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California Energy Commission

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**American National Standard for  
Portable Electric Spa Energy Efficiency**

**SECRETARIAT:**

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Approved September 12, 2014  
American National Standards Institute

# American National Standard

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# Foreword

This Foreword is not part of the American National Standard ANSI/APSP/ICC-14 2014. It is included for information only.

The ANSI/APSP/ICC-14 2014, American National Standard for Portable Electric Spa Energy Efficiency, was approved by ANSI as a new standard on September 12, 2014. This is a revision of ANSI/APSP/ICC-14 2011.

The objective of this voluntary standard is to provide recommended minimum guidelines for testing the energy efficiency of factory-built residential portable electric spas. It also defines an evaluation procedure to qualify a test facility for the sole purpose of testing to the requirements of this standard. This standard is intended to meet the needs for incorporation into national or regional building codes, and also for adoption by federal, state and/or local governments, and/or as a local code or ordinance. It is understood that, for the sake of applicability and enforceability, the style and format of the standard may need adjustment to meet code or ordinance style of the jurisdiction adopting this document.

APSP does not certify, test or endorse any product.

This standard is based on a collaborative effort dating back to 2005 including The Association of Pool & Spa Professionals, leading portable spa manufacturers, and the California Energy Commission and its contractors Pacific Gas and Electric (PG&E) and Davis Energy Group, and the California Investor Owned Utilities (IOUs). The test procedures in this standard are based on that effort and the test method for portable spas described in Section 1604 of Title 20, California Code of Regulations as amended December 3, 2008. To further support the claims in this standard, the portable spa manufacturers, working through APSP, conducted research and testing of the energy efficiency of portable spas.

As with any product, the specific recommendations for installation and use provided by the manufacturer should be carefully observed.

This standard was prepared by the APSP-14 American National Standard for Portable Electric Spa Energy Efficiency Writing Committee of The Association of Pool and Spa Professionals (APSP) in accordance with American National Standards Institute (ANSI)

Essential Requirements: Due process requirements for American National Standards.

Consensus approval was achieved by a ballot of the balanced APSP ANSI Standards Consensus Committee and through an ANSI Public Review process. The ANSI Public Review provided an opportunity for additional input from industry, academia, regulatory agencies, safety experts, state code and health officials, and the public at large.

Suggestions for improvement of this standard should be sent to The Association of Pool and Spa Professionals, 2111 Eisenhower Avenue, Suite 500, Alexandria, VA 22314.

This standard is published in partnership with the International Code Council (ICC). ICC develops and publishes the *International Building Code (IBC)* and *International Residential Code (IRC)*, which are adopted as the basis for the building codes used in most states and jurisdictions within the United States. Additionally, APSP and ICC have collaborated to develop the first comprehensive model swimming pool and spa code, known as the *International Swimming Pool and Spa Code (ISPSC)*. This landmark document incorporates and references material from ANSI/APSP standards and ICC's model codes, to create a stand-alone code that is consistent with codes and standards from both organizations.

These codes and standards are the result of a joint effort between ICC and APSP as a service to both the swimming pool and spa community, and building code professionals. It is the hope of both organizations that they will lead to enhanced safety for pool and spa users around the world.

## Organizations Represented

Consensus approval in accordance with ANSI procedures was achieved by ballot of the following APSP Standards Consensus Committee. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

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Idaho Aquatic Services . . . . . Scott Heusser  
Hayward Industries . . . . . John O'Hare  
HomerXpress South Florida . . . . . Bill Kent  
Master Spas, Inc. . . . . Nathan Coelho  
Paragon Pools . . . . . Joe Vassallo  
Rosebrook Carefree Pools, Inc. . . . . John Bently  
S.R. Smith, LLC . . . . . Bill Svendsen  
Trilogy Pools . . . . . Ted Baudendistel  
Van Kirk & Sons, Inc. . . . . Don Cesarone

## General Interest

American Red Cross . . . . . Connie Harvey  
Chesapeake Aquatic Consultants, LLC . . . . Frank Goldstein  
Conroe Independent School District, TX . . . Louis Sam Fruia  
Higgins Environmental Solutions  
(National Environmental Health Assoc.) . . . Florence Higgins  
Walt Disney Parks and Resorts . . . . . Michael Beatty  
Don Witte, Consultant . . . . . Don Witte  
World Waterpark Association . . . . . Rick Root  
Bluegreen Corporation  
(American Hotel & Lodging Association) . . . Tony Mendez  
Water Technology, Inc. . . . . Chuck Newman  
YMCA of the USA . . . . . Albert Tursi

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City of Martinsville, VA . . . . . Kris Bridges  
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\*non-voting

In accordance with American National Standards Institute (ANSI) procedures, this document will be reviewed periodically. The Association of Pool & Spa Professionals welcomes your comments and suggestions, and continues to review all APSP standards, which include:

