulator pumps are designed to optimally run at low flows where as a two-speed pump running on low-speed is very inefficient. Based on the CASE Team’s observed research, many of the more affordable/entry level spas only have 1 pump (often 2-speed) whereas more medium to high-end spas are making use of circulator pumps to save energy.

Spa Cover

The spa cover likely offers the greatest opportunity for energy efficiency improvement for a portable electric spa because in addition to providing insulating value the cover provides a good seal with the top of the spa shell to prevent water evaporation. Important features of an energy efficient cover include making sure the entire cover is insulated and that heat loss through the hinge is minimized. Most spa covers utilize a double-hinge design which can create a 1-inch to 3-inch gap of insulation in the middle of the cover. Additionally, the gap can extend the entire length of the cover allowing for significant heat loss. This heat loss can be mitigated with a cover that has a single hinge or insulated hinge design. (COVERPLAY 2014) In Figure 4.5 below you can see the air gap on the left with the traditional dual-hinge cover design as compared to the single hinge design from CoverPlay Inc. on the right which essentially eliminates the gap all together.

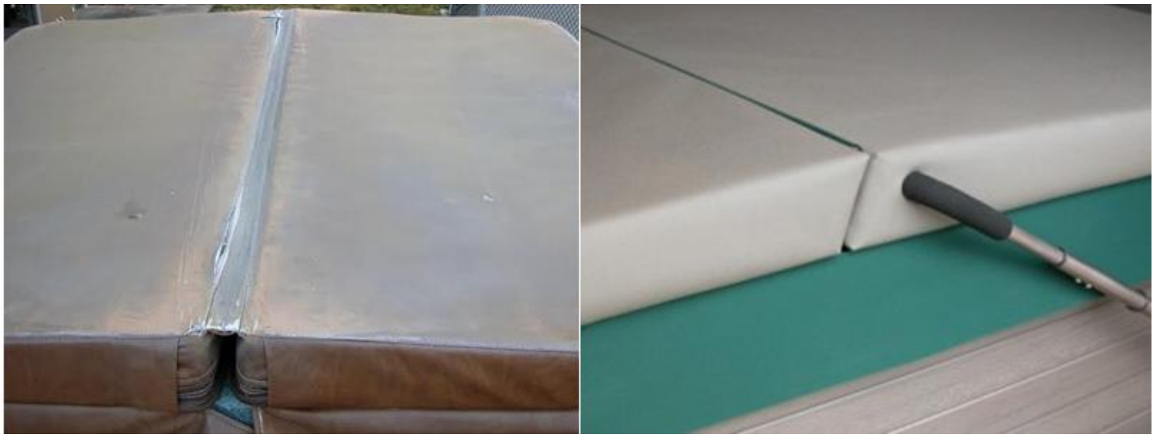


Figure 4.5 Dual-hinge designed spa covers leak more energy than a single hinge design.

Source: http://coverplay.com/science-corner/

The energy savings opportunity with spa covers is significant enough that that utilities and are starting to design and implement energy efficiency programs around them. The first such program, administered by the Energy Trust of Oregon, has been offering $100 rebates for spa covers since early 2013 which have a minimum R-Value of 12 and have one continuous piece or have an insulated hinge of at least R-12. Conversations with the implementers of this program have shared with the CASE Team that thus far the program has been popular and successful. (OREGON 2014)

4.4.1 Energy Use for Qualifying Products

Figure 4.6 below shows the qualifying products which are in the Database as of March 17, 2014 based on the proposed standard level described above in Section 4.2.3.

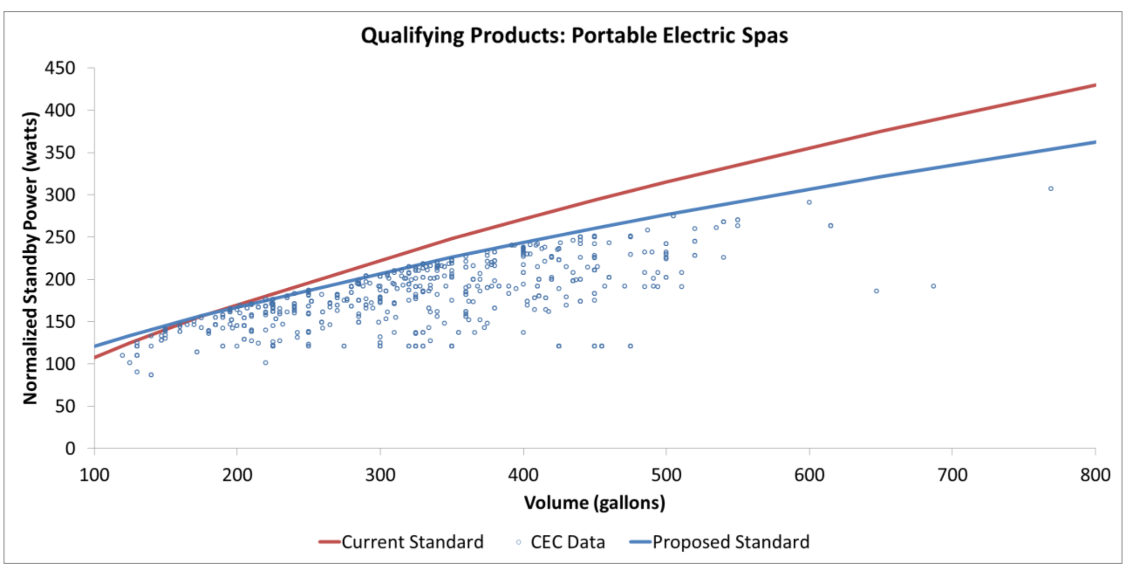


Figure 4.6 Qualifying Portable Electric Spas

Source: CEC2014a

The equation below describes how the UEC is calculated for a qualified product.

$$kWh_{stds} \ = \ (Average\ Standby\ Watts_{stds}\ /\ 1000)\ \times\ Hours_{standby}$$

Where:
kWh_{stds} = Kilowatt hours consumption of a qualified product in one year
$Hours_{Standby}$ = Number of hours in standby mode, 8760 hours per year
Average Standby $Watts_{stds}$ = Sales-weighted average standby power draw

Based on proposed standard level in this report, the average normalized standby power consumption of qualifying products is 180 watts, the UEC would be calculated as follows:

$$kWh_{stds} = \ (Standby\ Watts_{non-stds}\ /\ 1000)\ *\ Hours_{stds}$$

$$kWh_{stds} = \ (180W/1000) \times\ 8{,}760$$

$$kWh_{stds} = \ 1{,}580\ kWh\ /\ year$$

4.4.1 Summary of UECs

As can be seen in Table 4.3, the average annual sales-weighted standby energy consumption for spas in the Database, assuming year round operation, is 1,910 kWh, which aligns closely to PG&E's 2004 Field Test of Spas (DEG & ES 2004) of 1,879 kWh/ year. This value also corresponds with the UEC of 2,500 kWh/year used in the 2004 Portable Electric Spa CASE Report for all spa energy use including standby *and* active energy consumption. (DEG & ES 2004) The qualifying product UEC of 1,580 kWh/ year represents significant savings.

