



CITY OF LANCASTER SDWH TOOLKIT DOCUMENT #1

Submittal Requirements Bulletin Solar Domestic Water Heating Installations 30 kWth or Less for One- and Two-Family Dwelling

This information bulletin is published to guide applicants through a streamlined permitting process for solar pool heating (SDWH) projects 30 kWth (462 square foot) in size or smaller. This bulletin provides information about submittal requirements for plan review, required fees and inspections.

1. Approval Requirements

The following permits are required to install a SDWH system with a maximum thermal output of 30 kWth or less:

- a) Plumbing Permit

Planning review IS NOT required for SDWH installations of this size.

2. Submittal Requirements

- a) Completed permit application form. This permit application form can be downloaded [here](#).
- b) Demonstrate compliance with the eligibility checklist for expedited permitting in [Toolkit Document #2](#).
- c) A completed Standard Plumbing, Electrical and Structural Plan. The standard plan in [Toolkit Document #3](#) may be used for proposed solar installations 30 kWth in size or smaller. *A standard plan should be submitted that includes the following.*
 - Total number of collectors and area
 - Make, model, and collector certification number
 - System certification number
 - Solar storage tank name, model, insulation and capacity
 - Heat exchanger make and model (if applicable)
 - Specifications of heat transfer fluid (if applicable)
- d) A roof plan showing roof layout and solar collectors with attachment details.
- e) Standard one-line plumbing diagram of system showing and labeling major components.
- f) Equipment cut sheets including collectors, controller, motorized valve (if applicable).
- g) Completed expedited Structural Criteria checklist in [Toolkit Document #4](#) along with required documentation.

For systems that do not meet all the requirements in the structural criteria checklist, provide structural drawings and calculations along with the following information.

- The type of roof covering and the number of roof coverings installed
- Type of roof framing, size of members and spacing
- Weight of panels, support locations and method of attachment
- Framing plan and details for any work necessary to strengthen the existing roof structure
- Site-specific structural calculations
- Where a racking system is used, provide documentation showing manufacturer of the rack system, Maximum allowable weight the system can support, attachment method to the roof or ground and product evaluation information or structural design for the rack system

3. Plan Review

Permit applications and plans can be submitted to Building and Safety in person at 44933 Fern Avenue, Lancaster 93534, and electronically through the following website: <https://aca.accela.com/lancaster/>.

Permits not approved “over the counter” will normally be reviewed in one business day.

4. Fees

Small Solar Pool Water Heating System Plan Check and Inspection: \$106

Travel and Documentation: \$27

Permit Issuance: \$8

Total: \$141

5. Inspections

Once all permits to construct the solar installation have been issued and the system has been installed, it must be inspected before final approval is granted. On-site inspections can be scheduled by contacting Building and Safety by telephone at (661) 723-5930 or electronically at <https://aca.accela.com/lancaster/>. Inspection requests received within business hours are typically scheduled for the next business day. If next business day is not available, inspection should happen within a five-day window.

Permit holders must be prepared to show conformance with all technical requirements in the field at the time of inspection. The inspector will verify that the installation is in conformance with applicable code requirements and with the approved plans.

The inspection checklist in [Toolkit Document #5](#) provides an overview of common points of inspection, and the applicant should be prepared to show compliance with these points.

6. Departmental Contact Information

For additional information regarding this permit process, please consult our departmental [website](#) or contact Building and Safety at (661) 723-6144.