**ANSI/APSP/ICC-1 2014** Standard for Public Swimming Pools

**ANSI/APSP-2 1999** Standard for Public Spas

**ANSI/APSP/ICC-3 2014** Standard for Permanently Installed Residential Spas and Swim Spas

**ANSI/APSP/ICC-4 2013** Standard for Aboveground/Onground Residential Swimming Pools

**ANSI/APSP/ICC-5 2011** Standard for Residential Inground Swimming Pools

**ANSI/APSP/ICC-6 2013** Standard for Residential Portable Spas and Swim Spas

**ANSI/APSP/ICC-7 2013** Standard for Suction Entrapment Avoidance In Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins

**ANSI/APSP/ICC-8 2005 (R2013)** Model Barrier Code for Residential Swimming Pools, Spas and Hot Tubs

**ANSI/APSP-9 2005** Standard for Aquatic Recreation Facilities

**ANSI/APSP-11 2009** Standard for Water Quality in Public Pools and Spas

**ANSI/APSP/ICC-14 2014** Standard for Portable Electric Spa Energy Efficiency

**ANSI/APSP/ICC-15** Standard for Residential Swimming Pool and Spa Energy Efficiency

**ANSI/APSP-16 2011** Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs

**APSP 2013** Workmanship Guidelines and Practices For Residential Inground Swimming Pools and Spas

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Jacuzzi Hot Tubs . . . . . Tony Sadati  
L.A. Spas . . . . . Vincent Wong  
Maax Spas . . . . . Jeff Dugger  
Marquis Spas . . . . . Sam Collins  
Master Spas, Inc. . . . . Nathan Coelho  
Newport Controls . . . . . Lee West  
Nordic Hot Tubs . . . . . Kristen Woiteshek  
Pacific Gas & Electric Company . . . . . Gary Fernstrom  
Premium Leisure Spas . . . . . Victor Kaykov  
Softub . . . . . Jeff Collins  
Speck Pumps . . . . . Jan Baljan  
Waterway . . . . . Ray Mirzaei  
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**NOTE:** Solid vertical lines within the body of the standard indicate a technical change from the requirements of the 2011 edition. Deletion indicators in the form of an arrow (  ) are provided in the margin where an entire section, paragraph, exception, or table has been deleted, or an item in a list of items or a table has been deleted.



# Portable Electric Spa Energy Efficiency Standard

## 1 Scope

**1.1** These requirements apply to factory-built residential portable electric spas and residential exercise spas (also known as swim spas) and portions of combination spas/swim spas that are used for bathing and are operated by a private owner.

**1.2** This standard is meant to establish minimum energy efficiency requirements for portable electric spas and swim spas. This standard shall be met notwithstanding certain variations in equipment, materials, and design (refer to ANSI/APSP/ICC-6).

**1.3** These requirements do not apply to public spas (ANSI/APSP-2), permanently installed or inground spas (ANSI/APSP/ICC-3), or other spas, such as those operated for medical treatment, physical therapy or other purposes.

**1.4** This standard also defines an evaluation procedure to qualify a test facility for the sole purpose of testing to the requirements of this standard.

**1.5** Other standards are referenced in this standard for items not covered.

## 2 Normative References

ANSI/APSP-2 1999 *Standard for Public Spas*

ANSI/APSP/ICC-3 2014 *Standard for Permanently Installed Residential Spas and Swim Spas*

ANSI/APSP/ICC-6 2013 *Standard for Residential Portable Spas and Swim Spas*

ANSI/APSP-16 2011 *Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs*

ISO/IEC 17025 *General Requirements for the Competence of Calibration and Testing Laboratories*

ISO/IEC Guide 65 *General Requirements for Bodies Operating Product Certification Systems*

## 3 Definitions

**ambient temperature:** Air temperature inside testing chamber

**ancillary equipment:** Additional components used in the construction of the spa beyond pumps, heaters, and control systems

**certification body (CB):** An independent third party that operates a product, process, or service certification system

**chamber:** A controlled environment suitable for conducting energy efficiency testing

**cover, specified:** The cover that is provided or specified by the spa manufacturer

**energy efficiency standard:** A performance standard expressed in numerical form, such as energy factor, EER, or thermal efficiency

**exercise spa (Also known as a swim spa):** 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 ANSI/APSP-16 2011 to swim or exercise in place

**fill volume:** The halfway point between the bottom of the skimmer opening and the overflow level of the spa. In the absence of a wall skimmer, the fill volume is 6 inches (152 mm) below the overflow level of the spa

**filter cycle:** The period when the control system activates a pump intended to move water through a filter media

**gallon:** One U.S. liquid gallon

**heating cycle:** The period when the temperature regulating system activates the heating component for the purpose of increasing the water temperature

