Form 233

Solar Water Heating Installation Checklist

Solar Water Heating Program

EnergyTrust of Oregon

Project Information

Verifier ☐ Energy Trust ☐ Trade Ally*		Verification Date(s) 1st: 2nd:	Time of Measurement
System Owner ☐ Form 223R ☐ Form 223C		Trade Ally Contractor	
Site Address		City	Zip
Ambient Temperature (°F)	Solar Radiation (W/m^2)	Water Temperature (°F)	
Notes:			

*Solar Trade Ally that has qualified for Random Verification status shall complete the 1st installation checklist column and sign below.

Installation Checklist (Requirement numbers refer to sections of the Solar Water Heating Installation Requirements.)

Verification 1st	2nd		
		2.1	**General**
☐	☐	2.1.1	Backup heater is either: a) electric and served by ☐ PGE or ☐ Pacific Power, or b) gas and served by ☐ NW Natural or ☐ Cascade Natural Gas (*select one*).
☐	☐	2.1.2	Installation is of industry standard and workmanlike quality.
☐	☐	2.1.3	Collectors are optimized for performance without sacrificing aesthetics.
☐	☐	2.1.4	Installation is consistent with plumbing diagram.
☐	☐	2.1.5	Installation is consistent with manufacturers' instructions.
☐	☐	2.1.6	Jurisdictional inspection(s) have been passed: Permit # _____ Date _____
		2.2	**Materials**
☐	☐	2.2.1	Materials used outdoors are UV-resistant and listed for outdoor locations.
☐	☐	2.2.2	Materials are designed to withstand the temperatures to which they are exposed.
☐	☐	2.2.3	Dissimilar metals that have galvanic action are isolated.
☐	☐	2.2.4	Stainless steel fasteners are used to secure collectors, high quality fasteners are used throughout.
☐	☐	2.2.5	Structural members are made of approved materials.
		2.3	**Equipment and Installation**
☐	☐	2.3.1	All system components are new.
☐	☐	2.3.2	System has SRCC OG-300 certification and is on Energy Trust approved system list (residential only).
☐	☐	2.3.3	Any building insulation disturbed due to system installation is restored to previous condition.
☐	☐	2.3.4	Penetrations to building shell are sealed and fire resistance maintained.
☐	☐	2.3.5	Components, including solar storage and backup tanks, are located to allow access and are adequately protected.
☐	☐	2.3.6	Storage and backup tanks and related components are located in an enclosed tempered space.
☐	☐	2.3.7	If pressure reduction or back flow prevention on potable supply, expansion tank properly sized and installed.
☐	☐	2.3.8	If recirculation system exists, return piping is plumbed downstream of solar storage tank.
		2.4	**Collector Mounting**
☐	☐	2.4.1	Roof has 10 or more years useful life remaining or entire collector is flashed into roof (if roof-mounted).
☐	☐	2.4.2	Collectors are spaced a minimum of 1.5" off roof, or are properly flashed into roof.
☐	☐	2.4.3	All roof penetrations are flashed and sealed appropriately.
☐	☐	2.4.4	Mounting equipment is installed according to manufacturer specification.
		2.5	**Solar Access**
☐	☐	2.5.1	Solar resource is documented with an Energy Trust approved tool from location where shading is most significant.

