

Solar Thermal Systems

Covered Products:

Solar systems that convert solar energy into heat using a fluid (liquid or air) transfer medium.

Guidance:

Solar thermal panels use the sun's light to heat domestic water or to provide space heating (or cooling using absorption chillers) and reduce the purchase of fossil fuels or electricity for this purpose.

Definitions:

Active solar systems directly convert solar energy into electricity or require electricity to transfer energy (electric or thermal) from one location to another.

Passive solar systems use specific site locations, design or building materials that take advantage of the sun's position and availability to provide direct heating or lighting, or to store heating in thermal mass. Gravity and natural changes in fluid density provide motive force.

Active solar thermal systems directly convert solar energy into heat and require external electrical energy to transfer the heat from one location to another.

Passive solar thermal systems use specific site locations, design or building materials that take advantage of the sun's position and availability to provide direct heating or to store heat in thermal mass. A Thermal Siphon System, which has a water tank above a collector, is one type of passive solar thermal system.

Solar thermal collectors are devices used to capture the energy from the sun and transfer it to a working fluid (usually glycol, water or air). Pool heating (unglazed), flat plate and evacuated tube collectors are types of solar thermal collector as are once-through ambient air systems, such as building integrated transpired metal panels. Solar concentrators focus the sun's energy onto small collectors.

Solar thermal hydronic systems usually consist of the solar thermal collectors, a heat exchanger tank, circulating pumps with controls and interconnecting piping. Some systems may include heat storage tanks or waste heat radiators.

LEED (Leadership in Energy and Environmental Design) is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies intended to improve performance in metrics such as energy savings, water efficiency, CO₂ emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

Standard Setting and Certifying Programs:

American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) is an international organization committed to its mission of advancing heating, ventilation, air conditioning and refrigeration (HVAC&R) to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education. It is committed to the advancement of HVAC&R for the benefit of society. For additional information on ASHRAE, visit the organization website at <http://www.ashrae.org/>.

Solar Rating and Certification Corporation (SRCC) is a non-profit organization whose primary purpose is the development and implementation of certification programs and national rating standards for solar energy equipment. The corporation is an independent third-party certification entity. It is unique in that it is the only national certification program established solely for solar energy products. It is also the only national certification organization whose programs are the direct result of combined efforts of state organizations involved in the administration of standards and an industry association. For additional information on SRCC, visit the organization website at <http://www.solar-rating.org/>.

International Association of Plumbing and Mechanical Officials (IAPMO) is a membership-based association providing code development assistance, industry-leading education, and a manufacturer-preferred quality assurance program. It utilizes an open consensus process in the development of the *Uniform Plumbing Code*® and *Uniform Mechanical Code*® and the *Uniform Solar Energy Code*®. These codes are established through scientific research, debate, and analysis. Each component of the IAPMO Group works toward the ultimate goal of protecting the health of people everywhere. For additional information on IAPMO, visit the organization website at <http://www.iapmo.org/>

The North American Board of Certified Energy Practitioners (NABCEP) is the organization that provides certification for photovoltaic and solar thermal installation. Designed to raise industry standards and promote consumer confidence, NABCEP offers certification and certificate programs to renewable energy professionals throughout North America. For additional information, visit the NABCEP website at: <http://www.nabcep.org/>.

United Association (UA) of Plumbers, Fitters, Welders and HVAC Technicians is an international multi-craft organization whose members are engaged in the fabrication, installation and servicing of piping systems. UA offers premier training programs, including a five-year apprenticeship program that includes Solar Thermal training, organized instructor training certification programs and Solar Thermal continuing education courses. For additional information, visit UA's website at: <http://www.ua.org/>.

Underwriters Laboratory (UL) is an independent, not-for-profit product safety testing and certification organization. UL works closely with industries, authorities and customers to keep safety ahead of innovation in an evolving global landscape. UL has a process of product evaluation that includes periodic inspection of production during manufacturing. Products that are listed as being in compliance with UL standards will bear the UL label, an identifying mark which can be used to determine that a product is acceptable. For additional information, visit UL's website at: <http://www.ul.com/>.

Specifications

Ambient Air Collectors

Affected entities shall provide ambient air collectors meeting the following specifications: performance shall be certified by an SRCC accredited testing laboratory, in addition to meeting all federal and state laws, local codes, rules and regulations.