**hot tub:** See spa

**inground spa:** Non-portable, non-self-contained spa (see ANSI/APSP/ICC-3)

**model:** Any collection of appliance units to which the manufacturer has assigned the same model number.

**model, basic:** A unit of a given type of appliance (or class thereof) that are manufactured by one manufacturer, that have the same primary energy source, and that do not have any differing electrical, hydraulic, physical, or functional characteristics that affect energy consumption



**model number:** A combination of letters, digits, or characters representing the manufacturer, brand, design, or performance of an appliance

**NIST:** National Institute of Standards and Technology

**normalize:** Calculation of power consumption to eliminate temperature bias

**power factor:** The ratio of watts to volt-amperes of an AC circuit

**purge cycle:** The period when the control system activates a pump intended to rapidly move water throughout the spa

**skimmer, vented:** A suction opening intended to remove floating debris from the water surface. Installed where part of the water intake opening is open to atmospheric pressure

**spa:** A product intended for the immersion of persons in temperature-controlled water circulated in a closed system, and not intended to be drained and filled with each use. A spa usually includes a filter, a heater (electric, solar, or gas), a pump or pumps, and a control, and may also include other equipment, such as lights, blowers, and water sanitizing equipment

**permanent residential spa:** A spa in which the water heating and water circulating equipment is not an integral part of the product. The spa is intended as a permanent plumbing fixture and is not intended to be moved (see ANSI/APSP/ICC-3)

**public spa:** Any spa other than a permanent residential spa or residential portable spa which is intended to be used for bathing and is operated by an owner, licensee, concessionaire, regardless of whether a fee is charged for use (see ANSI/APSP-2)

**residential portable spa:** Either self-contained or non-self-contained

**self-contained spa:** A factory-built spa in which all control, water heating and water circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected

**non-self-contained spa:** A factory-built spa in which the water heating and circulating equipment is not an integral part of the product. Non-self-contained spas may employ separate components such as an individual filter, pump, heater and controls, or they may employ assembled combinations of various components

**standby mode:** All settings at default as shipped by the manufacturer, except water temperature, which may be adjusted to meet the test conditions. No manual operations are enabled

**swim spa:** See exercise spa

## 4 Qualification of Testing Laboratories and Certification Bodies

**4.1** All Certification Bodies (CB) shall be accredited by a member of International Accreditation Forum (IAF) using ISO/IEC Guide 65, General Requirements for Bodies Operating Product Certification Systems.

**4.2** All testing laboratories shall be qualified by a CB.

**4.2.1** The CB shall assess the testing laboratory's quality system to determine that it satisfies applicable requirements of ISO/IEC 17025.

**NOTE:** Different parts of ISO/IEC 17025 are applicable to first-party, second-party, and third-party laboratories.

**4.2.2** Where a laboratory is accredited to ISO/IEC 17025 by a member of International Laboratory Accreditation Council (ILAC) the CB is permitted to accept such accreditation as evidence of conformity to ISO/IEC 17025, in whole or in part.

**4.2.3** The CB shall additionally assess the laboratory's facilities, test equipment, testing personnel and test procedures, to establish that the laboratory is competent to perform the tests in this standard.

**4.2.4** The CB shall provide a copy of the assessment report to the testing laboratory, and retain a record of the assessment. Any discrepancies identified in the assessment report shall be cleared before the laboratory is deemed qualified.

**4.3** Testing laboratories shall demonstrate qualification on a continuing basis.

**4.3.1** The CB shall audit the testing laboratory for ISO/IEC 17025 compliance and testing competence on a regular basis.

**4.3.1.1** Laboratories accredited by an ILAC member shall be audited at intervals not exceeding three (3) years.

**4.3.1.2** Non-accredited laboratories shall be audited annually by the CB.

**4.3.2** The CB shall provide a copy of the audit report to the testing laboratory, and retain a record of the audit. Any discrepancies identified in the audit report shall be cleared before the laboratory is deemed re-qualified.



## 5 Test Method

**5.1 Purpose:** To measure the energy consumption of a portable electric spa in standby mode, using a repeatable and reproducible test procedure. The results will be used to calculate the standby power demand for each basic model.

**5.2** The test facility and equipment will be audited as indicated in 4.3 of this standard to confirm they meet the requirements of this standard. Documentation showing facility and test equipment compliance to this standard from the CB will be maintained on site by the test facility and made available as required. (See Appendices B and C.)

**5.3** All equipment shall be calibrated at intervals not to exceed 18 months, and traceable to NIST or other national standard.

