

Ground Loop Design

Borehole Design Project Report - 4/12/2024



Project Name:	Bryant Neighborhood, Ann Arbor, MI - District Geothermal Simulation
Designer Name:	
Date:	Total - home loads
Client Name:	
Address Line 1:	
Address Line 2:	
City:	
State:	
Zip:	

Calculation Results

Roughly 196 ft/ton

Design Method: <i>Hourly</i>	COOLING	HEATING
Total Bore Length (ft):	126000.0	126000.0
Borehole Number:	180	180
Borehole Length (ft):	700.0	700.0
Ground Temperature Change (°F):	N/A	N/A
Peak Unit Inlet (°F):	72.6	35.9
Peak Unit Outlet (°F):	79.3	30.0
Total Unit Capacity (kBtu/Hr):	5300.2	7714.9
Peak Load (kBtu/Hr):	5300.2	7714.9
Peak Demand (kW):	320.9	661.2
Heat Pump EER/COP:	16.4	3.4
Seasonal Heat Pump EER/COP:	18.9	3.8
Avg. Annual Power (kWh):	2.28E+5	9.54E+5
System Flow Rate (gpm):	1325.1	1928.7

Input Parameters

Fluid		Soil	
Flow Rate	3.0 gpm/ton	Ground Temperature:	53.8 °F
Fluid:	23.3% Propylene Glycol	Thermal Conductivity:	1.61 Btu/(h*ft*°F)
Specific Heat (Cp):	0.93 Btu/(°F*lbm)	Thermal Diffusivity:	1.20 ft^2/day
Density (rho):	64.4 lb/ft^3		

Piping

Pipe Type:	1 1/2 in. (40 mm) - SDR11
Flow Type:	Laminar
Pipe Resistance:	0.128 h*ft*°F/Btu
U-Tube Configuration:	Single
Radial Pipe Placement:	Average
Borehole Diameter:	6.00 in
Grout Thermal Conductivity:	0.90 Btu/(h*ft*°F)
Borehole Thermal Resistance:	0.256 h*ft*°F/Btu

Input Parameters (Cont.)

Pattern		Modeling Time Period		
Vertical Grid Arrangement:	18 x 10	Prediction Time:	1.0 years	
Borehole Number:	180	Long Term Soil Temperatures:		
Borehole Separation:	20.0 ft		<i>Cooling:</i> 53.8 °F	
Bores Per Circuit	1		<i>Heating:</i> 53.8 °F	
Fixed Length Mode	On			
Grid File	None			
File:				
Default Heat Pumps		Optional Hybrid Loads		
Manufacturer:	- Default Generic		Cooling	Heating
Series:	Generic Medium Efficiency	Geo Peak (%)	100%	100%
Design Heat Pump Inlet Load Temperatures:		Geo Total (%)	100%	100%
	<i>Cooling (WB)</i> <i>Heating (DB)</i>	Hybrid Peak (%)	0 %	0 %
Water to Air:	67 °F 70 °F	Hybrid Total (%)	0 %	0 %
Water to Water:	55 °F 100 °F			
Extra kW		Loads File		
Pump Power	0.0 kW	<i>23007327.00 Ann Arbor.zon</i>		
Cooling Tower Pump:	0.0 kW			
Cooling Tower Fan:	0.0 kW			
Additional Power	0.0 kW			