Glazed Flat Plate Collectors and Evacuated Tube Type Collectors

Affected entities shall provide glazed flat plate collector and evacuated tube type collector [bracketed items for Evacuated Tube type collectors] systems meeting the following specifications, in addition to meeting all federal and state laws, local codes, rules and regulations:

- No lead used in solder in collector or in related valves and fittings as defined in Section 116875 of the California Health and Safety Code, adopted in California in January 2010.
- Re-circulating water and air collectors shall be certified by the Solar Rating and Certification Corporation (SRCC) OG 100 and/or OG300 or equivalent.
- Major pieces of equipment other than collectors shall be listed by the International Association of Plumbing and Mechanical Officials (IAPMO); electrical items by UL or equivalent.
- Systems should be installed by NABCEP certified solar thermal installer, manufacturer's certified solar thermal installer, or a solar installer that is certified through a qualified apprenticeship program.
- Glazing of low-iron tempered glass [borosilicate (soda lime) glass] with a minimum transmissivity of 91%.
 - The glazing shall be thermally isolated from the frame [manifold].
- A minimum insulation value of R-6 between the absorber plate and the back of the unit casing [double-wall vacuum of < 0.005 Pa], and insulation on the full height of the unit casing's sides.
- The minimum instantaneous efficiency of the collector (y-intercept) shall be 0.70 [0.36] and the slope of the efficiency curve shall fall between -0.65 [-0.18] and -0.80 [-0.54].
- If glycol is used in the system, provide food-grade propylene or other food-grade glycol.
- Provide design life expectancy of >20 years.
- 10-year minimum warranty on collectors.

Affected entities are encouraged to:

- Provide routine inspection, cleaning, and servicing (recommend annual inspection at minimum).
- Prior to equipment purchase, perform feasibility studies to determine whether solar thermal panels may be a cost-effective application. Install performance monitoring equipment that will allow quantification of savings.
- If glycol is used in the system, provide food-grade glycerol (corn glycol) or other non-petroleum, food-grade glycol, if available and suitable.
- Due to the higher temperatures and pressures associated with Solar Thermal Systems, stainless steel or copper piping should be used for collector loop, not PEX (Cross-linked polyethylene).

- Do not use insulation products that have binders with high volatile organic compound (VOC) content or are blown with HFCs or other gases known to deplete the ozone layer or produce global warming.
- For glazed flat plate collectors, a minimum insulation value of R-7 between the absorber plate and the back of the unit casing, and insulation on the full height of the unit casing's sides at a minimum of R-4.
- Provide signage that explains solar thermal and its use.
- Reduce the State's carbon footprint by procuring local, regional or national products.
 - a. For projects registered with a LEED rating system, some contribution to achievement of credits may be realized in purchasing units that are manufactured within 500 miles of the project site.

Lead: In addition to other codes prohibiting lead in solder and flux, for collectors that directly circulate potable water, prohibit the use of more than 0.25 percent lead in wetted surfaces of pipes, pipe fittings, plumbing fittings and fixtures, as determined by a weighted average per the California Health & Safety Code, § 116875.

Packaging

Packaging shall comply with Environmental Conservation Law section 37-0205. Packaging shall not contain inks, dyes, pigments, adhesives, stabilizers, or any other additives to which any lead, cadmium, mercury or hexavalent chromium is intentionally added or contain incidental concentrations of lead, cadmium, mercury or hexavalent chromium which together are greater than 100 parts per million by weight (0.01%).

New York State encourages affected entities to adopt the following:

- The use of bulk packaging.
- The use of reusable packaging.
- The use of innovative packaging that reduces the weight of packaging, reduces packaging waste, or utilizes packaging that is a component of the product.
- That all packaging remain the property of the supplier and not become the property of the affected state entity under any circumstance or condition. In situations where packaging take back is sought, the vendor shall certify that the packaging material will be reused, recycled, or composted, and managed in compliance with applicable local, state, and federal laws.
- Packaging that maximizes recycled content and/or meets or exceeds the minimum post-consumer content level for packaging in the U.S. Environmental Protection Agency Comprehensive Procurement Guidelines.
- Packaging that is recyclable or compostable.