Table 4.3 Summary of Unit Energy Consumption

Product Class	Power Draw (W)	Annual Standby Operating Hours	Unit Energy Consumption (kWh/yr)
Sales-Weighted Average Non-Qualifying Spa Standby Power	218	8,760	1,910
Sales-Weighted Average Qualifying Standby Power	180	8,760	1,580

Source: CEC2014a

5 Market Saturation & Sales

5.1 Current Market Situation

5.1.1 Total Stock and Shipments

Given that nearly 95 percent of portable electric spas are installed in single-family homes (KEMA 2010), the analysis in this CASE report assumes spa saturation grows at the same rate of building of single family homes. The CASE Team used the CEC building forecast data from Title 24 which forecasts annual new buildings growing by roughly 1.7 percent per year. (HMG 2010) Therefore, the CASE Team forecasts portable electric spa annual sales will grow by 1.7 percent per year.

Table 5.1 California Portable Electric Spas Annual Sales

Year	California Total Stock	California Annual Sales[A]
First Effective Year - 2016	493,000	49,300
Product Turnover - 2025	562,000	56,200

Source: RASS 2009, HMG 2010
[A] Assuming 10-year lifetime for portable electric spas

Using California sales-weighted data provided by the APSP-14 Committee, the annual sales can be estimated by spa sizes as is shown below in Table 5.2.

Table 5.2 Spa Sales by Volume

Spa Size (Gallons)	Annual Sales	
	Percentage[A]	Units[B]
<199	8%	3,950
200-299	25%	12,300
300-399	44%	21,700
400-499	21%	10,400
>500	2%	1,000
Total	100%	49,300

Source: RASS 2009, APSP 2014
[A] The APSP-14 committee provided size based CA sales data to the CASE team based on a survey of manufacturers
[B] Extrapolated from Table 5.1and percentage sales data

Table 5.3 provides estimates for statewide energy consumption of portable electric spas, based on existing stock size and usage characteristics.

Table 5.3 California Statewide Portable Electric Spa Energy Usage – 2014

	For First-Year Sales		For Entire Stock	
Product Class	Peak Demand (MW)	Annual Energy Consumption (GWh/yr)	Peak Demand (MW)	Annual Energy Consumption (GWh/yr)
Portable Electric Spas	15	80	152	798

Source: Table 4.2, Table 4.3, Table 5.1, Table 5.2

5.2 Market Share of High Efficiency Options

Data distinguishing between shipments of qualifying versus non-qualifying portable electric spas is not currently available. Qualifying and non-qualifying products were therefore identified using available product data in the Database, which is not shipment-weighted.

5.3 Future Market Adoption of High Efficiency Options

The Database suggests that spas have not been increasing in efficiency since the standard was introduced. The CASE Team evaluated whether spas became more efficient and did not see any significant trend from spas added between 2006 and 2014. While roughly 71 percent of existing spas in the Database already meet the proposed Standards, in the absence of updated Standards, the CA IOUs do not believe the market would shift towards more efficient products on its own. However, the CA IOUs believe an informative energy label would shift the market towards more efficient spas. This opportunity and the savings potential are described further in Section 6 below.

6 Spa Labeling Opportunity

Since the 2006 spa standard, all portable electric spas which have been reported into the Database have met the Standard with many far exceeding the existing Standard and even the proposed Standard, as is shown below in Figure 6.1. There are many spas that use half of the normalized standby power as compared to others of similar volumes. With this wide range of energy efficiency among the portable electric spa market, the CA IOUs believe customers who shop for spas would benefit greatly from an informative label about spa energy consumption. This label would help customers shopping for spas understand the impact of their purchase on their energy bills and could also help shift the portable electric spa market to more efficient products.

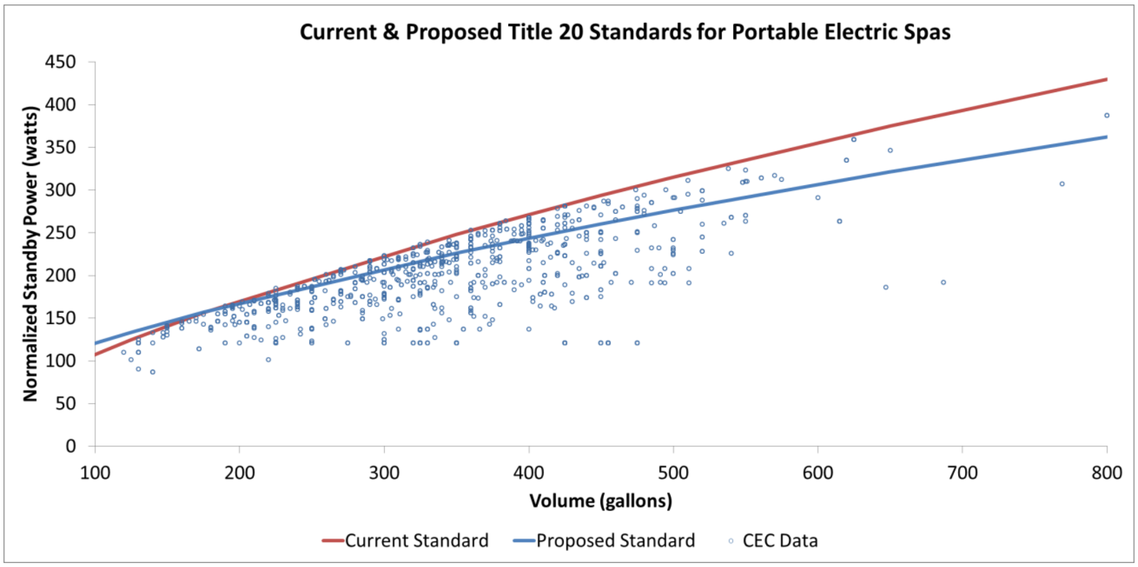


Figure 6.1 Current & Proposed Portable Electric Spa Standby Energy Use

Source: CEC2014a

6.1 Improved Compliance

While all reported portable electric spas in the Database currently meet the CEC Standard, it is unknown whether some spas are being sold in California that are not listed on the Database as there is no marking or label to confirm compliance. A visible label on the spa shell would inform spa dealers, consumers and CEC as to whether spas were complaint and suited for sale in California.

6.2 Better Informed Consumers

Currently, purchasers of portable electric spas have no way of understanding the energy consumption of different spas on a showroom floor. While some manufacturers do report their energy efficiency and other “green” features, there is no consistency as to how this information is displayed and whether it is accurate.

