



SunEarth Solar Collectors

OPERATIONS AND MAINTENANCE MANUAL

Thank you for choosing SunEarth solar collectors for your solar heating and cooling project. These high quality collectors are designed for many years of trouble free performance with minimum maintenance as outlined below.

Handling and storage prior to installation:

Collectors should be stored in a clean dry environment while being protected from any accidental damage. The collector glazing must not be exposed to direct sunlight during storage as this may result in dangerously high temperatures of the absorber plate and high thermal stresses on the collector. Collectors should never be handled by the headers and care should be taken to protect the glazing from damage.

Installation:

Refer to appropriate installation manual regarding flush or tilted methods.

Plumbing Details:

- Use piping capable of withstanding 450°F for array supply and return lines.
- Supply pipe to the collector should be plumbed to the bottom header and the return from the collector should be plumbed to the opposite top header of the array.
- The maximum number of collectors that can be continuously connected is 8 for models with 1" nominal headers and 12 for models with 1.5" nominal headers.
- To ensure equal flow between banks of collectors, each bank of collectors should have an equal number of collectors and should be plumbed in reverse return with flow balancing valves located such that flow to each bank of collectors can be adjusted.
- Debris such as flux, dirt, scale and oil must be purged from all fluid passages during the commissioning process. This can be accomplished by circulating a solution of 1-2% trisodium phosphate with water in the system then flushing with water until it runs clear.
- A system flow rate of 0.025 GPM to 0.075 GPM per ft² of collector area should be maintained during system operation.
- Only Solder Fluxes meeting the criteria set forth by ASTM B 813 shall be utilized for joining by soldering any copper and copper alloy tube and fittings in the entire solar system.

Mounting Details:

- Structures should be in good condition before installation.
- Racking must be attached to structural members as to resist wind, snow, seismic and other environmental loading conditions.
- All roof penetrations should be flashed and sealed per best roofing practices and as required by the Authority having Jurisdiction (AHJ).
- Collectors shall be attached to racking using C100 mounting clips (4 per collector). Methods of attachment which require piercing of the collector enclosure are prohibited.
- If collectors are provided with *Solar-Mask*, 2 month radiation barrier; it should be removed after system installation and inspection. Following removal of the Solar-Mask the glazing should be cleaned immediately with a citrus based cleaner to remove any adhesive residue.
- Shading of the collectors between 10am and 3pm should be avoided.

- A minimum tilt angle of 10 degrees shall be maintained in order to allow rain run off to clean dust from the collectors glazing and to avoid water from ponding on the glazing. If the installation is to be exposed to snow, a tilt angle of 30 degrees is recommended in order to allow snow to slide off the collectors glazing.
- A tilt angle equal to the latitude of the installation is generally suggested for DHW systems while a tilt angle of the latitude plus 15 degrees is suggested for space heating systems.
- The optimal siting of the collector is facing true South (Northern hemisphere) however if this is not possible an orientation no more than 45 degrees east or west of true south is acceptable.

Thermal Fluid Details:

- If the system design calls for an antifreeze solution Dow Frost HD with a high temperature limit of 325°F mixed with distilled water at an appropriate ratio for the installation location is suggested. A mix ratio of at least 40% is suggested to assure a proper level of inhibitors even if the weather conditions do not require it.
- If the heat transfer fluid in the collectors is water then the water must meet the requirements tabulated below. In addition a Langelier Saturation Index (LSI) below 0 is required to ensure no scale potential. Ensure that there is no potential for water to freeze in the collectors and that no water can be present in a collector which is above its boiling point.

| Water Property | Minimum Acceptable | Maximum Acceptable | Units |
|-------------------------------------|--------------------|--------------------|-------|
| pH | 7.8 | 9 | pH |
| Calcium (Ca) | 0 | 31.8 | mg/l |
| Chloride (Cl) | | 6 | mg/l |
| Free Chlorine (Cl ₂) | 0 | 0.22 | mg/l |
| Copper (Cu) | 0 | 1.3 | mg/l |
| Fluoride (F) | 0 | 0.94 | mg/l |
| Potassium (K) | 0 | 1.8 | mg/l |
| Magnesium (Mg) | 0 | 0.1 | mg/l |
| Sodium (Na) | | 20 | mg/l |
| Phosphate (PO ₄) | 0 | 0.07 | mg/l |
| Silicon Dioxide (SiO ₂) | 0 | 7.47 | mg/l |
| Sulfate (SO ₄) | | 20.8 | mg/l |
| Zinc (Zn) | 0 | 0.02 | mg/l |
| Hydrogen Deuterium Oxide (DOH) | 0 | 0.007 | mg/l |
| Total Alkalinity | 40 | 70 | mg/l |
| Total Dissolved Solids (TDS) | 140 | 180 | mg/l |

Maintenance:

Collectors:

- Inspect for structural integrity of enclosure and glass.
- Inspect for fluid leaks.
- Clean the glazing removing dirt and debris utilizing a biodegradable cleaner and soft bristled brush as necessary in conformance with AAMA 609 & 610-02.

Racking:

- Yearly inspect for structural integrity and check all mounting fasteners for tightness. Fasteners may loosen with time due to thermal expansion and contraction as well as environmental conditions.
- Re-evaluation of racking may be necessary if many joints are found to be loose.
- Clean racking removing dirt and debris utilizing a biodegradable cleaner and soft bristled brush as necessary in conformance with AAMA 609 & 610-02.

Thermal Fluid:

- For indirect pressurized systems, check system pressure and re-charge when necessary. Low pressure may be an indication of a system leak.

- For indirect atmospheric pressure systems (such as drainback) check fluid level regularly and fill if needed. A drop in fluid level may be an indication of a system leak.
- For systems employing antifreeze heat transfer fluids check fluid concentration, pH and total alkalinity.
- Attempts should be made to charge flooded systems during morning or evening hours when the collectors are not at high stagnation temperatures caused by full sun exposure.

If there is no demand for hot water for a time period of one week or more then the controller's vacation mode should be activated. If the system is to be shut down or go unused for a time period exceeding 3 months then it is recommended that the controller be turned off and the system drained. It is also advisable to cover the collectors with a radiation barrier during periods of shut down exceeding 3 months to avoid high thermal stresses from extreme sustained collector temperatures.