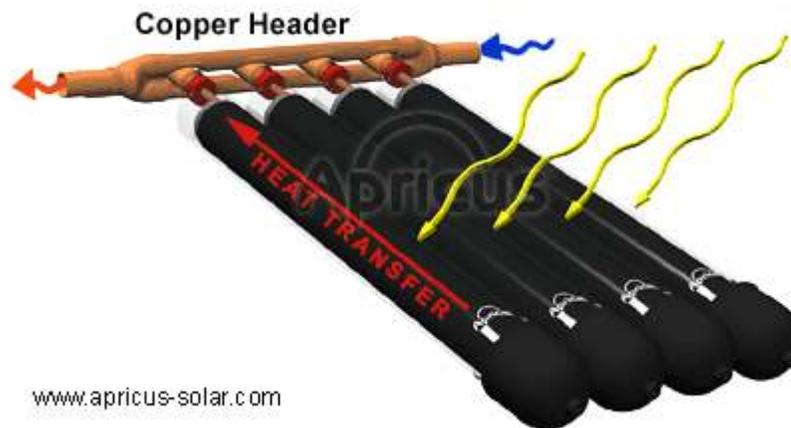


Evacuated Tube Solar Collectors used for Thermal solar heating

Our Solar Water Heater is a device that absorbs thermal energy from the sun and converts it into usable heat. In the installation at Maple Hill Farm, 202 roof-mounted evacuated tube collectors form the core of the system where the heat is absorbed by an anti-freeze mix, and this heat is then transferred to water tanks in the basement. This hot water is used to supplement our hot water heating, including bathrooms, whirlpool tubs, laundry, and our commercial kitchen.

The key features of the Apricus Solar Collector tubes that are used in our system include:

1. Reliable, efficient, twin-glass evacuated tubes
2. Copper heat pipes for rapid heat transfer
3. Easy plug-in installation
4. Maintenance Free
5. Suitable for water pressure up to 116
6. Corrosion resistant silver brazed copper header
7. All stainless steel frame (439 grade SS)
8. Stable solar conversion throughout the day (tubes passively track the sun)
9. The perfect solar collector for domestic solar water heater systems
10. Ideal for our high-demand commercial solar water heating application
11. Comprehensive 10 year limited warranty

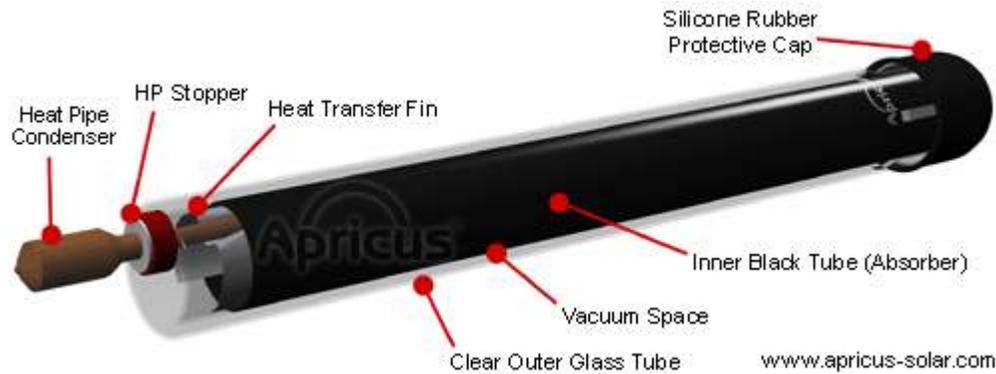


The operation of the solar collector is very simple.

1. **Solar Absorption:** Solar radiation is absorbed by the evacuated tubes and converted into heat.
2. **Solar Heat Transfer:** Heat pipes conduct the heat from within the solar tube up to the header.
3. **Solar Energy Storage:** Antifreeze is circulated through the header, via intermittent pump cycling. Each time the water circulates through the header the temperatures is raised by 9 to 18°F. Throughout the day, 320 gallons of water in storage tanks in our basement is gradually heated using a heat exchanger to extract the heat from the antifreeze.

The Apricus solar collector design incorporates 6 main components: The **Evacuated Tubes** themselves, **Copper Heat Pipes**, a **Copper Header Pipe**, **Glass Wool Insulation**, the **Manifold Casing**, and a **Mounting Frame**.

Evacuated Tube & Heat Pipe



The heat pipe, heat transfer fin and evacuated tube shown above form the heat absorption and transfer portion of the solar collector. Unlike some other evacuated tube heat pipe designs, Apricus evacuated tubes and heat pipes are not joined or fused together. This allows the two components to move independently, allowing for building movement and the expansion and contraction that occurs daily in a solar system.

Copper Heat Pipes and Header Pipe

The Apricus solar collector's header is designed to providing excellent heat transfer and corrosion resistance while using a simple "plug in" installation method. The key features are as follows:

1. Heat pipe ports provide simple plug in installation while still ensuring tight contact with the heat pipes for optimal heat transfer. Thermal heat conduction grease is applied to each heat pipe condenser prior to insertion to further enhance heat transfer. Given the high temperatures that the manifold is exposed to, the expansion of the heat pipe condenser and "setting" of the heat conduction paste results in the heat pipe being firmly held in place. This ensures excellent heat transfer for the life of the solar collector. As the heat pipe is extremely reliable and durable, there is no need to ever remove or replace the heat pipe, even if changing a solar tube.
2. The twin header pipes are molded to match the shape of the heat pipe ports in order to maximize contact area. In addition, the heat pipe ports are brazed to the twin header pipes providing a direct metallic connection.
3. The "contoured" header pipe design produces turbulent water flow enhancing heat transfer.
4. The header pipes are brazed using Ag45CuZn, lead free brazing rods, which are suitable for potable water and provide a strong, quality joint.
5. Copper temperature sensor ports are brazed directly to both the inlet and outlet of the header pipe to provide accurate temperature measurements.

Glass Wool Insulation

Glass wool is a very popular insulation material, used throughout the world in many high temperature insulation applications. Glass wool is also non-flammable, and so an excellent choice for a high temperature solar thermal solar collector. One key advantage of glass wool is that it can be molded into any shape. Via a process similar to baking a cake, the glass wool is "cooked" at high temperatures matching perfectly the shape of the header and the evacuated tubes. Glass wool is made from 90% recycled glass and very lightweight.

Manifold Casing

The manifold casing protects the header and glass wool insulation from the elements, and makes the collector attractive and neat. The casing is made from corrosion resistant grade aluminum and is black.

Mounting Frame

The frame is designed to withstand high speed winds, and the tubes provide minimal resistance due to their round shape.