

# Residential **SOLAR** Sizing Guide

This publication has been prepared as a general guide for **how to properly size a closed loop residential solar hot water system**. This guide does not replace or supersede the Instruction Manual that ships with the product. For complete installation instructions, always refer to the Instruction Manual that came with the solar water heating system.

**Solar water heating** requires two things: Access to the sun's energy and an efficient solar water heating system. With Solar Energy Factor (SEF) ratings of up to 10.1, State Premier® solar water heating systems can provide up to 70% of the domestic hot water demand directly from the sun.

**Harnessing The Sun's Energy** requires proper orientation and location of the solar collectors to maximize system performance, efficiency and ease of installation.

A **site analysis** should be performed before purchasing equipment to ensure there is access to the southern sky without excessive shading and available space for the installation of the solar collectors, solar booster tank, integrated pump station and associated piping.

## Steps For An Effective Site Analysis

1. The proposed location must accommodate the installation of the solar collectors and be acceptable to the customer. You must take into account any Home Owner Association (HOA) covenants that may restrict the installation of solar collectors on a customer's property. We recommend you contact the neighborhood association's representative to ensure the installation of a solar water heating system is permissible within the guidelines of any covenants in effect.
2. A south facing location for the collectors is ideal. North facing locations will not provide adequate access to the sun's energy and are not suitable for locating the solar collectors. East and west facing locations may be used but will require tilt kits to orient the collectors towards the southern sky. Web sites with satellite imagery (such as Google Maps) can often be used to survey the orientation of the roof before a site visit.
3. The best horizontal orientation is achieved when the collectors are facing due south plus or minus 45°, this is often referred to as the azimuth angle.
4. The best vertical orientation is achieved when the collectors are tilted at an angle equal to the geographic latitude of the location plus 10°. Tilt kits are available to achieve the optimal vertical angle.
5. Placing the collectors as close as possible to the peak of the roof will make installation easier by providing increased attic access. Placing the collectors near the edge of the roof will make installation difficult since attic access is more restricted at this point. The attic space must be examined during the site analysis to confirm adequate space is available for installing the solar collectors in the proposed location.
6. The solar collectors should be located as close to the solar storage tank as possible to minimize heat loss in the piping runs.
7. The proposed location must have access to the southern sky with a minimum amount of shading between 10:00 AM and 3:00 PM each day throughout the year.
8. The Solar Pathfinder™ unit may be used to measure shading levels for an entire year at any given location. By combining the site-specific shading data from the Solar Pathfinder™ with published global weather data, an accurate contribution of solar energy (solar fraction) can be determined. The Solar Pathfinder™ Assistant software provides a detailed report showing the estimated annual percentage of solar contribution towards the total hot water demand of the home.

Often, customers will prefer to have the solar collectors flush mounted to the roof for aesthetic reasons. The customer's preferences should always be considered when these determinations are made.

NOTE: the solar collectors used in our solar water heating systems are so efficient they can be oriented within the horizontal and vertical tolerances listed above and still achieve excellent performance.

NOTE: that federal tax credits may be available for the installed costs of a solar hot water system that contributes a minimum of 50% to the total domestic hot water demand in the home. In addition, some states and utility companies offering tax credits, rebates and incentives may require a detailed report validating the solar contribution at the proposed location.



9. When the site analysis is complete and it has been determined that the proposed installation location is suitable, the sizing information on the back can be used to choose the system that will best match the domestic hot water demand of the home.

## Additional Information

Visit [www.statewaterheaters.com](http://www.statewaterheaters.com) for Specification Sheets, Instruction Manuals and installation videos.

Visit [www.solarpathfinder.com](http://www.solarpathfinder.com) for more information on the Solar Pathfinder™.