### 5.4 Test Equipment

**5.4.1** Recording watt-hour meter – Accuracy: Class 2 or better

**5.4.2** Temperature measurement equipment – Accuracy:  $\pm 1^\circ\text{F}$

**5.4.3** Water meter to measure fill water in gallons – Accuracy:  $\pm 2\%$

**5.4.4** Volt meter – Accuracy:  $\pm 1\%$

**5.4.5** Amp meter – Accuracy:  $\pm 1\%$

**5.5 Test Conditions:** The test method for portable electric spas is as follows:

**5.5.1** Minimum continuous testing time shall be 72 hours.

**5.5.2** The spa shall be filled with water to the halfway point between the bottom of the skimmer opening and the overflow level of the spa. In the absence of a wall skimmer, the fill volume is 6 inches (152 mm) below the overflow level of the spa.

#### 5.5.2.1 Measure and record fill volume (V).

**5.5.3** The water temperature of the spa or spa portion of a combination swim spa shall be a minimum of  $100^\circ\text{F}$  ( $38^\circ\text{C}$ ) 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  $85^\circ\text{F}$  ( $29^\circ\text{C}$ ), for the duration of the test.

**5.5.4** The ambient air temperature shall be a maximum of  $63^\circ\text{F}$  ( $17^\circ\text{C}$ ) for the duration of the test.

**5.5.5** The manufacturer's specified cover shall be used during the test.

**5.5.6** Voltage shall be  $\pm 10\%$  of the nameplate rating.

## 5.6 Test Procedure

**5.6.1** The test shall start when the water temperature has been at  $102^\circ\text{F}$  ( $39^\circ\text{C}$ ),  $\pm 2^\circ\text{F}$  ( $1^\circ\text{C}$ ), at  $87^\circ\text{F}$  ( $31^\circ\text{C}$ ),  $\pm 2^\circ\text{F}$  ( $1^\circ\text{C}$ ) for exercise spas for at least a four hour stabilizing period.

### 5.6.2 Record water temperature.

**5.6.2.1** The temperature measurement equipment shall be located three to five inches, 3–5 in. (76–127 mm) below the water level and centrally located relative to the shape of the spa.

**5.6.3** Record ambient air temperature at one point located twelve to eighteen inches, 12–18 in. (305–458 mm) above spa cover level and a minimum of eight inches, 8 in. (204 mm) from the chamber wall. The temperature probe will be positioned and out of direct airflow from the circulation fan.

### 5.6.4 Data Recording

**5.6.4.1** Record the make, model, serial number, and measured volume of the basic model tested.

**5.6.4.2** Record spa cover manufacturer and model number.

**5.6.4.3** Record temperatures at a maximum interval of 5 minutes.

**5.6.4.4** Measure voltage, current, and power factor (OPTIONAL) at a maximum interval of 5 minutes.

**5.6.4.5** Record watt-hours, voltage and current used during entire test period.

**5.6.4.6** Record elapsed time during test period.

**5.6.5** Record the total energy use for the test period, starting at the end of the first heating cycle after the stabilization period, and finishing at the end of the first heating cycle after 72 hours have elapsed.

**Exception:** For spas without heaters, substitute heating cycle with filter or purge cycle.

**5.6.6** 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. The minimum filtration rate shall be 12 water turns within a 24-hour period. 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 its controls are user accessible.

## 6. Formulas

**6.1** The measured standby power ( $P_{meas}$ ) shall be determined by  $E/t$ :

$$P_{meas} = E/t$$

Where:

$E$  = total energy use during the test (Wh)

$t$  = length of test (hr)

**6.2** The measured standby power for spas ( $P_{meas}$ ) shall be normalized ( $P_{norm}$ ) to a temperature difference of 37°F (21°C) using the equation:

$$P_{norm} = P_{meas} (\Delta T_{std} / \Delta T_{meas})$$

Where:

$$\Delta T_{std} = 37^{\circ}\text{F} (21^{\circ}\text{C})$$

$$\Delta T_{meas} = T_{water\ avg} - T_{air\ avg}$$

$T_{water\ avg}$  = Average water temperature during test

$T_{air\ avg}$  = Average air temperature during test

**6.2.1** The normalized standby power ( $P_{norm}$ ) shall not be greater than the maximum allowable standby power.

( $P_{max}$  Watts):

$$P_{max} = 40 + 3.75V^{(2/3)} \text{ Watts}$$

Where:

$V$  = fill volume in gallons

**6.3** The measured standby power for swim spas ( $P_{meas}$ ) shall be normalized ( $P_{norm}$ ) to a temperature difference of 22°F (-5.6°C) using the equation:

$$P_{norm} = P_{meas} (\Delta T_{std} / \Delta T_{meas})$$

Where:

$$\Delta T_{std} = 22^{\circ}\text{F} (-5.6^{\circ}\text{C})$$

$$\Delta T_{meas} = T_{water\ avg} - T_{air\ avg}$$

$T_{water\ avg}$  = Average water temperature during test

$T_{air\ avg}$  = Average air temperature during test

**6.3.1** The normalized standby power ( $P_{norm}$ ) shall not be greater than the maximum allowable standby power.

( $P_{max}$  Watts):

$$P_{max} = 5(V^{2/3}) \text{ Watts}$$

Where:

$V$  = fill volume in gallons

## 7. Label Requirements

7.1 The spa shall be marked by the manufacturer as shown in Figure 7.1 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.