CITY OF LANCASTER SDWH TOOLKIT DOCUMENT #2

Eligibility Checklist for Expedited Solar Domestic Water Heating Permitting for One- and Two-Family Dwellings

GENERAL REQUIREMENTS

- A. System size is 30 kWth (462 square feet of collector) or less Y N
- B. The solar array is roof-mounted on one- or two-family dwelling or accessory structure Y N
- C. The solar collector arrays will not exceed the maximum legal building height Y N
- D. Solar collectors are certified by an accredited listing agency Y N
- E. Solar domestic water heating system is certified by an accredited listing agency Y N
- F. Permit application is completed and attached Y N
- G. System schematic is included Y N
- H. List of major components to match system schematic Y N
- I. Heat transfer fluid is either water or a nontoxic fluid Y N

PLUMBING REQUIREMENTS

- A. Adequate extreme temperature protection is provided Y N

STRUCTURAL REQUIREMENTS

- A. A completed Structural Criteria and supporting documentation is attached (as required) Y N

Notes:

These criteria are intended for streamlined solar permitting process.

- 1. If any items are checked NO, revise design to fit within Eligibility Checklist, otherwise permit application may go through standard process.*

CITY OF LANCASTER SDWH TOOLKIT DOCUMENT #3



**Solar Domestic Water Heating
Standard Plan
for One- and Two-Family Dwellings**

SCOPE: Use this plan ONLY for solar domestic water heating systems not exceeding a thermal output rating of 30 kWth on the roof of a one- or two-family dwelling or accessory structure and used for domestic water heating. Systems must be in compliance with current California Building Standards Code, Title 24 and local amendments of the authority having jurisdiction (AHJ). Other articles of the California Plumbing Code (CPC) or California Mechanical Code (CMC) or other California health and safety codes shall apply.

MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed collector, controller, pump, storage tank/heat exchanger/heat transfer fluid (if applicable) and mounting systems. Equipment intended for use with SWH system shall be identified and listed for the application.

Job Address: _____ Permit #: _____

Contractor/Engineer Name: _____ License # and Class: _____

Signature: _____ Date: _____ Phone Number: _____

Email: _____

Total # of Collectors Installed _____ Total Area of Collectors _____

Collector Certification Number (include certifying agency) _____

System Certification Number (include certifying agency) _____

Max Height Above Roof _____ Height Above Ground _____

Major Components (for SDWH systems)

Solar Tank Make/Model _____

Gallons _____ Insulation R- _____ Pressurized? _____

Heat Exchanger Make/Model _____

Number of Walls _____ Heat Exchange Fluid _____

Solar Control Make/Model _____

Solar Pump/Circulator Make/Model _____

Expansion Tank Make/Model _____ Appropriately Sized for Use? _____

Mounting Hardware Make/Model or Type _____

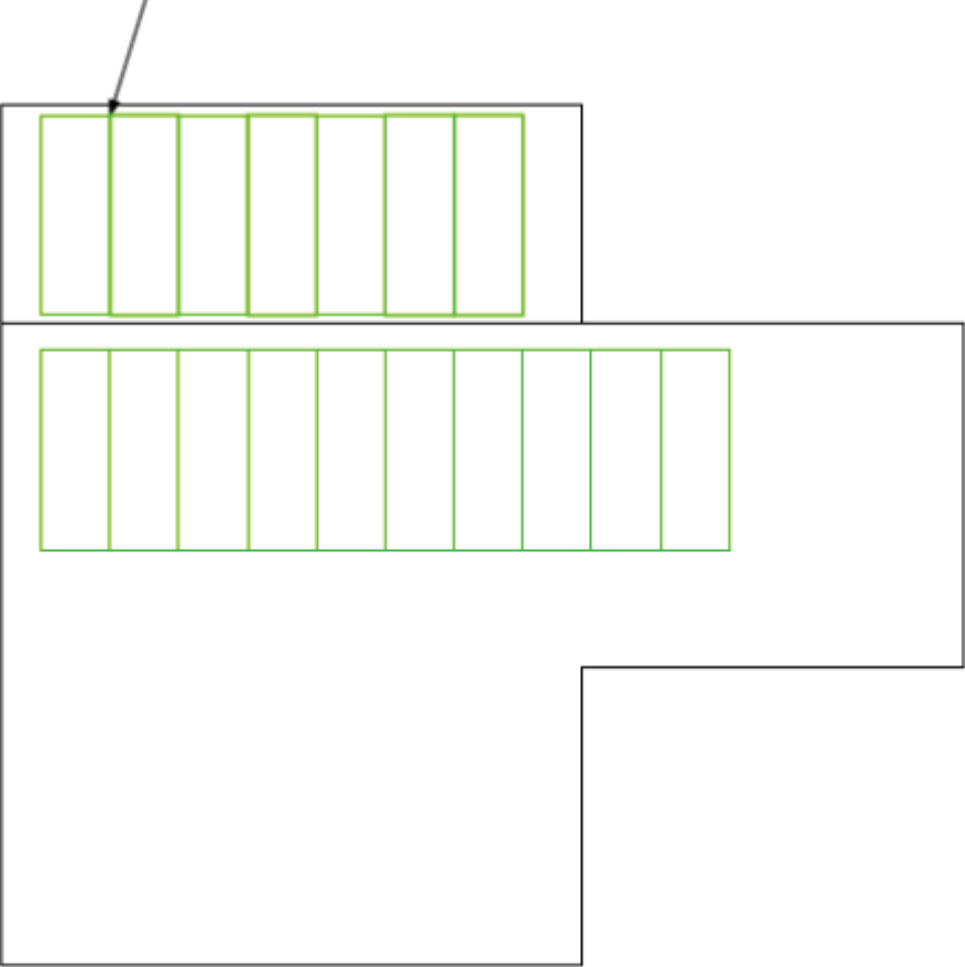
Do all the above data match substantially the data used for certification? _____