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☐ ☐	2.5.2	Total Solar Resource Fraction (TSRF) is 75% or greater at all points on the collector(s).
☐ ☐	2.5.3	If PV-powered, module is mounted within 6 ft of collector(s) and TSRF is equal or greater to highest collector TSRF.
	2.6	**Plumbing**
☐ ☐	2.6.1	Collector loop piping is copper or stainless steel. Potable water piping is copper, stainless steel, or PEX. Fittings are copper or brass. PEX connections are made with compression fittings.
☐ ☐	2.6.2	Potable plumbing in unheated overhead spaces is PEX with no connections
☐ ☐	2.6.3	Piping runs are adequately and appropriately supported.
☐ ☐	2.6.4	All pipes have minimum 3/4" high temperature rated elastomeric foam or factory-jacketed fibrous glass insulation. R-12 insulation on potable water piping in unheated spaces. *Exception: 5/8" minimum for factory-insulated line sets.*
☐ ☐	2.6.5	Pipe insulation properly sized to fit pipe and continuously closed and sealed using a manufacturer-approved method.
☐ ☐	2.6.5	Pipe insulation exposed to outdoors is adequately protected.
☐ ☐	2.6.6	Underground piping is fully enclosed with appropriately-waterproofed R-6 insulation designed for underground use.
☐ ☐	2.6.7	Underground potable piping is PEX with no buried connections. Underground collector loop piping is Type L copper.
☐ ☐	2.6.8	Full port isolation valves are installed enabling bypass of solar storage tank
☐ ☐	2.6.9	ASSE 1017 temperature actuated tempering valve installed downstream of backup heater.
☐ ☐	2.6.10	Check valves shall be installed (or integrated) on both hot and cold inlets to the tempering valve(s).
☐ ☐	2.6.11	If hot water recirculation system, return water piped to both tempering valve inlets and aquastat controller installed.
☐ ☐	2.6.12	Temperature & pressure relief valve installed on solar storage tank.
☐ ☐	2.6.7	Valves installed for filling, flushing, and draining collector loop and potable water piping.
	2.7	**Heat Transfer Fluid**
☐ ☐	2.7.1	Heat transfer fluid (HTF) is appropriate for the system type and components used.
☐ ☐	2.7.2	If used, antifreeze is inhibited propylene glycol (or approved glycerin) solution rated for usage up to 300 °F (149 °C). For system with single-wall heat exchanger, all HTF additives shall be FDA Generally Recognized as Safe.
☐ ☐	2.7.3	If any additives are used, fill valve has a warning label: "Non-potable fluid. Do not drink."
	2.8	**Backup Heater**
☐ ☐	2.8.1	If backup heater is new it is sized according to OPSC.
☐ ☐	2.8.2	If new backup heater is tankless unit it has thermostatically controlled variable firing rate.
☐ ☐	2.8.3	Means to limit supply water temp (if necessary) are installed and meet program requirements.
☐ ☐	2.8.4	If backup heater is new or moved and installed over wood framed floor, drip pan installed and piped to drain.
	2.9	**Solar Storage Tank**
☐ ☐	2.9.1	Electric power shall not be connected to a roof-mounted tank or a separate solar storage tank.
☐ ☐	2.9.2	If storage tank is installed over wood framed floor, drip pan installed and piped to drain.
☐ ☐	2.9.3	If storage tank is installed over concrete floor, R-10 bottom pad is installed.
☐ ☐	2.9.4	If tank includes a sacrificial anode rod, means for changing the anode is provided.
	3.1	**Passive Systems (if applicable)**
☐ ☐	3.1.1	If solar tank is roof-mounted, the potable water inlet and outlet piping is type L copper, stainless or brass piped to directly above the roof jack, where the connection to nonmetal piping is made.
☐ ☐	3.1.2	Check valve is installed in the cold water supply line before the cold water expansion valve.
☐ ☐	3.1.3	Thermometer is installed in piping between solar storage and backup heater near the top of the backup tank.
☐ ☐	3.1.4	Temperature and pressure relief valve on solar tank is piped to drain.
☐ ☐	3.1.5	If system uses glycol solution in a single wall heat exchanger, potable water supply pressure is 40 psi or greater.
	3.2	**All Active Systems (if applicable)**
☐ ☐	3.2.1	Collector loop plumbing was thoroughly flushed and pressure tested prior to charging with collector fluid.
☐ ☐	3.2.2	Fluid flow rate and direction is a within manufacturer's specifications.
☐ ☐	3.2.3	Circulation pump is installed with shaft oriented horizontally.
☐ ☐	3.2.4	System is designed to allow for isolation of the circulation pump.
☐ ☐	3.2.5	Controller has correct settings and is mounted in an accessible location near solar tank.

