

## Ground Loop Bore Hole Design

<b>Project Name:</b> 32 Glenilla Road	
<b>Designer Name:</b> Mark Glasspool	
<b>Date:</b> 27/01/2017	<b>Project Start Date:</b> 27/01/2017
<b>Client Name:</b> Richie & Daffin	
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### Calculation Results

<b>Design Method:</b>	<b>Design Day</b>	<b>COOLING</b>	<b>HEATING</b>
Total Bore Length (m):		<b>300.0</b>	<b>300.0</b>
Borehole Number:		<b>3</b>	<b>3</b>
Borehole Length (m):		<b>100.0</b>	<b>100.0</b>
Ground Temperature Change (°C):		<b>-0.3</b>	<b>-0.3</b>
Unit Inlet (°C):		<b>32.2</b>	<b>3.1</b>
Unit Outlet (°C):		<b>32.2</b>	<b>0.1</b>
Total Unit Capacity (kW):		<b>0.0</b>	<b>16.5</b>
Peak Load (kW):		<b>0.0</b>	<b>15.0</b>
Peak Demand (kW):		<b>0.0</b>	<b>3.9</b>
Heat Pump COP:		<b>2.4</b>	<b>4.3</b>
System COP:		<b>0.0</b>	<b>4.3</b>
System Flow Rate (L/min):		<b>0.0</b>	<b>48.4</b>

### Input Parameters

<b>Fluid</b>		<b>Soil</b>	
Flow Rate	11.4 (L/min)/3.5kW	Ground Temperature:	13.0 °C
Fluid:	12.9% Propylene Glycol	Thermal Conductivity:	1.90 W/(m*K)
Specific Heat (Cp):	4.105 kJ/(K*kg)	Thermal Diffusivity:	0.070 m^2/day
Density (rho):	1012.5 kg/m^3		
<b>Piping</b>			
Pipe Type:	1 1/2 in. (40 mm)		
Flow Type:	Turbulent - SDR13.5-OD		
Pipe Resistance:	0.049 m*K/W		
U-Tube Configuration:	Single		
Radial Pipe Placement:	Average		
Borehole Diameter:	106.9 mm		
Grout Thermal Conductivity:	1.70 W/(m*K)		
Borehole Thermal Resistance:	0.110 m*K/W		

### Input Parameters (Cont.)

Pattern		Modeling Time Period	
Vertical Grid Arrangement:	1 x 3	Prediction Time:	15.0 years
Borehole Number:	3	Long Term Soil Temperatures:	
Borehole Separation:	7.0 m		<i>Cooling:</i> 12.7 °C
Bores Per Circuit	1		<i>Heating:</i> 12.7 °C
Fixed Length Mode	On		
Grid File	None		
File:			
Default Heat Pumps		Optional Hybrid Loads	
Manufacturer:	Viessmann		Cooling Heating
Series:	Vitocal 200G - A17	Geo Peak (%)	100% 100%
Design Heat Pump Inlet Load Temperatures:		Geo Total (%)	100% 100%
	<i>Cooling (WB) Heating (DB)</i>	Hybrid Peak (%)	0 % 0 %
Water to Air:	19.4 °C 21.1 °C	Hybrid Total (%)	0 % 0 %
Water to Water:	12.8 °C 37.8 °C		
Extra kW		Loads File	
Pump Power	0.0 kW	<i>Belsize Park 1.zon</i>	
Cooling Tower Pump:	0.0 kW		
Cooling Tower Fan:	0.0 kW		
Additional Power	0.0 kW		
Loads			
Design Day Loads			Annual Equivalent Full-Load Hours
<i>Time of Day</i>	<i>Heat Gains (kW)</i>	<i>Heat Losses (kW)</i>	<i>COOLING 0 HEATING 1278</i>
8 a.m. - Noon	0.0	15.0	Days Occupied per Week: 7.0
Noon - 4 p.m.	0.0	3.7	
4 p.m. - 8 p.m.	0.0	3.7	
8 p.m. - 8 a.m.	0.0	3.7	
Monthly Loads on Next Page			

### Monthly Loads Data

	Cooling				Heating			
	Total	(kWh)	Peak	( kW )	Total	(kWh)	Peak	( kW )
January		0		0		3961		14
February		0		0		3019		11
March		0		0		2336		8
April		0		0		1052		4
May		0		0		282		1
June		0		0		0		0
July		0		0		0		0
August		0		0		0		0
September		0		0		0		0
October		0		0		1471		6
November		0		0		2881		10
December		0		0		4166		15
Total		0				19167		
Hours at Peak				3.0				3.0

<b>Hourly Loads Data</b>
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**Included:** None

**Filename:** None