Energy labeling programs such as “ENERGY STAR®” and “EnergyGuide” have proven to be successful at providing consumers simple information which can lead to more energy efficiency purchasing decisions. Furthermore, categorical based labels such as those used in the European

Union (EU) have showed the ability to shift the market significantly with respect to efficiency. An evaluation of the EU labeling scheme demonstrated a 10 percent improvement in the sales-weighted average efficiency of refrigerators between 1994 and 1999 due to the label. (Bertoldi 2000) The "Categorical" type label and respective market shift as a result can be seen below in Figure 6.2.

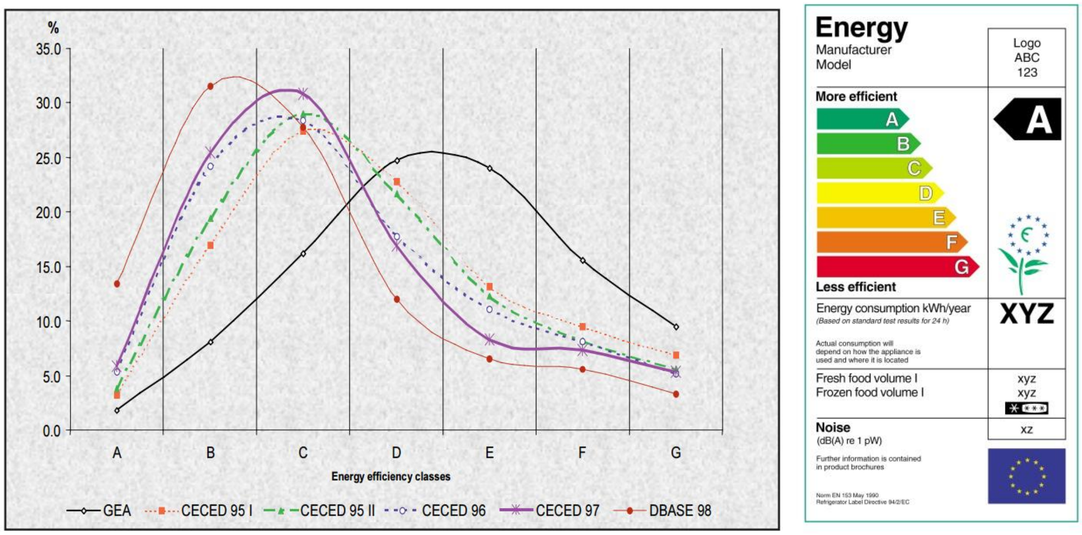


Figure 6.2 EU Energy Label and Market Shift in Consumer Purchasing

Source: Bertoldi 2000

6.3 Types of Labels

There are many types of labels different countries and agencies have used to display information to inform consumers of the energy impacts of products. Two of the most effective types of labels are continuous and categorical.

Continuous Labels

Continuous labels use a bar graph or line to show the range of models available on the market. The scale allows consumers to see where the labeled unit fits into the full range of similar models without sorting performance into specific categories. (See the United States EnergyGuide Label in Figure 6.3.)

Categorical Labels

Categorical labels use a ranking system that allows consumers to tell how energy efficient a model is by using multiple classes that progress from least efficient to most efficient or most energy consuming to least energy consuming. (See the Labels in Figure 6.3.)

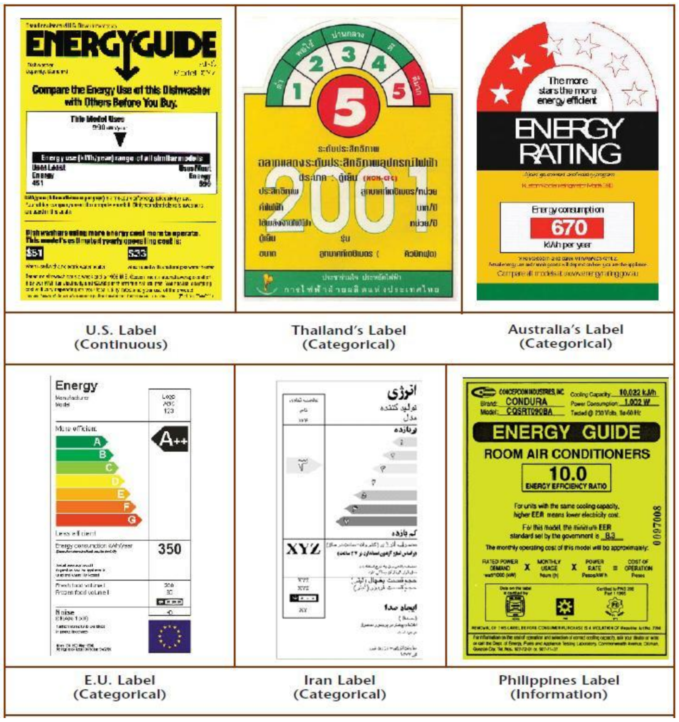


Figure 6.3 Different Label Designs from Different Countries

Source: www.clasp.org

Given the large range of spa efficiencies and effectiveness of energy labels in other markets, the CASE Team believes this product is well suited for a consumer facing categorical or continuous energy label.

6.4 Proposed Label Designs

In August 2013, the CASE Team submitted two potential portable electric spa label designs to CEC. Since then, the CASE Team has conducted additional research and collaborated with the APSP-14 Committee in an effort to design an effective spa energy label. The design shown below in Figure 6.4 is the result of this collaboration.