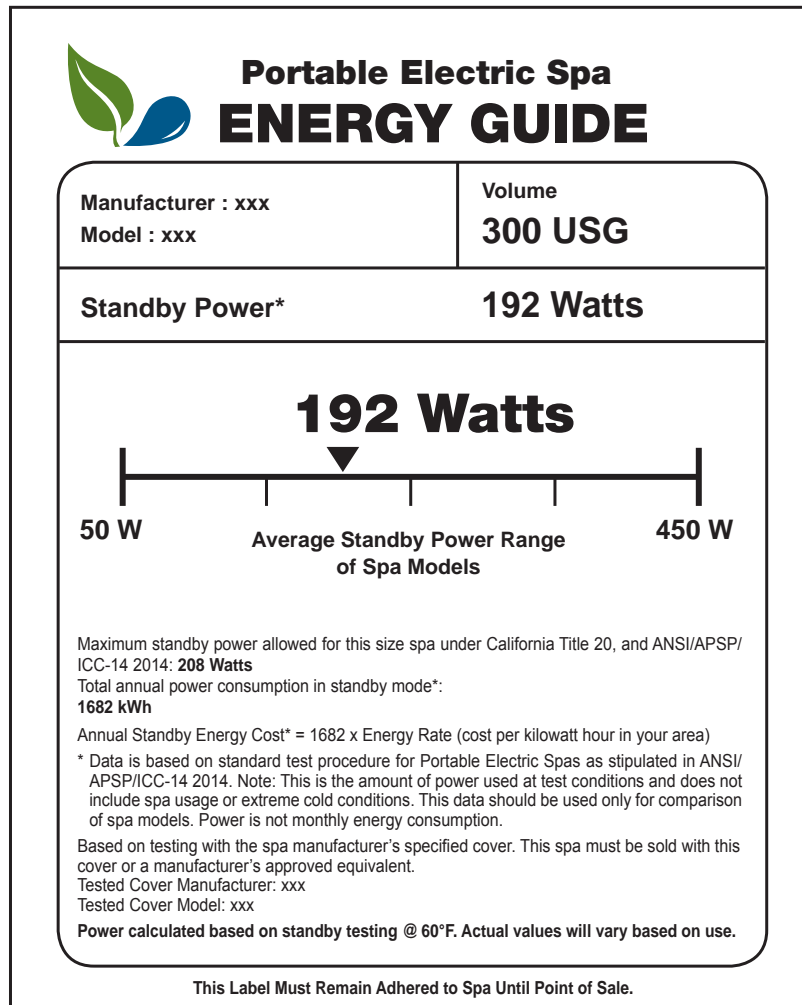


Figure 7.1 (a)