SAMPLE ROOF PLAN for SDWH and SPH systems

- ROOF TYPE: STANDING SEAM
- ROOF HEIGHT (Elevation): MAX 15' (1 story)
- RAFTERS: 2" X 6" @ 24" OC



(18) 4'x12' XXX PANELS





**Structural Criteria for Residential
Rooftop Solar Energy Installations**

STRUCTURAL CRITERIA FOR RESIDENTIAL FLUSH-MOUNTED SOLAR ARRAYS

1. ROOF CHECKS

A. Visual Review/Contractor's Site Audit of Existing Conditions:

- 1) Is the roof a single roof without a reroof overlay? Y N
- 2) Does the roof structure appear structurally sound, without signs of alterations or significant structural deterioration or sagging, as illustrated in Figure 1? Y N

B. Roof Structure Data:

- 1) Measured roof slope (e.g. 6:12): _____:12
- 2) Measured rafter spacing (center-to-center): _____ inch
- 3) Type of roof framing (rafter or manufactured truss): Rafter Truss

2. SOLAR ARRAY CHECKS

A. Flush-mounted Solar Array:

- 1) Is the plane of the modules (panels) parallel to the plane of the roof? Y N
- 2) Is there a 2" to 10" gap between underside of module and the roof surface? Y N
- 3) Modules do not overhang any roof edges (ridges, hops, gable ends, eaves)? Y N

B. Do the modules plus support components weigh no more than:
4 psf for photovoltaic arrays or 5 psf for solar thermal arrays?

Y N

C. Does the array cover no more than half of the total roof area (all roof planes)?

Y N

D. Are solar support component manufacturer's project-specific completed worksheets, tables with relevant cells circled, or web-based calculator results attached?

Y N

E. Is a roof plan of the module and anchor layout attached? (see Figure 2)

Y N

F. Downward Load Check (Anchor Layout Check):

- 1) Proposed anchor horizontal spacing (see Figure 2): _____' - _____"ft-in
- 2) Horizontal anchor spacing per Table 1: _____' - _____"ft-in
- 3) Is proposed anchor horizontal spacing less than Table 1 spacing? Y N

G. Wind Uplift Check (Anchor Fastener Check):

- 1) Anchor fastener data (see Figure 3):
 - a. Diameter of lag screw, hanger bolt or self-drilling screw: _____ inch
 - b. Embedment depth of rafter: _____ inch
 - c. Number of screws per anchor (typically one): _____
 - d. Are 5/16" diameter lag screws with 2.5" embedment into the rafter used, OR does the anchor fastener meet the manufacturer's guidelines? Y N

3. SUMMARY

A. All items above are checked YES. No additional calculations are required.

B. One or more items are checked NO. Attach project-specific drawings and calculations stamped and signed by a California-licensed Civil or Structural Engineer.