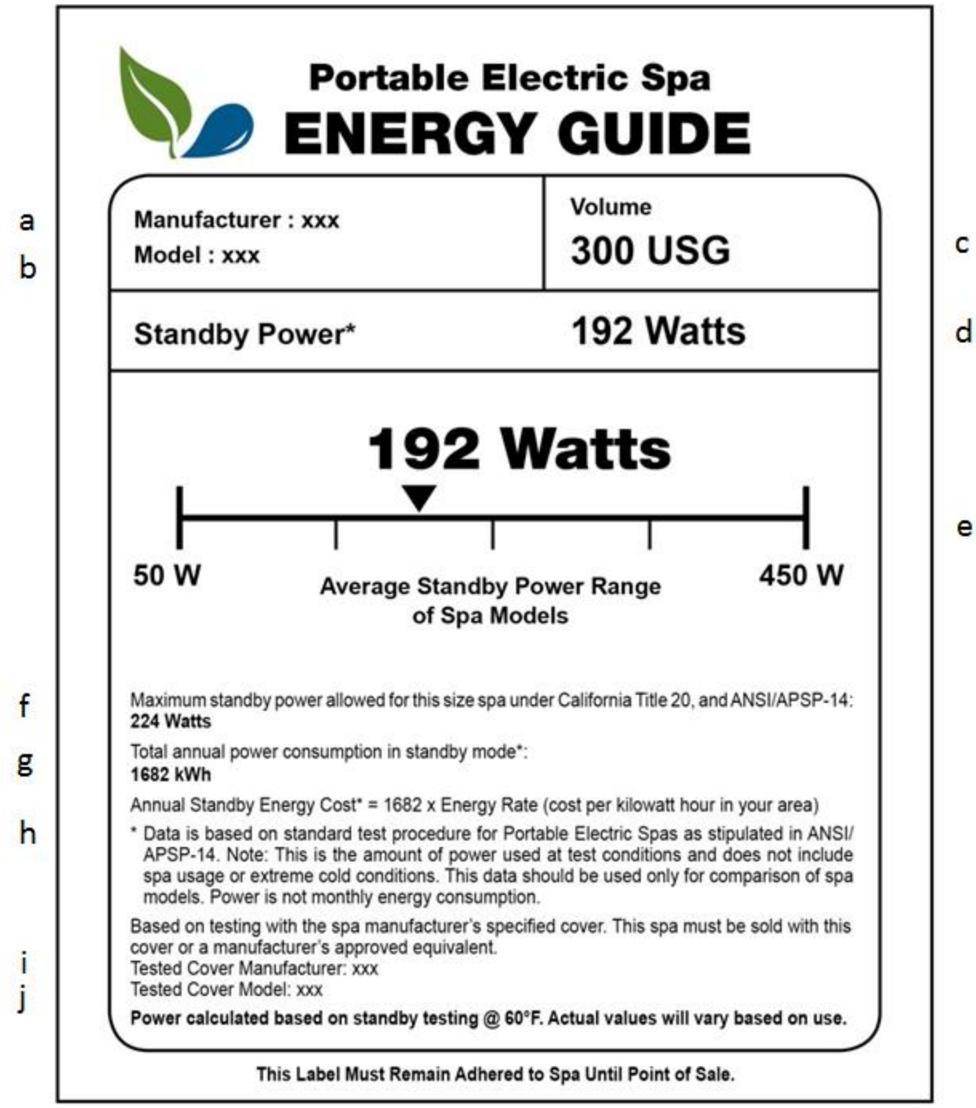


Figure 6.4 APSP-14/ CA IOU Proposed Label Design

The following model-specific information should be included on each label:

a. Spa manufacturer
b. Spa model
c. Spa volume
d. Standby power
e. Standby power chart arrow location and standby power value
f. Maximum standby power allowed
g. Total annual power consumption in standby mode
    i. Standby Power x 8760 hours per year
h. Annual energy variable in annual standby power cost formula
i. Specified cover manufacturer

j. Specified cover model

For a more detailed label schematic with specific requirements on fonts, colors, sizes, etc., please see Section 10.2.

6.5 Cost of Labeling

The cost of labeling portable electric spas with a removable sticker type label on the shell of the spa is estimated to be minimal compared to even the most modest savings estimates. The CASE Team conservatively estimates the per label cost to be $0.38 per label, when labeling the entire stock of 565,000 portable electric spas in CA over the course of 10 years. These costs were mostly estimated using a Federal Trade Commission cost estimate for Energy Guide labels and are further detailed below in Table 6.1.

Table 6.1 Labeling Costs for Portable Electric Spas

One Time Set-Up Costs		Units
Engineer/ Designer Time	40	Hours
Engineer/ Desiger Hourly Wage	$44.36	Dollars
Set-Up Cost to each Manufacturer	$1,774	Dollars
Number of Spa Manufacturers	40	Manufacturers
Total Set-Up Cost Statewide	*$70,976*	*Dollars*
Material Cost		
Printing Costs	$0.22	Per Label
Total printing costs to label stock	*$123,683*	*Dollars*
Labor Costs to Apply Label		
Time to adhere each Label	8	Seconds
Total time to adhere Labels to Entire Stock	1,249.33	Hours
Packaging and Filling Machine Operators Hourly Wage	$13.44	Dollars
Total Labor Costs	*$ 16,791*	*Dollars*
Total		
Total Cost to Label Stock	$ 211,450	Dollars
Label Cost per unit	***$ 0.38***	*Dollars/ Label*

Source: FTC 2013, www.uprinting.com/standard-sticker-printing.html

6.6 Economic Analysis & Savings Potential from Labeling

The CASE Team believes that using a consumer facing label on portable electric spas in California will improve compliance, educate consumers and lead to energy savings. While calculating the savings effect from a label is difficult to quantify, the CA IOUs believe that a label could lead to a 5 percent improvement in the sales-weighted average efficiency of spas, meaning that the label will, on average, lead consumers to purchase a spa which is 5 percent more efficient than they would have otherwise without the label. The CA IOUs based this conservative savings estimate on the 10 percent improvement in sales-weighted savings seen from the EU label scheme described above in Table 6.2. A 5 percent average efficiency improvement from the qualifying product UEC (standard only) will lead to an additional 80 kWh/year of savings.

The equation below describes how Unit Energy Consumption (UEC) is calculated for label impacted qualified product.

$$kWh_{label/std} = (Average\ Standby\ Watts_{stds}/1000) \times (1 - \%_{Label\ Improvement}) \times Hours_{standby}$$

Where:
$kWh_{non\text{-}stds}$ = Kilowatt hours consumption of qualified product in one year
$Hours_{Standby}$ = Number of hours in standby mode, 8760 hours per year.
$Average\ Standby\ Watts_{Stds}$ = Sales weighted normalized standby power draw
$\%_{Label\ Improvement}$ = Percentage improvement in the sales-weighted average efficiency of spas from a label

Based on proposed standard level in this report, the average normalized standby power consumption of qualifying products with the label impact is 171 watts and the UEC would be calculated as follows:

$$kWh_{label/std} = (Average\ Standby\ Watts_{stds}/1000) \times (1 - \%_{Label\ Improvement}) \times Hours_{standby}$$

$$kWh_{label/stds} = \left(\frac{171W}{1000}\right) \times (1 - 5\%) \times 8{,}760$$

$$kWh_{label/stds} = 1{,}500\ kWh\ /\ year$$

Table 6.2 Unit Energy Consumption with Label Impact

Product Class	Power Draw (W)	Annual Standby Operating Hours	Unit Energy Consumption (kWh/yr)
Sales-Weighted Average Qualifying Spa Standby Power	180	8,760	1580
Sales-Weighted Average Qualifying Standby Power with Label Impact	171	8,760	1,500

Source: Table 4.3, Bertoldi, 2000

7 Savings Potential

7.1 Statewide California Energy Savings

Table 7.1 and Table 7.2 show statewide energy consumption associated with portable electric spas in a non-standards scenario and an adopted standards scenario, respectively. Statewide energy consumption for first-year sales is calculated through multiplying annual new and replacement sales numbers, shown in Table 5.1, by the label impacted standards and non-standards average unit energy consumptions, as shown in Table 4.3 and Table 6.2.

Peak demand values are calculated using the same methodology as described above for energy consumption, with the addition of incorporating an assumed peak load factor of 60 percent (Brown & Koomey 2002, 849).

Values are also extrapolated to show the peak demand and annual energy consumption should total market be converted to either a non-standards or standards scenario. These values are based on an expansion of the results for first-year sales using an estimated product lifetime of 10 years.