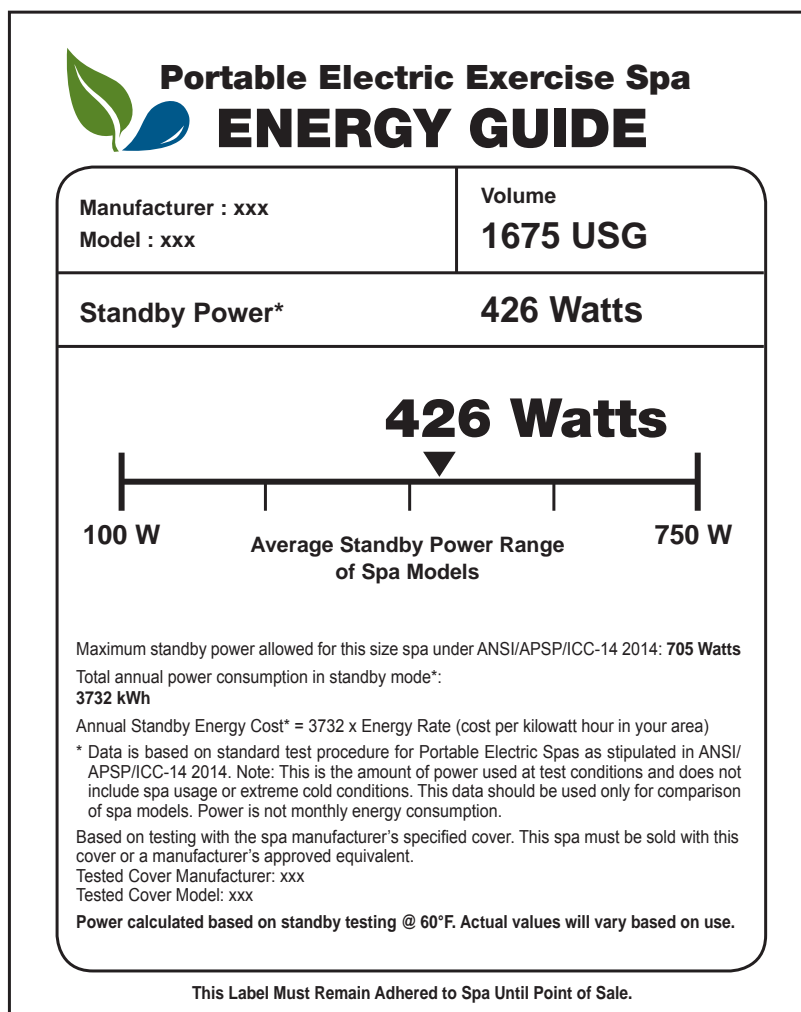


Figure 7.1 (b)

## 7.2 Label Design

7.2.1 The label shall be formatted as shown in figure 7.1 and as directed in 7.2 and contain the following model specific information.

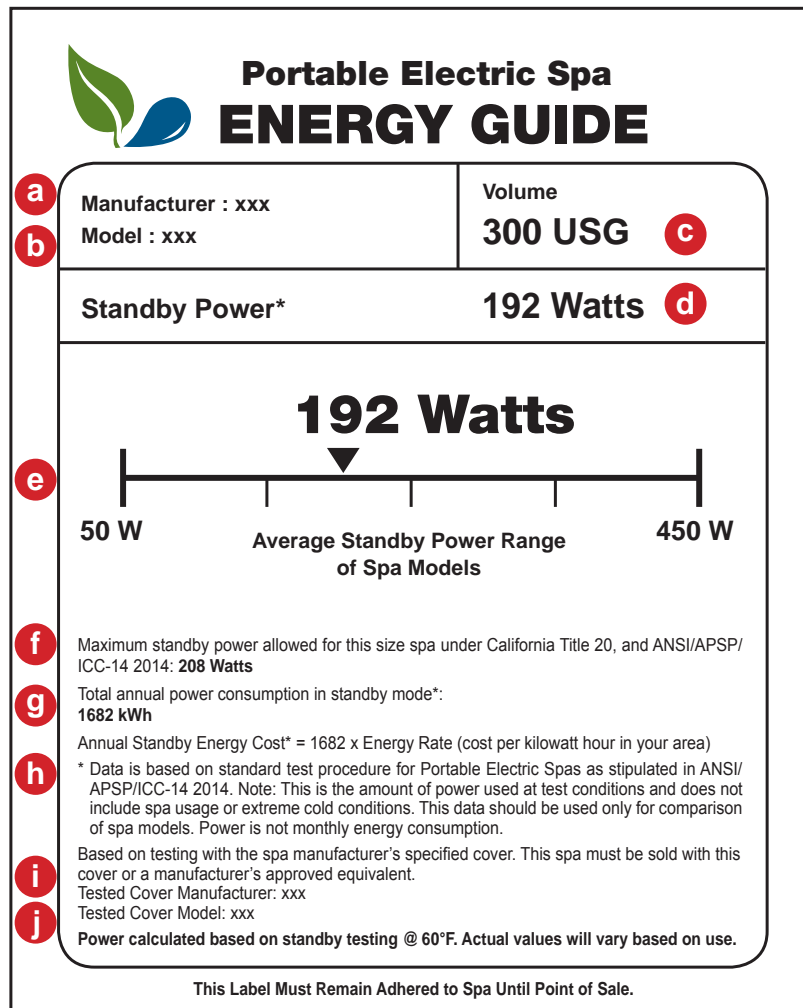


Figure 7.2

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>a. Spa manufacturer</li> <li>b. Spa model</li> <li>c. Spa volume</li> <li>d. Standby power</li> <li>e. Standby power chart arrow location and standby power value</li> </ul> | <ul style="list-style-type: none"> <li>f. Maximum standby power allowed</li> <li>g. Total annual power consumption in standby mode</li> <li>h. Standby Power x 8760 hours per year</li> <li>i. Specified cover manufacturer</li> <li>j. Specified cover model</li> </ul> |
|---|--|

### 7.3 Label Specifications

7.3.1 Label shall be printed on a removable adhesive-backed white polymer label or the equivalent.

7.3.2 Text color shall be black. Leaf color: equivalent to Pantone 363 green (also permitted to be black) Water color: equivalent to Pantone 7691 blue (also permitted to be black).

