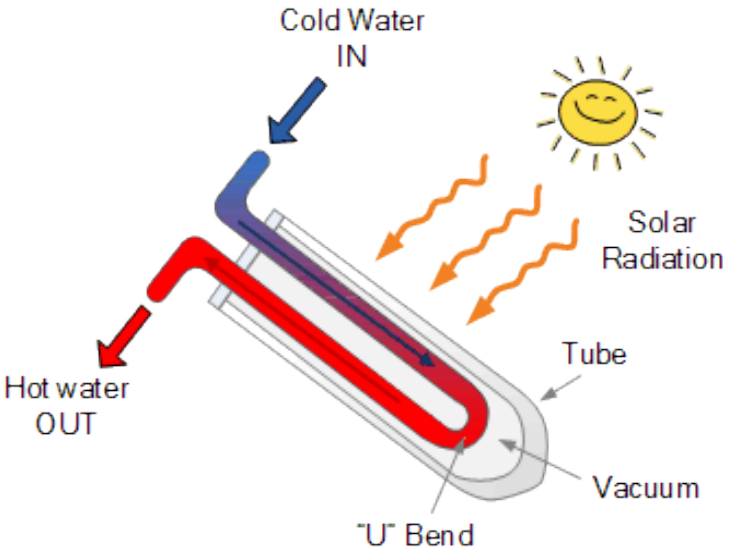
Direct Flow Evacuated Tube Collector

(Low Pressure System)

Direct flow evacuated tube collectors also known as “U” pipe collectors, are different from the previous ones in that they have two heat pipes running through the centre of the tube. One pipe acts as the flow pipe while the other acts as the return pipe. Both pipes are connected together at the bottom of the tube with a “U-bend”, hence the name.

The heat absorbing reflective plate acts like a dividing strip which separates the flow and the return pipes through the solar collector tubes. The absorber plate and the heat transfer tube are also vacuum sealed inside a glass tube providing exceptional insulation properties.



The hollow heat pipes and the flat or curved reflector plate are made out of copper with a selective coating to increase the collectors overall efficiency. This particular evacuated tube configuration is similar in operation to the flat plate collectors, with the exception of the vacuum provided by the outer tube.

Since the heat transfer fluid flows into and out of each tube, direct flow evacuated tube collectors are not as flexible as the heat pipe types. If a tube cracks or breaks it can not be easily replaced. The system will require draining as there is a “wet” connection between the tube and manifold.

Many solar industry professionals believe that direct flow evacuated tube designs are more energy efficient than heat pipe designs, because with direct flow, there isn’t a heat exchange between fluids. Also, in an all-glass direct flow construction the two heat tubes are placed one inside the other so the fluid being heated passes down the middle of the inner tube and then back up through the outer absorber tube.

Direct flow evacuated tubes can collect both direct and diffuse radiation and do not require solar tracking. However, various parabolic trough reflector shapes placed behind the tubes are sometimes used to usefully collect some of the solar energy, which may otherwise be lost, thus providing a small amount of solar concentration.