Energy savings associated with the adoption of the proposed standard, presented in Table 7.3, are the difference between values presented in Table 7.1 and Table 7.2, which assumes a market shift from the non-standards scenario to standards scenario starting in the implementation year.

Table 7.1 California Statewide Non-Standards Case Energy Use – After Effective Date (2016)

	First-Year Sales		**After Entire Stock Turnover**	
Product Class	Coincident Peak Demand (MW)	Annual Energy Consumption (GWh/yr)	Coincident Peak Demand (MW)	Annual Energy Consumption (GWh/yr)
Portable Electric Spas	16	83	164	863

Table 7.2 California Statewide Standards Case Energy Use - After Effective Date (2016)

Product Class	**For First-Year Sales**		**After Entire Stock Turnover**	
	Coincident Peak Demand (MW)	Annual Energy Consumption (GWh/yr)	Coincident Peak Demand (MW)	Annual Energy Consumption (GWh/yr)
Portable Electric Spas	15	77	152	799

Table 7.3 California Statewide Energy Savings for Standards Case – After Effective Date (2016)

Product Class	**For First-Year Sales**		**After Entire Stock Turnover**	
	Coincident Peak Demand Reduction (MW)	Annual Energy Savings (GWh/yr)	Coincident Peak Demand Reduction (MW)	Annual Energy Savings (GWh/yr)
Portable Electric Spas	1	6	12	64

7.2 Other Benefits and Penalties

Table 7.4 shows estimated greenhouse gas (GHG) emissions avoided by the proposed standards. Values have been calculated by converting energy savings per year, as shown in Table 7.3 to MT of CO2e/year using a constant conversion factor of 437 MT CO2e/GWh. (CARB 2008)

Table 7.4 California Statewide Greenhouse Gas Savings for Standards Case

Product Class	Annual GHG Savings for First-Year Sales (MT of CO2e/year)	Annual GHG Savings After Stock Turnover (MT of CO2e/year)
Portable Electric Spas	2,650	28,000

Source: Assumes 437 metric tons of CO_2 equivalents (MTCO2e) per GWh of electricity saved.

8 Economic Analysis

8.1 Incremental Cost

In order to understand the effect of spa standby energy efficiency on price, it is important to first determine which attributes of a spa do contribute to its price. Spa attributes include size (# of people/ volume), type of construction (rotationally molded, acrylic, other), quality of construction, warranty, component options (ozonator, stereo, lights, waterfalls, etc.), number of jets, insulation type, type of cover, electrical connection type (120V or 240V), brand and energy efficiency. To develop this analysis, in addition to the attributes listed on the CEC Appliance Database (Manufacturer, Brand, Model Number, Volume, # of People, Voltage, Fully Insulated (Y/N), Standby Power) the CASE team collected list price, MSRP price (where available), # of jets and construction type (Rotational Molded, Acrylic or Other) for 107 spas in March 2017. This cost data is plotted along with CEC data below in Figure 8.1.

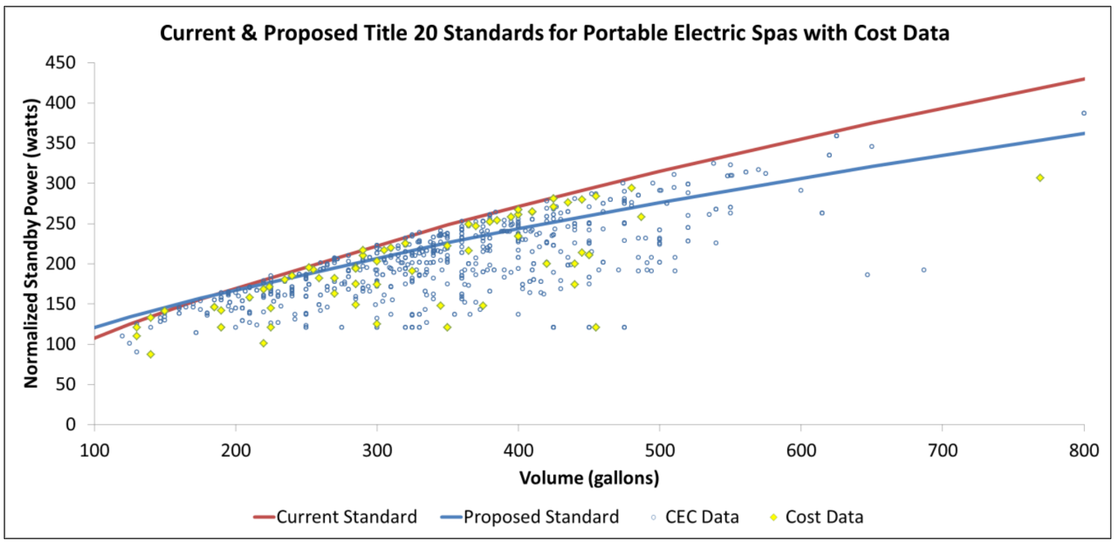


Figure 8.1 IOU collected Cost Data for 107 portable electric spas

Source: CEC2014a, IOU 2014

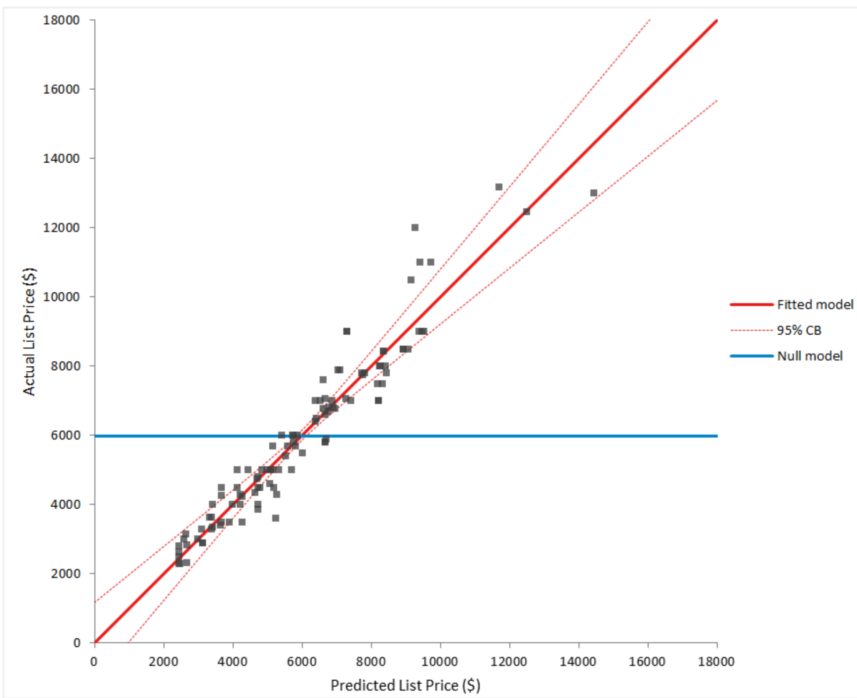
The CASE Team then conducted a multi-variable regression analysis on these 107 portable electric spas to analyze price as a function of four characteristics, efficiency, brand, number of jets, and volume. The variables included in the model are defined as follows:

- Price: The price, in dollars, of portable electric spas determined through internet research performed by the CASE Team.
- Efficiency: Binary variable indicating whether or not the portable electric spa passes the proposed Standard level. Sixty-seven of the 107 spas in the model meet the proposed Standards.
- Brand: The brand of each spa as listed in the Database (21 brands from 17 different manufacturers were evaluated).
- Number of Jets: The number of jets in each spa, determined through internet research.