Job Address: _____ Permit #: _____
Contractor/Installer: _____ License # & Class: _____
Signature: _____ Date: _____ Phone #: _____

Table 1. Maximum Horizontal Anchor Spacing

Roof Slope		Rafter Spacing		
		16" o.c.	24" o.c.	32" o.c.
Photovoltaic Arrays (4 psf max)				
Flat to 6:12	0° to 26°	5'-4"	6'-0"	5'-4"
7:12 to 12:12	27° to 45°	1'-4"	2'-0"	2'-8"
13:12 to 24:12	46° to 63°	1'-4"	2'-0"	2'-8"
Solar Thermal Arrays (5 psf max)				
Flat to 6:12	0° to 26°	4'-0"	4'-0"	5'-4"
7:12 to 12:12	27° to 45°	1'-4"	2'-0"	2'-8"
13:12 to 24:12	46° to 63°	Calc. Req'd	Calc. Req'd	Calc. Req'd

Solar support component manufacturer’s guidelines may be relied upon to ensure the array above the roof is properly designed, but manufacturer’s guidelines typically do NOT check to ensure that the roof itself can support the concentrated loads from the solar array. Table 1 assumes that the roof complied with the building code in effect at the time of construction, and places limits on anchor horizontal spacing to ensure that a roof structure is not overloaded under either downward loads or wind uplift loads. Note 4 below lists the basic assumptions upon which this table is based.

Table 1 Notes:

1. Anchors are also known as “stand-offs”, “feet”, “mounts” or “points of attachment”. Horizontal anchor spacing is also known as “cross-slope” or “east-west” anchor spacing (see Figure 2).
2. If anchors are staggered from row-to-row going up the roof, the anchor spacing may be twice that shown above, but no greater than 6’-0”.
3. For manufactured plated wood trusses at slopes of flat to 6:12, the horizontal anchor spacing shall not exceed 4’-0” and anchors in adjacent rows shall be staggered.
4. This table is based on the following assumptions:
 - The roof structure conformed to building code requirements at the time it was built.
 - The attached list of criteria are met.
 - Mean roof height is not greater than 40 feet.
 - Roof sheathing is at least 7/16” thick oriented strand board or plywood. 1x skip sheathing is acceptable.
 - If the dwelling is in Wind Exposure B (typical urban, suburban or wooded areas farther than 500 yards from large open fields), no more than one of the following conditions apply:
 - The dwelling is located in a special wind region with design wind speed between 115 and 130 mph per ASCE 7-10, or
 - The dwelling is located on the top half of a tall hill, provided average slope steeper is less than 15%.
 - If the dwelling is In Wind Exposure C (within 500 yards of large open fields or grasslands), all of the following conditions apply:
 - Design wind speed is 110 mph or less (not in a Special Wind Region), and
 - The dwelling is not located on the top half of a tall hill.
 - The solar array displaces roof live loads (temporary construction loads) that the roof was originally designed to carry.
 - The Structural Technical Appendix provides additional information about analysis assumptions.

