

Ground Loop Design

Borehole Design Project Report - 4/3/2015



Project Name: Geothermal Design	
Designer Name: Designer	
Date: 4/3/2015	Project Start Date: 4/3/2015
Client Name: Test Design	
Address Line 1:	
Address Line 2:	
City: Metropolis	Phone:
State: CA	Fax:
Zip: 12345	Email:

Calculation Results

Design Method: <i>Monthly</i>	COOLING	HEATING
Total Length (ft):	12600.0	12600.0
Borehole Number:	42	42
Borehole Length (ft):	300.0	300.0
Ground Temperature Change (°F):	N/A	N/A
Peak Unit Inlet (°F):	86.7	31.1
Peak Unit Outlet (°F):	95.4	26.1
Total Unit Capacity (kBtu/Hr):	344.7	378.8
Peak Load (kBtu/Hr):	344.7	378.8
Peak Demand (kW):	24.5	26.3
Heat Pump EER/COP:	14.0	4.4
Seasonal Heat Pump EER/COP:	17.6	4.2
Avg. Annual Power (kWh):	3.75E+4	3.42E+4
System Flow Rate (gpm):	86.2	94.7

Input Parameters

Fluid		Soil	
Flow Rate	3.0 gpm/ton	Ground Temperature:	43.8 °F
Fluid:	24.1413995673348% Propylene Glycol	Thermal Conductivity:	0.58 Btu/(h*ft*°F)
Specific Heat (Cp):	0.96 Btu/(°F*lbm)	Thermal Diffusivity:	0.38 ft^2/day
Density (rho):	64.0 lb/ft^3		

Piping	
Pipe Type:	1 1/4 in. (32 mm) - SDR11
Flow Type:	Turbulent
Pipe Resistance:	0.105 h*ft*°F/Btu
U-Tube Configuration:	Single
Radial Pipe Placement:	Average
Borehole Diameter:	5.00 in
Grout Thermal Conductivity:	0.85 Btu/(h*ft*°F)
Borehole Thermal Resistance:	0.236 h*ft*°F/Btu

Input Parameters (Cont.)

Pattern		Modeling Time Period		
Vertical Grid Arrangement:	6 x 7	Prediction Time:	20.0 years	
Borehole Number:	42	Long Term Soil Temperatures:		
Borehole Separation:	20.0 ft		<i>Cooling:</i> 43.8 °F	
Bores Per Circuit	1		<i>Heating:</i> 43.8 °F	
Fixed Length Mode	On			
Grid File	None			
File:				
Default Heat Pumps		Optional Hybrid Loads		
Manufacturer:	WaterFurnace		Cooling	Heating
Series:	Envision Com. ND Vert. (Full)	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>Report Example.zon</i>		
Cooling Tower Pump:	0.0 kW			
Cooling Tower Fan:	0.0 kW			
Additional Power	0.0 kW			