- Volume: The volume of each spa determined from the CEC Database. The average volume of the sample size was 330 gallons.

The resulting regression model that was established was a good fit to the data; meaning that it explained 92% of the observed variability in spa price (R^2 value of 0.922) and had a statistically significant slope ($p<0.001$). The model also yielded roughly normally distributed residuals. Figure 8.2 presents the results of the multiple regression analysis and lists the effects of individual terms in the model.

Effect of Model



Term	SS	DF	MS	F	p-value
Brand Name	1.933502 E+08	20	9667510.279	16.32	<0.0001 [1]
Volume	10620473.220	1	10620473.220	17.93	<0.0001 [1]
# of Jets	20110528.948	1	20110528.948	33.96	<0.0001 [1]
Meets Proposed Standard	13627.304	1	13627.304	0.02	0.8798 [2]

H0: $\beta_{Term} = 0$

The term does not contribute to the model.

H1: $\beta_{Term} \neq 0$

The term contributes to the model.

[1] Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.

[2] Do not reject the null hypothesis at the 5% significance level.

Figure 8.2 Multiple-regression analysis results

Some of the spa characteristics studied did not demonstrate statistically significant independent effects on price when corrected for the influence of other metrics. The p-values indicate that only "Brand Name," "Volume" and "Number of Jets" have a statistically significant impact on price at the 5 percent significance level. Whether a spa met the Standard or not has a high p-value, indicating that it does not exert statistically significant independent effects on price in the model. Removing this variable (Meeting the standard) completely had little effect on the overall model, with the R^2 value only decreasing very slightly ($R^2 = 0.921$).

The results of this analysis suggest that whether or not a given portable electric spa passes the proposed standard is not statistically linked to the price of the spa. In other words, passing spas are not shown by the model to be more expensive than failing spas. Rather, spa price is more dependent on spa size, brand, and the number of jets. The CASE Team therefore concludes that the model shows no incremental cost for the proposed energy efficiency standard levels in this CASE report.

8.2 Design Life

Table 8.1 displays estimated design life for portable electric spas and spa covers.

Table 8.1 Estimated Design Life

Component	Life (years) [A]
Portable Electric Spas	10
Spa Covers	5

[A] DEG & ES 2004

8.3 Lifecycle Cost / Net Benefit

Table 8.2 and Table 8.3 show lifecycle costs and benefits of the proposed standards for portable electric spas. Net present value is determined by subtracting costs from savings. Statewide net present value is determined by multiplying weighted per-unit net present value against projected sales.

Table 8.2 Costs and Benefits per Unit for Qualifying Products

Product Class	Design Life (years)	Lifecycle Costs per Unit (Present Value $)			Lifecycle Benefits per Unit (Present Value $)		
		Incremental Cost	Label Costs[A]	**Total PV Costs**	Energy Saving[B]	Add'l Benefits[C]	**Total PV Benefits**
Portable Electric Spa	10	$0	$0.38	**$0.38**	$727	$ -	**$727**

PV = Present Value

[A] No additional costs (e.g. maintenance) assumed.

[B] Calculated using the CEC's average statewide present value statewide energy rates that assume a 3% discount rate (CEC 2012b).

[C] No additional benefits assumed.

Table 8.3 Net Present Value

Product Class	Net Present Value[A]		
	Per Unit ($)[B]	First Year Sales (Million $)	Stock Turnover (Million $)[C]
Portable Electric Spa	$727	$11	$117

[A] Total present value benefits divided by total present value costs.
[B] Positive value indicates a reduced total cost of ownership over the life of the appliance.
[C] Stock Turnover NPV is calculated by taking the sum of the NPVs for the products purchased each year following the standard's effective date through the stock turnover year, i.e., the NPV of "turning over" the whole stock of less efficient products that were in use at the effective date to more efficient products, plus any additional non-replacement units due to market growth, if applicable. For example, for a standard effective in 2015 applying to a product with a 5 year design life, the NPV of the products purchased in the 5th year (2019) includes lifecycle cost and benefits through 2024, and therefore, so does the Stock Turnover NPV.

9 Acceptance Issues

9.1 Infrastructure issues

No infrastructure related issues are expected as a result of the updated standards.

9.2 Existing Standards

Title 20 Section 1604(g): Portable electric spas are tested according section 1604 (g) and regulated under section 1605.3 (g) of the current Title 20 regulations, with normalized standby power (Watts) and other basic information reported to the CEC.

ANSI/APSP/ICC-14 2011: American National Standard for Portable Electric Spa Energy Efficiency: This voluntary standard provides recommended minimum guidelines for the energy efficiency of aboveground portable electric spas. Acceptance issues are not anticipated.

CSA C374-11: The Canadian Standards Association has also developed a model standard based on the CEC test procedure with the main difference being the standard equation and the lower air temperature at which spas are tested. Acceptance issues are not anticipated.

9.3 Stakeholder Positions

The APSP-14 Committee is a key stakeholder and was involved in the first CEC Spa Standard-setting process. This committee is responsible for the development of ANSI/APSP/ICC-14 2011, a voluntary national standard for spa efficiency modeled after California's Title 20 regulations. The CA IOUs have been engaging and collaborating with the APSP-14 Committee on the issue of the test procedure, spa labeling and updated spa standards for months in preparation for this proposal.

10 Recommendations

10.1 Recommended Standards Proposal

10.1.1 Adoption of ANSI/APSP/ICC-14-2011 Test Procedure

We propose Title 20 adopt the test procedure outlined in ANSI/APSP/ICC-14-2011. Specifically, we support the chamber requirements, third party lab certification and the overall greater detail the test procedure has to improve clarity and reduce confusion.

10.1.2 Updated Performance Standards for Portable Electric Spas

We propose updating the standard and modifying the standard equation so that the maximum allowable standby power = 3.75 x Volume$^{2/3}$ + 40.

10.1.3 Addition of Spa Cover Requirements

We propose that if a manufacturer does not ship a cover with a spa that the seller of the spa is responsible for selling a cover which at least meets the spa cover performance standards to which the spa was tested with and certified to CEC.

10.1.4 Reporting of Additional Spa Characteristics

We propose requiring additional reporting characteristics, including whether a manufacturer always ships their own OEM cover with a spa and what third party manufactured covers a spa manufacturer approves to be sold with their spa. Lastly, we propose standardizing the permissible answers for voltage to improve the usability of the Database.