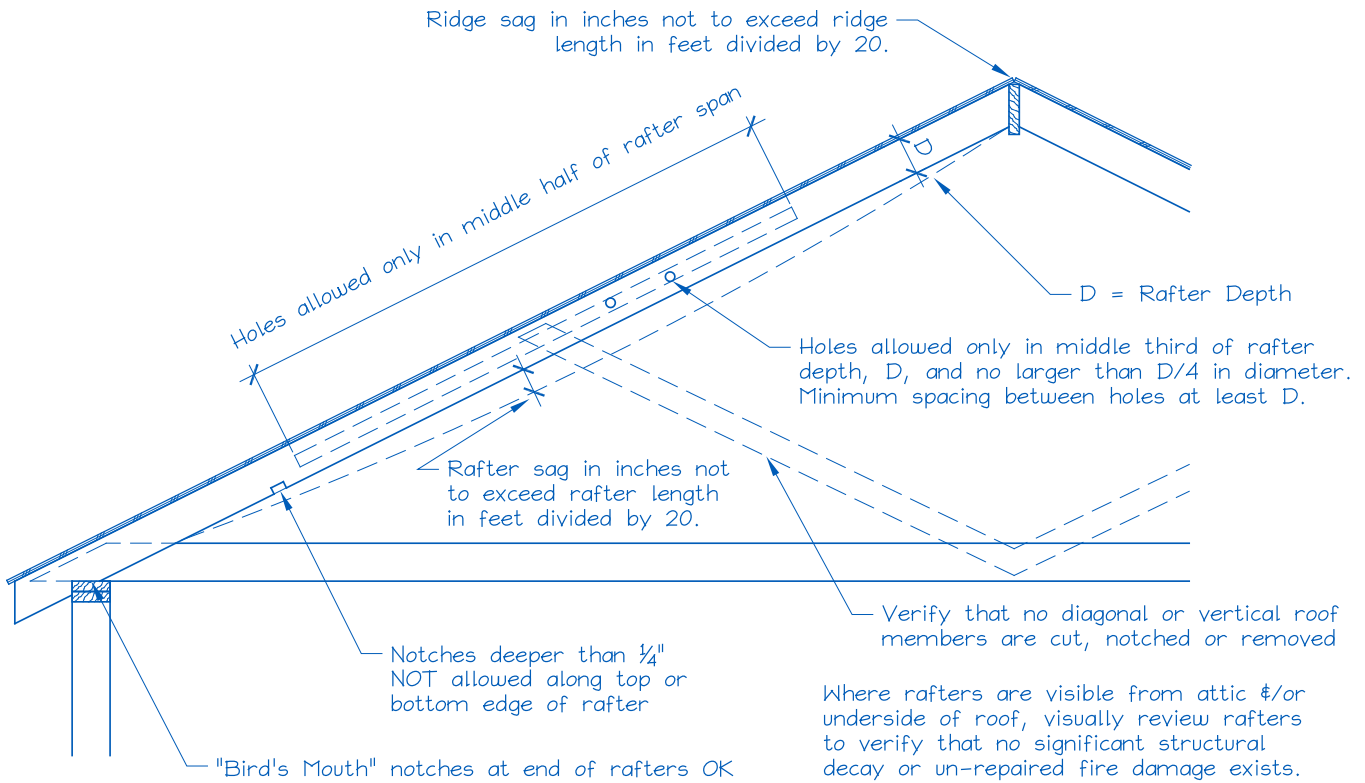


Figure 1. Roof Visual Structural Review (Contractor's Site Audit) of Existing Conditions.

The site auditor should verify the following:

1. No visually apparent disallowed rafter holes, notches and truss modifications as shown above.
2. No visually apparent structural decay or un-repaired fire damage.
3. Roof sag, measured in inches, is not more than the rafter or ridge beam length in feet divided by 20.

Rafters that fail the above criteria should not be used to support solar arrays unless they are first strengthened.