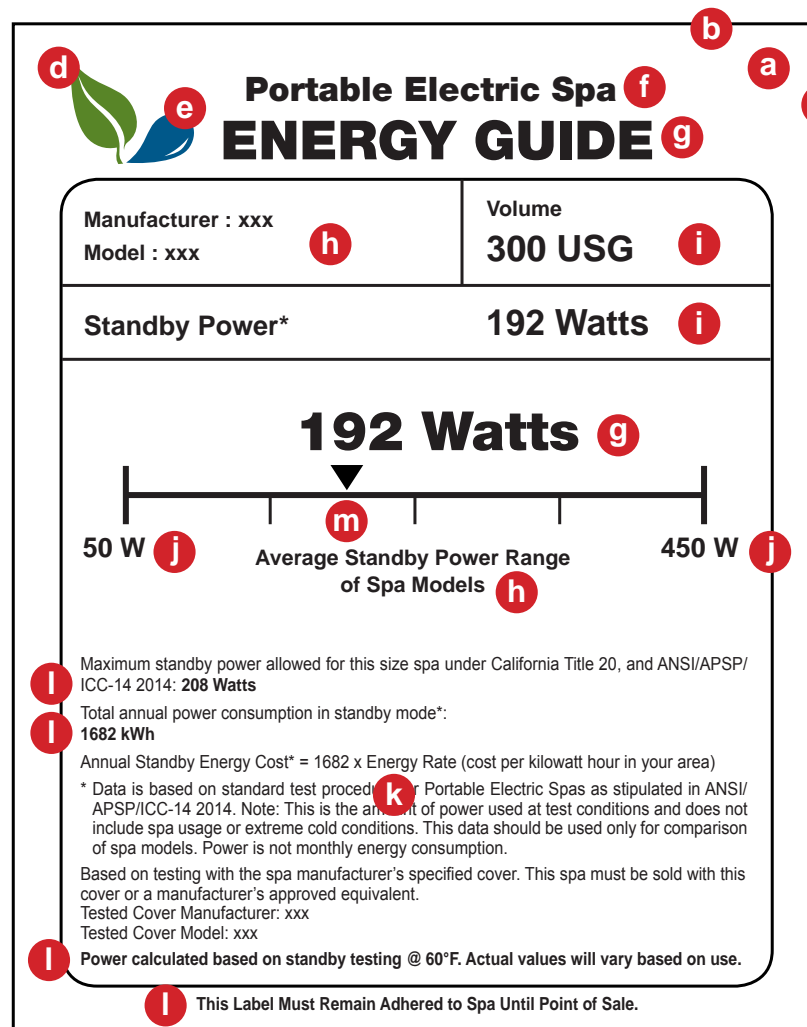


Figure 7.3

- a. Label shall be printed on a white label with black text
- 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.

## Appendix A (Informative)

### Minimum Chamber Requirements

This appendix is not part of the American National Standard ANSI/APSP/ICC-14 2014. It is included for information only.

#### Chamber internal dimensions:

Minimum 7 feet (*2.13 m*) high

Minimum 1 foot (*305 mm*) from spa to chamber wall or other internal barrier.

**Air flow:** If air circulation from the air temperature control equipment is intermittent, install 1 fan in one corner of the chamber, 6 feet (*1.82 m*) from the floor. Direct toward the center of the floor. The fan should move at least 80 CFM (*2.27 cmm*) of air, and not more than 100 CFM (*2.83 cmm*). If the air temperature control equipment continuously circulates air in the chamber, no fan is required.

**Chamber insulation:** Walls shall be insulated adequately to maintain proper ambient temperatures.

**Chamber floor:** The floor may be insulated with 2 in. (*51mm*) thick R-13 polyisocyanurate with radiant barrier on both sides. This insulation shall be laid directly on a level concrete floor or slab or other firm, level surface created for it. The insulating layer shall be sheathed with minimum 1/2 in. (*13 mm*) thick plywood to protect the insulation layer and provide a smooth surface to properly position the spas to be tested.



## Appendix B (Informative)

### Procedure for Establishing Test Facility and Equipment Compliance

This appendix is not part of the American National Standard ANSI/APSP/ICC-14 2014. It is included for information only.

This section provides an evaluation procedure to qualify a test facility for the sole purpose of testing to the requirements outlined in ANSI/APSP/ICC-14 2014 American National Standard for Portable Electric Spa Energy Efficiency.

All evaluations are to be conducted by a CB as defined in Section 3 of this standard.

Any testing performed, data and results obtained, or facility and equipment used prior to the adoption of ANSI/APSP/ICC-14 2014 is exempt from the requirements of Appendix B.

#### 1. Test Chamber

1.1 The test chamber will be evaluated to establish compliance with the construction requirements outlined in Appendix A.

1.2 The test chamber must demonstrate the capability to maintain the test environment(s) called for in Section 5 of this standard.

1.2.1 The test chamber will be evaluated operating at the test parameters for a minimum of three (3) hours.

#### 2. Data Measuring and Recording Equipment

2.1. The operator of the test facility will provide proof of calibration traceable to NIST or other national standard for all equipment used to measure and collect data as outlined in Section 5 of this standard.

2.2 The maximum period before equipment recalibration is required will be eighteen (18) months from its previous calibration date.

