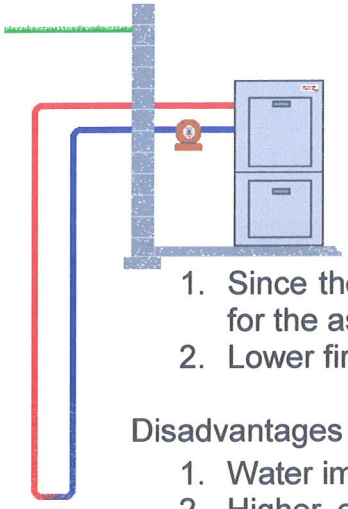
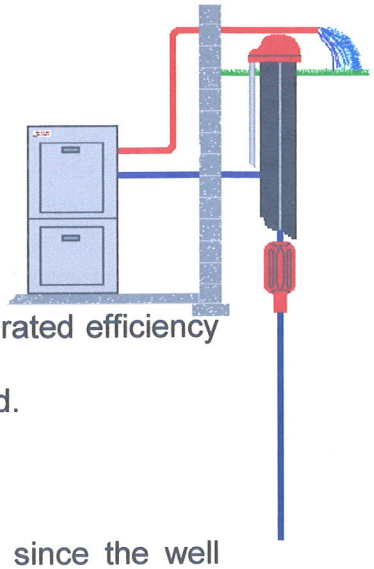
GEOTech Bulletin

Open Loop or Closed Loop?

A GeoExchange system is a renewable energy technology because it has the ability to move 70% of the heating and cooling requirement of a space from the ground. Water is used to move energy to and from the earth principally because of its superior heat transfer properties. The two ways to deliver the heat transferring properties to the geothermal heat pump is by an Open Loop system or a Closed Loop Heat Exchanger.



An Open Loop system, illustrated on the right, draws water from a well, the water is delivered to the Heat Pump, energy is transferred to or from the water and then the water is discharged to the ground.



Advantages to an Open Loop system:

1. Since the water temperatures remain relatively constant, rated efficiency for the associated Heat Pump is higher,
2. Lower first costs compared to installing a Closed Loop field.

Disadvantages of an Open Loop system:

1. Water impurities can shorten Heat Pump life.
2. Higher efficiencies are partially offset by pumping cost, since the well pump must "lift" the water from the aquifer as opposed to just moving it.
3. Disposing of water limits qualifying application sights and is subject to Department of Natural Resources regulations.

A Closed Loop Heat Exchanger, shown on the left, circulates water through hundreds of feet of pipe buried horizontally or vertically in the ground.

Advantages of a Closed Loop Heat Exchanger:

1. Water quality and its effect on equipment life and maintenance is not an issue.
2. Broader range of applications.
3. Heat Exchanger pipe has nearly an unlimited life span.
4. Small circulating pump consumes small amount of energy.

Disadvantage of a Closed Loop Heat Exchanger:

1. Higher installation costs.
2. Improper sizing of Heat Exchanger will reduce efficiency.

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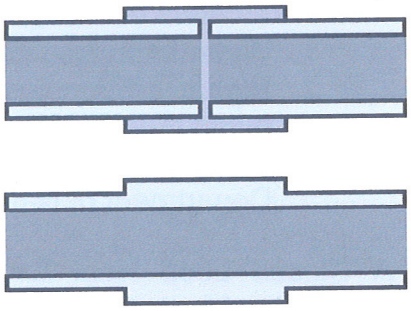
Where water conditions are ideal and disposal is not an issue an Open Loop System should be considered. A simple water test, often performed as a complimentary service, will indicate if the ground water is suitable. The water test should determine pH, hardness and iron content. A reputable contractor can advise you as to the appropriate levels of these three indicators of water quality.

The Wisconsin Geothermal Association encourages consumers to consider the advantages of a Closed Loop Heat Exchanger, despite its impact on installation costs. Changes in ground water quality, water disposal regulations and equipment life are important reasons the Association favors Closed Loop Heat Exchanges. On a broader perspective, Closed Loop Heat Exchangers allow for more widespread installations of GeoExchange. While Open Loop systems are limited to rural residential settings, with ideal water quality and acceptable disposal options, a Closed Loop Heat Exchanger allows GeoExchange to move to the urban subdivision, the school and the commercial application. Less limitations on acceptable GeoExchange sites translates into more installations, helping drive cost out of the GeoExchange industry as a whole.

The Closed Loop Heat Exchanger pipe is extremely reliable. Laboratory tests indicate the pipe has an estimated life of 250 years! The fittings or couplings are heat fused to the pipe, as pictured on the right. The process makes the pipe and the coupling one continuous piece, no seam, thread or crack. The joints are twice as thick and strong as the pipe itself!



Engineered sizing methodology insures sufficient length of this reliable product is installed to maintain optimum efficiency.

If you have further questions on this GeoTech Bulletin please contact us toll-free

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