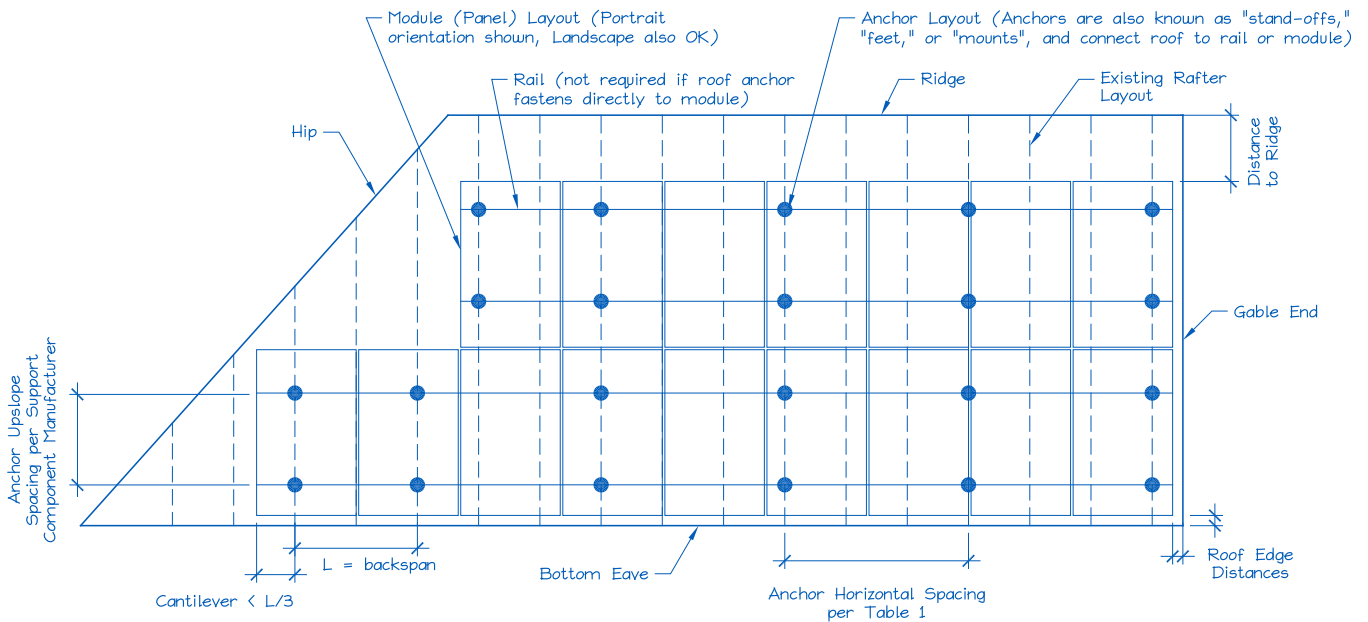


Figure 2. Sample Solar Panel Array and Anchor Layout Diagram (Roof Plan).

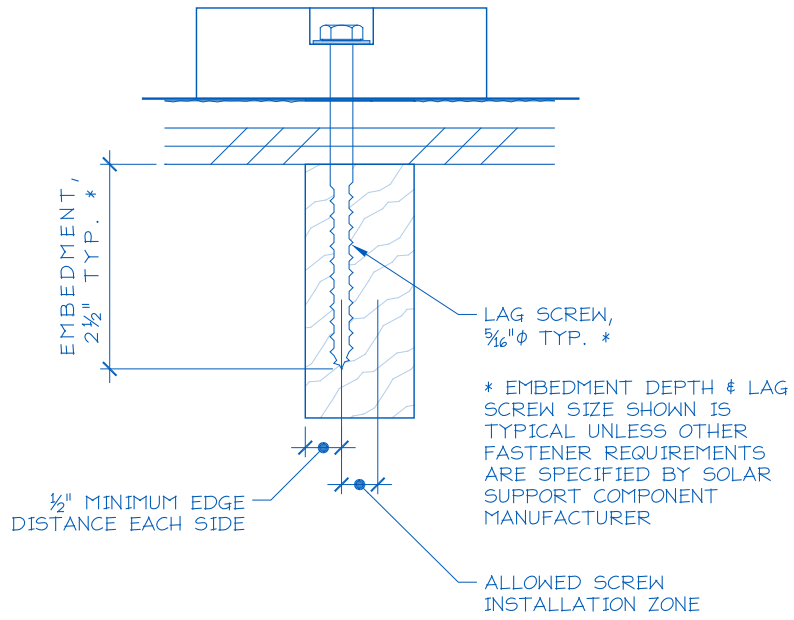


Figure 3. Typical Anchor with Lag Screw Attachment.



