Modine GeoSync

BJ Terroni Company, Inc.

Water Based Heat Pumps Where and How They Are Applied

by "Geo" Pete July 24, 2017

Issue # 3 Loops

In the last issue, you were introduced to the Ground Water option to fuel a geothermal or ground source heat pump. In this issue, I will introduce you to an alternative method of supplying said fuel.
After you describe to a prospective customer what an "open system" is, as described in the last issue, inherently you are asked "what if you run out of water" or "I live in the burbs and we have city water". So, I guess you are stuck, right? **WRONG**! Loops are your go to. Loops are designed to mimic what the ground source does. There are very few properties in the world that cannot be fitted with a Geo unit. It is a matter of cost, permissions and imagination.

As described in the last edition, the constant temp of the well is a very desirable condition. It aids with the efficient operation of the unit. There were a few problems with the quality and quantity of the water which needed to be addressed but all in all the direct well is the most economical to install and because of the steady temperatures from the well it allowed the unit to run at a constant rate thereby a highly predictable rate of energy usage and efficiency.

Loops represent the same percentage of fuel as the Open system or Pump & Dump. It will move about 73% of the BTU's needed into your space. See *fig 1 below*

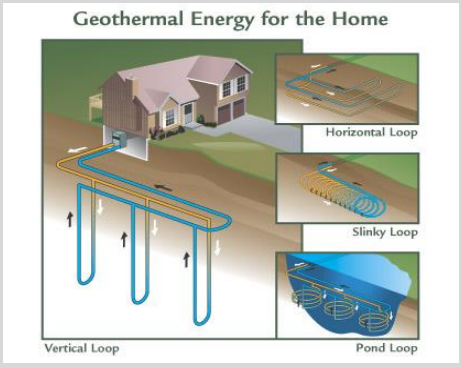

fig 1

A loop can be installed in many different configurations. It isn't about "how many holes" or a per ton number. Too many think the loop is a constant. NOT TRUE. A closed loop is the relationship between the heat loss/gain of the building and the soil. It must produce a specific amount of BTU's for the unit to operate efficiently. It depends on the heat exchange properties of the soil and the length of pipe needed to harvest those BTU's.

Not all soil is the same. Some is dry, some holds water, some is not as compacted as others. Whatever the properties of the soil you have, there will be a corresponding footage of pipe that will accommodate your requirements. There is software will help you to determine the length of the loop, the condition of the soil and will calculate the incredible savings your investment will produce. The software Modine and I use is called Loop Link. Then there is the driller. I have made plenty of calls to drillers asking them of what is the soil like in a certain area and I do get great answers!

How Do I Get The BTU'S In My Building??

There is a solution of an antifreeze and water in the pipe. This solution is pumped through the pipe at a specific rate of flow. As the solution tumbles through the pipe, it picks up the temperature from the walls of the pipe, who pick it up from the earth. This temperature adjusted fluid then travels through a co-axial heat exchanger. *See fig 2 below*.

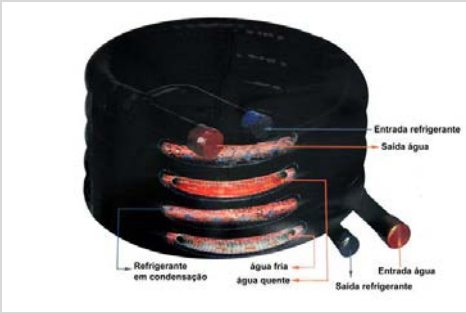

fig 2

In the co-ax (fig 2), the fluid transfers its energy to the refrigerant. In the heating mode, it will add temperature to the refrigerant. In the cooling mode, the refrigerant will be rejecting the heat it has picked up from the air in the building and transfer the temp to the fluid in the pipe. The fluid then goes out through the pipe and touches the soil and drops off the heat to the ground. Back to basic principles, heat seeks the lower temperature. The ground is cooler than the air in the summer and warmer than the outside air in the winter.

Water Based Heat Pumps
Where and How They Are Applied

What Moves the Fluid ??

The fluid is pumped by a device called a Flow Center. A flow Center consists of 1, 2 up to 4 fractional horsepower wet rotor pumps in *SERIES*, mounted in an insulated cabinet. There are 2 types of flow centers. The most common is a **Pressurized flow center** *see fig 3 below*. Pressure is added by shutting one of the valves and "dead heading" with the flushing cart pump pushing against the closed valve.

fig 3

You also see *2 brass ports* at the top of the cabinet.

They are called ***3way valves***. Their purpose is to allow access to the loop and the inside piping for flushing and purging. Shown as a separate unit. *See fig 4*.

fig 4

OR

A non - pressurized system. These systems utilize the same pumps but work on a small reservoir and a little different set up in the mechanical room**.** The only pressure in this type of system is created from circulating the fluid**.** *See fig 5*

The non-pressurized system does not require pressurization. You can access the loop through the top of the unit. This allows you to add fluid to the loop if required. This system has a little different set up in the room.
There is also a possibility you may see a system that uses central pumping stations. This will be used when you have units located remotely from the pumping center, usually on a commercial job or multiunit application.
There are many discussions on each of these systems on preferences. It is best to consider the application and decide on the circumstances.

What Kind of Pipe is Used ??

The most common pipe used is Polyethylene, cell classification 3408 or 4710, SDR11. You will see ¾", 1.0", 1 ¼" 1 ½ 2" . Commercial jobs the diameters can greatly increase. In the case of commercial, the fusion method may differ.
The pipe is fused together with heat. See fig 6. There are 2 methods of this joining. Socket (pictured) and Butt fusion. Both methods melt the pipe together permanently.

fig 6

The results look like this fig 7

fig 7

This pipe is really the only accepted pipe to be used in a geothermal application. It is chosen for its heat transfer properties, durability and joining methods. Many types of pipe have been tried. As it stands this fits the application the best. This pipe has been the standard for over 30 years and is warranted for over 50 years by the manufacturer.

Questions Contact "Geo" Pete

pete.prydybasz@bjterroni.com
215-639-3600