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☐ ☐	3.2.6	If PV powered system, PV module is connected to the pump with wiring of appropriate gauge and type installed through a dedicated roof jack with exterior conduit.
☐ ☐	3.2.7	If PV powered system, a DC rated on/off switch is installed between the PV module and the circulating pump.
☐ ☐	3.2.8	If PV powered system, a high temperature limit shutoff function is installed and wired through the circulation pump.
☐ ☐	3.2.9	Sensors are securely installed according to manufacturer's instructions.
☐ ☐	3.2.10	Sensor wiring has UV-rated exterior jacketing; is continuously attached and protected from abrasion, contact with 110V/220V lines/conduit, weather, and high temperature; and has solid connections.
☐ ☐	3.2.11	Fill and drain valves have brass leak-proof caps.
☐ ☐	3.2.12	Flow meter is installed in a visible location on supply line to collector(s).
☐ ☐	3.2.13	For systems with an external heat exchanger, a means of flow detection is installed in the potable water loop.
☐ ☐	3.2.14	Thermometer is installed at hot water outlet port on solar storage tank.
	3.3	**Active Antifreeze Systems**
☐ ☐	3.3.1	Pressure gauge is installed in collector loop and indicates acceptable operating pressure.
☐ ☐	3.3.2	Pressure relief valve is correctly installed on collector loop return piping.
☐ ☐	3.3.3	Check valve is installed on collector return line near heat exchanger inlet.
☐ ☐	3.3.4	Expansion tank is correctly sized and installed.
☐ ☐	3.3.5	Approved air removal method is installed.
	3.4	**Active Antifreeze Systems with Single Wall Heat Exchangers**
☐ ☐	3.4.1	Potable water supply pressure in greater than 40psi.
☐ ☐	3.4.2	Vertical distance in the collector loop is less than 35 feet.
☐ ☐	3.4.3	The collector loop cold-charge pressure is appropriate for the height of the collector loop.
	3.5	**Drainback Systems**
☐ ☐	3.5.1	Collectors and collector piping are correctly installed and pitched to drain.
☐ ☐	3.5.3	A max 150 psi pressure relief valve is installed on drainback tank.
☐ ☐	3.5.4	Drainback tank has R-4 minimum insulation.
☐ ☐	3.5.5	Pump is sized according to manufacturer's guidelines.
	4.1	**System Labeling**
☐ ☐	4.1.1	All required system components are labeled per program specifications.
☐ ☐	4.1.3	System has all required warning labels.
	4.2	**Monitoring and Maintenance Instructions**
☐ ☐	4.2.1	Monitoring & Maintenance Instructions sheet is mounted near/on system in clear plastic sleeve and includes: ☐ System monitoring instructions. ☐ Recommended maintenance. ☐ Emergency and maintenance contact info.
	4.3	**Customer Manual**
☐ ☐	4.3.1	Customer Manual is provided and includes: ☐ O & M Instructions, ☐ As-built Diagram, ☐ Valve Chart (if used), ☐ Contractor Warranty, ☐ Material Safety Data Sheets, ☐ Required Data Sheets ☐ Manufacturer's OG-300 Manual.

Trade Ally Self-Verification Signature (For Solar Trade Allies on Random Verification status. See Program Guide)

I certify that the system listed on this ***Form 233—Solar Water Heating Installation Checklist*** was installed as indicated on the Incentive Application and that the system complies with the requirements listed in the ***Solar Water Heating Installation Requirements***. Should a subsequent random verification of the system identify a Program violation, I understand that I will be required to remedy the violation within thirty (30) days of the random verification report. If I do not cure the violation, I will be required to refund to Energy Trust an amount equal to the incentive funds paid by Energy Trust for this system.

Trade Ally Name	Trade Ally Representative Signature	Date

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