10.1.5 Labeling for Portable Electric Spas

We recommend that portable electric spas be required to carry a label which is visible to consumers shopping for portable electric spas on showroom floors. It will inform consumers of the standby power consumption, maximum allowable standby power consumption and estimated standby cost/year. This label would be applied as a sticker on the spa shell so as to be visible to the consumer and would be required to remain adhered to the spa until it is sold. See Section 6.4 for proposed label designs.

10.2 Proposed Changes to the Title 20 Code Language

Proposed additions to the code language are underlined, and deletions are ~~struck out~~. Ellipses (…) are used to indicate spaces or "skips" between code language.

Section 1601. Scope.

…

Gas pool heaters, oil pool heaters, electric resistance pool heaters, heat pump pool heaters, residential pool pump and motor combinations, replacement residential pool pump motors, and portable electric spas.

…

Section 1602. Definitions.

…

(g) Pool Heaters, Portable Electric Spas, Residential Pool Pump and Motor

Combinations, and Replacement Residential Pool Pump Motors.

…

"Portable electric spa" means a factory-built electric spa or hot tub, supplied with equipment for heating and circulating water."

"OEM spa cover" means a spa cover for a portable electric spa which is shipped with a new spa directly from the manufacturer.

"Third party spa cover" means a spa cover which is sold with a new portable electric spa, but not made or shipped from the spa manufacturer. A third party spa cover is certified to be sold with a portable electric by the spa manufacturer.

"Exercise spa" (also known as a swim spa) means a variant of a spa in which the design and construction includes specific features and equipment to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place. Exercise spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/ exercise spa and may have separate controls. These aquatic vessels are of a design and size such that it has an unobstructed volume of water large enough to allow the 99th Percentile Man as specified in ASME A112.19.8-2007 to swim or exercise in place.

…

Section 1604. Test Methods for Specific Appliances.

…

(g) Pool Heaters, Portable Electric Spas, Residential Pool Pump and Motor Combinations, and Replacement Residential Pool Pump Motors.

…

(2) Test Method for Portable Electric Spas

Portable electric spas shall be tested in accordance with ANSI/APSP/ICC-14 2011 except for Section 6.3 and Section 7.

~~(A) Minimum continuous testing time shall be 72 hours.~~

~~(B) The spa shall be filled with water to the halfway point between the bottom of the skimmer basket opening and the top of the spa. If there is no skimmer basket, the spa shall be filled with water to six inches below the top of the spa.~~

~~(C) The water temperature shall be 102°F, ± 2°F for the duration of the test.~~

~~(D) The ambient air temperature shall be 60°F, ± 3°F for the duration of the test.~~

~~(E) The spa standard cover that comes with the unit shall be used during the test.~~

~~(F) The test shall start when the water temperature has been at 102°F, ± 2°F for at least four hours.~~

~~(G) Record the total energy use for the period of test, starting at the end of the first heating cycle after the stabilization period specified in Section 1604(g)(2)(F), and finishing at the end of the first heating cycle after 72 hours has elapsed.~~

~~(H) The unit shall remain covered and in the default operation mode during the test. Energy-conserving circulation functions, if present, must not be enabled if not appropriate for continuous, long-term use. Ancillary equipment including, but not limited to lights, audio systems, and water treatment devices, shall remain connected to the mains but may be turned off during the test if their controls are user accessible.~~

~~(I) The measured standby power shall be normalized to a temperature difference of 37°F using the equation,~~

$$\cancel{Pnorm = Pmeas * (\Delta T\ ideal / \Delta T\ meas)}$$

~~Where:~~

~~Pmeas = measured standby power during test (E/t)~~
~~ΔTideal = 37°F~~
~~ΔTmeas = Twater avg – Tair avg~~
~~Twater avg = Average water temperature during test~~
~~Tair avg = Average air temperature during test.~~

~~(J) Data reported shall include: spa identification (make, model, S/N, specifications); volume of the unit in gallons; supply voltage; minimum, maximum, and average water temperatures during test; minimum, maximum, and average ambient air temperatures during test; date of test; length of test (t, in hours); total energy use during the test (E, in Wh); and normalized standby power (P_{norm}, in watts).~~

…

1605.1. Federal and State Standards for Federally-Regulated Appliances.

…

(g) Pool Heaters, Portable Electric Spas, Residential Pool Pump and Motor Combinations, and Replacement Residential Pool Pump Motors.

…

(5) Energy Efficiency Standards for Portable Electric Spas. See Section 1605.3(g) for energy efficiency standards for portable electric spas.

…

Section 1605.2 State Standards for Federally-Regulated Appliances.

…

(g) Pool Heaters, Portable Electric Spas, Residential Pool Pump and Motor Combinations, and Replacement Residential Pool Pump Motors.

…

(2) See Section 1605.3(g) for energy efficiency standards and energy design standards for portable electric spas and residential pool pump and motor combinations and replacement residential pool pump motors.

…

Section 1605.3 State Standards for Non-Federally-Regulated Appliances.

…

(g) Pool Heaters, Portable Electric Spas, Residential Pool Pump and Motor Combinations, and Replacement Residential Pool Pump Motors.

…

(6) Portable Electric Spas.

(A) The normalized standby power, as defined in Section 1604(g)(2)(I), of portable electric spas:

1. Manufactured on or after January 1, 2006, shall be not greater than 5 $(V^{2/3})$ watts where V = the fill volume, in gallons.

2. Manufactured on or after January 1, 2016, shall be not greater than $3.75(V^{2/3})+40$ watts where V = the fill volume, in gallons.

(B) Spa manufacturers must certify all OEM spa covers and third party spa covers a portable electric spa would be sold with in CA to the CEC database.

(C)Spa sellers are responsible for ensuring a new portable electric spa is sold with the spa's OEM cover or a third party manufacturer approved cover which is listed on the CEC database.

Section 1606. Filing by Manufacturers; Listing of Appliances in Database

Table X Continued - Data Submittal Requirements

	Appliance	**Required Information**		**Permissible Answers**
G	Portable Electric Spas	*Voltage		120, 240
		Volume (gallons)		
		Rated Capacity (number of people)		
		Normalized Standby Power (watts)		
		Spa Enclosure is Fully Insulated		Yes, No
		OEM Spa Cover is Always Shipped with Spa		Yes, No
		Manufacturer OEM Cover	Manufacturer	
			Model	
		Manufacturer Approved Third Party Covers (list all that apply)	Manufacturer	
			Model	

* "Identifier" information as described in Section 1602(a).

…

Section 1607. Marking of Appliances.