2.2.1 If the test equipment comes from the manufacturer with a Certificate of Calibration, the time frame for recalibration will be a maximum of eighteen (18) months from date of purchase.

2.3 Calibration records (electronic or hard copy), will be kept by the test facility and made available upon request by the evaluating CB.

#### 3. Training of Personnel

3.1 The test facility will designate the person, and alternates, responsible for training other employees in the requirements of performing the ANSI/APSP/ICC-14 2014 American National Standard for Portable Electric Spa Energy Efficiency.

3.1.1 Training records will include:

The person(s) doing the training

Date(s) the training took place

Facility and chamber used

3.2 The test facility will keep employee training records and provide them to the CB upon request

#### 4. Record Maintenance

4.1 Upon request of the CB, the test facility will provide a copy of all forms used, whether electronic or hard copy, to record the required test data.

4.2 The CB may review previous testing performed for compliance to this standard.

#### 5. Documentation of Test Facility Compliance

5.1 If the test facility successfully completes the evaluation, the CB will issue the appropriate document(s) indicating compliance with Appendix B of this standard.

5.2 If found non-conforming, the CB will issue a report of corrective actions the test facility must address to be compliant.

5.2.1 A second site visit to verify the corrective actions will be at the discretion of the CB.

5.3 Upon the test facility addressing and providing the necessary documentation, the CB will issue the appropriate document(s) indicating compliance with Appendix B of this standard.

## Appendix C (Informative)

### Hot Tub Audit Protocol

This appendix is not part of the American National Standard ANSI/APSP/ICC-14 2014. It is included for information only.

Required Equipment				
1. Tape measure		4. Power analyzer	5. Water meter (flow meter)	
2. Anemometer		(must be able to read watt-hours,	6. Level	
3. Temperature recording device		or separate device required	7. Stopwatch or clock	
Item Number	Method	Test Principle/Requirements	Test Results	Rating
Lab Equipment Calibration Verification				
1.	Visual	Verify equipment used to record data or perform measurements is calibrated to a NIST traceable standard or other national standard. Proof of traceability will be determined by reviewing the calibration records. Record any discrepancies.	•	
2.	Visual	Calibration records will be reviewed to ensure that the maximum time frame between calibrations are less than or equal to 18 months. Record any discrepancies.	•	
3.	Visual	Calibration records shall be reviewed for out of tolerance findings and corrective actions. If out of tolerance calibration reports are found, record the equipment in question and verify the existence of an out of tolerance investigation and the outcome.	•	
4.	Document Review	Verify that all of the required equipment per Section 5.4 of the ANSI/APSP/ICC-14 2014 American National Standard for Portable Electric Spa Energy Efficiency exists and is suitable for the intended application. Suitability shall be determined by reviewing the equipment specification sheet or by physical measurement as applicable.  • Watt hour meter shall have an accuracy level of a Class 2 device or better.  • Temperature Measurement System shall have an accuracy of ±1 °F (0.6 °C) or better  • Water meter shall have an accuracy of ±2% of reading.  • Power meter shall be able to measure voltage, current, and power factor (OPTIONAL) at a maximum interval of 5 minutes.	•	
			•	
			•	
			•	
			•	
Lab Test Room and Conditions				
5.	General Measure	Verify and record test room floor to ceiling height. Test room shall be at least 7 feet (2.13 m) in height and shall be able to maintain a 1 foot (305 mm) clearance between the outside of the spa and the side walls/internal barriers.	• Test Room Height • Clearance	
6.	Visual Observation and General Measure	Verify continuous air circulation or use of installed fan. If installed fan is used verify the fan is installed 6 feet (1.82 m) from the floor in one corner of the test room and operates between 80 and 100 CFM (2.27 and 2.83 cmm). Record height and airflow rate.	• Fan Placement (Location) • Fan Height • Fan Air Speed (CFM)	
7.	General Measure	Verify test room is able to maintain the specified temperature of 63 °F (17 °C) maximum during testing. Verification shall be performed by measuring the room temperature over the course of 3 hours and shall be recorded at 1 minute intervals.	• Max Temperature (°F)	

(continued)

Lab Test Room and Conditions, continued				
8.	Visual Observation	Verify the test room floor is provided with a smooth level surface.	•	
9.	Visual Observation	Verify training records exist and include the following information: • The person(s) responsible for performing the training • Date(s) the training took place • Facility and chamber used for training  • Names of the attendees	•	
			•	
			•	
			•	
			•	
10.	Visual Observation	Verify the existence of all required test data forms.	•	

Summary of Test Equipment						
	Test Equipment Type	Manufacturer Name	Certification Body (CB) Number	Range Used	Calibration Date	Calibration Due
		Model Number				
		Serial Number				
1.						
2.						
3.						
4.						
5.						
6.						
NOTE: For measurement uncertainty, refer to the calibration certificates for all the test equipment located in the equipment files						