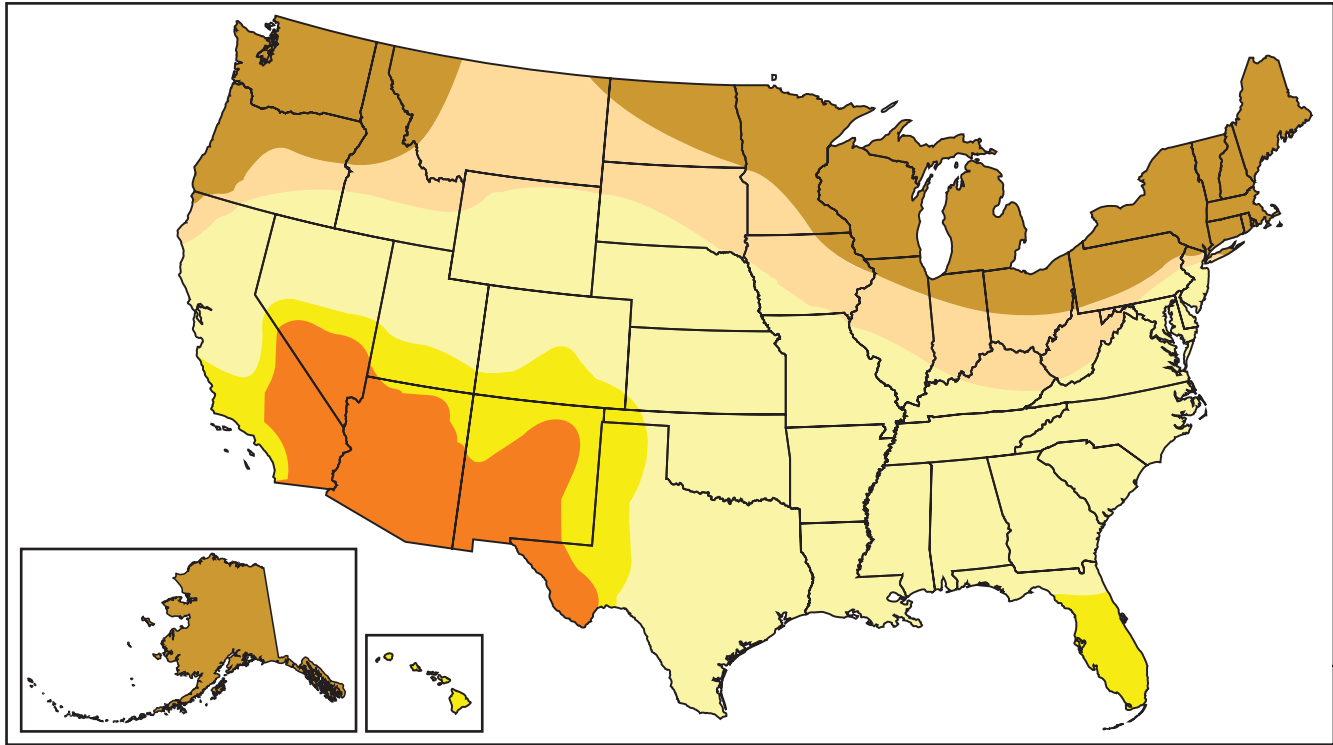
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## SIZING TABLE

ZONE	People in Household							
	UP TO 3		4		5		6	
	Tank (gal)	No. Panels	Tank (gal)	No. Panels	Tank (gal)	No. Panels	Tank (gal)	No. Panels
Orange	80	1	80	1	80	1	120	2
Yellow	80	1	80	2	120	2	120	2
Light Yellow	80	2	80	2	120	2	120	2
Light Orange	80	2	80	2	120	3	120	3
Dark Orange	80	3	80	3	120	3	120	3

### United States Solar Map



### Sizing Instructions:

1. Use the map and sizing table above to determine the number of solar collectors (panels) and solar tank size (gallons) needed.
2. Sizing based on number of people should take future changes into consideration such as additions to the family to avoid undersizing.
3. If your location is on the border of a zone, a larger system should be selected to avoid undersizing.
4. These solar hot water systems use a mixture of distilled water and Dowfrost™ propylene glycol as a heat transfer fluid in a closed loop. Order double wall heat exchanger systems if required by local codes. See the table below.
5. Sizing is based on an azimuth of 180° (due south), a vertical orientation equal to the geographic latitude +15° and hot water temperature of 120°F (48°C) supplied to the fixtures.
6. The sizing table above is based on standard water fixtures and bathtubs in a home and a per-person hot water usage of 20 gallons per day. If the home has multiple head showers, large garden/Jacuzzi tubs or more than 4 bathrooms, a backup water heater capable of meeting 100% of demand may be required to ensure there is an adequate supply of hot water.

### State Premier® Solar Systems

*Solar System Model Numbers	Number of Solar Collectors - Size (ft)	**Solar Heat Exchanger Type	***Solar Booster Tank Model Numbers 80 or 120-Gallon (ordered separately)	Solar Energy Factors (increases with tank size)	
				80-Gallon Tank	120-Gallon Tank
SSX01-ACI-501	One - 4' x 10'	Single Wall Internal Coil	SB6-80-SOTX or SB6-120-SOTX	2.2	1.9
SSX02-ACI-202	Two - 3.5' x 7'	Single Wall Internal Coil	SB6-80-SOTX or SB6-120-SOTX	3.0	2.3
SSX02-ACI-402	Two - 4' x 8'	Single Wall Internal Coil	SB6-80-SOTX or SB6-120-SOTX	5.3	3.3
SSX03-ACI-203	Three - 3.5' x 7'	Single Wall Internal Coil	SB6-80-SOTX or SB6-120-SOTX	10.1	4.9
SSX01-ACE-501	One - 4' x 10'	Double Wall External Plate	SBV-82-10TS or SBV-120-10TS	1.8	1.7
SSX02-ACE-202	Two - 3.5' x 7'	Double Wall External Plate	SBV-82-10TS or SBV-120-10TS	2.2	2.1
SSX02-ACE-402	Two - 4' x 8'	Double Wall External Plate	SBV-82-10TS or SBV-120-10TS	3.0	2.8
SSX03-ACE-203	Three - 3.5' x 7'	Double Wall External Plate	SBV-82-10TS or SBV-120-10TS	4.3	3.5

\* These models are Deluxe systems. Solar systems are available in Standard and Deluxe package kits, see specification sheet # SRVSS00110 for more information.

\*\* Check local building codes for single wall or double wall heat exchanger requirements for closed loop systems using a mixture of Dowfrost™ propylene glycol and water.

\*\*\* Solar booster tanks are ordered separately. SB6-80-SOTX and SB6-120-SOTX models utilize an internal single wall heat exchanger, see specification sheet # SRQSS00109. SBV-82-10TS and SBV-120-10TS models utilize an external double wall heat exchanger, see specification sheet # SRESS00306.