CITY OF LANCASTER SDWH TOOLKIT DOCUMENT #5A

**Inspection Guide for SDWH Systems in
One- and Two-Family Dwellings**

This document is a field inspection guide for SDWH systems. These inspection references detail most of the issues that relate to SDWH systems during the inspection process.

All California Electrical Code (CEC), California Residential Code (CRC), California Building Code (CBC), California Mechanical Code (CMC) and California Plumbing Code (CPC) references are to the 2016 versions unless otherwise noted.

SOLAR DOMESTIC WATER HEATING SYSTEM ELIGIBILITY			
SYSTEM	Criteria		Yes
		1. Major components installed match those of certified system?	
SOLAR DOMESTIC WATER HEATING INSPECTION GUIDE			
	Guideline	Source of Guideline	Yes
ROOF	I. Roof penetrations/attachments are properly flashed	CBC Chap. 15, CRC Chap. 9	
SOLAR LOOP PIPING	I. Piping must be properly supported, hung and anchored per code	CPC 313.1	
	II. Solar piping properly insulated	See local ordinance.	
	III. Dissimilar materials isolated, as required	CPC 310.6	
	IV. Penetrations through structural members as per code	CPC 312.2	
	V. Penetrations through fire-resistant assemblies installed per code	CPC 1505.2	
	VI. System has adequate freeze protection	CPC 312.6	
	VII. System overheat protection	CPC 505.2	
	VIII. Expansion tank sized correctly (indirect system) according to need for operation or overheat protection?	CMC 1005.3, 1005.4	
	IX. Pressure relief/temperature relief valve(s) installed per design (if applicable)	CPC 608.4 & 608.5	
	X. Piping labels show type of fluid and direction of flow	CPC 601.2	
	XI. Drain and fill valves capped and labeled	CPC 601.2	
STORAGE TANK	I. Tank labeled with pressure rating for pressurized storage	CPC 505.4	
	II. Relief drain installed properly for pressurized storage	CPC 504.6, CMC 1006.1	
	III. Heat exchanger must protect potable water system from being contaminated by the heat transfer medium	CPC 603.5.4	
	IV. Tank installed in garage meets code requirements	CPC 507.13	
	V. Pan installed under tank (as required)	CPC 507.4	
	VI. Tank installed on level surface	CPC 508.4.3	
	VII. Tank supported for seismic loads	CPC 507.2	
	VIII. All valves, fittings and solders are rated for potable systems and meeting CA lead law requirements	CPC 604.1	
	IX. Unions installed within 12" of tank connections for all piping to and from tank and heat exchangers	CPC 609.5	

POTABLE PIPING	I. All valves, fittings and solders are rated for potable systems and meeting CA lead law requirements	CPC 604.1	
	II. Potable water piping properly labeled	CPC 601.2	
	III. Any connection to PEX is more than 18" from tank fittings	CPC 604.13	
	IV. Hot water service piping insulated properly	See local ordinance.	
	V. Vacuum relief valve properly installed (if required)	CPC 603.5.4, 608.7	
CONTROLS	I. Control and pump disconnect(s) properly installed	CEC 430 (IX), 690.17	
	II. Conductors between control and power source properly installed	CEC 430 (II)	
	III. Conductors between control and pump properly installed	CEC 430 (II), 690 (IV)	
	IV. Solar collector sensors protected from sun and weather	CEC 310.8 B, D(1), D(2)	
	V. Control relay rated higher than load for each output	CEC 430.83	