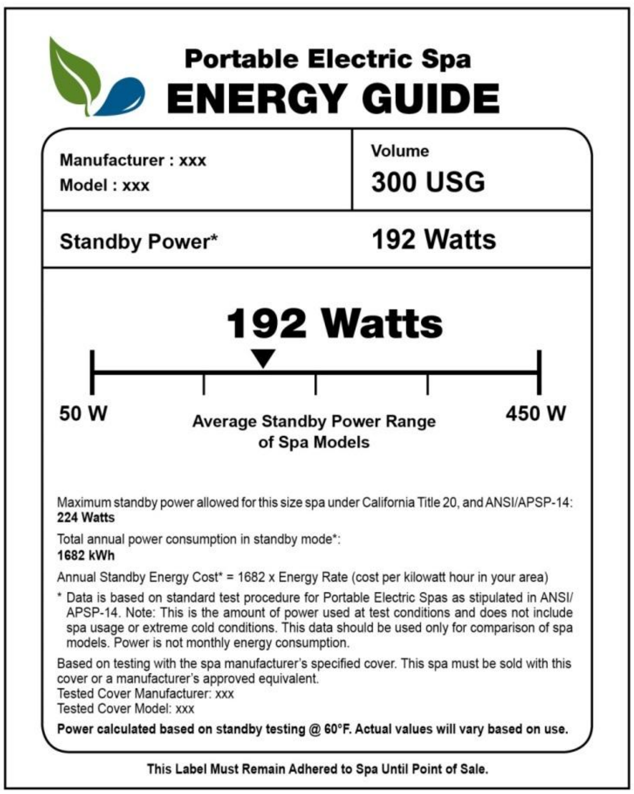
…

(d) Energy Performance Information.

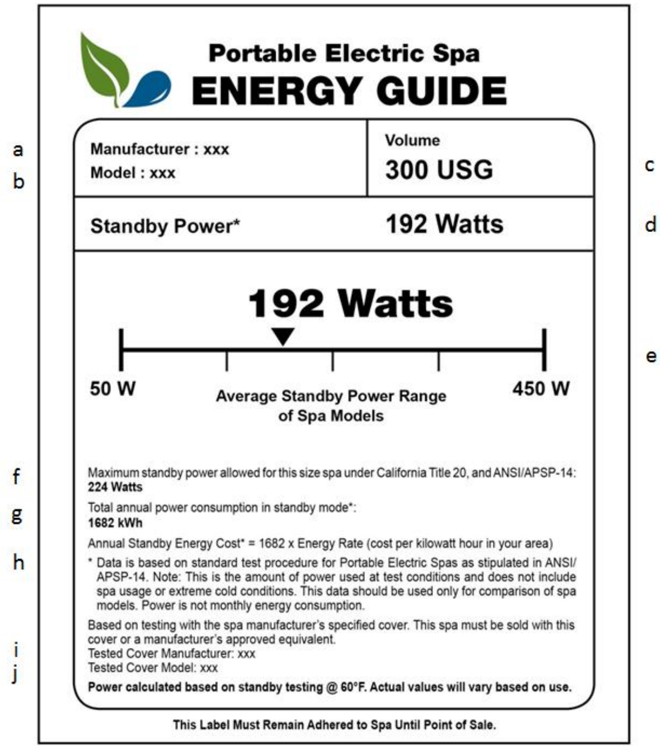
…

<u>(12) Portable Electric Spas.</u>

<u>(A) The spa shall be marked by the manufacturer as shown below where readily visible on the shell or front skirt panel during the point of sale. The marking shall be on a removable adhesive-backed label and shall only be removed by the consumer.</u>



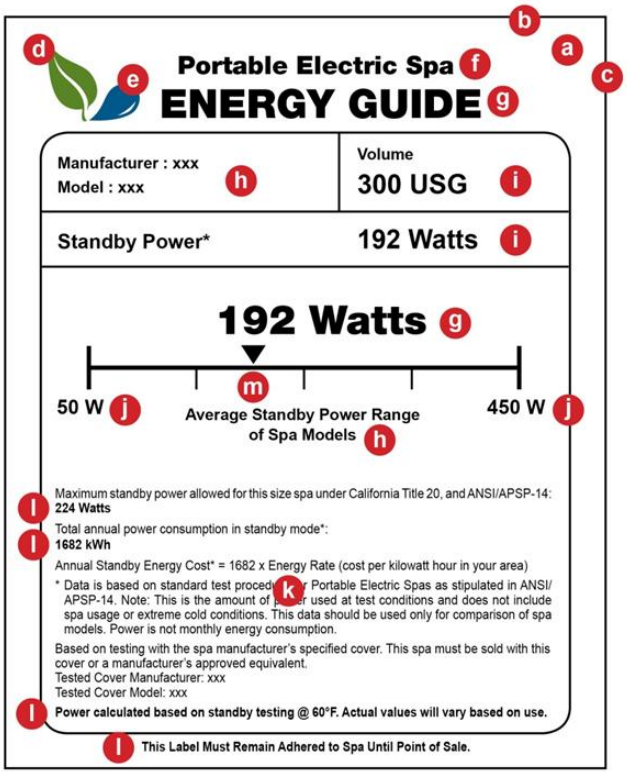
<u>(B)</u> <u>**Label Design:**</u> The label shall be formatted as shown in figure 7.1 and as directed in 7.2 and contain the following model specific information.



<u>Where the following model specific information should be included on each label:</u>

a. <u>Spa manufacturer</u>
b. <u>Spa model</u>
c. <u>Spa volume</u>
d. <u>Standby power</u>
e. <u>Standby power chart arrow location and standby power value</u>
f. <u>Maximum standby power allowed</u>
g. <u>Total annual power consumption in standby mode</u>
    I. <u>Standby Power x 8760 hours per year</u>
h. <u>Annual energy variable in annual standby power cost formula</u>
i. <u>Specified cover manufacturer</u>
j. <u>Specified cover model</u>

<u>(C) **Label Specifications:** Label shall be printed on a removable adhesive-backed white polymer label or the equivalent and shall meet the following criteria.</u>



Where the label should include the following specifications:

a. Label color: white
b. Minimum Label width: 5 inches
c. Minimum Label height: 6.25 inches
d. Leaf color: equivalent to Pantone 363 green (also permitted to be black)
e. Water color: equivalent to Pantone 7691 blue (also permitted to be black)
f. Font: Helvetica Neue Black. Character height shall not be less than 15 pt type.
g. Font: Helvetica Neue Black. Character height shall not be less than 24 pt type.
h. Font: Arial Bold. Character height shall not be less than 9.5 pt type.
i. Font: Arial Bold. Character height shall not be less than 16 pt type.
j. Font: Arial Bold. Character height shall not be less than 12 pt type.
k. Font: Arial. Character height shall not be less than 8 pt type, and may be horizontally scaled to no less than 85%.
l. Font: Arial Bold. Character height shall not be less than 8 pt type, and may be horizontally scaled to no less than 85%.
m. The standby power chart arrow shall be scaled at the appropriate location between the minimum and maximum power range using the standby power value for the spa which is being installed.

11 References

[APSP] Association of Pool and Spa Professionals. 2011. ANSI/APSP/ICC-14 2011: American National Standard for Portable Electric Spa Energy Efficiency. Approved January 4, 2011.

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