COMPREHENSIVE TRAINING

SOLAR WATER HEATING INSTALLATION REQUIREMENTS

Provide complete operation and installation instructions for water heater/solar storage tank/solar collector. (Section 705.1 of the Solar Code) Obtain approved third party listing for all components including lead free certification. (Section 301 of the Solar Code) Solar collectors must not interfere with any plumbing vents or mechanical equipment. (3' minimum clearance from any plumbing vent per 94.906.2) Provide seismic bracing for all water heaters, storage tanks, and piping as applicable. (94.508.2) Properly label all non-potable systems with liquid conveyed including direction of flow. (Section 402 and 413 of the Solar Code) All solar collectors and tanks must be approved third party listed for SRCC (Solar Rating and Certification Corporation) per Title 24 Energy Code and all solar piping must be insulated. SGSOV for project evaluations in excess of $10,000.

Bulletin Requirements:

- Building permit and plan check for structural approval (or see exceptions in Information Bulletin) Mechanical plan check approval does not check structural

Active System: Includes mechanical circulation.

Passive System: Operates by utilizing convection (no pump).

Direct: Potable water goes to the collectors.

Indirect: Heat transfer fluid in the solar loop is circulated through a heat exchanger and does not come into contact with potable water.

Open Loop System:

- A system where the fluid is enclosed in any piping system that is vented to the atmosphere (Chapter 2 Definitions Solar Code)
- Batch system incorporates open loop direct system
- Thermosiphon systems
- Automatic air vent as required by system design (Section 409 of the Solar Code)
- A control valve shall be installed immediately ahead of each water supplied solar system. (Section 407.2 of the Solar Code)
- Pressure relief valve (Section 408.2 of the Solar Code)
- Freeze protection valve (Section 312.12 of the Solar Code)

Closed Loop System:

- A system where fluid is enclosed in any piping system that is not vented to the atmosphere (Chapter 2 Definitions Solar Code)
- Isolation valves (optional)

- Balancing valves (optional)
- Closed loop systems, where hose bibbs and similar valves are used to charge or drain the system, shall be of loose key type, have valve outlets capped, or have handles removed when the system is operational. (Section 407.4 of the Solar Code)
- Closed loop or other type pressure systems shall be tested at one and one- half (1-1/2) times maximum designed operating pressure. (Section 316.2.3 of the Solar Energy Code)
- Manual air release vents shall be installed at all high points of the solar system as required by the system design requirements and installation instructions. (Automatic air release vents not recommended for glycol systems) Section 409.0 of the Solar Code
- Pressure relief valves at150 psi or needs to be equal to the expansion tank rating (Section 405.1.1b of the Solar Code)
- Double wall heat exchanger required (94.506.4.2 or Section 405.1 of the Solar Code)
- Expansion tank must be sized properly (Section 602 of the Solar Code)
- Temperature sensor
- Pump
- Air separator (optional)
- Charging Station (glycol)
- NO makeup water

Drainback:

- Collectors must be rated for empty exposure (evacuated tube collector for example)
- Collectors must be sloped to drain
- Piping must be sloped to drain: ¼" per foot on exterior piping
- No air traps allowed in piping
- Vacuum relief valves shall be installed at the high point of the solar system for drain down or drain back system as required by the system design requirements and installation instructions. (Section 410 of the Solar Code)
- Piping and system components must be rated to take occasional high temp steam exposure
- No expansion tank necessary if system has an air gap
- Pump must be below drainback tank level

Integral Collector Storage (ICS) or Batch Heater: Enclosed storage tank that acts as a collector. Cold water is supplied at the bottom of the tank (open loop). Generally used in single family dwellings.

Storage Tanks:

- With heat exchangers must be double wall vented to atmosphere (look for discharge vent)
- Tankless type heaters used in conjunction with solar system must be approved for use

Heat Exchangers:

- UL or other approved testing agency listing (Section 301 of the Solar Code)
- Double wall and vented to atmosphere (94.603.4.4 or Section 405.1 of the Solar Code)
- Tanks with coils (double wall)
- Drainback systems using non-potable heat transfer fluids

Expansion Tanks:

- For all closed loop systems
- Properly sized
- Separate expansion tank for Glycol systems
- Most closed Loop glycol systems using Pressure Stagnation Prevention method
- Most Closed Loop glycol using steam back method

Approved Materials:

- Test Lab Research Reports or approved third party listing for heat exchangers (Section 301 of the Solar Code)
- Lead free valves and components (AB 1953)

Mechanical Test Lab:

- Provide approved third party listing for intended use or obtain Mechanical Test Lab Research Report. 94.301.1.1
- Test lab to give one time approval for listing of components used in a system. (Glycol system for example)

Insulation:

- R-4 on piping up to 2" per Title 24 Energy Code
- R-6 on piping 2-1/2" and larger per Title 24 Energy Code
- 5' on both hot and cold water to tank for residential per Title 24 Energy Code
- 8' on both hot and cold water on commercial per Title 24 Energy Code
- Insulate all recirculating piping per Title 24 Energy Code
- Insulate all Solar Piping per Title 24 Energy Code

Drainage:

- Properly terminate T & P
- Drainage for smitty pan
- Condensate must be piped to sanitary system

Other Components:

- Solar Bypass
- Backflow Protection as required (Section 405.3 and Table 4-3 of the Solar Code)
- Vacuum relief valve (when mechanical room is on roof above fixtures served) Section 410 of the Solar Code and 94.608.7
- Any solar system providing hot water exceeding 140 degrees F shall be equipped with a listed tempering valve or temperature limiting device to limit the temperature of the domestic hot water system to a maximum of 140 defrees F or less. (Section 319.4 of the Solar Code)
- Shut off valves must be installed to properly service and replace in line equipment (excluding expansion tanks)
- Termpering valve install per installation instructions

Pressure Vessel Requirements:

- Not required until further notice

Plan Check Required:

- When the water supply is 2" or larger at the meter. Or systems designed by Appendix A.

Commercial Pools:

- Plan check required when solar is run through circulating piping. 94.101.3.6 (8)
- Pumps must be UL listed.

Mechanical Plan Check Plans:

- Location of collectors on plan view
- Provide location of storage tank, water heater, and heat exchanger
- Required clearances and access around all equipment
- Plumbing schematic with equipment schedule and key
- Elevation drawings of all equipment
- Riser diagram
- Pressure losses through tempering valve and heat exchanger
- Closed loop system show pressure rating
- Sizing of Expansion tank
- Show approved heat exchanger